Nuiqsut Caribou Subsistence Monitoring Project: Results of Year 9 Hunter Interviews and Household Harvest Surveys

FINAL REPORT

Prepared for

ConocoPhillips Alaska, Inc.

September 13, 2018

Stephen R. Braund & Associates

P.O. Box 10-1480

Anchorage, Alaska 99510-1480

(907) 276-8222

(907) 276-6117 (fax)

info@srbak.com

EXECUTIVE SUMMARY

This Year 9 report presents the ninth year of data for the Nuiqsut Caribou Monitoring Project based on research conducted by Stephen R. Braund & Associates (SRB&A) under contract to ConocoPhillips Alaska, Inc. (COP). The purpose of the Nuiqsut Caribou Monitoring Project is to document impacts of CD4 and other COP satellite developments on Nuiqsut residents' caribou hunting activities. The monitoring project is an ongoing, multi-year program meant to measure impacts and changes over time. The intent of the project is to assemble data on impacts on caribou subsistence uses in order to work toward a common understanding of these impacts by the community of Nuiqsut, industry, and government oversight agencies. With the assistance of the Kuukpik Subsistence Oversight Panel, Inc. (KSOPI), SRB&A formed a Nuiqsut panel of caribou experts, whose purpose is to assist with developing the monitoring plan, reviewing the results of the monitoring program, suggesting changes to the monitoring program, and identifying active caribou harvesters to interview.

COP activities during the Year 9 study period (November 2015 through December 2016) included ongoing production at CD1, CD2, CD3, and CD4; the initiation of CD5 drillsite production which began in October 2015 and continued throughout 2016; and the drilling of two exploration wells in the NPRA off of ice road and pads to the west of Nuiqsut.

Several types of data are relevant to a common understanding of caribou harvesting impacts: (1) hunter observations; (2) caribou distribution, abundance, herd size, habitat quality; (3) industry mitigation activities; and (4) historical subsistence use. This ninth annual report is based primarily on hunter observations and a comprehensive household caribou harvest survey.

In November of 2016 and February of 2017, SRB&A interviewed 63 active harvesters regarding their caribou hunting activities over the previous 12 months (November 2015 to October 2016). SRB&A also conducted a household caribou harvest survey in Year 9 in February 2017.

Data from the Year 9 active harvester interviews complement similar data on hunting activities collected for Year 1 (2008), Year 2 (2009), Year 3 (2010a), Year 4 (2011), Year 5 (2012), Year 6 (2013), Year 7 (2014), and Year 8 (2015). In addition, Year 9 household harvest survey data complement caribou harvest data collected by SRB&A for Year 3 (2010a), Year 4 (2011), Year 5 (2012), Year 6 (2013), and Year 8 (2015); Year 7 (2014) data from the Alaska Department of Fish and Game (ADF&G); and data collected by the North Slope Borough (NSB) and ADF&G in years before 2008.

Active harvester interview participants identified 195 caribou subsistence use areas and 163 caribou harvest locations for the Year 9 study year, the majority of which were located along the Colville River (including Nigliq Channel and the East Channel), west of the community toward Fish Creek, along the lower portion of Itkillik River, and north of the community along the Spur Road. The extent of riverine travel in Year 9 was relatively similar to previous study years but with decreased use of the upper Colville River. The overall extent of overland travel in Year 9 was similar to Years 5, 6, and 8, but smaller than the other study years. The concentration of harvests in Year 9 were similar to recent years (Years 6 through 8) in that fewer areas of concentrated harvests occurred along Nigliq Channel when compared to Years 1 through 5. In Year 9, harvests were most concentrated at Nigliq camp on the Nigliq Channel, along the Spur Road north of the community and in an overland area west of the community, east at locations near Miluveach River Itkillik River, and south near Sentinel Hill. Year 9 followed a trend, beginning in Year 7, of increasing activity to the north of the community along the Spur Road.

While certain hunting characteristics (e.g., trip frequency, duration, and travel method) have remained similar over the nine study years, other characteristics, such as the timing of caribou hunting activities and hunting success within use areas, vary from year to year. In Year 9, caribou hunting activities, in terms of the percentage of use areas and the percentage of harvests (rather than the frequency of trips), peaked in the months of July and August; however, these months accounted for a smaller number and percentage of

harvests when compared to all previous years, while the months of January and March showed a slightly higher percentage of harvests compared to previous years. Boats were the most common method of transportation used over all study years, followed by snowmachine or four-wheeler. The last several years showed a slightly smaller reliance on boats for caribou hunting; however, boat remains the primary mode of transportation by far, with 69 percent of Year 9 use areas accessed by boat. Snowmachine use was at its lowest in Year 9 (eight percent of use areas), while truck use was at its highest (14 percent of use areas), reflecting the increase in hunting along the Spur Road. In general, over all study years, respondents take primarily day trips to their caribou use areas. In Year 9, residents' longest hunting trips lasted between one night and between one and two weeks at 12 percent of their hunting areas. The frequency of hunting trips to use areas has remained relatively stable over all study years, with at least two-thirds of areas visited more than once yearly. Year 9 harvest success in terms of the percentage of successful hunting areas was on the low end of the range of previous years, with respondents reporting successful harvests at 53 percent of hunting areas, compared to between 54 percent and 78 percent in previous years.

In Year 9, the community of Nuiqsut harvested an estimated 481 caribou, on the low end compared to the previous four years (between 501 and 774 caribou), but within the range of all previous study years (between 258 and 774 caribou). This was consistent with results from the active harvester interviews, which showed lower reported harvests and a smaller percentage of successful use areas. Household uses of caribou were similar to previous years, with 96 percent of households using caribou, and 76 percent of households attempting harvests of caribou. The difference between the percentage of households attempting to harvest and successfully harvesting caribou (nine percentage points) was within the range of previous years.

During Year 9, of the 11 pre-defined hunting areas, the area "West of Nuiqsut" accounted for the highest portion (36 percent) of caribou harvested, within the range of previous years. This area was the only one contributing more than 15 percent of the harvest in Year 9. Nigliq Channel, East Channel Colville, Itkillik River, Ocean Point, and Sentinel Hill all contributed around the same amount (between eight and 12 percent) to the total harvest in Year 9. All other areas contributed five percent or less. The area labeled "Other" includes any lands outside 11 pre-defined hunting areas. This area accounted for three percent of the harvest in Year 9. In Year 9, Itkillik River accounted for a higher percentage of the harvest (11 percent) than it had in previous years. The last three years have shown Nigliq Channel providing a smaller percentage of the total harvest than previous years, and the number harvested along Nigliq Channel in Year 9 (37) was also lower than any previous year (between 38 caribou in Year 8 and 85 caribou in Year 1)

The percentages of active harvester respondents reporting changes in hunting area, hunting months, trip frequency, trip duration, and harvest amounts are somewhat similar over all study years. Overall, the percentages of respondents reporting changes in hunting area, frequency, duration, and harvest amount in Year 9 were within the range of previous years. In Year 9, 40 percent of respondents indicated that they did not harvest enough caribou, an increase from the previous two years but within the range of previous years; this is consistent with a general decrease in reported harvests in Year 9.

The percentage of respondents observing caribou abnormalities in Year 9, at 18 percent, was lower than in previous years. Likewise, the total number of caribou with abnormalities in Year 9 was lower than in most years except Year 6. Health problems were the primary type of observation in caribou in Year 9, followed by abnormal size. Disease/Infection was the most commonly reported type of abnormality by active harvesters, followed by Change in Texture of Meat.

In Year 9, 27 percent of respondents reported one or more perceived Alpine-related impacts on their caribou hunting, lower than all other years. While helicopter traffic has been the most commonly reported Alpine-related impact over all previous study years, in Year 9 helicopter traffic had the smallest percentage of respondents reporting impacts and was tied with man-made structures as the most frequently reported impact (28 percent of observations). These impacts were followed closely by plane traffic, at 24 percent of observations, higher than previous study years. While impact reports were lower during the active harvester interviews, household harvest surveys showed a relatively higher percentage of households reporting

impacts in Year 9 (41 percent), which was within the range of all previous years (between 21 and 44 percent).

Fifty-one percent of respondents indicated that they no longer hunted in or generally avoided certain areas they previous used, a decline from previous years. Fish Creek, Alpine/Alpine Satellites, Colville Delta, *Kuupaqullurak*, and Nanuq areas were the most frequently mentioned, for reasons related to development infrastructure and activities, as well as security restrictions. Fewer individuals directly named Alpine/Alpine Satellites areas in Years 8 and 9, although a number of individuals reported avoiding specific geographic areas, such as the Colville Delta, Nigliq Channel, Nanuq, and *Kuupaqullurak,* for reasons related to development activities or infrastructure.

ACKNOWLEDGEMENTS

Stephen R. Braund & Associates (SRB&A) would like to thank the community of Nuiqsut for their cooperation and assistance in completing nine years of the Nuiqsut Caribou Monitoring Project. In particular, we would like to give a special thanks to the Kuukpik Subsistence Oversight Panel, Inc. (KSOPI) in helping form a Nuiqsut panel of caribou experts (Nuiqsut Caribou Panel), providing space to conduct interviews, and assisting with contacting local residents. We would also like to thank the Nuiqsut Caribou Panel for assisting with the development of the monitoring plan, identifying active caribou harvesters to interview, and making suggestions to improve the program; and the North Slope Borough Department of Wildlife Management for supporting the project. We would also like to thank ConocoPhillips Alaska, Inc. (COP) for providing funding and logistical support. Finally, SRB&A would like to thank the 63 Nuiqsut caribou hunters and elders who provided us with the information for Year 9 of this study.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF MAPS

ACRONYMS AND ABBREVIATIONS

ABR	ABR Inc.—Environmental Research & Services
ADF&G	Alaska Department of Fish and Game
COP	ConocoPhillips Alaska, Inc.
GIS	Geographic Information System
KSOPI	Kuukpik Subsistence Oversight Panel, Inc.
NPRA	National Petroleum Reserve-Alaska
NSB	North Slope Borough
SPSS	Statistical Package for the Social Sciences
SRB&A	Stephen R. Braund & Associates
USGS	U.S. Geological Survey

INTRODUCTION

As a result of the CD4 permit from the North Slope Borough (NSB), ConocoPhillips Alaska, Inc. (COP) is required to conduct a study to monitor the impacts of CD4 and other Alpine Satellite developments on Nuiqsut subsistence hunting and harvesting activities. In part, the NSB permit reads:

> CPAI [COP] shall hire a third party to conduct a subsistence study to better understand and act upon the impacts of the CD4 development and other CPAI satellite developments. The third party contractor shall be selected with the concurrence of the North Slope Borough. The purpose of the study will be to evaluate the short and long term impacts of CD4 and other CPAI satellite developments on the people of Nuiqsut. The scope of the study shall include but is not limited to (a) harvest success by area and species, (b) changes in harvest levels by area and species composition over time, (c) changes in use of subsistence areas and identification of the causes for any changes. The study design shall be forwarded to the North Slope Borough Department of Wildlife Management for review and approval. The contractor will collaborate with the on-going North Slope Borough subsistence harvest documentation study to avoid duplication of efforts, and especially to avoid "burnout" of interviewees. A draft annual report shall be submitted to the North Slope Borough, City of Nuiqsut, Native Village of Nuiqsut, and Kuukpik Corporation for review and comments. The final report shall address any comments made by these parties. The study shall commence no later than November 1 of the winter CPAI begins construction and will continue annually for 10 years. At the end of 5 years, CPAI and the North Slope Borough will discuss the results of the study and determine if the study methods should be adjusted. At the end of 10 years, the third party contractor shall summarize the results and CPAI and the North Slope Borough shall then review the summary and synthesize the results from the study. Based on the study results, CPAI and NSB shall evaluate the need for additional subsistence impact studies. It is intended that the study design will address the possible impacts of CD4 development as well as the additional anticipated CPAI satellite developments proposed for construction prior to 2010.

In response to this requirement, COP contracted Stephen R. Braund & Associates (SRB&A) to conduct a caribou subsistence monitoring project in Nuiqsut. The Nuiqsut Caribou Monitoring Project is an ongoing, multi-year project meant to measure impacts on caribou hunting related to CD4 and other Alpine satellite developments. The intent of the project is to assemble data on caribou harvesting activities and impacts on caribou harvesting that lead to a common understanding of these impacts by the community of Nuiqsut, industry, and government oversight agencies.

COP activities during the Year 9 study period (November 2015 through December 2016) included ongoing production at CD1, CD2, CD3, and CD4; the initiation of CD5 drillsite production which began in October 2015 and continued throughout 2016; and the drilling of two exploration wells in the National Petroleum Reserve-Alaska (NPRA) off of ice road and pads to the west of Nuiqsut.

Several types of data are relevant to a common understanding of caribou harvesting impacts: (1) hunter observations; (2) caribou distribution, abundance, herd size, habitat quality; (3) industry mitigation activities; and (4) historical subsistence use. This ninth annual report is based primarily on hunter observations and household surveys. An important function of the report is to identify additional data monitoring components most relevant to developing a common understanding of these impacts. This report contains the results of the first nine years of hunter information derived from face-to-face interviews conducted in Nuiqsut between March 2009 and February 2017.

STUDY OBJECTIVES

The primary objective of this project is to monitor impacts on Nuiqsut caribou hunting related to CD4 and other Alpine satellite developments and, in doing so, to facilitate and maintain communication between the study team, Nuiqsut residents and organizations, the NSB, and COP.

STUDY AREA

The NSB permit to COP for development of CD4 stipulates that the subsistence study should consider impacts of the CD4 development as well as other COP satellite developments. Impacts related to these developments may occur outside the immediate vicinity of the individual developments. Therefore, for the purposes of this project, the study area includes all areas used for caribou hunting by the community of Nuiqsut. Map 1, Map 2, and Map 3 show place names and oil and gas infrastructure in the study area.

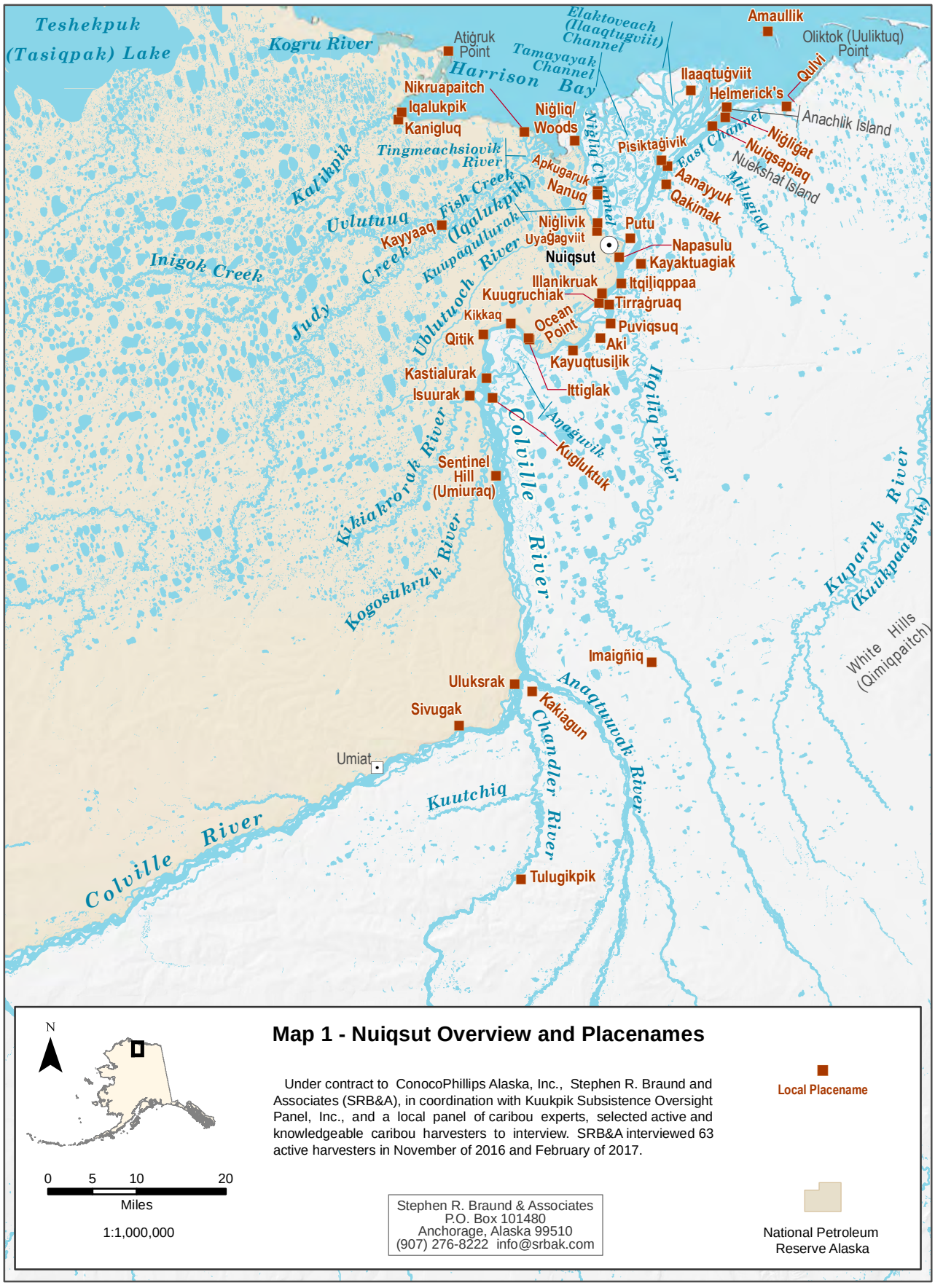
METHODS

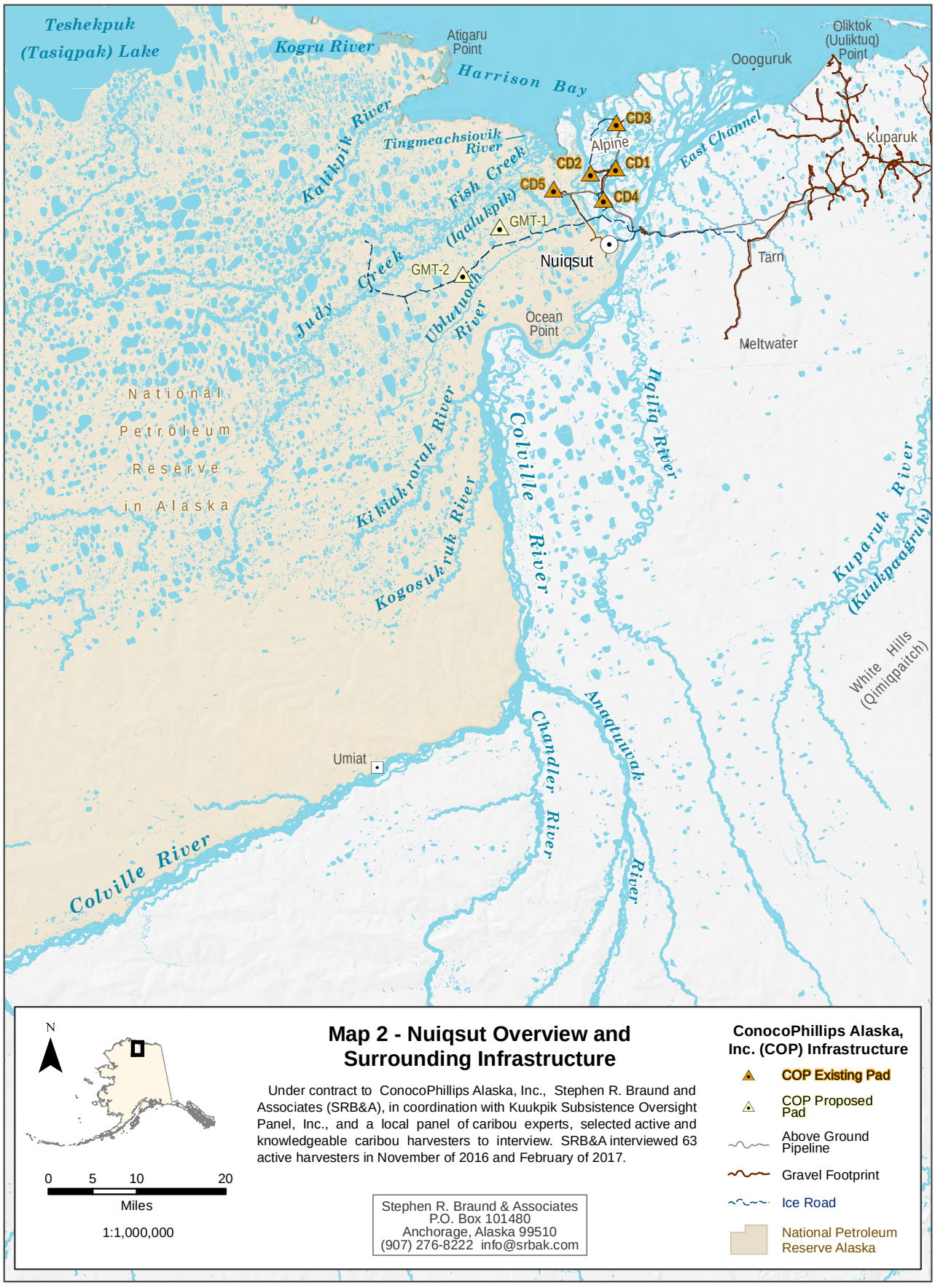
In 2009, SRB&A initiated a program to gather yearly information from local Nuiqsut residents about caribou hunting and harvest activities, observations about harvested caribou, changes in caribou, and impacts on caribou hunting. These data are gathered on a yearly basis in order to monitor impacts on caribou hunting related to CD4 and other Alpine satellite developments over time. This section of the report describes the methods used during Year 9 to design and implement the study. Year 9 active harvester interviews gathered information for harvesting activity between November 2015 and October 2016 and household harvest surveys gathered information for the 2016 calendar year (January to December 2016). Interviews, surveys, and meetings (including the NSB meeting in Utqiaġvik [formerly Barrow]) for Year 9 took place between November 2016 and July 2017. Thus, the methods describe 2016 and 2017 monitoring program activities, while the results and discussion describe the Year 9 study period caribou harvest amounts, hunting activities, and impacts (spanning from November 2015 to December 2016).

Community Engagement

One of the goals of this project is to promote and facilitate community involvement in the monitoring program. The primary method of facilitating ongoing community involvement for the Year 9 monitoring program was through contact with the Kuukpik Subsistence Oversight Panel, Inc. (KSOPI) and the previously formed Nuiqsut Caribou Panel. SRB&A met with the Nuiqsut Caribou Panel on November 14, 2016 to discuss the previous hunting season, review draft results from the previous study year, and discuss upcoming fieldwork. The November 14 meeting was attended by five panel members and two SRB&A staff members who were in Nuiqsut to conduct Year 9 active harvester interviews. The following is a summary of meeting topics:

- The panel discussed the nomination and selection of new panel members since several former panel members had moved out of the community during the previous year.
- Panel members noted that a combination of a lack of snow and the presence of a large number of wolves had affected caribou distribution near the community during the previous winter.
- They also noted that the previous boating season had been unusually long, extending into October.
- The panel spoke positively about minimal helicopter traffic to the west of the community during the previous year.


Teshekpuk (Tasiqpak) Lake
Kogru River
Atiġruk Point
Elaktoveach (Ilaaqtugviit) Channel
Tamayayak Channel
Harrison Bay
Amaullik
Oliktok (Uuliktuq) Point
Ilaaqtuġviit
Quivi
Helmerick's
Anachlik Island
Nikruapaitch
Iqalukpik
Kanigluq
Niġliq/ Woods
Niġliq Channel
Pisiktaġivik
East Channel
Niġigat
Nuiqsapiaq
Nuekshat Island
Miluqiaq
Tingmeachsiovik River
Apkugaruk
Nanuq
Aanayyuk
Qakimak
Kalikpik
Uvlutuuq Creek
Fish Creek (Iqalukpik)
Kayyaaq
Kuupaqullurak River
Niġlivik
Putu
Uyaġagviit
Nuiqsut
Napasulu
Kayaktuagiak
Inigok Creek
Judy Creek
Ublutuoch River
Illanikruak
Itqiliqppaa
Kuugruchiak
Tirraġruaq
Kikkaq
Ocean Point
Puviqsuq
Qitik
Aki
Kayuqtusiłik
Kastialurak
Ittiglak
Isuurak
Itqiliq River
Anaqtuvik
Kugluktuk
Kikiakrorak River
Sentinel Hill (Umiuraq)
Colville River
Kogosukruk River
Kuparuk River (Kuukpaagruk)
White Hills (Qimiqpaitch)
Imaigñiq
Uluksrak
Kakiagun
Anaqtuvak River
Sivugak
Chandler River
Umiat
Kuutchiq
Colville River
Tulugikpik
N
0 5 10 20
Miles
1:1,000,000
Map 1 - Nuiqsut Overview and Placenames
Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.
Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com
Local Placename
National Petroleum Reserve Alaska



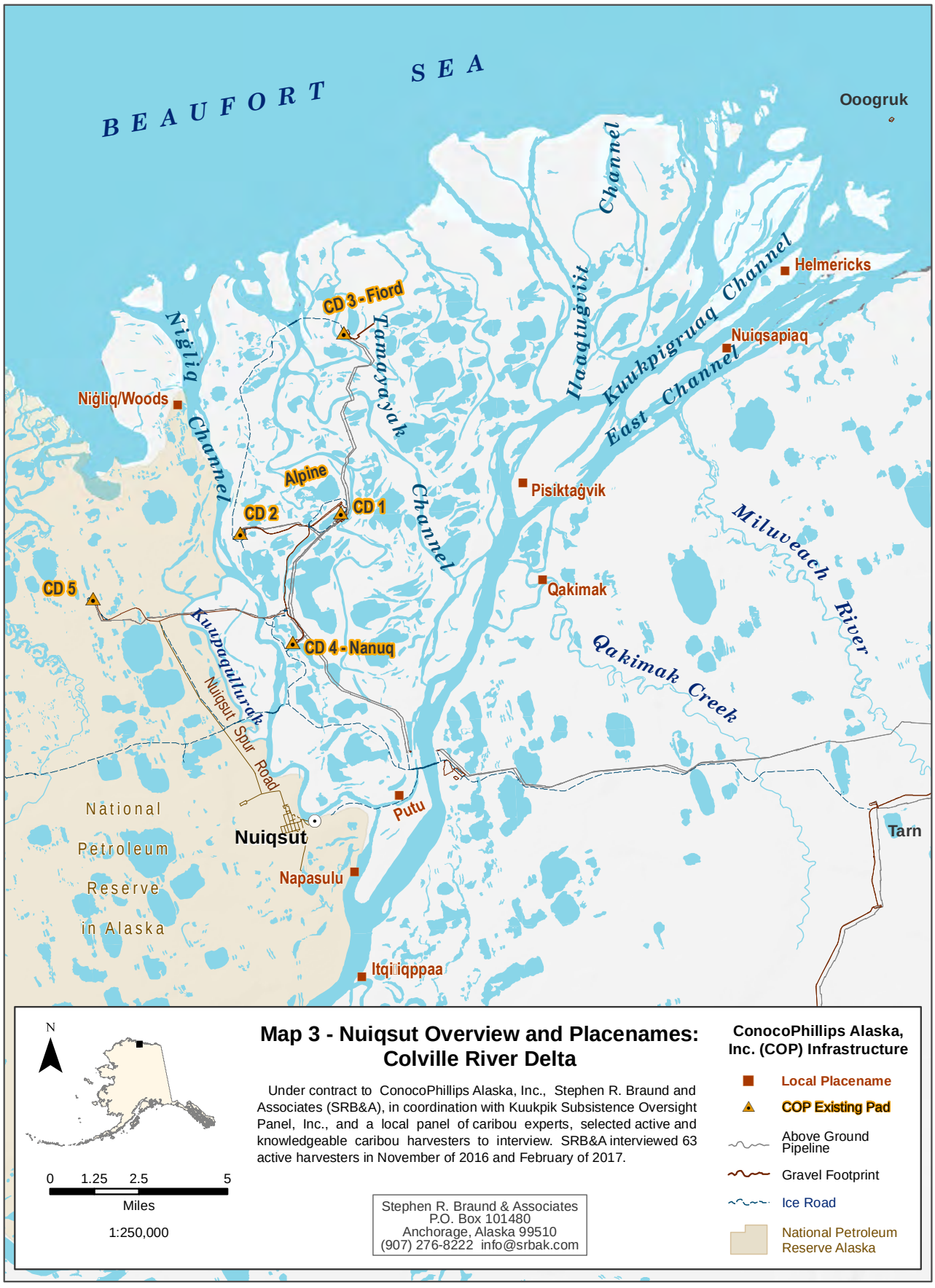
Map 2 - Nuiqsut Overview and Surrounding Infrastructure

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

ConocoPhillips Alaska, Inc. (COP) Infrastructure

- COP Existing Pad
- COP Proposed Pad
- Above Ground Pipeline
- Gravel Footprint
- Ice Road
- National Petroleum Reserve Alaska



Map 3 - Nuiqsut Overview and Placenames: Colville River Delta

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

ConocoPhillips Alaska, Inc. (COP) Infrastructure

- Local Placename
- COP Existing Pad
- Above Ground Pipeline
- Gravel Footprint
- Ice Road
- National Petroleum Reserve Alaska

- Upon reviewing draft data from Year 8, the panel noted that a peak in caribou harvests during the month of September, in addition to an increase in the use of trucks and ATVs, was likely due to the use of the Spur Road by caribou hunters. One panel member even thought that use of trucks was underrepresented in the Year 8 data, saying,

  > *"I think that the Spur Road use has to be more than nine percent. They are depending on that [road]. And also, these people who don't have boats to go out, don't have elsewhere to scout for caribous, so they go and wait for them [along the road]" (Nuiqsut Caribou Panel Meeting November 2016).*

- One panel member observed that, while helicopter traffic had been reduced due to construction of the CD5 road, COP continues to operate its twin otter airplane. He questioned why they couldn't use the new road instead[1].
- Panel members noted changes in the distribution of the caribou after construction of the CD5 road, indicating that they are hesitant to cross the road: "You could see like a few or a handful or five, but not the big herd that we used to see coming right through town" (Nuiqsut Caribou Panel Meeting November 2016).

Study Design and Field Preparation

At the outset of this project in Year 1 (beginning in 2009), the field effort for the Nuiqsut caribou monitoring program was comprised of annual interviews with a sample of active caribou harvesters in Nuiqsut. Annual household caribou harvest surveys to document yearly caribou harvest amounts were added to the monitoring design in response to suggestions from the Nuiqsut caribou panel during Year 1. These surveys were not completed in Year 2 (see discussion below), but were completed during Year 3, Year 4, Year 5, Year 6, Year 7 (by ADF&G), Year 8, and Year 9 data collection.

In addition to the field effort, the study team incorporated several other components to the study design, which provide additional context for measuring impacts. The components include the following:

- Implement work session between hunters and biologists (from Alaska Department of Fish and Game [ADF&G], NSB, or ABR Inc.) to discuss observations about impacts on caribou. (see Year 5 report)
- Incorporation of additional sources of Nuiqsut caribou harvest and use area data to aid in the comparison of harvests and hunting patterns over time. (see Year 5 report)
- Incorporation of traditional knowledge about caribou from additional sources. (see Year 5 report)

The study team addressed all of the above components during Year 5. The study did not add any study components during Year 9.

Field protocols and maps for the active harvester interviews and household surveys had been developed during previous study years. The study team updated the active harvester protocol for Year 9 fieldwork (Appendix A). The study team used an informed consent form that guaranteed the confidentiality of respondent information, anonymity of persons interviewed, and the reporting of aggregated data only (Appendix B).

Active Harvester Interviews

SRB&A used the active harvester protocol during annual interviews with Nuiqsut caribou hunters (see Appendix A). The protocol consisted of four sections: 1) Caribou Hunting Activities; 2) Assessment of

[1] CPAI notes that there are no flights to CD5; however, flights must continue to Alpine during the summer because there is no gravel road between Kuparuk and Alpine.

Harvested Caribou; 3) Impacts on Caribou Hunting; and 4) Additional Observations about Caribou. The protocol was designed to gather hunting areas and harvest locations in addition to hunting activity characteristics, assessments of abnormalities in harvested caribou, and observations of personal experiences with impacts on caribou hunting, in addition to general observations about the behavior, distribution, or migration of caribou during the study year. Gathering these data yearly allows for multi-year comparison and monitoring of subsistence use data, resource observations, and impact experiences over time. For Years 1 and 2, the active harvester interviews collected data on the previous calendar year (i.e., January through December). However, because Year 3 through Year 9 data collection occurred during the month of November at the request of the Nuiqsut Caribou Panel, the study team shifted the study period for the active harvester interviews from a calendar year to the previous 12 months (November through October). The purpose of shifting the study period was to place active harvester interviews closer to the end of the peak hunting season to assist with harvester recall.

The first section of the active harvester interviews (Caribou Hunting Activities) included mapping of Year 9 hunting areas and harvest locations. For each hunting area, the study team gathered the following variables:

- Months of use
- Transportation method
- Number of trips
- Duration of trip(s) (including typical duration and longest duration)
- Harvest success (in terms of whether the hunter did or did not harvest caribou in that hunting area in Year 9)
- Location of harvested caribou

In addition, for each harvest location, the study team gathered the following variables:

- Number of caribou harvested by sex
- Month of harvest
- Herd size of harvested caribou[2]

The first section of the interview also gathered data about changes related to the above variables (hunting area, number of trips, duration of trips, months, number of caribou harvested, and whether or not an adequate amount of caribou was harvested for the hunters' household). In Year 6, the study team added a question related to avoidance of any areas previously used for caribou hunting, to better understand the extent to which hunters avoid or stop using traditional use areas, and the reasons why they do so. This question remained on the protocol in subsequent study years.

The second section of the interview (Assessment of Harvested Caribou), gathered data about the following abnormalities in the respondent's harvested caribou in Year 9:

- Abnormal health (e.g., disease/infection/color of meat)
- Abnormal quality (e.g., taste, smell)
- Abnormal size (e.g., fat content or overall size)

[2] Although not on the original protocol, a Nuiqsut Caribou Panel member requested that this question be added to the active harvester interview during the November 12, 2012 panel meeting. The study team subsequently added herd size as a new variable to the Year 5 active harvester interviews.

- Abnormal quantity of parasites (flies)
- Other abnormalities

Each observation of abnormal caribou was tied to a harvest location on the map. Respondents also indicated whether or not they used the abnormal caribou and reported the number of abnormal caribou by type of abnormality.

The third section of the interview (Impacts on Caribou Hunting) included questions regarding impacts on caribou hunting in Year 9 related to CD4 or other Alpine Satellite developments. If respondents indicated that they had experienced impacts in Year 9, then researchers asked them specifically about the following potential impacts:

- Helicopter traffic
- Plane traffic
- Other traffic
- Oil company personnel
- Structures blocking hunter access
- Regulations
- Seismic lines or activity
- Other

The study team also documented non-Alpine related impacts when volunteered by respondents, but these were not systematically documented. Finally, the study team asked each respondent if they had observed anything else unusual about the behavior, distribution, or migration of caribou during the study year, and recorded their responses.

Household Caribou Harvest Surveys

The study team added the harvest survey component to the monitoring plan during Year 2 as a result of panel members' concerns that the original study design would not adequately capture overall uses and harvests of caribou by the community of Nuiqsut. The study team was successful implementing the harvest survey in Year 3 and in subsequent years (Years 4 through 8) (see SRB&A 2010a-2017 for a description of the previous efforts to complete the household surveys). In Year 7, ADF&G collected caribou harvest data as part of a comprehensive household survey and shared these data with SRB&A. In Years 8 and 9, the study team resumed implementation of the annual household caribou harvest survey.

The Year 9 household caribou harvest surveys addressed the 2016 calendar year (January 2016 through December 2016) and consisted of eight questions regarding caribou harvests during the Year 9 study period. Questions in the survey included:

- Did you or anyone in your household use caribou (e.g., harvested, received, or utilized in the home)?
- Did you or anyone in your household try to harvest caribou?
- Did you or anyone in your household successfully harvest caribou?
- How many caribou did your household harvest (only harvested or shot by residents in your household; do not count other households' harvests) in 2016?
- Were any of the caribou harvested by your household sick or injured? Did you use the sick caribou?
- Did you or anyone in your household give caribou to other households?
- Did you or anyone in your household receive caribou from other households?
- Did any Alpine-related activities in 2016 make your household's caribou hunting more difficult?

The study team made several changes to the household harvest survey after Year 3. First, because residents had difficulty reporting the number of caribou harvested by month, the study team elected to remove this question from the survey. Second, the study team added a question about the number of residents living in the household during the study year; this allowed the study team to produce a per capita harvest estimate. Finally, the study team added a question asking residents whether any of the caribou they harvested were sick or injured and, if so, whether they had used those caribou.

The study team conducted Household Caribou Harvest surveys in February 2017. Surveys were conducted by phone and in person in the community.

Respondent Selection Process

Active Harvester Interviews

In order to collect accurate data for the Year 9 caribou hunting season, it was necessary to interview currently active caribou harvesters. The study team attempted contact with Year 1 through Year 8 respondents with the goal of achieving consistency between study years. As anticipated, not all Year 1 through Year 8 respondents were available to participate in Year 9 interviews (e.g., absent from the community for the entire field period, medical issues, or had moved to another community) and therefore in order to maintain a similarly sized sample of Nuiqsut caribou harvesters, the study conducted interviews with additional harvesters who had been identified by others as active (but who had not previously participated in the study), or on a walk-in basis.

Study team members have periodically received comments from community residents that certain participants in the active harvester interviews—particularly walk-in participants—are not "active harvesters." In some cases, their observations are backed up by interviews which document limited harvesting activity in the previous 12 months. In other cases, the respondent proved to be an active harvester and other respondents have confirmed this. The study team consulted with the Nuiqsut Caribou Panel regarding how interviews should address requests by walk-ins, and how the study team should ultimately "select" active harvesters for inclusion in the study. The study team provided the caribou panel with a list of residents believed to be active harvesters. Panel members preferred not to comment specifically on the list, other than providing the names of several individuals they believed were missing, and referred the study team to the City of Nuiqsut's cultural coordinator. Follow-up consultation with the cultural coordinator resulted in the decision that the study team should allow any resident who has hunted caribou in the last 12 months to participate in an interview if they request to participate, and that the study team should continue its efforts to interview an adequate number of individuals identified as active harvesters, with a focus on previous participants to facilitate comparison to previous study years.

Walk-in interviews were selectively conducted only after confirming that the individual had hunted caribou during the Year 9 hunting season; if the schedule was full, fieldworkers recorded these individuals' names and contact information and agreed to contact them to schedule an interview if time allowed. If the fieldworkers had an opening and had exhausted efforts to schedule interviews with individuals on the list of active harvesters, they often conducted these interviews at that time. Fieldworkers found that these "walk-in" respondents were generally active hunters and harvesters who provided informative and thorough interviews.

Household Caribou Harvest Surveys

SRB&A attempted to obtain an updated household list from the City of Nuiqsut in November 2016; however, the city did not have an updated list at the time. Instead, city employees provided SRB&A with a recent list of households receiving fuel vouchers, which the study team used to compare to the previous year's household list. Study team members also walked each segment of the community, confirming that all households were accounted for. Based on that information, the study team identified 103 occupied residences within the city limits, not including schoolteacher housing, TNHA (Tagiugmiullu Nunamiullu

Housing Authority) and NSB housing which were not included in the household survey. For the purposes of the Nuiqsut household caribou harvest survey, the study team identified "eligible households" as those that were occupied at the time of the survey, had been occupied during the study year (2016), and were occupied year-round, thereby excluding seasonal workers and teachers who left the community during the summer months. The study team worked with KSOPI to review and finalize the household list. Of the 103 residences initially identified by the study team, 12 of the residences were later determined to be either unoccupied or out of town for an extended period of time, or were occupied by seasonal workers, making 95 total households eligible for the survey. The final household list (95 households) that was developed by SRB&A included all households that were permanently occupied during the 2016 year by Nuiqsut residents and were still occupied during the period in which the survey was implemented.

Interview Process

Active Harvester Interviews

This section describes the interview process for the active harvester interviews. The contents of the active harvester interview are described above under "Study Design and Field Preparation." Researchers generally conducted interviews at the KSOPI office, although some interviews were conducted at the Kuukpik Hotel, where researchers were staying. KSOPI employees assisted the researchers in contacting residents and scheduling interviews. Before the interview began, study team members asked respondents to read and sign the informed consent form.

Two study team members were present for each active harvester interview. One team member conducted the interview and recorded geographic information on an acetate sheet positioned over a 1:250,000 U.S. Geological Survey (USGS) map. The interviewer put registration marks on the clear acetate corresponding to locations on the USGS base maps so that it could later be registered on identical USGS base maps for digitizing. The interviewer recorded geographic data on the acetate, including hunting areas, harvest locations, and impact locations, using color-coded permanent markers and using a different color for each type of data. The second team member took detailed notes using a laptop computer of the responses of the respondents and probes by the interviewer.

Interviewers recorded each mapped feature as a polygon, line, or point. Caribou hunting areas were recorded as polygons, and harvest locations were recorded as points. In most cases, impact locations were recorded as points in order to pinpoint the location where the respondent experienced the impact. SRB&A assigned numbers to each feature as the interview proceeded (e.g., "Polygon 1") and recorded this number next to the feature on the map and in the notes about that feature. This provided a link between the notes and the map and was later used to create distinct feature codes in the Geographic Information System (GIS) and Access databases. In addition to recording data on the acetate and in the laptop, the interviewers also recorded data next to the relevant questions on the field protocol used to guide the interview. The protocol for each interview was later referenced while entering data to ensure the accuracy of the notes.

In three instances, study team members conducted interviews with two respondents at a time, generally hunting partners or family members who traveled to many of the same areas for subsistence purposes. Interviewers used the same overlay for each respondent and used initials to denote respondents' use of an area. If more than one person used the same feature, SRB&A entered and digitized the feature once for each participant. Study team members were careful to distinguish between each respondent's information on the maps and in the notes.

Active harvester interviews generally lasted between less than 30 minutes and up to one hour, depending on the respondent's age, experience, activity level, and interview participation. The number of participants in each interview also affected the length of the interview. At the conclusion of the interview, each participant received a $50 honorarium for their participation and time and signed a receipt.

Household Caribou Harvest Surveys

The contents of the household harvest surveys are described above under "Study Design and Field Preparation." Household surveys were conducted by a single interviewer either in person or over the phone. The interviewer explained the purpose of the interview and asked to speak either to a head of household or to an adult who was able to answer questions about the household's caribou harvesting activities during the study year. Surveys generally took less than 10 minutes.

Fieldwork Summary

Active Harvester Interviews

The study team traveled to Nuiqsut twice to conduct Year 9 active harvester interviews in November 2016 and February 2017. As shown in Table 1, SRB&A researchers interviewed 63 Nuiqsut residents. Over the nine study years, SRB&A has developed a list of 119 active caribou harvesters in Nuiqsut (Table 1), which include all residents interviewed and/or identified as active harvesters during Years 1 through 9. The list of active harvesters has evolved over time and changes from year to year. A number of younger hunters have been added to the harvester list in recent years as they have become more active and proficient hunters. Likewise, some older hunters have indicated that they no longer do the majority of hunting for their household and have recommended that the study team interview their sons or daughters who have taken over these duties. A hunter's level of activity may also vary from year to year based on work or personal commitments, or the hunter's access to a working boat, snowmachine, or four-wheeler. Thus, a hunter may be particularly active in one study year and then less active during the following study year.

Table 1 depicts the number of persons eligible for interviews in Year 9. A person was not eligible for an interview if he or she did not go caribou hunting during Year 9, if they had moved or were out of town for an extended period of time, or if they had an illness that precluded them from participating in an interview. An exception was made for elders who could provide traditional knowledge about long-term changes. As noted above, SRB&A developed a list of 119 active harvesters, 118 of whom were assumed eligible for an interview based on the information available to the study team. This includes individuals who had been nominated as active harvesters in the past but who had never participated in an interview. Of the 134 individuals who had participated in one of the eight previous study years, 100 were eligible for an interview. Some individuals had been removed from the active harvester list altogether, either because they were not active caribou hunters, they had moved away from the community, or they were deceased.

Table 1: Fieldwork Summary, Year 9

# of Permanent Occupied Households (2016)[1]	Population (2016)[2]	# of Persons Identified as Active Caribou Harvesters	# of Persons Eligible for Interviews	# (%) of Eligible Respondents Interviewed	Number of Interview Workshops	Number of Interview Trips to Community
95	426	119	118	63 (53%)	60	2
[1]Based on eligible households identified during the Year 9 household harvest surveys. Does not include schoolteacher housing, or vacant TNHA (Tagiugmiullu Nunamiullu Housing Authority) or NSB housing.						
[2]Estimated based on reported household occupants during the Year 9 household harvest surveys. Does not include estimates for schoolteacher housing, NSB housing, or other non-permanent households.						

Stephen R. Braund & Associates, 2017.

.

The study team attempted to interview respondents from previous study years again in Year 9, with a focus on respondents who have participated in multiple study years or have been highly recommended as active harvesters. SRB&A interviewed 63 individuals, or 53 percent of those eligible for interviews (Table 1). As shown in Table 2, during each previous study year, between 32 percent and 54 percent of respondents also participated in Year 9. These percentages were slightly lower than in Year 8 (between 44 percent and 70 percent) (SRB&A 2017).

Table 2: Respondent Summary, Years 1–9

Respondent	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Number of Active Harvester Respondents	36	53	57	58	57	57	60	58	63
Number of Respondents also Interviewed in Year 9	15 (42%)	17 (32%)	21 (37%)	23 (40%)	26 (46%)	24 (42%)	31 (52%)	31 (54%)	-

Stephen R. Braund & Associates, 2017.

The Year 9 sample included 18 respondents not interviewed in a previous study year, somewhat higher than usual, although the total number of respondents was also higher. Differences in the makeup of the nine samples could potentially account for observed differences in results between the eight years. In Year 3, to test for sample-related differences, results for 15 principal variables were compared for the entire sample for each year and the subsample of 18 respondents interviewed in all three study years. The pattern of results for the entire sample was similar in the subsample. This indicates that the results shown for the entire sample in each year are representative and comparable across years despite changes in the sample of respondents from year to year. As the study has proceeded, the sample has been more likely to include respondents who had participated in a previous study year (see Table 2).

The following tables (Table 3 through Table 6) show descriptive data for the Year 1 through Year 9 respondents. During all nine study years, over 80 percent of respondents were born on the North Slope (Table 3). The percentage of Year 9 respondents born in Nuiqsut was on the high end of the range of the previous eight study years. The first study year showed the highest percentage of respondents whose birth residence was not Nuiqsut; this corresponds with a larger percentage of respondents born before the community was reestablished in the 1970s.

Table 3: Respondents' Residence at Time of Birth[3], Years 1-9

Residence	Percent of Respondents								
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Nuiqsut	26%	40%	32%	44%	40%	44%	41%	41%	46%
Other North Slope Community	62%	48%	52%	44%	47%	48%	48%	50%	42%
Elsewhere in Alaska	9%	8%	13%	9%	9%	8%	10%	7%	12%
Outside Alaska	3%	4%	4%	2%	4%	0%	0%	2%	0%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Respondents	34	52	56	54	53	50	58	56	59

Stephen R. Braund & Associates, 2017.

[3] In some tables, percentages may add up to less or more than 100 percent (e.g., 99 percent or 101 percent). This is because the percentages are rounded to the nearest whole number, which occasionally results in percentages that do not total 100 percent. In addition, during each study year some interviews were conducted with elders who were no longer active harvesters, or who were not active harvesters during the study year. In this report, tables reporting data collected from active harvesters are based on the active harvester totals, rather than the total number of interviews conducted during each study year. The total number of active harvester interviews in Year 8 was 58 of 60 interviews.

The distribution of decades in which respondents were born remained fairly consistent in Year 9 compared to Year 8 with a slight decrease in Year 9 respondents born in the 1970s and an increase in Year 9 respondents born in 1980s and 1990s (Table 4). The large majority (between 73 and 83 percent in the various study years) of respondents have resided in Nuiqsut for 20 or more years (Table 5). Male respondents have constituted the majority of active harvester respondents for all study years, although the study team interviewed a somewhat higher percentage of females in Years 6 through 9, with a peak in female participation in Year 9 (27 percent) (Table 6).

Table 4: Decade Born, Years 1-9

Decade	Percent of Respondents								
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
1940s	6%	10%	0%	2%	2%	4%	2%	2%	3%
1950s	18%	12%	15%	9%	19%	12%	14%	14%	15%
1960s	32%	17%	27%	16%	17%	20%	24%	26%	20%
1970s	21%	17%	16%	18%	11%	8%	8%	12%	5%
1980s	21%	31%	25%	36%	32%	36%	24%	31%	38%
1990s	3%	13%	16%	20%	17%	18%	25%	16%	20%
2000s	0%	0%	0%	0%	2%	2%	3%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Respondents	34	52	55	56	53	50	59	58	61

Stephen R. Braund & Associates, 2017.

Table 5: Years of Residence in Nuiqsut, Years 1-9

Years of Residence	Percent of Respondents								
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
5 years or less	3%	2%	2%	0%	0%	2%	0%	4%	0%
6-10 years	3%	6%	5%	2%	2%	4%	7%	2%	3%
11-19 years	12%	19%	16%	25%	23%	20%	14%	15%	14%
20 plus years	82%	73%	77%	73%	75%	75%	79%	80%	83%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Respondents	34	52	56	55	53	51	58	55	59

Stephen R. Braund & Associates, 2017.

Table 6: Respondent Gender, Years 1-9

Gender	Percent of Respondents								
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Male	97%	92%	96%	95%	95%	87%	90%	88%	73%
Female	3%	8%	4%	5%	5%	13%	10%	12%	27%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Respondents	36	53	57	58	55	52	60	58	63

Stephen R. Braund & Associates, 2017.

Household Caribou Harvest Surveys

As noted above (Respondent Selection Process), households considered eligible for the household caribou harvest surveys were those that were permanently occupied during the 2016 year by Nuiqsut residents and were still occupied during the period in which the survey was implemented. SRB&A acquired an updated list for 2016 of 107 occupied households (not including teacher and itinerant housing) from the City of Nuiqsut. Out of the 107 residences on the household list for Year 9, 12 households were either unoccupied or out of town for an extended period of time, or were occupied by seasonal workers. Therefore, the total number of eligible households for the Year 9 household surveys was 95.

The study team aimed to achieve a minimum response rate of 80 percent (76 households) in order to provide a representative sample of the community that could be expanded to estimate for the community as a whole. SRB&A completed a total of 79 (83.2 percent) household surveys in the community of Nuiqsut (Table 7). Of the eligible households not surveyed, seven declined to participate, and the remaining nine households were otherwise unavailable.

Table 7: Nuiqsut List of Occupied Households, 2016

Type of Household	Number of Households
Original Household List	107
Unoccupied or empty at time of survey	12
Total Eligible Households	**95**
Surveyed Households (Percent of Eligible Households)	**79 (83.2%)**

Stephen R. Braund & Associates, 2017.

Post-field Data Processing

Editing Notes and Overlays

After completing fieldwork in Nuiqsut, study team members edited the acetate overlays and notes for each interview. Researchers checked the overlays to ensure that they were readable and that all features had been numbered correctly without duplications and that the feature numbers were consistent with the information in the notes. For example, if a map contained 42 polygons, 10 lines, and 5 points, SRB&A ensured that none of these had accidentally been repeated in the field (e.g., two "Polygon 8" features). Study team members then wrote the total number of features on the corner of the overlay to assist digitizers. Researchers proofread interview notes for typing errors, legibility, and accuracy.

Data Entry

After editing the notes and overlays, researchers entered all of the data from the interview, including the features on each overlay, into an Access database created by the study team. Each geographic feature received a unique feature code, which matched the feature code in the GIS database (see below under "GIS File Preparation"). Each feature code included the community code, respondent ID, interview date, shape type (e.g., polygon, line, or point), and shape number. Data for each section of the interview were entered as records in separate tables. The Access Database included the following data tables:

- Respondent Table – This table contains each individual's Respondent ID, interview date, birth residence, birth date, gender, and years of residence.
- Harvest Area Table – This table contains one record per hunting area collected in Section A of the field protocol ("Caribou Hunting Activities"), in addition to variables (months, transportation method, number of trips, and duration of trips) for each of those features. Each record also includes the unique feature code assigned to that feature.
- Harvest Location Table – This table contains one record per harvest location collected in Section A of the field protocol ("Caribou Hunting Activities"), in addition to the number harvested and

month of harvest for each of those features. Each record also includes the unique feature code assigned to that feature.

- Harvest Activity Assessment Table – This table contains one record per respondent and includes their responses regarding changes to their hunting activities (e.g., hunting area, trip frequency, trip duration, hunting months, and harvest amount) as collected in Section A of the field protocol. The study team coded each response so that the data could later be queried.
- Harvested Caribou Assessment Table – This table contains one record per abnormal caribou reported by respondents, as collected in Section B of the field protocol ("Assessment of Harvested Caribou"). The study team coded each response so that the data could later be queried based on type of abnormality.
- Hunting Impact Table – This table contains one record per impact observation, as collected in Section C of the field protocol ("Impacts on Caribou Hunting"), in addition to the month of impact, associated feature codes, descriptions of the impact, and descriptions of suggested mitigation to lessen the impacts.

The resulting database contains seven data sets. The number of records in each data set for the nine study years is shown in Table 8. After completion of data entry, SRB&A performed a Quality Control check of all data previously entered. This consisted of a detailed review of maps, notes, and database records and resulted in all data entry being checked for accuracy.

Table 8: Nuiqsut Datasets, Years 1-9

Nuiqsut Dataset Component	Number of Records								
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Active harvester respondent characteristics (age, residence duration, place of birth)	36	53	57	58	57	57	60	58	63
Subsistence use areas	137	187	215	194	211	196	206	153	195
Harvest locations	182	152	196	162	195	143	248	173	163
Observations of changes in harvest patterns	36	53	57	58	56	57	57	58	63
Observations of changes in condition of caribou	87	67	71	68	83	51	67	72	67
Impacts on harvest activities	111	109	81	72	102	107	87	83	84
Number of Active Harvester Respondents	36	53	57	58	57	57	60	58	63

Stephen R. Braund & Associates, 2017.

For the Harvest Activity Assessment and Harvested Caribou Assessment tables, the study team assigned numeric codes to each observed change or observed abnormality and to respondents' explanations as to why each observed change or abnormality occurred. Coding of these variables allowed the study team to develop tables with frequencies of respondent observations. Appendix C provides codes used in the Access database, with examples of the types of responses each code encompasses. The study team conducted a quality control check of the codes to ensure consistency.

Digitizing

To facilitate digitizing, SRB&A first had all the acetate overlays scanned. This step permitted multiple staff to complete the digitizing process by editing scanned images. All digitizing was done using ArcGIS ArcEdit

software. Digitized features included polygons associated with subsistence use areas and impact areas; lines associated with impacts and other data; and points associated with harvest locations and impact locations. Altogether, SRB&A digitized 195 Year 9 use areas and 163 Year 9 harvest locations. SRB&A checked all digitized records against acetate maps for accuracy and conducted a Quality Control check of each digitized record. Each GIS record was assigned a unique Feature Code.

Analytic File Preparation

The Access Database resulting from entry of field data consists of six related tables, which are described above ("Data Entry"): (1) Respondent; (2) Harvest Area; (3) Harvest Location; (4) Harvest Activity Assessment; (5) Harvested Caribou Assessment and (6) Hunting Impact. SRB&A used Stat Transfer to convert Access tables for analysis with the Statistical Package for the Social Sciences (SPSS). SRB&A created reports within Access to compile quotes for inclusion in this report.

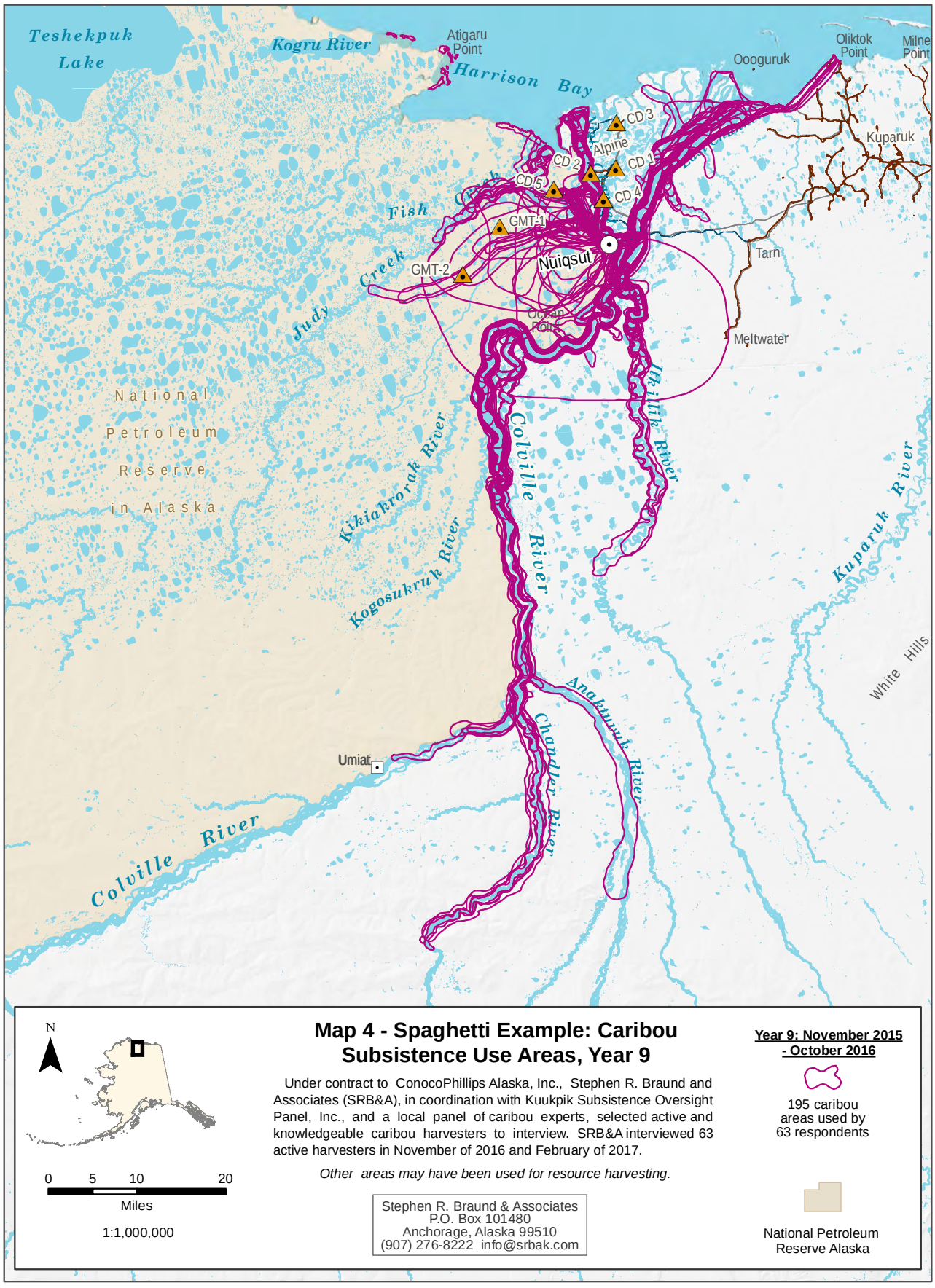
GIS File Preparation

The relevant tables from the Access database were linked to the GIS database so that GIS staff could develop maps querying specific feature information. The SRB&A GIS mapping system consists of three possible methods of presenting mapped information. The first method is represented by Map 4 and is referred to as a "spaghetti map." The spaghetti map as shown is made up of vectors (e.g., a point, line or polygon) and represents overlaying all of the individual respondent outlines of Year 9 caribou hunting areas. Typically, this representation is not used in map production as it presents individual data (e.g., individual polygons). The second method uses a single polygon to depict the extent of subsistence use areas for all respondents, as seen in Map 5. Researchers often use this method to represent subsistence use areas on maps. While this single polygon approach clearly shows the extent of the use area, it does not differentiate between areas that are used by one person from those that are used by multiple persons. In the third method (Map 6), SRB&A converts polygons (use areas) to a grid with each pixel being assigned a value of one. Then, the number of overlapping pixels are summed and assigned a color, with the darkest color representing the highest density (or number) of overlapping pixels. This method is the primary one SRB&A used to depict use areas and other variables in this report and can be seen below, under "Location of Caribou Use Areas."

Household Harvest Survey Data Analysis

Similar to the data analysis steps for the active harvester interviews, the study team entered the data from each household harvest survey form into an Access database developed by the study team, and used Stat Transfer to convert the Access tables to SPSS for analysis. To create a community harvest estimate based on the results of the household surveys, the study team multiplied the sum of all reported caribou harvests by a weighting factor. The weighting factor was computed by dividing the total number of eligible households for the study year (95) by the number of interviewed households (79). The study team operated under the assumption that the 16 households who did not participate in the household survey (or could not remember the number harvested) were not substantially more active or less active (in terms of caribou harvesting) than the community as a whole.

To determine the total pounds of caribou harvested, the study team used a conversion factor of 117 pounds per caribou. The study team chose this conversion factor because it was the one most recently used by ADF&G for the North Slope in Braem et al. (2011). During the NSB review meeting in Barrow on April 16, 2013, several meeting attendees asked about this conversion factor and expressed concern that 117 pounds seemed high; in contrast, Nuiqsut Caribou Panel members later expressed that the conversion factor may be low, noting that Nuiqsut residents use not only the meat of the caribou, but the heart, head, stomach, brains, bones (for marrow and for use in soups), and skin (for clothing and crafts). However, to facilitate comparison with other recent harvest studies which have used the 117 pound conversion factor, the study team has retained the conversion rate of 117 pounds per caribou for this study.



