

**Nuiqsut Caribou Subsistence Monitoring Project:
Years 1 through 10 (2008-2017) Final Report**

Prepared for
ConocoPhillips Alaska, Inc.

October 31, 2019

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EXECUTIVE SUMMARY

This Year 10 report presents the 10th 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). In addition, this report provides a synthesis of the 10 years of the monitoring study in addition to a discussion of changes in caribou hunting activities over time. 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 10 study period included ongoing production at CD1, CD2, CD3, CD4, and CD5; completion of the CD5 to GMT1 road; continued construction of GMT1; and seismic activity 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 10th annual report is based primarily on hunter observations and a comprehensive household caribou harvest survey in addition to the incorporation of historic data for comparative purposes.

In November of 2017, SRB&A interviewed 68 active harvesters regarding their caribou hunting activities over the previous 12 months (November 2016 to October 2017). SRB&A also conducted a caribou harvest survey in Year 10 in March 2018.

Data from the Year 10 active harvester interviews complement similar data on hunting activities collected for Year 1 (2008), Year 2 (2009), Year 3 (2010), Year 4 (2011), Year 5 (2012), Year 6 (2013), Year 7 (2014), Year 8 (2015), and Year 9 (2016). In addition, Year 10 household harvest survey data complement caribou harvest data collected by SRB&A for Year 3 (2010), Year 4 (2011), Year 5 (2012), Year 6 (2013), Year 8 (2015), Year 9 (2016); 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 233 caribou subsistence use areas and 190 caribou harvest locations for the Year 10 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, CD5 road, and GMT1 road. The extent of riverine travel in Year 10 was relatively similar to previous study years but with decreased use of the upper Colville River. The overall extent of overland travel in Year 10 was similar to many previous years. The concentration of harvests in Year 10 were similar to recent years (Years 6 through 9) in that fewer areas of concentrated harvests occurred along Nigliq Channel, with the exception of the camp at *Nigliq*; despite the continued decrease in concentrated harvests, Nigliq Channel saw an increase in the percentage of harvests occurring in that area in Year 10. Fewer areas of harvest density occur along the East Channel in Year 10 when compared to previous years. In Year 10, harvests were most concentrated at Nigliq camp on the Nigliq Channel, along the road system north and northwest of the community and along the lower Itkillik River. Year 10 followed a trend, beginning in Year 8, of increasing activity along the road system.

While certain hunting characteristics (e.g., trip frequency, duration, and travel method) have remained similar over the 10 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 10, 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 of harvests when compared to all previous years except Year 9. 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 70 percent of Year 10 use areas accessed by boat. Snowmachine use was at its lowest in Years 9 and 10 (six percent of use areas), while truck use was at its highest (14 percent and 11 percent of use areas, respectively), 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 10, 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 10 harvest success in terms of the percentage of successful hunting areas was within the range of previous years, with respondents reporting successful harvests at 57 percent of hunting areas, compared to between 53 percent and 78 percent in previous years.

Caribou harvest amounts have remained relatively stable over time, with Year 10 harvests within the mid-range of the previous five years. In 2017, the community of Nuiqsut harvested an estimated 635 caribou, substantially higher than in 2016 (481 caribou) but within the range of all previous study years (between 258 and 774 caribou). Household uses of caribou were similar to previous years, with 96 percent of households using caribou, and 72 percent of households attempting harvests of caribou. The difference between the percentage of households attempting to harvest (72 percent) and successfully harvesting caribou (60 percent) was on the high end of previous years (12 percentage points). The percentage of successful households in 2017 (60 percent) was the lowest since 2011.

During Year 10, of the 11 pre-defined hunting areas, the area "West of Nuiqsut" accounted for the highest portion (30 percent) of caribou harvested, within the range of previous years. The Nigliq Channel area was the only other area contributing more than 15 percent of the harvest in Year 10, at 17 percent, which was higher than the previous several years which had seen a decline in Nigliq Channel harvests. Itkillik River showed a higher percentage of harvests than any previous study year, at 15 percent; in addition, the "Other" area accounted for a greater percentage of the harvest than previous years, at nine percent. The East Channel Colville area provided a lower percentage of the harvest compared to previous years, at four percent. Several Colville River areas upriver from the community continued to provide between two and 15 percent of the harvest, similar to previous years.

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 and duration in Year 10 were higher than previous years, while other categories (frequency, months, harvest amount) remained within the range of previous years. In Year 10, 41 percent of respondents indicated that they did not harvest enough caribou, an increase from the previous three years. This is consistent with the somewhat lower percentage of successful households in Year 10, despite relatively high overall harvests.

The total number of caribou with abnormalities in Year 10 was within the range of previous study years. The percentage of respondents observing caribou abnormalities in Year 10, at 29 percent, was higher than the previous several years. Health problems were the primary type of observation in caribou in Year 10, followed by abnormal size. Disease/Infection was the most commonly reported type of abnormality by active harvesters, followed by Decrease in Resource Size.

In Year 10, 51 percent of respondents reported one or more perceived Alpine-related impacts on their caribou hunting, higher than the previous three years but within the range of all years. While helicopter traffic was the most commonly reported Alpine-related impact during Years 1 through 8, in Year 9 helicopter traffic was tied with man-made structures for the most reported impact, and in Year 10 helicopter traffic was surpassed by man-made structures as the most commonly reported impact (22 percent versus 29

percent of observations). These impacts were followed by other traffic (e.g., trucks), plane traffic, and seismic activity. While impact reports were on the high end during the active harvester interviews, household harvest surveys showed a similar percentage of households reporting impacts in Year 10 (29 percent), compared to previous study years (between 21 and 44 percent).

Seventy-five percent of respondents indicated that they no longer hunted in or generally avoided certain areas they previously used, an increase from previous years; however, the number of avoidance observations attributed to development causes was within the range of previous study years. A higher number of avoidance observations were attributed to a change (primarily a decrease) in resource availability in previously used areas. The East Channel, Alpine/Alpine Satellites, Fish Creek, and Nigliq Channel areas were the most frequently mentioned, primarily for reasons related to decreased resource availability, development infrastructure, and development activities. The East Channel had a higher number of avoidance reports compared to previous years, with individuals citing reduced caribou availability in addition to development infrastructure and activities. Avoidance of the East Channel is consistent with a decline in the contribution of that area toward the total harvest and few areas of high harvest density in Year 10.