Map 4 - Spaghetti Example: Caribou Subsistence Use Areas, Year 9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

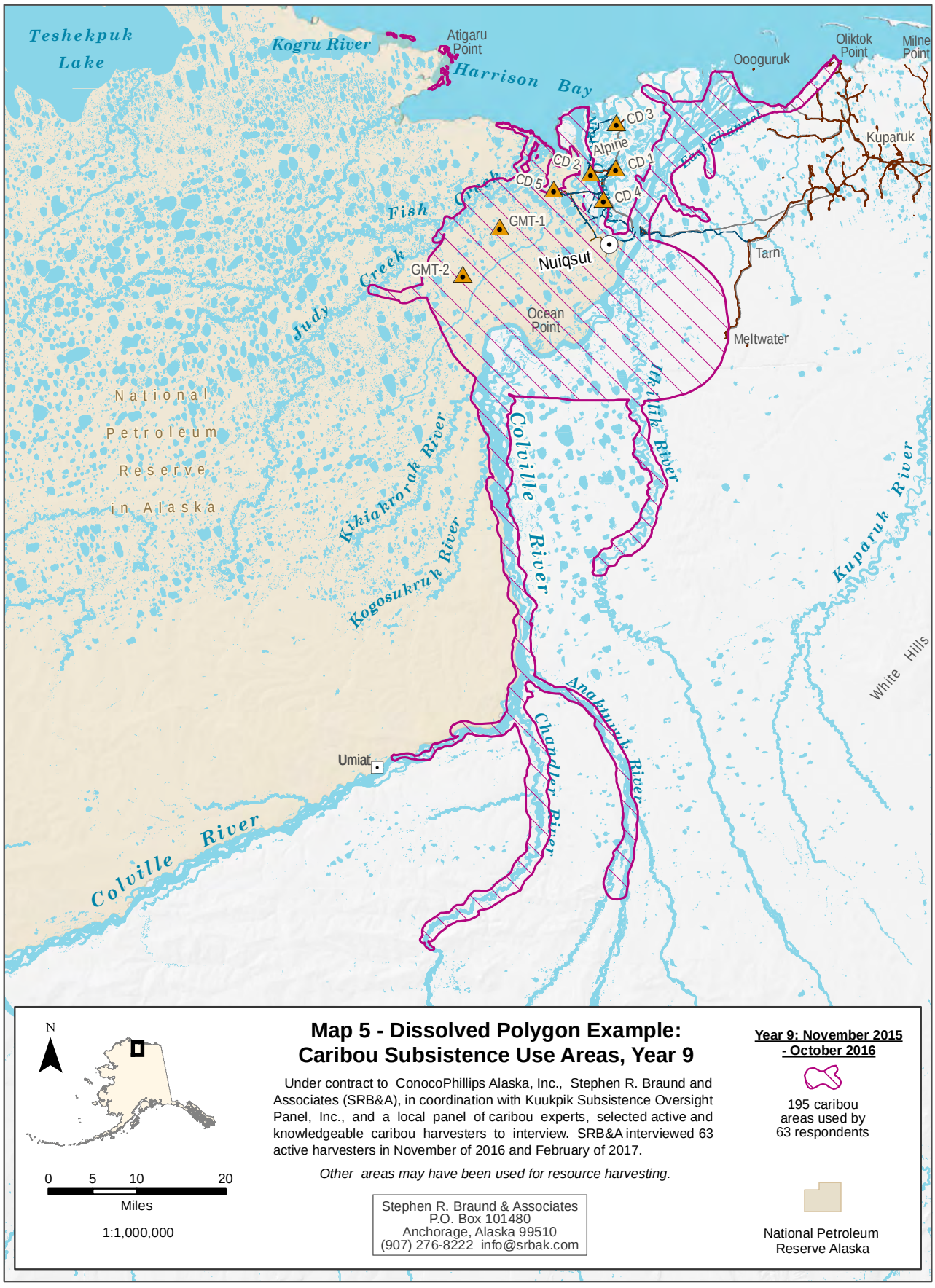
Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

Year 9: November 2015 - October 2016

195 caribou areas used by 63 respondents

National Petroleum Reserve Alaska



N

0 5 10 20

Miles

1:1,000,000

Map 5 - Dissolved Polygon Example: Caribou Subsistence Use Areas, Year 9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

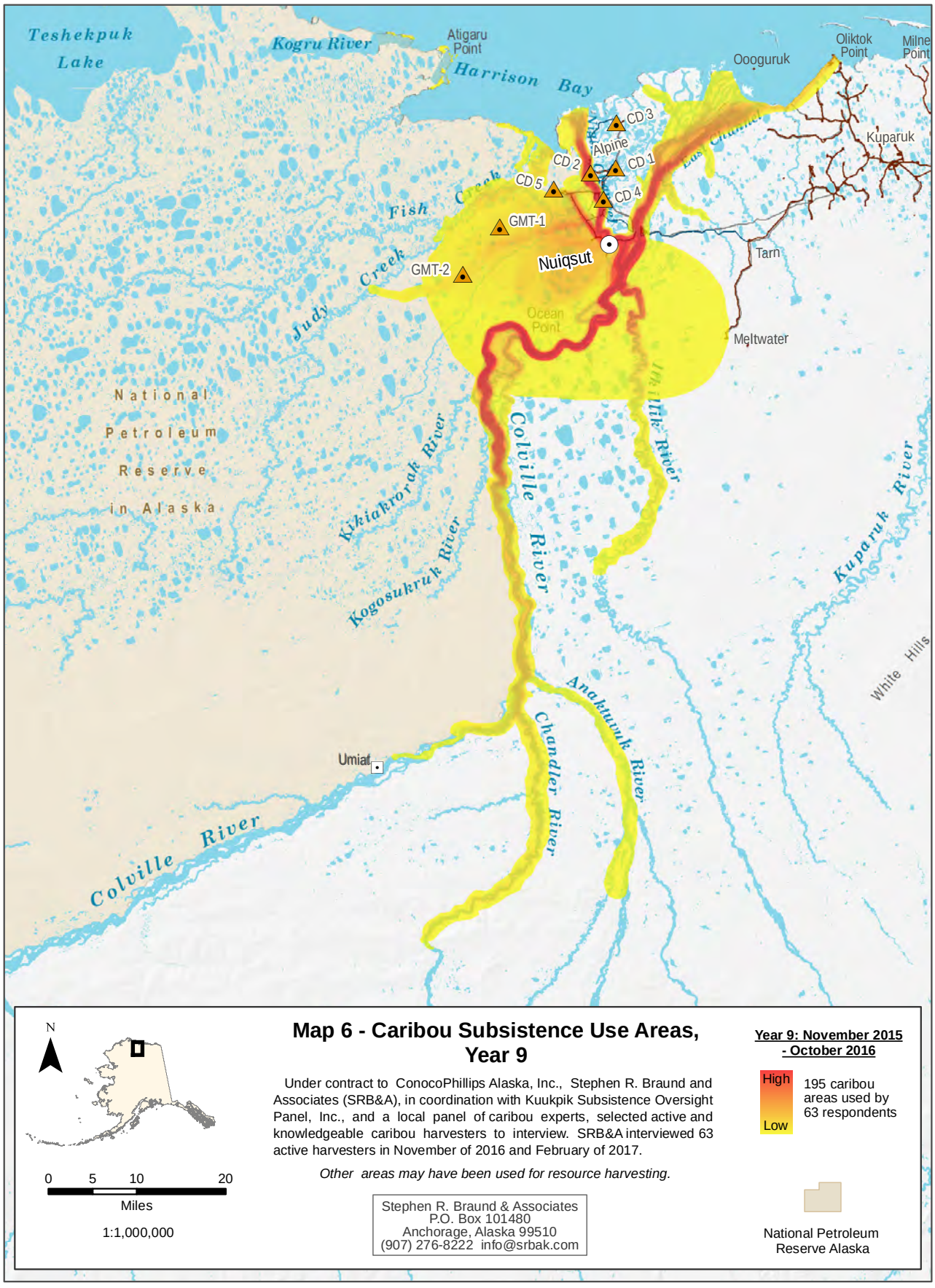
Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

Year 9: November 2015 - October 2016

195 caribou areas used by 63 respondents

National Petroleum Reserve Alaska



N

0 5 10 20

Miles

1:1,000,000

Map 6 - Caribou Subsistence Use Areas, Year 9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

Year 9: November 2015 - October 2016

High

Low

195 caribou areas used by 63 respondents

National Petroleum Reserve Alaska

In Year 9, the study team also calculated confidence limits, expressed as a percentage, using the methods described in ADF&G Technical Paper No. 426 (Brown et al. 2016). The study team also included confidence limits as calculated and reported by ADF&G for the 2002-2007 and 2014 study years.

Data Review

SRB&A submitted a draft of the Year 9 report to CPAI in October 2017 and prepared a draft review summary for distribution and discussion at the November 2017 Nuiqsut Caribou Panel meeting. The study team met with COP on March 14, 2018 to discuss COP's comments on the draft report. A revised draft was sent to COP in March 2018, and the study team presented the results of the Year 9 report to the NSB on April 9, 2018. The study team sent copies of the revised Year 9 draft report to the Nuiqsut Caribou Panel and met with the Nuiqsut Caribou Panel on May 24, 2018, to present draft Year 9 findings. The study team prepared a meeting summary, including proposed approaches to addressing panel members' concerns in the Year 9 report, and sent the meeting summary to the Nuiqsut Caribou Panel. Following the review meetings with the NSB and Nuiqsut Caribou Panel, the study team revised and finalized the Year 9 report. Key edits to the Year 9 report based on comments from the NSB and the Nuiqsut Caribou Panel include:

- Inclusion of a section entitled "Traditional Knowledge of Caribou in the Colville Delta," which was included in the Year 5 through 7 reports as an appendix but subsequently removed. The Nuiqsut Caribou Panel requested that traditional caribou use areas and knowledge be incorporated into the report as they are important for understanding the cumulative impacts of development on subsistence.
- Addition of maps comparing use areas collected as part of the subsistence monitoring program to historic or pre-Alpine use areas. Such maps were included in the Year 4 and 5 reports but subsequently removed. One of the primary reasons for removing these maps was concern that they showed use areas from a four or five-year time period (Years 1 through 5 of the Nuiqsut Caribou Subsistence Monitoring Project) alongside use areas for an approximately 10-year time period (1995-2006; SRB&A 2010b) and were therefore not comparable. Now that the two studies reflect similar 10-year time periods, and in response to concerns of a lack of comparative data in study reports, the study team has elected to include comparative maps in the Year 9 report.
- Review of Year 9 sample makeup to ensure it is adequately addressed in the Year 9 report. Panel members expressed concern that the large number of new study participants in Year 9 could have affected study results.
- Incorporation of additional comments from the Nuiqsut Caribou Panel regarding changes in caribou hunting over time.

Presentation of Interview Results

This report summarizes the results of the active harvester interviews through analysis of the data collected during the Year 9 active harvester interviews and household harvest surveys. This report summarizes the results of the active harvester interviews using the verbatim (as close as possible by typing their responses during interviews) responses of study participants. The report presents the data as the observations of active harvester respondents. While researchers attempted to obtain the most detailed descriptions of residents' observations, they did not try to verify the factual basis of their reports. In addition to reporting on the Year 9 active harvester interviews and household harvest surveys, this report incorporates Nuiqsut traditional knowledge of caribou in the Colville River Delta in addition to historic harvest and subsistence use area data. Traditional knowledge and historic subsistence data provide useful context for understanding current trends and subsistence user concerns.

TRADITIONAL KNOWLEDGE OF CARIBOU IN THE COLVILLE RIVER DELTA

Although the purpose of the Nuiqsut Caribou Subsistence Monitoring Project is to monitor changes in and impacts on caribou subsistence hunting activities related to the Alpine and Alpine satellite developments, it is helpful to view current trends in the context of historic and long-term trends. This section provides a summary of Nuiqsut traditional knowledge about caribou, particularly as it relates to the Colville River Delta. This summary is based on interviews with Nuiqsut residents conducted by SRB&A during the Nuiqsut Caribou Subsistence Monitoring Project (SRB&A 2010a-2017), in addition to a review of traditional knowledge in existing literature. Although the current community of Nuiqsut was formed in 1973, many elders living today were born in or lived in the Nuiqsut region (including Nigliq Channel, Itkillik River, Oliktok Point, and Foggy Island) prior to the 1970s resettlement, and thus have long-term knowledge of the environment, climate, land, and animals in the area, including traditional knowledge passed on to them by their elders. As Elijah Kakinya stated of the Nuiqsut people in *Puiguitkaat,*

> *And so some of them had gone here to Barrow but we now have some of them up there as a part of us. And so these here, their relatives, stayed here for a time all right, but then became people-of-Nuiqsat, that river has been their river since time immemorial, it has been the root of these people-of-Nuiqsut, they have it today as a place of their roots. They have returned to a place of their roots, these.* (Kakinya 1978)

Statements from elders who had lived in the Colville River Delta before the establishment of the present-day community of Nuiqsut can provide a glimpse of caribou migratory patterns prior to oil and gas development in the region. In addition to traditional knowledge related to caribou migration and distribution, various studies conducted since the 1970s have documented Nuiqsut subsistence use areas and traditional knowledge related to Nuiqsut caribou hunting activities. These data are incorporated into the section entitled, "Changes in Caribou Hunting Areas Over Time."

During a 1978 elder's conference, Elijah Kakinya described the general patterns of caribou in Colville River region and noted that, according to oral history, these patterns had remained consistent over time. His description is similar to more recent descriptions of the typical migratory patterns of caribou, in that the caribou tend to congregate along the coast during the summer and travel inland during the late fall and early winter:

> *See here, these caribou, after being along here toward the ocean during the summer, when it is starting to almost become winter they always head up to the trees going by way of us. Up towards inland. And then, even so, after being up there all during the winter, again toward here, after wintering up there they would head toward the ocean to go fawn. It is said ever since that time long ago, way before our time, when there must have been some people [in the area], they would act always in this manner, thus. From since that time long ago they are ones who act in this manner…. Going by way of our place, via Killiq [River]. Through over farther more that way, and over through the other side of Killiq [River], through Killiq, through south of there, through us, through Ulu and through Narvavak. Up in that certain area we see that they had that route ever since that time long ago. Being that way since that time long ago.* (Kakinya 1978)

During SRB&A interviews in 2009, several elders identified and described the locations of past and present caribou migration routes. Although they stressed that the routes they identified were not exact and that the caribou migration varies from year to year, the elders noted some general patterns in the movement of caribou. According to their descriptions, the Teshekpuk herd migrates along the coast west of Nuiqsut during the summer and fall months, arriving west of the community and then heading south along the Colville River toward the Brooks Range. The Central caribou herd arrives from the east around the same time. In September and October, some caribou from the west (Teshekpuk Herd) and east (Central and Porcupine herds) mingle in an area west of the community toward Fish Creek and Ocean Point before

heading south for the winter. Some caribou remain in the area all winter long. These migratory patterns as described by Nuiqsut elders are generally consistent with biological studies of caribou movements through aerial surveys and radiocollar data.

During public hearings in the late 1970s and early 1980s, Nuiqsut elders were beginning to observe changes in caribou, which they believed were a direct result of oil and gas development. During a scoping meeting related to oil and gas leases in the Beaufort Sea, Sarah Kunaknana stressed the importance of the coastal areas to various wildlife species including caribou. She observed that "the caribou are abundant in the summertime on the shoreline" (Sarah Kunaknana, USDOI, MMS 1979). Through an interpreter, Nannie Woods, also of Nuiqsut, noted a general decline in the availability of caribou compared to the past:

> *There were lots of caribou that we hardly see anymore…But she thinks that she hardly see caribou anymore. Life is getting hard and she can barely…she is one of the elders, elders here at Nuiqsut.* (Nanny Woods, USDOI, MMS 1979)

Starting in the 1990s, Nuiqsut residents continued to express concerns about changes to caribou during public hearings related to the National Petroleum Reserve – Alaska. They stressed, over and over again, the importance of the Colville River delta and surrounding areas to caribou. Residents generally indicated that caribou were readily available near Nuiqsut, but expressed concern that this may change if oil and gas development continued its westward expansion toward Nuiqsut:

> *Lot of caribous, but very seldom we get the Porcupine [caribou]. If they do come in they'll get all the way up here if we have southwesterly wind blowing steadily for a week and hot. Lot of mosquitos. They'll come, otherwise they will stop up there by Canning, not Canning but Sagavanirktok, and then move back east.* (Thomas Napageak, USACE 1996)

> *Last spring we were fortunate to have caribou in our region as well as this fall. And they've been seeing caribou in the area north of us and I think it has been mainly due to less activity by these people here. I doubt that they would have been seen if these people had come around doing their activity. I think that once they start up again, our caribou are going to go elsewhere because they will see them. The residents of Nuiqsut hunt seasonally when the time comes that certain game are perfect to catch and not all the time.* (Ruth Nukapigak; USDOI, BLM 1998)

> *In Nuiqsut, the effect of subsistence harvest patterns will be very high because not only will the bowhead whale always be reduced or eliminated by construction activities, but the caribou hunt will be reduced as well by construction activities and the pipelines.* (Thomas Napageak; USDOI, MMS 1990)

> *Like last summer, there was a herd of caribous coming out from the east and they were crossing the Nerluk [Nigliq] Channel, and some people were killing some caribous.* (Joe Kasak; USDOI, MMS 1990)

> *Ever since we moved here our people have given testimonies and I know about there being a lot of them. I don't speak up very often but at this time I want to talk about this area that used to have caribou in the winter when we lived in Barrow. When the caribou was in short supply we would travel to Tasiqpak [Teshekpuk] knowing that we would find caribou and to the area close to Kuuguluk [Kogru River?]. Before we moved back to Nuiqsut I used to also do my hunting at Umiat. That area [NPR-A] is a prime hunting ground and if they could choose other sites [to develop], that would be fine by me. It is a very prime hunting area.* (Archie Ahkiviana; USDOI, BLM 1998)

Public hearings in Nuiqsut related to the Alpine Satellites Development in the early 2000s show an increasing concern among Nuiqsut residents related to the impacts of the Alpine and Meltwater (Kuparuk

Drill Site 2P) developments in addition to potential impacts from development of Alpine Satellites. Elder Sarah Kunaknana described changes that had already occurred within the region, saying,

> *Much of the development nearby already has altered migratory paths of the wildlife, caribou for example, they don't migrate in the areas traditionally. That change is significant. And for that reason, she would like the Alpine site as a good measuring tape for this because their migrations are altered and these have--the migrations have changed and right now they are in a dilemma of oil and subsistence resources that are utilized.* (Sarah Kunaknana; USDOI, BLM 2004)

During the hearings, residents noted that the proposed placement of Alpine Satellites infrastructure was in the pathway of traditional caribou migratory routes:

> *And CD-5 is an area where caribou migrate on the coastal plain during summer. If we go that route and CD-5 and the bridge is down there, we will have the same problem we did in the Prudhoe Bay and the Kuparuk area with our caribou.* (Frank Long, Jr.; USDOI, BLM 2003)

> *...around where you guys are planning to propose in putting your guys' infrastructures (Alpine) and stuff like that, that is one of the main caribou crossings on the Colville River delta.* (Isaac Kaigelak; USDOI, BLM 2003)

The presence of impacts on caribou prior to initiation of the Nuiqsut Caribou Subsistence Monitoring Project were echoed during a recent meeting of the Nuiqsut Caribou Panel. As one panel member observed, caribou movement patterns had begun changing well before Alpine Development began, due to the various exploratory activities happening in the region:

> *In 2000, before Alpine started, we saw no caribou in this area because they were doing summer studies for the EIS. This was new to us; we never dealt with any of this. If you go back to 2000, we [had] not see[n] any caribou for many years; they were doing studies to get Alpine going. As I told you guys, I was the only one that got caribou in the village [that one year], because I had to go way out.* (Nuiqsut Caribou Panel Meeting May 2018)

In more recent years, Nuiqsut elders and hunters have expressed the belief that the Central Herd migration has changed due to interference from pipelines, and they pointed out several areas on the Colville River delta, including *Pisiktaġvik*, where they used to cross more regularly and in greater numbers. Respondents commented that the reflection from the pipelines deflects caribou, and suggested that the oil companies should dull or paint the surface of the pipelines to mitigate this impact. As one individual described, "The pipeline is so shiny that they come to it and start to cross it, the glare in that pipeline took the caribou away from migration" (SRB&A Nuiqsut Interview March 2009). The elders provided the following descriptions of caribou migrations and impacts on caribou migrations:

> *He knows that Teshekpuk has never changed much, they still go on the migration of their past. Central Herd is same general area, but changed slightly, because low water happened and some pipeline in Meltwater [Kuparuk Drill Site 2P]. Can't come across it, and that's why it's up, caribou can't cross to the other side. They go around the pipeline. Some of them [pipelines] are real low. Make sure they are seven feet [tall]. The older ones are those ones deflecting the caribou [new pipes are better, taller].* (SRB&A Nuiqsut Interview March 2009)

> *I never seen a real lot of caribou. Back then we used to have a lot. There'd be a lot more caribou in this area than compared to the west, Teshekpuk Herd. When they'd migrate there'd be more. In the 50s there's lots of caribou used to cross right down there, in the summer time. Never do that anymore, hardly. They start CD3 and Alpine, but that Tamayayak River used to have lots and lots of caribou but hardly any more. CD3, the people told Alpine, there's hardly*

any here. There used to be a lot of caribou that migrate right here, they don't do that anymore [by the coast]. (SRB&A Nuiqsut Interview March 2009)

When the caribou from the Central come through here they go this way, but after they start build pipeline they stopped going to this area. Pisiktaġvik*, this whole sandbar, this whole island. But now with pipelines they don't come there no more. There used to be a lot of caribou on the west side, following the coast lines. Went right along here by Nanuk, CD4, used to go through there all the time but not now. It changed their migration. We were in Fish Creek, making fish and tuttu try to take for winter and then they start coming in August from Teshekpuk. Going to… Heading up north from there. To the mountains. Pretty soon they gonna come, maybe next month. May, June, they start heading back up. The start heading from the mountains. They start coming in May, June, July. They used to cross there.* (SRB&A Nuiqsut Interview March 2009)

Teshekpuk go up this way. This side of the Colville. The Central Herd go back [along Itkillik River]. And start migrating up to the mountains from this area. September, October. In the spring time they [Central Herd] always go down [toward Nuiqsut]. (SRB&A Nuiqsut Interview March 2009)

Yeah, they still come through here on this area [west]. This side of the channel. And they cross straight down to the ocean. Porcupine Herd and Teshekpuk Herd come together in this area and mingle, then go their separate ways. (SRB&A Nuiqsut Interview March 2009)

As indicated above, many elders reference the Porcupine Herd when discussing changes in migration over the years. The Porcupine Caribou Herd, as defined by wildlife biologists, generally does not range as far west as the Colville River; however, some Nuiqsut residents refer to any large herd arriving from the east into the Colville River area as Porcupine caribou, and many of these individuals make a distinction between those caribou and the Central Arctic herd, which also migrates from the east. It is unclear whether these differences are related to terminology, or whether they are a result of different observations of historic movement patterns. One elder noted that the Porcupine herd once traveled into the Nuiqsut area but observed that their migration routes have changed in recent years due to diversion from pipelines:

The Porcupine Herd that comes from Canada through here, when the pipeline, when it went all the way to the Meltwater [Kuparuk Drill Site 2P], when they build that pipeline to Alpine, they stopped seeing them. Oliktok, to Meltwater [Kuparuk Drill Site 2P]. (SRB&A Nuiqsut Interview March 2009)

One elder expressed concern that the pipelines east of the community have affected caribou calving areas, indicating that some caribou no longer travel to the Teshekpuk area to calve, as they traditionally have. He went on to describe the effects of pipelines on caribou migration from the east and access to insect relief areas on the coast:

There's a lot of changes. There's too much pipeline on that other side [east]. They're starting to have their young on that side. Usually had them down toward Teshekpuk. Yeah, over here on this side, cause of this pipeline they couldn't go. I seen quite a few in that area…. They been impacted by the oil companies, yes, true…. No caribou from the east. You gotta keep telling them there's no caribou from the east in Nuiqsut anymore. When me and my buddies used to catch them, the ones from the east and west joined together and come up. They meet and start going up. By Nechelik, right close and they start going up. Yeah, quite a few [come from west]. In the mosquito harassment area here [on the coast east of Colville], they got closed out by the pipeline. They should put an easement, about a half mile, to let them cross. I seen some turned back, about 100, back by that pipeline from Meltwater [Kuparuk Drill Site

2P]. They stay by Prudhoe nowadays. That Meltwater [Kuparuk Drill Site 2P] pipeline. When they first put this pipeline, the shine from that, they seen it and started running around back. (SRB&A Nuiqsut Interview March 2009)

This elder also commented that the pipelines cause the caribou to stop and scatter, rather than continuing on their migratory route and remaining as one herd. He described,

Once they get corralled by the pipeline they just stay there. They go some place, I don't know where. They don't bunch, they scattered all over. That's what they need, an easement along the coast. Sometimes they come through [to the west]. But that pipeline, I see quite a few turn. Maybe they go around it nowadays or not. And the flash from that pipeline, that galvanized thing, will turn them back, too. Put a dull finish on it. (SRB&A Nuiqsut Interview March 2009)

During a study by the Alaska Native Science Commission (ANSC) related to NPR-A development, elder Annie Lampe discussed her observations about the impacts of pipelines on the availability of caribou in traditional hunting areas, noting that residents no longer harvest as many caribou directly along the Nigliq Channel:

There's a pipeline. We always get the caribou, up there, down there, that way. Now we have to go that way [west] to go get caribou. Because the structures we have to go the other direction to harvest. Got to go through out to the ocean and then go get caribou way over there. Much longer routes than usual. (Annie Lampe; ANSC 2009)

During the same study, another Nuiqsut resident discussed changes in caribou hunting patterns, due to avoidance of oil and gas infrastructure. This individual noted that some hunters no longer travel to traditional hunting areas because of the presence of oil and gas activity, even if the caribou are available in those areas:

And then you kind of prepare where you're going to go hunt. In the old days you go where the animals went. Now you have to [go] where you won't be disturbed or you won't feel like you will disturb someone else in their work, vice versa. So you go to an area. I won't see any oil rigs out in Nuiqsut. I won't see airplanes going over me. Hopefully, I'll see a caribou. It's not as good as out north where all the rigs are. It's a lot calmer and peaceful to go out where there are no activities. A lot of us hunters are going south more and more than we used to. (Unknown Respondent; ANSC 2009)

In addition to impacts from pipelines, elder respondents described experiencing or observing impacts related to traffic, such as helicopter, plane, and boat traffic. They indicated that the noise from traffic causes the caribou to act skittish or "spooked."

Plenty [of traffic]. Especially those boats with loud noise. Go through my allotment every summer. Really loud, you can hear them from a distance. Airplane, helicopter fly everyday. Even small planes, sometimes. Summer, in summer, mostly always fly. They always go through towards Fish Creek, land by my allotment, helicopters down there. Every summer, in July, June. I never see much in August, I always go up river moose hunting. They got three of them [airboats]. They can go through the shallow water. Lots of noise. Some of them get spooky. That noise is no good for an animal. Yeah, when some of the caribou get spooked, they run off. When they get spooked they just start running away. (SRB&A Nuiqsut Interview March 2009)

We stay in Fish Creek for the month, preparing food for winter. Little plane was back and forth. We try to go get that tuttu, we can't, there's a plane right there. (SRB&A Nuiqsut Interview March 2009)

> *I heard they are always counting the caribou through helicopters. One time before Alpine had happened, they did a lot of caribou stuff by "Piniqtuk" and they noticed they used chopper and planes to scoot them away from the area where they planned to build Alpine. Then they say helicopters don't interfere with the migration. I think they always be together when they start coming in, the main herd that stay together. Then one lone caribou [makes it near Nuiqsut]. We always wait long time for caribou. Then July we're hungry because we got one in June, waiting for August. How we gonna get the meat from the store, it's expensive? $16 a steak.* (SRB&A Nuiqsut Interview March 2009)

As recently as 2011, elder Marjorie Ahnupkana provided observations at a public hearing regarding the changes she had observed over her lifetime. In two different statements, she noted a general decrease in large herds of caribou near Nuiqsut:

> *You don't see caribous like three to five thousand at a time coming this way. She have seen more than that in her lifetime, and none of those come through here anymore. They are being dispersed before they get to Colville.* (Marjorie Ahnupkana; AECOM 2011)

> *Again, the caribou from the east side has been diverted because of tremendous drill sites; a lot of pipelines crisscross. Our caribou from the east don't come directly through Nuiqsut. They're 15, 20 miles south of here, meaning we have to travel that (much) further to harvest our caribou at some point. If the caribou are left alone by the industries, they will migrate right around through their migration path. But if they are being harassed, they're going to go further south, meaning we have to travel further south towards Umiat to subsist. And they say (that this is) the first time that that has happened to this village.* (Marjorie Ahnupukana; AECOM 2011)

In summary, traditional knowledge of the Nuiqsut people indicates that prior to oil and gas development in the region, caribou movement through the Colville River delta area was relatively predictable, followed similar patterns from year to year, and included large herds measuring in the thousands. Over time, residents have observed that caribou movement into the Colville River delta is generally less frequent, less predictable, and involves smaller or more widely distributed herds. Through traditional knowledge and first-hand observations, residents indicate that various development-related factors have the potential to deflect or delay caribou movement in the region, including pipelines and other infrastructure causing physical or visual obstructions to caribou (including glare/reflection from pipelines disorienting the caribou); and air traffic, ground traffic, boat traffic and human activity disrupting or delaying caribou movement.

In addition to observations about caribou migration and distribution patterns, Nuiqsut elders have also commented on changes in the health and quality of caribou in recent years. Elders have observed that the caribou are fat or skinny often depending on where they are located. Caribou from the Porcupine Herd, for example, are skinny after traveling such long distances. The amount of fat on the caribou also depends on the timing of the year. Two elders described,

> *The ones from Porcupine Herd travel a long distance. They travel constantly, compared to the ones that stay around here. They get more fatter here, compared to that Porcupine Herd that has to travel further.* (SRB&A Nuiqsut Interview March 2009)

> *The Teshekpuk Herd that went over there would always be skinnier. But the ones from up river where there's less snow would be fatter [not as much digging]. There's caribou feeding in the high plains, Ocean Point area.* (SRB&A Nuiqsut Interview March 2009)

One elder observed that the caribou have been getting fat later in the summer, saying, "In the old days, they got fat in July. They are late to get fat these days." He indicated that the fat is approximately two inches

thick in July, whereas it used to be approximately four inches thick. During a meeting with the Nuiqsut Caribou Panel in Year 5, an elder discussed changes in the fat content of caribou and believed these changes were due to warming trends:

> *Yeah, it changed a lot. They get used to get fat around July and nowadays in July they have a thin fat because the weather gets hot, and [that is] how come they get fat later. Towards September, that is the only time the fat gets a little thicker… Yeah, [on] hot days the caribou are running around too much to get away from the mosquitos.* (SRB&A Nuiqsut Caribou Panel Meeting November 2012)

The elders also observed differences and changes in the taste of caribou. Several commented that caribou harvested west of the community, near Atqasuk and Wainwright, taste better than the caribou harvested near Nuiqsut. One of these elders indicated that this started occurring within the last 10 years. These elders believe that contamination related to development affects the taste of the caribou. The following are descriptions of changes and variations in the taste of caribou:

> *Yeah, some of them, I don't even feel like eating sometimes when I get one like that. Tastes different, even if it's fat. I don't know why it tastes different, can't figure out why they taste like that. Because good caribou taste real good to eat. It's been how many years now, five, six years? They'll be fat, but taste different. They could notice it and can't even eat it. Once you get it from this west side the caribou are good and more tastier. Even from the right they taste good. Some of them taste good around here. The ones close to the bank and stuff eat some of the stuff that's been polluted and they are different from one caught on the west side. When I have some caribou from Wainwright they taste good. Around here, that area, right around here. A couple years ago the two he had, one from here and one around there, taste different, could hardly eat them.* (SRB&A Nuiqsut Interview March 2009)

> *The one coming from the west is real tasty but the ones staying around here change. The ones that be staying around here is [not good]. There's no pipeline, no anything [in Atqasuk]. There's nothing around, so the caribou are really tasty and heathy.* (SRB&A Nuiqsut Interview March 2009)

One elder commented that the incidence of sick caribou has increased since Alpine development began, saying,

> *When they get caribou that are sick they leave it alone. Give it to eagle. They used to get some sick caribou, but they mostly showed up after Alpine. Some of them got sore right there, inside the joints, can't move. Some of them caribou, in the bone marrow they have yellow pus, are sick.* (SRB&A Nuiqsut Interview March 2009)

In addition, concerns remain about contamination from Umiat, a former military site. One elder commented that many of the changes in caribou can be traced back to that contamination. She observed

> *One drum diesel, five gallon motor gas, they were floating down the river. Some changes in the 40s and 50s, there were lots [of changes] from the Navy explorations. Some of the buoys were left behind before they clean up that area. The caribou changed, and everything changed with the caribou. Notice that, I trace changes back to that. That's what I know happened. From Umiat. I think it was 15 years ago [drums floating down the river]. They been cleaning up slowly, but they're still out there.* (SRB&A Nuiqsut Interview March 2009)

RESULTS

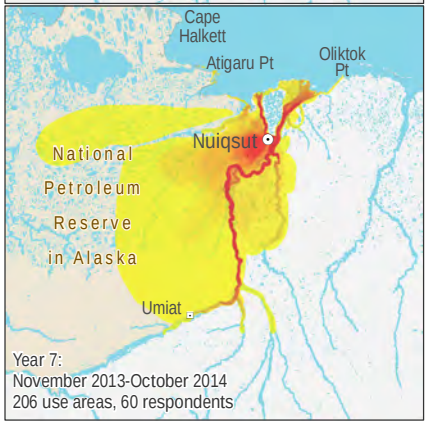
Caribou Subsistence Use Areas and Harvest Sites

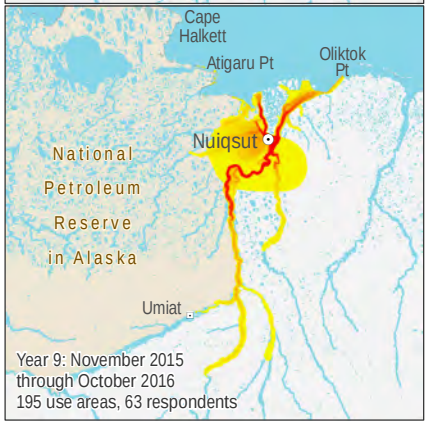
Nuiqsut respondents reported 195 caribou subsistence use areas for the Year 9 study period. In addition to providing the location of their Year 9 caribou hunting areas, respondents identified the location of the 163 harvest sites within the use areas. The locations and characteristics of Year 9 caribou use areas and harvest sites are described below. Maps and comparative descriptions of caribou use areas from previous time periods (e.g., prior to the Nuiqsut Caribou Subsistence Monitoring Project) are presented in a later section entitled, "Changes in Caribou Hunting Areas over Time."

Location of Caribou Use Areas and Harvest Sites

Nuiqsut Year 9 caribou use areas, as reported by 63 Nuiqsut respondents, are depicted on Map 6. Year 1 through Year 9 caribou use areas are depicted side by side on Map 7. During the Year 9 time period (November 2015 through October 2016), study participants reported searching for caribou along local rivers, along the coast of the Beaufort Sea east of the Colville Delta to Oliktok Point and west beyond Atigaru Point, and overland to the west and south of the community. Residents' riverine travel extended along Nigliq Channel and the East Channel of the Colville River, along Fish Creek, upriver along the Colville River nearly to Umiat, and along the Itkillik, Chandler and Anaktuvuk rivers. Overland travel extended west to the Fish and Judy creeks area, in addition to south and west of the community in an area surrounding the Ublutuoch River and near Ocean Point. Use areas also extended north of the community along the Spur Road and along an ice road extending from the Spur Road to the GMT1 and GMT2 areas. The highest numbers of overlapping caribou use areas in Year 9 occurred along the Nigliq and East Channels of the Colville River, upriver along the Colville River to Sentinel Hill, along the lower portion of the Itkillik River, and along the Spur Road north of the community. A moderate number of overlapping use areas extended overland to the west and south of the community (including along an ice road identified by several respondents), farther downriver on the Nigliq and East channels, farther upriver along the Itkillik and Colville rivers, and along Fish Creek.

In terms of use areas, Year 9 was relatively similar to previous study years. The extent of overland travel was similar to Years 5, 6, and 8 but smaller than the other study years. The change in overall extent from year to year is often associated with a subset of hunters who hunt by snowmachine during the winter; in years where these hunters are not available for an interview, the overall extent may be smaller. A smaller extent may also reflect distribution patterns of caribou or winter travel conditions. As noted earlier, Nuiqsut caribou panel members reported a lack of snow during the previous winter which may explain the relatively limited overland extent in Year 9; Prichard et al. (2017) note that snow melt during both 2015 and 2016 came one to two weeks earlier than usual, which may indicate low snow accumulations and/or higher temperatures during those years. During a meeting of the Nuiqsut Caribou Panel to review the Year 9 report, one panel member noted a potential relationship between increased snowmelt and air pollution, indicating that air particles in the vicinity of Nuiqsut and development areas may contribute to poor snow conditions. Those individuals who did travel overland in Year 9 traveled primarily to the west of the community by four-wheeler or snowmachine, in an area between Nigliq Channel, Fish Creek, and Ocean Point. A new hunting pattern, which emerged in Year 8 and grew in Year 9, was the use of the Spur Road and CD5 roads to hunt caribou.





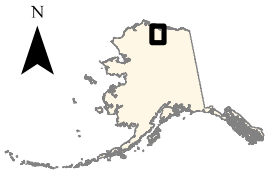
Map 7 - Caribou Subsistence Use Areas: Years 1-9 Individually

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 148 active harvesters from March 2009 through February of 2017.

Other areas may have been used for resource harvesting.

Overlapping Polygons

National Petroleum Reserve Alaska



0 20 40 80

Miles

SCALE: 1:1,500,000

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

As indicated by the following quotes, Year 9 hunters frequently described using the Spur Road, CD5 road, and seasonal ice roads to facilitate their access to overland areas, or searched for caribou using a combination of road and overland hunting:

> *[My four-wheeler use area is] from Fish Creek all the way down and stop about right here and then come back. Because with that Spur Road it's way easy, you can go back this way too. And normally, I go out with a group of guys. This one is just four-wheeler. [I went out in that area] maybe 18 times. November-December would be snowmachines and car because normally there is a GMT project where we build the ice roads all the way from Moose's Tooth to here.* (SRB&A Nuiqsut Interview November 2016)

> *CD5. Yeah, I go to CD5 with my four-wheeler, and I get 6 caribou right around there. Where is all the cabins? Like [local resident' cabin and, OK this road, I followed this road, and then I went off the road after, after that CD5.* (SRB&A Nuiqsut Interview November 2016)

> *I caught a lot on the Spur Road…. [It was] even better than the winter. We do a lot on the Spur Road, and with a truck. During the winter when there's an ice road, I go on the ice road. We have to sign a waiver[4]. Like right between these two big lakes, there was always caribou running around there, there's foxes around there too. I think the foxes scare them. I went on the ice road a lot, with snowmachine and four-wheelers. I always go fast, so I'm not too sure [how far]. At least 15 miles from Nuiqsut. When I went out, I do a hook and come back [overland toward Nuiqsut]. Like I leave on the ice road then come back right behind the dumps….Lots [of caribou], I was getting them [on the Ice Road].* (SRB&A Nuiqsut Interview November 2016)

Others used roads exclusively from off-road travel, particularly if they traveled in trucks or cars. In Year 9, ice roads extended from the Spur Road toward the GMT1 and GMT2 proposed developments and beyond (see Map 2 and Map 3), and a number of hunters took advantage of this road system for winter hunting; the Spur Road and CD5 road were used year-round. Others preferred not to hunt along the roads and instead went directly overland to the west of their community by four-wheeler and snowmachine. Several respondents described their overland and road hunting activities as follows:

> *Also, I went four-wheeling lots this season too. On the four-wheeler we went west. We went past to Fish Creek during September and October. Yeah, I don't know [if we had to cross Fish Creek], we had to cross two of them. [We traveled] about 15 miles [west]. Yeah, [I got to Fish Creek]. I go in one big loop, around all the lakes. That probably was one of my farthest trips. Yeah, I came back up through there [by these lakes]. Umm, probably like 10 to 20 times.* (SRB&A Nuiqsut Interview November 2016)

> *We have a map that we have all of our ice roads. There was a lot of people out there. Normally when we are done with the ice road it is about January until [April]. I'd say maybe eight [times out that way]. [I harvested] four [caribou on the road] and they were kind of in this area. I stay away from CD5 and the other rig that was over here—midway—I stayed away from those.* (SRB&A Nuiqsut Interview November 2016)

> *Mine is going to be all down the Spur Road. [I started searched for caribou by truck] from December, I got my truck in December so we started going out to see what we can find. We went out where they built that ice road, we drive for about an hour and the kids get cranky so we turn around and come back. They had a bridge where they come up by the river and that's where we turned around and stopped where that bridge was. Throughout the road, wherever*

[4] Kuukpik Corporation requires that residents sign a waiver in order to access the Spur Road

> *we see them we pop them out. There's usually nobody out there when we went. Man, we were able to share a lot of our caribou this year. Somebody asked if we are selling that caribou? I said 'no.'* (SRB&A Nuiqsut Interview November 2016)

During a meeting of the Nuiqsut Caribou Panel to review the draft Year 9 report, panel members expressed concerns that the use of roads in Year 9 could have been overstated due to the higher number of "new" respondents participating in Year 9 interviews. It is possible that the increase in new Year 9 respondents was due in part to increased access resulting from the roads (i.e., individuals who were previously less active were more active in Year 9 due to the road and therefore were eligible to participate in the study). A review of the data indicate that use of roads was not limited to new respondents but instead occurred among all respondents at varying levels.

Use of different river systems varies from year to year. Year 9 shows relatively modest use of Fish Creek and less use of the upper Colville River (beyond Sentinel Hill) when compared to previous years. Several individuals mentioned a lack of caribou farther upriver, in addition to low water levels, which may have contributed to decreased hunting activity in that area:

> *I have never passed Umiuraq in a long time, it's too shallow, I don't want to [mess up] my motor.* (SRB&A Nuiqsut Interview November 2016)

> *That's why I didn't go farther inland [upriver], because it was shallow.* (SRB&A Nuiqsut Interview November 2016)

> *I did [travel upriver] for moose hunting. Caribou wasn't upriver to see. Actually, I did see a small caribou at Ocean Point, but that was all I saw all summer. Right along the river I went with a boat. I went past it, I went to Chandler and I didn't see a caribou. I went about five miles into the [Chandler] River and went back out. No caribou to be seen from Ocean Point to Chandler. Yeah, [that's unusual].* (SRB&A Nuiqsut Interview November 2016)

Travel along Anaktuvuk River in Year 9 was more extensive than in past years, but such travel was reported by a small number of harvesters. Residents who hunt along the Anaktuvuk and Chandler rivers are usually those with jet boats which allow travel in shallower conditions:

> *I went all over. Maybe past to [Shivugak Bluff] and we went in Anaktuvuk River, 10 miles, then on our way back, we went farther upriver. Yeah, we went to Shivugak Bluff. No, [not as far as Umiat]—Shivugak Bluff. Almost every day [I went upriver]…. [I traveled up the Anaktuvuk River to], Outpost, we were straight from Outpost [Mountain], that's a little farther than 10 miles. That's a crazy river. You need a jet boat for that. The river is skinnier than this table [i.e., less than five feet]. We even saw birch trees up there.* (SRB&A Nuiqsut Interview November 2016)

A number of respondents hunted along Itkillik River in Year 9, and several mentioned a high water event which allowed them to access the usually shallow waterway:

> *That old airport right there [on Itkillik River], we went up there during the flash flood. During the low tide, we can't even pass a couple of turns. We had a good chance to go up there in the flash flood, in August, mid-August. It would have been early, like on the 10th or on the 20th. We couldn't find any caribou because they were all farther on these bluffs.* (SRB&A Nuiqsut Interview November 2016)

> *Itkillikpaat, I got a couple at the cabin. Right at the cabin. The caribous were coming from the east side, and south side. Working their way, they came right through the cabin. A big herd came right through the cabin when they were coming from the east or south side. And they*

> *were coming from Tirraġruaq and Napasalu and come across somewhere around here. They cross on the south side of the village. They were looking for caribous and went up to see where the cabin was. My big boat can't go that far, it gets to shallow up there. My boat can only make it to the old airport on high tide. I only went there [to the Itkillik River] once.* (SRB&A Nuiqsut Interview November 2016)

> *In June we were kind of along the river over here [at] Itkillik. My uncle brought me that way just this summer. It was always too low. This year it was high and that was the very first time [I've been there]. It was a different scenery; I'm so used to going this way.* (SRB&A Nuiqsut Interview November 2016)

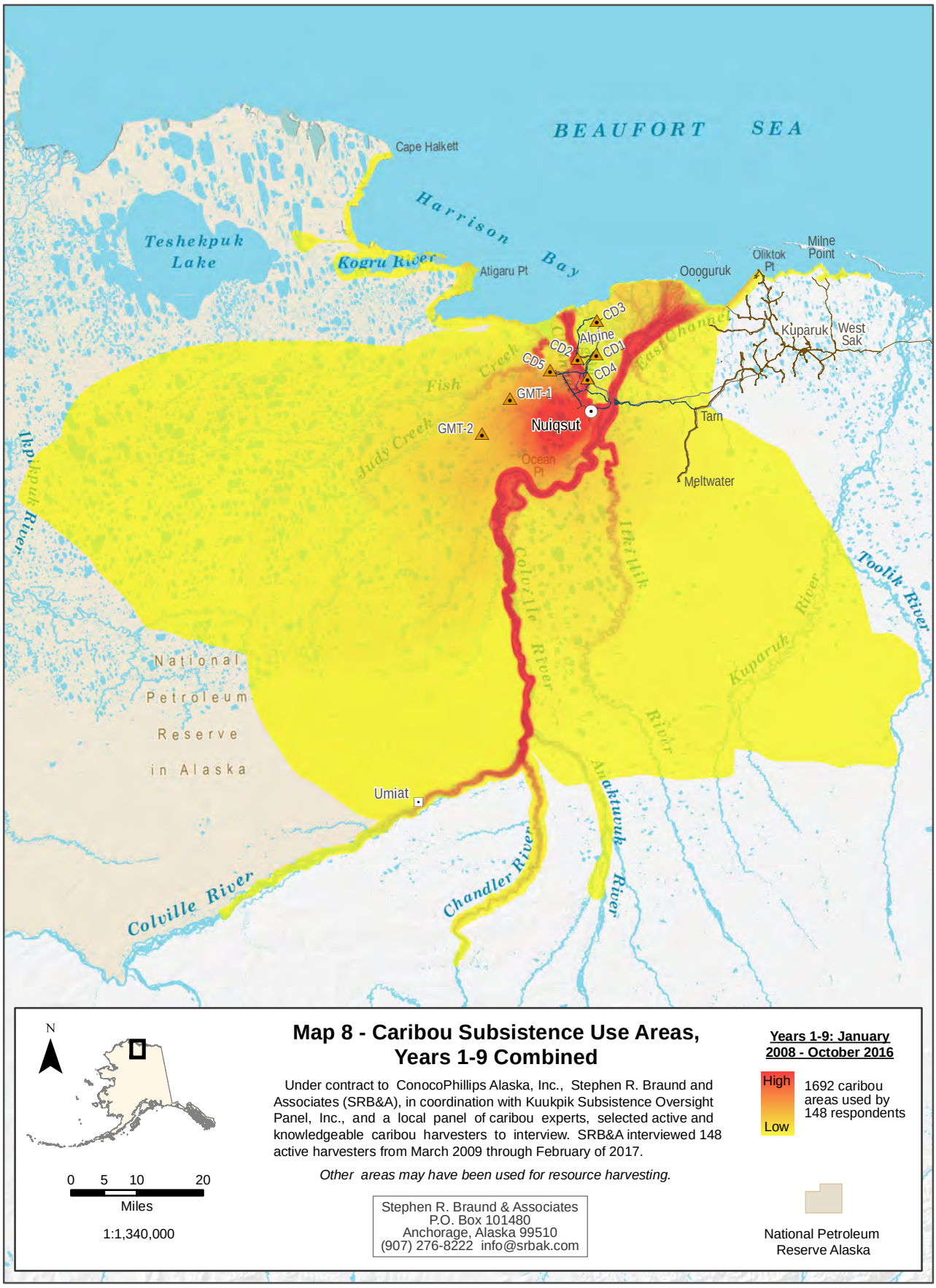
Coastal hunting was comparable to previous years, with at least one hunter traveling to Atigaru Point, and a number of harvesters reporting travel to Oliktok Point. Some respondents reported traveling to Oliktok Point frequently during the previous open water season, primarily to pick up or drop off family or friends using the Haul Road. As one individual described,

> *I didn't get no caribou going out to Oliktok. We kept looking for something, but we never see nothing. Napasulu [all the way to Oliktok]. I probably went 20 times bringing my family back and forth, but didn't see any caribous.* (SRB&A Nuiqsut Interview November 2016)

Map 8 and Map 9 depict caribou use areas for all eight study years, using two different methods. Map 8 shows overlapping use areas for all 1,692 polygons provided over the eight study years combined, while shows overlapping use areas for nine polygons—one merged polygon for each study year. The highest numbers of overlapping use areas during all study years (Map 8) occur along the Colville River, including the Nigliq Channel and East Channel, and as far upriver as Umiat; along the lower portion of the Itkillik River; near the mouth of Fish Creek; and in an overland area between the community, Fish Creek, and Ocean Point. The high use of the Colville River corresponds with the predominance of boat travel for caribou hunting activities. Over the course of the nine study years, use areas have extended as far as Ikpikpuk River in the west and beyond Kuparuk River in the east to Toolik River. Riverine use areas have extended along the Colville, Itkillik, Chandler, and Anaktuvuk rivers as well as along Fish Creek and the Kachemach and Miluveach rivers. Respondents identified coastal subsistence use areas extending from Cape Halkett to beyond Oliktok Point (Map 8). Year 9 (Map 6) differs from the cumulative Year 1 through 8 use areas (Map 8 and Map 9) in that during Year 9 use areas do not extend as far east overland as they have some other years, nor do they extend as far upriver along the Colville River as they have in previous years. Similarities between Map 6 (Year 9 use areas) and Map 8 (representing all years cumulatively) are that the Nigliq and East Channel of the Colville remain highly used, as does the Colville River extending upriver from Nuiqsut.

Map 9 depicts overlapping use areas for all nine years, but instead of portraying all 1,692 polygons individually, this map includes only one polygon per study year. Areas that were used during all nine study years are portrayed in dark red, while areas that were used during only one study year are shown in lightest yellow. Areas used during two to eight study years are shown in various shades of red, orange and yellow. Areas used during a majority of the study years include the Colville River (including the Nigliq Channel, East Channel and nearby tributaries, and portions of the middle Colville River delta) to Umiat; the Chandler and Itkillik rivers; Fish Creek; coastal areas to Oliktok Point and Atigaru Point; an overland area west of the community between Nuiqsut, Ocean Point, and Fish Creek; and an overland area to the southeast of the community surrounding the Itkillik River.

Map 10 shows the geographic locations of Nuiqsut caribou harvest sites, as noted by respondents during interviews using a 1:250,000 scale USGS map. Year 9 caribou harvest locations are shown in red, with previous study years' harvest locations shown in gray. In order to maintain a degree of confidentiality and also to account for the fact that respondents are often unable to pinpoint the exact location of a harvest due



Map 8 - Caribou Subsistence Use Areas, Years 1-9 Combined

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 148 active harvesters from March 2009 through February of 2017.

Other areas may have been used for resource harvesting.

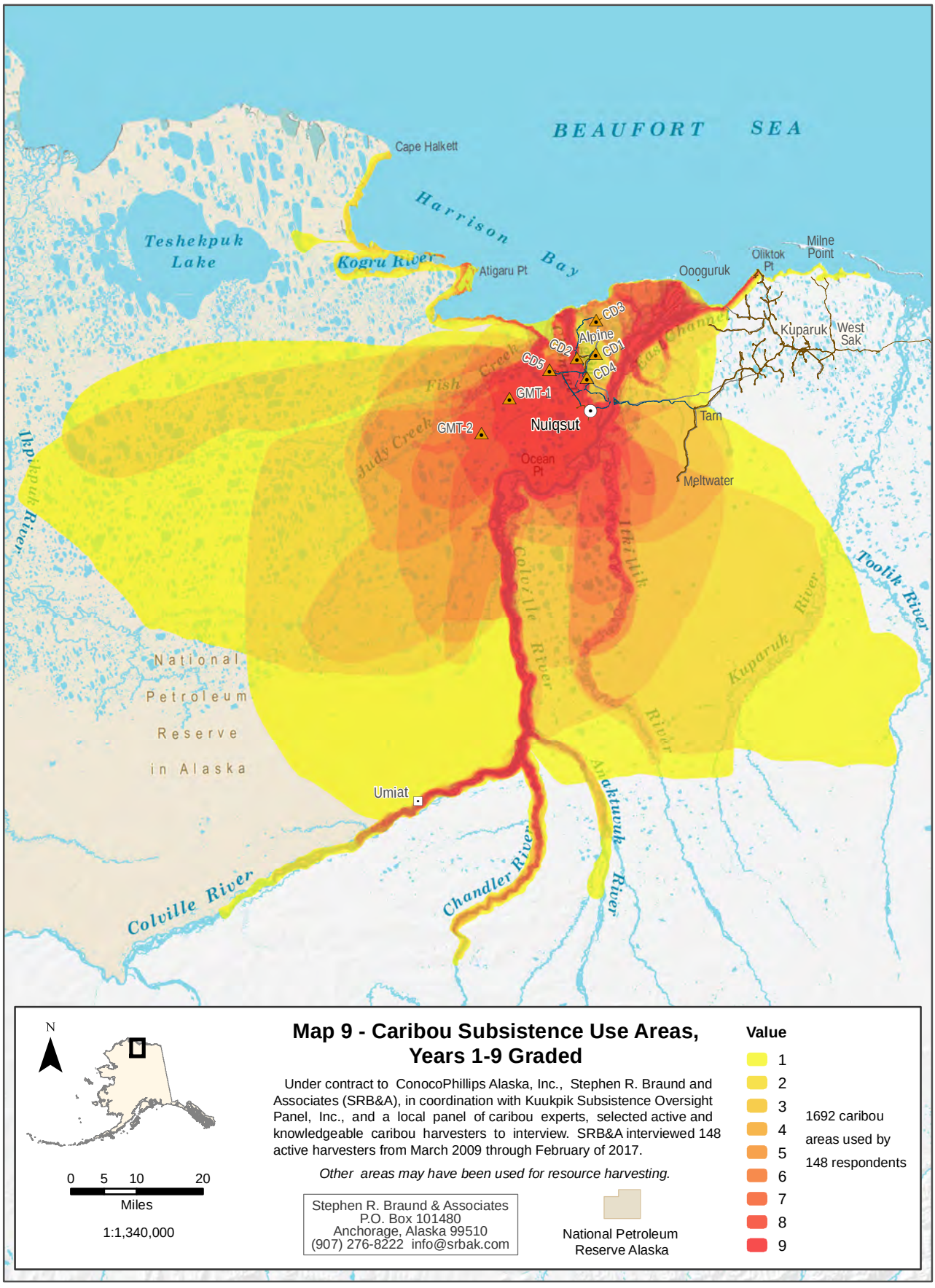
Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

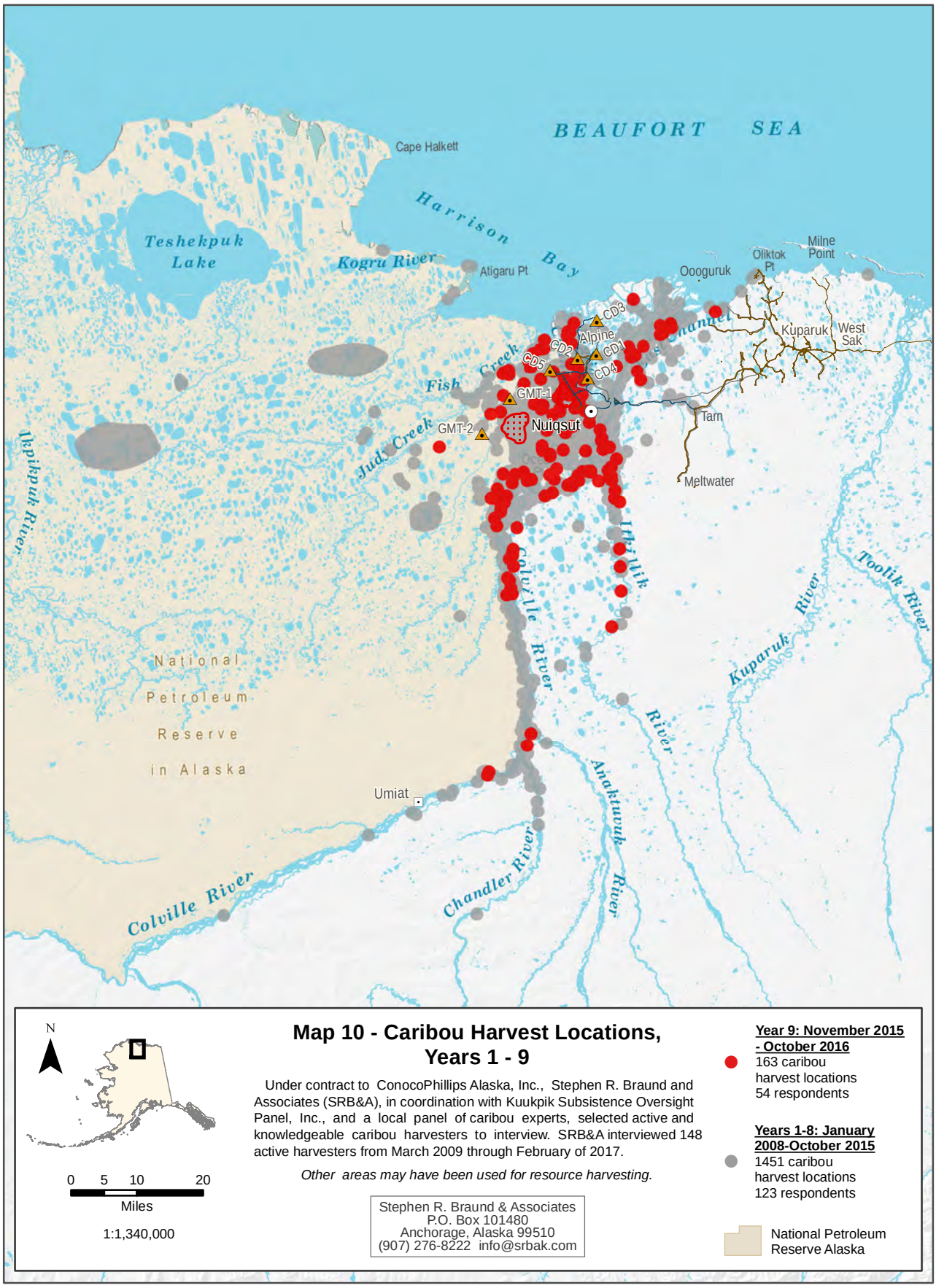
Years 1-9: January 2008 - October 2016

High
Low

1692 caribou areas used by 148 respondents

National Petroleum Reserve Alaska


BEAUFORT SEA
Cape Halkett
Harrison Bay
Teshekpuk Lake
Kogru River
Atigaru Pt
Oooguruk
Oliktok Pt
Milne Point
Kuparuk
West Sak
CD3
Alpine
CD2
CD1
CD5
CD4
GMT-1
GMT-2
Nuiqsut
Tarn
Meltwater
Ocean Pt
Fish Creek
Judy Creek
East Channel
Ikpikpuk River
Itkillik River
Colville River
Toolik River
Kuparuk River
National Petroleum Reserve in Alaska
Umiat
Colville River
Chandler River
Anaktuvuk River
N
0 5 10 20
Miles
1:1,340,000
Map 9 - Caribou Subsistence Use Areas, Years 1-9 Graded
Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 148 active harvesters from March 2009 through February of 2017.
Other areas may have been used for resource harvesting.
Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com
National Petroleum Reserve Alaska
Value
1
2
3
4
5
6
7
8
9
1692 caribou areas used by 148 respondents



Map 10 - Caribou Harvest Locations, Years 1 - 9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 148 active harvesters from March 2009 through February of 2017.

Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

Year 9: November 2015 - October 2016
163 caribou harvest locations
54 respondents

Years 1-8: January 2008-October 2015
1451 caribou harvest locations
123 respondents

National Petroleum Reserve Alaska

to the scale and accuracy of the USGS map, SRB&A shows all harvest locations as points buffered at a one-mile radius (or two-mile diameter). In some cases, respondents were unable to identify the exact location of the caribou they harvested, or they harvested a large number of caribou spread over a general area, and those areas were documented as polygons rather than as points. Fifty-four respondents reported harvesting caribou at 163 harvest locations in Year 9.

Respondents reported successful harvests in the Colville River Delta; upriver to the confluence of the Chandler and Colville rivers, along Itkillik River and Fish Creek; and in overland areas to the west of Nigliq Channel and the community. Few harvests occurred upriver from Sentinel Hill on the Colville River. A large number of caribou harvests took place in the area to the west between the village of Nuiqsut and Fish Creek, along the Spur Road, around Ocean Point, along the Itkillik River, and along the Nigliq Channel and East Channel of the Colville River.

Map 11 shows harvest density for all study years combined, with areas of higher harvest concentration shown in red. SRB&A determined harvest density through the use of the Kernel Density Tool (or Point Density Tool) located in the Spatial Analyst toolbox in ArcGIS. The Kernel Density Tool creates an analysis grid, in this case using 100x100 meter cells, to calculate the magnitude per unit area (in this case the number of caribou harvested) from a point feature (harvest locations shown on Map 8) that fall within a one mile radius of each cell. SRB&A chose the one mile radius in order to account for variation in accuracy due to recording harvest locations on a 1:250,000 USGS map (see discussion above). The map accounts for all reported caribou harvests from all nine study years. Over the course of the nine study years, 138 respondents have noted 1,574 caribou harvest locations, most of which are shown on Map 11 (Map 11 does not include harvest locations that were reported as polygons). The highest concentrations of harvest locations over the nine study years have occurred along the Nigliq Channel to the north of the community; along the East Channel near *Pisiktaġvik;* within a few miles of Nuiqsut overland to the west and north; and along the Colville to the south, particularly near the mouth of Itkillik River, in the area of Ocean Point, near the mouth of Kikiakrorak River, and near Sentinel Hill.

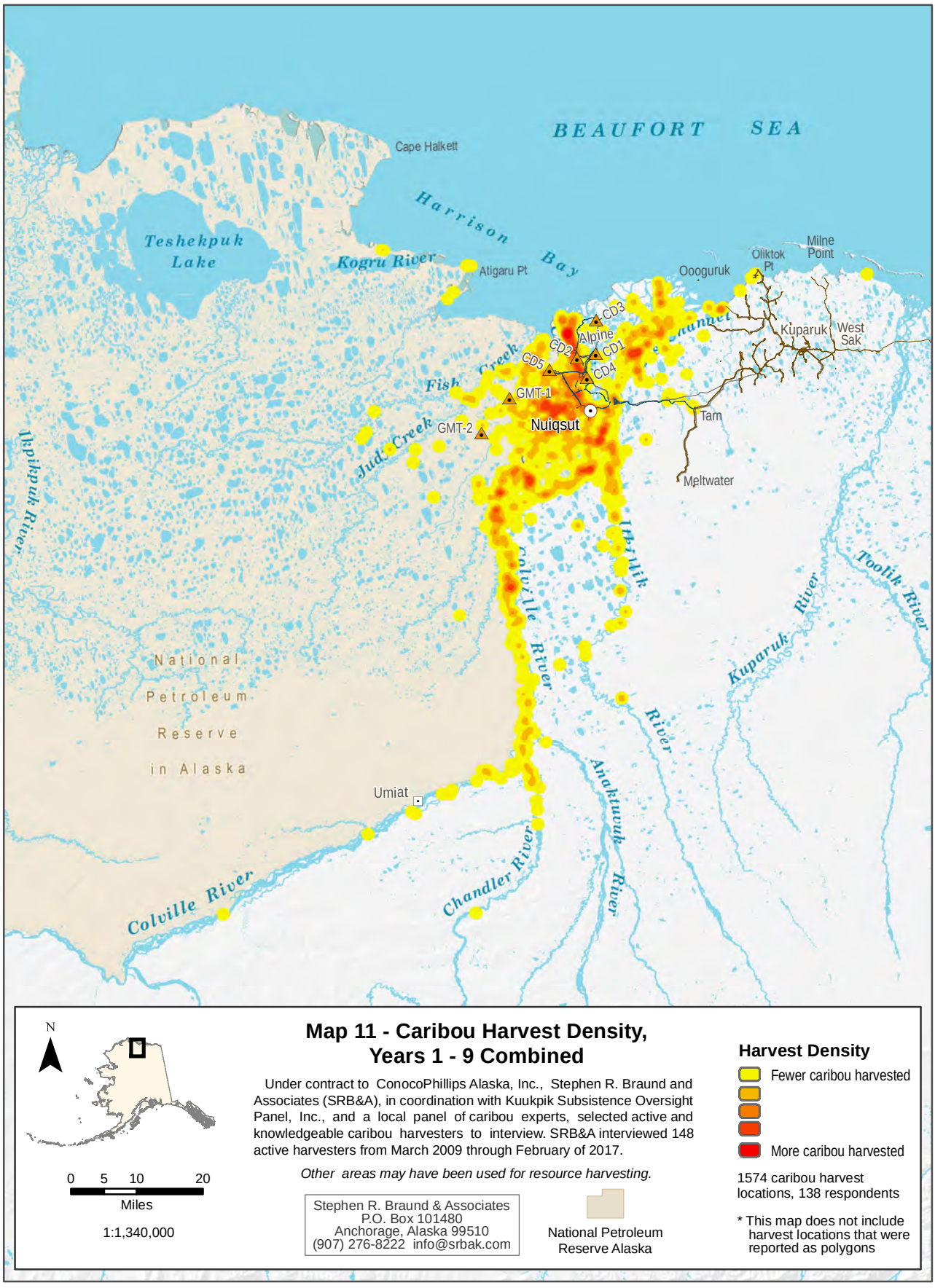
Map 12 shows the same data for individual study years using the method described above. The concentration of harvests in Year 9 are similar to recent years (Years 6 through 8). Years 6 through 9 differ from the first five study years in that they show fewer areas of high harvest density along Nigliq Channel, with the exception of the camp at Nigliq which residents continue to use for fishing while waiting for caribou to approach the river corridor. In Year 9, a high concentration of harvests is evident at Nigliq, along the Spur Road north of the community and overland to the west of the community, near the mouth of Miluveach River, at a location on the Itkillik River, and near Sentinel Hill. Year 9 also showed moderate harvest concentrations near *Pisiktaġvik,* along Kachemach River, near the mouth of Itkillik River, along Fish Creek, and at various locations along the Colville River between Nuiqsut and Sentinel Hill.

Characteristics of Caribou Use Areas and Harvest Sites

Study participants characterized their Year 9 caribou use areas for the following variables: timing of hunting activities, travel method, success (measured according to whether the respondent successfully harvested caribou in the use area or not), duration of trips, and frequency of trips. Caribou harvest locations were characterized by month, number of caribou harvested, sex of caribou harvested, and size of herd from which the caribou were harvested. The following sections describe the characteristics listed above as they pertain to caribou use areas and harvest sites.

Timing

Figure 1 shows that caribou hunting activities over the nine study years have occurred during every month of the year, with the most use areas reported in July and August. For Year 9, respondents reported traveling to over 50 percent of their caribou use areas during the month of July (55 percent), with nearly 50 percent (49 percent) visited in August. Year 9 shows a somewhat higher percentage of use areas reported during the winter months of November through April when compared to most previous years, except for Year 3.



Map 11 - Caribou Harvest Density, Years 1 - 9 Combined

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 148 active harvesters from March 2009 through February of 2017.

Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

National Petroleum Reserve Alaska

Harvest Density

Fewer caribou harvested

More caribou harvested

1574 caribou harvest locations, 138 respondents

* This map does not include harvest locations that were reported as polygons

Map 12 - Caribou Harvest Density: Years 1-9 Individually

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 148 active harvesters from March 2009 through February of 2017.

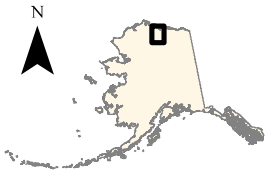
Other areas may have been used for resource harvesting.

Harvest Density

Fewer caribou harvested

More caribou harvested

National Petroleum Reserve Alaska



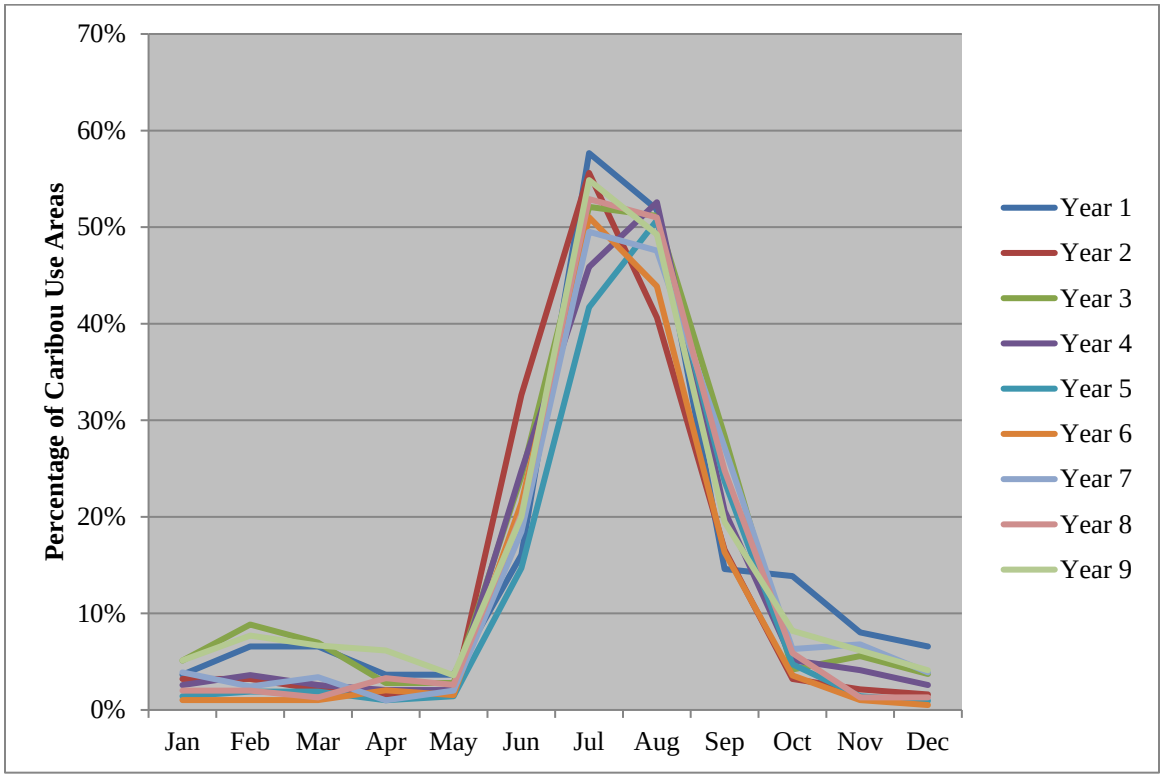
0 20 40 80

Miles

SCALE: 1:1,500,000

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

Figure 1: Nuiqsut Percentage of Caribou Use Areas by Month, Years 1-9



Stephen R. Braund & Associates, 2017.

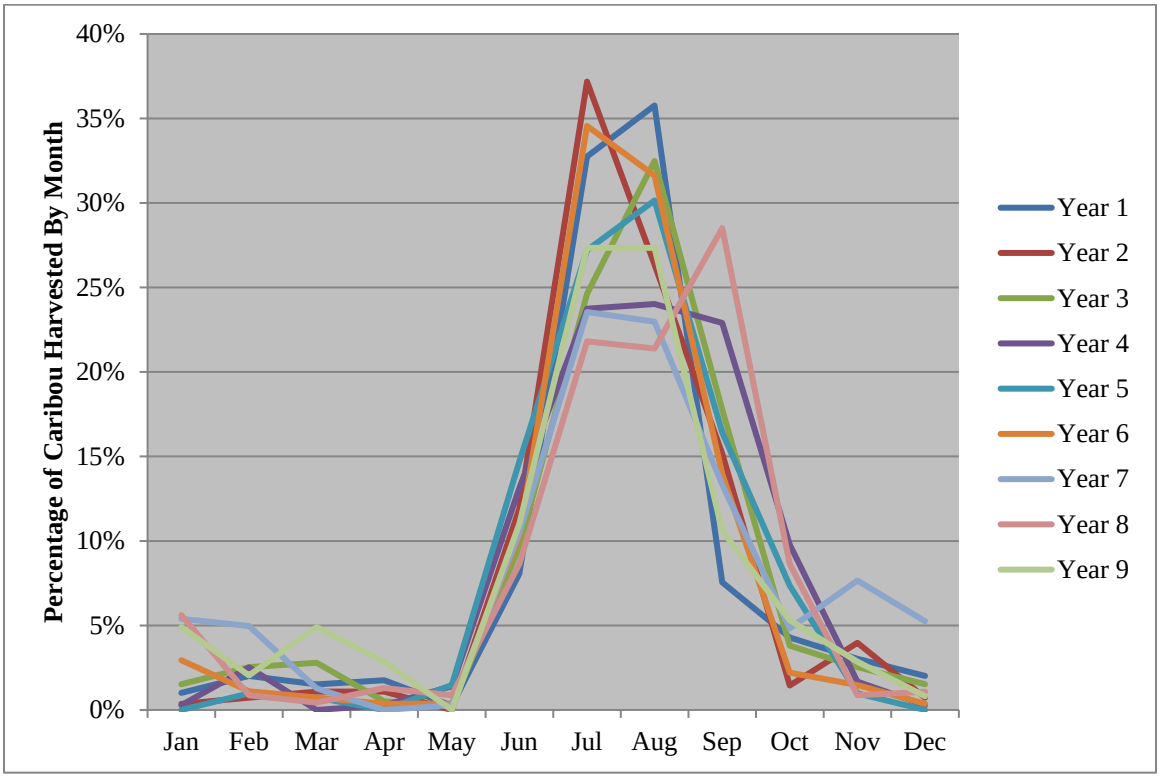
Error! Not a valid bookmark self-reference. shows the percentage of caribou harvested by respondents, by month. In most years, July and August have accounted for a majority of the harvest. July and August are usually the peak months for caribou harvest activity because caribou are migrating into the area in large numbers, the rivers have opened which allow for boat travel (many residents' preferred method to hunt caribou), and most other major subsistence activities are not occurring (e.g., moose hunting, bowhead whaling, arctic cisco fishing). Later in August, some residents begin preparing for the bowhead whale hunt in September. While many individuals continue to hunt caribou during September, some shift their focus to bowhead whaling or moose hunting:

> *In August, I start slowing down hunting and I start preparing for whaling. June and July and first week of August. Afterwards I start slowing down and start preparing for whaling.* (SRB&A Nuiqsut Interview November 2016)

> *[I went boating during the] end of June until late August—no, beginning of September because from September 1st to the 14th is moose season.* (SRB&A Nuiqsut Interview November 2016)

> *Not [caribou hunting in] September. From September 1st into moose season, I go full on moose.* (SRB&A Nuiqsut Interview November 2016)

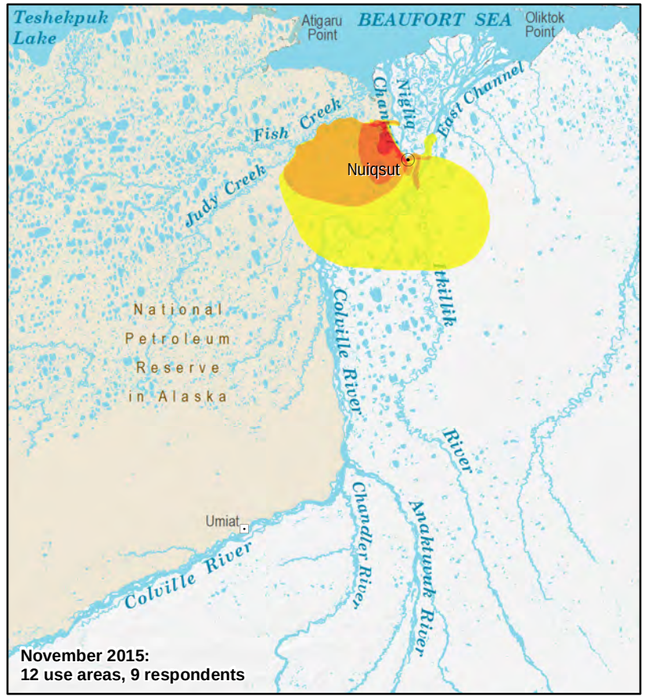
Figure 2: Nuiqsut Percentage of Caribou Harvested by Month, Years 1-9



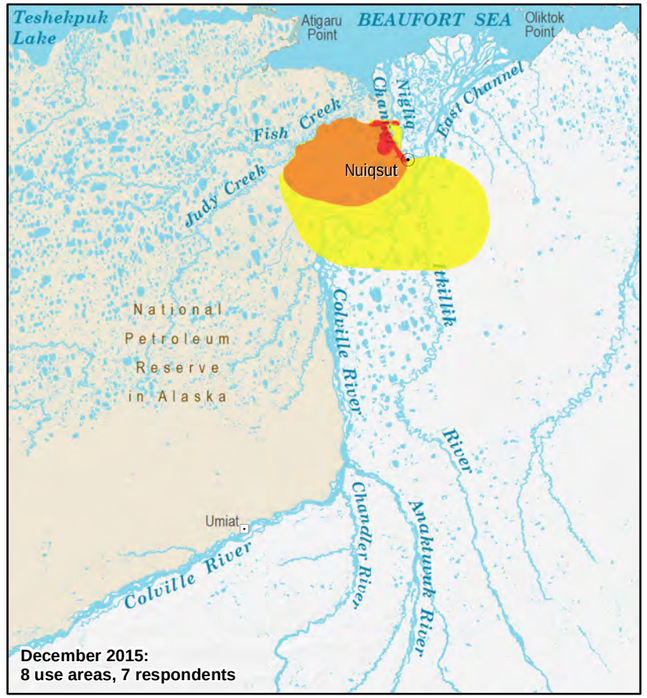
Stephen R. Braund & Associates, 2017.

Year 8 marked the first year of the eight study years where September accounted for the greatest percentage of the harvest (29 percent). In Year 9, while July and August continued to be the peak harvest months, they accounted for a smaller percentage of harvests compared to some previous study years, at 27 percent, and the number of reported harvests during those months was lower than any previous year. January and March showed a higher percentage of harvests in Year 9 (five percent each) compared to most previous study years. As mentioned above, respondents noted that there was a lack of snow in Year 9 and a late start to the season. As one respondent said, "We just got our snow in October. It was a month and a half late, the snow" (SRB&A Nuiqsut Interview November 2016). While this would typically affect the ability to hunt during the winter, accessibility to the Spur Road likely facilitated winter hunting in Year 9. Other months were relatively consistent compared to the past.

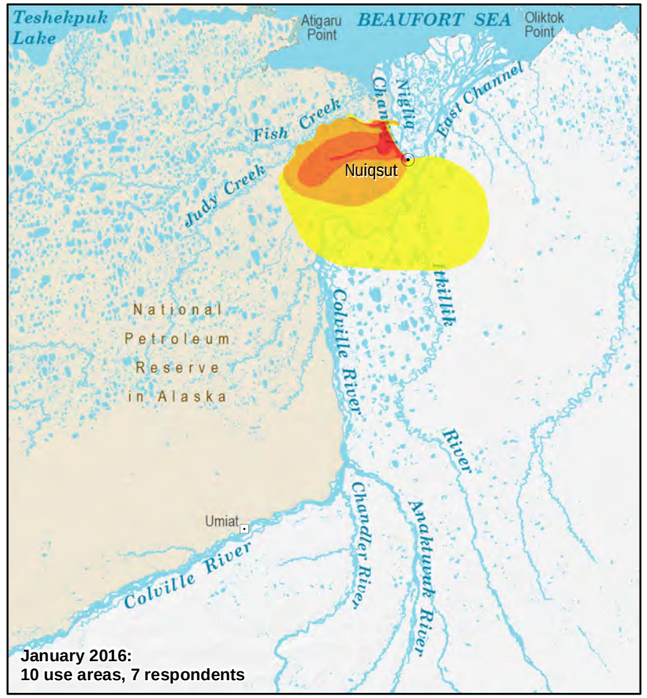
Map 13 through Map 16 show Year 9 caribou subsistence use areas and harvest locations by month, and Map 17 and Map 18 show the extent of previous study years (Years 1 through 8) as a single polygon, with all harvest locations, by month. According to Year 9 active harvester interviews, during the winter/spring months of November through April, harvesters traveled primarily along the Spur Road, part of the CD5 road, and connected ice roads, with some individuals also reporting larger overland areas accessed by snowmachine. A number of harvest locations were reported during the November through April time period, primarily along the road system. Year 9 hunting activities from November to April occurred within the extent of previous years (Map 17 and Map 18). Travel along the Spur Road and ice roads continued into May, with some limited use of the Nigliq Channel by boat. In June, hunting activities shifted to concentrate more along river channels, although some activity along the Spur Road continued throughout the summer. June saw primarily upriver travel toward Ocean Point with some hunting effort along Nigliq Channel and the East Channel; use of both Nigliq Channel and the East Channel increased in July, as did upriver travel to Sentinel Hill and beyond. River travel continued into August and September. Overland travel to the west



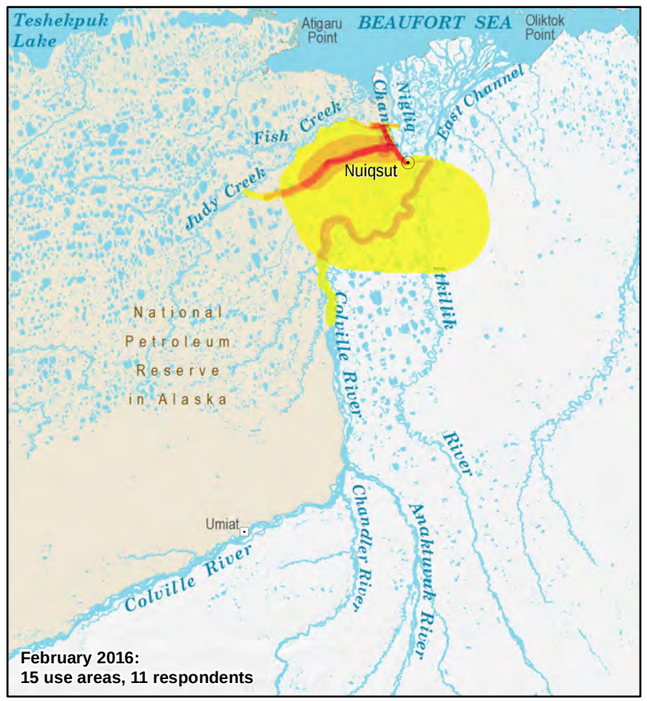
November 2015:
12 use areas, 9 respondents



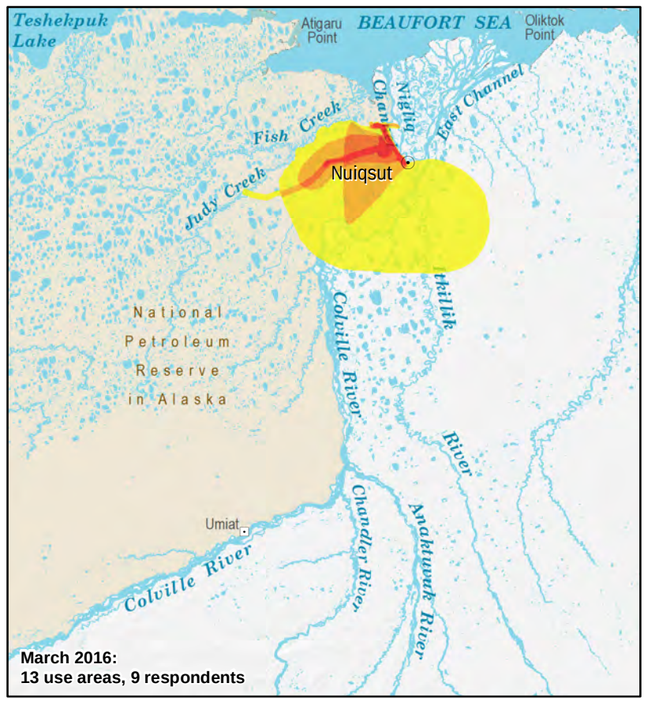
December 2015:
8 use areas, 7 respondents



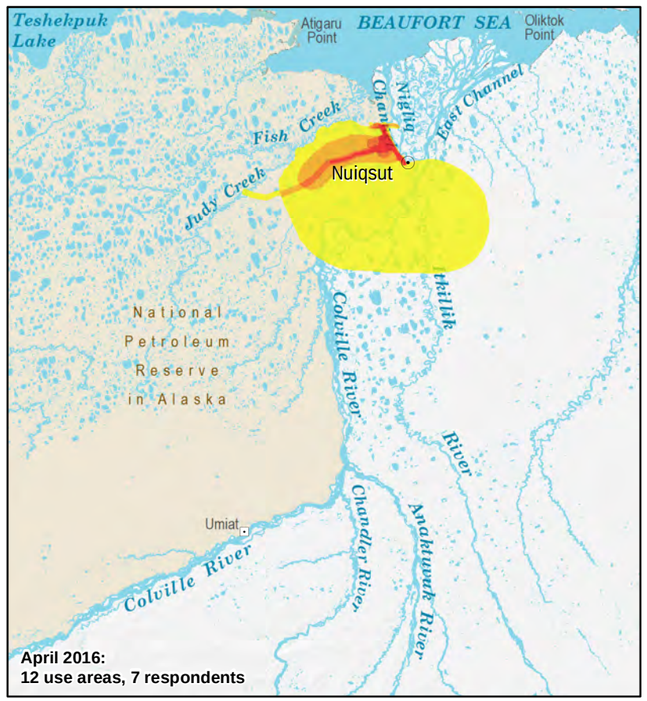
January 2016:
10 use areas, 7 respondents



February 2016:
15 use areas, 11 respondents



March 2016:
13 use areas, 9 respondents



April 2016:
12 use areas, 7 respondents

Map 13
Caribou Subsistence Use Areas, November - April, Year 9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

Other areas may have been used for resource harvesting.

LEGEND

Overlapping Polygons

High

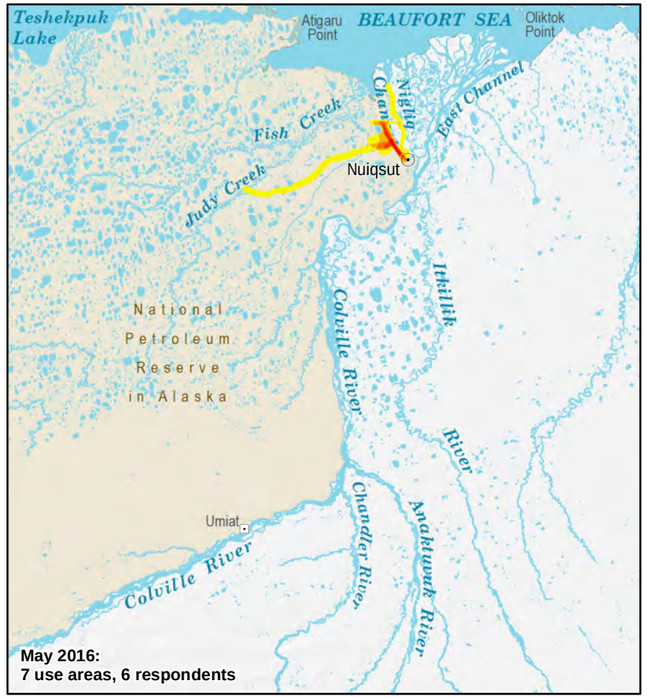
Low

National Petroleum Reserve Alaska

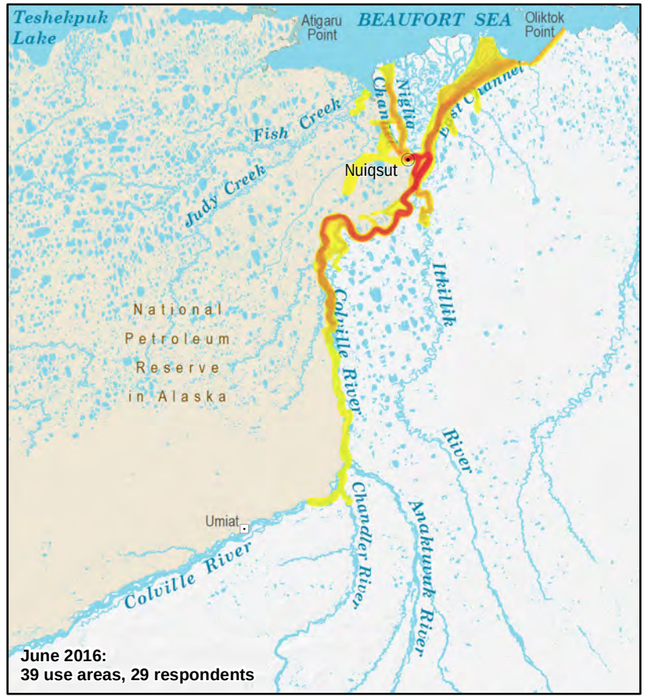
0 5 10 20
Miles

SCALE: 1:1,800,000

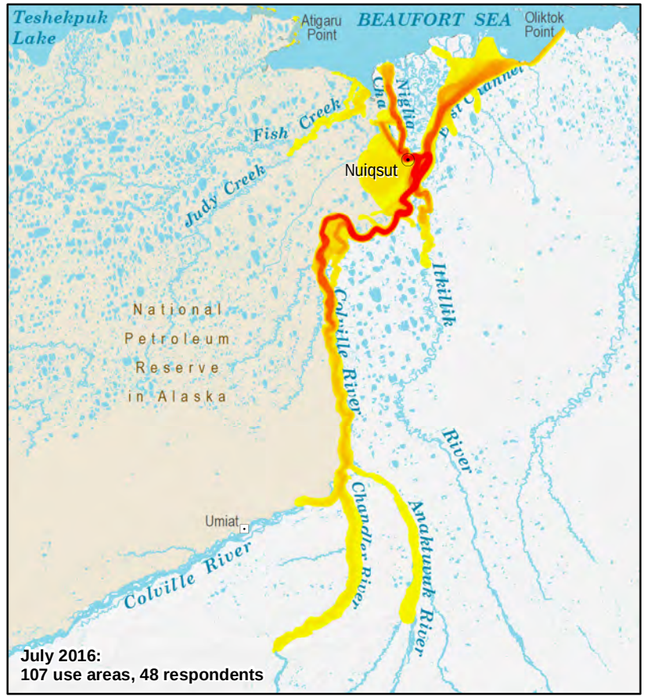
Stephen R. Braund & Associates
P.O. Box 1480
Anchorage, Alaska 99510
(907) 276-8222 srba@alaska.net



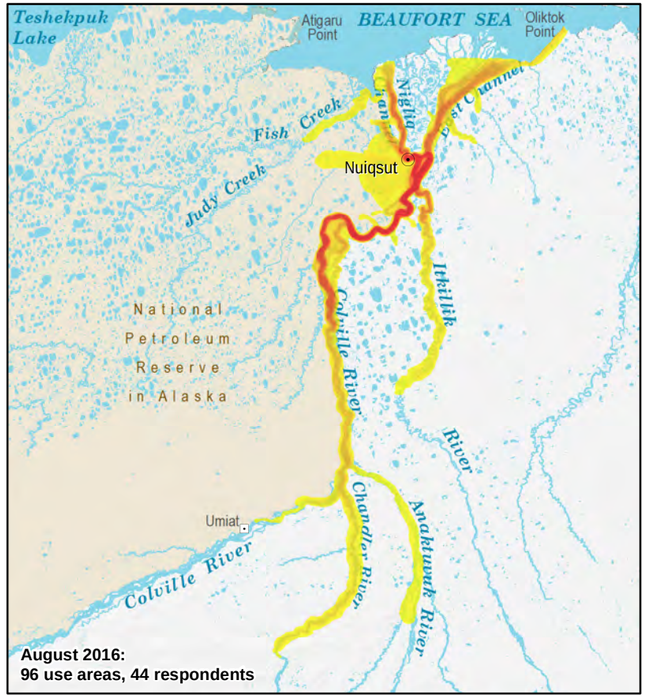
May 2016:
7 use areas, 6 respondents



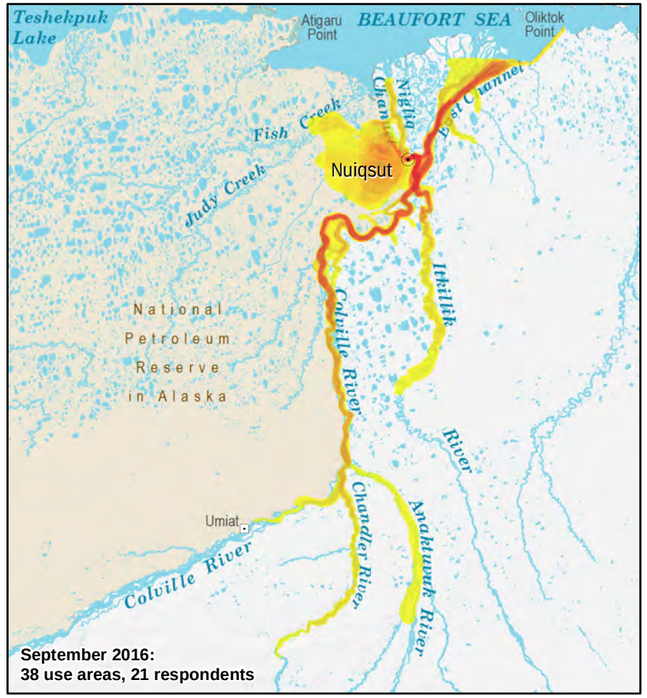
June 2016:
39 use areas, 29 respondents



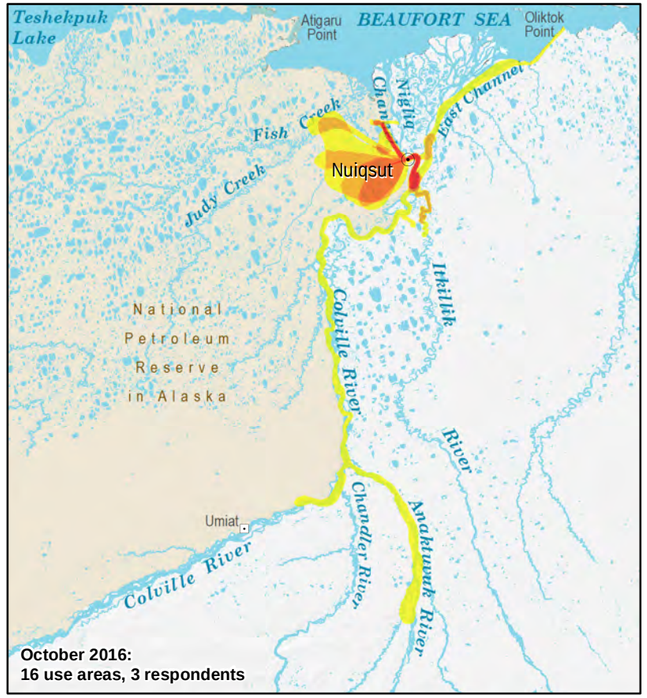
July 2016:
107 use areas, 48 respondents



August 2016:
96 use areas, 44 respondents



September 2016:
38 use areas, 21 respondents



October 2016:
16 use areas, 3 respondents

Map 14
Caribou Subsistence Use Areas, May - October, Year 9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

Other areas may have been used for resource harvesting.

LEGEND

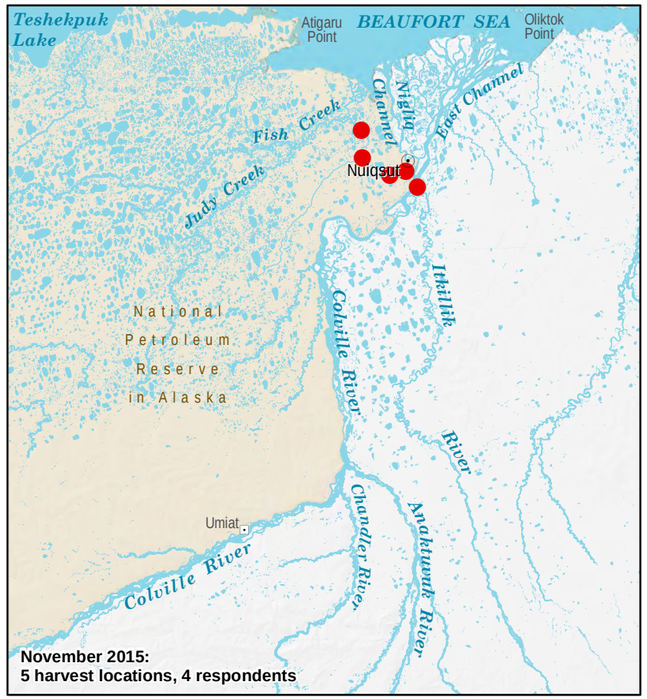
Overlapping Polygons

National Petroleum Reserve Alaska

0 5 10 20
Miles

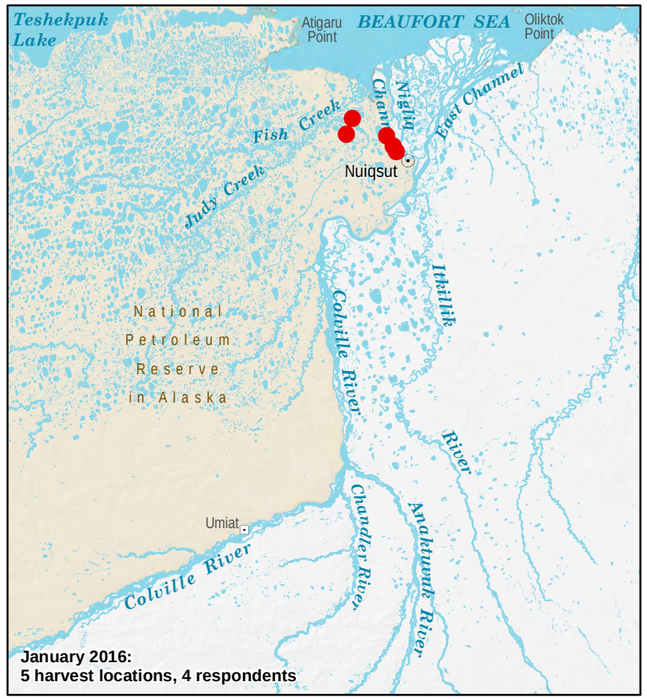
SCALE: 1:1,800,000

Stephen R. Braund & Associates
P.O. Box 1480
Anchorage, Alaska 99510
(907) 276-8222 srba@alaska.net

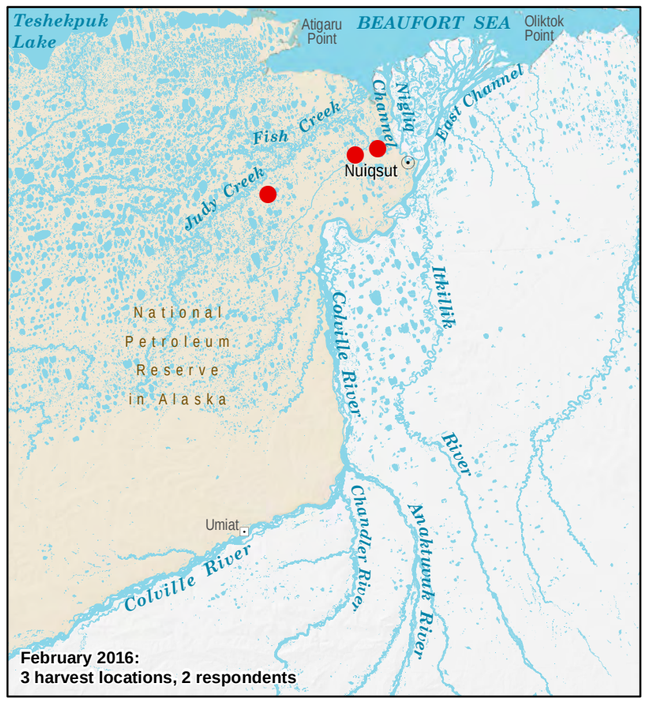


November 2015:
5 harvest locations, 4 respondents

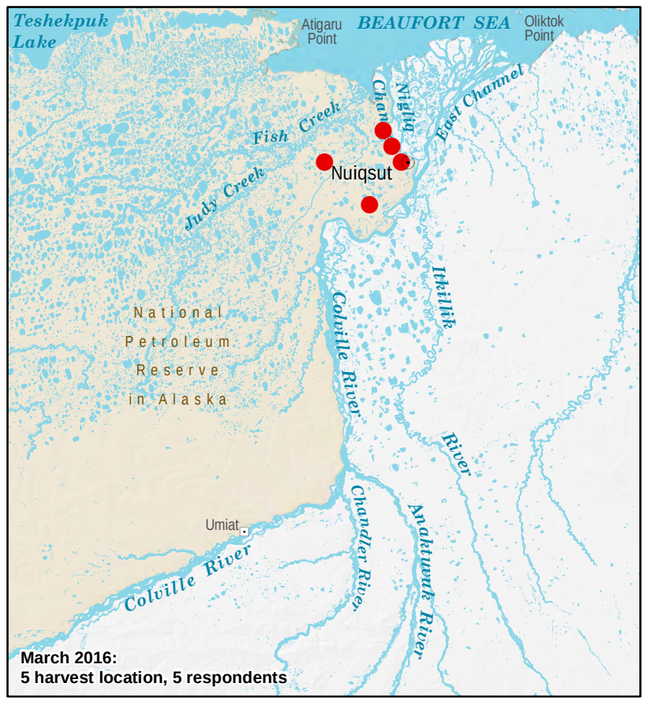
December 2015:
2 harvest locations, 2 respondents



January 2016:
5 harvest locations, 4 respondents



February 2016:
3 harvest locations, 2 respondents



March 2016:
5 harvest location, 5 respondents

April 2016:
4 harvest locations, 2 respondents

Map 15
Caribou Harvest Locations
November - April, Year 9

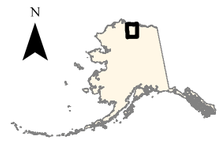
Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

Other areas may have been used for resource harvesting.

LEGEND

Harvest Locations

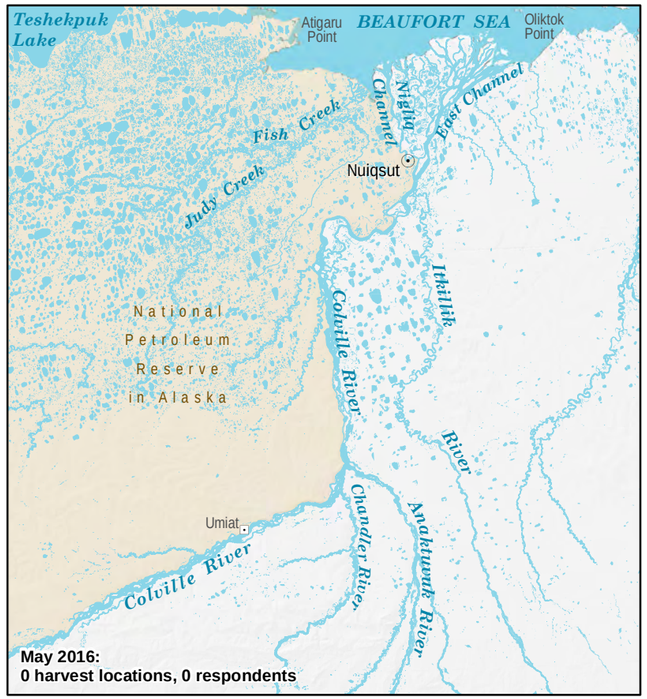
National Petroleum Reserve Alaska



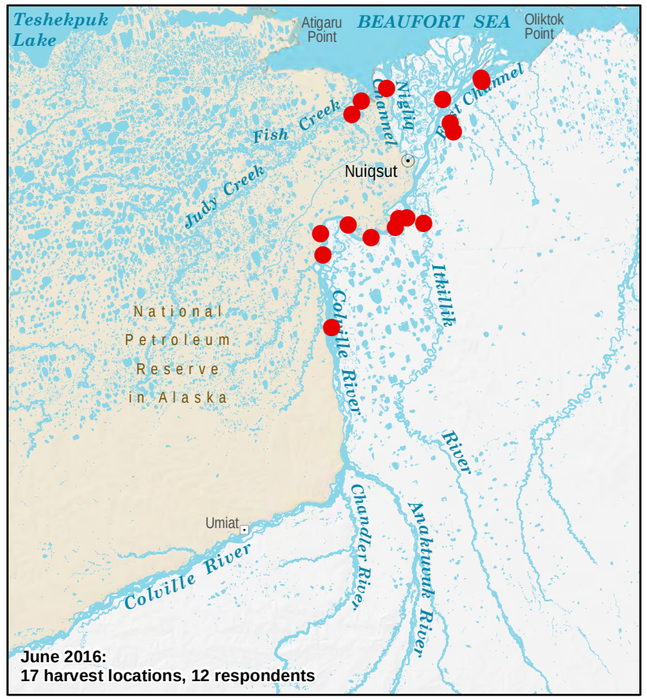
0 5 10 20
Miles

SCALE: 1:1,800,000

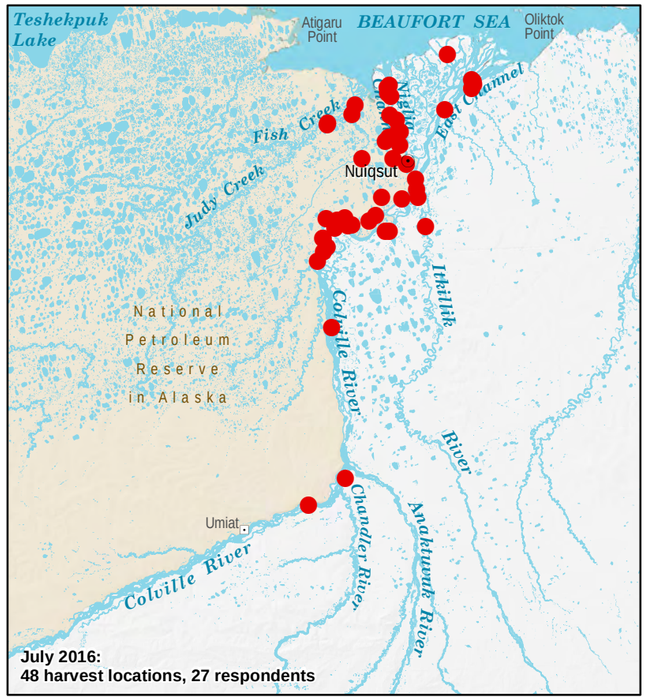
Stephen R. Braund & Associates
P.O. Box 1480
Anchorage, Alaska 99510
(907) 276-8222 srba@alaska.net



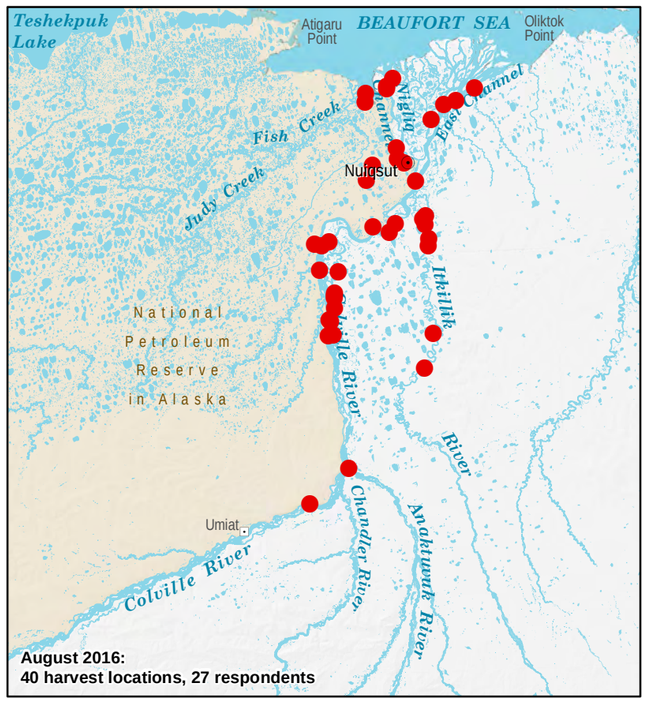
May 2016:
0 harvest locations, 0 respondents



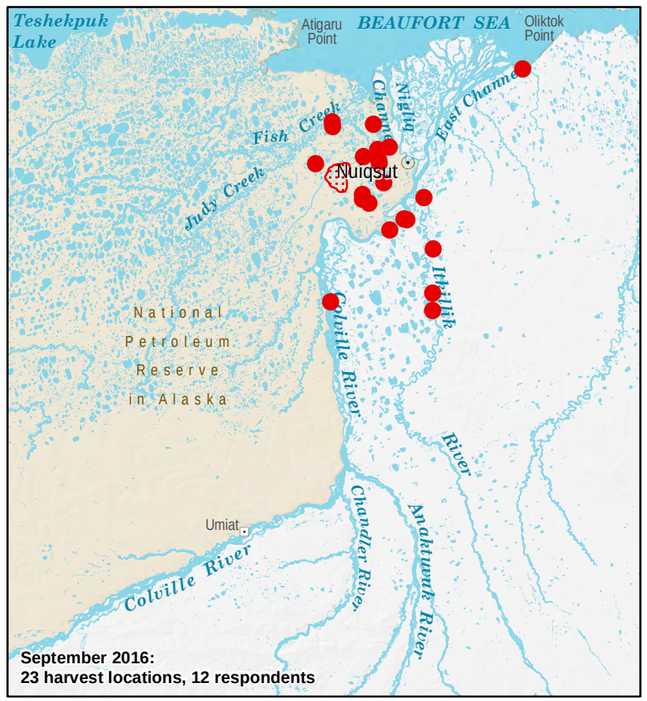
June 2016:
17 harvest locations, 12 respondents



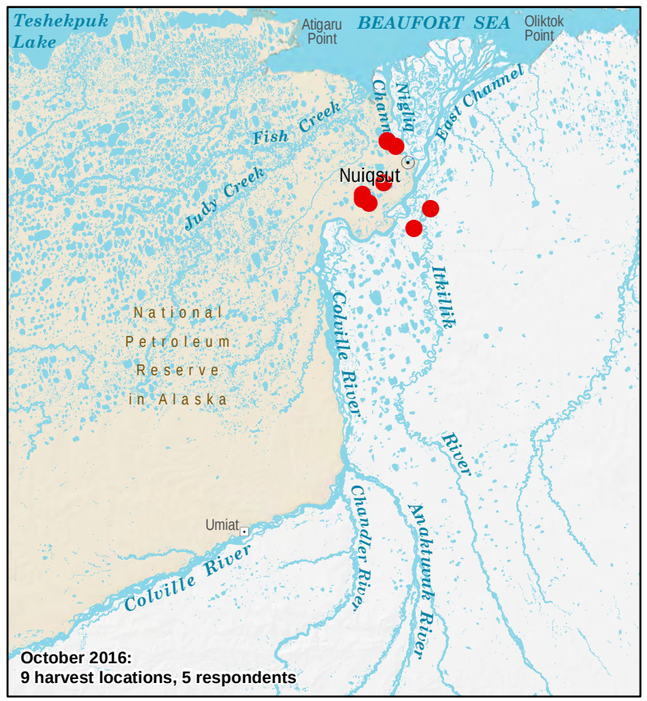
July 2016:
48 harvest locations, 27 respondents



August 2016:
40 harvest locations, 27 respondents



September 2016:
23 harvest locations, 12 respondents



October 2016:
9 harvest locations, 5 respondents

Map 16
Caribou Harvest Locations
May - October, Year 9

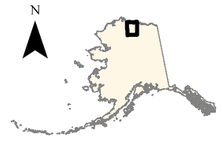
Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

Other areas may have been used for resource harvesting.

LEGEND

Harvest Locations

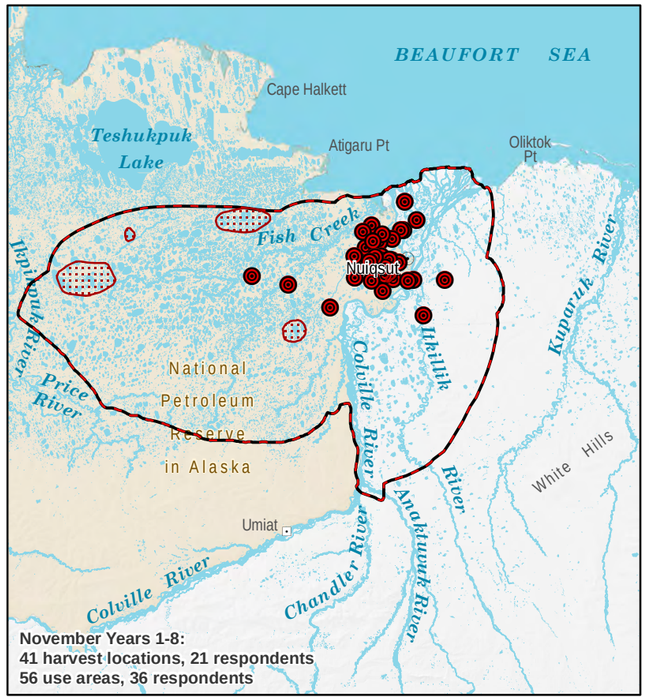
National Petroleum Reserve Alaska



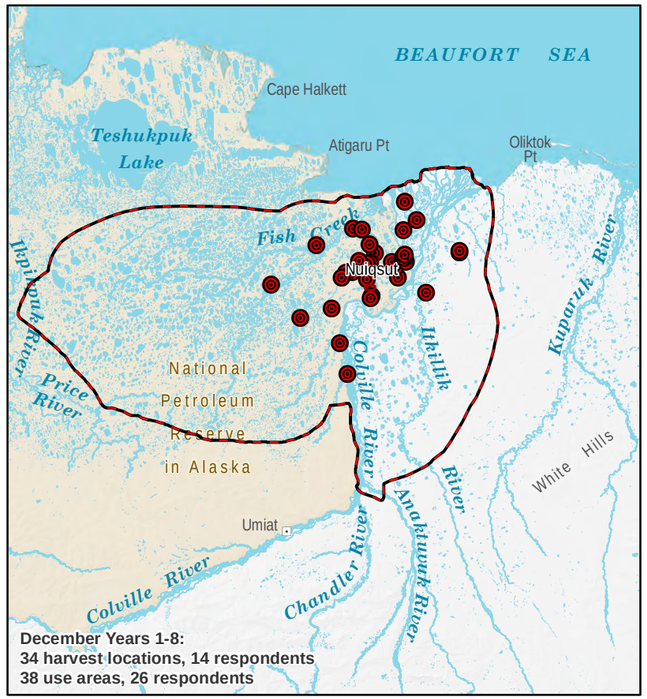
0 5 10 20
Miles

SCALE: 1:1,800,000

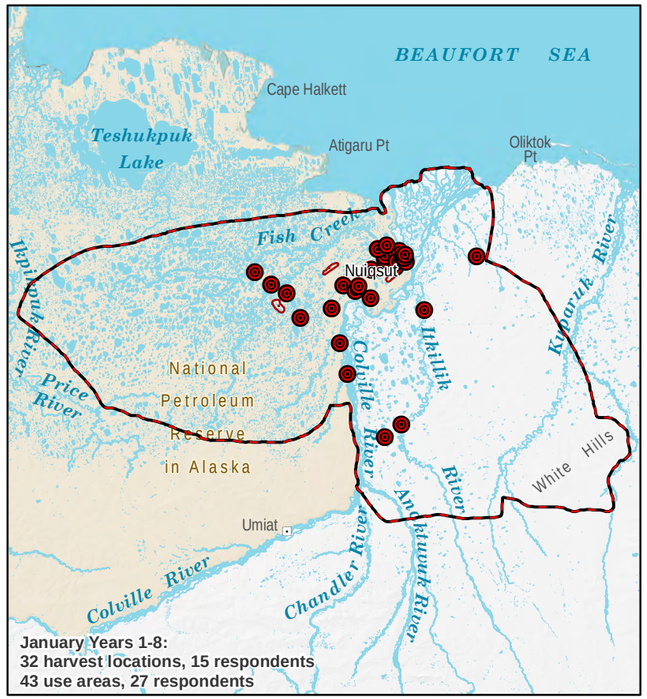
Stephen R. Braund & Associates
P.O. Box 1480
Anchorage, Alaska 99510
(907) 276-8222 srba@alaska.net



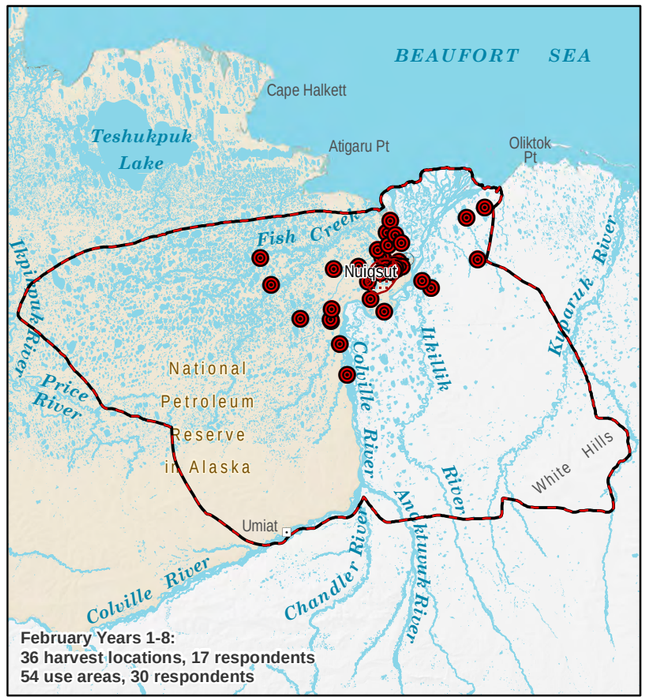
November Years 1-8:
41 harvest locations, 21 respondents
56 use areas, 36 respondents



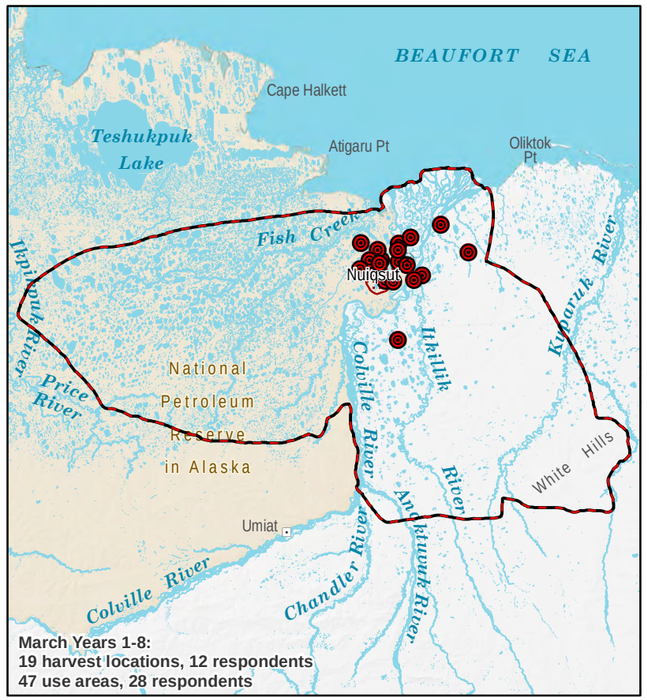
December Years 1-8:
34 harvest locations, 14 respondents
38 use areas, 26 respondents



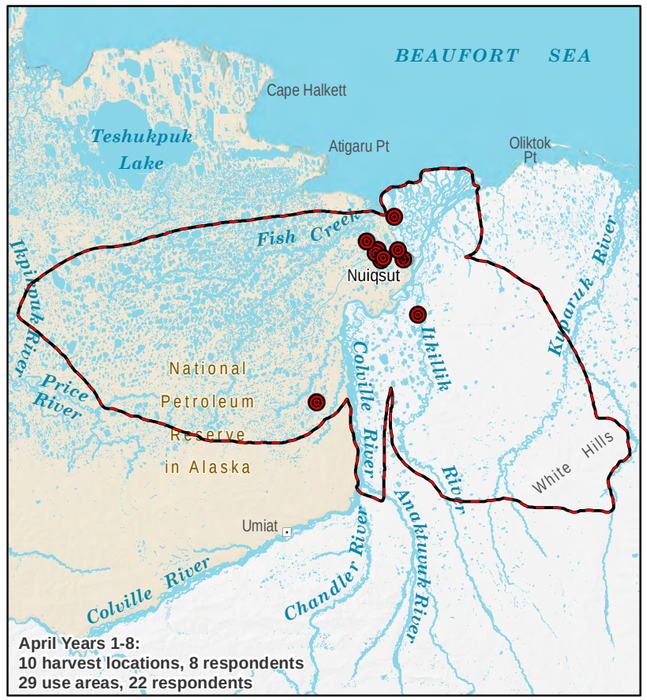
January Years 1-8:
32 harvest locations, 15 respondents
43 use areas, 27 respondents



February Years 1-8:
36 harvest locations, 17 respondents
54 use areas, 30 respondents



March Years 1-8:
19 harvest locations, 12 respondents
47 use areas, 28 respondents



April Years 1-8:
10 harvest locations, 8 respondents
29 use areas, 22 respondents

Map 17
Caribou Harvest Locations and Use Areas, November - April, Years 1-8

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 130 active harvesters from March of 2009 through February of 2017.

Other areas may have been used for resource harvesting.