Analyses and syntheses of the 10 years of monitoring data in addition to other existing data on caribou hunting activities indicate changes in hunting patterns over time. Most notably, while larger shifts are evident in response to the Prudhoe Bay development, shifts in use around the Alpine and Alpine Satellites Development appear to be on a smaller scale and affect individual hunters through reported avoidance behaviors. Decreased use of the middle Colville Delta immediately surrounding the Alpine and Alpine Satellites developments is evident, in addition to decreased use of the Nigliq Channel. The data indicate decreased use of other traditional hunting areas such as Fish Creek and the Coastal West area, primarily resulting from environmental changes but also, in the case of Fish Creek, due to increased development activity in that vicinity. In contrast, introduction of roads into the community's hunting area west of the community has resulted in increased use of that area, particularly among hunters who do not have access to non-road modes of transportation. Recent data show caribou hunting activities more concentrated into the summer months, with lesser activity in the winter, although recent years have shown a slight increase in winter harvests related to increased road access; in addition, use of snowmachines has decreased while use of four-wheelers and trucks has increased. Community harvests of caribou remain high, despite evidence of a decrease in hunting success based on certain measures related to harvest effort. The majority of caribou harvests occur among the top third of harvesting households. Over the 10 years of the monitoring study, 75 percent of Nuiqsut harvester respondents have reported at least one impact on their caribou hunting associated with the Alpine/Alpine Satellites developments. As development has expanded over the 10 study years, there has not been a notable increase in the number of individuals experiencing direct impacts, although the nature of such impacts has changed over time; while helicopter traffic has been the primary source of impacts across study years, in Year 10 man-made structures (e.g., roads) became the most reported source of impacts by Nuiqsut caribou harvesters.

ACKNOWLEDGEMENTS

Stephen R. Braund & Associates (SRB&A) would like to thank the community of Nuiqsut for their cooperation and assistance in completing 10 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. The Nuiqsut Caribou Panel has been instrumental to the success of this project, assisting with the development of the monitoring plan, identifying active caribou harvesters to interview, reviewing results of the monitoring program, and making suggestions to improve the program. Thank you to the members of the Nuiqsut Caribou Panel for their patience, wisdom, and support throughout the study. We would also like to thank the North Slope Borough Department of Wildlife Management for supporting the project and providing valuable feedback and ConocoPhillips Alaska, Inc. (COP) for providing funding and logistical support. Finally, SRB&A would like to thank the 72 Nuiqsut caribou hunters and elders who provided us with the information for Year 10 of this study, and the 157 Nuiqsut residents who have participated in the 10 years of this study.

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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 10 study period included ongoing production at CD1, CD2, CD3, CD4, and CD5; completion of the CD5 to GMT1 road; continued construction of GMT1; and seismic exploration 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 10th annual report is based primarily on hunter observations and household surveys in addition to existing use area and harvest information.

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 (including Iñupiaq place names) and oil and gas infrastructure in the study area.

METHODS

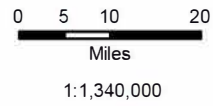
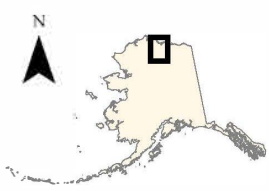
In 2009, SRB&A initiated a program to gather yearly information from local Nuiqsut residents about caribou hunting and harvest activities, observations about harvested caribou, changes in caribou, and impacts on caribou hunting. These data are gathered on a yearly basis in order to monitor impacts on caribou hunting related to CD4 and other Alpine satellite developments over time. This section of the report describes the methods used during Year 10 to design and implement the study. Year 10 active harvester interviews gathered information for harvesting activity between November 2016 and October 2017 and household harvest surveys gathered information for the 2017 calendar year (January to December 2017). Interviews, surveys, and meetings (including the NSB meeting in Utqiagvik [formerly Barrow]) for Year 10 took place between November 2017 and March 2019. Thus, the methods describe 2017 and 2018 monitoring program activities, while the results and discussion describe caribou harvest amounts, hunting activities, and impacts for the Year 10 study period (spanning from November 2016 to December 2017). In addition to reporting the results of Year 10 fieldwork, this report provides a synthesis of all 10 years of data, in addition to the incorporation of new data sets and analyses.

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 10 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 10, 2017 to discuss the previous hunting season, review draft results from the previous study year, and discuss upcoming fieldwork. The November 10 meeting was attended by seven panel members and three SRB&A staff members who were in Nuiqsut to conduct Year 10 active harvester interviews. The following is a summary of issues raised during the meeting:

- Panel members reported issues with the CD5-GMT1 road, indicating that it is too high, difficult to cross, and that caribou are staying on the other (north) side of the road or diverting around it. The panel indicated that residents are having to use the road to access the caribou, which are farther to the west and north of the community.
- Despite the presence of ramps along the road to facilitate crossing, panel members indicated that some individuals still have trouble using the ramps, especially if they are hauling a trailer, and the ramps are not always in a location convenient to hunters¹.
- Panel members reported a continued decrease in helicopter-related impacts but expressed frustration with continued plane traffic despite the construction of roads.
- Panel members reported continued impacts from jet boats in the Colville Delta. One panel member who stayed at Nigliq for most of the summer reported seeing only two caribou while there.
- Regarding the previous harvest season, panel members generally indicated that it had been a low harvest year and noted a higher incidence of sick caribou in Year 10.

¹ Since the November 2017 meeting, CPAI worked with the community to make improvements to the ramps



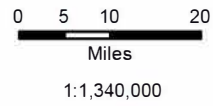
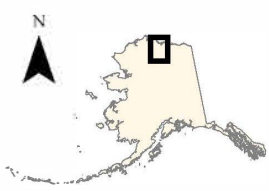
Map 1 - Nuiqsut Overview and Placenames

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 68 active harvesters in November 2017.

Local Placename

National Petroleum Reserve Alaska

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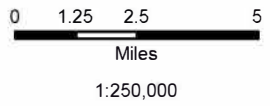
Map 2 - Nuiqsut Overview and Surrounding Infrastructure

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 68 active harvesters in November 2017.

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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 68 active harvesters in November of 2017.

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ConocoPhillips Alaska, Inc. (COP) Infrastructure

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

- Caribou did not approach East Channel in usual numbers – they were staying by Milne Point – possibly due to increased air traffic along the coast coming out of Helmericks
- Panel members asked about the future of the caribou monitoring project and indicated a need for continued monitoring due to the continuing expansion of oil and gas development to the west and south of the community. They believed the issue should be brought up at the Year 10 community review meeting.
- A primary concern voiced during the meeting was related to the continuing expansion of oil and gas development on the North Slope—in particular, panel members expressed concern that the entire National Petroleum Reserve-Alaska (NPR) area will be opened to oil and gas development, in addition to the Alaska National Wildlife Refuge (ANWR).

A subsequent meeting was held with the Nuiqsut Caribou Panel in May 2018 to review the results of the Year 9 report. Panel members made additional comments at that meeting pertaining to the monitoring study as a whole and recommendations for the future, which will be summarized in a forthcoming study plan for future monitoring research.

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 subsequent years.

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.—Environmental Research & Services [ABR]) 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, Year 9, and Year 10 reports)
- Incorporation of traditional knowledge about caribou from additional sources. (see Year 5, Year 9, and Year 10 reports)

Field protocols and maps for the active harvester interviews and household surveys were developed during previous study years. The study team updated the active harvester protocol for Year 10 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 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 10 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 10 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 10)
- 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

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 10:

- Abnormal health (e.g., disease/infection/color of meat)
- Abnormal quality (e.g., taste, smell)
- Abnormal size (e.g., fat content or overall size)
- 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 10 related to CD4 or other Alpine Satellite developments. If respondents indicated that they had experienced impacts in Year 10, 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 10) (see SRB&A 2010a-2018 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 through 10, the study team resumed implementation of the annual household caribou harvest survey.