LEGEND

Harvest Locations

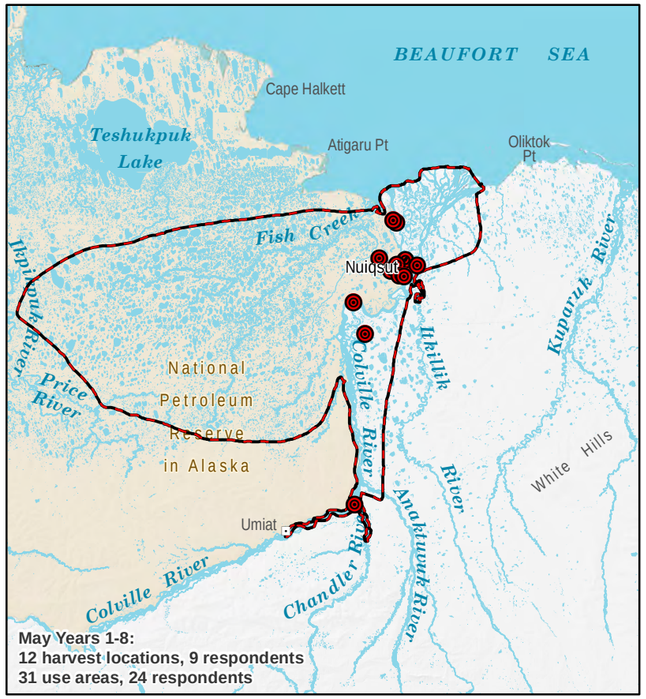
Use Areas

National Petroleum Reserve Alaska

0 10 20 40
Miles

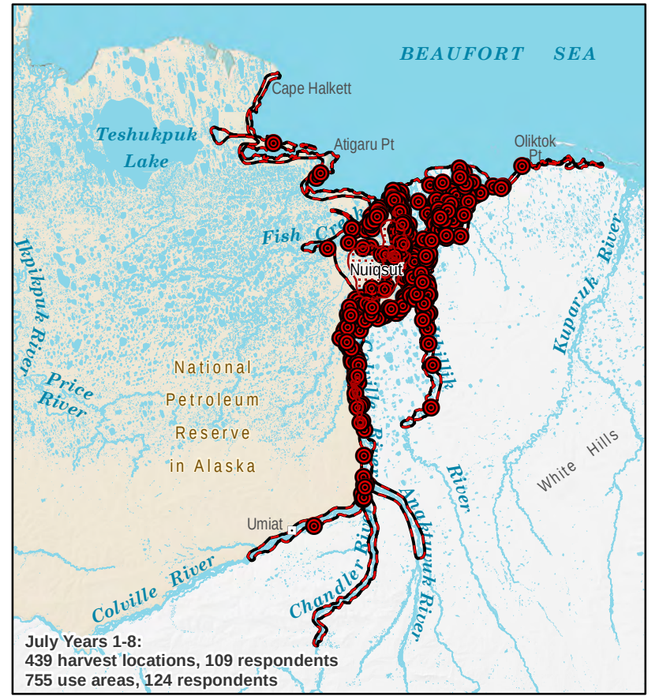
SCALE: 1:1,800,000

Stephen R. Braund & Associates
P.O. Box 1480
Anchorage, Alaska 99510
(907) 276-8222 srba@alaska.net

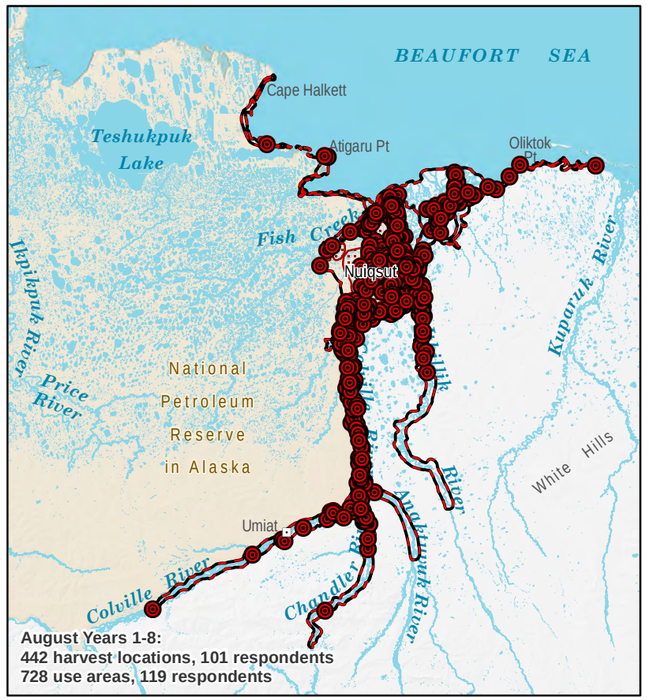


May Years 1-8:
12 harvest locations, 9 respondents
31 use areas, 24 respondents

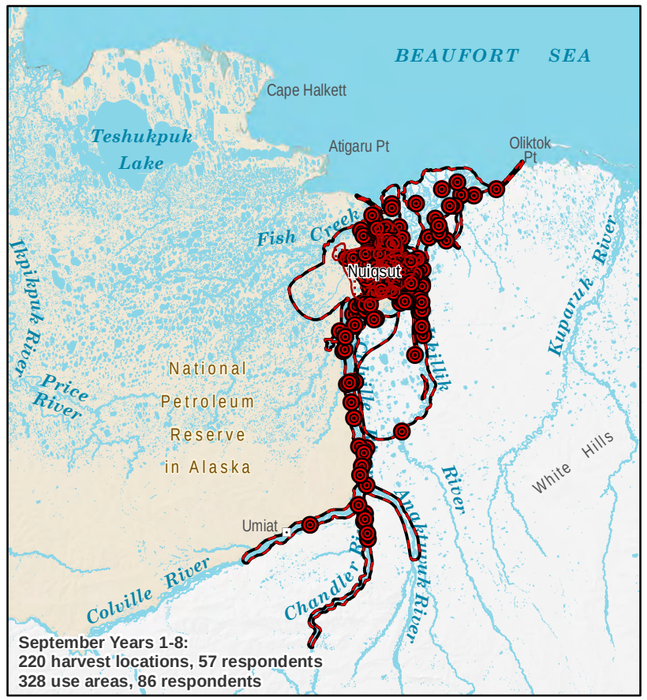
June Years 1-8:
152 harvest locations, 60 respondents
325 use areas, 89 respondents



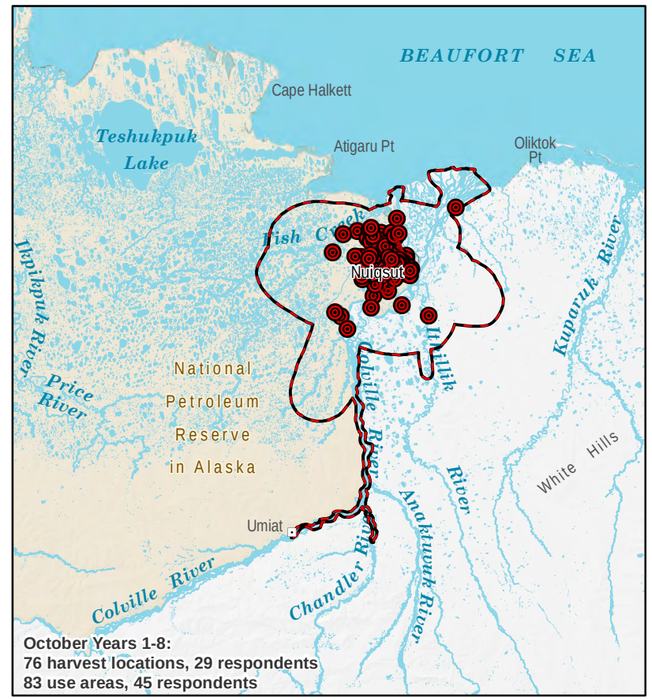
July Years 1-8:
439 harvest locations, 109 respondents
755 use areas, 124 respondents



August Years 1-8:
442 harvest locations, 101 respondents
728 use areas, 119 respondents



September Years 1-8:
220 harvest locations, 57 respondents
328 use areas, 86 respondents



October Years 1-8:
76 harvest locations, 29 respondents
83 use areas, 45 respondents

Map 18
Caribou Harvest Locations and Use Areas, May - October, Years 1-8

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 130 active harvesters from March of 2009 through February of 2017.

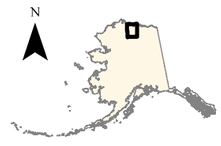
Other areas may have been used for resource harvesting.

LEGEND

Harvest Locations

Use Areas

National Petroleum Reserve Alaska



0 10 20 40
Miles

SCALE: 1:1,800,000

Stephen R. Braund & Associates
P.O. Box 1480
Anchorage, Alaska 99510
(907) 276-8222 srba@alaska.net

of the community occurred during July and August, but was most prominent during September and October. Use of the Spur Road picked up again in October.

Harvest sites were generally located in areas of high overlap during each month. No harvest locations were reported in the month of May. Harvests in June were focused upriver from the community toward Ocean Point; successful harvests increased and extended to Nigliq Channel and the East Channel in July. In August, residents continued harvesting caribou along local river channels (including Itkillik River, Fish Creek, and the Upper Colville River), with some overland harvests occurring as well. September harvests occurred most frequently to the west of the community but also near Itkillik River. Year 9 use areas and harvest locations for the May to October time period, were within the extent of previous years (Map 17 and Map 18).

Travel Method

Several new trends in travel method started in Years 7 and 8 and continued into Year 9. Although boat remained the principle travel method to caribou use areas, the past several years have shown a decrease in boat reliance to harvest caribou, from between 74 and 80 percent of use areas to between 65 and 70 percent in Years 7 through 9. In Year 9, respondents used boat to access 69 percent of caribou use areas. Snowmachine use areas were at an all-time low in Year 9, at six percent of use areas, while truck use increased substantially from two percent or less of use areas in Years 1 through 7 to eight percent in Year 8 and 14 percent in Year 9 (Table 9). Four-wheeler use was reported at 13 percent of use areas, higher than the average across all years. The increased use of truck, and possibly also four-wheeler, is likely due to respondents' increased use of the recently constructed Spur Road:

> *[I travel by] four-wheeler, truck, [and] snowmachine. At least 30 to 20 plus [trips on the Spur Road by four-wheeler]. Like a hundred times [I went searching for caribou by truck on the Nuiqsut Spur Road], we got like 20 caribou with a truck. Like 10 times [I hunted for caribou along the Spur Road by snowmachine], [but] it's too rough to ride a snowmachine, there's never enough snow.* (SRB&A Nuiqsut Interview November 2016)

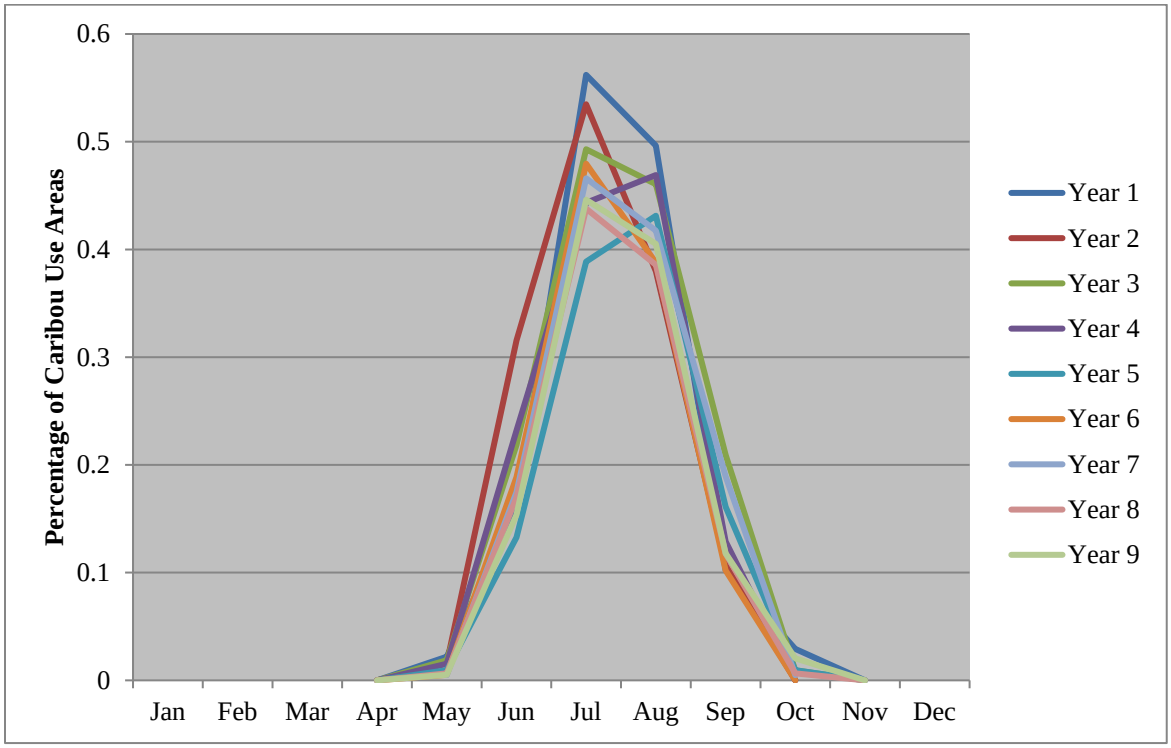
Table 9: Travel Method to Caribou Use Areas, Years 1-9

Travel Method	Percentage of Caribou Use Areas								
	Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**
Boat	74%	80%	74%	80%	74%	77%	70%	65%	69%
Snowmachine	22%	9%	16%	12%	8%	10%	15%	8%	6%
Four-wheeler	4%	9%	9%	9%	17%	11%	14%	18%	13%
Truck	2%	2%	<1%	0%	1%	1%	1%	8%	14%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

Stephen R. Braund & Associates, 2017.

In general, boat travel begins as soon as the ice breaks up in June and continues until sometime in September when the waterways ice over again; in some years, boat travel can commence as early as May and extend as late as October. In terms of the number of use areas, the peak month for boat travel for Years 1, 2, and 3 was July, with Years 4 and 5 having a slightly later peak in August, and Years 6, 7, 8, and 9 peaking again in July (
Figure 3). Annual differences in the peak of boating activities may be explained by the timing of break up in the spring and the availability, or lack of availability, of caribou in boat-accessed use areas during each ice-free month.

Figure 3: Boat Use by Month, Years 1-9

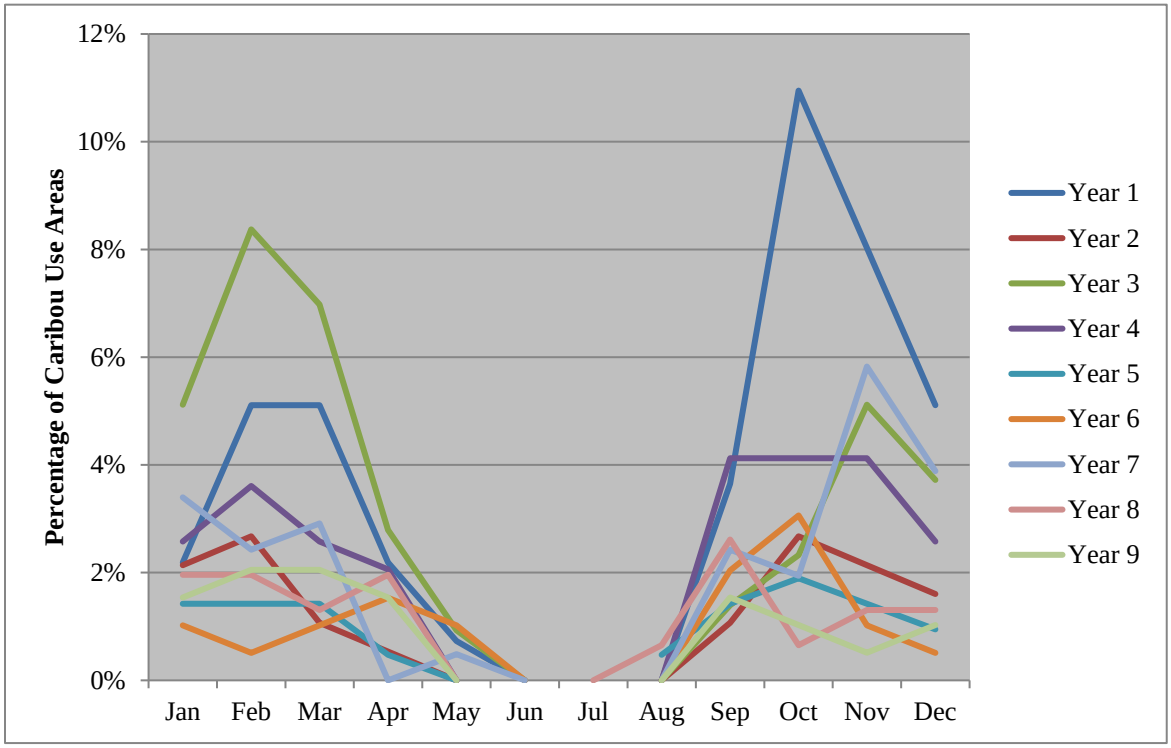


Stephen R. Braund & Associates, 2017.

Snowmachine use by active harvesters generally occurs beginning in September through April or May depending on the snow cover. During Year 9, snowmachine use occurred from September through April, with the peak in February and March (two percent of use areas) (**Error! Not a valid bookmark self-reference.**). As mentioned above, in Year 9, only six percent of use areas were accessed by snowmachine, the lowest of any study year. During the Nuiqsut Caribou Panel meeting in November 2016, panel members noted that there had been little snow during the previous winter, which may explain the limited use of snowmachines in Year 9. As with boat, the extent of snowmachine use is dependent on the weather and the availability of caribou during the winter months. Hunters often report traveling by snowmachine to harvest caribou only when they are confident that there is a herd relatively close to the community, when they are conducting other winter subsistence activities (e.g., wolf and wolverine hunting), or when they are in need of caribou meat.

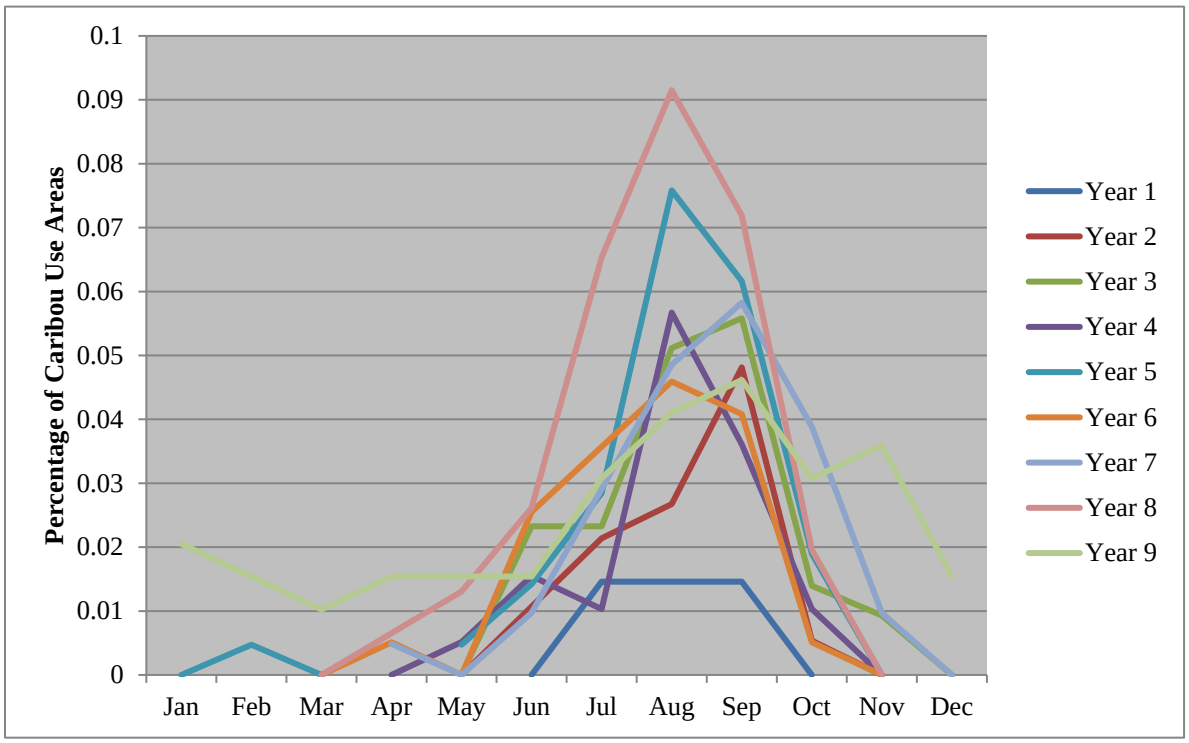
Four-wheeler use is usually limited to the summer and fall months, starting in April/May and tapering off in October/November (Figure 5). In Year 9, four-wheeler use extended outside the usual time frame of May through October, and occurred year-round. This was likely due to residents having access to the Spur Road year-round, which allowed them to use four-wheelers at times when conditions would typically not be conducive. Similar to previous study years, four-wheeler use in Year 9 peaked in August and September; a second peak occurred during the month of November. Overall, Year 9 continued the trend of respondents accessing a higher percentage of use areas with four-wheelers during the past five study years (between 11 and 18 percent) than during the first half of the study, when four-wheelers consistently accounted for less than 10 percent of use areas.

Figure 4: Snowmachine Use by Month, Years 1-9



Stephen R. Braund & Associates, 2017.

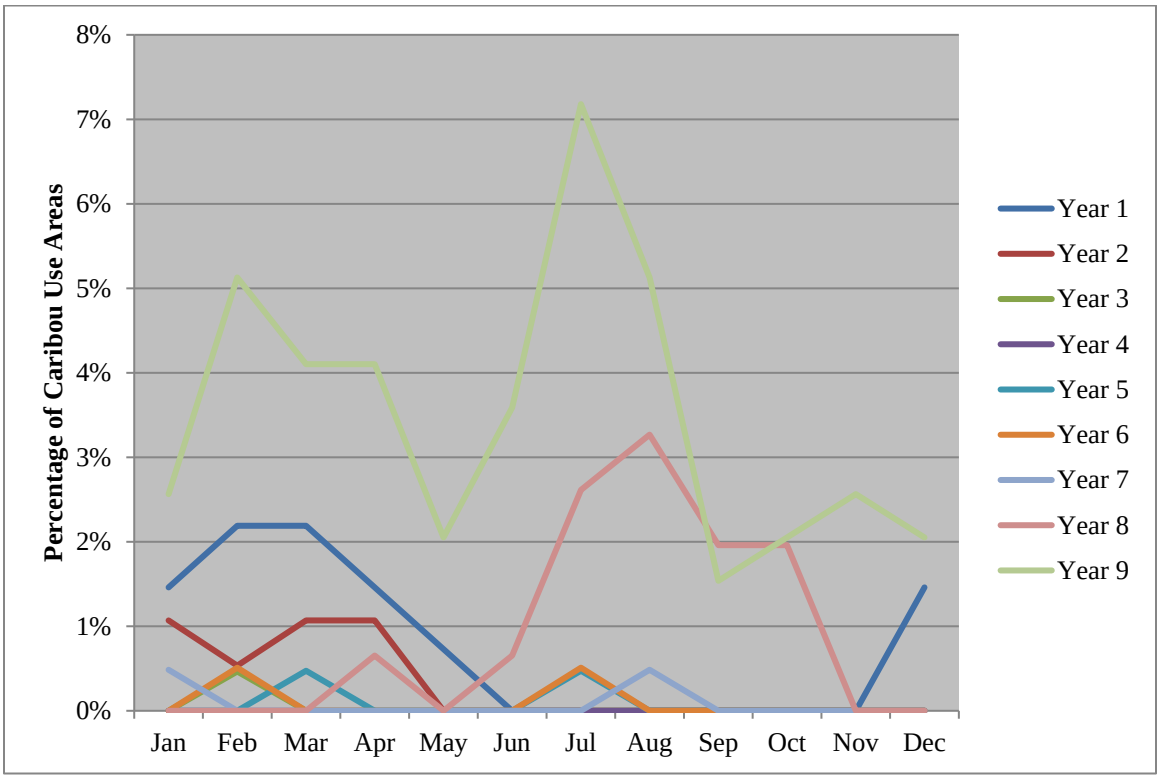
Figure 5: Four-wheeler Use by Month, Years 1-9



Stephen R. Braund & Associates, 2017.

Previous reports for Years 1 through 7 did not include a figure for truck travel method by month due to the low use of this travel method in general. However, because of the noted increase in truck use during Year 8 and again in Year 9 (see Table 9) the study team added a corresponding travel method by month figure for truck (Figure 6). As shown in the figure, truck travel in Years 1 through 7 was primarily limited to the winter months when ice roads were accessible for travel. However, with the opening of the Spur Road to CD5, truck use in Years 8 and 9 increased during non-winter months. In Year 9, truck use peaked during the month of July and August and continued at lower levels throughout the fall, winter, and spring, with a second peak occurring in the month of February.

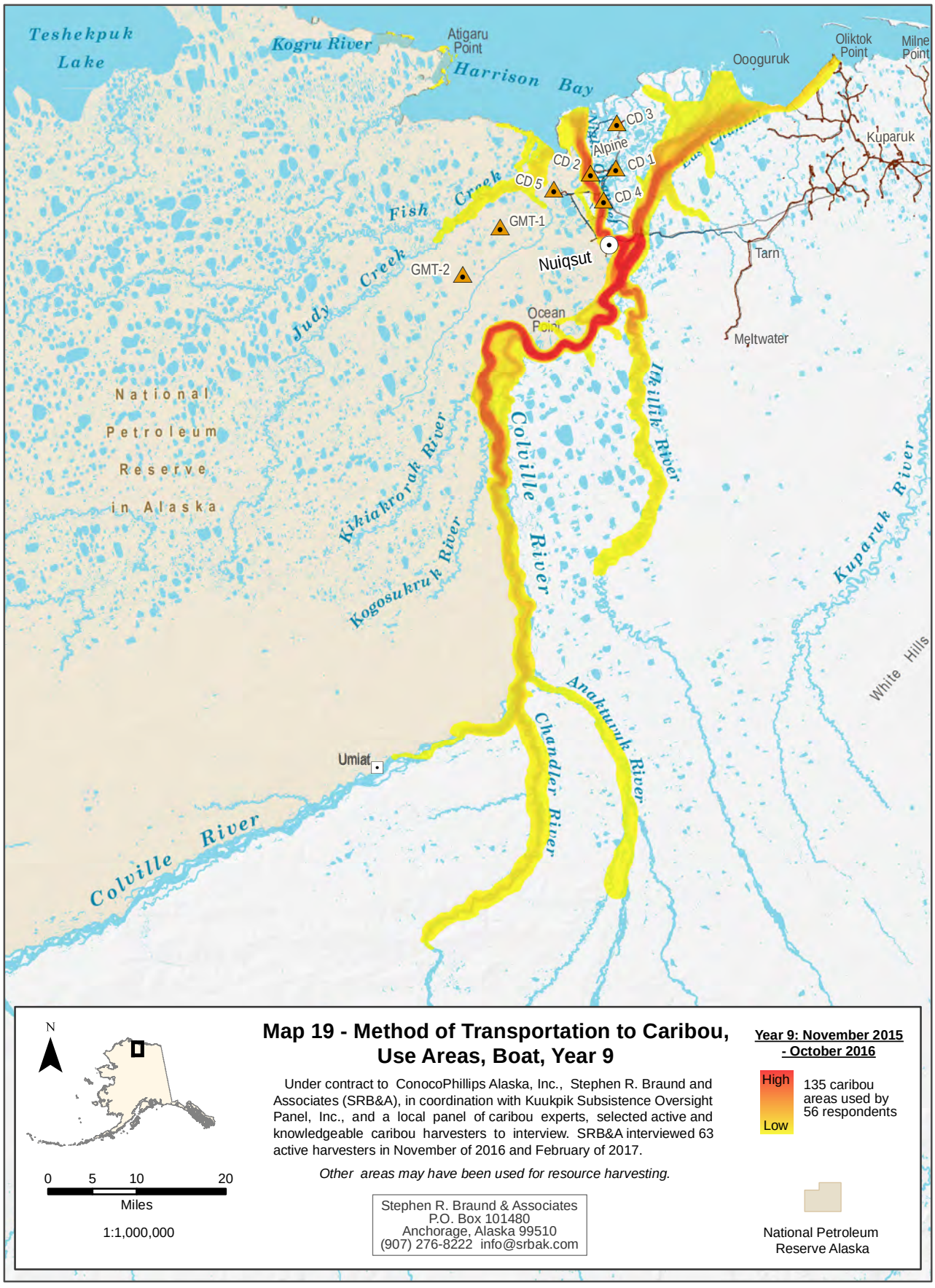
Figure 6: Truck Use by Month, Years 1-9



Stephen R. Braund & Associates, 2017.

Caribou use areas by transportation method are shown on Map 19 through Map 26. Map 19 shows that Year 9 respondents traveled by boat primarily along the Colville River, with the moderate to high overlaps occurring along the Nigliq Channel, the East Channel of the Colville Delta, the mouth of the Itkillik River, and upriver along the Colville River to Sentinel Hill. Fewer overlapping use areas occurred along Fish Creek, the middle Colville Delta, Miluveach and Kachemach rivers, the upper Itkillik River, Chandler and Anaktuvuk rivers, the upper Colville River, and in coastal areas (although some moderate overlapping use is evident along the coast east of the delta to Oliktok Point). Boating use areas for Year 9 are similar to those for previous years, but do not extend as far along the coast east or west of the Colville Delta, or as far along the Colville, Chandler, and Itkillik rivers, as some previous years (Map 20). Respondents traveled slightly farther along the Anaktuvuk River by boat in Year 9.

In Year 9, four-wheeler areas were generally located west of the Colville River near the community and to the northwest of the community along the Spur Road (Map 21). Four-wheeler travel extended to Fish and Judy creeks. A majority of four-wheeler use areas extended west toward the Ublutuoch River, south toward Ocean Point, or northwest along the Spur Road, with some low to moderate use reported along the CD5



N

0 5 10 20

Miles

1:1,000,000

Map 19 - Method of Transportation to Caribou, Use Areas, Boat, Year 9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

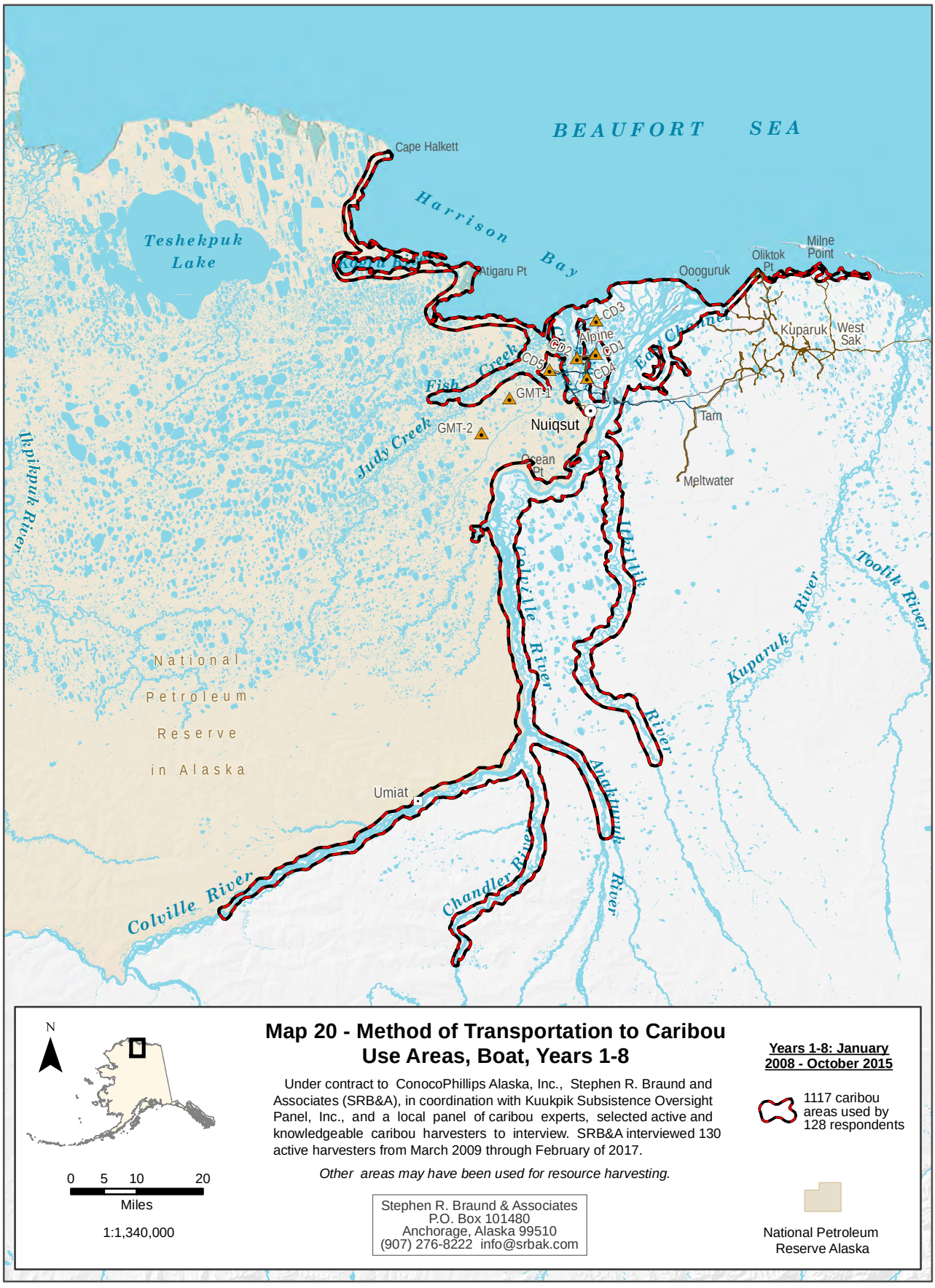
Year 9: November 2015 - October 2016

High

Low

135 caribou areas used by 56 respondents

National Petroleum Reserve Alaska



Map 20 - Method of Transportation to Caribou Use Areas, Boat, Years 1-8

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 130 active harvesters from March 2009 through February of 2017.

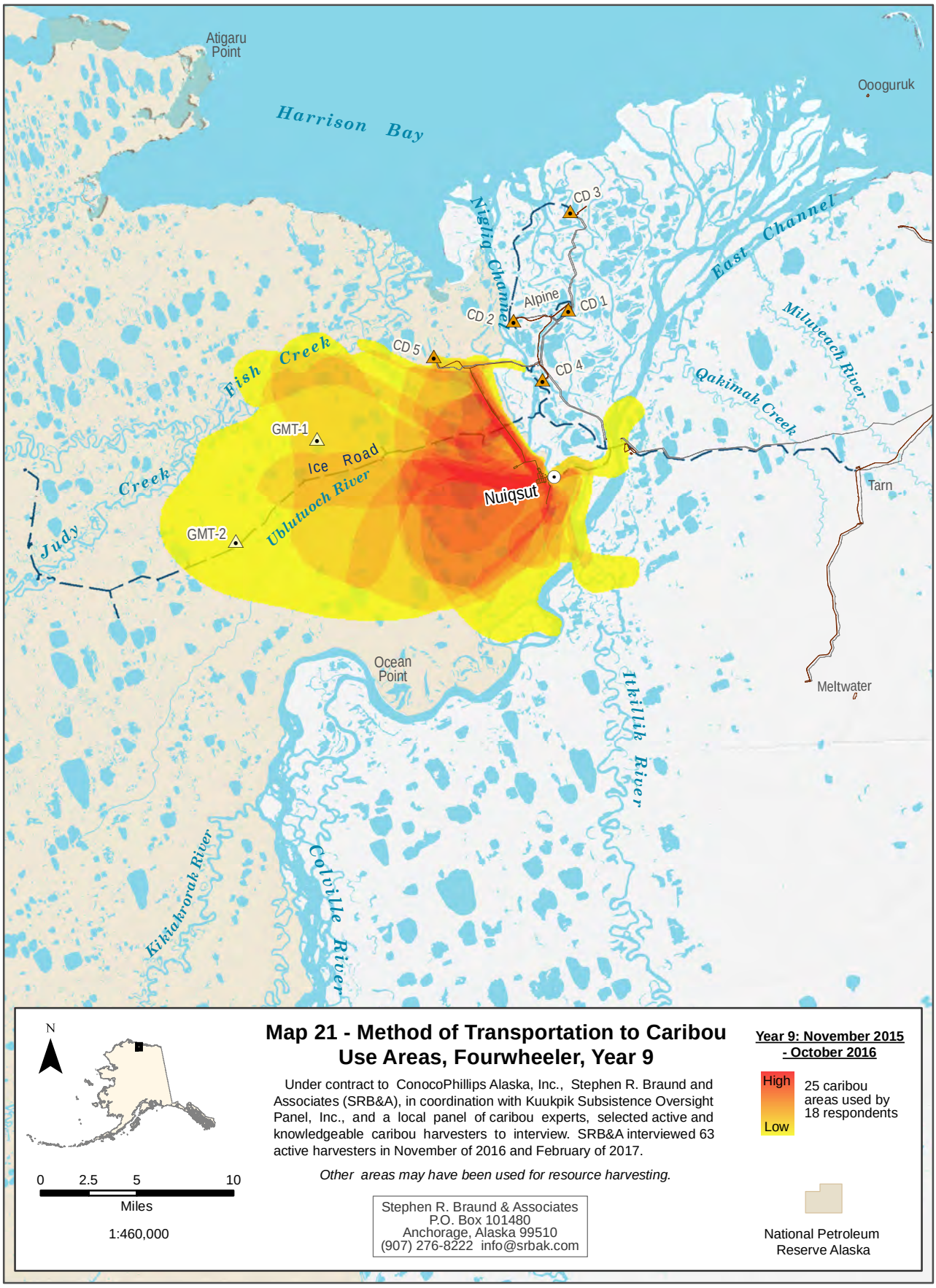
Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

Years 1-8: January 2008 - October 2015

1117 caribou areas used by 128 respondents

National Petroleum Reserve Alaska



N

0 2.5 5 10

Miles

1:460,000

Map 21 - Method of Transportation to Caribou Use Areas, Fourwheeler, Year 9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

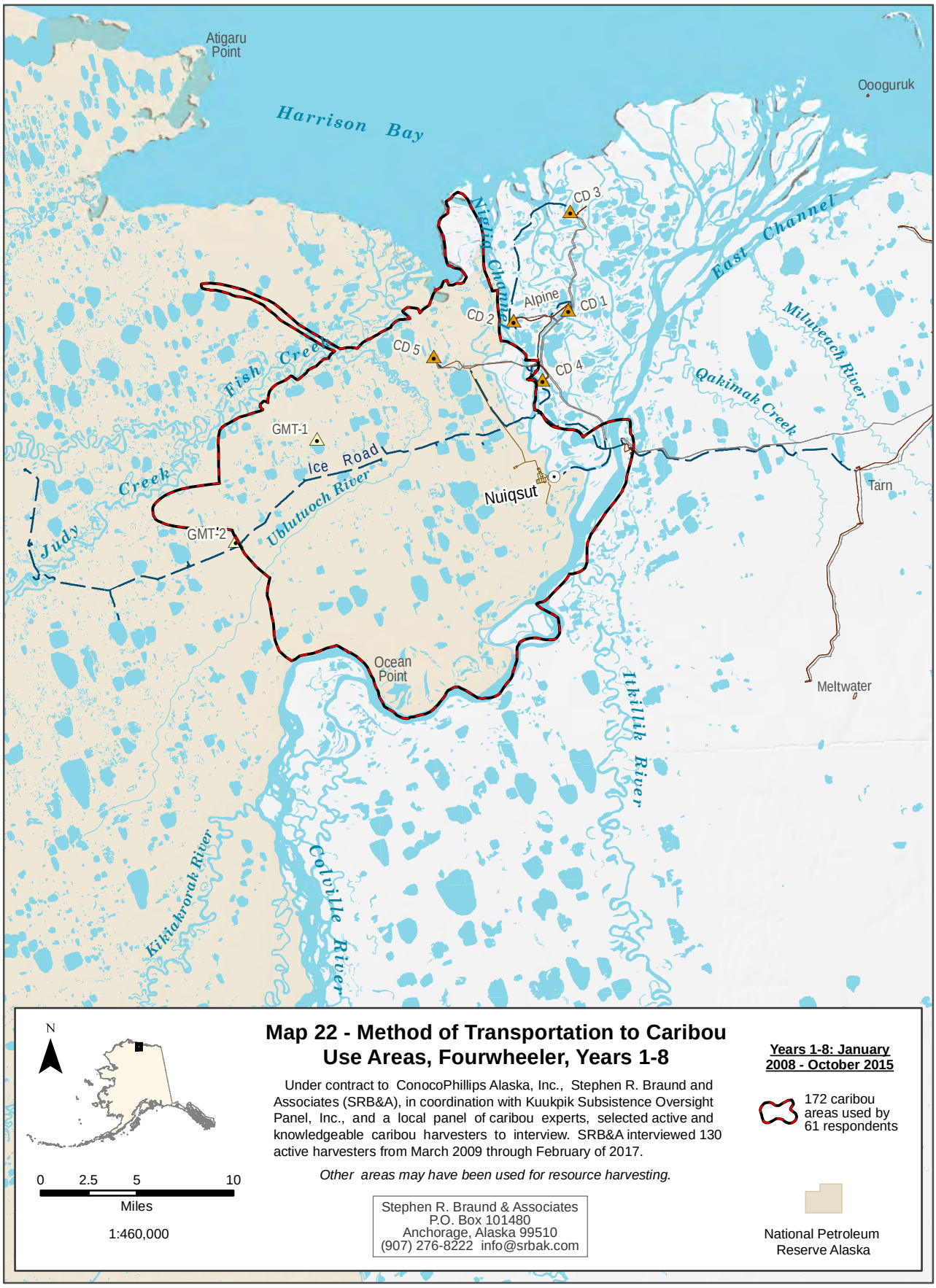
Year 9: November 2015 - October 2016

High

Low

25 caribou areas used by 18 respondents

National Petroleum Reserve Alaska



Map 22 - Method of Transportation to Caribou Use Areas, Fourwheeler, Years 1-8

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 130 active harvesters from March 2009 through February of 2017.

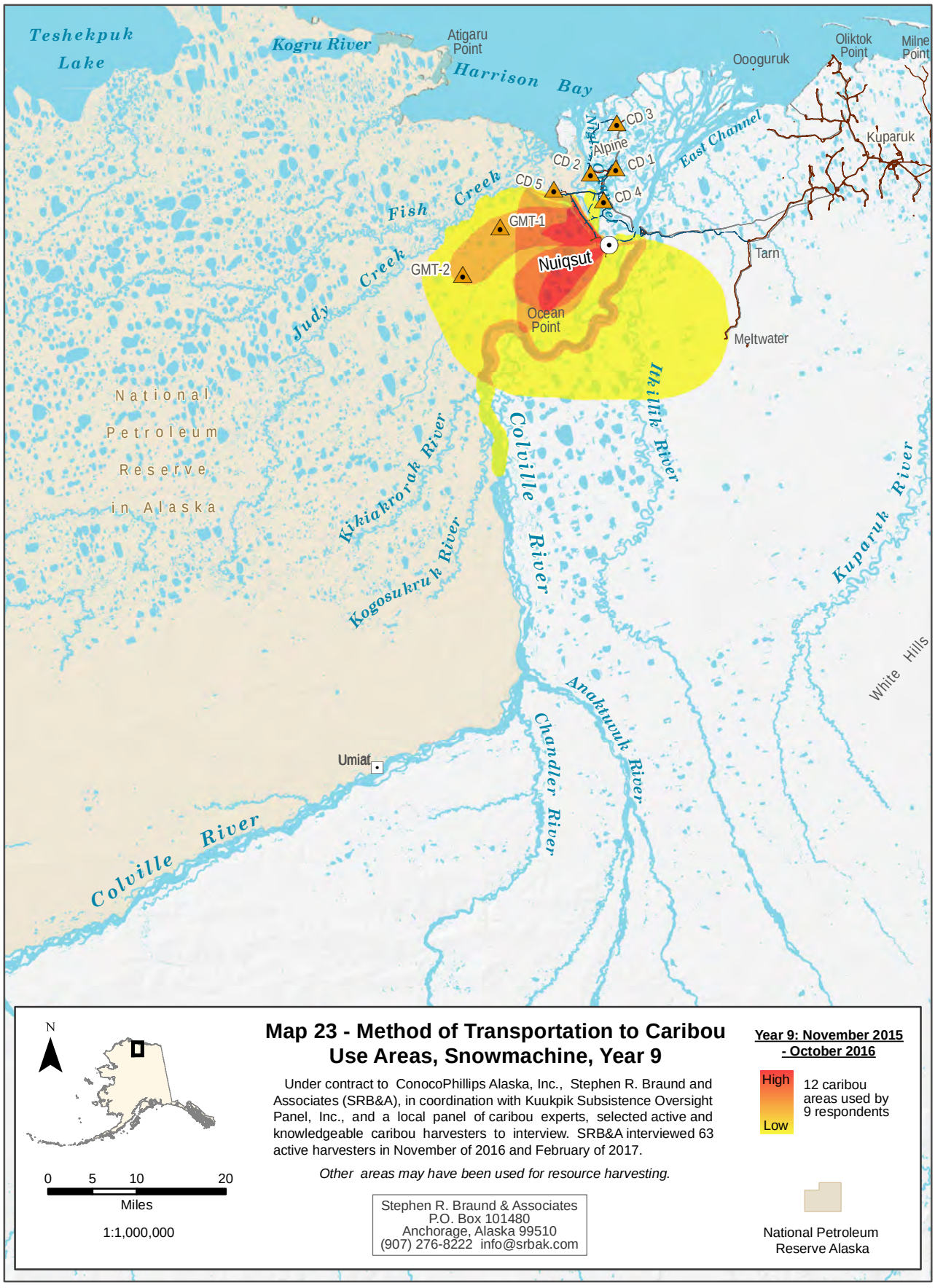
Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

Years 1-8: January 2008 - October 2015

172 caribou areas used by 61 respondents

National Petroleum Reserve Alaska



N

0 5 10 20

Miles

1:1,000,000

Map 23 - Method of Transportation to Caribou Use Areas, Snowmachine, Year 9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

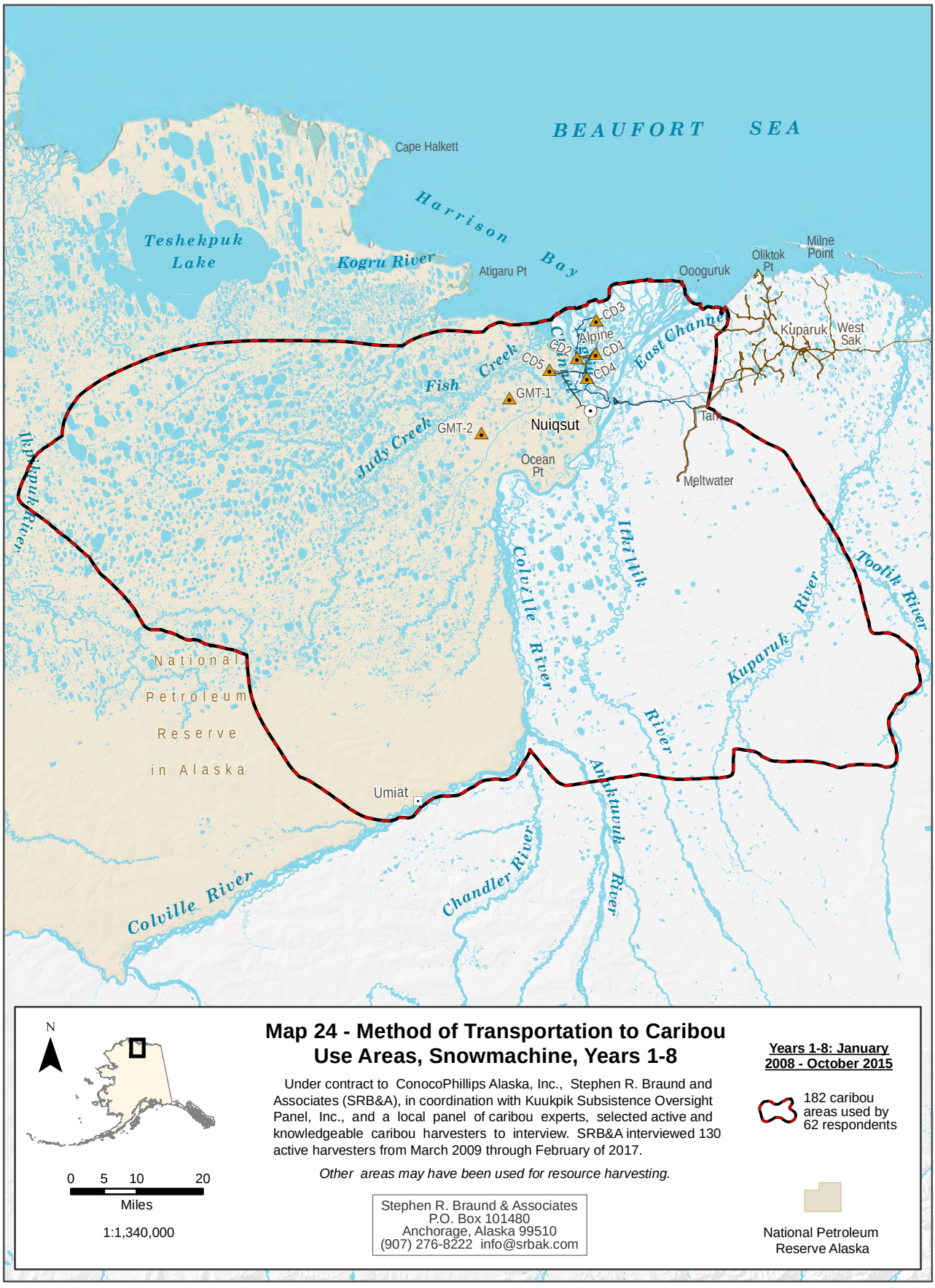
Year 9: November 2015 - October 2016

High

Low

12 caribou areas used by 9 respondents

National Petroleum Reserve Alaska



N

0 5 10 20

Miles

1:1,340,000

Map 24 - Method of Transportation to Caribou Use Areas, Snowmachine, Years 1-8

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 130 active harvesters from March 2009 through February of 2017.

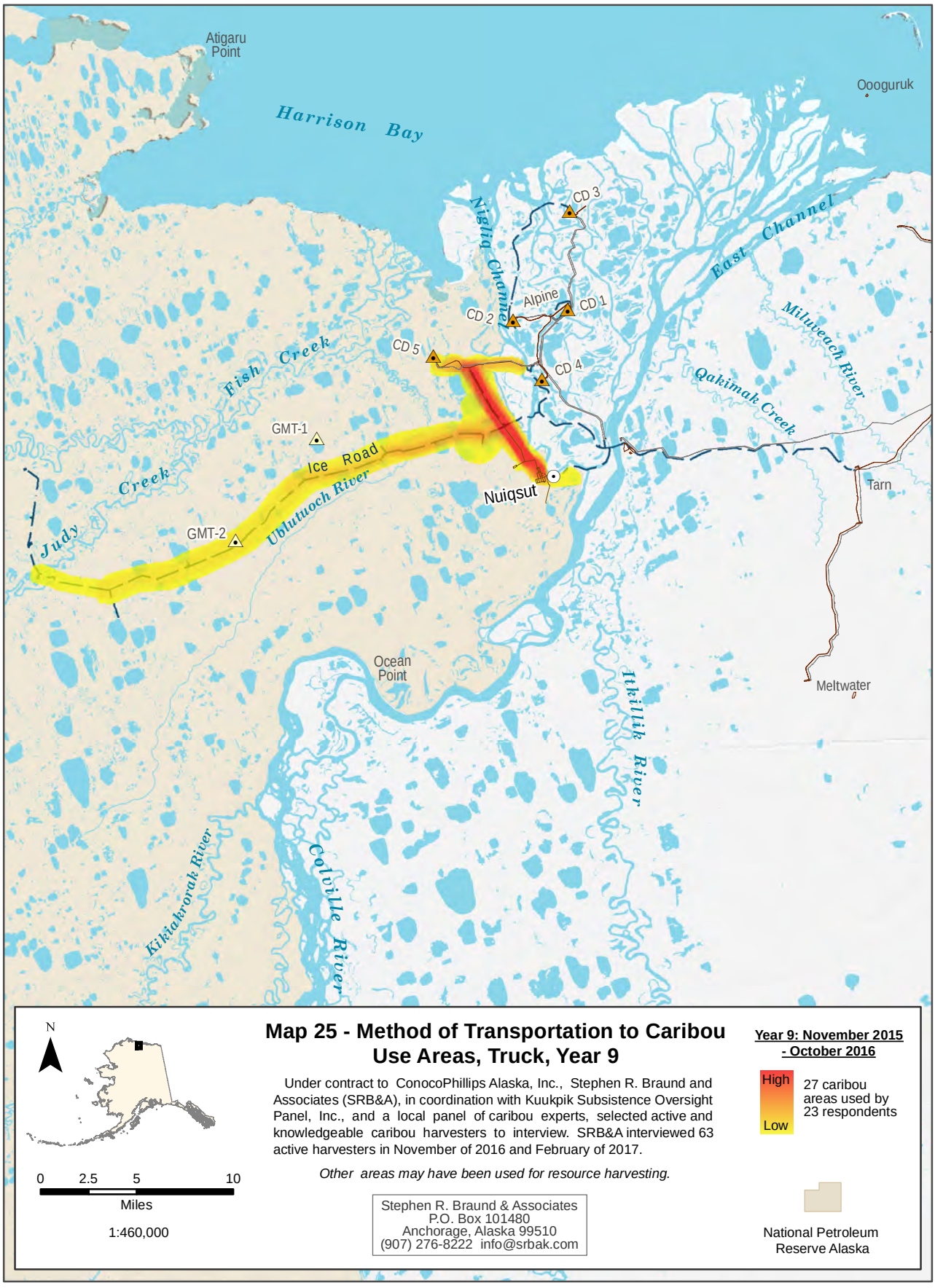
Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

Years 1-8: January 2008 - October 2015

182 caribou areas used by 62 respondents

National Petroleum Reserve Alaska



N

0 2.5 5 10

Miles

1:460,000

Map 25 - Method of Transportation to Caribou Use Areas, Truck, Year 9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

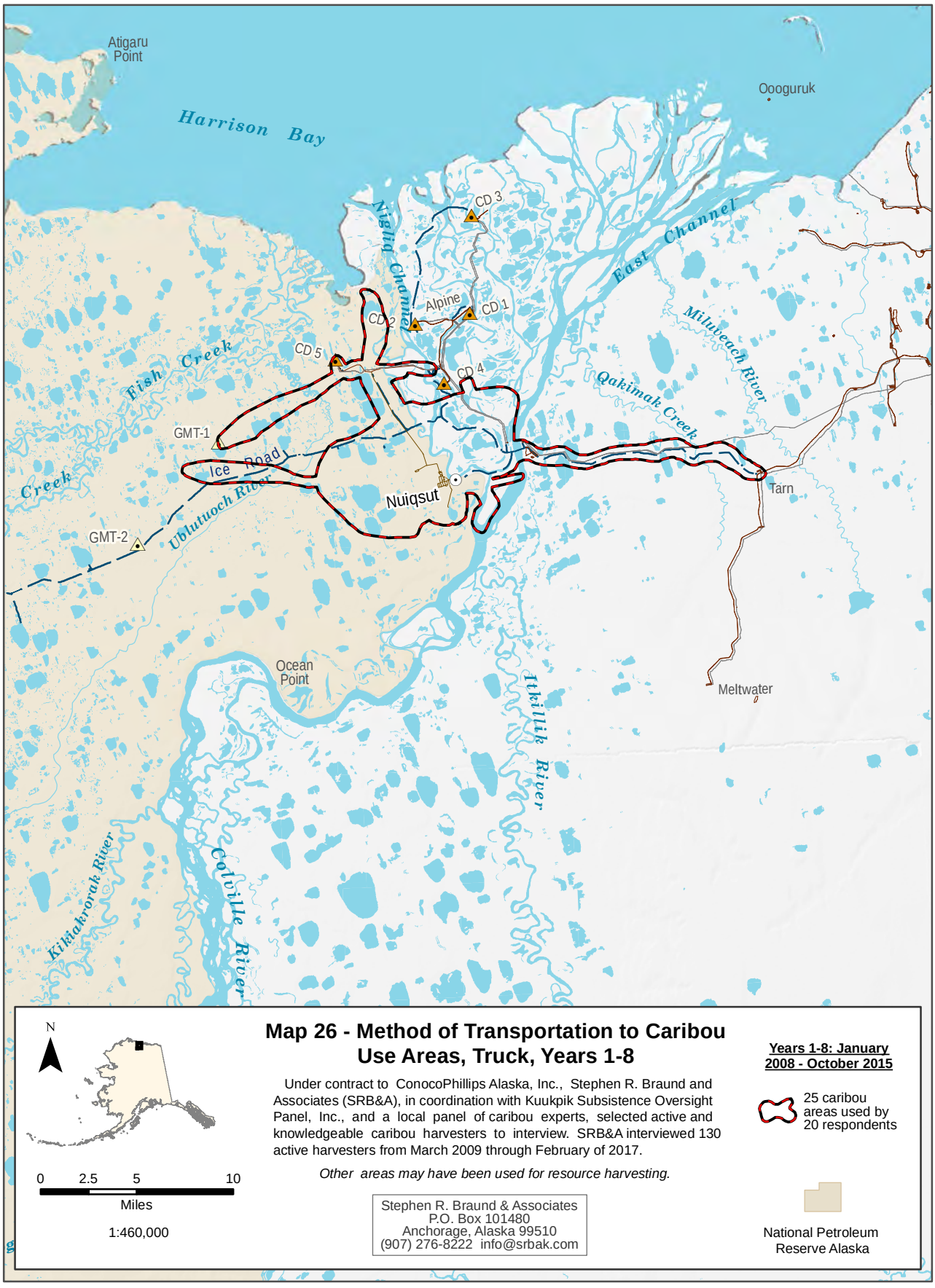
Year 9: November 2015 - October 2016

High

Low

27 caribou areas used by 23 respondents

National Petroleum Reserve Alaska



Map 26 - Method of Transportation to Caribou Use Areas, Truck, Years 1-8

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 130 active harvesters from March 2009 through February of 2017.

Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

Years 1-8: January 2008 - October 2015

25 caribou areas used by 20 respondents

National Petroleum Reserve Alaska

road. Year 9 four-wheeler activity (Map 21) was very similar to Years 1 through 8 (Map 22), but did not extend as far to coastal areas in the north or to Ocean Point in the south.

Compared to hunting by four-wheeler, snowmachine hunting generally occurs over a larger area and varies the most from year to year. During Year 9, the area of snowmachine use was relatively similar to the area of four-wheeler use, extending to the west of the community toward Fish Creek and south beyond Ocean Point (Map 23). Some travel along the Spur Road north of the community is also evident. In addition, residents traveled upriver along the Colville River and to the east of the Colville River toward Meltwater.

In general, the extent of snowmachine use areas in Year 9 compared to Years 1 through 8 (Map 24) was much smaller than the extent of previous years.

As noted above, truck use by Nuiqsut caribou harvesters increased in Years 8 and 9 due to construction of the Spur Road. In Year 9, truck use areas were concentrated along the Spur Road, with a smaller number of truck use areas occurring on the CD5 road and on ice roads extending west beyond the proposed GMT2 development from the Spur Road (Map 25). In previous years, respondents have also reported limited truck use north of the CD5 road and east towards Tarn (Map 26).

Differences in the maximum extent of hunting areas may reflect overall changes in overland travel or it may be a product of differences in the yearly sample. For example, the maximum extent of yearly snowmachine hunting areas may vary substantially with the inclusion (or exclusion) of certain hunters. Other factors that affect the maximum extent of use areas each year include snow conditions (i.e., are snow conditions adequate for extensive snowmachine travel?) and the location/availability of caribou during the winter months.

Harvest Success

Table 10 shows the percentage of caribou use areas in which respondents reported successful harvests. During Year 1 respondents reported the highest percentage of successful use areas (78 percent); the percentage of successful use areas subsequently declined to 61 percent in Year 2 and ranged from 53 percent (Year 9) to 64 percent (Year 5) during the following study years. While Year 8 (65 percent of areas successful) marked the highest percentage of successful use areas since Year 1, Year 9 showed a slightly lower percentage of successful use areas compared to previous study years. Several respondents discussed the reasons why they believed they were not successful in a particular area, including poor snow conditions, caribou being diverted by hunters along the East Channel, caribou being too far inland to access from riversides, and hunters not able to find a preferred caribou (e.g., all females with calves, or too small):

> *I was in this [Fish Creek] area, but there was not any. They were all on the north side. I go across here because it's steep… Mid-September was when I started, so maybe seven times. I had no success on finding caribou near the Fish Creek area. Pretty rough, yup, [poor snow conditions]… These were the first times that I had no success.* (SRB&A Nuiqsut Interview November 2016)

> *Along the straightaway, on the east side I found a herd but they were on the move and I couldn't get out them. I normally go on the east side and on the west fork around Pisiktaġvik. Somewhere around here [on the east channel] there were two boats, floating, waiting for this herd to come across. That is why we don't have caribous coming across. People are just waiting for that first herd to come across. They are the ones diverting the herds. They were floating… two boats waiting for that herd I seen. I told those guys they should be letting those caribou come through. They should be waiting for those calves and females to come through. That's why the caribou were farther inland trying to come across somewhere and those two boats were somewhere.* (SRB&A Nuiqsut Interview November 2016)

It seemed like the caribou were on the high bluff, they were moving south and we were not able to get any of those - on the high bank. You see a lot of those caribou with calves and the majority were on the high bluff. (SRB&A Nuiqsut Interview November 2016)

This year was kind of hard. Even though they were there, they were just so far away from the river. (SRB&A Nuiqsut Interview November 2016)

[I went upriver] twice, two times, but the caribou we saw were too small to harvest and they were not suitable to me. (SRB&A Nuiqsut Interview November 2016)

In Year 9, the average number of caribou harvested per use area (1.5) was on the low end compared to previous years, which ranged from 1.4 (Year 6) to 2.7 (Years 1 and Year 7) (Table 11). The average number of caribou harvested at each individual harvest location was 1.8 in Year 9, on the low end compared to previous study years (between 1.8 and 2.3). There does not seem to be a direct correlation between the percentage of successful caribou use areas and other variables such as community harvest amounts or self-reported changes in harvest amounts (e.g., harvested more or less than the previous year). This could indicate that the data in Table 11 are more likely to reflect caribou distribution or movement patterns in a given year (i.e., were the caribou more concentrated in a specific area or spread out across multiple use areas?), rather than overall harvest success.

Table 10: Percentage of Caribou Use Areas in Which Respondents Reported Successful Harvests, Years 1-9

Success Response	Percentage of Caribou Use Areas								
	Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**
Yes (successful)	78%	61%	58%	55%	64%	54%	61%	65%	53%
No (unsuccessful)	22%	39%	42%	45%	36%	46%	39%	35%	47%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Use Areas	137	187	215	194	211	196	206	153	195

Stephen R. Braund & Associates, 2017.