The Year 10 household caribou harvest surveys addressed the 2017 calendar year (January 2017 through December 2017) and consisted of eight questions regarding caribou harvests during the Year 10 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 2017?
- 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 2017 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 March 2018. Surveys were conducted in person in the community.

Respondent Selection Process

Active Harvester Interviews

In order to collect accurate data for the Year 10 caribou hunting season, it was necessary to interview currently active caribou harvesters. The study team attempted contact with Year 1 through Year 9 respondents with the goal of achieving consistency between study years. As anticipated, not all Year 1 through Year 9 respondents were available to participate in Year 10 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.” These observations are sometimes 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 10 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 obtained an updated household list from the City of Nuiqsut in November 2017, and 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 112 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 (2017), 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 112 residences initially identified by the study team, eight 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 104 total households eligible for the survey. The final household list (104 households) that was developed by SRB&A included all households that were permanently occupied during the 2017 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 once to conduct Year 10 active harvester interviews in November 2017. The study team conducted a higher-than-usual number of interviews in November. While study team members were prepared to conduct additional interviews when in Nuiqsut for the household harvest surveys, the focus was on completing the household surveys and the study team was unable to successfully arrange additional active harvester interviews while in Nuiqsut. As shown in Table 1, SRB&A researchers interviewed 72 Nuiqsut residents, 68 of who were active harvesters (four were elders are other knowledgeable individuals who are not currently active but provided traditional knowledge). Over the nine study years, SRB&A has developed a list of 132 active caribou harvesters in Nuiqsut (Table 1), which include all residents interviewed and/or identified as active harvesters during Years 1 through 10. 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. In addition, some previous participants have moved out of the community or are deceased. 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: Fieldwork Summary, Year 10

# of Permanent Occupied Households (2017)¹	Population (2017)²	# of Persons Identified as Active Caribou Harvesters	# of Persons Eligible for Interviews³	# (%) of Eligible Respondents Interviewed	Number of Interview Workshops	Number of Interview Trips to Community
104	454	132	129	63 (53%)	60	1
¹ Based on eligible households identified during the Year 10 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 10 household harvest surveys. Does not include estimates for schoolteacher housing, NSB housing, or other non-permanent households.						
³ Based on information available to the study team. Eligible respondents are those who actively hunted for caribou during the study period. Hunting status is not obtained for all active harvesters on the study team's list each year.						

Stephen R. Braund & Associates, 2019.

Table 2 depicts the number of persons eligible for interviews in Year 10. A person was not eligible for an interview if he or she did not go caribou hunting during Year 10, 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 132 active harvesters, 129 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. 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. Others had been added to the list through their participation in Years 9 and/or 10 of the study.

Table 2: Respondent Summary, Years 1–10

Respondent	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Number of Active Harvester Respondents	36	53	57	58	57	57	60	58	63	68
Number of Respondents also Interviewed in Year 10	16 (44%)	17 (42%)	21 (46%)	23 (50%)	26 (49%)	24 (54%)	31 (55%)	31 (62%)	39 (62%)	-

Stephen R. Braund & Associates, 2019.

The study team attempted to interview respondents from previous study years again in Year 10, with a focus on respondents who have participated in multiple study years or have been highly recommended as active harvesters. SRB&A interviewed 68 individuals, or 53 percent of those eligible for interviews (Table 1). As shown in Table 2, during each previous study year, between 42 percent and 62 percent of respondents also participated in Year 10. These percentages were slightly higher than in Year 9 (which ranged from 32 to 54 percent) (SRB&A 2017).

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 10 respondents. During all 10 study years, a majority of respondents were born on the North Slope (Table 3). The percentage of Year 10 respondents born in Nuiqsut was within the range of the previous nine study years; the percentage of Year 10 respondents born elsewhere in Alaska (e.g., Anchorage, Fairbanks) was somewhat higher than previous years (21 percent compared to between seven and 13 percent in previous 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 Birth², Years 1-10

Residence	Percent of Active Harvester Respondents									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Nuiqsut	25%	40%	32%	41%	44%	47%	44%	40%	52%	43%
Other North Slope Community	64%	46%	51%	48%	42%	42%	44%	48%	34%	37%
Elsewhere in Alaska	8%	10%	14%	9%	11%	11%	12%	10%	13%	19%
Outside Alaska	3%	4%	4%	2%	4%	0%	0%	2%	0%	3%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Respondents	34	52	56	54	53	50	58	56	59	67

Stephen R. Braund & Associates, 2019.

² 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.

Table 4: Decade Born, Years 1-10

Decade	Percent of Respondents									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
1940s	6%	10%	0%	2%	2%	4%	2%	2%	3%	1%
1950s	17%	12%	16%	10%	16%	11%	14%	14%	15%	13%
1960s	33%	19%	26%	19%	19%	22%	24%	26%	19%	25%
1970s	19%	15%	16%	16%	11%	9%	8%	12%	5%	6%
1980s	22%	31%	25%	33%	32%	35%	24%	31%	37%	29%
1990s	3%	13%	18%	21%	19%	18%	25%	16%	21%	25%
2000s	0%	0%	0%	0%	2%	2%	3%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Respondents	34	52	55	56	53	50	59	58	61	67

Stephen R. Braund & Associates, 2019.

Table 5: Years of Residence in Nuiqsut, Years 1-10

Years of Residence	Percent of Respondents									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
5 years or less	3%	2%	2%	0%	0%	2%	0%	4%	0%	3%
6-10 years	3%	6%	5%	2%	2%	4%	7%	2%	3%	1%
11-19 years	12%	19%	16%	25%	23%	20%	14%	15%	14%	16%
20 plus years	82%	73%	77%	73%	75%	75%	79%	80%	83%	79%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Respondents	34	52	56	55	53	51	58	55	59	68

Stephen R. Braund & Associates, 2019.

Table 6: Respondent Gender, Years 1-10

Gender	Percent of Respondents									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Male	97%	92%	96%	95%	95%	86	90%	88%	71%	69%
Female	3%	8%	4%	5%	5%	14%	10%	12%	29%	31%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Respondents	36	53	57	58	55	52	60	58	63	68

Stephen R. Braund & Associates, 2019.

The distribution of decades in which respondents were born remained fairly consistent in Year 10 compared to previous years with the percentage of Year 10 respondents born in the 1940s and 1950s on the low end (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). The majority of active harvester respondents have been male for all study years, although the study team has interviewed an increasing number of females in recent years, with a peak in female participation in Years 9 and 10 (27 and 31 percent, respectively) (Table 6).

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 2017 year by Nuiqsut residents and were still occupied during the period in which the survey was implemented. SRB&A acquired an updated list for 2017 of 117 occupied households (not including teacher and itinerant housing) from the City of Nuiqsut. Out of the 117 residences on the household list for Year 10, 12 households were either unoccupied or out of town for an extended period of time, or were occupied by seasonal workers. Another household was ineligible for other reasons (household member not able to answer questions). Therefore, the total number of eligible households for the Year 10 household surveys was 104.