Table 11: Mean Number of Caribou Harvested Per Harvest Location and Subsistence Use Area, Years 1-9

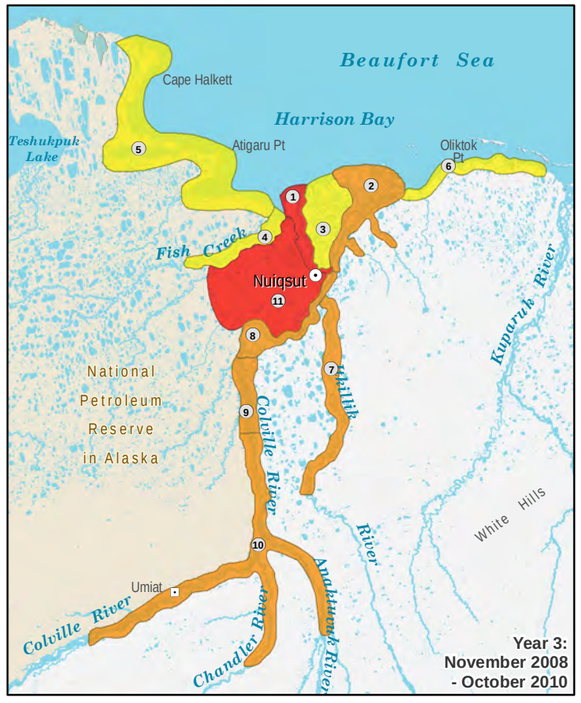
Mean Number	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Mean Number Caribou Harvested Per Harvest Location	2	1.8	1.9	2	1.8	1.9	2.2	2.3	1.8
Number of Harvest Locations	182	152	196	162	195	143	248	173	163
Mean Number Caribou Harvested by Use Area	2.7	1.5	1.7	1.7	1.6	1.4	2.7	2.6	1.5
Number of Use Areas	137	187	215	194	211	196	206	153	195

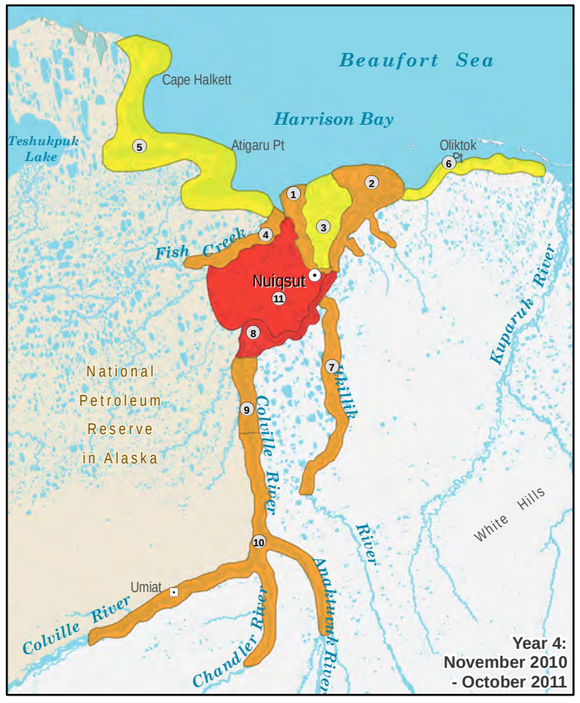
Stephen R. Braund & Associates, 2017.

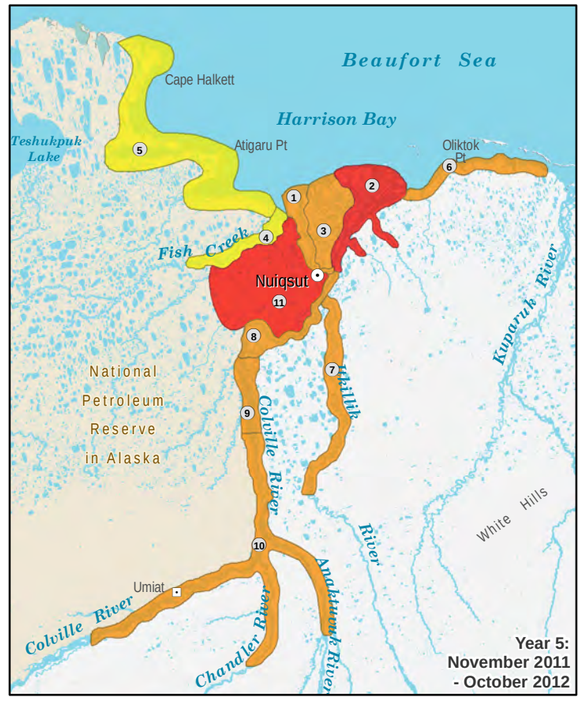
Table 12 reports the percentage of caribou harvest locations and the percentage of caribou harvested for each study year by 12 caribou hunting areas. The study team identified these 12 geographic caribou hunting areas based on residents' descriptions of those areas as separate hunting activities (e.g., Nigliq, Fish Creek, coastal area west of Nuiqsut, upriver to Sentinel Hill, upriver to Umiat); the defined areas were reviewed by the Nuiqsut Caribou Panel for accuracy and appropriateness (see Map 27). Map 27 depicts the geographic boundary of each hunting area group for Years 3 through 9, and categorizes each area as yellow, orange, or red. The yellow areas represent the smallest percentage of the total caribou harvest (less than

Table 12: Percentage of Caribou Harvest Locations and Caribou Harvests by Caribou Hunting Area, Years 1-9

Caribou Hunting Area		Percentage of Caribou Harvest Locations									Percentage of Total Caribou Harvests								
		Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**
1	Nigliq Channel	19%	18%	16%	17%	15%	23%	8%	9%	12%	23%	22%	18%	15%	15%	27%	9%	10%	12%
2	East Channel Colville	8%	8%	8%	12%	17%	14%	9%	8%	9%	8%	8%	7%	10%	20%	18%	11%	9%	10%
3	Other Colville Delta	2%	1%	2%	1%	1%	1%	0%	1%	1%	2%	1%	1%	1%	2%	1%	0%	0.3%	0%
4	Fish Creek	8%	7%	1%	1%	1%	3%	4%	3%	7%	7%	7%	1%	2%	0%	3%	5%	3%	5%
5	Coastal West	1%	0%	1%	0%	2%	1%	0%	0%	0%	1%	0%	1%	0%	1%	1%	0%	0%	0%
6	Coastal East	3%	0%	1%	1%	1%	0%	0%	0%	1%	3%	0%	1%	1%	4%	0%	0%	0%	1%
7	Itkillik River	7%	4%	5%	7%	5%	7%	8%	6%	11%	6%	4%	5%	4%	4%	6%	7%	5%	11%
8	Ocean Point	22%	23%	21%	19%	16%	5%	13%	17%	17%	17%	20%	15%	17%	11%	4%	7%	21%	12%
9	Sentinel Hill	9%	10%	8%	8%	6%	9%	6%	6%	9%	9%	9%	7%	5%	3%	6%	7%	4%	8%
10	Colville River South	4%	11%	10%	4%	6%	11%	8%	4%	2%	3%	11%	7%	4%	3%	9%	7%	3%	1%
11	West of Nuiqsut	14%	17%	23%	30%	30%	21%	37%	43%	30%	18%	17%	30%	40%	34%	20%	39%	43%	36%
12	Other	3%	1%	6%	1%	1%	4%	8%	2%	2%	3%	1%	6%	1%	1%	4%	8%	3%	3%
	Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100







Map 27
Nuiqsut Caribou Hunting Area Groups: Years 3 - 9

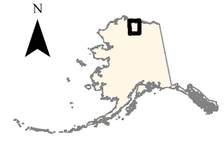
Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview.

LEGEND

- Less than two percent of total harvest
- Between two and 15 percent of total harvest
- Greater than 15 percent of total harvest

0 5 10 20
Miles

N



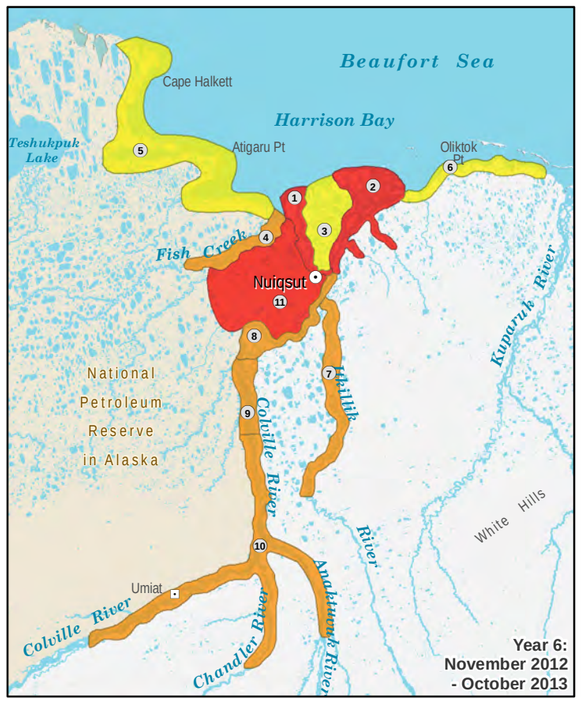
SCALE: 1:1,500,000

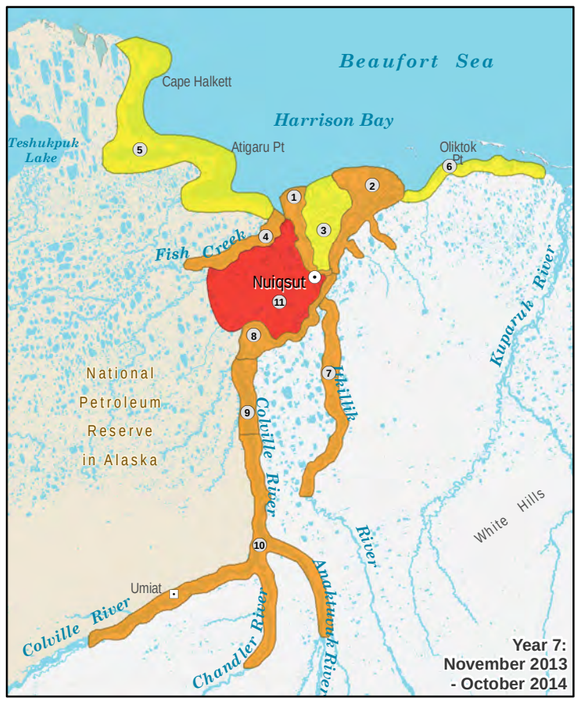
Areas categorized as follows:

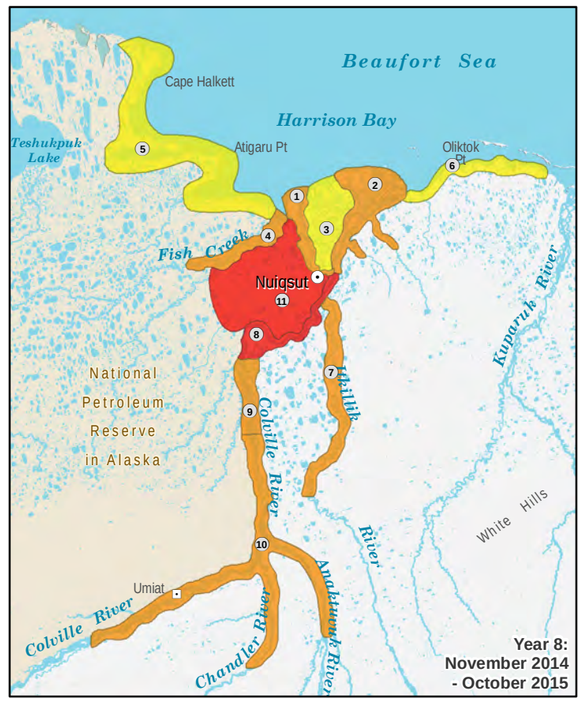
1. Nigliq Channel
2. East Channel Colville
3. Other Colville Delta
4. Fish Creek
5. Coastal West
6. Coastal East
7. Itkillik River
8. Ocean Point
9. Sentinal Hill
10. Colville River South
11. West of Nuiqsut

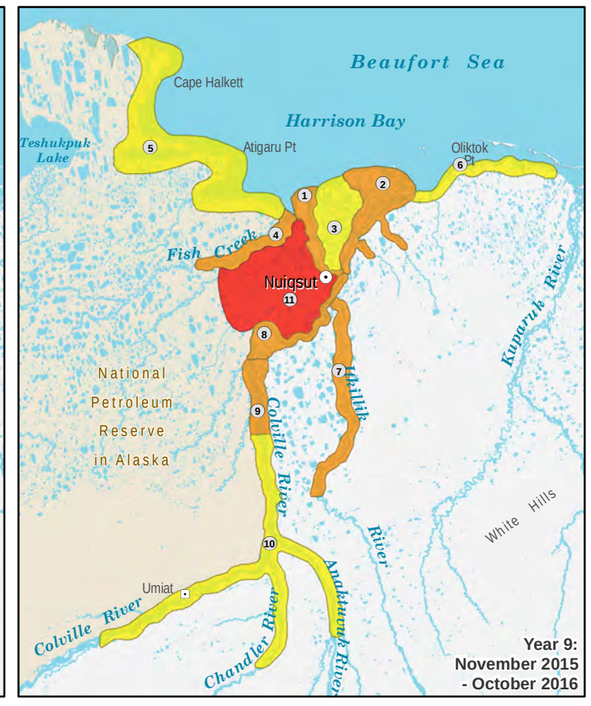
Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 10-1480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com









two percent), the orange areas represent the next largest percentage of the total caribou harvest (between two and 15 percent), and the red areas represent the largest percentage of the total caribou harvest (15 percent or more). The Coastal West area (Area 5) is the only area that has accounted for less than two percent of the total harvest during all study years, whereas other areas, such as Fish Creek, Other Colville Delta, and Coastal East, have alternated between providing less than two percent of the harvest and between two and 15 percent of the harvest. Areas along the Colville River upriver from the community (Sentinel Hill, Colville River South, Itkillik River), have generally provided between two and 15 percent of the harvest; however, Year 9 was the first year that the Colville River South provided less than two percent of the harvest. The only area that has consistently provided more than 15 percent of the harvest during all nine study years is West of Nuiqsut (Area 11); Nigliq Channel provided more than 15 percent of the harvest during the first three study years, and again in Year 6, but not in Years 7, 8, and 9, when it accounted for nine, 10, and 12 percent of the harvest, respectively.

Table 12 shows that during Year 9 the area West of Nuiqsut (Area 11) accounted for the highest portion (36 percent) of caribou harvested, similar to many previous years. The area West of Nuiqsut was the only area contributing more than 15 percent of the harvest in Year 9 (see Map 27). Nigliq Channel, East Channel Colville, Itkillik River, Ocean Point, and Sentinel Hill all contributed around the same amount (between eight and 12 percent) to the total harvest in Year 9. All other areas contributed five percent or less. The area "Other" is not shown on the map, as it is defined as any area falling outside the 11 areas depicted on Map 27. This area accounted for three percent of the harvest in Year 9. In Year 9, Itkillik River accounted for a higher percentage of the harvest (11 percent) than all previous years.

It is important to note that while the percentage of harvests in certain areas has changed from year to year, these percentages are relative to the total reported amount harvested within a given year. Thus, while the percentage of harvest in a certain area may decrease from the previous year, it is possible that the number harvested within that area actually increased. In the case of Year 9, decreases and increases in percentages generally reflected a corresponding decrease or increase in the number of caribou harvested in each area. For example, the percentage of caribou harvested in the Itkillik River area (11 percent) was higher in Year 9 than in any previous year, while the actual number harvested (35) was the second highest after Year 7 (37). The last three years have shown Nigliq Channel providing a smaller percentage of the total harvest than previous years, and the number harvested along Nigliq Channel in Year 9 (37) was also lower than any previous year (between 38 caribou in Year 8 and 85 caribou in Year 1).

Table 13 shows the number of harvest locations by the number of caribou harvested for study years 1 through 9. In general, respondents reported harvesting six or fewer caribou at any given harvest location during all study years. Typically, respondents reported harvesting one or two caribou per location. During Year 9, respondents reported harvesting either one or two caribou at 84 percent of harvest locations, on the high end compared to previous years (between 73 and 83 percent). Three or four caribou were harvested at 11 percent of harvest locations, and between five and 20 caribou were harvested at the remaining five percent of harvest locations. This has remained relatively consistent across study years.

Table 13: Number of Caribou Harvested by Number of Harvest Locations, Years 1-9

# of Caribou Harvested	Number (%) of Harvest Locations								
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
1	95 (52%)	75 (49%)	99 (51%)	85 (52%)	120 (62%)	66 (46%)	105 (42%)	86 (50%)	94 (59%)
2	44 (24%)	48 (32%)	60 (31%)	40 (25%)	40 (21%)	42 (29%)	77 (31%)	46 (27%)	40 (25%)
3	19 (10%)	16 (11%)	22 (11%)	12 (7%)	16 (8%)	24 (17%)	23 (9%)	13 (8%)	13 (8%)
4	7 (4%)	8 (5%)	7 (4%)	14 (9%)	9 (5%)	8 (6%)	26 (10%)	12 (7%)	4 (3%)
5	13 (7%)	4 (3%)	5 (3%)	4 (2%)	4 (2%)	1 (1%)	6 (2%)	6 (3%)	3 (2%)
6	1 (1%)	1 (1%)	2 (1%)	2 (1%)	4 (2%)	1 (1%)	5 (2%)	2 (1%)	1 (1%)
7	2 (1%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)	1 (1%)	1 (<1%)	1 (1%)	0 (0%)
8	0 (0%)	0 (0%)	0 (0%)	2 (1%)	0 (0%)	0 (0%)	2 (1%)	1 (1%)	1 (1%)
9	0 (0%)	0 (0%)	0 (0%)	1 (1%)	1 (1%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)
10	0 (0%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)	0 (0%)	1 (<1%)	1 (1%)	0 (0%)
11	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)	0 (0%)	2 (1%)	0 (0%)
12	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (<1%)	0 (0%)	0 (0%)
15	1 (1%)	0 (0%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	1 (<1%)	1 (1%)	1 (1%)
20	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)

Stephen R. Braund & Associates, 2017.

Duration of Trips

The typical duration of caribou hunting trips has maintained a similar pattern across all study years. Residents typically take day trips to over 80 percent of their caribou hunting areas (Table 14). The percentage of use areas typically visited during same day trips was the highest during Years 7 through 9, at 91, 93, and 96 percent, respectively, but not substantially higher than previous years. In Year 9, four percent of caribou use areas were typically visited during trips lasting one or more nights, on the low end compared to previous years which ranged from six to 17 percent. Similar to Year 8, no Year 9 harvesters reported typical trip duration lasting 1-2 weeks or more than 2 weeks. In addition to asking the typical duration of trips to caribou use areas, SRB&A also asked respondents to report the longest trip they took to each area during the study year (Table 15). Table 15 shows that in Year 9, respondents' longest trip lasted 1-2 weeks at one percent of use areas, two to six nights at seven percent of use areas, and one night at four percent of use areas. Respondents took only same day trips to a majority (88 percent) of use areas, the highest of all study years by a margin of several percentage points.

In general, the data indicate an increasing trend of same day trips, rather than overnight hunting trips. According to respondents, overnight trips are usually reserved for upriver trips, which are often combined with moose hunting, or for longer stays at fish camps which also include scouting for caribou. Overnight hunting trips may also occur in the event of unplanned inclement weather conditions. As several individuals described,

> *[It's been all] day trips I have been going. When we camp out, like, the first or second and third week in August, it's in this area [for moose].* (SRB&A Nuiqsut Interview November 2016)

> *This year I went only twice [to Fish Creek]. I went on a day trip. If I get weathered in, I would spend the night there. I have a couple places if I get weathered in. I have a place near Kogru too.* (SRB&A Nuiqsut Interview November 2016)

Yeah, I went out with my grandma, to her camp at Nigliq. Up Kuupaqullurak. I also went upriver with one of my friends. I don't know how far up he went though. I went in May [to Nigliq]. I went in June and then in July I also went [to Nigliq]. Yeah, I stayed out there for a week or so. She like to smoke fish. (SRB&A Nuiqsut Interview November 2016)

Maybe six days [was my longest trip] – I broke down. We stayed out there for the three days, then three days floating on the river back [to Nuiqsut]. [Usually, they're] all day [trips], most of the day. Like moose season, that's when I camp out. For caribou, it's day trip. (SRB&A Nuiqsut Interview November 2016)

Table 14: Caribou Hunting Typical Trip Duration, Nuiqsut, Years 1-9

Typical Duration	Percentage of Caribou Use Areas								
	Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**
More than 2 weeks	0%	1%	0%	0%	<1%	2%	1%	0%	0%
1-2 Weeks	1%	1%	1%	1%	1%	1%	0%	0%	0%
2-6 Nights	7%	15%	7%	8%	9%	10%	6%	6%	2%
1 Night	5%	2%	2%	1%	2%	4%	3%	1%	2%
Same Day	87%	81%	90%	90%	88%	84%	91%	93%	96%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Use Areas	135	176	212	193	209	196	190	153	190

Stephen R. Braund & Associates, 2017.

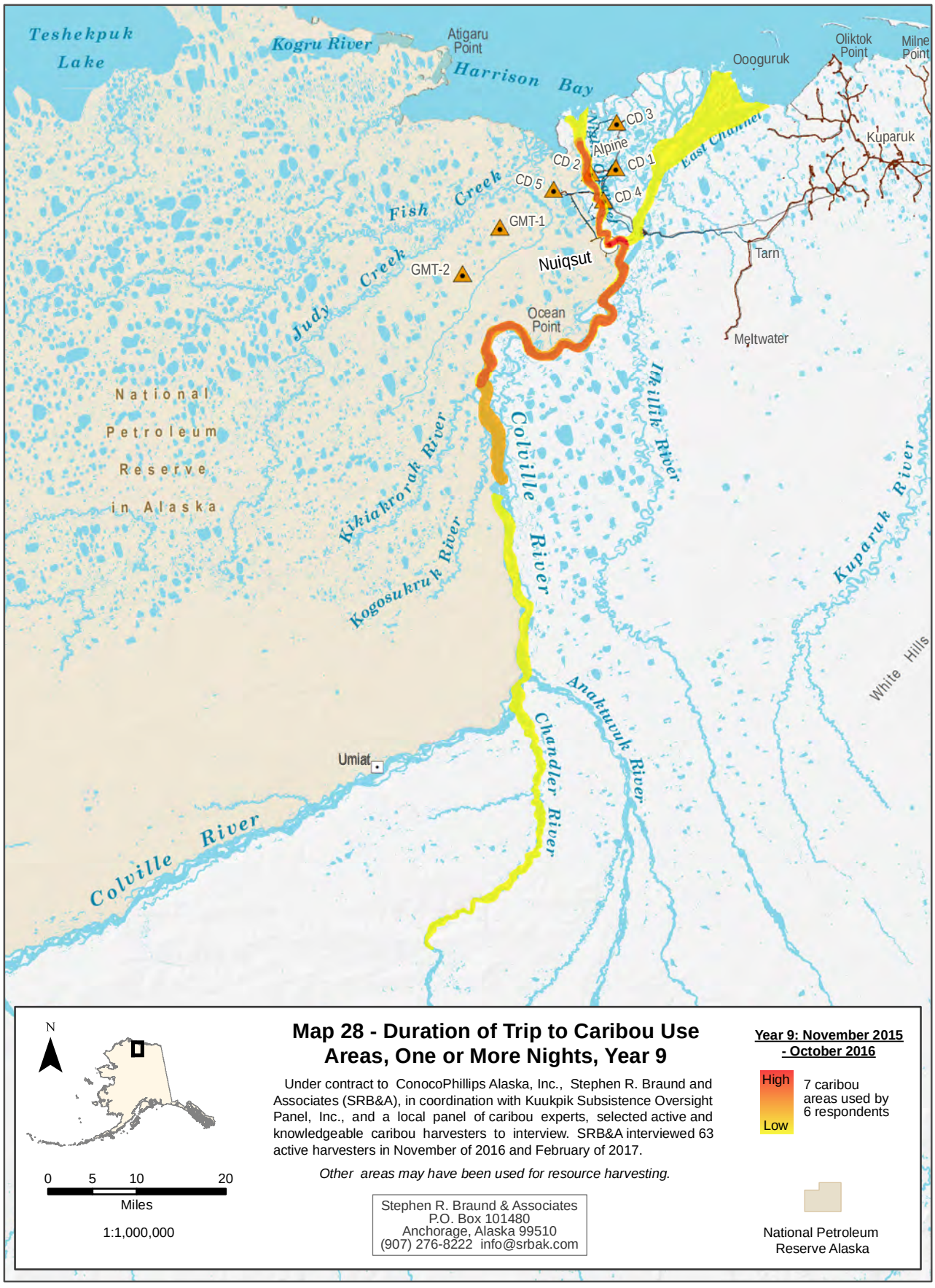
Table 15: Caribou Hunting Longest Trip Duration, Years 1-9

Typical Duration	Percentage of Caribou Use Areas								
	Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**
More than 2 weeks	1%	2%	0%	0%	1%	2%	1%	0%	0%
1-2 Weeks	3%	6%	4%	3%	2%	2%	2%	2%	1%
2-6 Nights	20%	24%	12%	12%	11%	14%	9%	10%	7%
1 Night	6%	5%	4%	4%	2%	8%	4%	3%	4%
Same Day	70%	63%	80%	81%	85%	74%	85%	86%	88%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Use Areas	97	163	211	193	208	196	188	153	190

Stephen R. Braund & Associates, 2017.

Map 28 depicts use areas where respondents reported staying for one or more nights, and Map 29 depicts use areas where respondents reported taking same day trips. The red areas depict higher number of overlapping use areas on each map and do not reflect differences in trip length. As shown in Map 28, respondents primarily reported taking overnight trips when traveling upriver by boat from the community toward Sentinel Hill or downriver to the camp at Nigliq; this is evident by the higher number of overlapping use areas compared to other areas.

No overnight trips were reported during overland (i.e., snowmachine or four-wheeler) trips. Same day trips (shown on Map 29) more commonly occurred in overland areas and are more evenly distributed across all boating areas such as in the Colville Delta, upriver from the community toward Umiat and the Chandler River, and along the Itkillik River.



N

0 5 10 20

Miles

1:1,000,000

Map 28 - Duration of Trip to Caribou Use Areas, One or More Nights, Year 9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

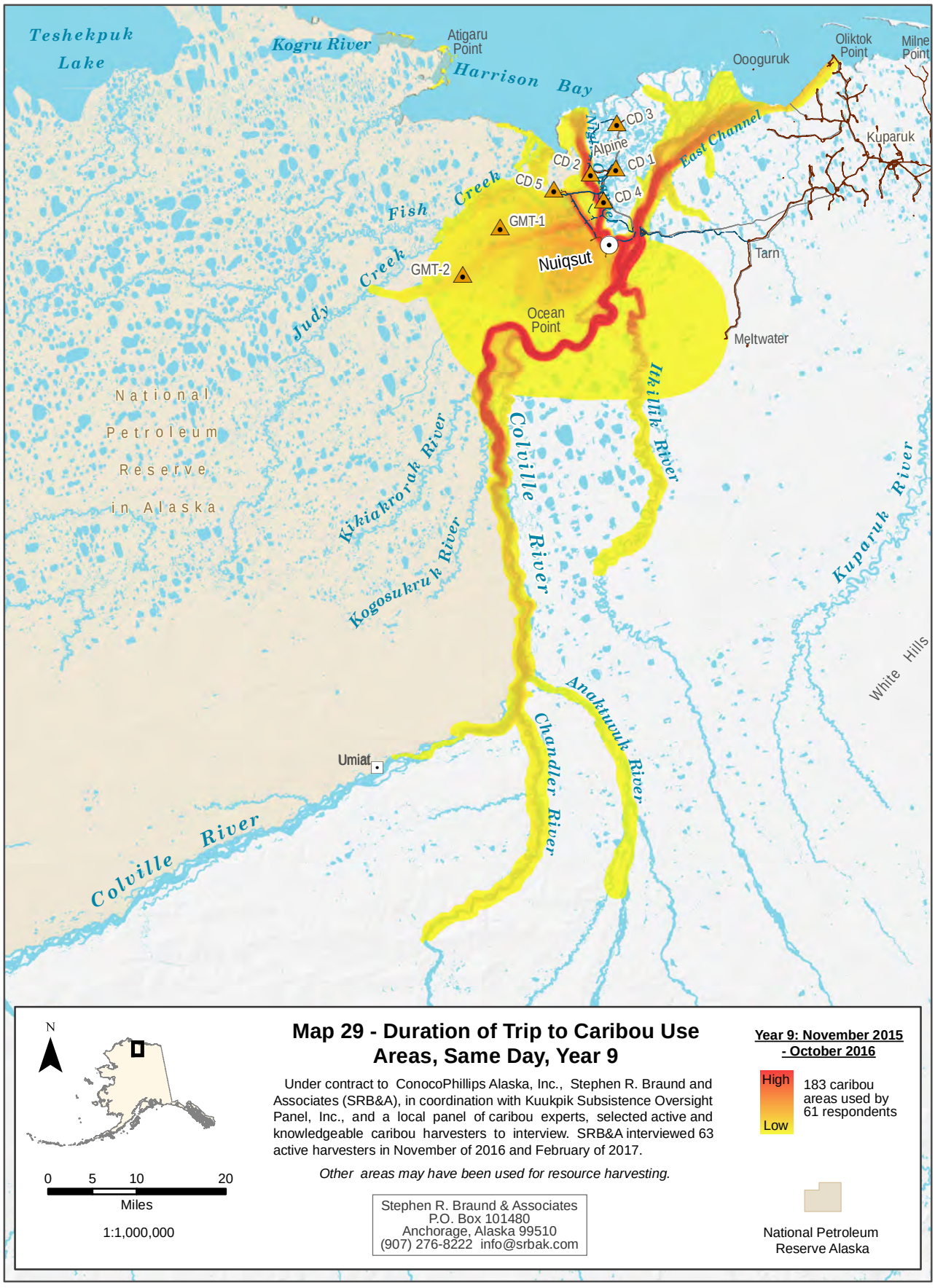
Year 9: November 2015 - October 2016

High

Low

7 caribou areas used by 6 respondents

National Petroleum Reserve Alaska



N

0 5 10 20

Miles

1:1,000,000

Map 29 - Duration of Trip to Caribou Use Areas, Same Day, Year 9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

Year 9: November 2015 - October 2016

High

Low

183 caribou areas used by 61 respondents

National Petroleum Reserve Alaska

While this report lumps all "same day" trips into one category for duration, it is important to note that there is wide variation in the duration of same day trips. In some cases, residents may start hunting in the afternoon and then hunt all night, returning to the community the next morning:

> *We did day trips. We went out maybe early afternoon and then we would be back 2-3 AM in the morning.* (SRB&A Nuiqsut Interview November 2016)

> *To the ocean yeah, we went out to the ocean to hunt some seals. Yeah [we were also looking for caribou on the coast] but we didn't see any out there…. That was in June, in break up, yeah. Twice. It was an extended day trip. We were out there almost three days. No caribou.* (SRB&A Nuiqsut Interview November 2016)

Because these individuals are not stopping and camping during their hunt, these trips are categorized as "same day trips." In general, resource availability, distance from the community, power and efficiency of transportation equipment (e.g., jet outboard versus propeller outboard motor), harvest season, time and work commitments, and associated subsistence activities are the primary factors that determine trip duration.

Frequency of Trips

The distribution of the number of trips taken to caribou use areas remained relatively consistent over the first four study years, with about 50 percent of use areas visited between one and three times, and the other 50 percent of use areas visited four or more times per year (Table 16). During Years 5 and 6, a slightly smaller percentage of use areas were visited four or more times (35 and 39 percent, respectively). In Year 9, 49 percent of use areas were visited four or more times, similar to most previous years. Nuiqsut active harvesters were more likely to take more than 20 trips to caribou use areas in Years 3 through 9 (between four and nine percent of use areas) compared to Years 1 and 2 (zero percent) (Table 16).

Table 16: Caribou Hunting Number of Trips, Nuiqsut, Years 1-9

Number of Trips	Percentage of Caribou Use Areas								
	Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**
20+			9%	7%	4%	7%	7%	8%	5%
6-20 trips	30%	28%	21%	28%	16%	19%	21%	20%	23%
4-5 trips	23%	21%	19%	15%	15%	13%	17%	15%	21%
2-3 trips	27%	26%	27%	29%	34%	28%	26%	28%	29%
1	20%	24%	24%	21%	32%	33%	28%	29%	21%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Use Areas	121	174	212	193	210	196	204	153	192

Stephen R. Braund & Associates, 2017

In some cases, respondents reported a high number of trips because they were traveling to and from fish camp or Oliktok Point, and scouting for caribou along the way. However, in other cases, a high frequency of trips was associated with a high motivation to harvest caribou, or a lack of success which required a higher number of trips:

> *I'm always fishing down the river. My mother-in-law stays at her camp, so we are always going back and forth. Every time we are looking for caribou. Maybe 20 times.* (SRB&A Nuiqsut Interview November 2016)

And in July the caribou was late. The migration—I think they're the arctic western herd—they come from the east and go to the west. Well, there was like 2000 that normally migrate and go this way from Nigliq to Lonely Island. [I searched in the Delta] 10 times because I was looking for the migration of the herd pretty much every day. All day trips. (SRB&A Nuiqsut Interview November 2016)

Other factors that affect the frequency of trips to a use area include a lack of transportation, lack of fuel, lack of time, and poor weather conditions:

I went to Ocean Point [looking for caribou]. I didn't see any [then]. That was a day trip. I went there once only this summer. I went there once. And after that my outboard went kaput. I was stranded for the rest of the summer! My nephew's looking for some outboards for me. This was like first week of August, something like that. (SRB&A Nuiqsut Interview November 2016)

Respondent 1: July and August. [I went in Nigliq] all summer.
Respondent 2: As soon as the summer calm down, a lot of time it's windy, but as soon as it's calm.
Respondent 1: Whenever the wind stops blowing. It was pretty windy this summer. At least 10 times this summer, for me.
(SRB&A Nuiqsut Interview November 2016)

Every time I had gas, I went out [hunting upriver]. (SRB&A Nuiqsut Interview November 2016)

[I went out] every other weekend right after Saturday, Saturday afternoon or Sunday. Five or six times—more than that maybe. About six times in a week. But mainly on weekends. Since I was working during the week. (SRB&A Nuiqsut Interview November 2016)

Herd Size

In response to a request from a member of the Nuiqsut Caribou Panel, in Year 5 the study team began asking respondents to estimate how many caribou were present at each harvest location they reported. Residents have expressed concern that the cumulative impacts from development are dispersing caribou into smaller and smaller groups (rather than the large herds of the past) and these smaller groups reduce the hunters' chances for successful harvests. In a majority of cases in Year 9 (82 percent of harvest locations for which harvesters provided responses), residents reported harvesting caribou from groups of 20 or less (Table 17) compared to between 74 and 88 percent of locations in past years.

Although three quarters or more of harvest locations have occurred in groups of caribou 20 or smaller, the percentage of caribou harvested in groups of more than 20 have been higher during some study years; in Year 8, 44 percent of harvested caribou were in groups of more than 20. In Year 9, this percentage declined to 27 percent. In Year 9, 16 percent of caribou were harvested in groups of 100 or more, within the range of previous years (between 13 and 21 percent) (Table 17). One individual noted a lack of large herds near the Spur Road in Year 9:

There is not always herds, just couples out there. Rarely will I see herds, they'll just be far away. When I do go on the Spur Road, there's two, three, four of them. There's never a whole herd.

Table 17: Caribou Group Size Noted at Caribou Harvest Locations, Years 5-9

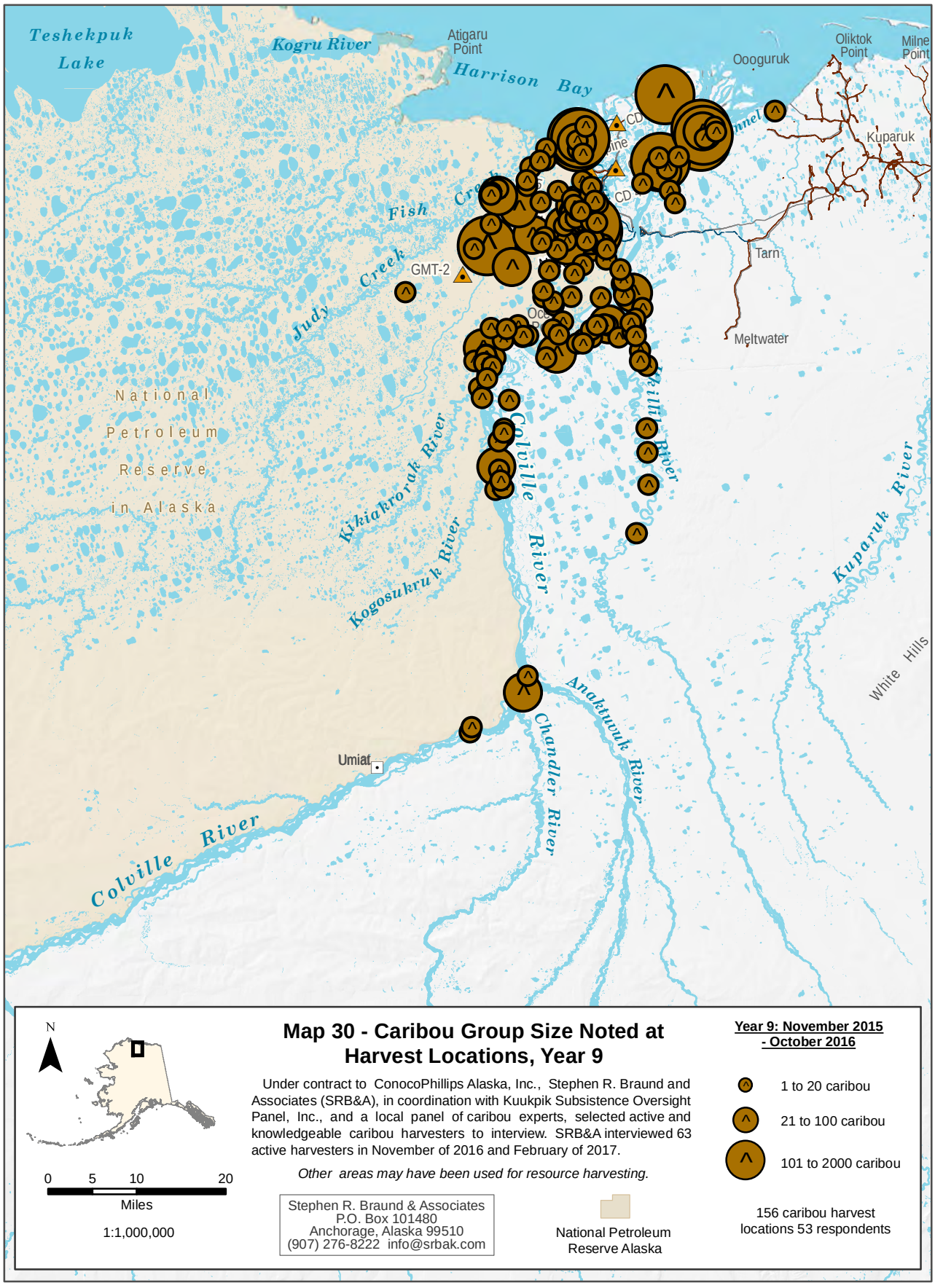
Estimated Herd Size	Percent of Harvest Locations					Percent of Caribou Harvested				
	Y5	Y6	Y7	Y8	Y9	Y5	Y6	Y7	Y8	Y9
1000-2000	2%	1%	1%	1%	3%	3%	1%	1%	4%	5%
500-999	1%	3%	1%	4%	0%	0%	5%	1%	5%	0%
100-499	3%	10%	9%	9%	8%	10%	15%	15%	12%	11%
81-99	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
71-80	1%	0%	1%	1%	0%	1%	0%	1%	2%	0%
61-70	1%	0%	0%	0%	0%	2%	0%	1%	0%	0%
51-60	2%	1%	2%	2%	1%	3%	1%	1%	3%	0%
41-50	2%	2%	3%	1%	1%	4%	3%	4%	1%	2%
31-40	1%	2%	2%	3%	1%	0%	2%	3%	12%	3%
21-30	1%	3%	4%	4%	5%	2%	5%	5%	5%	6%
11-20	13%	11%	14%	11%	15%	14%	14%	17%	11%	19%
2-10	41%	38%	42%	44%	36%	42%	39%	42%	35%	34%
1	34%	29%	20%	20%	31%	19%	16%	9%	9%	20%
Total Number	176	138	234	160	156	311	267	503	340	235

Stephen R. Braund & Associates, 2017.

Map 30 depicts the herd size noted at reported harvest locations, more than 100 caribou depicted by large symbols, between 21 and 100 caribou depicted by medium symbols, and 1 to 20 caribou depicted by small symbols. As shown on the map, in Year 9, herds of over 100 caribou were most frequently reported to be observed along the East Channel, in addition to the Nigliq Channel. Some large herds were also observed to the west of the community near Fish Creek. A number of herds sized 21-100 were observed to the west of the community toward Ublutuoch River and upriver along the Colville.

Harvest Amounts (Household Harvest Surveys)

This section presents the caribou harvest data from the 2016 household caribou harvest surveys in Nuiqsut alongside harvest data available from ADF&G and NSB harvest studies from previous years. Table 18 compares harvest information over time. The percentage of households using caribou has remained at or above 90 percent during every available study year since 1985 and was 96 percent in 2016. The percentage of households attempting to harvest and successfully harvesting caribou has varied over time, with the percentage in Year 9 (76 percent attempting to harvest and 67 percent harvesting) within the range of the previous study years. The difference between the percentage of households attempting to harvest and successfully harvesting caribou (nine percent) was within the range of unsuccessful households compared to previous study years. The estimated number of caribou harvested in 2016 (481) was the lowest in five years, consistent with active harvesters reporting a smaller number of successful caribou harvests during interviews (see under “Harvest Success”). However, the estimate was within the range of all study years (between 258 in 1994/95 and 774 in 2014). The estimated per capita harvest (132 pounds) was also within the range of previous years. For the 2014 study year, ADF&G used a higher conversion rate to estimate pounds than they used in the past (136 versus 117). SRB&A applied a conversion rate of 117 to the 2014 study year to facilitate comparison with previous study years. Confidence limits for available study years are shown in Table 18 and Figure 7. As these data show, the 95 percent confidence interval for Year 9 was within the range of previous years (plus or minus 22 percent). The highest confidence intervals (indicating the lowest confidence in the estimates) occurred in Year 7, which had a higher estimate of harvested caribou than any previous year.



N

0 5 10 20

Miles

1:1,000,000

Map 30 - Caribou Group Size Noted at Harvest Locations, Year 9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

National Petroleum Reserve Alaska

Year 9: November 2015 - October 2016

- 1 to 20 caribou
- 21 to 100 caribou
- 101 to 2000 caribou

156 caribou harvest locations 53 respondents

Table 18: Nuiqsut Caribou Harvests 1985-2016

Year	% of Households…					Estimated Harvests				95% Confidence Interval (+/-)	Source
	Use	Attempt to Harvest	Harvest	Give	Receive	Number	Pounds	Mean HH Lbs	Per Capita Lbs		
1985	98%	90%	90%	80%	60%	513	60,021	790	150		ADF&G 2011
1992		81%				278	32,551	310	78		Fuller and George 1999
1993	98%	74%	74%	79%	79%	672	82,169	903	228		Fall and Utermohle Unpublished
1994-95						258	30,186	364	73*		Brower and Hepa 1998; Braem et al. 2011
1995-96						362	42,354	455	99*		Bacon et al. 2009; Braem et al. 2011
1999-00						413			112		Pedersen and Taalak *Unpublished* as cited in Braem et al. 2011
2000-01						496	57,985	453	134*		Bacon et al. 2009
2002-03	95%	47%	45%	49%	80%	397	46,449	442	118	32.4%	Braem et al. 2011
2003-04	97%	74%	70%	81%	81%	564	65,988	617	157	16.2%	Braem et al. 2011
2004-05	99%	62%	61%	81%	96%	546	63,882	597	147	10.4%	Braem et al. 2011
2005-06	100%	60%	59%	97%	96%	363	42,471	442	102	11.4%	Braem et al. 2011
2006-07	97%	77%	74%	66%	69%	475	55,575	579	143	32.4%	Braem et al. 2011
2010	94%	86%	76%	67%	63%	562	65,754	707	-**	13.2%	SRB&A 2012
2011	92%	70%	57%	49%	58%	437	51,129	544	134	17.6%	SRB&A 2013
2012	99%	68%	62%	65%	79%	501	58,617	598***	147	20.8%	SRB&A 2014
2013	95%	79%	63%	62%	75%	586	68,534	692	166	31.7%	SRB&A 2015
2014	90%	66%	64%	67%	59%	774	90,558****	839	218	43.1%	ADF&G 2016
2015	96%	84%	78%	74%	72%	621	72,631	719	178	12.9%	SRB&A 2017
2016	96%	76%	67%	79%	81%	481	56,277	592	132	22.0%	Year 9 HH Surveys
Mean of observed values	96%	73%	67%	73%	73%	489	57,952	591	140		

Blank cells indicate data not available

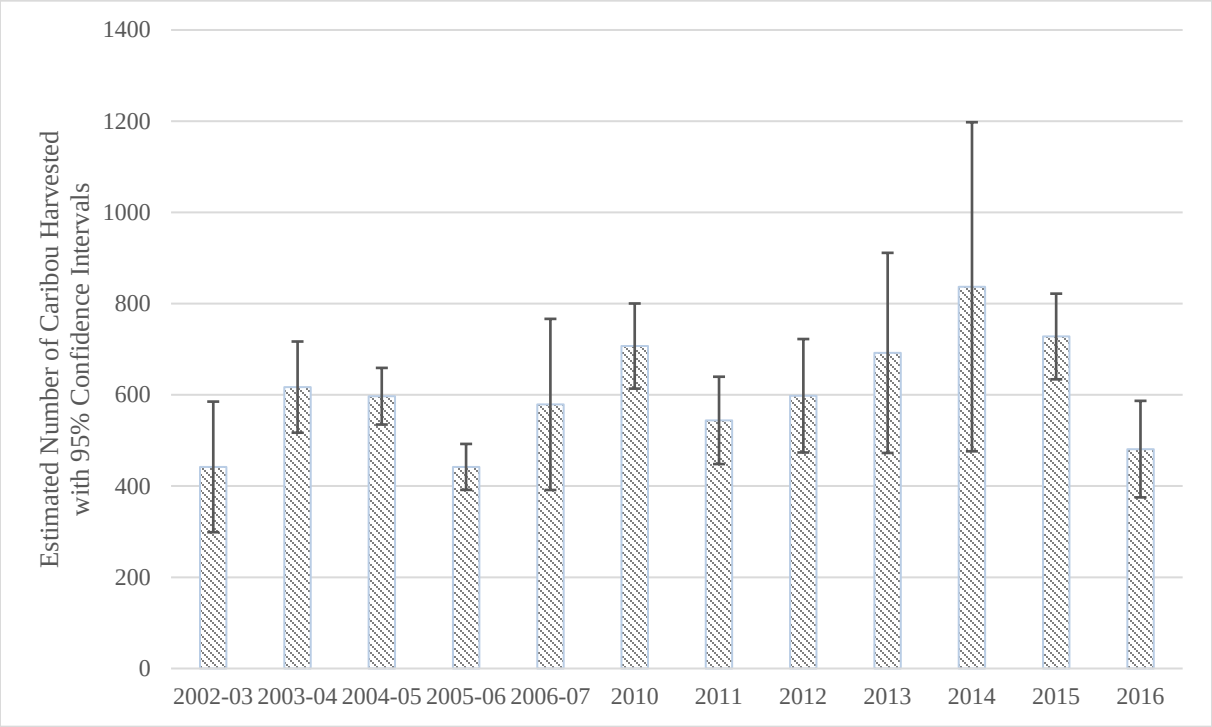
*Per capita pound estimates for the 1994-95, 1995-96, and 2000-2001 study years were not originally published but were subsequently calculated by Braem et al. (2011) based on Alaska Department of Labor and Workforce Development (ADOLWD) population estimates for those years.

***The estimates for Years 2010, 2011, 2012, 2013, and 2016 are based on averages that include one particularly high-harvesting household. In 2013 and 2016, this household reported harvesting over one quarter of all the reported harvests for the community. Therefore, the estimated harvests for those study years may be skewed upward due to the participation of this high-harvesting household in the harvest survey. Likewise, changes in community harvest estimates in future surveys could be due to this high-harvesting household not being interviewed.

**** This table uses a conversion factor of 117 lbs edible weight per caribou, based on the conversion factor used in an ADF&G caribou harvest study on the North Slope (Braem et al. 2011). ADF&G has since updated their conversion factors and ADF&G's report on the 2014 harvest survey in Nuiqsut uses a conversion factor for caribou of 137 lbs instead of 117 lbs. For the purposes of comparison in this report, the study team retained a conversion factor of 117 lbs for the 2014 study year.

Stephen R. Braund & Associates, 2017.

Figure 7: Estimated Caribou Harvests with Confidence Intervals, Nuiqsut, Available Study Years



Stephen R. Braund & Associates, 2017.

Observations of Changes in Harvest Patterns

During the active harvester interviews, respondents were asked if any of the following hunting attributes had changed from the previous year: hunting area, frequency of trips, duration of trips, months of use, and harvest amounts. In each case where they answered that a change had occurred, harvesters were asked to describe the change and to state what they believed (or thought) caused the change. Table 19 summarizes the percentage of respondents reporting a given type of change. Overall, the percentages of respondents reporting changes in hunting area, frequency, duration, and harvest amount in Year 9 were all within the range of previous years. As shown in Table 20, respondents also indicated whether they harvested enough caribou. In Year 9, 40 percent of respondents indicated that they did not harvest enough caribou, showing an increase from the previous two study years (32 percent and 22 percent, respectively). The percentage of respondents not harvesting enough is consistent with a decline in reported harvests during both the active harvester interviews and household harvest surveys. In Years 1 through 8, the percentage of respondents not harvesting enough caribou ranged from 16 percent (Year 4) to 54 percent (Year 6).

Changes in Harvest Amount

During Year 9 interviews, 67 percent of Nuiqsut respondents reported a change in harvest amounts, within the range of previous study years (Table 21). The other 33 percent of respondents reported harvesting the same amount as the previous year. Of those reporting a change in harvest amounts, 48 percent reported harvesting less and 19 percent reported harvesting more, both of which are within the range of previous years.

Table 19: Percentage of Respondents Reporting Changes in Harvest Activities, Years 1-9

Type of Change	Percentage of Respondents								
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Hunting Area Changed	31%	28%	39%	34%	36%	40%	28%	38%	34%
Frequency Changed	50%	77%	65%	60%	63%	67%	70%	67%	60%
Duration Changed	39%	32%	21%	21%	23%	26%	39%	28%	33%
Months Changed	19%	15%	12%	21%	21%	18%	11%	20%	18%
Harvest Amount Changed	75%	85%	68%	72%	54%	63%	82%	57%	67%

Stephen R. Braund & Associates, 2017.

Table 20: Percentage of Respondents Reporting Not Harvesting Enough Caribou, Years 1-9

Not Harvesting Enough	Percentage of Respondents								
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Reported Did Not Harvest Enough	47%	53%	21%	16%	41%	54%	32%	22%	40%

Stephen R. Braund & Associates, 2017.

Table 21: Type of Change in Harvest Amount Compared to Previous Year, Years 1-9

Type of Harvest Amount Change	Percentage of Respondents								
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Harvest More	11%	15%	21%	17%	9%	9%	30%	16%	19%
Harvest Less	64%	70%	47%	55%	45%	54%	53%	41%	48%
Harvest the Same	25%	15%	32%	28%	46%	37%	18%	43%	33%
Number of Respondents	36	53	57	58	56	57	57	52	63

Stephen R. Braund & Associates, 2017

Table 22 shows a cumulative list of reasons given for a decrease in harvest from the previous year, which have been organized under broader categories. Over all nine study years, Personal Factors were the most frequently cited causes for harvesting less caribou (121 observations), followed closely by causes related to Resource Distribution and Migration (115 observations). Other types of causes cited by respondents have included Development Activities (32 observations), Environmental Factors (nine observations) and Hunting Success (eight observations). In Year 7, 8, and 9, factors related to Resource Abundance (i.e., overall population levels) were also cited, consistent with recent surveys of caribou herds which have shown a decline (Lawhead et al. 2015).

Each observation was coded to reflect the respondents' direct response. For example, if a respondent indicated they harvested less because the caribou were not in the area, their response was coded as Resource Availability. If the respondent indicated that they harvested less because of helicopter traffic making the caribou harder to harvest, then their response was coded as Helicopter Traffic. In Year 9, Resource Availability (12 observations) was the most commonly reported individual reason for harvesting less caribou, followed by Personal Reasons and Lack of Transportation/Equipment with four observations each. No individuals directly reported development causes as a reason for decreased harvests in Year 9.

Table 22: Reasons for Decrease in Harvest Amount Compared to Previous Year, Nuiqsut, Years 1-9

Causes	Number and Percent of Observations									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	All Years
Personal Factors Total	**9**	**10**	**16**	**22**	**6**	**14**	**14**	**17**	**13**	**121**
	26%	**26%**	**47%**	**52%**	**17%**	**38%**	**36%**	**68%**	**34%**	**38%**
Personal Reasons		3	3	7	1	6	2	3	4	29
Lack of Transportation/Equipment	2	1	3	4		3	3	3	4	23
Take Fewer Trips		1	6	1	2		4	3	1	18
Change in Subsistence Providers	1	1	2	4	2	1	1	2		14
Employment/Lack of Time	1	2	2	4		2		2	1	14
Change in Subsistence Dependents	3	2		2				1		8
Need Less	2						2	2		6
Smaller Hunting Area					1				2	3
Increased Cost of Living/Expenses							1		1	2
Use Area Changed						2				2
Change in Transportation Method							1			1
Sharing Less								1		1
Resource Distribution or Migration Total	**12**	**18**	**10**	**8**	**15**	**15**	**16**	**5**	**16**	**115**
	35%	**46%**	**29%**	**19%**	**43%**	**41%**	**41%**	**20%**	**42%**	**36%**
Resource Availability	8	9	2	4	9	10	7	5	12	66
Migration Changed or Diverted	3	5			1	2	4			15
Farther from Riversides/Farther Inland		2	4		2	2	3		2	15
Change in Distribution / Migration		1		3	1					5
Moved Out of Area			3	1						4
Farther from Community		1					2		1	4
Timing of Migration						1			1	2
Earlier Migration/Arrival			1							1
Later Migration/Arrival					1					1
Move to Different Areas					1					1
Resource in Smaller Groups	1									1
Development Activities Total	**9**	**3**	**2**	**3**	**9**	**3**	**3**	**0**	**0**	**32**
	26%	**8%**	**6%**	**7%**	**26%**	**8%**	**8%**	**0%**	**0%**	**10%**
Helicopter Traffic Disturbance	4			2	5	2	2			15
Development	2	1	2				1			6
Airplane Traffic Disturbance	2	1		1	1					5
Air Traffic	1				2					3
Traffic Disturbance						1				1
Off Road Vehicles Disturbance					1					1
Oil Drilling		1								1
Don't Know Total	**0**	**2**	**1**	**5**	**1**	**0**	**0**	**0**	**2**	**11**
	0%	**5%**	**3%**	**12%**	**3%**	**0%**	**0%**	**0%**	**5%**	**3%**
I do not know		2	1	5	1				2	11
Environmental Factors Total	**0**	**3**	**2**	**1**	**1**	**1**	**0**	**0**	**2**	**9**
	0%	**8%**	**6%**	**2%**	**3%**	**3%**	**0%**	**0%**	**5%**	**3%**
Change in Food Availability		2								2
Predators			1						1	2

Causes	Number and Percent of Observations									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	All Years
Wind			1							1
More Rain					1					1
Climate Affecting Travel				1						1
Increase in Predators		1								1
New Species in Region						1				1
Climate Affecting Harvest									1	1
Hunting Success - General	**3**	**0**	**2**	**0**	**0**	**1**	**2**	**0**	**0**	**8**
Total	**9%**	**0%**	**6%**	**0%**	**0%**	**3%**	**5%**	**0%**	**0%**	**2%**
Worse success			1			1	2			4
More difficult	2									2
Reduced harvest opportunities			1							1
Travel farther to harvest resource	1									1
Competition or Hunting	**0**	**1**	**0**	**1**	**0**	**3**	**0**	**1**	**1**	**7**
Pressure Total	**0%**	**3%**	**0%**	**2%**	**0%**	**8%**	**0%**	**4%**	**3%**	**2%**
Competition with Sport Hunters						2				2
Sport Hunting Methods Disturbing Migration Routes		1							1	2
Sport Hunting and Fishing				1						1
Hunting Pressure						1				1
Overharvesting by Sport Hunters / Fishermen								1		1
Resource Behavior Total	**0**	**0**	**1**	**0**	**2**	**0**	**0**	**1**	**0**	**4**
	0%	**0%**	**3%**	**0%**	**6%**	**0%**	**0%**	**4%**	**0%**	**1%**
Skittish Behavior in Species			1		2			1		4
Development	**1**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**3**
Infrastructure Total	**3%**	**3%**	**0%**	**0%**	**3%**	**0%**	**0%**	**0%**	**0%**	**1%**
Pipeline	1	1								2
Oil Field Infrastructure					1					1
Resource Abundance Total	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**3**	**6**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**4%**	**8%**	**2%**
Decrease in Species Number							2	1		3
Fewer Males									3	3
Contamination Concerns	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**3**
Total	**0%**	**3%**	**0%**	**0%**	**0%**	**0%**	**3%**	**0%**	**3%**	**1%**
Contamination from Air Pollution		1					1			2
Contamination									1	1
Resource Health Total	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**2**
	0%	**0%**	**0%**	**2%**	**0%**	**0%**	**3%**	**0%**	**0%**	**1%**
Disease/Infection							1			1
Concern of Disease/Infection				1						1
Other Total	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**
	0%	**0%**	**0%**	**2%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
Miscellaneous				1						1
Grand Total	**34**	**39**	**34**	**42**	**35**	**37**	**39**	**25**	**38**	**322**

Stephen R. Braund & Associates, 2017.

Over all study years, the most frequently cited reasons for a decrease in harvest amount have generally alternated between the broader categories of Personal Factors and Resource Distribution/Migration Factors. In Year 9, Resource Distribution/Migration reasons were most frequently cited for decreased harvests, at 16 observations (42 percent of all observations), within the range of previous years. Specifically, under the category of Resource Distribution/Migration, respondents most commonly cited resource availability more generally, or indicated that the caribou were farther inland from the riversides, making them more difficult to harvest:

> *I don't know, it's so different I think it's because the weather changed. It's really weird, right now it should be cold, but it's raining and it's foggy. They [caribou] are confused because of the weather. We had a short summer again.* (SRB&A Nuiqsut Interview November 2016)

> *There is a lot of hunters on the Haul Road. Maybe made the caribou herd go a different way. I was surprised the number of planes I saw on the Haul Road this year when I was in the process of moving up here. I saw at least four or five of them over there. And there are way more hunters out there than there usually is.* (SRB&A Nuiqsut Interview November 2016)

> *That [caribou harvest] was a little less. Hardly seen them in close to the water. They were all too far in.* (SRB&A Nuiqsut Interview November 2016)

Under the Personal Factors category (13 observations, or 34 percent of all observations), residents indicated that personal reasons (e.g., lack of money, too busy, took fewer trips) or a lack of transportation or equipment resulted in them harvesting fewer caribou in Year 9. In a couple of cases, respondents indicated that their hunting area was smaller in Year 9 and therefore they were less successful. Two individuals explained the personal factors that affected their hunting success in Year 9:

> *This year we didn't have our boat running, and then the four-wheeler, so it was up to my sister, when she went out, if I went with her.* (SRB&A Nuiqsut Interview November 2016)

> *[I took] less [trips because of] gas prices. And nobody wanted to go. They work and then end of the day they are tired and they don't want to go, and I am depending on those relatives for their boat.* (SRB&A Nuiqsut Interview November 2016)

Three individuals cited Resource Abundance for their decreased harvests in Year 9, specifically that there were fewer bulls available during the hunting season. In two cases, respondents cited causes under the Environmental Factors category, indicating that predators and climate had affected their hunting success. No remaining category had more than one cause cited for decreased harvests in Year 9. Years 8 and 9 marked the first years of the nine study years that Development Activities were not directly cited as a cause for decreased harvests of caribou.

Table 23 shows the reasons given for harvesting more caribou in Year 9. Over the nine study years, Personal Factors were the most common reason for harvesting more caribou, followed by Resource Distribution/Migration Factors. This was also the case in Year 9, with Personal Factors accounting for 55 percent of observations (six observations), and Resource Distribution/Migration accounting for 27 percent (three observations). Under Personal Factors, residents cited Personal Reasons, followed by Better Transportation/Equipment and an increase in the number of hunting trips taken.

> *Oh, we got more. Because we got more transportation. More chances to hunt.* (SRB&A Nuiqsut Interview November 2016)

> *Well, the more people I went out with—they take me straight to the caribou and I shoot them! There was a bunch of people that wanted to me go out with them this year [compared to] last year.* (SRB&A Nuiqsut Interview November 2016)

Several individuals reported harvesting more caribou because the caribou were more available in their hunting areas. Residents cited a lack of snow and associated availability of winter feeding grounds, a decrease in helicopter traffic, and fewer predators for the relative abundance of caribou in Year 9:

> *There were more caribou last year and this year because they are grazing in this area a lot. And last year we hardly had any snow. And that's the reason the caribou were here. They could feed year round. Some years when the snow is so deep they go farther south. But last year with low snow—like today. They stick around.* (SRB&A Nuiqsut Interview November 2016)

> *There was no helicopters flying. There was more caribous going towards Pisiktagavik, and there was caribou out there.* (SRB&A Nuiqsut Interview November 2016)

> *It's because there has been a lot more wolf hunting which lowered down the predators. Lowered the death rate of the caribou really helps the overall caribou population I think.* (SRB&A Nuiqsut Interview November 2016)

Table 23: Reasons Given for Increase in Harvest Amount Compared to Previous Year, Nuiqsut, Years 1-9

Causes	Number and Percent of Observations									
	Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**All Years**
Personal Factors Total	**4**	**6**	**6**	**7**	**2**	**1**	**10**	**3**	**6**	**45**
	80%	**75%**	**50%**	**58%**	**50%**	**33%**	**59%**	**38%**	**55%**	**56%**
Personal Reasons	2	2	1	5			2		3	15
Take More Trips	1	3	2				4	2	1	13
Better Transportation/Equipment			1			1	2	1	2	7
Change in Subsistence Dependents	1		1	1	1					4
Change in Subsistence Providers			1	1	1					3
Sharing More							2			2
Need More		1								1
Resource Distribution or Migration Total	**1**	**2**	**5**	**4**	**2**	**2**	**3**	**3**	**3**	**25**
	20%	**25%**	**42%**	**33%**	**50%**	**67%**	**18%**	**38%**	**27%**	**31%**
Resource Availability		2	2	4	2	1	2	1	3	17
Closer to Community	1						1	2		4
Moved into Area			2							2
Travel Farther to Harvest Resource						1				1
Migration Changed or Diverted			1							1
Don't Know Total	**0**	**0**	**0**	**1**	**0**	**0**	**2**	**0**	**1**	**4**
	0%	**0%**	**0%**	**8%**	**0%**	**0%**	**12%**	**0%**	**9%**	**5%**
I Do Not Know				1			2		1	4
Hunting Success - General Total	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**2**	**0**	**4**
	0%	**0%**	**8%**	**0%**	**0%**	**0%**	**6%**	**25%**	**0%**	**5%**
Better Success			1				1	2		4
Environmental Factors Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**9%**	**1%**
Decrease in Predators									1	1
Resource Health Total	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**6%**	**0%**	**0%**	**1%**
Increase in Resource Size							1			1
Grand Total	**5**	**8**	**12**	**12**	**4**	**3**	**17**	**8**	**11**	**80**

Stephen R. Braund & Associates, 2017.

Changes in Trip Frequency

As shown in Table 24, the percentage of harvesters reporting a change in trip frequencies has varied over the nine study years, from 50 percent (Year 1) to 77 percent (Year 2). In Year 9, 60 percent of respondents reported a change in the frequency of their hunting trips, within the range of previous years; an equal percentage of respondents reported taking more or less trips, at 30 percent each. The percentage of respondents taking fewer trips than the previous year is on the low end in Year 9.

Table 24: Type of Change in Trip Frequency Compared to Previous Year, Nuiqsut, Years 1-9

Type of Trip Frequency Change	Percentage of Respondents								
	Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**
Take More Trips	25%	36%	32%	24%	27%	25%	30%	25%	30%
Take Fewer Trips	25%	42%	33%	34%	36%	42%	40%	42%	30%
Take Same Number of Trips	50%	23%	35%	41%	38%	33%	30%	33%	40%
Number of Respondents	36	53	57	58	56	57	57	52	63

Stephen R. Braund & Associates, 2017

Over the nine study years, Personal Factors have been the most frequently cited causes of an increase in trip frequency, followed by Resource Distribution/Migration Factors and Development Activities (Table 25). In Year 9, no respondents cited Development Activities for an increase in trip frequency although one individual cited Development Infrastructure, likely referring to the availability of the Spur Road and the road to CD5 for hunting activities. Two others cited Economic Factors or Hunting Success – General as reasons for their increased trip frequency.

Table 25: Reasons for Increase in Trip Frequency Compared to Previous Year, Years 1-9

Causes	Number and Percent of Observations									
	Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**All Years**
Personal Factors Total	**1**	**6**	**16**	**9**	**10**	**8**	**13**	**5**	**10**	**78**
	8%	**35%**	**80%**	**60%**	**63%**	**47%**	**76%**	**50%**	**56%**	**55%**
Personal Reasons		6	7	7	5	3	6	3	6	43
Better Transportation/Equipment			7	2	1	2	5	1	2	20
Need More			2		1		1		2	6
Sharing More	1					2				3
Change in Subsistence Providers					2					2
Change in Transportation Method							1	1		2
Change in Subsistence Dependents						1				1
Use Area Changed					1					1
Resource Distribution or Migration Total	**6**	**7**	**4**	**4**	**4**	**7**	**2**	**3**	**5**	**42**
	50%	**41%**	**20%**	**27%**	**25%**	**41%**	**12%**	**30%**	**28%**	**30%**
Resource Availability	4	7	2	4	3	6	2	2	5	35
Migration Changed or Diverted	2									2
Moved out of Area			1		1					2
Moved into Area			1							1

Causes	Number and Percent of Observations									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	All Years
Farther from Riversides/Farther Inland						1				1
Farther from Community								1		1
Development Activities Total	**3**	**2**	**0**	**0**	**2**	**1**	**1**	**0**	**0**	**9**
	25%	**12%**	**0%**	**0%**	**13%**	**6%**	**6%**	**0%**	**0%**	**6%**
Traffic Disturbance	1	1				1				3
Development	2	1								3
Helicopter Traffic Disturbance					1		1			2
Airplane Traffic Disturbance					1					1
Don't Know Total	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**2**
	0%	**6%**	**0%**	**7%**	**0%**	**0%**	**0%**	**0%**	**0%**	**1%**
I Do Not Know		1		1						2
Environmental Factors Total	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**1**	**3**
	0%	**0%**	**0%**	**7%**	**0%**	**6%**	**0%**	**0%**	**6%**	**2%**
Increase in predators						1			1	2
Weather				1						1
Development Infrastructure Total	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**2**
	8%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**6%**	**1%**
Roads/Ice Roads									1	1
Pipeline	1									1
Economic Factors Total	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**2**
	8%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**10%**	**0%**	**1%**
Mitigation Funds	1							1		2
Resource Behavior Total	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**6%**	**0%**	**0%**	**1%**
Skittish Behavior in Species							1			1
Hunting Success - General	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**2**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**10%**	**6%**	**1%**
Worse Success									1	1
Reduced Harvest Opportunities								1		1
Competition or Hunting Pressure Total	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
	0%	**6%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**1%**
Competition with Sport Hunters		1								1
Grand Total	**12**	**17**	**20**	**15**	**16**	**17**	**17**	**10**	**18**	**142**

Stephen R. Braund & Associates, 2017.

Under Personal Factors, the more general cause of Personal Reasons was the most frequently cited reason for an increase in the frequency of hunting trips in Year 9 (six observations), followed by Better Transportation/Equipment (two observations), and Need More (two observations) (Table 25).

> *Just high demand of caribou. [I have] my sister in Anchorage and we have family in Barrow that are always asking for meat. They say theirs tastes different than ours. We noticed a difference too. We do taste a difference.* (SRB&A Nuiqsut Interview November 2016)

> *It was more. So many people asked me to go out hunting with them and I took the chance and go follow them.* (SRB&A Nuiqsut Interview November 2016)

> *For me, it was more. Because my son was little [before]; I waited 'til he was old enough to come with me. He would mainly follow in the trips for the fish.* (SRB&A Nuiqsut Interview November 2016)

Those who identified Resource Distribution or Migration causes for their increase in trip frequency (five observations) attributed their need to conduct additional trips due to caribou being unavailable in the areas where they typically find them (Resource Availability), with one citing increased drilling activity in the area and another citing predators:

> *[I went out] more. Because I hardly got any in the beginning and then there was less around so that gave me more of a reason to go out. To see if they would get closer to the river.* (SRB&A Nuiqsut Interview November 2016)

> *It's exhausting and gas wise you are wasting gas to the point you are not even catching anything. The gas is expensive…. So, last year when we had these people, they were drilling not too far from here, that was really pushing, our hunting to our side. So basically, me hunting since '73 in Nuiqsut, I target the routes and areas they are actually at and now they are hardly there like they use to be.* (SRB&A Nuiqsut Interview November 2016)

> *Because [of] the lack of caribou that we saw on some of our trips. We usually see them out towards Qitik and Itkillik, mostly Itkillik. If we don't see any up to that first big hill, we travel farther. Last year, we saw tuttus inside Itkillik [River], but it was just too far in. [They were] at least a couple miles—two to five miles…. I know this summer when we hardly seen any caribou this summer a lot of people said they were seeing a lot of bears, brown bears.* (SRB&A Nuiqsut Interview November 2016)

Reasons for a decrease in trip frequency are provided in Table 26. Personal Factors were the most frequently cited causes, including the more general Personal Reasons (seven observations), followed by Employment/Lack of Time (five observations), and Lack of Transportation/Equipment (two observations). Personal Reasons were identified as a cause for a decrease in trip frequency seven times and involved local harvesters having to reduce their caribou hunting activities to assist in family matters or simply being out of the community more often during Year 9.

> *I'm working more through the day and by the time I get off it is either dark or real cold outside. I got three babies I have to take care of right now. And I have a job so I am only able to get out once in a while now.* (SRB&A Nuiqsut Interview November 2016)

A number of individuals also cited Employment/Lack of Time, indicating that they had less time for hunting because they recently gained employment. One individual made a more general statement about employment levels in the community, indicating that because more people were working in 2016, there were fewer opportunities to hunt. In addition to Personal Factors, several individuals indicated that they took fewer trips due to economic reasons, specifically a lack of money to purchase gas. One respondent reported a lack of funding for fuel vouchers, saying,

> *I didn't have no money for gas. It's pretty expensive. Five gallons is like $25. They used to have gas vouchers for the hunters, but there's no funding*[5]*…. No gas vouchers. That used to help a lot, too.* (SRB&A Nuiqsut Interview November 2016)

[5] CPAI notes that while there are mitigation funds, the committee that decides how to distribute these funds elected to drop fuel vouchers in 2016, instead providing equal payments to each household.

Table 26: Reasons for Decrease in Trip Frequency, Years 1-9

Causes	Number and Percent of Observations									
	Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**All Years**
Personal Factors Total	**9**	**16**	**19**	**22**	**17**	**21**	**18**	**20**	**14**	**156**
	90%	**80%**	**95%**	**88%**	**71%**	**75%**	**67%**	**83%**	**58%**	**77%**
Personal Reasons	2	2	8	10	8	10	4	6	7	57
Employment/Lack of Time	3	3	5	7	4	6	9	4	5	46
Lack of Transportation/Equipment	4	10	6	5	4	2	2	7	2	42
Change in Subsistence Providers					1	1	1	2		5
Better Transportation/Equipment						1	1			2
Change in Transportation Method							1			1
Need Less		1								1
Change in Subsistence Dependents						1		1		2
Resource Distribution or Migration Total	**0**	**4**	**1**	**1**	**3**	**3**	**4**	**1**	**5**	**22**
	0%	**20%**	**5%**	**4%**	**13%**	**11%**	**15%**	**4%**	**21%**	**11%**
Resource Availability		4			2	3	2	1	4	16
Farther from Community							1			1
Closer to Community							1			1
Change in Distribution/Migration					1					1
Moved into Area				1						1
Moved out of Area			1							1
Resource in Smaller Groups									1	1
Economic Factors Total	**0**	**0**	**0**	**0**	**1**	**4**	**2**	**2**	**4**	**13**
	0%	**0%**	**0%**	**0%**	**4%**	**14%**	**7%**	**8%**	**17%**	**6%**
Increased Cost of Living/Expenses					1	4	2	2	4	13
Don't Know Total	**0**	**0**	**0**	**2**	**1**	**0**	**1**	**0**	**0**	**4**
	0%	**0%**	**0%**	**8%**	**4%**	**0%**	**4%**	**0%**	**0%**	**2%**
I Do Not Know				2	1		1			4
Environmental Factors Total	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**1**	**4**
	10%	**0%**	**0%**	**0%**	**0%**	**0%**	**7%**	**0%**	**4%**	**2%**
Shallower Rivers/Lakes							1			1
Wind							1			1
Less Snow	1									1
Weather									1	1
Development Activities Total	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**2**
	0%	**0%**	**0%**	**0%**	**4%**	**0%**	**0%**	**4%**	**0%**	**1%**
Development					1					1
Disturbance								1		1
Development Infrastructure Total	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**
	0%	**0%**	**0%**	**0%**	**4%**	**0%**	**0%**	**0%**	**0%**	**0.5%**
Oil Field Infrastructure					1					1
Grand Total	**10**	**20**	**20**	**25**	**24**	**28**	**27**	**24**	**24**	**202**

Stephen R. Braund & Associates, 2017.

Five individuals reported taking fewer trips because of reasons related to Resource Distribution/Migration, indicating that they went out less due to the general lack of caribou in their hunting areas. This is in contrast to those who went out more due to the lack of caribou (see above) and illustrates the differing hunter responses to similar conditions. In the following instance, one respondent indicated they did not want to waste gas when they were hearing few reports of caribou in the area:

> *Usually we hear when they are around, and we will go out and get them. Gas was a factor too, that was so expensive, for 20 gallons that was 100 dollars. For that we even floated down so that we could conserve gas. And it wasn't fun. We ran out right by the village, and we used 60-80 gallons because of our heavy load.* (SRB&A Nuiqsut Interview November 2016)

Changes in Trip Duration

Twenty-four percent of Year 9 respondents reported taking longer trips compared to the previous year, higher than the previous six years (Table 27). The percentage of respondents taking shorter trips was 10 percent, within the range of previous years.

Table 27: Type of Change in Trip Duration, Nuiqsut, Years 1-9

Type of Trip Duration Change	Percentage of Respondents								
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Take Longer Trips	33%	25%	9%	12%	13%	16%	19%	8%	24%
Take Shorter Trips	6%	8%	12%	7%	11%	11%	19%	20%	10%
Take Same Duration Trips	61%	68%	79%	81%	77%	74%	61%	72%	67%
Number of Respondents	36	53	57	58	56	57	57	50	63

Stephen R. Braund & Associates, 2017

As shown in Table 28, the reasons given for taking longer hunting trips totaled 12 observations, higher than most previous years, including Personal Factors (8), Resource Distribution or Migration (2), Environmental Factors (1), and Development Infrastructure, specifically Ice Roads/Roads (1). Personal Reasons, such as staying out longer for personal enjoyment, were cited in seven instances. As one individual said, "[I'm] not usually staying out overnight. The reason why I wanted to go was to get out of Nuiqsut and check out the nature and see how it was out there" (SRB&A Nuiqsut Interview November 2016). In two cases, respondents indicated that they stayed out longer looking for caribou which were less available in their hunting areas (Resource Availability).

The primary reasons for taking shorter trips over all study years were related to Personal Factors (Table 29), including Personal Reasons in general, Employment/Lack of Time, and Lack of Transportation/Equipment. In one case, a respondent who cited Development Infrastructure indicated that the accessibility of the Spur Road allowed them to take shorter trips from the community.

Changes in Use Area

As shown in Table 19, 34 percent of harvester respondents reported that their hunting area was different in Year 9, within the range of previous study years (between 28 percent and 40 percent of harvesters). Six percent of Year 9 Nuiqsut caribou harvester respondents reported a general change in the location of their use area, tying Year 1 for the lowest incidence of this observation, while 15 percent reported using new or different areas, higher than any previous study year (Table 30). In addition, six percent of individuals reported an expanded use area and four percent reported a smaller hunting area, both within the range of previous years.

Table 28: Reasons for Taking Longer Trips Compared to Previous Year, Years 1-9

Causes	Number and Percent of Observations									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	All Years
Resource Distribution or Migration Total	**10**	**5**	**1**	**4**	**4**	**8**	**8**	**1**	**2**	**43**
	63%	**56%**	**20%**	**57%**	**57%**	**73%**	**73%**	**25%**	**17%**	**52%**
Resource Availability	4	3		3	2	6	4		2	24
Farther from Riversides/Farther Inland		1			1	2	4			8
Travel Farther to Harvest Resource	1	1	1	1	1			1		6
Migration Changed or Diverted	5									5
Personal Factors Total	**0**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**8**	**28**
	0%	**33%**	**60%**	**43%**	**43%**	**27%**	**27%**	**50%**	**67%**	**34%**
Personal Reasons		3	3	3	1	1	3	2	7	23
Better Transportation/Equipment					1	1				2
Sharing More						1				1
Change in Transportation Method					1				1	2
Development Activities Total	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**
	31%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**6%**
Helicopter Traffic Disturbance	2									2
Airplane Traffic Disturbance	2									2
Development	1									1
Hunting Success - General Total	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
	6%	**0%**	**20%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**2%**
More Difficult	1									1
Worse Success			1							1
Economic Factors Total	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**2**
	0%	**11%**	**0%**	**0%**	**0%**	**0%**	**0%**	**25%**	**0%**	**2%**
Increased Cost of Living/Expenses		1						1		2
Environmental Factors Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**8%**	**1%**
Weather									1	1
Development Infrastructure Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**8%**	**1%**
Roads/Ice Roads									1	1
Grand Total	**16**	**9**	**5**	**7**	**7**	**11**	**11**	**4**	**12**	**82**

Stephen R. Braund & Associates, 2017.

Table 29: Reasons for Taking Shorter Trips Compared to Previous Year, Years 1-9

Causes	Number and Percent of Observations									
	Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**All Years**
Personal Factors Total	**2**	**2**	**6**	**3**	**5**	**3**	**2**	**2**	**6**	**31**
	100%	**100%**	**86%**	**60%**	**56%**	**50%**	**22%**	**20%**	**86%**	**54%**
Personal Reasons	1		5	2	4	1		1	3	17
Employment/Lack of Time	1	1			1	1	1		2	7
Lack of Transportation/Equipment		1	1	1		1			1	5
Change in Transportation Method							1			1
Better Transportation/Equipment								1		1
Resource Distribution or Migration Total	**0**	**0**	**1**	**1**	**2**	**1**	**3**	**5**	**0**	**13**
	0%	**0%**	**14%**	**20%**	**22%**	**17%**	**33%**	**50%**	**0%**	**23%**
Resource Availability			1	1	2	1	2	3		10
Farther from Riversides/Farther Inland							1			1
Harvest Resource Closer to Community								1		1
Closer to Shore								1		1
Economic Factors Total	**0**	**0**	**0**	**0**	**1**	**2**	**2**	**2**	**0**	**7**
	0%	**0%**	**0%**	**0%**	**11%**	**33%**	**22%**	**20%**	**0%**	**12%**
Increased Cost of Living/Expenses					1	2	2	2		7
Environmental Factors Total	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	**0**	**3**
	0%	**0%**	**0%**	**0%**	**11%**	**0%**	**11%**	**10%**	**0%**	**5%**
Weather							1			1
More Rain					1					1
Rain								1		1
Don't Know Total	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**
	0%	**0%**	**0%**	**20%**	**0%**	**0%**	**0%**	**0%**	**0%**	**2%**
I Do Not Know				1						1
Hunting Success - General	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**11%**	**0%**	**0%**	**2%**
Better Success							1			1
Development Infrastructure Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**14%**	**2%**
Roads/Ice Roads									1	1
Grand Total	**2**	**2**	**7**	**5**	**9**	**6**	**9**	**10**	**7**	**57**

Stephen R. Braund & Associates, 2017.

Table 30: Type of Change in Use Area, Nuiqsut, Years 1-9

Type of Use Area Change	Percentage of Respondents								
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Use Area Changed	6%	19%	14%	29%	29%	28%	16%	15%	6%
Smaller Hunting Area	11%		11%		4%		4%	8%	4%
Expanded Use Area			7%		4%	11%	7%	2%	6%
Travel Farther to Harvest Resource	14%	4%	5%	2%				6%	
Utilizing New or Different Areas			2%				2%	6%	15%
Changing of Timing of Hunt		2%				2%			
Personal Reasons		2%							
Take Fewer Trips		2%							
Change in Harvest Methods				2%					
Move to Different Areas		2%							
No Change in Use Area	69%	70%	61%	67%	64%	60%	72%	63%	70%
Number of Respondents	36	53	57	58	56	57	57	52	53

Stephen R. Braund & Associates, 2017.

Table 31 shows the reasons given for any change in use area. The area where Nuiqsut residents hunt each year is dependent on a number of factors, including the location or distribution of the caribou, environmental factors such as river levels or snow conditions, human factors such as development activities or hunting competition, and the availability of transportation methods to access certain areas.

Table 31: Reasons Given for a Change in Use Area, Years 1-9

Causes	Number and Percent of Observations									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	All Years
Personal Factors Total	**4**	**4**	**19**	**15**	**13**	**12**	**8**	**7**	**8**	**90**
	25%	**25%**	**83%**	**68%**	**46%**	**44%**	**40%**	**37%**	**47%**	**49%**
Personal Reasons	1	1	10	11	6	3	2	4	1	39
Lack of Transportation/Equipment	2	2	5	4	3	4	2	2	2	26
Better Transportation/Equipment			4		1	3	1	1	3	13
Employment/Lack of Time	1	1				2			1	5
Change in Transportation Method					1		3			4
Change in Subsistence Providers					1					1
Smaller Hunting Area					1					1
Need More									1	1
Resource Distribution or Migration Total	**6**	**7**	**2**	**2**	**12**	**8**	**4**	**4**	**2**	**47**
	38%	**44%**	**9%**	**9%**	**43%**	**30%**	**20%**	**21%**	**12%**	**25%**
Resource Availability	1	2		1	4	8	3	3	2	24
Migration Changed or Diverted	4	2			1					7
Change in Distribution/Migration		1		1	3			1		6
Farther from Community		1			1					2
Moved Out of Area			2							2
Closer to Community							1			1
Harvest Resource Closer to Community					1					1
Move to Different Areas		1								1
Farther from Shore					1					1
Moved into Area					1					1
Farther from Riversides/Farther Inland	1									1
Environmental Factors Total	**1**	**3**	**2**	**4**	**2**	**2**	**3**	**4**	**4**	**25**
	6%	**19%**	**9%**	**18%**	**7%**	**7%**	**15%**	**21%**	**24%**	**14%**

Causes	Number and Percent of Observations									
	Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**All Years**
Shallower Rivers/Lakes			1	3		1	2	1	1	9
River Channel Changed						1		3	3	7
Wind		1					1			2
Climate Affecting Travel		2								2
Climate					1					1
Less Snow	1									1
Warmer Temperatures					1					1
Water Quality				1						1
Weather			1							1
Development Activities Total	**4**	**1**	**0**	**1**	**1**	**5**	**3**	**2**	**0**	**17**
	25%	**6%**	**0%**	**5%**	**4%**	**19%**	**15%**	**11%**	**0%**	**9%**
Development	1	1		1	1	1	2			7
Helicopter Traffic Disturbance	1					1	1			3
Traffic Disturbance	1					2				3
Disturbance								2		2
Airplane Traffic Disturbance	1									1
Air Traffic						1				1
Don't Know	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**2**	**0**	**3**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**11%**	**0%**	**2%**
I Do Not Know							1	2		3
Development Infrastructure Total	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**1**
	6%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**18%**	**1%**
Roads/Ice Roads	1								3	4
Pipeline	1									1
Economic Factors Total	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**2**
	0%	**6%**	**0%**	**0%**	**0%**	**0%**	**5%**	**0%**	**0%**	**1%**
Increased Cost of Living/Expenses		1					1			2
Grand Total	**16**	**16**	**23**	**22**	**28**	**27**	**20**	**19**	**17**	**185**
Stephen R. Braund & Associates, 2017.										

Over all nine study years, Personal Factors were the most commonly cited reasons for a change in use area, followed by Resource Distribution or Migration Factors, Environmental Factors, and Development Activities. This was also the case in Year 9, except that Environmental Factors were more commonly cited than Resource Distribution/Migration factors. In addition, Year 9 was the first year since Year 1 that Development Infrastructure was cited as a cause for change in use area, accounting for 18 percent of observations. Specifically, three respondents indicated that access to the Spur Road has resulted in them hunting in a new area. As one individual said, "Yeah, like the Spur Road, I would never hunt there, now I do. Easier access. You can just go there and back" (SRB&A Nuiqsut Interview November 2016). Another respondent indicated that the road both facilitates and obstructs travel, explaining:

> *They [use areas] kind of are [changing], because - It's kind of hard to say, because of the Spur Road – like if you want to go to Barrow, you have to go around [the road]. It changes your route. You have to go on the top or the bottom. Yeah, yup. I've been trying to utilize it [the Nuiqsut Spur Road] to spot caribou. If they were right at the road I would be happier than ever. You can't [snowmachine on the Spur Road] because the road is all gravel and there's hardly any snow this year.* (SRB&A Nuiqsut Interview November 2016)

Several individuals also cited River Channel Changed in Year 9, reflecting use of a newly created channel on the Colville River near *Puviksuk*, which is evident on Map 6 from the high occurrence of use areas in the location of the new channel. Personal Factors cited in Year 9 included Better Transportation/Equipment

(three observations), Lack of Transportation/Equipment (two observations), Personal Reasons (one observation), and Employment/Lack of Time (one observation). Several individuals indicated that access to new modes transportation such as a jet boat or four-wheeler allowed them to travel to areas they did not previously. In contrast, those without their usual transportation reported traveling in a smaller area or did not travel to the same areas (e.g., did not travel overland because their snowmachine broke down).

Changes in Hunting Months

Eighteen percent of Nuiqsut caribou harvester respondents reported a change in their hunting months in Year 9, within the range of previous years (between 12 percent and 21 percent) (Table 19). In most cases, these respondents (16 percent) reported a general change within their normal harvest season, rather than an overall shift in the timing of their hunting season (Table 32).

Table 32: Type of Change in Months of Harvest by Type of Change, Nuiqsut, Years 1-9

Type of Hunting Month Change	Percentage of Respondents								
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Later Hunting Season	11%		5%				2%	2%	2%
Earlier Hunting Season					2%	2%	2%	2%	
Harvest Season Changed	8%	15%	7%	21%	20%	16%	7%	14%	16%
Harvest Season Same	81%	85%	88%	79%	79%	82%	89%	82%	82%
Number of Respondents	36	53	57	58	56	57	57	50	62

Stephen R. Braund & Associates, 2017

Over the nine study years, Personal Factors were the most commonly cited reasons for a change in harvest seasons, and this trend held true in Year 9, with three observations (Table 33). In Year 9, of the three Personal Factor causes, two were for Personal Reasons more generally, and one was related to a Change in Transportation Method. Regarding the latter, one individual indicated that the ability to hunt by truck along the Spur Road allowed them to hunt during the colder months. Another individual reported they did not hunt in June, like they usually do, because they could not afford gas to go out:

> *That is because we didn't go in June. We were hurting for caribou, so we had to go in September. That [not going in June] was because of gas. Usually you can get some vouchers.* (SRB&A Nuiqsut Interview November 2016)

In addition to Personal Factors, two individuals cited Resource Availability for the change in harvest season (the animals were not available during the usual times) and two cited Environmental Factors related to weather and a lack of snow.

Table 33: Reasons Given for a Change in Harvest Season, Years 1-9

Causes	Number and Percent of Observations									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	All Years
Personal Factors Total	**4**	**5**	**5**	**12**	**8**	**7**	**4**	**7**	**3**	**55**
	57%	**63%**	**71%**	**86%**	**67%**	**70%**	**67%**	**88%**	**38%**	**69%**
Lack of Transportation/Equipment	2	2	2	3	6	3	1			19
Personal Reasons		2		7	1	1	2	4	2	19
Employment/Lack of Time	2		1	2		1				6
Better Transportation/Equipment			2		1					3
Need More						1	1	1		3
Change in Subsistence Dependents		1						1		2
Change in Subsistence Providers						1				1
Need Less								1		1
Change in transportation method									1	1
	3	**2**	**2**	**1**	**2**	**1**	**1**	**0**	**2**	**14**

Causes	Number and Percent of Observations									
	Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**All Years**
Resource Distribution or Migration Total	**43%**	**25%**	**29%**	**7%**	**17%**	**10%**	**17%**	**0%**	**25%**	**18%**
Resource Availability		2	1		2	1	1		2	9
Later Migration/Arrival	3									3
Change in Distribution/Migration				1						1
Moved Out of Area			1							1
Environmental Factors Total	**0**	**0**	**0**	**0**	**2**	**1**	**0**	**0**	**2**	**5**
	0%	**0%**	**0%**	**0%**	**17%**	**10%**	**0%**	**0%**	**25%**	**6%**
Climate					1					1
Harsh Winter					1					1
Weather						1			1	2
Less Snow									1	1
Development Activities Total	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
	0%	**13%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**1%**
Airplane Traffic Disturbance		1								1
Don't Know Total	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**2**
	0%	**0%**	**0%**	**7%**	**0%**	**0%**	**17%**	**0%**	**0%**	**3%**
I Do Not Know				1			1			2
Hunting Success - General Total	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**10%**	**0%**	**0%**	**0%**	**1%**
Better Success						1				1
Development Infrastructure	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**13%**	**0%**	**1%**
Ice Roads								1		1
Economic Factors	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**13%**	**1%**
Increased cost of living/expenses									1	1
Grand Total	**7**	**8**	**7**	**14**	**12**	**10**	**6**	**8**	**8**	**80**
Stephen R. Braund & Associates, 2017										

Harvested Enough Caribou

In Year 9, 40 percent of Nuiqsut respondents indicated that they did not harvest enough caribou, within the range of previous years, which ranged from 16 percent (Year 4) to 54 percent (Year 6) (Table 20). Compared to the previous two study years, a smaller percentage of respondents reported harvesting enough caribou in Year 9. Respondents discussed a variety of reasons for not harvesting enough caribou during the Year 9 study period, often referring back to their reasons for harvesting fewer caribou in Year 9 (see Table 22). Respondents discussed a variety of reasons for not harvesting enough caribou during the Year 9 study period. The primary reasons were a lack of caribou in the area; harvesters sharing much of their caribou with other households; and lack of adequate equipment/fuel to access the caribou.

> *Not enough. Me and my brother hunt for three families. He has his family, I have my family, and then my mom's [family]. We didn't have enough [caribou].* (SRB&A Nuiqsut Interview November 2016)

> *It wasn't just for my household, it was also for the elders of Nuiqsut. About half of my catch were for the elders of Nuiqsut.* (SRB&A Nuiqsut Interview November 2016)

> *No, no, there was less, they are either farther or they have a different route of where we usually get them. It's usually right back here where we go.* (SRB&A Nuiqsut Interview November 2016)

Respondent 2: Yeah, [we didn't harvest enough]. But we were looking this summer but there was just nothing, hardly any on the land.
Respondent 1: Most hang out by Oliktok where we couldn't hunt or they are up too far in those hills, that was what I was told.
Respondent 2: Yeah, the farthest I went up to is by my Grandma's cabin and by my land. There was no caribou or nothing. (SRB&A Nuiqsut Interview November 2016)

Observations of Harvested Caribou Health and Condition

The percentage of respondents reporting one or more "abnormalities" in caribou ranged from 22 percent to 64 percent over the first seven study years; Years 8 and 9 had the lowest percentage of respondents observing abnormalities, at 21 and 18 percent, respectively (Table 34). The number of harvested caribou with abnormalities in Year 9 (16 caribou) was lower than in all previous study years except Year 6 (14 caribou) (Table 35).

Table 34: Respondent Observations of Abnormalities in Harvested Caribou, Nuiqsut, Years 1-9

Type of Abnormality	Percentage of Respondents								
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Health	47%	26%	18%	26%	33%	16%	15%	16%	13%
Other	3%	4%	0%	0%	4%	4%	5%	2%	1%
Parasites	22%	2%	5%	3%	4%	0%	2%	0%	0%
Quality	8%	4%	4%	10%	14%	4%	0%	10%	1%
Size	28%	11%	18%	16%	26%	12%	8%	5%	4%
One or More Abnormalities	64%	38%	40%	29%	44%	25%	22%	21%	18%
Number of Active Harvester Respondents	36	53	57	58	57	57	60	58	63

Stephen R. Braund & Associates, 2017.

As with most other years, health problems were the primary type of observation in caribou in Year 9 (69 percent of observations), followed by abnormal size (25 percent of observations) (Table 35). In Year 9, respondents reported using only a small portion (18 percent) of caribou with health-related abnormalities (two of 11), Year 9 respondents used 100 percent of abnormal caribou with size-related abnormalities, in contrast to between eight percent and 89 percent in previous study years. For all types of abnormalities, respondents reported using seven of the 16 caribou with reported abnormalities in Year 9, or 44 percent, well within the range of previous years, which ranged from 26 percent to 70 percent (Table 35).

As shown in Table 36, the most commonly observed abnormalities in Year 9 were Disease/Infection and Change in Texture of Meat, both of which had six observations. These were followed by Decrease in Resource Size (four observations), Change in Smell of Meat (one observation), and Injured Resource (one observation).

Those who observed Disease/Infection noted caribou pus in the ribs and legs of the caribou or infected areas from previous injuries:

Wait a minute, one was sick, it had a yellow puss ball in the left quarter. That was the male we caught off of the Spur Road. We weren't sure what was wrong with it and it had this whole puss ball, it was as big as my hat here. I didn't want to feed anyone with that so we had to dispose of it. We couldn't figure out why, when we shot it, it didn't want to get off the ground when all the other ones were already up. (SRB&A Nuiqsut Interview November 2016)

Table 35: Number and Percent of Abnormal Caribou by Type of Abnormality, Nuiqsut, Years 1-9

Type of Abnormality	Number (%) of Abnormal Caribou									Number (%) of Abnormal Caribou Used								
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Health	24 (32%)	16 (47%)	13 (35%)	23 (85%)	30 (60%)	9 (64%)	19 (83%)	18 (51%)	11 (69%)	4 (17%)	4 (25%)	2 (15%)	10 (43%)	7 (23%)	6 (67%)	2 (11%)	2 (11%)	2 (18%)
Other	1 (1%)	2 (6%)	0 (0%)	0 (0%)	2 (4%)	2 (14%)	3 (13%)	4 (11%)	1 (6%)	0 (0%)	2 (100%)	-	-	0 (0%)	1 (50%)	2 (67%)	4 (100%)	1 (100%)
Parasites	13 (18%)	5 (15%)	8 (22%)	3 (11%)	2 (4%)	0 (0%)	1 (4%)	0 (0%)	0 (0%)	11 (85%)	5 (100%)	7 (88%)	0 (0%)	0 (0%)	-	0 (0%)	-	-
Quality	3 (4%)	2 (6%)	2 (5%)	6 (22%)	11 (22%)	2 (14%)	0 (0%)	8 (23%)	1 (6%)	2 (67%)	1 (50%)	2 (100%)	1 (17%)	1 (9%)	1 (50%)	-	0 (0%)	1 (100%)
Size	43 (58%)	9 (26%)	16 (43%)	12 (44%)	33 (66%)	7 (50%)	10 (43%)	14 (40%)	4 (25%)	38 (88%)	8 (89%)	14 (88%)	1 (8%)	20 (61%)	3 (43%)	2 (20%)	12 (86%)	4 (100%)
One or More Abnormalities	74	34	37	27	50	14	23	35	16	52 (70%)	20 (59%)	25 (68%)	11 (41%)	25 (50%)	9 (64%)	6 (26%)	18 (51%)	7 (44%)

Stephen R. Braund & Associates, 2017.

Table 36: Types of Observed Abnormalities, Nuiqsut, Years 1-9

Observed Abnormality	Number of Observations									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	All Years
Disease/Infection	24	12	13	2	29	7	17	16	6	144
Decrease in Resource Size	36	9	12	12	33	6	1	14	4	136
Change in Texture of Meat		3		4	8	1		3	6	25
Change in Smell of Meat	2	1		5	6	1		5	1	21
Fewer Parasites	1		7							17
Increase in Resource Size	5		4							9
Physical Abnormalities		3			1			4		8
More Parasites	3		1	3	1					8
Parasites		5								5
Injured Resource						4			1	5
Taste	1				1	1				3
Resource Injury							2			2
Change in Resource Quality			2							2
Resource Appears Unhealthy					1	1				2
New Species in Region		1								1
Abnormal Resource Death	1									1
Less Fat	1									1
Fur Less Thick							1			1

Stephen R. Braund & Associates, 2017.

Observations of a Change in Texture of Meat included meat and organs that were an unusual color and a tough or rough texture to the meat and/or bones. In the following quotes, one respondent noted red, green, and yellow hues while butchering a caribou they harvested, while another reported various abnormalities associated with the bones, stomach, intestines, and other organs of a caribou they harvested:

> *No—Oh! Oh! One of them that I caught. It was reddish, greenish, and yellow [on the inside]. That was weird. I mean, I don't want that caribou. I got that one nearby Kayuktusulik…. There was another one near by Fish Creek. Reddish color. That was on the side, inside. That was how it might be sick. I just leave it. I just leave them, I cut it, skin it, and leave it.* (SRB&A Nuiqsut Interview November 2016)

> *It had a number of things wrong with it. I started skinning it first and the bones were rough and odd and then I got into the stomach and everything was very dark and the stomach lining was not normal to my eyes. All the intestines and everything were all dark. The lungs were small and the fat was dry. The heart—everything inside there was pretty bad, pretty dark…. I left it outside so that a dog who kept coming by could eat it but the dog wouldn't even eat it. That is the only sick one that I got.* (SRB&A Nuiqsut Interview November 2016)

Finally, those who observed a Decrease in Resource Size indicated that the caribou they harvested had less than the usual amount of fat. One individual attributed this to the unusual weather conditions in Year 9:

> *Yes, just a little fat, but we were able to eat it. If it was not healthy we would use it for dog food or something. It was tiny. Just not enough. It was the climate change I think. It was rain, we had warm spells, and then the coldness. One day it would be really cold and then the next day warm. It was incredible.* (SRB&A Nuiqsut Interview November 2016)

When asked by researchers what they thought caused the sicknesses observed in the caribou, most respondents reported not knowing or were unsure what could have caused the disease/infection. Those

individuals who did proffer a cause for the abnormality cited wounds caused by predators, contamination from old drums upriver, and climate change.

The locations where Year 9 respondents reported harvesting caribou they perceived to be abnormal are depicted in red on Map 31, and locations identified during previous study years are shown in gray. For the Year 9 time period, respondents reported harvesting "abnormal" caribou primarily to the overland area west of the community and north along the Spur Road. Other locations where abnormal caribou were harvested occurred along the East Channel of the Colville Delta, Itkillik River, and upriver from the community on the Colville River toward Sentinel Hill. As shown on Map 32, over all study years, the locations where respondents have harvested abnormal caribou are similar to the locations where they have harvested healthy caribou. Few abnormal caribou have been reported along the upper Itkillik River.

During the Year 9 household harvest survey, respondents were asked whether any of the caribou they harvested were sick or injured. In Year 9, 11 percent of households reported harvesting sick caribou, lower than previous study years and consistent with the smaller number of respondents reporting abnormal caribou during the active harvester interviews (Table 37). However, the number of sick caribou reported was higher than the previous study year (Year 8), at 26 caribou, which accounted for seven percent of all caribou harvested.

Table 37: Household Harvest Survey Observations of Sick/Injured Caribou

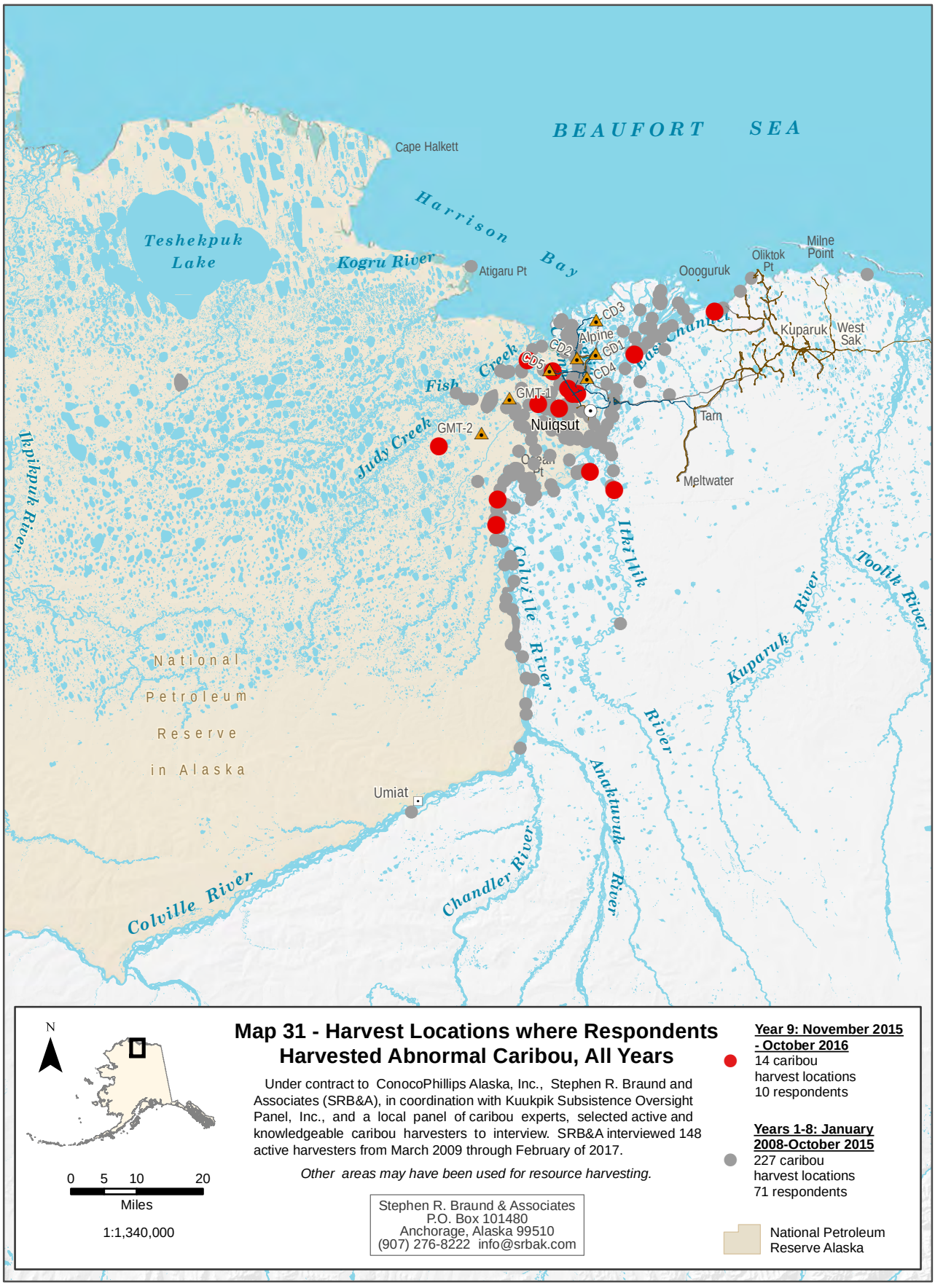
Study Year	Percent of HH Reporting Sick/Injured Caribou	Number (%) of Sick/Injured Caribou*	Number (%) of Sick/Injured Caribou Used by HH
2011 (Year 4)	18%	21 (6%)	3 (14%)
2012 (Year 5)	24%	40 (10%)	6 (15%)
2013 (Year 6)	17%	33 (7%)	1 (3%)
2015 (Year 8)	15%	15 (3%)	1 (7%)
2016 (Year 9)	11%	26 (7%)	2 (8%)
Notes: ADF&G data for 2014 (Year 7) not reported due to low response rate.			

Stephen R. Braund & Associates, 2017.

Impacts on Harvesting Activities

In Year 9, 27 percent of respondents reported one or more perceived Alpine-related impacts on their caribou hunting[6], lower than all other study years (Table 38; Figure 8). A somewhat higher number of "new" respondents participated in the Year 9 active harvester interviews (18 respondents who had not participated in previous study years; in recent years active harvester interviews have included closer to 10 new respondents each year). To ensure that the lower impact reports during the active harvester interviews were not due to a difference in the respondent sample, the study team calculated the percentage of active harvester respondents reporting impacts, only looking at respondents who had participated in previous study years. However, the percentage of respondents reporting impacts is only slightly higher when looking at this subsample (31 percent reporting impacts). During a meeting of the Nuiqsut Caribou Panel to review the Year 9 report, panel members expressed concern that the decline in reported impacts in Year 9 would be

[6] The impacts discussed in this section are those that respondents believed were related to Alpine activities. It is not possible to verify the source of all impacts, and in some cases respondents were unsure of the source of an impact.



Map 31 - Harvest Locations where Respondents Harvested Abnormal Caribou, All Years

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 148 active harvesters from March 2009 through February of 2017.

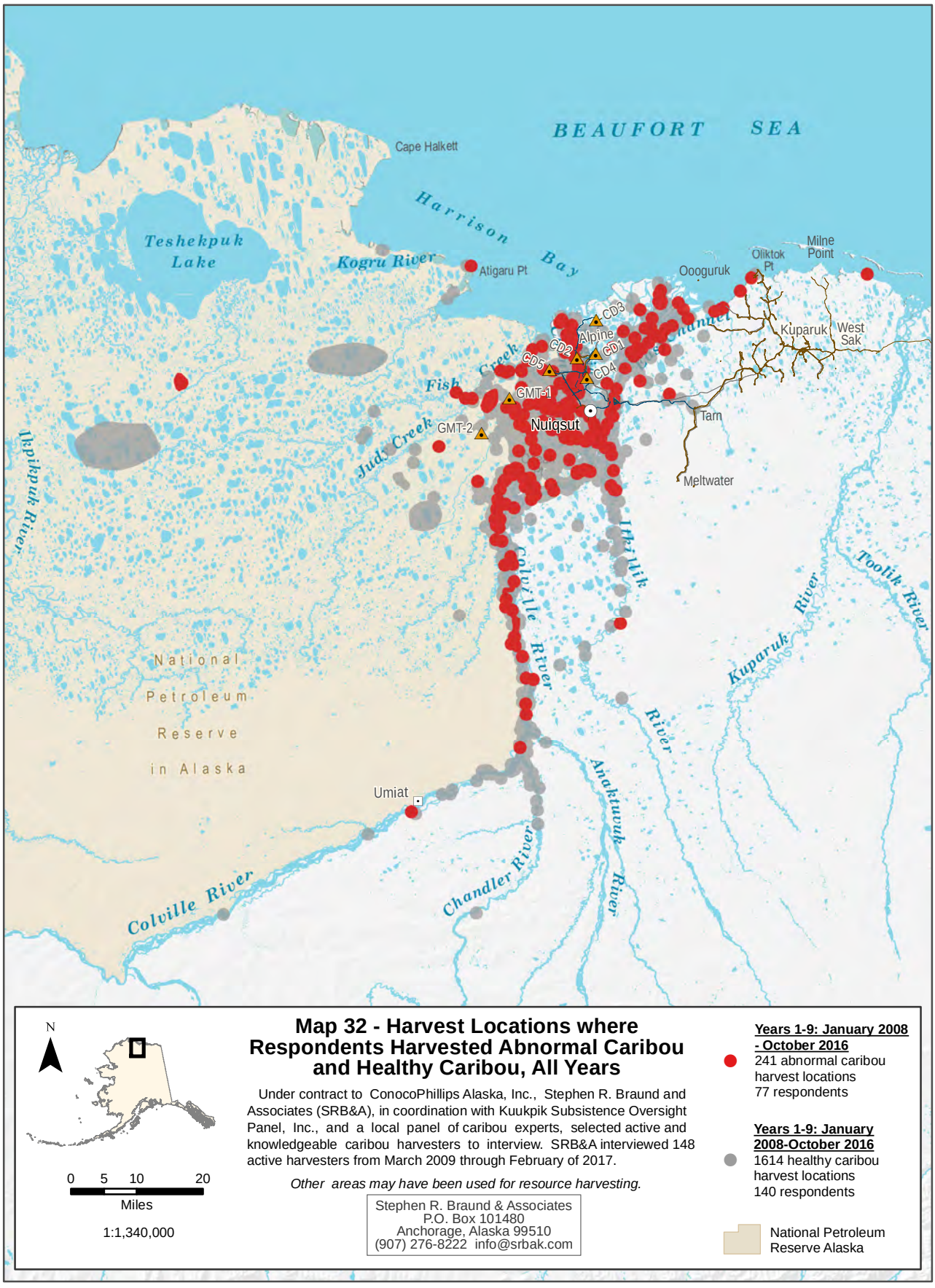
Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

Year 9: November 2015 - October 2016
14 caribou harvest locations
10 respondents

Years 1-8: January 2008-October 2015
227 caribou harvest locations
71 respondents

National Petroleum Reserve Alaska



Map 32 - Harvest Locations where Respondents Harvested Abnormal Caribou and Healthy Caribou, All Years

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 148 active harvesters from March 2009 through February of 2017.

Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

Years 1-9: January 2008 - October 2016
241 abnormal caribou harvest locations
77 respondents

Years 1-9: January 2008-October 2016
1614 healthy caribou harvest locations
140 respondents

National Petroleum Reserve Alaska

Table 38: Respondent Reported Alpine-Related Impacts on Caribou Hunting, Nuiqsut, Years 1-9

Type of Alpine-Related Impact	Percent of Respondents									Percent of Observations								
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Helicopter Traffic	61%	40%	47%	22%	30%	51%	33%	22%	13%	28%	26%	49%	54%	55%	46%	48%	52%	28%
Plane Traffic	42%	32%	16%	9%	9%	13%	10%	2%	11%	22%	21%	16%	18%	18%	12%	14%	3%	24%
Other Traffic	25%	19%	2%	3%	0%	11%	2%	5%	8%	10%	12%	2%	7%	0%	9%	2%	10%	17%
Oil Company Personnel	6%	2%	4%	0%	0%	9%	0%	0%	0%	2%	1%	4%	0%	0%	7%	0%	0%	0%
Man-made Structures	61%	32%	9%	5%	12%	22%	20%	16%	13%	30%	22%	9%	11%	18%	19%	33%	29%	28%
Regulations	14%	11%	0%	0%	2%	0%	0%	0%	0%	6%	7%	0%	0%	3%	0%	0%	0%	0%
Seismic Lines or Activity	0%	11%	18%	0%	0%	5%	0%	0%	0%	0%	7%	18%	0%	0%	4%	0%	0%	3%
Other	6%	6%	2%	5%	4%	2%	2%	3%	2%	2%	4%	2%	11%	5%	1%	2%	6%	0%
Any Impact	72%	64%	58%	31%	46%	58%	43%	41%	27%									
No Impact	28%	36%	42%	69%	54%	42%	57%	59%	73%									
Number of Respondents/ Observations	36	53	57	58	57	55	60	58	63	87	82	55	28	38	67	42	31	29

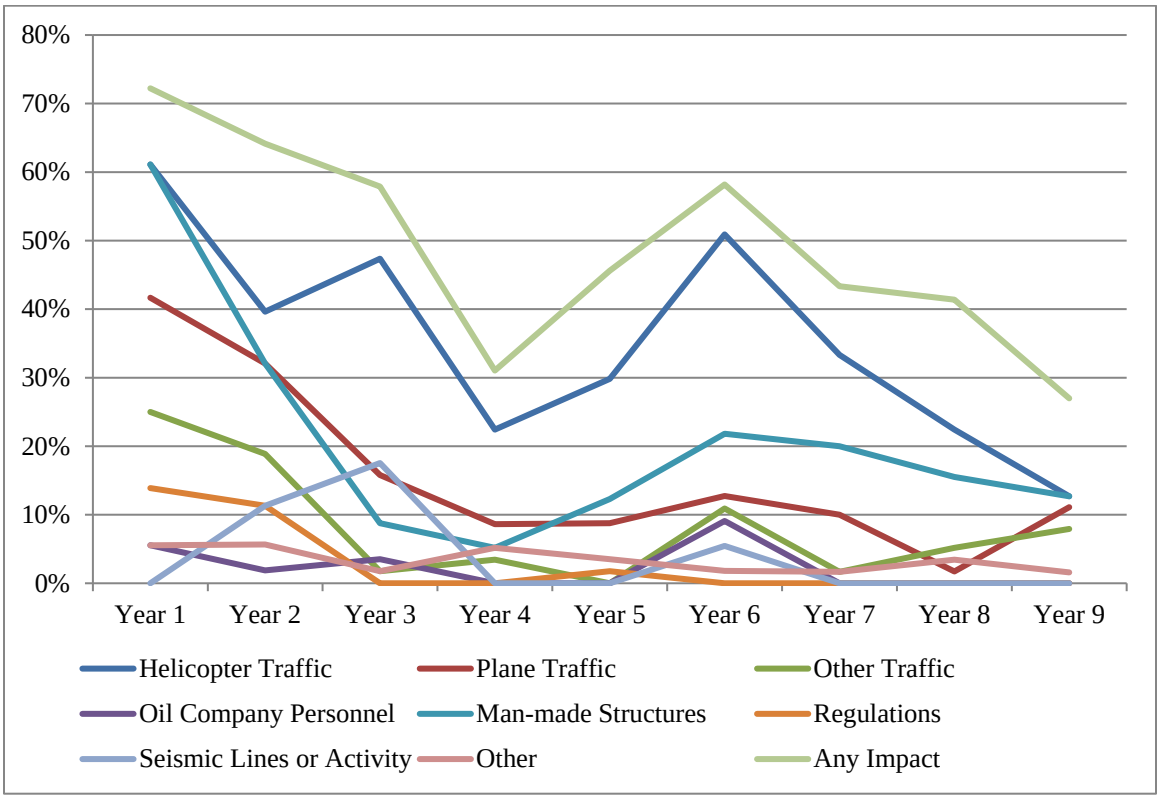
Stephen R. Braund & Associates, 2017.

used to make decisions about proposed developments in the area; panel members expressed the belief that Year 10 would show an increase in reported impacts over Year 9.

The percentage of respondents reporting impacts in Year 9 (27 percent) was similar to Year 4 (31 percent of respondents), and the number of impact observations (29) was similar to the number of observations in Year 4 (28 observations) and Year 8 (31 observations). The substantially higher percentage of study participants (72 percent) reporting impacts in 2008 (Year 1) is due in part to Year 1 respondents including impacts that had occurred since the Alpine development had begun.

For the first time since Year 1, helicopter traffic was tied with another impact (man-made structures) for the most commonly reported impact, with both reported by 13 percent of respondents and accounting for 28 percent of impact observations. In most other years, helicopter traffic was the most commonly reported impact by a substantial margin.

Figure 8: Percentage of Respondents Reporting Impacts by Study Year



Stephen R. Braund & Associates, 2017.

Reports of impacts related to helicopter traffic and man-made structures were followed closely by reports of plane traffic (11 percent of respondents) and other traffic (eight percent of respondents) (Table 38). The percentage of respondents reporting helicopter impacts in Year 9 (13 percent) was substantially lower than previous years, which have ranged from 22 percent of respondents reporting helicopter impacts (in Years 4 and 8) to 61 percent of respondents (in Year 1). The percentages of respondents reporting impacts related to man-made structures, plane traffic, and other traffic were within the range of previous years. While residents and Nuiqsut Caribou Panel members continue to express concerns about the impacts of pipelines and other infrastructure on caribou migration, they are less likely to report pipelines as direct impacts on their caribou hunting (i.e., impacts that occurred while they hunted) in recent years than they were at the beginning of this study. This may be in part due to Year 1 collecting data on changes that started since the

beginning of the Alpine development. In addition, residents were more likely to discuss indirect impacts (e.g., impacts of pipelines on caribou migration which indirectly affects harvester success) earlier in the study.

Despite the lower prevalence of reported impacts during the active harvester interviews, the percentage of households in Year 9 responding to a cued question about Alpine impacts was as high as most previous study years, at 41 percent compared to between 21 percent and 44 percent in previous years (Table 39). A small percentage of households reported that they had avoided the Alpine area altogether—however, the percentage may be higher, as these observations were volunteered by respondents and not cued during the survey.

Table 39: Impact Observations, Household Harvest Surveys

Year[1]	Percentage of Nuiqsut Households		
	Alpine-related Impacts	Other Impacts[2]	Avoiding Alpine Area
2010 (Year 3)	41%	-	-
2011 (Year 4)	21%	9%	9%
2012 (Year 5)	32%	18%	4%
2013 (Year 6)	35%	8%	10%
2015 (Year 8)	44%	4%	2%
2016 (Year 9)	41%	1%	3%

[1] ADF&G data for 2014 (Year 7) not reported due to low response rate.
[2] "Other Impacts" and "Avoiding Alpine Area" are based on volunteered observations; the percentages are likely higher since the question was not cued.

Stephen R. Braund & Associates, 2017.

Figure 9 shows the number of reported impacts on caribou hunting of all types by month for the nine study years, and Figure 10 through Figure 17 show individual impact reports by month for the nine study years. Respondents did not always provide a month associated with a reported impact, instead indicating that the impact did not occur at a specific time or was more of a general and ongoing occurrence. The peak months for reported impacts in all nine years are June, July, and August, the same months as peak caribou hunting activity (Figure 9, Figure 1). In Year 9, similar to most previous years, impacts were most commonly reported to occur during the month of July. Helicopter impacts also peaked in July, with five observations of impacts, with additional observations in June and February (Figure 10). Reported airplane impacts occurred at low levels year-round, peaking in June (Figure 11). Other traffic impacts occurred from June through October (Figure 12). Man-made structure impacts were reported May to November, peaking in July with three impact observations (Figure 13).