The study team generally aims to achieve a response rate of 80 percent 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 82 (79 percent) household surveys in the community of Nuiqsut (Table 7).

Table 7: Nuiqsut List of Occupied Households, 2017

Type of Household	Number of Households
Original Household List	117
Unoccupied or empty at time of survey	12
Not eligible for other reasons	1
Total Eligible Households	104
Surveyed Households (Percent of Eligible Households)	82 (79%)

Stephen R. Braund & Associates, 2019.

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 10 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 1-10

Nuiqsut Dataset Component	Number of Records									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Active harvester respondent characteristics (age, residence duration, place of birth)	36	53	57	58	57	57	60	58	63	68
Subsistence use areas	137	187	215	194	211	196	206	153	195	233
Harvest locations	182	152	196	162	195	143	248	173	163	190
Observations of changes in harvest patterns	36	53	57	58	56	57	57	58	63	68
Observations of changes in condition of caribou	87	67	71	68	83	51	67	72	67	74
Impacts on harvest activities	111	109	81	72	102	107	87	83	84	105
Number of Active Harvester Respondents	36	53	57	58	57	57	60	58	63	68

Stephen R. Braund & Associates, 2019.

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 233 Year 10 use areas and 190 Year 10 harvest locations (Table 8). 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.

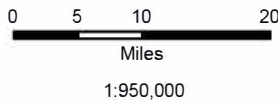
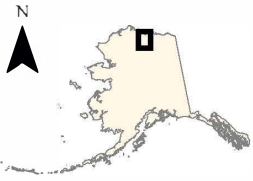
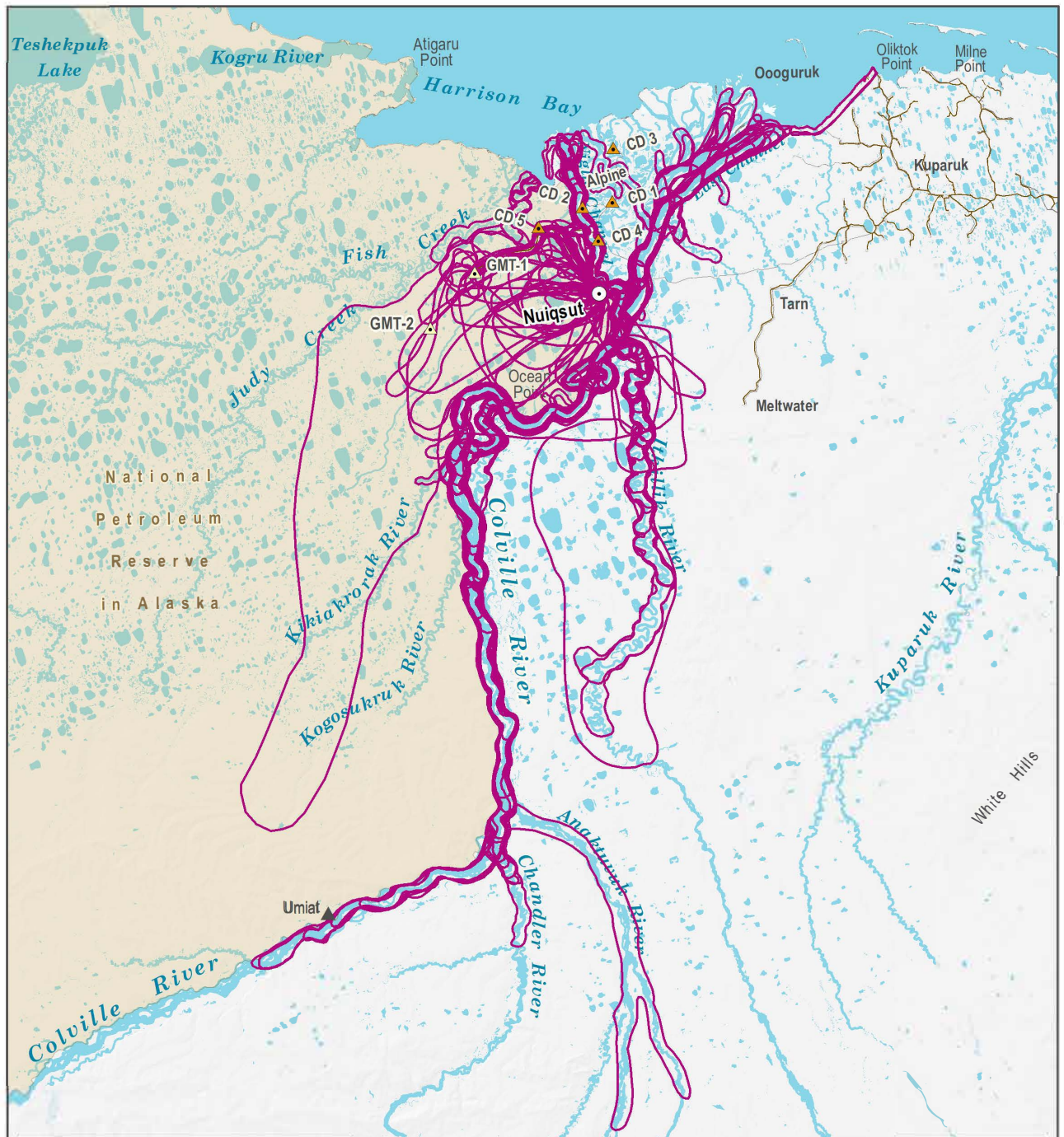
GIS File Preparation

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 10 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 (104) by the number of interviewed households (82). The study team operated under the assumption that the 22 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 Utkiaġvik 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).



Map 4 - Spaghetti Example: Caribou Subsistence Use Areas, Year 10

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 68 active harvesters in November 2017.

Other areas may have been used for resource harvesting.

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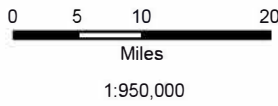
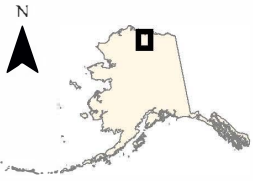
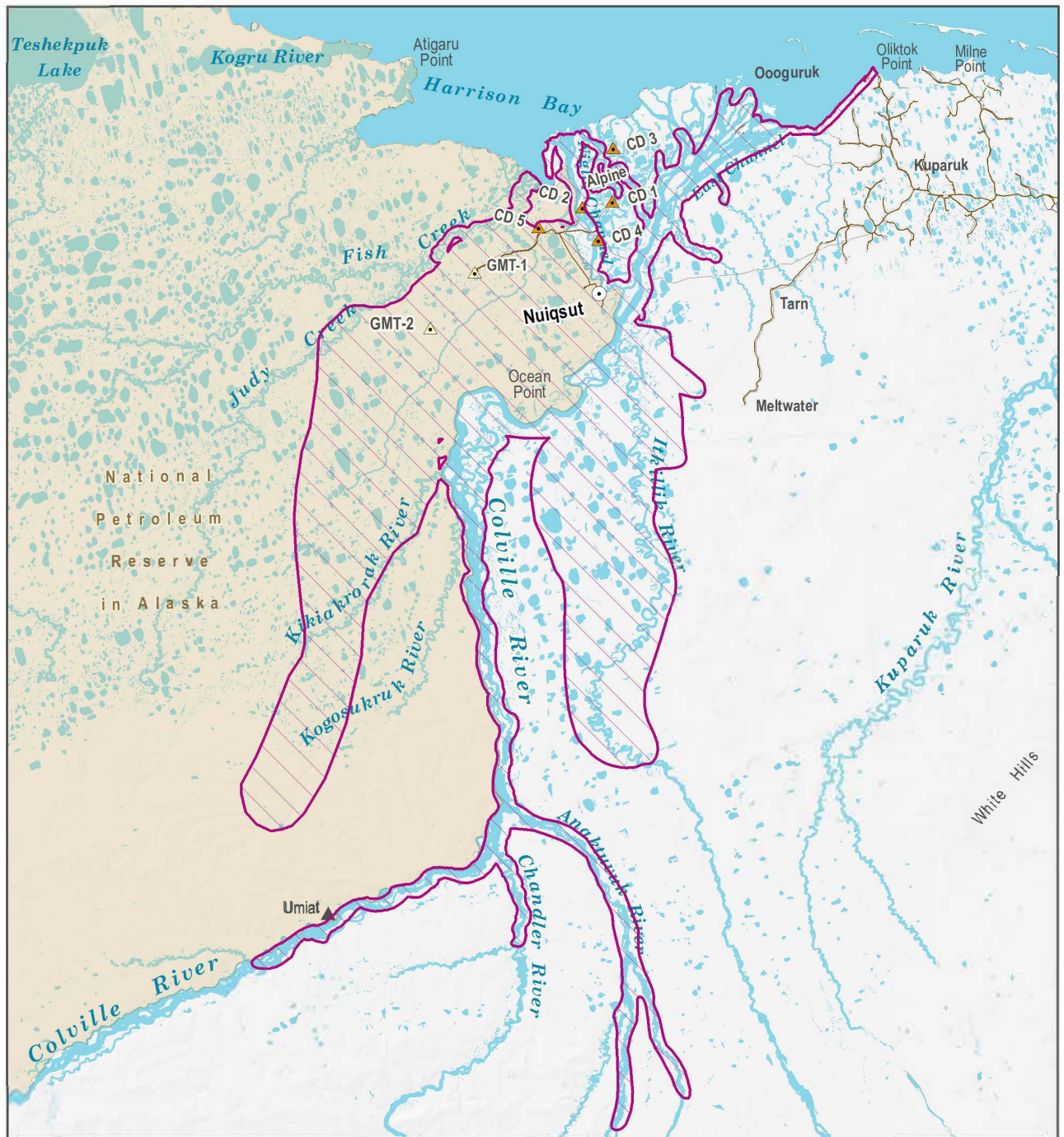
Year 10: November 2016 - October 2017



233 caribou areas used by 68 respondents



National Petroleum Reserve Alaska



**Map 5 - Dissolved Polygon Example:
Caribou Subsistence Use Areas, Year 10**

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 68 active harvesters in November 2017.

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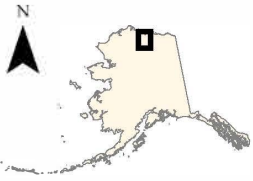
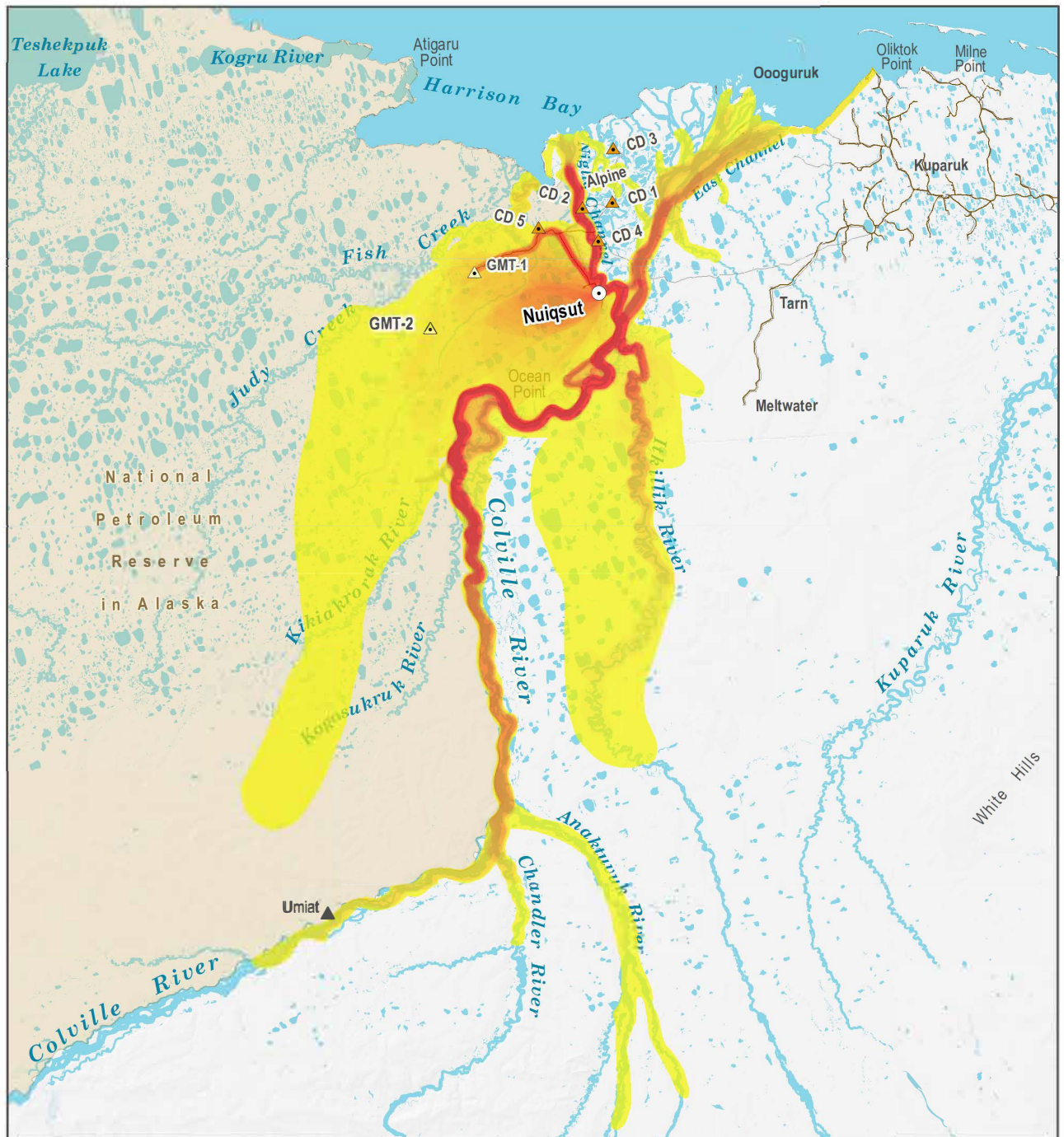
**Year 10: November 2016
- October 2017**



233 caribou areas used by 68 respondents



National Petroleum Reserve Alaska



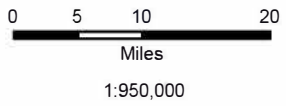
Map 6 - Caribou Subsistence Use Areas, Year 10

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 68 active harvesters in November 2017.