Figure 9: Reported Impacts by Month, Years 1-9

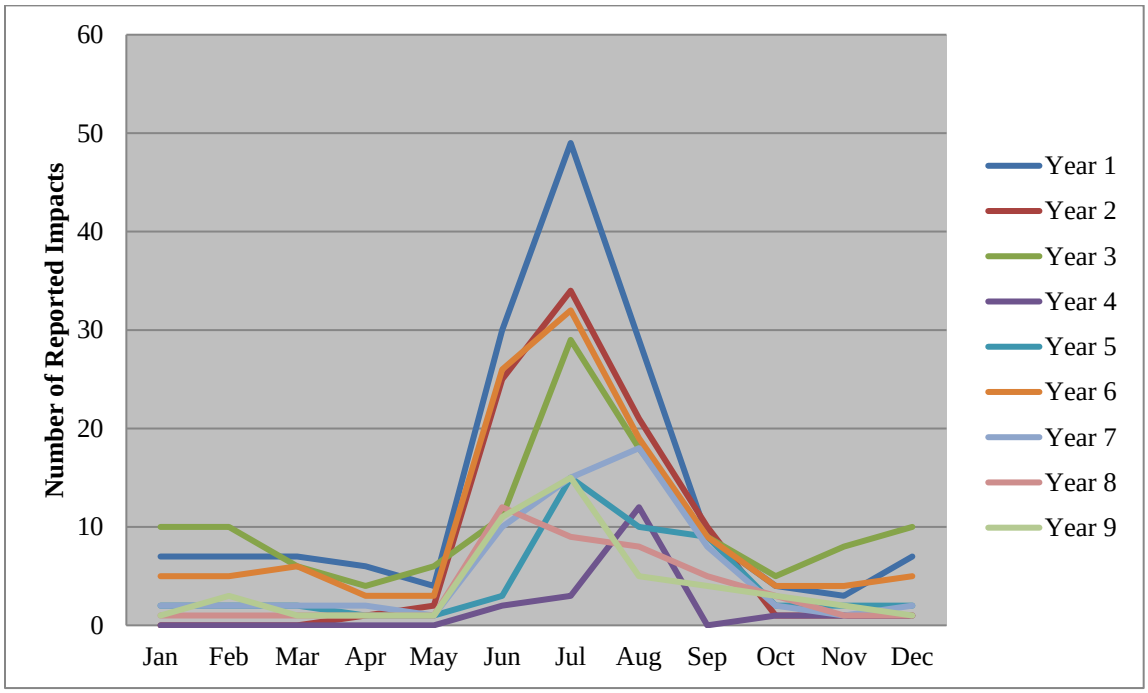


Figure 10: Reported Helicopter Impacts on Caribou Harvest Activities by Month: Years 1-9

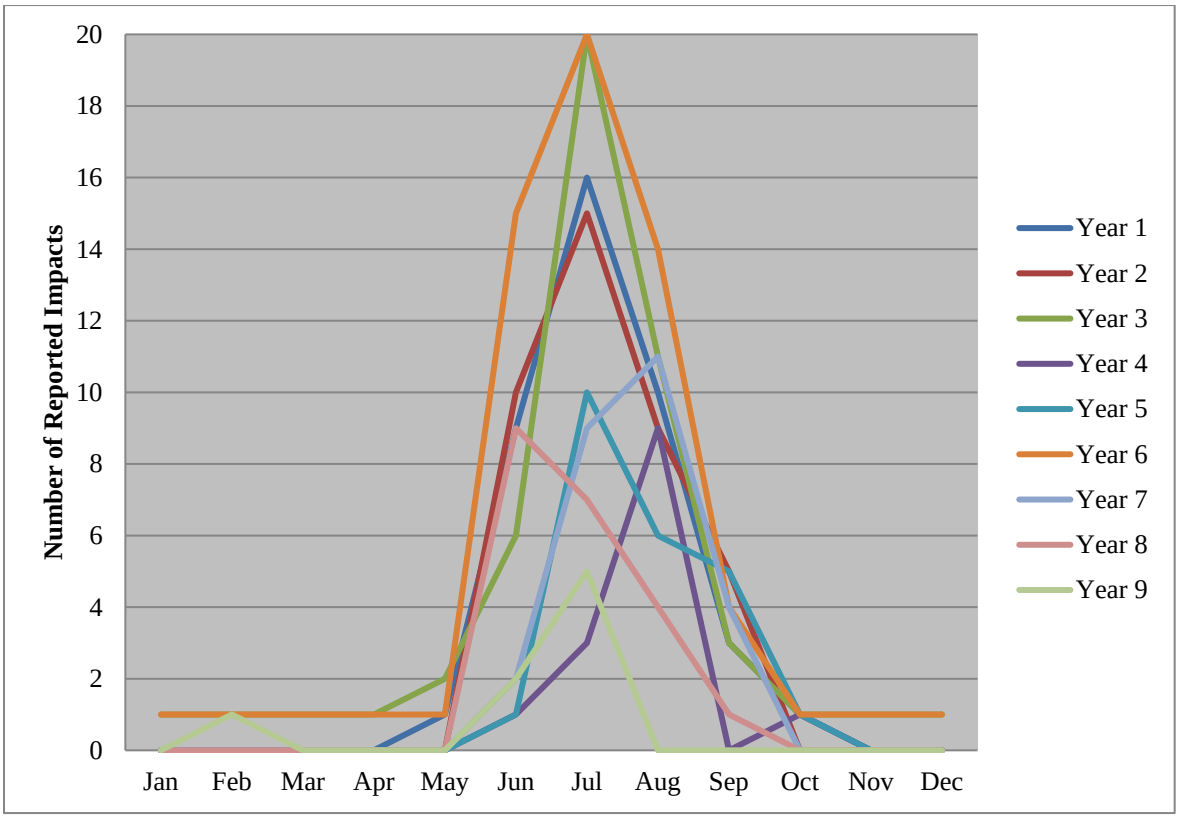


Figure 11: Reported Airplane Impacts on Caribou Harvest Activities by Month: Years 1-9

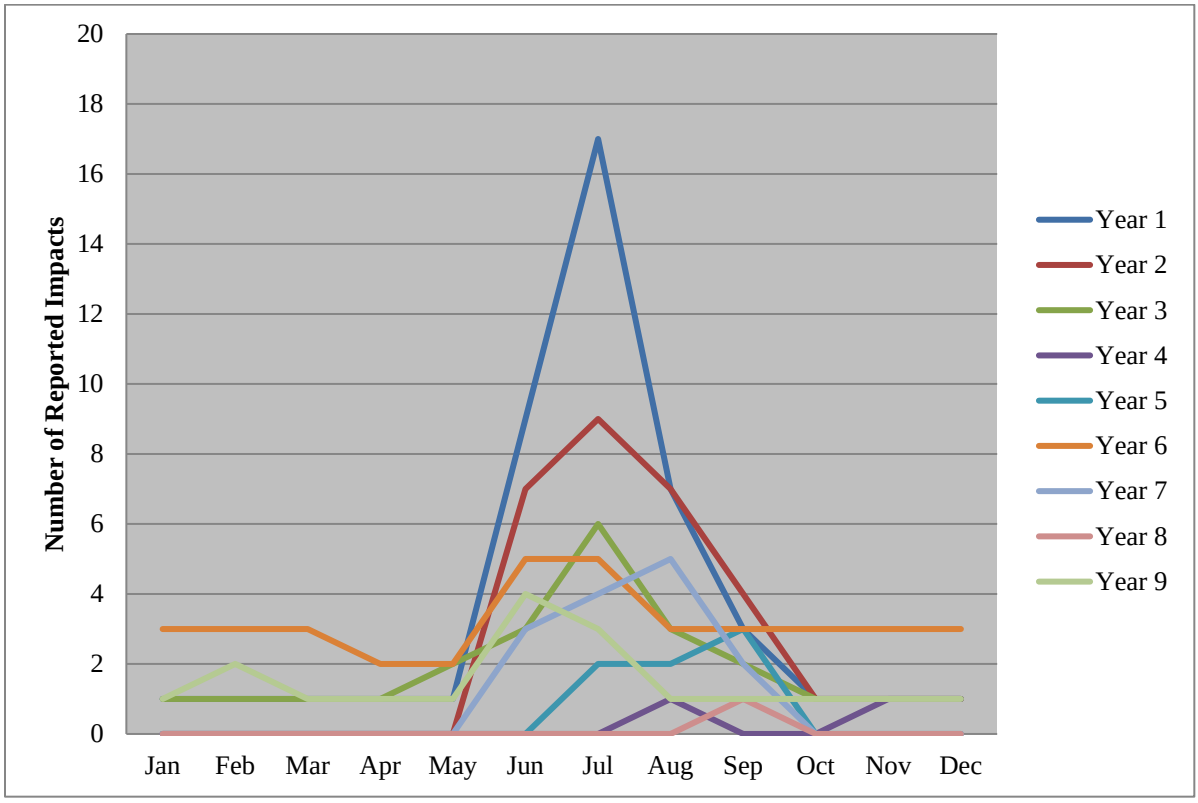


Figure 12: Reported Other Traffic Impacts on Caribou Harvest Activities by Month: Years 1-9

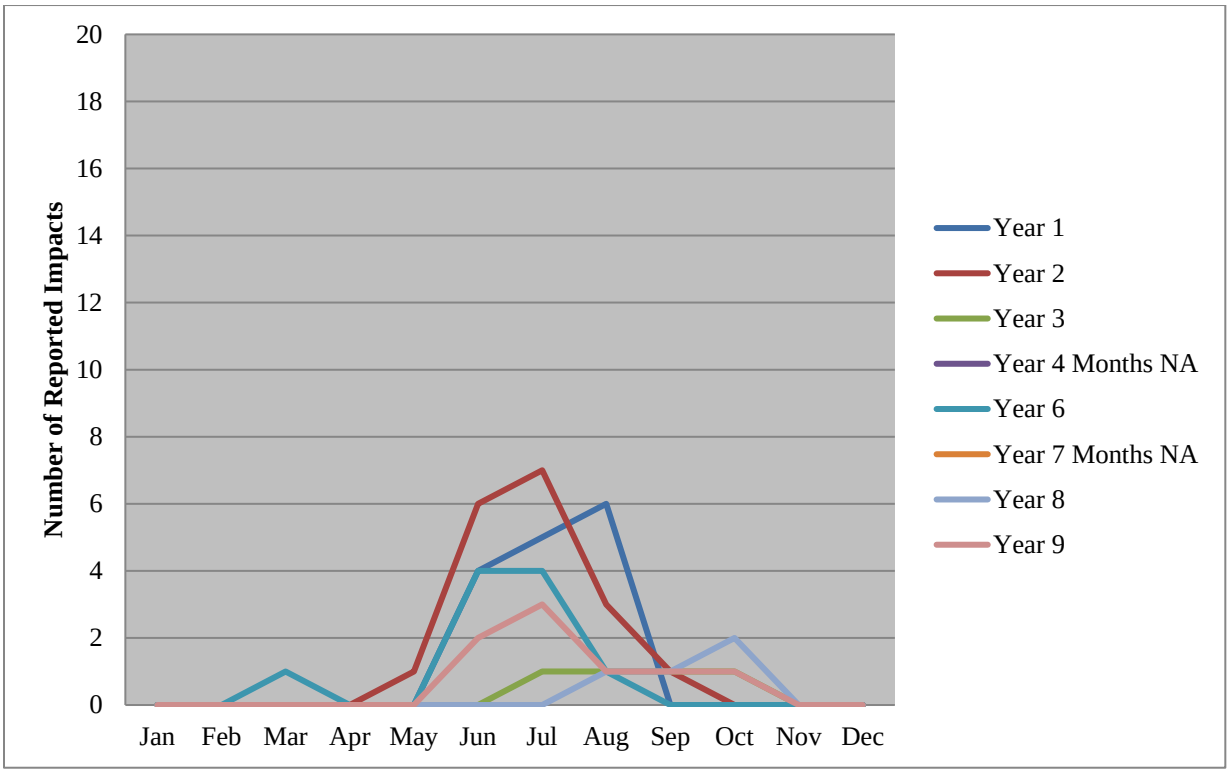


Figure 13: Reported Oil Company Personnel Impacts on Caribou Harvest Activities by Month: Years 1-9

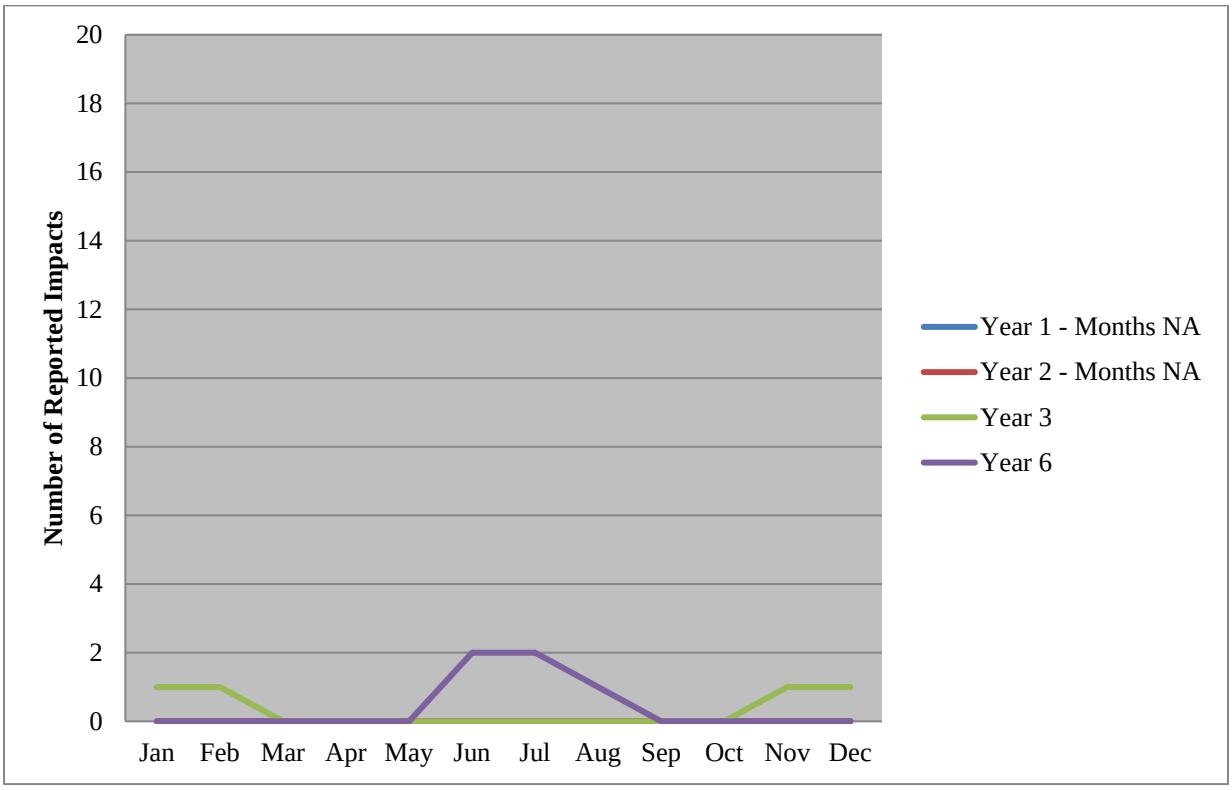


Figure 14: Reported Man-Made Structure Impacts on Caribou Harvest Activities by Month: Years 1-9

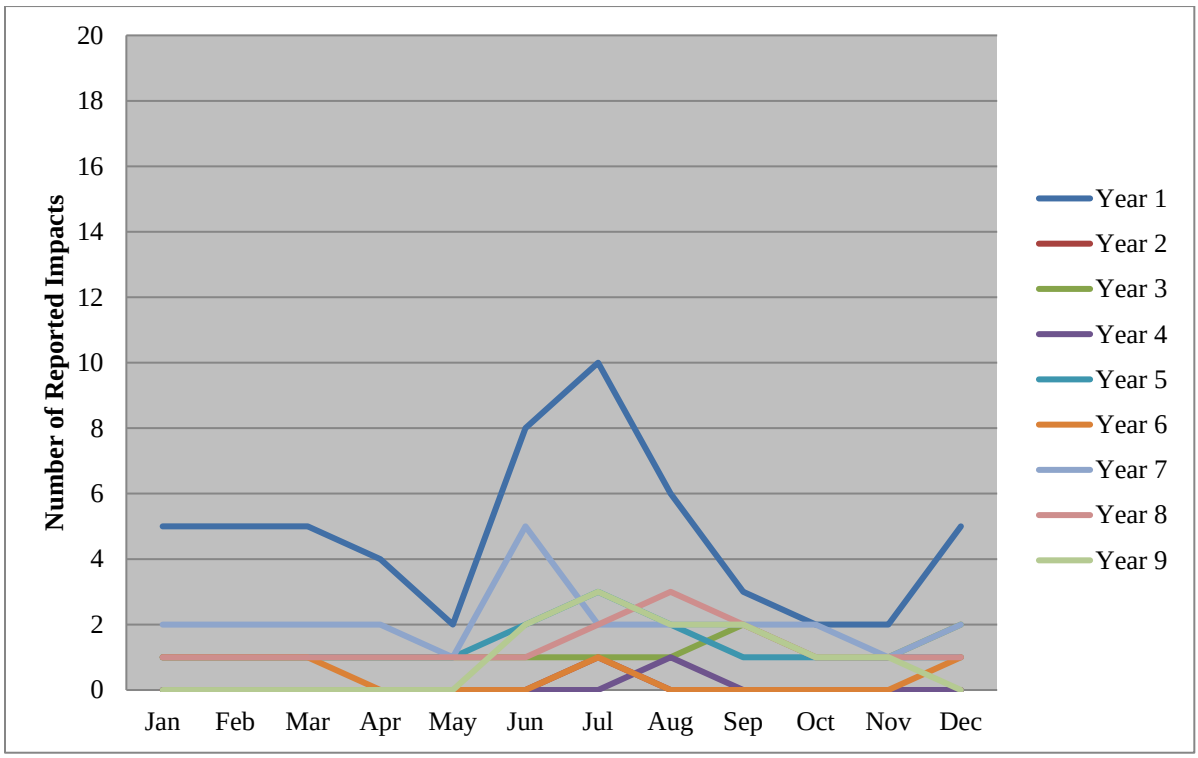


Figure 15: Reported Regulation Impacts on Caribou Harvest Activities by Month: Years 1-9

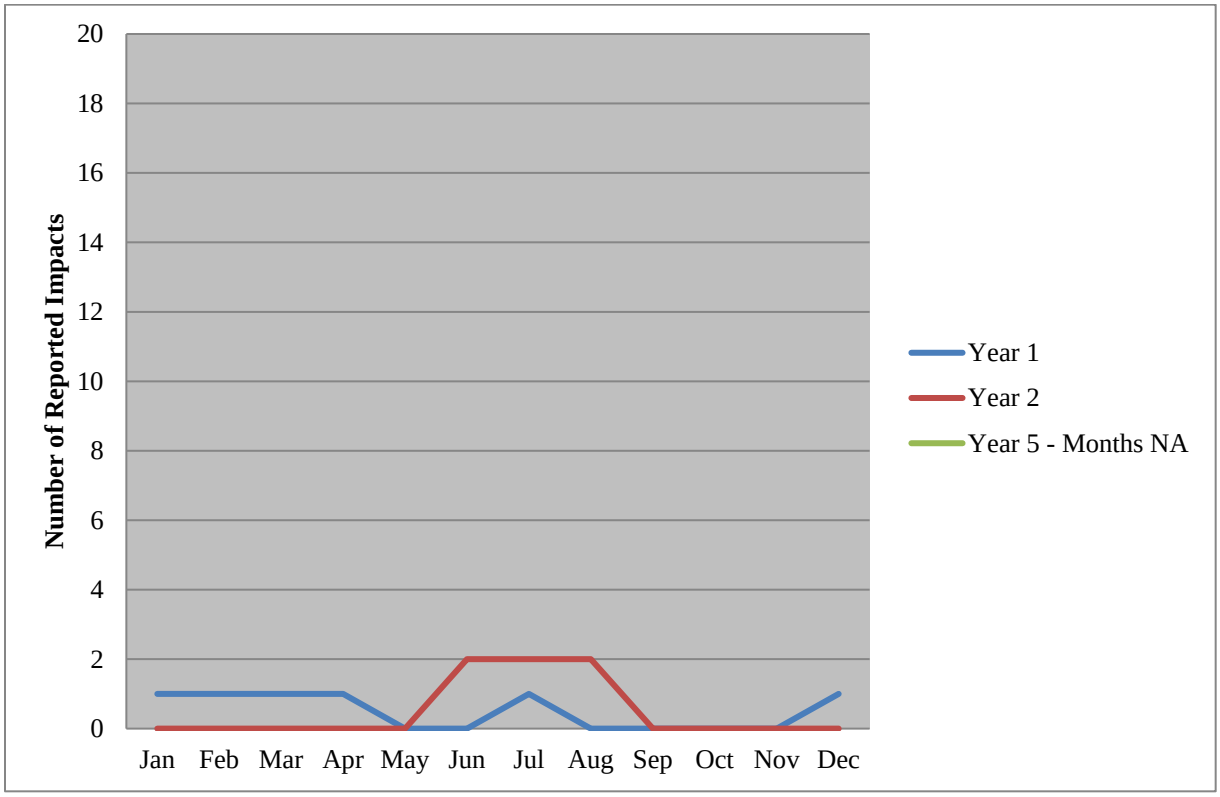


Figure 16: Reported Other Impacts on Caribou Harvest Activities by Month: Years 1-9

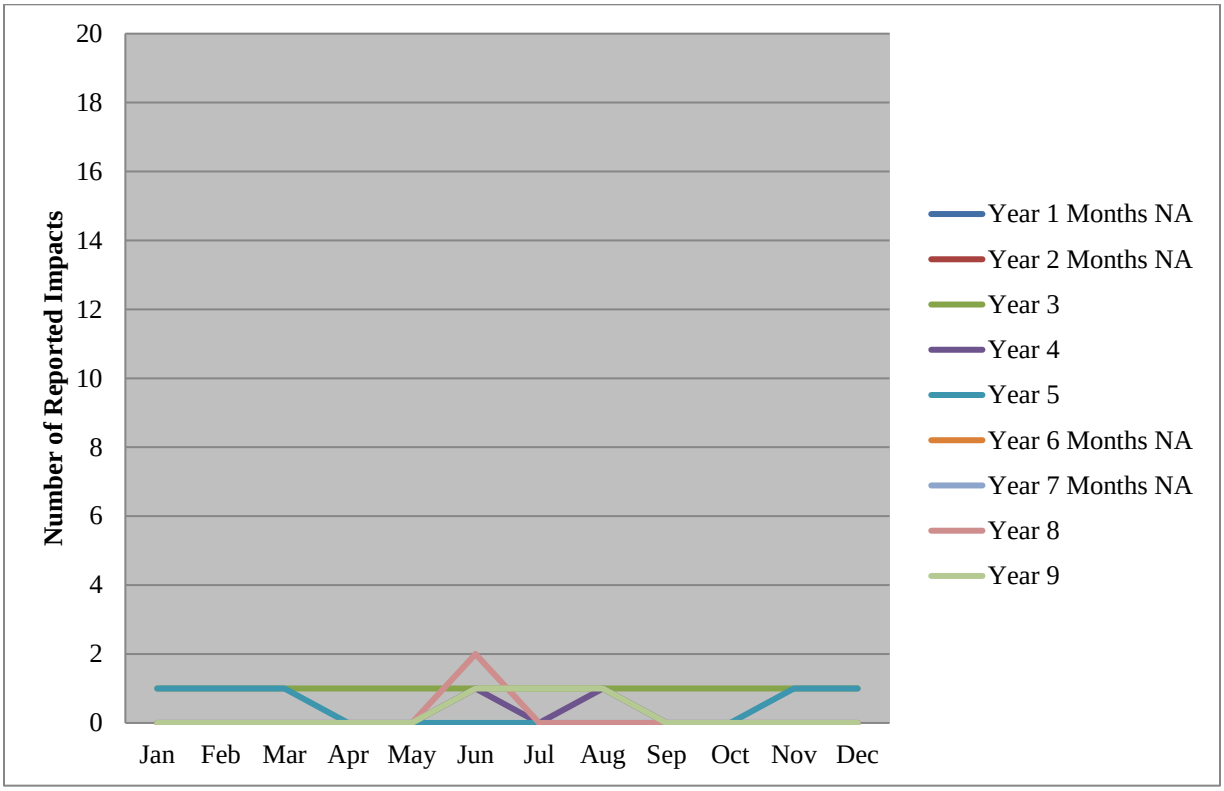
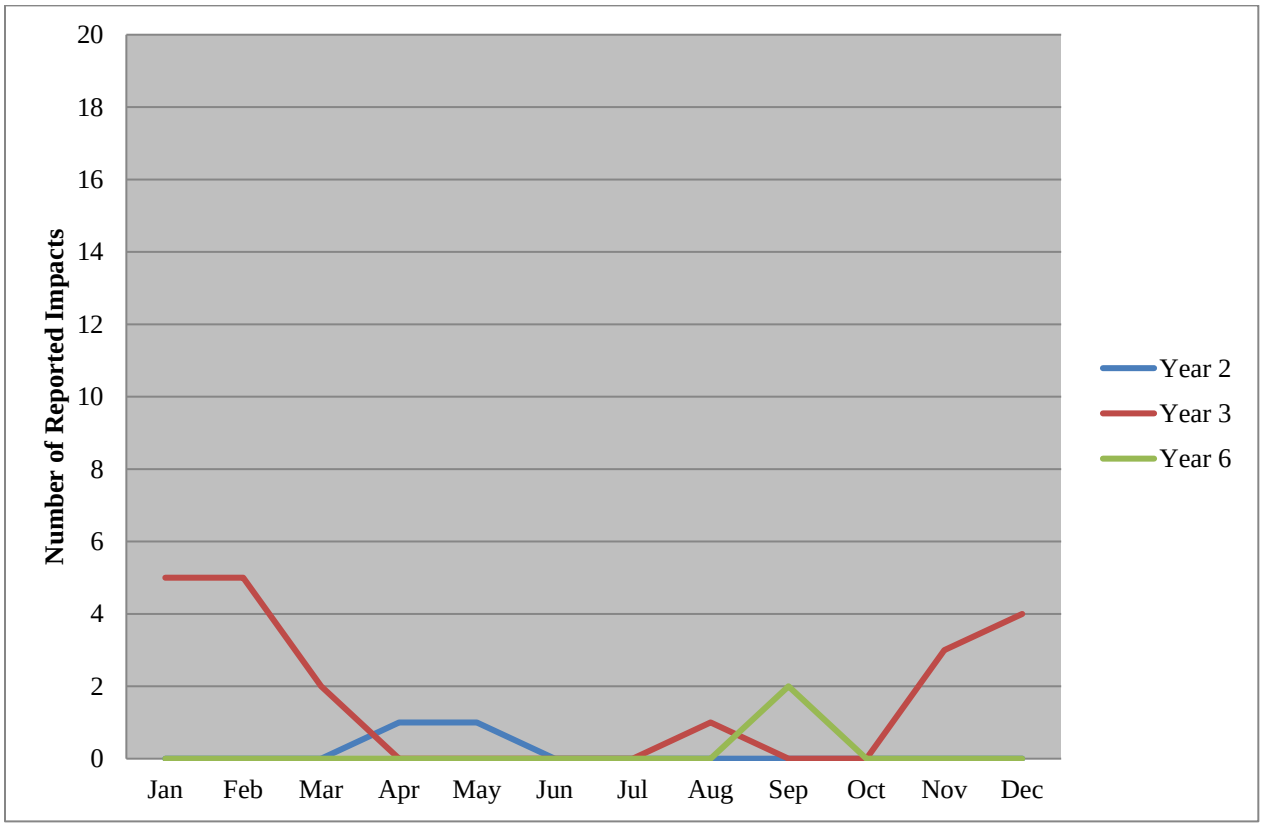


Figure 17: Reported Seismic Line and Activity Impacts on Caribou Harvest Activities by Month: Years 1-9

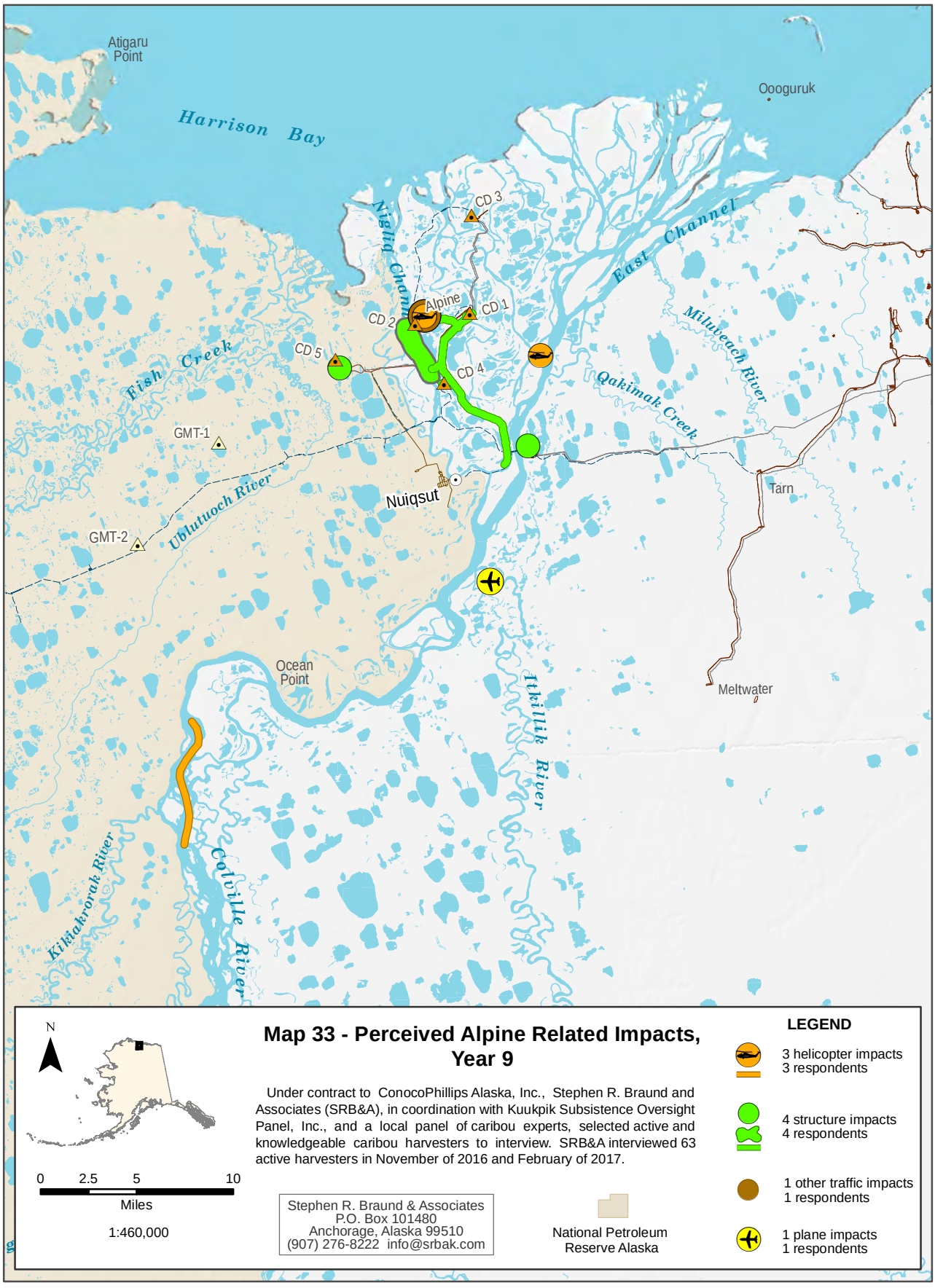


Map 33 shows the locations of Alpine-related impacts reported by Year 9 respondents. In some cases, respondents could not identify the location of an impact or indicated that the impact occurred multiple times over a longer time period (and therefore did not point out each location). The study team generally recorded impact locations only when the respondent could identify the specific (i.e., point) locations where they were when the impact occurred; however, in some cases, when residents indicated that the impact occurred over a larger area, these impact locations were documented as a polygon instead of a point. As shown on Map 33, impacts related to manmade structures were reported at CD5, along the Nigliq Channel near Kuupaqulluraq, and along ice roads to the north and east of the community. Helicopter impacts were also reported along Nigliq Channel, along the East Channel, and upriver past Ocean Point (Map 33). One airplane impact was reported near the mouth of the Itkillik River.

Impacts of Helicopter Traffic

As shown in Table 38, 13 percent of respondents reported helicopter impacts in Year 9, a smaller percentage than all previous years. Helicopter impacts accounted for 28 percent of the reported impacts during the Year 9 study period (Table 38). Several individuals in Years 8 and 9 suggested that construction of the CD5 road has decreased (although not eliminated) the need for helicopter traffic associated with development, which may have led to the lower reports of impacts in both years. Those individuals who did report helicopter related impacts described circumstances similar to those discussed in past study years:

> *Yup, this year [in] the river in between, I think it was Qitik, in between Qitik and somewhere along this way, the helicopter flew real low and the caribous run away. It's usually around that area is where there is always helicopters. [It looked] like an Alpine Helicopter…. [That was] in July.* (SRB&A Nuiqsut Interview November 2016)



N

0 2.5 5 10

Miles

1:460,000

Map 33 - Perceived Alpine Related Impacts, Year 9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 63 active harvesters in November of 2016 and February of 2017.

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com

National Petroleum Reserve Alaska

LEGEND

- 3 helicopter impacts, 3 respondents
- 4 structure impacts, 4 respondents
- 1 other traffic impacts, 1 respondents
- 1 plane impacts, 1 respondents

While most individuals reported direct impacts of helicopter traffic on their caribou hunting, others simply described the presence of helicopters as an impact to their overall subsistence experience. When asked to describe the helicopters causing the impacts, respondents most commonly reported "Unknown Owner" (five observations), followed by "Blue and White" (two observations), and "Red" (one observation) (Table 40). According to CPAI, helicopters associated with CPAI activities in Year 9 were green and yellow.

Table 40: Respondent Descriptions of Helicopters Associated with Impacts, Nuiqsut, Years 3-9

Helicopter Descriptions	Number of Observations							
	Y3	Y4	Y5	Y6	Y7	Y8	Y9	All Years
Helicopters - Unknown Owner	9	7	4	9	6	4	5	44
Blue and White Helicopter	8	6	10	9	5	1	2	41
Alpine Helicopter	4		5	6	5	6		26
Air Logistics Helicopter	4		2	3		1		10
Conoco Phillips Helicopter	1				1	2		4
Helicopter, Blue		1			1	2		4
Helicopter, Blue and Orange		1		1				2
Red Helicopter	1						1	2
Red and Black Helicopter				1				1
Yellow Helicopter					1			1
Other Oil Company Helicopter				1				1
Airplane - Unknown Owner				1				1
Green and White Helicopter					1			1
Total	27	15	21	31	20	16	8	138

Stephen R. Braund & Associates, 2017.

Impacts of Airplane Traffic

Impacts related to airplane traffic were reported by 11 percent of respondents, within the range of previous study years (between two percent and 42 percent of respondents) (Table 38). Certain individuals noted that while the road had successfully reduced helicopter traffic in the region, airplane traffic had continued at similar rates as before. As one respondent observed,

> *None of them [airboats] were heard down river. No interference or anything. There's not a lot of air traffic flying west. The majority of the studies they did were from CD5 and from there they are walking. The only problem is that the twin otter likes to fly when the caribou are coming around. Between the village and Alpine. I haven't seen any other commercial planes or private planes other than Alpine. No Department or Fish and Game or anything out there. Just industrial flights. It's way down, those helicopters. Chopper traffic is way down compared to when they first started flying. There's less air traffic. June and July is when the planes have the most impact. It is when the migration is real heavy.* (SRB&A Nuiqsut Interview November 2016)

Compared to helicopter traffic, airplane traffic has generally been less of a concern to hunters as residents indicate that the noise levels are less disruptive to caribou, particularly when planes are flying at higher altitudes. However, a number of respondents have expressed the view that despite being less directly disruptive than helicopter traffic, regular airplane traffic can result in overall changes in caribou migration and distribution:

> *Well, there is that daily plane that would go by, I think that impacts [the caribou]. That one time when we were going to Itkillik it passed, it was me and my sister and all 10 kids. I'd say that was right around here. That is all summer that they fly, they put up flyers and they let us know to call if we have complaints.* (SRB&A Nuiqsut Interview November 2016)

When asked to describe the airplane affecting their caribou hunting activities, respondents reported "Unknown Owner" (three observations), followed by Alpine Airplane (two observations) and White Airplane (two observations) (Table 41).

Table 41: Descriptions of Airplanes Associated with Airplane Traffic Impacts, Nuiqsut, Years 3-8

Airplane Descriptions	Number of Observations							
	Y3	Y4	Y5	Y6	Y7	Y8	Y9	All Years
Airplane - Unknown Owner	2	3		3	2		3	13
Alpine Airplane		1	2	2	4		2	11
Cargo Airplane	4	1	1	2		1		9
Twin Otter	1		2					3
Shared Services Airplane			2					2
White Airplane							2	2
Supercub	1							1
Cessna				1				1
Yellow Airplane	1							1
Total	9	5	7	8	6	1	7	43

Stephen R. Braund & Associates, 2017.

Impacts of Other Traffic

Five respondents (eight percent) reported impacts related to other traffic (i.e., not helicopters or airplanes) in Year 9. These observations accounted for 17 percent of Alpine impact observations (Table 38), and in almost all cases, participants noted that road traffic on the new road to CD5 and along the Spur Road causes caribou to avoid the area. In one case, a respondent noted the presence of airboats along Nigliq Channel, which they believed had diverted caribou during the previous hunting season:

> *During the summertime, we go to our cabin and there's two hovercrafts. They travel together at the same time. You could hear them five or six miles from our cabin. These guys are coming from Cody Creek. One time they travel together, side by side. Why can't they use regular jet boat? Oh, yes [that keeps caribou away]. We could hear them from five miles! [That was] this past summer in June and July. [It] interrupts caribou migration.* (SRB&A Nuiqsut Interview November 2016)

Impacts of Oil Company Personnel

Similar to the previous few study years, no respondents reported experiencing impacts related to oil company personnel in Year 9 (Table 38).

Impacts of Man-made Structures

Impacts related to man-made structures were reported by 13 percent of Year 9 respondents, which was within the range of Years 3 to 8 (five to 22 percent) (Table 38). As shown in Table 42, pipelines and roads/bridges accounted equally for the eight man-made structure impact observations. Roads and bridges have emerged as a reported impact in the last several study years, since the CD5 and connected Spur Road were built.

Impacts associated with man-made structures as reported by Year 9 respondents included the overall increasing presence of permanent infrastructure (e.g., the CD5 and Spur roads and the bridge over Nigliq Channel) and avoidance of these areas by some hunters, pipelines blocking hunters from shooting at caribou, shiny pipelines diverting caribou, and changes in caribou distribution and behavior due to the presence of bridges and roads.

Table 42: Descriptions of Sources of Man-Made Structures Associated with Impacts, Nuiqsut, Years 3-9

Man-Made Structure Descriptions	Number of Observations							
	Y3	Y4	Y5	Y6	Y7	Y8	Y9	All Years
Pipeline	2	1	6	7	3	1	4	24
Roads and Bridges					3	6	4	13
Infrastructure	1	1	1	6	1	2		12
Ice Roads and Bridges	2				5			7
Trucks					1			1
Seismic Lines					1			1
Waste		1						1
Total	5	3	7	13	14	9	8	59

Descriptions of these impacts in Year 9 by active harvesters included the following:

> *So over here, the bridge [across Nigliq Channel] was one of the big impacts. [It impacts my] boating going towards CD4 and CD5, that area. Well, there is more increased traffic, trucks going over the bridge and helicopters. It's just not—it doesn't look right to hunt in anymore. The scenery has changed. I think it is more bothersome to me [than the caribou]. We have to have more caution about hunting close to people like that. Kind of like that area [of the Nigliq Channel].* (SRB&A Nuiqsut Interview November 2016)

> *Basically, that Spur Road, those three caribou were afraid to come to the road, they wanted to come. I waited them out for like four hours before I made my catch. I really see their hesitation. They run toward the road and then they run back. It's like a bear cage. They are really afraid to cross the road. When they finally did I popped three of them. That was on the Spur Road. Since September I haven't spotted a caribou on that road yet. That was the last time I got one. The road is pretty visible. These caribou, they use this highway. It's a migration thing. They use the landmarks. This road is so high it kind of puts them off, to me they are afraid to cross it. You can tell when a caribou is afraid. It wants to be a tough guy. They know their best feeding grounds. They make a circle so they continue feeding, but you never see that anymore.* (SRB&A Nuiqsut Interview November 2016)

> *[The] pipeline probably [impacted me]. [The pipeline impact] was because I was by CD5. They just didn't want to come around. When we came back from whaling, me and my family were over here and I pulled off on one of the ramps and I was looking that way and out of nowhere there was a hill and there were three caribou running for their lives this way but with nothing behind them. Running—running for their life. I didn't see nothing from behind. I waited but I never saw what spooked them. That was pretty strange to me.* (SRB&A Nuiqsut Interview November 2016)

> *I really think that road, that road that they built up from the village, I think that's most of the reason that it's different the caribou are not out, there's less caribou coming this way. Which way are they going, I'm confused, I was watching this summer. I really think it's because of that road, when you go back there, there's a road going toward Alpine and there's a lake right there and that's where caribous go to drink and I think, that's no, no not like they used to. Somewhere around maybe the end of July coming towards this way from the ocean, yeah. Yeah, from the ocean they go and have their salt and then start migrating back.* (SRB&A Nuiqsut Interview November 2016)

As in Years 7 and 8, while this section focuses on the impacts of man-made structures on caribou hunting activities, several hunters in Year 9 reported continued use of the newly built Spur Road for caribou hunting.

While impacts related to man-made infrastructure have occurred over the study years, Nuiqsut hunters continue to harvest caribou in proximity to these areas. As shown in Table 43, over the nine study years, between three and 28 percent of reported caribou harvests have occurred within 2.5 miles of infrastructure, and between 12 and 53 percent of respondents have reported harvesting caribou within 2.5 miles of infrastructure. Year 8 and Year 9 showed an uptick in the number and percentage of caribou harvested within 2.5 miles of infrastructure, which may reflect use of the Spur Road by some residents to hunt caribou. The percentage of respondents harvesting caribou within 2.5 miles of infrastructure (44 percent) was within the range of all previous study years. It is important to note that the percentage of harvests occurring within 2.5 miles of infrastructure will naturally increase as infrastructure moves closer into the community's core hunting area.

Table 43: Nuiqsut Caribou Harvested Within 2.5 Miles of Infrastructure

Study Year	Within 2.5 Miles of Infrastructure[1]	
	Number (%) Caribou Harvested	Number (%) Respondents Harvesting Caribou[2]
Year 1	32 (8%)	16 (44%)
Year 2	39 (14%)	13 (29%)
Year 3	46 (13%)	19 (35%)
Year 4	56 (17%)	23 (42%)
Year 5	57 (16%)	20 (38%)
Year 6	7 (3%)	6 (12%)
Year 7	71 (13%)	21 (38%)
Year 8	88 (22%)	26 (53%)
Year 9	87 (28%)	24 (44%)

[1] Each year is analyzed based on permanent infrastructure present during that year. In Years 8 and 9, infrastructure related to the CD5 project was added to the analysis for those years.
[2] Percentages are based on the number of respondents who reported successful harvests during the study year, not the total number of active harvester respondents.

Stephen R. Braund & Associates, 2017.

Impacts of Regulations

No respondents reported experiencing impacts related to regulations in Year 9 (Table 38).

Impacts of Seismic Lines

No respondents reported experiencing impacts under the impact category of seismic lines in Year 9 (Table 38).

Impacts of Other

One respondent described an impact that did not readily fit into the other impact categories. This respondent reported that, following construction of the bridge over Nigliq Channel, they had observed a white, foamy substance in the water with which they had concerns about.

Non-Alpine Impacts

In addition to impacts attributed to the Alpine or Alpine Satellites developments, the study team also documented non-Alpine impacts when volunteered by respondents. In these cases, respondents indicated that the impact was from a different source, or they were unsure of the source of the impact and the study team assigned the impact as "non-Alpine" due to its location (i.e., outside of the general area of current or planned Alpine Satellites developments). As shown in Table 44, 19 percent of Nuiqsut respondents reported at least one type of non-Alpine impact in Year 9, lower than the previous few years but within the range of all study years (from five percent of respondents [Year 3] to 54 percent [Year 5]). A majority of these reported impacts were related to airplane and helicopter traffic (37 percent of observations, each). Non-Alpine impacts in Year 9 focused on general air traffic, including commercial flights, sport hunting guides, and surveys conducted by government agencies or industry (not COP).

Changes in Caribou Hunting Areas Over Time

Prehistoric and Historic Use Patterns

The traditional use of the lower Colville River and surrounding region by the Iñupiat is evident in the various historic and prehistoric archaeological sites found in the area. Many of these sites contain the remnants of caribou hunting and harvesting activities (Hoffman et al., 1988). While little data on prehistoric use patterns are available, Burch (1980) estimates that there were approximately 500 Kuukpigmiut (people of the lower Colville River) living on the Colville River in the mid-1800s; many of these individuals had moved to Barrow by the early 20th century, although some families remained year-round.

During SRB&A's interviews, several elders described hunting caribou while growing up in the region near the Colville Delta, along the Colville River, and at coastal settlements to the east of the delta. They also discussed their hunting activities since Nuiqsut was resettled in 1973. Respondents most commonly described hunting caribou along the Nigliq Channel and indicated that caribou regularly and predictably migrated through the Colville River delta during the summer months. Describing past caribou hunting, one elder said, "Everywhere is caribou; they're not bothered" (SRB&A Nuiqsut Interview March 2009). However, she went on to describe recent changes to their traditional hunting area along Nigliq Channel:

> *Right now it is hard to get caribou here. They going to up there, the mountains. [Translator] When they first come [to Nuiqsut], they were all over this area, they roam over there by the village. Nowadays they hardly in this area because of the pipelines. Hardly catch any caribou in this area. The pipeline has diverted the caribou.* (SRB&A Nuiqsut Interview March 2009)

Another elder observed,

> *Just in here, hunt mostly in that area [Nigliq Channel] before. Up and down there. Yeah, they have to go farther [now], only place to go. They'd be all around here briefly, but when [the caribou] moved, [the hunters] had to change, because they had to go Fish Creek and along this area to hunt now, on the west side, along the coastline or up in the Fish Creek area.* (SRB&A Nuiqsut Interview March 2009)

> *That's where we used to go [hunting], from Nigliq. Used to have* tuttus *hang around there, where Alpine is. We used to hunt* tuttu *where the Alpine is.* (SRB&A Nuiqsut Interview March 2009)

The timing of the caribou hunt, as described by elders, was similar to the present day. One elder recalled that they usually harvested one caribou in June, but preferred to harvest the majority of their caribou in August, when they were fat:

> *We don't hunt caribou until…. We gotta get one in June. We gotta wait until August, they are skinny [before August]. Before they come in July, take one caribou. In August, we go hunting*

> *for winter. Sometimes we get five caribou, cut them, put them away…. Those days they didn't have no fridge, nothing. Had to take it to the ground level, permafrost and store them down there in ice cellars. We hunt in August and September only. But there's October, we don't hunt those. They try to get as much as they can before rutting season.* (SRB&A Nuiqsut Interview March 2009)

According to historic accounts, inhabitants of the Colville River region tended to follow the caribou migration; staying in settlements near the coast during the summer and traveling inland during the winter. During times of resource scarcity, such as in the late 19th century when the caribou were depleted, families may have traveled to alternate hunting grounds; however, the Colville River remained an important area which residents returned to time and time again. During a 1978 elders' conference, Levi Greist, whose ancestors came from the Nuiqsut area, noted that his ancestors had at one point moved away from the Colville River to the east due to a lack of caribou, only to return to the area at a later time:

> *They had gone to Saġvaġniqtuuq [Sagavanirktok River], we learned, because that Colville River did not have much caribou and they followed along to a place which had some caribou. They would return, though, to that area over here, my relatives, including both my grandparents.* (Greist 1978)

Greist went on to describe how the Iñupiat at Nigliq would travel to the mouth of Itkillik River (referred to as *Killiq*) by boat just before freeze-up. From there, they would travel inland following the caribou by dogteam:

> *And then when they are ready there at Niġliq those Eskimos there, hoping to cut the distance which they would have to travel by dogteam, would quickly proceed to go upriver to that certain place up there which is their usual stopping place, Killiq-Killiq, it is said- and it is there that we would await winter. And then as soon as it freezes we would go up along through [It]Killiq up to the mountains. At that time long ago there would be no caribou there, there were no caribou there. Although it would have a few caribou, those which would cross up and over the hills wherever. Although one could find some once in a while. But the sheep which are on the mountains would never leave. They would always be there in their usual habitat all the time.* (Greist 1978)

A historical account of the seasonal activities of people living in the Colville River delta was provided by William Irving (1953) and reproduced in Hoffman et al. (1988). His account, in addition to elder accounts of historic hunting activities, indicate that the Colville River delta was most heavily used by the Iñupiat during the late spring and summer months when caribou were most available in that area. The late fall and winter months were more frequently spent traveling inland to winter hunting grounds. Irving described,

> *…the people of the lower river would begin seal hunting in May, more than a month before the visitors from the mountains arrived at Neklek [Nigliq] in the delta and finished their trading with people from Barrow. They would customarily spend the fall and winter at fishing sites and make regular excursions into the tributary valleys on the west side of the Colville to look for caribou if these were not abundant near camp. Seals were not hunted in the winter as a rule, and were probably not as important in the diet as caribou and fish.* (Irving 1953 as cited in Hoffman et al. 1988)

According to IAI (1990), during the early 20th century, Iñupiat stayed at various settlements in the lower Colville River and at coastal settlements and trading posts to the west and east of the delta including Cape Halkett, Oliktok Point, Beechey Point, and Flaxman Island. After the collapse in the fur trade in the 1930s and 1940s and in response to government requirements that Iñupiaq children attend school, most families from the Colville River region moved to Barrow permanently. However, many returned to the Colville River area during the summer and stayed at fish camps or coastal settlements east of the delta, or they would

take shorter subsistence hunting trips during the winter months as time allowed. These patterns persisted until the early 1970s when the region was resettled.

A cultural plan entitled *Nuiqsut Paisaŋich* was prepared in cooperation with the community of Nuiqsut in 1979 and provides insight into community use patterns around the time of resettlement (Brown 1979). The *Paisaŋich* notes that prior to resettlement in 1970, several individuals with ties to the Nuiqsut area had traveled to the area to hunt and trap; these travels were documented as part of a study of use and occupancy on the North Slope. These individuals' subsistence pursuits occurred in an area extending from Teshekppuk Lake to the Colville River, extending upriver along the Colville River to the mouth of the Chandler River, overland in an area between the Itkillik and Sagavanirktok rivers, and in a coastal and inland area between the Colville River delta and Prudhoe Bay. Soon after resettlement in 1973, documentation of caribou hunting areas showed use occurring throughout the Colville River delta and upriver; overland in coastal areas west of Nuiqsut to Fish Creek; and overland east of the Colville River delta to Deadhorse.

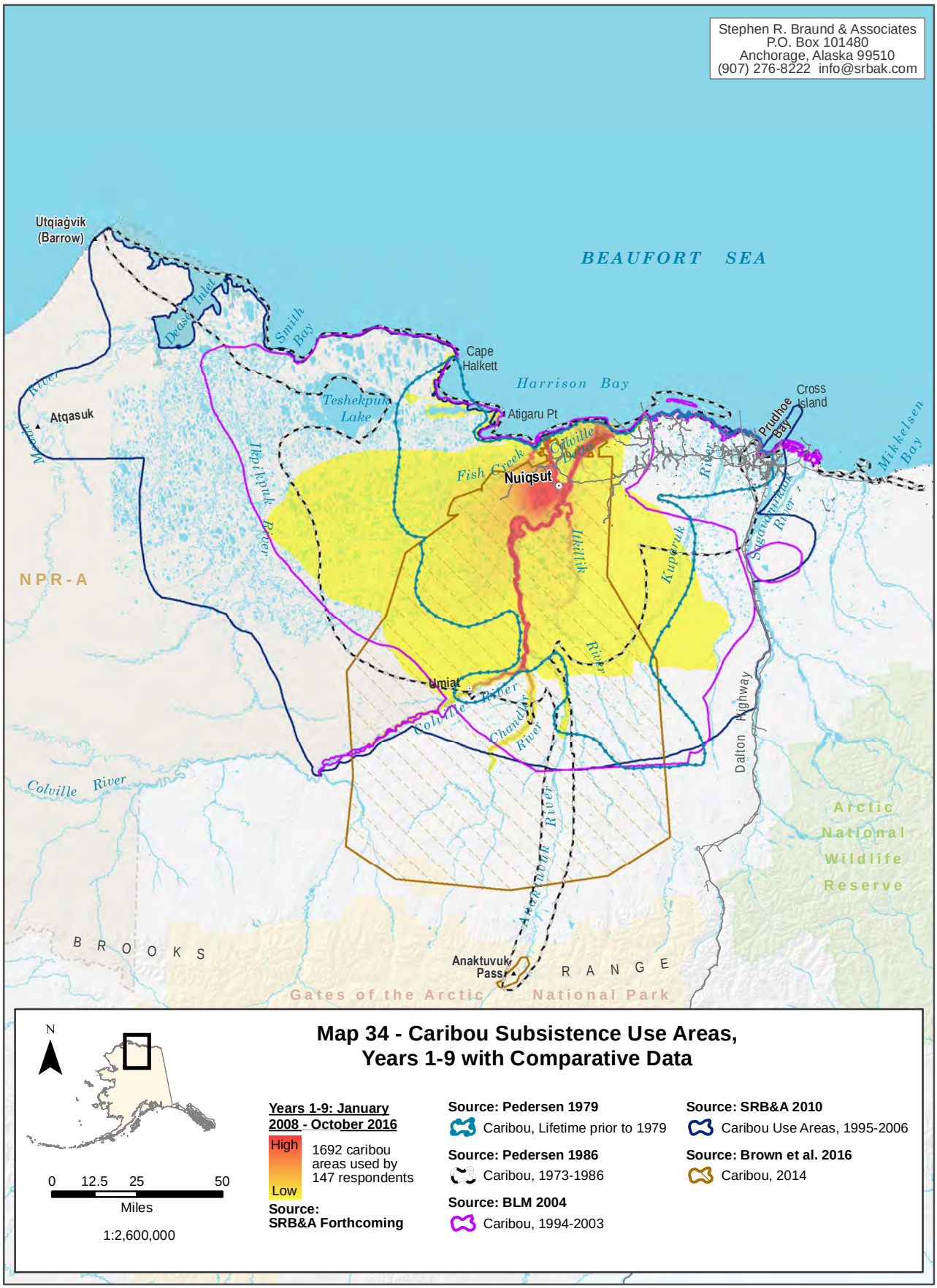
Comparison of Hunting Patterns over Time

Available caribou subsistence use area data for the community of Nuiqsut for all time periods are provided on Map 34. These data show the most recent data collected for this study (Years 1 through 9), in addition to caribou use area data from 2014 (Brown et al. 2016), 1995-2006 (SRB&A 2010b), 1994-2003 (BLM 2004), 1973-1986 (Pedersen 1986), and lifetime prior to 1979 (Pedersen 1979). Comparison of more recent use area data to use areas from the 1970s and 1980s shows a shift away from the Prudhoe Bay/Kuparuk development areas. This shift has been substantiated by harvester reports of reduced use of the area resulting from a combination of user avoidance, physical barriers, security restrictions, and state hunting closures. Today, it is general community knowledge that while the area east of the delta to Prudhoe Bay is part of the community's cultural landscape and identity, it is not part of the current area of subsistence use. Previous time periods also show a somewhat larger overland area of use, possibly resulting from documentation of hunting during inter-community travel (i.e., between Nuiqsut and Barrow, Atqasuk, and Anaktuvuk Pass) or combined hunting trips (i.e., hunting for both caribou and wolf/wolverine). In the 1970s, the *Nuiqsut Paisaŋich* defined the community's area of current intensive subsistence use as extending from Teshekpuk in the west to the Sagavanirktok River in the west, and Umiat in the south, while an area of extended use occurred over a much larger area. The caribou use areas documented in this study occur in an area similar to the area of intensive use documented in the *Paisaŋich*, with the exception of the area surrounding the Prudhoe Bay and Kuparuk development areas.

In the mapping study for the 1995-2006 time period (SRB&A 2010b), SRB&A employed the same "overlapping use areas" method used in the Nuiqsut Subsistence Caribou Monitoring study. Comparison of overlapping use areas from these two studies may provide insight into more recent changes in patterns of use within the Alpine and Alpine Satellites development areas (see Map 35). In the 1995-2006 study, respondents were interviewed once regarding their subsistence use area over the previous 10-year period in contrast to the data gathered annually during this study. The monitoring study reflects the use areas of a substantially larger number of respondents overall, but a comparable number of respondents on an annual basis; in both time periods, the sample is meant to represent active caribou harvesters in the community. Use areas documented during the 1995-2006 time frame included hunting activities while residents traveled to and from other communities (e.g., Atqasuk and Barrow/Utqiaġvik), hence a substantially larger use area extent. In addition, the data represent slightly different time frames (a 12 year period versus a nine year period), and these differences should be kept in mind when comparing the two data sets.

To facilitate comparison of the two data sets, SRB&A merged each respondent's use areas so that each data set shows only one polygon per respondent. The study team also applied an overlapping use area method to each data set which assigned shading (from yellow to brown) under three categories. Therefore, the brown on Map 35 depicts the top category of overlapping use (reflecting a higher number of overlapping respondents), and the yellow depicts the lowest category of overlapping use (reflecting a smaller number of overlapping respondents). The method used to apply breaks to the subsistence use area data is based on

Stephen R. Braund & Associates
P.O. Box 101480
Anchorage, Alaska 99510
(907) 276-8222 info@srbak.com



N

0 12.5 25 50
Miles

1:2,600,000

Map 34 - Caribou Subsistence Use Areas, Years 1-9 with Comparative Data

Years 1-9: January 2008 - October 2016

High
Low

1692 caribou areas used by 147 respondents

Source: SRB&A Forthcoming

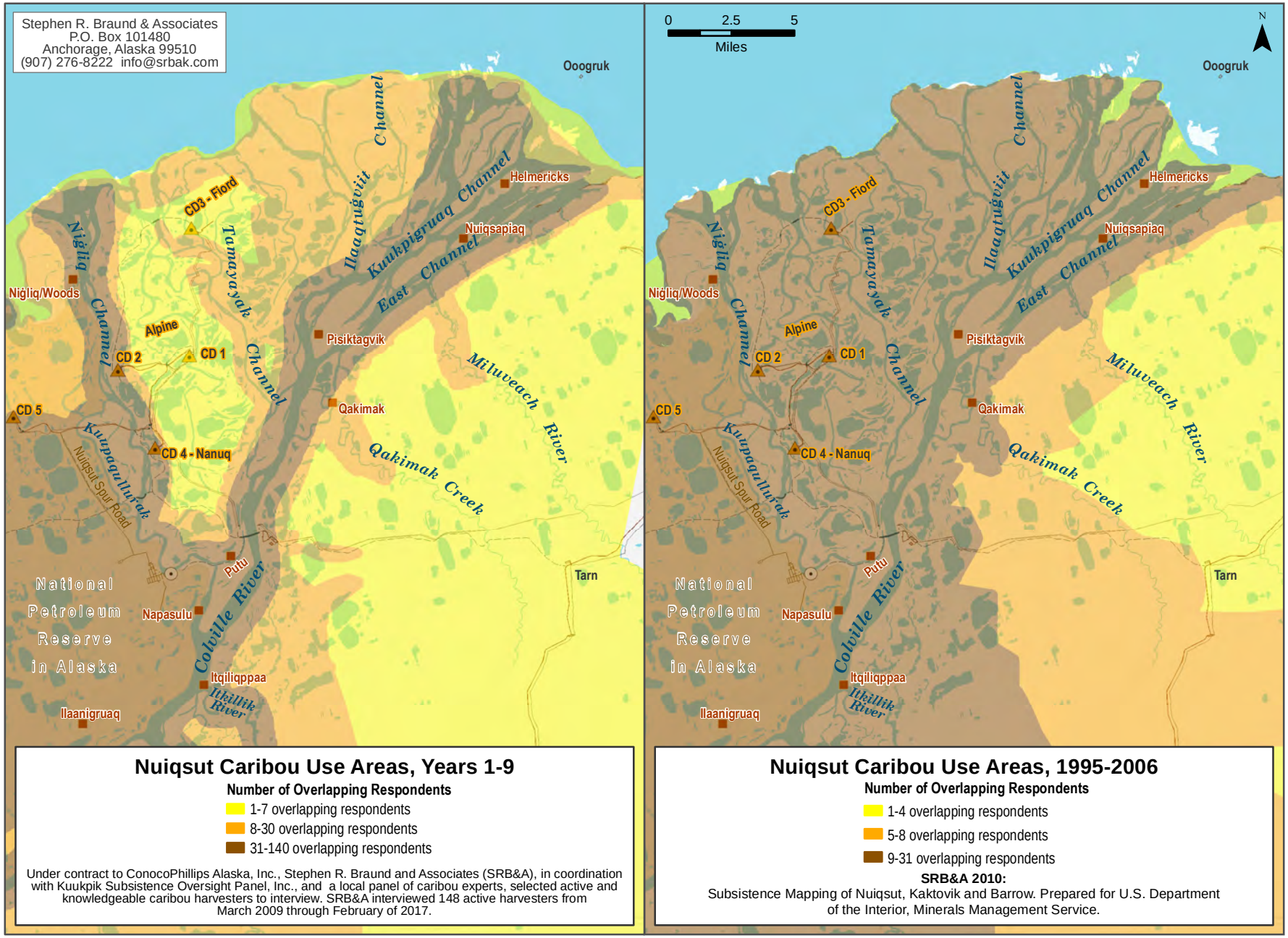
Source: Pedersen 1979
Caribou, Lifetime prior to 1979

Source: Pedersen 1986
Caribou, 1973-1986

Source: BLM 2004
Caribou, 1994-2003

Source: SRB&A 2010
Caribou Use Areas, 1995-2006

Source: Brown et al. 2016
Caribou, 2014



Map 35 - Comparative Use Areas, Colville River Delta

the nature of the underlying data which reveal a heavy-tailed distribution. Data that exhibit heavy-tailed distribution patterns have a minority of large values (i.e., higher number of respondent overlaps) concentrated in the head and a majority of small values (i.e., one or two respondent overlaps) concentrated in the tail (Jiang 2013). In order to group and classify the data around natural breaks in a way that was replicable for each data set, SRB&A implemented a method known as head/tail breaks that was developed by Jiang (2013) as a means of identifying the underlying hierarchy of data that displays a heavy-tailed distribution. The method breaks the data into multiple classes based on high to low overlaps. For the purposes of this comparison, the data are presented under three classes of data which represent high, medium, and low overlaps.

An overall comparison of the two data sets indicates less use of the middle Colville Delta in more recent years and west of the Nigliq Channel (north of the CD 5 area). In addition, more recent data show less overlapping use in overland areas to the east and south of the community and along the coast toward Oliktok Point. In a meeting of the Nuiqsut Caribou Panel, several panel members discussed the decreased use of the coastal area to Oliktok Point in recent years, indicating that fewer caribou are available in that area. Because this study documents use areas reported by respondents on an annual basis for the previous year, rather than in a single interview for the previous 10 years, harvesters may be more specific when identifying their hunting areas. However, respondents' descriptions of use areas from the two time periods are generally consistent with the differences depicted on the map.

Earlier descriptions of caribou hunting activities by Nuiqsut residents also may inform changes in hunting patterns over time, or in hunter perceptions regarding the availability of caribou. Previous studies by the NSB and ADF&G provide information on subsistence harvests by location. In 1993, Fish Creek was the top harvest location for caribou, with an estimated 111 caribou harvested there, followed by Ocean Point (63 caribou) and Nigliq (53 caribou) (Pedersen et al. 2000). In addition, according to Brower and Hepa (1998), Fish Creek was the top harvest location used by Nuiqsut hunters in 1994-95, followed by Nigliq Channel and the Nuiqsut area. For the 1999-2000 time period (Pedersen Unpublished), Fish Creek provided a much smaller portion of the overall harvest compared to other hunting areas. Instead, Ocean Point, Umiraq, and Nigliq were the top harvest areas. This decreased use of Fish Creek is also evident in the more recent data, both through decreased overlapping use areas and decreased harvests in the area. Other areas that show fewer overlapping use areas in the recent study (i.e., the middle Colville River delta and large overland areas to the west and east of the community) show minimal caribou harvests associated with them during all of the previous studies (Pedersen et al. 2000, Pedersen Unpublished, Brower and Hepa 1998) and therefore no corresponding decrease in harvests is evident.

A 1990 report entitled "Subsistence Resource Harvest Patterns: Nuiqsut" (IAI 1990), which was funded by the Minerals Management Service, describes subsistence harvesting patterns as based on previously existing studies and through fieldwork in the community. Hunter perceptions related to the availability of caribou as described in that report are notably different than those documented in recent years. In the following passage, caribou are described as being readily available to hunters in the vicinity of Nuiqsut:

> *For the hunters of Nuiqsut, caribou are ubiquitous. Caribou are also wanderers and are ultimately unpredictable in terms of knowing exactly where to find them. Given the need to harvest a caribou, however, most Nuiqsut hunters would be fairly confident of being able to do so in a reasonable amount of time.* (IAI 1990)

The report goes on to describe caribou hunting activities in more detail and, again, provides a description that is in contrast to more recent accounts. In particular, the following passage notes the high availability of caribou with the Colville River delta and to the west of the community, especially in coastal regions:

> *Caribou are perceived by Nuiqsut residents to be so ubiquitous and readily available that it was difficult for them to indicate areas where they specifically hunted for caribou. They pointed out that one could find caribou in the entire area, that the entire area was used at one*

> *time or another, and to point out part of the range over other parts may in fact be misleading…. Most indicated that the coastal areas were the most productive for caribou hunting and that they used boats to access the resource. Although the entire coastal region and Colville River delta was said to be good, the Kogru River area and the upper Harrison Bay regions was pointed out as an especially productive area in the summer. The area around Atigaru Point and below it are also very productive areas, but the water is so shallow there that one must know how to gain access to use this area. Other informants were quite insistent that the Colville delta and other river systems were vital summer caribou harvest sites as well…. As was true of caribou in the summer, informants say that usually there is no lack of caribou in the winter and there is no real concern about the "best" spot to locate them. They are usually quite near the village. In fact, during fieldwork in February and March, 1990, caribou were observed (and hunted) near the dump, airport, sewage lagoon, and ice road.* (IAI 1990)

Another account of Nuiqsut hunting and harvesting patterns is in Hoffman et al (1988; original distributed in 1978). This document provides a summary of Nuiqsut subsistence activities in the 1970s. Again, caribou hunting is depicted as a reliable subsistence activity which does not require large amounts of time or effort:

> *Hunting for caribou is the bread-and-butter component of the Nuiqsut subsistence complex, although regulations by the Alaska Department of Fish and Game have reduced the harvest of caribou in the past two years. It is possible to hunt caribou with a relatively small cash outlay. Since the founding of Nuiqsut, there have been some caribou in the Fish Creek area each year, throughout the year. This area is only about 12 miles from the village and the cost of traveling there by snowmachine is small. During the summer, caribou are found along both channels of the Colville. Summer caribou hunting trips were usually combined with the checking of gill nets to produce a fairly reliable harvest for the time and money invested.* (Hoffman et al. 1988)

Previous accounts of caribou hunting activities also indicate a possible shift in the timing of caribou harvests. Both IAI (1990) and Hoffman et al. (1988), stated that June and July were not common caribou hunting periods, noting difficulties with preserving the meat due to the warmer temperatures during those months. IAI (1990) indicated that this was changing due to technology that allowed for more efficient harvests and freezers that allowed residents to preserve foods year-round:

> *June and July also tend to be low activity months for the harvest of caribou, although they are usually locally available. Their condition tends to be poorer than later in the year and the relatively high temperatures makes preserving the meat a problem. More people do take caribou in June and July than in the past, however, perhaps due to larger and faster boats and home freezers. Most of the caribou taken in these months tend to be shot at or near fish camps in the Colville River delta.* (IAI 1990)

Hoffman et al. (1988) notes that August was the prime time for harvesting caribou due to their high quality at that time in addition to cooler temperatures which reduced the chances of spoiled meat. While it is still the case that August is a key time for harvesting caribou (and one that is cited by a number of harvesters as preferable due to the high quality of meat at that time), July is now equally important for the harvests of caribou (Figures 1 and 2). During a meeting of the Nuiqsut Caribou Panel to review the Year 9 report, panel members noted the potential for a more recent shift in caribou hunting activities, indicating that caribou have been less available earlier in the summer, particularly in coastal areas. For additional discussion regarding changes in caribou hunting patterns in addition to traditional knowledge of caribou in the Colville River Delta, see the section above entitled, "Traditional Knowledge of Caribou in the Colville River Delta.