Other areas may have been used for resource harvesting.

Year 10: November 2016 - October 2017

High 233 caribou areas used by 68 respondents
Low



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 National Petroleum Reserve Alaska

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.

The study team also calculated confidence limits for estimated harvests, 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.

10-Year Synthesis and Analyses

NSB's permit stipulation for this study required that monitoring occur over a period of 10 years; at the end of the 10 years, the results of the study would be synthesized and the need for additional research would be evaluated based on that synthesis. Thus, this Year 10 report provides both the results of the Year 10 active harvester interviews/household harvest surveys and a synthesis and analysis of all 10 years of the study.

To facilitate the 10-year synthesis and analyses, the study team reviewed previous study reports and comments from the NSB, CPAI, and the Nuiqsut Caribou Panel to identify key indicators which were previously lacking or inadequately documented in annual monitoring reports. Based on this review, the study team revised study databases and identified new possible analyses. For example, throughout the monitoring study, the study team has received comments from the NSB and the Nuiqsut Caribou Panel regarding changes in the amount of effort required to harvest caribou; commenters expressed concern that while caribou harvests have remained stable over time, the data may not adequately reflect the amount of effort which is required to maintain those harvests. Previously, indicators related to effort were limited to the frequency and duration of trips, and these indicators were collected or entered at a scale which may not have allowed for the identification of changes (e.g., results were entered in ranges such as "6-20 trips"). The study team identified a potential improvement to the database by reviewing the original interview notes and mylars and, where possible, converting the frequency of trip ranges to a single number (e.g., six trips). Such a revision was not feasible for duration of trips, as most trips were day trips and were rarely reported in terms of number of hours. In addition, each user-defined area was assigned to previously-defined hunting areas (see under "Characteristics of Caribou Use Areas and Harvest Locations") to facilitate comparison of certain variables within and between hunting areas where possible.

In addition to providing new analyses, the study team incorporated data from other studies to provide additional context for indicators collected during the 10-year monitoring study. A primary concern of the Nuiqsut Caribou Panel has been the lack of comparative (e.g., pre-Alpine) data incorporated into study reports. New analyses and syntheses are provided in a section entitled, "Synthesis: Monitoring Impacts and Change in Caribou Hunting Activities over Time," following the results of the Year 10 active harvester interviews and household harvest surveys.

Data Review

SRB&A presented draft Year 10 results to the NSB Department of Wildlife Management in March 2019 and submitted the draft Year 10 report to CPAI in April 2019. The study team met with COP on May 24, 2019 to discuss CPAI's comments on the draft report. SRB&A submitted the revised draft to CPAI in July 2019 and the revised draft was subsequently submitted to the NSB for review. The study team sent copies of the revised Year 10 draft report to the Nuiqsut Caribou Panel, prepared a draft summary handout, and met with the Nuiqsut Caribou Panel on September 23, 2019, to present draft Year 10 findings. The study team sent a follow up letter with summary handouts to panel members who had not attended the September 23 meeting and gave members approximately two weeks to respond with additional comments. The study team received correspondence from one panel member regarding the Year 10 report related to the reason for the addition of the "Synthesis" section at the end of the report. The study team also received comments from the NSB and sent a follow-up letter in October 2019 to ensure NSB staff did not have any additional comments on the Year 10 report. Following the conclusion of the review period with the NSB and Nuiqsut Caribou Panel, the study team revised and finalized the Year 10 report.

Presentation of Interview Results

This report summarizes the results of the active harvester interviews through analysis of the data collected during the Year 10 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.

TRADITIONAL KNOWLEDGE OF CARIBOU AND CARIBOU HUNTING PATTERNS

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. In addition, this section includes a summary of prehistoric and historic hunting and use patterns which provide a basis for comparison to current hunting patterns. This summary is based on interviews with Nuiqsut residents conducted by SRB&A during the Nuiqsut Caribou Subsistence Monitoring Project (SRB&A 2010a-2018), in addition to a review of historic accounts and traditional knowledge in existing literature.

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 Kuukpigmuit (people of the lower Colville River) living on the Colville River in the mid-1800s; many of these individuals had moved to Utkiaġvik by the early 20th century, although some families remained year-round. 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)

Caribou Migration, Distribution, Behavior, and Health in the Colville River Delta

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 radio collar 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, USDO, 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, USDO, MMS 1979)

Starting in the 1990s, Nuiqsut residents continued to express concerns about changes to caribou during public hearings related to the NPRA. 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; USDO, BLM 1998)

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; USDO, 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; USDO, 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.; USDO, 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; USDO, 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 *Pisiktagvik*, 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. Pisiktagvik, 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)

During a recent meeting of the Nuiqsut Caribou Panel, an elder made similar comments regarding the range of the Porcupine Herd, indicating that the Porcupine Herd continues to range as far west as Fish Creek and are identifiable by their distinctive antlers:

Teshekpuk stays out in the northwest. The Central [herd] migrates and comes back. The next herd is Porcupine. They go as far as Fish Creek area. We can tell by the antlers—they are the biggest caribou we have. Even bigger than the Western herd. We can tell the difference between Western, Central, and Teshekpuk and [Woodland caribou] is the same as Porcupine. They come directly from south and north, from ANWR. South of Kuparak is where one of the big herds congregate. (SRB&A Nuiqsut Caribou Panel Meeting September 2019)

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)

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 Ahnupkana; 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)

Prehistoric and Historic Use Patterns

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).

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 tuttu 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 dog team:

And then when they are ready there at Nigliq those Eskimos there, hoping to cut the distance which they would have to travel by dog team, 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 Iñupiat 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 Paisanich* 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 *Paisanich* notes that prior to resettlement in 1973, 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. Oil production at Prudhoe Bay began in 1977, and the Prudhoe Bay area was subsequently closed to subsistence hunting and harvesting. Contemporary subsistence use patterns are discussed below.

RESULTS

Caribou Subsistence Use Areas and Harvest Sites

Nuiqsut respondents reported 233 caribou subsistence use areas for the Year 10 study period. In addition to providing the location of their Year 10 caribou hunting areas, respondents identified the location of the 190 harvest sites within the use areas. The locations and characteristics of Year 10 caribou use areas and harvest sites are described below.