Reported Avoidance of Use Areas

As shown in Table 45, the percentage of Year 9 respondents who reported no longer using or avoiding certain areas (51 percent) was somewhat lower than Years 6 through 8 (between 58 and 61 percent). The remaining 49 percent of respondents indicated there had been no change in their hunting area over time. As noted above, the Year 9 sample of active harvesters included a higher than usual percentage of "new" respondent. To ensure that the lower avoidance reports during the active harvester interviews were not due to a difference in the respondent sample, the study team calculated the percentage of active harvester respondents reporting avoidance, only looking at respondents who had participated in previous study years. The percentage of harvesters within this subsample reporting avoidance is 58 percent, within the range of previous years. Thus, it is possible that the lower prevalence of reported avoidance in Year 9 is due to the slightly higher number of new respondents. During a meeting of the Nuiqsut Caribou Panel to review the Year 9 report, one panel member discussed the potential annual variation in avoidance responses by hunters. This hunter noted that hunter avoidance may change from year to year and may be temporary, depending on the action causing the avoidance. For example, hunters may avoid one small temporary construction map for a winter hunting season, but once the camp is gone they may return to that area to hunt.

The most commonly mentioned places avoided were Fish Creek (five observations), followed by Alpine/Alpine Satellites, Nanuq, Colville Delta, and *Kuupaqullurak*, all with four observations each. Other areas with more than one observation each included the East Channel, Itkillik River, and the camp at *Nigliq* (Table 46).

Fewer individuals directly named Alpine/Alpine Satellites areas in Years 8 and 9, although a number of individuals reported avoiding specific geographic areas, such as the Colville Delta, Nigliq Channel, Nanuq, and *Kuupaqullurak,* for primarily development-related reasons, many of which are frequently related to Alpine/Alpine Satellites:

> *This Kuupaqullurak area, they are just never around anymore since they built the road. They used to be on the west and east side of the road near the lakes, they used to be near the little creeks too before they built that Spur Road.* (SRB&A Nuiqsut Interview November 2016)

> *Yeah, Nanuq. Right where the bridge is. It's just too much. That's where we could camp all the time. Now everything is closed, too close [to hunt there].* (SRB&A Nuiqsut Interview November 2016)

> *We used to go to that little Kuupaqullurak [Creek] but there is too much traffic with the bridge. Not sure if it is even deep enough now. I used to go there all of the time now we don't even go there this year. We used to camp there for like four days.* (SRB&A Nuiqsut Interview November 2016)

> *I used to hunt a lot in this area [Colville Delta]. [I avoid that now] because of the oil activities that are going on there.* (SRB&A Nuiqsut Interview November 2016)

Respondents who reported avoiding or no longer hunting in certain areas sometimes cited multiple different causes for a change; hence, there are a total of 49 cause observations, compared to 36 location observations.

Table 44: Non-Alpine Impacts on Caribou Hunting, Nuiqsut, Years 1-9

Type of Non-Alpine Impact	Percent of Respondents									Percent of Observations								
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Helicopter traffic	11%	9%	2%	7%	32%	13%	13%	16%	6%	22%	45%	33%	40%	43%	32%	45%	35%	37%
Plane traffic	17%	6%	4%	5%	28%	15%	13%	16%	8%	39%	27%	67%	40%	34%	36%	40%	42%	37%
Other traffic	3%	0%	0%	0%	4%	4%	2%	2%	0%	6%	0%	0%	0%	4%	9%	5%	4%	4%
Oil company personnel	0%	0%	0%	0%	5%	0%	2%	0%	0%	0%	0%	0%	0%	6%	0%	5%	0%	2%
Man-made structures	6%	4%	0%	0%	2%	2%	0%	2%	2%	11%	18%	0%	0%	2%	5%	0%	4%	5%
Regulations	3%	0%	0%	0%	4%	2%	0%	0%	3%	6%	0%	0%	0%	4%	5%	0%	0%	3%
Seismic lines or activity	0%	2%	0%	2%	0%	0%	0%	0%	2%	0%	9%	0%	10%	0%	0%	0%	0%	2%
Other	8%	0%	0%	2%	5%	5%	2%	7%	3%	17%	0%	0%	10%	6%	14%	5%	15%	10%
Any impact	31%	15%	5%	16%	54%	29%	27%	31%	19%									

Stephen R. Braund & Associates, 2017.

Table 45: Respondents Reporting Avoidance of Previously Used Hunting Areas

Avoid Areas?	Y6	Y7	Y8	Y9
No	39%	42%	42%	49%
Yes	61%	58%	58%	51%
Total	100%	100%	100%	100%

Stephen R. Braund & Associates, 2017.

Table 46: Places of Avoidance

Place	Number (%) of Observations				
	Year 6	Year 7	Year 8	Year 9	All Years (Years 6-9)
Alpine/Alpine Satellites	13 (29%)	11 (30%)	8 (21%)	4 (11%)	36 (23%)
Fish Creek	4 (9%)	3 (8%)	1 (3%)	5 (14%)	13 (8%)
Colville Delta	2 (4%)	2 (5%)	3 (8%)	4 (11%)	11 (7%)
Kuupaqullurak		3 (8%)	3 (8%)	4 (11%)	10 (6%)
Nigliq Channel	4 (9%)	1 (3%)	3 (8%)	1 (3%)	9 (6%)
Nanuq			4 (10%)	4 (11%)	8 (5%)
East Channel	3 (7%)		3 (8%)	2 (6%)	8 (5%)
Tamayayak Channel	3 (7%)	3 (8%)	1 (3%)		7 (4%)
Upper Colville River	1 (2%)	2 (5%)	3 (8%)	1 (3%)	7 (4%)
Itkillik River	1 (2%)	3 (8%)		2 (6%)	6 (4%)
West of Nuiqsut	2 (4%)	2 (5%)	1 (3%)	1 (3%)	6 (4%)
Spur Road		1 (3%)	2 (5%)	1 (3%)	4 (3%)
Shallow Areas	3 (7%)				3 (2%)
Anaktuvuk River		2 (5%)			2 (1%)
East of Colville Delta		1 (3%)	1 (3%)		2 (1%)
East of Colville River	1 (2%)			1 (3%)	2 (1%)
East of Nigliq Channel	1 (2%)		1 (3%)		2 (1%)
Kachemach River	1 (2%)			1 (3%)	2 (1%)
Puviksuk	2 (4%)				2 (1%)
Teshekpuk Lake	1 (2%)			1 (3%)	2 (1%)
Various Areas		2 (5%)			2 (1%)
Nigliq				2 (6%)	2 (1%)
Pisiktaġvik			1 (3%)	1 (3%)	2 (1%)
Atigaru Point	1 (2%)				1 (1%)
Chandler River		1 (3%)			1 (1%)
Oliktok Point			1 (3%)		1 (1%)
Kuparuk River	1 (2%)				1 (1%)
Lake near Kachemak	1 (2%)				1 (1%)
Nuiqsupiaq			1 (3%)		1 (1%)
Tingmeachsiovik			1 (3%)		1 (1%)
Eskimo Island			1 (3%)		1 (1%)
Ikpikpuk River				1 (3%)	1 (1%)
Total Observations	45	37	39	36	157

Stephen R. Braund & Associates, 2017.

As shown in Table 47, Development-related Causes were most commonly cited (26 observations), followed by Environmental Causes (14 observations), and Personal Reasons (eight observations). Year 9 had a lower percentage of avoidance due to development (53 percent) compared to the previous year (72 percent), and a higher percentage of avoidance due to personal reasons (16 percent).

Table 47: Causes of Avoidance

Causes	Number (%) of Observations				
	Y6	Y7	Y8	Y9	All Years
Development Causes	**32 (60%)**	**28 (60%)**	**36 (72%)**	**26 (53%)**	**122 (61%)**
Development Activities	8	5	14	13	40
Development Infrastructure	7	12	12	4	35
Development-General	4		6	5	15
Security Restrictions	4	3	3	3	13
Contamination Concerns	6	4			10
Safety Concerns	3	4	1	1	9
Environmental Causes	**18 (34%)**	**9 (19%)**	**12 (24%)**	**14 (29%)**	**53 (27%)**
Resource Availability	6	6	9	13	34
Environmental Factors	12	3	3	1	19
Personal Reasons	**2 (4%)**	**10 (21%)**	**2 (4%)**	**8 (16%)**	**22 (11%)**
Don't Know	**1 (2%)**	**0 (0%)**	**0 (0%)**	**0 (0%)**	**1 (1%)**
Cause Not Captured	**0 (0%)**	**0 (0%)**	**0 (0%)**	**1 (2%)**	**1 (1%)**
Total Observations	**53**	**47**	**50**	**49**	**199**

Stephen R. Braund & Associates, 2017.

Environmental causes were within the range of the three previous years. Development-related causes included activities associated with development (e.g., air traffic), development infrastructure, general development causes, security restrictions, and safety concerns (see Table 47):

> *All of these work areas. All of this, especially CD 5, but since there is so much development out there, and there is a lack of caribou over there now. Well, we don't hunt near the fields because we are not allowed, but then if we see one then we would try to wait and see which way it was going to go. [He] knows better which way it might go. And we were trying to spot a [polar] bear out there but we didn't see it.* (SRB&A Nuiqsut Interview November 2016)

> *[I used to go to] Pisiktaġvik, I think there is more oil activity around there now and increased activity is not appealing. Both, [avoid Pisiktaġvik due to lack of success and unappealing]. Just generally the East Channel [same reasons as avoiding Pisiktaġvik]. Also, I'm not hearing from other hunters about caribou over there. Why would I go if there is nothing there?* (SRB&A Nuiqsut Interview November 2016)

> *Towards CD5. Before CD5 there was lots of caribou, that's where all the caribou was. That way. That way is flat and you can cruise on that flat land, but… you can't go that way. That was a shortcut to Fish Creek too. But that's about it.* (SRB&A Nuiqsut Interview November 2016)

> *This area, Fish Creek. I haven't been there in quite a while. I don't know—it's probably more [oil and gas] activity down there.* (SRB&A Nuiqsut Interview November 2016)

Several individuals reported avoiding areas for development reasons not related to the Alpine/Alpine Satellites developments. One respondent blamed a combination of new development activities and young hunters not letting the caribou cross for their avoidance of the East Channel:

> *[I stopped hunting] on the east channel of the Colville, east side, east of Colville where the pipeline and drill sites are placed and producing. There are multiple developments over there now. The caribous will just make a U-turn and go back - away from the Colville. I do notice the boats are out there waiting for the caribous to come back. It's not just air traffic, it is the young people who used to listen to the elders but now they have no ears to listen to them. Sometimes they go out in the silent mode and don't talk about the first herd coming through. They are thinking it is like first come first serve. They have first access and gone way down river. Out in the Kachemach River, along Pisiktaġvik and Lonely [Island], just waiting around. Some of the first herds don't come through because the helicopter and those young hunters.* (SRB&A Nuiqsut Interview November 2016)

Environmental causes were primarily related to resource availability (13 observations), rather than environmental factors which had been more commonly cited in past years. Those individuals citing resource availability as a cause for avoidance generally reported no longer using certain areas because of a general lack of caribou in those areas (Table 47).

As shown in Table 48, the causes cited for avoiding the area near Alpine/Alpine Satellites included security restrictions (e.g., concerns about being confronted by oil company personnel or not understanding hunting policies in developed areas), general development, and resource availability. In addition to mentioning Alpine/Alpine Satellites directly, respondents also reported avoiding areas such as Colville Delta, Fish Creek, *Kuupaqullurak, Nanuq,* the area east of the Colville River, *Nigliq,* and the Spur Road for development reasons.

Table 48: Causes Cited for Avoidance by Place – Year 9

Place	Environmental Causes		Development Causes					Personal Reasons	Total
	Environmental Factors	Resource Availability	Development Activities	Development Infrastructure	Security Restrictions	Safety Concerns	Development-General		
Colville Delta		2	3	1			1		7
Alpine/Alpine Satellites		2			2		2		6
Kuupaqullurak		1	2	2					6
Nanuq		2			1		2		5
Fish Creek			2					3	5
East channel		2	1						3
East of Colville River		1	1	1					3
Nigliq		1	1					1	3
Itkillik river	1		1						2
Pisiktaġvik		1	1						2
Kachemach River		1							1
Spur Road						1			1
Teshekpuk Lake								1	1
Upper Colville River								1	1
West of Nuiqsut								1	1
Nigliq Channel			1						1
Ikpikpuk River								1	1
Total	1	13	13	4	3	1	5	8	49
Stephen R. Braund & Associates, 2017.									

In general, respondents' observations addressed the following development related reasons for avoidance of these areas:

- Avoidance of development areas due to general discomfort or a sense that one's connection to that area has been weakened
- Avoidance of development activity (including traffic) and infrastructure
    - Believe that noise from traffic and the presence of infrastructure such as pipelines, bridges, and raised roads, deflect caribou and reduce hunting success rates
    - Prefer hunting in areas of quiet and no traffic
- Feeling forced out from traditional areas
    - Respondents identified no longer using traditional areas, such as *Nanuq* and the area near CD5, where oil and gas facilities are visible; they expressed concern that the same effect will happen with development of GMT1 and GMT2.
    - Some individuals reported shifting their hunting activities upriver away from development
- Concern that certain areas, such as *Kupaqullurak,* are no longer navigable due to the presence of infrastructure
- Security restrictions deterring residents from hunting in development areas
- Concerns of shooting towards people and infrastructure when traveling along the Spur Road
- Avoidance of development and other areas due to the belief that caribou are no longer as abundant in those areas

General Observations Regarding Status of Caribou Herds in Year 9

This section summarizes residents' general Year 9 observations relevant to the behavior, distribution, or migration of caribou in 2016. This section includes observations that are not readily organized into the sections above, or observations made during the final section of the active harvester interviews, where respondents were asked, "Was there anything else abnormal about the behavior, distribution, or migration of caribou in 2016?" In Year 9, respondents' observations trended toward the following topics:

- General availability of caribou
- Effects of development activity and infrastructure on caribou and harvester activities
- Effects of changing weather patterns and climate on caribou and harvester activities

A general observation made by a number of Nuiqsut respondents in Year 9 was that, unlike the previous year when caribou were observed to be relatively abundant, there were few caribou around throughout the study year. Residents observed that the caribou seemed more dispersed and did not follow their usual migration patterns.

> *That's basically where I did my caribou hunting for the year and I'm still out of caribou. My family in Barrow are hurting for caribou, but I cannot help them. It's getting weird. You know, I'm a subsistence hunter. I hunt for Barrow; I hunt for Wainwright. This year they are thinking I am goofing off, but I am not. My uncle in Barrow said are you goofing off again, where are all the caribou. I told him I've been going out, I'm not seeing them.* (SRB&A Nuiqsut Interview November 2016)

> *They are just smaller bunches. That is just that I keep hearing that they are smaller and in smaller bunches. What I hear is that most of them are hanging out in Wainwright. I am hurting for caribou. This year there are no caribou skins, we used to make the kids masks, but not this year. Kivgiq will be in February, and then like to make our boots the traditional way, but maybe this year I would have to get them from Anchorage.* (SRB&A Nuiqsut Interview November 2016)

> *I wasn't able to do caribou hunting all summer long just because there was nothing around. My brother and my nephew will probably come and tell you. My brother will come and talk to you—he's the one that is here all the time… I hear CD2 and CD4, there is supposed to be caribou around there [right now]. I don't know why there wasn't that much caribou this summer. My brother keeps going out and my nephews and nieces go with him and they didn't take any caribou this summer. I don't know which way they all have gone or what happened to them. Why didn't I see so much caribou? I knew there was a lot of caribou in the Barrow area.* (SRB&A Nuiqsut Interview November 2016)

Some attributed the changes to increasing development activities including air and road traffic to the north and west of the community. One respondent expressed the view that the cumulative effect of emissions and spills across the landscape have affected the health and distribution of caribou, saying,

> *It's basically these vehicles running around the tundra. When you think about it, in the last 40 years, it was never like that. You pinpoint where these vehicles are traveling and that's where it's happening. It's basically changing a lot. I used to work for [company name] for seismic and I busted them draining the antifreeze right to the ground and right off the bat you can smell that…. I would imagine a caribou, they get curious, and the curiosity brings them to hunger. And they think, 'wow it must be something.' It's kind of weird. It's a complete change. The smell of these things are just unbelievable. I would imagine when an animal seems something different they get very curious so they go over to find out what it is so the only thing they can do is taste it, but apparently if that little spill I made can attract a squirrel it can attract anything. Caribou are really picky about where they eat. When they are on their grounds they don't like to move from there.* (SRB&A Nuiqsut Interview November 2016)

Others believed the presence of new roads and bridges in the area, such as the CD5 road, Spur Road, and Nigliq Channel bridge, had deflected caribou from their usual areas. In the following quote, one respondent noted that caribou no longer congregate along *Kuupaqullurak* slough after construction of the Nigliq Channel bridge:

> *I noticed the herds are smaller when they come through town. They used to be huge herds. They would cover one whole block. Now it's more like 20 or less caribou. Probably, a lot more oil production scattered them out, I think. I don't know, probably [because of] the road. I think, I know a lot of caribou would be around Kuupaqullurak all of the time. We didn't even have to go far we just went there and now there is nothing there. That's where they, that's where their resting spot used to be. In between the bank and the little river, that little island inside there, I think that used to be their resting spot before the bridge and everything. That's where we would go - all of the time, we always knew they would be there.* (SRB&A Nuiqsut Interview November 2016)

Others cited weather conditions; a number of Year 9 respondents made comments about the unusual weather conditions in Year 9, including a lack of snow, unusual wind conditions, and unpredictable weather:

> *I haven't seen no abnormal behavior but the only concern I have is that they have switched their routes. They usually go close to the ocean to get away from the mosquitos, they go against the wind but this summer we had some weird winds and they were not where we expected.* (SRB&A Nuiqsut Interview November 2016)

A few individuals reported that a sizable herd had migrated toward the Colville Delta from the east during the summer of 2016, but never crossed into the delta. One respondent recalled that a number of young hunters were waiting for the caribou herd along the East Channel which caused the herd not to approach. Another individual addressed the issue of letting the first of the herd pass, saying,

> *I don't know, maybe about the young hunters. Talk to them, tell them to leave the leader alone so the herd can go where they are going. It's always these young hunters, they don't really understand to let the leader go so the herd can follow. At least try to talk to the young ones say they understand the leader and the herd [need to pass]. I don't know. Be more respectful for the caribou so they could pass through where they usually migrate.* (SRB&A Nuiqsut Interview November 2016)

Several individuals discussed concerns about further development to the west of the community, including construction of a pipeline, and the potential impacts on hunters and caribou.

> *Anyways, I think we are starting to see the problem that we are going to have with Alpine now that they are going to create a Moose's Tooth unit, the caribous that are coming in from the west, they're going to turn around and go south.* (SRB&A Nuiqsut Interview November 2016)

> *They are proposing to put a pipeline in here. I was wondering if they might block them off. There used to be caribou in there [Colville Delta], but I never see caribou in there anymore.* (SRB&A Nuiqsut Interview November 2016)

The Spur Road north of the community was described by some as a benefit to the community ("That [Nuiqsut Spur Road] gave us access to where we never had access before"), while others indicated they preferred not to hunt along the road or avoided it altogether ("She wanted to take me to that Spur Road, but I felt funny about that in a vehicle; I like the boat"). One respondent discussed the general growth of development near the community and the tendency to avoid development altogether by shifting their hunting areas upriver:

> *It's quieter up the Colville River than downstream [in the delta]. Its farther and much quieter and untouched. Now as we see more production going towards GMT1 and GMT2 then we will have to go farther and farther south on the Colville River. We are skeptical about these developments going farther and farther west. They just keep moving farther west and we can hear them. If it goes through we will have to go farther and farther up the river. But, I have seen herds of caribou come through the village. Maybe it was a fluke, but they still come around a little - its hard to predict.* (SRB&A Nuiqsut Interview November 2016)

Another concern, which has been expressed in previous study years, was the impact of the Dalton Highway and Dalton Highway sport hunters on the availability of caribou near Nuiqsut:

> *I would just like to see the highway [Dalton] traffic more regulated. That is a whole line going all the way down the middle of Alaska and it disturbs them. It is like a boarder where hunters post up and I bet there are still a few of them out there right now. They are being turned off and scared away from the road back to the direction that they came from. I would just like to see some stricter regulations. It just means that there would be an area to hunt rather than any old place along the highway. I have nothing against it, it's just all over.* (SRB&A Nuiqsut Interview November 2016)

Summary

SRB&A, with the Nuiqsut Caribou Panel, has completed nine years of monitoring of impacts of CD4 and other COP satellite developments on Nuiqsut residents' caribou hunting activities. The monitoring data are based on interviews with a sample of active Nuiqsut caribou harvesters as well as household harvest surveys. Sixty-three respondents (all active harvesters) were interviewed in Year 9.

These respondents reported 195 caribou use areas for the Year 9 time period (November 2015 to October 2016). They also identified 163 successful harvest locations, within the range of previous study years (between 143 [Year 6] and 248 [Year 7] harvest locations). The majority of caribou hunting and harvesting

activities occurred along the Nigliq and East channels of the Colville River, upriver along the Colville River to Sentinel Hill, along the lower portion of the Itkillik River, and along the Spur Road north of the community. Compared to all previous study years, Year 9 was relatively similar. The extent of overland travel was similar to Years 5, 6, and 8 but smaller than the other study years. Year 9 shows relatively modest use of Fish Creek and less use of the upper Colville River (beyond Sentinel Hill) when compared to previous years. A new hunting pattern, which emerged in Year 8 and grew in Year 9, was the use of the Spur Road and CD5 roads to hunt caribou.

The concentration of harvests in Year 9 were similar to recent years (Years 6 through 8). Years 6 through 9 differ from the first five study years in that they show fewer areas of high harvest density along Nigliq Channel, with the exception of the camp at Nigliq. Overall, a large number of caribou harvests took place at Nigliq, along the Spur Road north of the community and overland to the west of the community, near the mouth of Miluveach River, at a location on the Itkillik River, and near Sentinel Hill.

July and/or August have been the peak hunting months during almost every study year, including Year 9; the exception was Year 8, in which the number of caribou harvested peaked in September. In Year 9, while July and August continued to be the peak harvest months, they accounted for a smaller percentage of harvests compared to some previous study years, at 27 percent each, and the number of reported harvests during those months was lower than any previous year. Year 9 showed a somewhat higher percentage of use areas reported during the winter months of November through April when compared to most previous years, except for Year 3.

Although boat remained the principle travel method to caribou use areas, recent study years have shown a decrease in the use of boat relative to other travel methods. In Year 9, respondents used boat to access 69 percent of caribou use areas. Snowmachine use areas were at an all-time low in Year 9, at eight percent of use areas, while truck use increased substantially from two percent or less of use areas in Years 1 through 7 to eight percent in Year 8 and 14 percent in Year 9. The increased use of truck, and possibly also four-wheeler, is likely due to respondents' increased use of the recently constructed Spur Road. Following an ongoing trend, respondents took primarily same day trips to a majority (96 percent) of use areas. The frequency of hunting trips to use areas was also similar to previous study years, although Nuiqsut harvesters were more likely to take more than 20 trips to caribou use areas in Years 3 through 9 compared to Years 1 and 2. A number of factors affect harvest timing and success, including weather and ice conditions, the timing of caribou migration into traditional hunting areas, and outside factors such as industrial or other activities that potentially affect caribou behavior. Harvest success in terms of the percentage of successful hunting areas has varied from between 53 percent of areas (in Year 9) to 78 percent of areas (in Year 1). Year 8 marked the highest percent of successful use areas (65 percent) since Year 1, while Year 9 marked the lowest (53 percent). Lower success rates in Year 9 were also evident in the relatively smaller number of reported harvests, both during Year 9 active harvester interviews and in the household harvest surveys.

The percentages of active harvester respondents reporting changes from the previous year in hunting areas, hunting months, trip frequency, trip duration, and harvest amounts are somewhat similar over all study years. Overall, the percentages of respondents reporting changes in hunting area, frequency, duration, and harvest amount in Year 9 were all within the range of previous years. In Year 9, 40 percent of respondents indicated that they did not harvest enough caribou, showing an increase from the previous two study years (32 percent and 22 percent, respectively). The percentage of respondents not harvesting enough is consistent with a decline in reported harvests during both the active harvester interviews and household harvest surveys.

The percentage of respondents observing caribou abnormalities in Year 9 was lower than all previous years, continuing a trend of decreasing observations since Year 6. This decline in the percentage of respondents reporting sick or injured caribou was also evident in the household survey, with 11 percent of households harvesting sick caribou compared to between 15 percent and 24 percent in previous study years. Despite

the smaller percentage of respondents, the number of sick caribou reported in both the active harvester interviews and household harvest surveys was not the lowest of all study years.

Twenty-seven percent of harvesters in Year 9 reported one or more Alpine-related impacts on caribou hunting, lower than all other years. While helicopter traffic was the most commonly reported impact source during active harvester interviews in previous years, in Year 9 helicopter traffic was tied with man-made structures as the most frequently reported impact (28 percent of observations each). In addition, plane traffic impacts accounted for a higher proportion of impact observations (24 percent) than previous years, which ranged from three percent (Year 8) to 22 percent (Year 1) of impact observations. The presence of recently built infrastructure in areas previously undeveloped (i.e., the Spur Road and CD5 road and bridge) was a continuing source of impacts to some hunters in Year 9. The Year 9 household harvest surveys told a somewhat different story regarding a higher level of impacts, with 41 percent of households reporting impacts compared to between 21 percent and 44 percent in previous study years.

Fifty-one percent of respondents indicated that they no longer hunted in or generally avoided certain areas they previously used, somewhat lower than the previous three study years. Fish Creek, Alpine/Alpine Satellites, Colville Delta, *Kuupaqullurak*, and Nanuq areas were the most frequently mentioned, for reasons related to development infrastructure and activities, as well as security restrictions. Other areas avoided due to development-related causes included the East Channel, East of Colville Delta, *Nigliq,* Itkillik River, Kachemach River, and the Spur Road.

A general observation made by a number of Nuiqsut respondents in Year 9 was that, unlike the previous year when caribou were observed to be relatively abundant, there were few caribou around throughout the study year. Residents observed that the caribou seemed more dispersed and did not follow their usual migration patterns. Some attributed the changes to increasing development activities including air and road traffic to the north and west of the community, while others cited abnormal weather conditions or did not provide a reason for the absence of caribou. Several individuals discussed concerns about further development to the west of the community, including construction of a pipeline, and the potential impacts on hunters and caribou. The Spur Road north of the community was described by some as a benefit to the community, while others indicated they preferred not to hunt along the road or avoided it altogether.

REFERENCES

Alaska Department of Fish and Game. 2011. Community Subsistence Information System. Available online at http://www.adfg.alaska.gov/sb/CSIS/index.cfm?ADFG=main.home. Accessed November 2011.

Alaska Native Science Commission (ANSC). 2009. The Voice of the Real People: North Slope Communities on NPR-A Social Science Plan. Prepared by Alaska Native Science Commission for the Bureau of Land Management, September 2009. Bacon, J., T. Hepa, H. Brower, Jr., M. Pederson, T. Olemaun, J. George, and B. Corrigan. 2009. Estimates Of Subsistence Harvest For Villages On The North Slope Of Alaska, 1994-2003. North Slope Borough, Department of Wildlife Management, Barrow, Alaska.

Braem, N.M., S. Pedersen, J. Simon, D.S. Koster, T. Kaleak, P. Leavitt, J. Patkotak, and P. Neakok. 2011. Monitoring of caribou harvests in the National Petroleum Reserve in Alaska: Atqasuk, Barrow, and Nuiqsut, 2003-2007. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 361, Fairbanks.

Braund, Stephen R. & Associates (SRB&A). 2017. Nuiqsut Caribou Subsistence Monitoring Project: Results of Year 8 Hunter Interviews and Household Harvest Surveys. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska

_____ 2016. Nuiqsut Caribou Subsistence Monitoring Project: Results of Year 7 Hunter Interviews and Household Harvest Surveys. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska.

_____2015. Nuiqsut Caribou Subsistence Monitoring Project: Results of Year 6 Hunter Interviews and Household Harvest Surveys. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska.

_____ 2014. Nuiqsut Caribou Subsistence Monitoring Project: Results of Year 5 Hunter Interviews and Household Harvest Surveys. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska.

_____ 2013. Nuiqsut Caribou Subsistence Monitoring Project: Results of Year 4 Hunter Interviews and Household Harvest Surveys. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska.

_____ 2012. Nuiqsut Caribou Subsistence Monitoring Project: Results of Year 3 Hunter Interviews. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska.

_____ 2011. Nuiqsut Caribou Subsistence Monitoring Project: Results of Year 2 Hunter Interviews. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska.

_____ 2010a. Nuiqsut Caribou Subsistence Monitoring Project: Results of 2009 Hunter Interviews. Prepared for ConocoPhillips Alaska, Inc. Anchorage, Alaska.

_____ 2010b. Subsistence Mapping of Nuiqsut, Kaktovik, and Barrow. Funded by the U.S. Department of the Interior, Minerals Management Service. Alaska OCS Region, Environmental Studies Program. Contract No. 1435-01-02-CT85123.

Brower, H. Jr., and R. Hepa. 1998. North Slope Borough Subsistence Documentation Project: Data for Nuiqsut, Alaska for the Period July 1, 1994 to June 30, 1995. North Slope Borough, Department of Wildlife Management. Barrow, Alaska.

Brown, C.L., N.M. Braem, M.L. Kostick, A. Trainor, L.J. Slayton, D.M. Runfola, E.H. Mikow, H. Ikuta, C.R. McDevitt, J. Park, and J.J. Simon. 2016. Harvests and uses of wild resources in 4 Interior Alaska communities and 3 Arctic Alaska communities. Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 426, Fairbanks.

Burch, E. 1980. Traditional Eskimo Societies in Northwest Alaska. Alaska Native Culture and History. Edited by Y. Kotani and W. Workman. Senri Ethnological Studies 4. National Museum of Ethnology. Senri, Osaka, Japan.

Fall, J.A., and C.J. Utermohle. Unpublished. An Investigation of the Sociocultural Consequences of Outer Continental Shelf Development in Alaska. Harvest data collected by ADF&G, Division of Subsistence. Prepared for U.S. Department of the Interior, Minerals Management Service, Alaska OCS Region, OCS Study MMS 95-012.

Fuller, A. and J. George. 1999. Evaluation of Subsistence Harvest Data from the North Slope Borough 1993 Census for Eight North Slope Villages: For the Calendar Year 1992. North Slope Borough, Department of Wildlife Management, Barrow, Alaska.

Greist, L. 1978. Puiguitkaat: The 1978 Elder's Conference. Transcription and translation by Kisautuq (Leona Okakuk), photographs by Gary Kean. North Slope Borough Commission on History and Culture, Barrow, Alaska.

Hoffman, D., D. Libbey, and G. Spearman. 1988. Nuiqsut: Land Use Values Over Time in the Nuiqsut Area. North Slope Borough and the Anthropology and Historic Preservation Section of the Cooperative Park Studies Unit, Occasional Paper No. 12, University of Alaska Fairbanks.

Impact Assessment, Inc. 1990. Subsistence Resource Harvest Patterns: Nuiqsut. John S. Petterson principal investigator and project manager. U.S. Department of the Interior, Bureau of Land Management, Alaska Outer Continental Shelf Office, Alaska OCS Socioeconomic Studies Program Special Report No. 8. (MMS 90-0038)

Jiang, B. 2013. Head/tail Breaks: A New Classification Scheme for Data with a Heavy-Tailed Distribution. The Professional Geographer, 65(3), 482-494.

Kakinya, E. 1978. Puiguitkaat: The 1978 Elder's Conference. Transcription and translation by Kisautuq (Leona Okakuk), photographs by Gary Kean. North Slope Borough Commission on History and Culture, Barrow, Alaska.Lawhead, B.E., A.K. Prichard, M.J. Macander, and J.H. Welch. 2015. Caribou Monitoring Study for the Alpine Satellite Development Program, 2014. Prepared for ConocoPhillips Alaska, Inc. by ABR, Inc—Environmental Research & Services. Fairbanks, Alaska.

Pedersen, S. 1986. Nuiqsut Subsistence Land Use Atlas, 1986 Update. ADF&G, Division of Subsistence, Fairbanks, Alaska, File Report 1986-01.

_____ 1979 Regional Subsistence Land Use, North Slope Borough, Alaska. Anthropology and Historic Preservation, Cooperative Park Studies Unit, University of Alaska, Fairbanks, Alaska and Conservation and Environmental Protection, North Slope Borough, Barrow, Alaska, Occasional Paper No. 21.

Pedersen, E., R. Wolfe, C. Scott, and R. Caulfield. 2000. Subsistence Economies and Oil Development: Case Studies from Nuiqsut and Kaktovik, Alaska. Part 1. In :Subsistence Economies and Oil Development: Case Studies from Nuiqsut and Kaktovik, Alaska, edited by S. Pederson, R. Wolfe, C. Scott, and R. Caulfield and Part 2: Subsistence Harvest Variability in Alaska Native Communities by R. Wolfe, C. Scott, S. Pedersen, and R. Caulfield. Prepared by the ADF&G, Division of Subsistence and the University of Alaska, Fairbanks, Department of Alaska Native

and Rural Development. Prepared for U.S. Department of the Interior, Minerals Management Service, Alaska OCS Region, Contract MMS 14-35-001-300661.

Prichard, A.K., M.L. Macander, J.H. Welch, B.E. Lawhead. 2017. Caribou Monitoring Study for the Alpine Satellite Development Program, 2015 and 2016. Prepared for ConocoPhillips Alaska, Inc. by ABR, Inc—Environmental Research & Services. Fairbanks, Alaska.

U.S. Army Engineer District (USAED), Alaska. 1996. Official Transcript, Proceedings of Public Hearing, Draft Environmental Impact Statement for the Proposed Beaufort Sea Oil and Gas Development, Northstar EIS Project, Public Scoping Meeting, Nuiqsut, Alaska, May 7, 1996: Anchorage AK, Alaska Stenotype Reporters.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2004. Alpine Satellite Development Plan Final Environmental Impact Statement (FEIS).

_____ 2003. Alpine Satellite Development Plan Scoping Meeting, Nuiqsut, Alaska, March 18, 2003. Anchorage AK; Liz D'Amour and Associates.

_____ 1998. Official Transcript, Proceedings of Public Hearing, National Petroleum Reserve-Alaska, NE NPR-A PDEIS, Nuiqsut, Alaska, January 14, 1998: Anchorage, AK, Computer Matrix.

U.S. Department of the Interior, Minerals Management Service (MMS) 1979. Official Transcript, Proceeding of Public Hearing, Draft Environmental Impact Statement for the Proposed Oil and Gas Lease Sale BF in the Beaufort Sea, Nuiqsut, Alaska, June 4, 1979: Anchorage AK, Alaska-Wide Court Reporters.

_____ 1990. Official Transcript, Proceedings of Public Hearing, Draft Environmental Impact Statement for the Proposed Oil and Gas Lease Sale 124 in the Beaufort Sea, Nuiqsut, Alaska, April 19, 1990: Anchorage, AK.

APPENDIX A: NUIQSUT CARIBOU MONITORING PROTOCOL, ACTIVE HARVESTER INTERVIEW YEAR 9

NUIQSUT CARIBOU MONITORING PROTOCOL, 2016

Date _____

Respondent Name _____

Respondent Birth date _____

Birthplace _____

Years in Community _____

SECTION A: CARIBOU HUNTING ACTIVITIES, NOVEMBER 2015 – OCTOBER 2016

1. Did you go caribou hunting between November 2015 and October 2016? YES ___ NO___ (IF NO, INTERVIEW OVER)

2. Where did you hunt for caribou between November 2015 and October 2016? (Draw caribou hunting areas on map)

FOR EACH CARIBOU HUNTING POLYGON, RECORD THE FOLLOWING INFORMATION ON THE MAP [**CHECK BOX WHEN COMPLETE**]:

	Months	**Transportation Method(s)**	**Number of Trips**	**Duration of Trip(s)** [***Longest and typical***]	**Did you harvest caribou here? (Y/N)**	**Where? (Mark harvest locations)**	**How many caribou?**	**Who harvested caribou? (self or other)**	**Sex of harvested caribou** (M/F)	**Harvest months (by harvest location)**
POLY 1										
POLY 2										
POLY 3										
POLY 4										
POLY 5										

3. Compared to 2015, was your hunting area different in 2016? YES _____ NO _____

3a. [IF YES], HOW? _____

_____

3b. [IF YES], WHY? _____

_____

4. Compared to 2015, was the # of hunting trips in 2016 the same, less, or more? LESS _____ SAME ____ MORE ____

4a. [IF LESS OR MORE], WHY? _____

_____

5. Compared to 2015, was the duration of trips in 2016 the same, less, or more? LESS _____ SAME ____ MORE ____

5a. [IF LESS OR MORE], WHY? _____

_____

6. Compared to 2015, were the months you hunted for and harvested caribou in 2016 different? YES _____ NO ____

6a. [IF YES], HOW? _____

_____

6B. [IF YES], WHY? _____

_____

7. Compared to 2015, was the # of caribou you harvested in 2016 the same, less, or more? LESS _____SAME __ MORE ___

7a. [IF LESS OR MORE], WHY? _____

_____

8. Did your household harvest enough caribou in 2016 to meet your needs? YES_____ NO _____

8a. [IF NO], WHY? _____

_____

9. Are there any areas where you used to hunt that you no longer use or avoid? YES_____ NO ____

9a [IF YES], WHY? _____

_____

SECTION B: ASSESSMENT OF HARVESTED CARIBOU, 2016

1. Thinking about the caribou you shot or harvested in 2016, were any of them abnormal in the following ways? (If none, Skip to Section C)

_____ Disease, infection, discolored meat (health)
_____ Unusual taste or smell (quality)
_____ Unusual fat content or overall size (size)
_____ Unusual quantity of parasites (flies)
_____ Other observations

2. For each caribou with the above observations, complete the following (Use additional sheets if necessary):

Type of Observation: _____ **Health** _____ **Quality** _____ **Size** _____ **Parasites** _____**Other**

Please describe the abnormality: _____

_____

_____

_____

_____

Please describe why you think the abnormality occurred: _____

_____

_____

_____

_____

Where was this caribou harvested? [Record Harvest Location Point]: _____

Did you use this caribou? YES _____ NO _____

SECTION C: IMPACTS ON CARIBOU HUNTING, 2016

1. In 2016, did you experience any impacts on your caribou hunting related to CD4 or any other Alpine Satellite Developments? _____ YES _____ NO

[If YES, complete the following table]:

In 2016, did you experience any impacts related to CD4 or Alpine Satellite…	**√ if YES**	**Mark Location on Map [POINTS ONLY] (√ if done)**	**Month**	**Please describe** **[*For helicopter and plane traffic, collect data about color of aircraft and aircraft number, if possible]**
Helicopter traffic*				
Plane traffic*				
Other traffic				
Oil company personnel				
Structures (e.g., pipelines) blocking hunter access				
Regulations				
Seismic lines or activity				
Other				

SECTION D: ADDITIONAL OBSERVATIONS ABOUT CARIBOU, 2016

1. Was there anything else abnormal about the behavior, distribution, or migration of caribou in 2016? YES _____ NO _____

1a. [IF YES], Please Explain: _____

APPENDIX B: NUIQSUT CARIBOU MONITORING INFORMED CONSENT, YEAR 9

Stephen R. Braund & Associates

P.O. Box 1480, Anchorage, Alaska 99510
907-276-8222 (Phone); 907-276-6117 (Fax)
srba@alaska.net

Nuiqsut Caribou Subsistence Monitoring Project - Year 9
November 2016

Informed Consent Form

Description of the Study

Stephen R. Braund & Associates (SRB&A) has been contracted by ConocoPhillips Alaska, Inc. (CPAI) to conduct a caribou subsistence monitoring project in Nuiqsut. In their CD4 permit from the North Slope Borough (NSB), CPAI is required to conduct a subsistence study to monitor the impacts CD4 and other Alpine satellite developments may have on Nuiqsut subsistence hunting and harvesting. The purpose of the research is to evaluate the short and long term effects of CD4 and other CPAI satellite developments on the people of Nuiqsut. It is important that this analysis relies on current and accurate subsistence information from Nuiqsut caribou hunters. This project is designed to gather relevant subsistence use information as well as residents' observations and perceptions of changes to subsistence over time. This is the eighth year of the study.

While in your community, we would like to interview knowledgeable subsistence harvesters about their caribou subsistence use between November 2015 and October 2016. We would also like to document the thoughts of Nuiqsut residents about changes in subsistence harvest and use patterns as well as impacts to caribou hunting during the study period.

Risks and Benefits of Being in the Study

This study is intended to provide current and accurate information in order to monitor the impacts of CD4 and other Alpine satellite developments on Nuiqsut caribou subsistence use. As such, any relevant information that helps avoid, minimize or mitigate environmental impacts is likely to benefit those who live in the area potentially affected by oil and gas development or use resources from the area. With any project of this kind, there is no guarantee how the information will be used in the future.

Anonymity

Your name will not be used in our study without your permission. Some people wish to be acknowledged for participating in this kind of study. Others prefer that their names are not mentioned in publications and reports. The decision is entirely up to you.

Confidentiality

Individual harvester information will remain confidential and will not be included in either the maps or report.

Voluntary Nature of the Study

Your decision to take part in the study is voluntary. You are free to choose not to take part in the study or to stop taking part at any time without any penalty to you.

Honoraria

SRB&A will pay honoraria to each participant who completes the entire interview.

Contacts and Questions

If you have questions, please contact Stephen Braund during the interview or workshop, or afterwards at 907-276-8222.

Statement of Consent

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study.

_____	_____
Signature & Date	Printed Name

APPENDIX C: HARVEST ACTIVITY AND HARVESTED RESOURCE ASSESSMENT CODES

Table C-1: Harvest Activity Assessment Codes

Numeric Code	Code Name	Notes
	How Codes	
100	Harvest More	Respondent harvested more caribou (this does not apply to respondents who used more caribou, i.e., received more caribou from relatives).
150	Take More Trips	Respondent took a higher number of caribou hunting trips compared to the previous study year.
151	Take Longer Trips	Respondent's caribou hunting trips were of a longer duration compared to the previous study year.
200	Harvest Less	Respondent harvested less caribou (this does not apply to respondents who used less caribou, e.g., received less caribou from relatives).
250	Take Fewer Trips	Respondent took a lower number of caribou hunting trips compared to the previous study year.
251	Take Shorter Trips	Respondent's caribou hunting trips were of a shorter duration compared to the previous study year.
293	Smaller Hunting Area	Respondent used a smaller overall area to hunt caribou compared to the previous study year.
294	Later Hunting Season	Respondent started hunting caribou later in the hunting season compared to the previous study year.
297	Expanded Use Area	Respondent used a larger overall area to hunt caribou compared to the previous study year.
310	Travel Farther to Harvest Resource	Respondent reported traveling a greater distance in search of caribou compared to the previous study year.
312	Change in Timing of Hunt	Respondent reported a change in the timing of their caribou hunting activities.
340	Use Area Changed	The respondent did not travel to usual caribou hunting areas.
341	Harvest Season Changed	The respondent did not hunt during a particular hunting season.
352	Utilizing New or Different Areas	Respondent traveled to new areas in search of caribou.
400	Change in Harvest Methods	Respondent used a new or different method or approach to harvest caribou
857	Resource Moved to Different Areas	The caribou was not in the respondent's usual hunting area at the usual time; this does not include observations of caribou migration being diverted.
	Why Codes	
110	Need More	Respondent had a need for caribou which necessitated harvesting more caribou, hunting at a different time of year, etc., or which was the result of not harvest enough caribou
120	Better Transportation/Equipment	Respondent reported acquiring new or improved transportation or other harvesting equipment (e.g., new snowmachine, fixed outboard motor). Often used in response to why respondent took more trips, had a change in harvesting timing, or traveled to new areas.

Numeric Code	Code Name	Notes
150	Take More Trips	Respondent took more hunting trips in study year. Often used in response to why respondent harvested or used more caribou (i.e., "I got more caribou this year because I went hunting more").
200	Harvest Less	Respondent harvested less than usual or less than the previous year. Often used in response to why a respondent did not harvest enough caribou during the study year (“I didn’t get enough because I harvested less than usual”).
210	Need Less	Respondent had less of a need for caribou, often because they had fewer people to feed, they received caribou from others, or because they harvested more of another resource. Often used in response to why respondent harvested or used less caribou.
211	Sharing Less	Respondent either shared less or commented that fewer people are sharing caribou with them. Used in response to why respondent harvested less caribou or did not have enough caribou (“I usually share with my brother’s family but they didn’t need any this year).
212	Sharing More	Respondent either shared more or commented that more people were sharing caribou with them. Often used in response to why respondent harvested more caribou or did not harvest enough caribou (i.e., "I had to harvest more caribou this year because I was hunting for another household").
220	Personal Reasons	Includes general factors related to age, illness, or personal interest. More specific personal reason codes include "Employment /Lack of Time" and "Change in subsistence providers/dependents."
250	Take Fewer Trips	Respondent took more hunting trips in study year. Often used in response to why respondent harvested or used less caribou (i.e., I couldn't go out hunting as much this year, so I didn't get as many caribou").
252	Reduced Harvest Opportunities	Respondent had fewer opportunities to harvest caribou when out hunting, or had fewer opportunities to go hunting. Often used in response to why a respondent did not harvest enough caribou during the study year (e.g., "I didn’t' harvest enough. I never saw any caribou when I was out hunting").
255	Change in Subsistence Dependents	Respondent had fewer or more people depending on them for caribou. Often used in response to why respondent harvested more or less caribou (i.e., "We harvested less caribou because our son moved away and we don't need as much").
256	Change in Subsistence Providers	Respondent had fewer or more people providing caribou for them. Often used in response to why respondent used more or less caribou (i.e. "I had less caribou because my son (main provider) moved away").
260	Employment/Lack of Time	Respondent had a high work load or had less time available to them. Often used in response to why respondent harvested less caribou, took fewer trips, or took shorter trips ("i.e., I didn't go hunting as much because I had to work").

Numeric Code	Code Name	Notes
270	Increased Cost of Living/Expenses	Respondent cited a high cost of living or increased expenses such as gas. Often used in response to why respondent took fewer trips, shorter trips, or longer trips (i.e., "I went hunting less because gas is so expensive" or "I stayed out longer because I didn't want to come home empty-handed. Gas is too expensive").
290	Lack of Transportation/Equipment	Respondent reported the loss of a transportation method or equipment. Often used in response to why respondent took fewer trips, harvested fewer caribou, or why their use area changed (i.e., "I didn't go hunting west of Nuiqsut in the fall because my four-wheeler broke down").
292	Change in Transportation Method	Respondent reported using a transportation method they had not previously used. Often used when respondent reports a different transportation method to pursue caribou (e.g., purchased a truck).
296	Mitigation Funds	Respondent cited mitigation funds (or a lack thereof) for an increase or decrease in hunting or harvesting. Often used in response to why respondent's frequency of trips changed (i.e., "I went out more last year because the mitigation funds helped with gas costs").
300	More Difficult	General term referring to increased difficulty accessing use areas or caribou. Often used in response to why respondent's harvest or duration of trips changed (i.e., "My trips are longer because it is more difficult to travel with the shallow water").
301	Worse Success	General term referring to poor harvesting success. Often used in response to why respondent did not harvest enough or harvested less (e.g., "I had poor success this year" or "I never got lucky this year").
310	Travel Farther to Harvest Resource	Respondent traveled farther than usual to local or harvest caribou. Often used in response to why respondent took longer trips (i.e., "I stayed out longer because we had to go farther to find caribou").
311	Harvest Resource Closer to Community	Caribou were harvested closer to the community than usual. Often used in response to why respondent's area or duration of trips changed (i.e., "I take shorter trips because the caribou are closer to the community").
321	Competition with Sport Hunters	Respondent cited increased sport hunting competition in relation to their own harvest success. Often used in response to why respondents harvested less caribou or took more trips.
351	Better Success	General term referring to improved harvesting success. Often used in response to why respondent harvested more caribou (e.g., "I was more successful this year").
500	Climate	Respondent cited climate-related changes or conditions which affected harvesting activities. Often used in response to why respondents' use area or month changed without specific reference to the changes in climate or environment (e.g., shallow rivers, less rain)
501	Less Snow	Respondents cited a lack of snow. Often used in response to why respondent's use area, transportation method, or frequency of trips has changed due to lack of snow

Numeric Code	Code Name	Notes
503	Shallower Rivers/Lakes	Respondent cited shallower rivers and lakes for a change in harvest activity. Often used in response to why respondents' use area changed (i.e., "We didn't hunt up Anaktuvuk River this year because it was too shallow").
505	Climate Affecting Travel	Respondent cited climate-related changes or conditions specifically affecting their ability to travel to use areas. Often used in response to why respondents' use area changed (i.e., "We didn't hunt up Anaktuvuk River this year because it was too shallow").
508	Wind	Respondent cited unusual wind strengths or conditions which affect travel or other harvesting conditions. Often used in response to why respondents' use area changed (i.e., "We didn't go to Fish Creek this year because the wind was blowing and the ocean was too rough").
518	More Rain	Respondent cited high rain levels in study year. Often used in response to why respondent's harvest or duration has changed due to greater amounts of rain than usual
523	Rain	Respondent cited rainy conditions in general, which is often used in response to why respondent's duration has changed ("We didn't do as much camping as usual because of the rain").
526	Water Quality	Respondent cited a change in water quality or condition (e.g., higher or murkier waters). Often used in response to why respondent's harvest area has changed due to changing water quality conditions.
530	Harsh Winter	Respondent cited a particularly harsh winter. Often used in response to why respondents' months changed due to cold winter weather or a decreased frequency of trips.
531	Climate Affecting Harvest	Respondent cited changes in weather or climate change for affecting their harvesting activities or harvest success (e.g., It's really weird—right now it should be cold, but it's raining and it's foggy. They [caribou] are confused because of the weather").
532	Weather	Respondent cited weather conditions in general as affecting harvesting activities. Often used in response to why respondent's use area changed (i.e., "I didn't go upriver this year. It was too hot up there and there were too many mosquitoes").
599	Disturbance	Respondent cited disturbance as a general response to why their area had changed or they took fewer trips, without further specifying the type of disturbance (e.g., "I went out less last year. Just all the disturbance").
600	Traffic Disturbance	Various development-related impact sources, which are used in response to why respondent took more trips, harvested less caribou, or did not harvest enough caribou (i.e., "I harvested less caribou because of air traffic/development/oil drilling/pipelines"). This code is used when the respondent does not elaborate on how the activity affected their subsistence uses (i.e., "I harvested less caribou because the caribou were diverted by the pipeline").
601	Off Road Vehicles Disturbance	

Numeric Code	Code Name	Notes
602	Helicopter Traffic Disturbance	
603	Airplane Traffic Disturbance	
650	Development	
659	Oil Drilling	
661	Pipeline	
662	Ice Roads	
663	Contamination from Air Pollution	
664	Oil Field Infrastructure	
700	Sport Hunting and Fishing	Respondent cited the presence of sport hunting and fishing as affecting harvesting activities in general. Often used in response to respondent harvesting less caribou due to sport hunting activity without specifying whether the activity is disturbing migration or leading to overharvesting (see codes 701 and 704).
701	Sport Hunting Methods Disturbing Migration Routes	Respondent cited the presence of sport hunting and fishing as specifically affecting caribou migration. Often used to describe a diversion of caribou migration specifically attributed to sport hunting activity, including associated hunting pressure, airplane traffic, and hunting methods (e.g., "The hunters along the Dalton Highway are really diverting the caribou from our community so we're harvesting less.").
704	Overharvesting by Sport Hunters/Fishermen	Respondent cited a decrease in caribou availability or population related to sport hunting. Often used in response to respondent harvesting less caribou and specifies sport hunters as the cause (i.e., "I harvested less this year because there are just too many sport hunters on the Dalton Highway").
713	River Channel Changed	Respondent cited a change in river channels affecting harvesting activities. Often used in response to why respondent's harvest area changed due to changes in river channels
718	Fewer Males	Respondent cited a decrease in harvests due to fewer harvestable males during the hunting season (e.g., "I harvested less – there were no bulls around, only females with calves").
802	Decrease in Species Number	Respondent cited an overall decrease in caribou as affecting harvesting activities. Often used in response to respondent harvesting less caribou because overall population levels have declined (i.e., "I harvested less because the herd population is down and there are fewer around").

Numeric Code	Code Name	Notes
806	Resource Availability	Respondent cited either a general increase or decrease in the availability of caribou within their use area. A general response to any change in harvest activities (i.e., "I harvested less because I couldn't find any caribou").
808	Skittish Behavior in Species	Respondent cited skittish behavior in caribou affecting harvesting activities. Often used in response to respondent harvesting less caribou (i.e., "I harvested less caribou; the caribou were moving around a lot and staying inland because of the helicopter traffic").
809	Predators	Respondent cited the presence of predators in general. Often used in response to respondent harvesting less caribou (i.e. "I harvested less caribou because there are more wolves killing them").
812	Resource in Smaller Groups	Respondent noted that caribou were scattered, affecting their harvesting activities ("I went hunting less because there weren't many caribou around – they were out there, but just here and there. They don't come in the big herds anymore").
816	Decrease in Predators	Respondent noted an decrease in predators in the area which is affecting harvesting activities. Often used in response to respondent harvesting more caribou (i.e. "I harvested more caribou this year – a lot of people have been hunting wolves this year, so the caribou are around").
818	Increase in Predators	Respondent noted an increase in predators in the area which is affecting harvesting activities. Often used in response to respondent harvesting less caribou (i.e. "I harvested less caribou because there are more wolves killing them") or more caribou (i.e., "There were more caribou around because the wolves are pushing them into our area").
823	Contamination	Respondent believes caribou are less available in their hunting area due to contamination from development or other activities (e.g., "The caribou haven't been around; they can sense the pollution from all the activities—they don't want to eat that").
850	Migration Changed or Diverted	Respondent indicated that the caribou migration has changed or been diverted and is thus affecting harvesting activities; usually attributed to human activities or man-made infrastructure (i.e., "I didn't harvest any caribou because all the air traffic diverted them south of the community").
851	Farther from Village	Respondent noted the caribou were farther from the community than usual. Often used to describe an animal being farther from the community than respondent is accustomed to; specific to the resource's distance from the community.
852	Closer to Community	Respondent noted the caribou were closer to the community. Often used to describe an animal being closer to the community than respondent is accustomed to; specific to the resource's proximity to the community.
853	Earlier Migration/Arrival	Respondent noted an earlier seasonal migration of caribou into the area. Used in response to respondent harvesting less caribou (i.e., "I harvested less this year; I usually harvest some in October, but they came through earlier than usual and I missed them").
854	Later Migration/Arrival	Respondent noted a later arrival or migration of caribou into the area. Used in response to respondent harvesting less caribou or months changed (i.e., "I had to go out in October this year – I usually get them in September but they got here later than usual").

Numeric Code	Code Name	Notes
856	Change in Food Availability	Respondent reported a change in the availability or type of food caribou eat. Used to describe an animal moving to another area in search of better feeding grounds (i.e., "the caribou overgrazed the area and moved west to find better feeding").
857	Move to Different Areas	Used to describe caribou moving to different areas within the study year.
859	Hunting Pressure	Respondent noted a general increase in hunting pressure on caribou. Often used in response to respondent harvesting less caribou without specifying a specific group of harvesters such as sport hunters (i.e., “I harvested less this year because there are just too many people hunting”).
865	Change in Distribution/Migration	General change in the distribution or migration of caribou in the area. Often used to describe respondents' general observation that caribou were not in the area, either through a change in distribution or migration.
866	Closer to Shore	Used to describe an animal being closer to coastline than respondent is accustomed; specific to marine environments.
867	Farther from Shore	Used to describe an animal being farther from coastline than respondent is accustomed; specific to marine environments.
869	Timing of Migration	Respondent noted a general change in the timing of the caribou migration. Often used in response to respondent experiencing a change in caribou harvest amount without specifying whether the migration was later or earlier (see codes 853 and 854).
870	Moved into Area	Used in response to respondent harvest more caribou (i.e., "We got more this year; there were more caribou in the area this year.")
871	Moved out of Area	Used in response to respondent harvesting less caribou (i.e., "I didn't harvest as much caribou this year; there weren't any caribou around).
872	Farther from Riversides/Farther Inland	Respondent indicated that the caribou were farther inland or farther away from riversides. Often used to describe caribou being less available along riversides, usually due to disturbance from boat or air traffic.
873	Concern of Disease/Infection	Respondent cited a general concern about the health of the caribou. Used in response to respondent harvesting less caribou (i.e., “I heard there was a disease in the caribou, so I didn’t harvester as many this year).
900	Miscellaneous	Used when respondent’s response does not fit into the categories described above
998	I Do Not Know	Used when a respondent states "I don't know."
999	Not Ascertained	Used when the researcher did not obtain a response to the question.

Table C-2: Harvested Resource Assessment Codes

Numeric Code	Code Name	Notes
	How Change	
814	Increase in Resource Size	Includes overall size (e.g., larger than usual animals) or fat content
815	Decrease in Resource Size	Includes overall size (e.g., smaller bulls) or fat content
820	New Species in Region	The respondent observed or harvested a type of caribou not previously seen or rarely seen (e.g., "Mountain caribou," reindeer)
825	Abnormal Resource Death	Used when a respondent reports death of a caribou for unusual or unexplained reasons
829	Physical Abnormalities	Deformity the resource was born with
830	Change in Texture of Meat	Includes color of meat
831	Disease/Infection	Includes cysts, nodules, pus on insides, etc. Something that the resource contracted.
833	Less Fat	Reduced fat content on caribou. More commonly entered as Decrease in Resource Size (815).
842	Change in Smell of Meat	Respondent harvested a caribou with unusual-smelling meat.
845	Change in Resource Quality	Respondent harvested a caribou that was of lesser quality than usual (e.g., "One of the caribou didn't have much flavor like they usually do").
846	Resource Appears Unhealthy	Respondent harvested a caribou that appeared sick or unhealthy without further description of the cause of the sickness
849	Fur Less Thick	Respondent harvested caribou with thin or patchy fur
876	More Parasites	Respondent observed more parasites than usual in harvested caribou.
877	Fewer Parasites	Respondent observed fewer parasites than usual in harvested caribou.
879	Injured Resource	Respondent observed a caribou with sustained injuries such as wounds from a predator attack or bullet wound
901	Taste	Respondent reported harvested caribou had a different or abnormal taste
	Why Change	
509	Warmer Temperatures	In response to why there is a decrease in caribou size (e.g., "They were skinny; maybe it was too hot").
521	Wildfires	In response to why there is a new species in region.
527	Global Warming	Respondent attributed a change in the health or quality of caribou to global warming.
603	Airplane Traffic Disturbance	In response to why there is a decrease in caribou size (i.e., "The caribou are running around a lot because of the airplanes").

605	Air Traffic	In response to why there is a decrease in caribou size (i.e., "The caribou are running around a lot because of the airplanes").
654	Human Waste/Pollution	Used when a respondent specifically cites general pollution or human waste as the cause of a caribou abnormality.
656	Oil Spill Contamination	Used when a respondent specifically cites contamination from oil spills as the cause of a caribou abnormality.
663	Contamination from Air Pollution	Used when a respondent specifically cites air pollution, usually related to oil development, as the cause of a caribou abnormality.
809	Predators	Respondent cited predators as the cause of a caribou abnormality (e.g., “Its leg was injured – I think it had been attacked by a wolf”).
812	Resource in Smaller Groups	Used to describe caribou being more sparsely populated and distributed into smaller groups rather than one large herd.
823	Contamination	Used when a respondent cites contamination in general as a cause of an abnormality in caribou.
831	Disease/Infection	Used when a respondent cites disease/infection as the cause of the abnormality (e.g., "This caribou had a lot of parasites, I think because it was sick").
832	Parasites	Used when a respondent believes that parasites are the cause of the abnormality (e.g., sick or diseased looking caribou)
841	Resource Injury	Used when a perceived abnormality is caused by the resource being wounded previously by a bullet or predator.
876	More Parasites	Used when a respondent believes that parasites are the cause of the abnormality (e.g., sick or diseased looking caribou)
879	Reindeer	Used as an explanation for an abnormality in caribou (i.e., "That caribou was much smaller than usual. I think it was a reindeer").
908	Natural Causes	Used when the respondent indicates that the cause of the abnormality is natural (i.e., "There were a lot of flies under the skin, more than I've ever seen. I think it was because of the time of year").
998	I Do Not Know	Used when a respondent states "I don't know."
999	Not Ascertained	Used when the researcher did not obtain a response to the question.