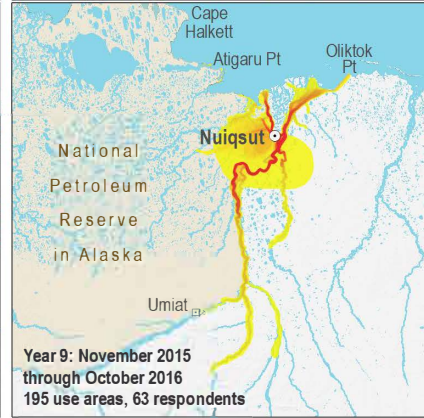
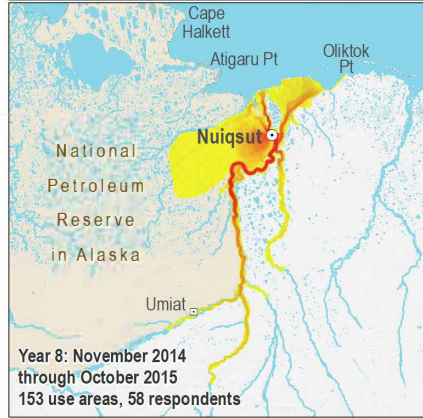
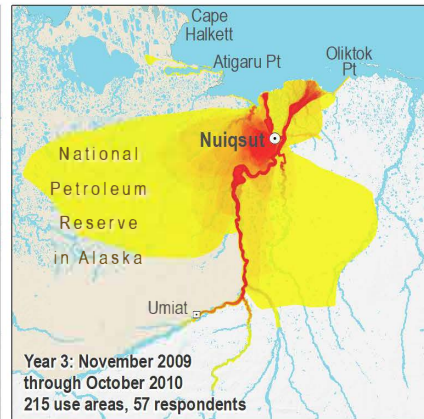
Location of Caribou Use Areas and Harvest Sites

Nuiqsut Year 10 caribou use areas, as reported by 68 Nuiqsut respondents, are depicted on Map 6. Year 1 through Year 10 caribou use areas are depicted side by side on Map 7. During the Year 10 time period (November 2016 through October 2017), 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 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 past Umiat, and along the Itkillik, Chandler, and Anaktuvuk rivers. Overland travel extended in the area west of Nuiqsut in an area bounded by the Fish and Judy creeks and Ocean Point, in addition to farther south along the Kikiakrorak, Kogosukruk, and Itkillik river drainages. Use areas also extended north of the community along the Spur road and the road to CD5 and GMT1. The highest numbers of overlapping caribou use areas in Year 10 occurred along the Nigliq Channel, upriver along the Colville River between the East Channel and Sentinel Hill, along the lower portion of the Itkillik River, and along the Spur road and GMT1 road north and northwest of the community. A moderate number of overlapping use areas extended overland to the west and south of the community, farther downriver on the Nigliq and East channels, and farther upriver along the Itkillik and Colville rivers.

In terms of use areas, Year 10 was relatively similar to previous study years. The extent of overland travel was similar to Years 5, 6, and 8 with use areas extending somewhat farther south, almost to Umiat. 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 certain hunters are not available for an interview, the overall extent may be smaller. As one panel member commented during the September 2019 review meeting, "You have to remember, all hunters might not be getting interviewed. This area might be a larger area" (SRB&A Nuiqsut Caribou Panel Meeting September 2019). A smaller or larger extent may also reflect distribution patterns of caribou or winter travel conditions. Those individuals who did travel overland in Year 10 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 number of individuals reported traveling along the road system and either hunting within walking distance from the road or using the road to access off-road areas farther from the community, such as toward Fish Creek.

Year 10 saw increasing use of gravel and ice roads by caribou harvesters, a relatively new hunting pattern which emerged in Year 8. In Year 10, the GMT1 road was fully constructed and accessible to local hunters. As indicated by the following quotes, Year 10 hunters frequently described using the Spur road, CD5 road, GMT1 road, and area ice roads to facilitate their access to overland areas, or searched for caribou using a combination of road and overland hunting. Others used roads exclusively from off-road travel, particularly if they traveled in trucks or cars. A few hunters took advantage of this road system for winter hunting; the Spur road and CD5 road were used year-round. A number of individuals reported successful hunts in these areas.

Descriptions of hunting activities where gravel or ice roads were used to access hunting areas include the following:



Map 7 - Caribou Subsistence Use Areas: Years 1-10 Individually

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 158 active harvesters from March 2009 through November of 2017.

Other areas may have been used for resource harvesting.

Overlapping Polygons
 High
 Low

National Petroleum Reserve Alaska

SCALE: 1:1,500,000
 0 20 40 80
 Miles

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

Year 10: November 2016 through October 2017
 233 use areas, 68 respondents

I never started catching caribous until recently, maybe the third week of September and I started going up the Spur road after the river started drying up and I couldn't go out that way. I was taking my four-wheeler. I use the Spur road to scout and when I see some caribous I would go towards them. Yeah, [I went on CD5 and GMT1 roads]. Right somewhere in the middle there are a couple of ramps that you can go down on the road and they are a little over four miles towards Fish Creek. Right here on this side. [The caribou] were mostly hanging around by these lakes. (SRB&A Nuiqsut Interview November 2017)

I didn't even hit that river this summer. I traveled out to GMT1 twice with a vehicle pulling a trailer with a couple of Hondas out there. We went straight out to GMT1 and started our hunt there. Road side hunting is frowned upon in the state of Alaska. You're not supposed to. I don't know about anybody who is going to try to come out here and regulate it. State law is state law and sooner or later somebody is going to point a finger. We kind of headed along these ones. The trail goes right here along the edge of these little lakes and it goes in between and we crossed pretty close in this area. It looks like the elevation goes down and it goes back up in this area. We shot at a bunch of caribou in this area but we didn't get lucky. The rough Honda ride got our scopes off and we spent 20 minutes trying to zero our scopes and then it was late. (SRB&A Nuiqsut Interview November 2017)

I used my snowmachine on my trailer and went to GMT1 and got my snowmachine off my trailer, and then I went out there. I just spotted them there [from the road]. There was seven on that side, and four on that side, and I got four. And there was six more there.... It was hard [getting on and off the road]. It's too high. (SRB&A Nuiqsut Interview November 2017)

Well, the ice road. My son had gotten a caribou. We were somewhere along these two lakes. It was by a lake and there was another lake close by. It was the ice road they used to build. We used my wife's car, we went out there. We were looking for caribou the whole route. We had heard that there were some in the area that day. It was that ice road route. We were really close to GMT1. I believe this ice road came in all the way back in. (SRB&A Nuiqsut Interview November 2017)

We went all the way to that (K) pad. It's like a little pad that they just got started working on it, and the road was closed, because they just started packing it down. There was this one day that we went out on the Spur and it was just crawling with tuttu all over the place. I think they like to get on top of the road and then it's windy and the wind blows the bugs away. (SRB&A Nuiqsut Interview November 2017)

Others reported using local roads to hunt but expressed difficulties with or reservations about hunting along the road. Difficulties included trouble getting on or off the road (or ramps) with four-wheelers or snowmachines; not being able to shoot in certain directions due to the presence of pipelines or oil fields; concerns about contamination; and a lack of caribou within reachable distance of the road (see also under "Harvest Success" below):

Respondent 1: I want to but it just doesn't seem like hunting to me. I call it cheating. It just doesn't feel like hunting to me.

Respondent 2: And we are not familiar with all of their rules, either, so we just avoid that part. (SRB&A Nuiqsut Interview November 2017)

And then we use the Spur road to get to our nigliq [geese hunting] spots. And then we saw some caribou out there on this side. This little area in here, they like that area in there, that spot. We just left them be [on the Spur road]. Some other people like to go on the Spur road

to hunt but I think it's unnatural. I don't really like it. (SRB&A Nuiqsut Interview November 2017)

I haven't gone to Fish Creek in a couple years. I just didn't want to go that way. Too much drone traffic now and more louder vehicles like eighteen wheelers. Local people too. Ones that just want to ride around. But I have used the road to scout for caribou all summer. The whole thing all the way to the end. Probably like 20 or 30 trips. There was caribou but they were too far. And you have to be escorted and go through security if you go that way. (SRB&A Nuiqsut Interview November 2017)

No, not on the Spur road, I am scared to eat whatever is on that area. With all the metals out there? (SRB&A Nuiqsut Interview November 2017)

We were on Spur road during the summer. We went through CD5. And because it's too high [the road], we had to go all the way over to CD5 and get off at their pad. Just to get off of the road. And then we just stayed around this area, because there was too much water and moss around here. We were getting mad. It's me and my best friend, he is a dude so he is out hunting and they have nothing in their freezer. The tuttus know we can't get to them so they are laying on this spot. They know we can't shoot them. It was frustrating. (SRB&A Nuiqsut Interview November 2017)

I know some people are using this road for hunting. And I don't hunt near the road. I am not the one who wanted that road. I don't want roads. We can't even hunt along the pipeline road. They are going to make another road, 8.5 miles to GMT2 and that is going to make it even harder.... It's too hard to go on the road, I got stuck on the ramps. I went out for seal hunting and I had to call for help. They had to come get me. I was stuck at the ramp. I called up Conoco Philips and said you have to fix these ramps! And so they put up a stop sign. And I was like I ain't going to stop at that stop sign. I stay away from them. I don't need to go on the roads. (SRB&A Nuiqsut Interview November 2017)

During a meeting with the Nuiqsut Caribou Panel in November 2017, panel members noted that some individuals were using the GMT1 road out of necessity because caribou were unavailable closer to the community. Thus, the road, provided access to hunting areas farther to the west of the community where the caribou herd was located. Other hunters continued their usual patterns of hunting directly overland to the west of their community by four-wheeler and snowmachine. Several respondents described their overland and road hunting activities as follows:

My usual spot is always over here [to the west of the village] that is my usual spot. I always go there. That is my only area for hunting. I go caribou hunting, I go fishing. This is my favorite area. I started using that area because I know they will be waiting over there [the caribous]. I caught some only once. This was maybe in June, towards July. It was the 4th of July. I was out there for the holidays. Right there on High Hill I go over and look around and I saw one. On High Hill I can see all over. I can see Nuiqsut when I'm out there. Yes, [I was riding a four-wheeler]. I'm not going to walk out there. (SRB&A Nuiqsut Interview November 2017)

I went through the dump road and then off through the four-wheeler trail. On [the village side] of the GMT road. I never signed their paper to go on the road, so I'm not allowed, I guess. It was somewhere along this creek, that's all I know. A couple of miles away from the dump. So it was around these lakes somewhere. Not too far [from the creek] but I am not too sure. I have never ever crossed these roads. We rode around for a while [in that area] it was like this whole area. That was in late fall, like September. Just once [out that way]. It was a rough ride.

My back can't take that very much these days haha. (SRB&A Nuiqsut Interview November 2017)

After I caught those caribou, I went about 15 miles I was about somewhere around here. I stayed in Kikiakroak Valley, this little valley right here. And pretty much just right there in January. Because I was wolf hunting at the same time too. I took one, two, three, four, five, six – six times while I was snowmachining. Just day trips. Those are the only three caribous I caught in January. (SRB&A Nuiqsut Interview November 2017)

While overland hunting is most common during the fall months of September and October, residents also hunt throughout the winter to harvest caribou as needed, or while hunting for other resources such as wolf and wolverine. Respondents in Year 10 reported hunting throughout the winter to the west, south, and southeast of the community. One individual described hunting by snowmachine in a large area from November to March:

Yeah, pretty much right over here out in this area [Itkillik area]. Last winter by snow machine it would be around this whole area [to the east] I actually went to that oil field—right on this side of Kayuktisiluk. It was out there last year [the camp]. And then way up into this valley over here [southwest of Nuiqsut]. Probably all of the way from November to March. (SRB&A Nuiqsut Interview November 2017)

Use of different river systems varies from year to year. Year 10 shows the highest overlapping use along Nigliq Channel, Itkillik River and upriver along the Colville River to Sentinel Hill (including the upper East Channel), and more modest use of the upper Colville River (beyond Sentinel Hill), the lower East Channel, and upper Itkillik River. Other river systems with relatively limited use in Year 10 included Fish Creek, Kachemach and Miluveach rivers, and Anaktuvuk and Chandler rivers. A small number of individuals also traveled by boat into the middle Colville River Delta (e.g., along Tamayayak River) and along the coast to Oliktok Point.

Nigliq Channel is a primary travel corridor for ocean-bound and upriver-bound hunters, as well as a key fishing and hunting area for residents. In Year 10, residents traveled along the channel to and from fishing and hunting locations, sometimes hunting along the way; some residents also specifically used Nigliq Channel for caribou hunting. While the percentage of harvests occurring along the Nigliq Channel did not decline in Year 10, a number of respondents reported limited hunting success in the Nigliq Channel area, with some attributing the lack of caribou to oil development and associated activities:

By Nanuq area, I got one, two—two more [caribou] at Nanuq area. There was so much traffic there. I shot my caribou and sometimes there is so much traffic, you can't shoot your caribou. There are a lot of trucks, water trucks. (SRB&A Nuiqsut Interview November 2017)

We went hunting at CD2. It was on this side of the channel, the bend over there. All the caribous are on the west side [of the channel] here. There's none over there because they're doing the oil drilling or whatnot. It was the only lonely one, I don't know where the other two went. It was alone when we caught it. (SRB&A Nuiqsut Interview November 2017)

[We went] several times towards Nigliq all the way to the camp there. I haven't been through [Kuupaqullurak] in a few years. We saw caribou but we weren't successful because they were too far. We were at Lydia's camp but they were around here and we couldn't get to them. (SRB&A Nuiqsut Interview November 2017)

In June, end of June [along Nigliq Channel]. Yeah. Two caribou, I just got two caribou. There was hardly any caribou out there this year. I didn't see herds out there. Just loners, or four to

five at a time. I didn't even see a 200 to 300 [count] herd. That was the first time I never seen that this summer. (SRB&A Nuiqsut Interview November 2017)

Yeah, I did [hunt along Nigliq Channel]. [I took] Kuupaqullurak with my friend and his little boy and there was no caribou at all. There was a bridge there, Kuupaqullurak bridge. We went right under that bridge all the way through. Yeah, [near Nanuq]. I went all the way to Nigliq and there were a lot of caribous there and they hardly moved. (SRB&A Nuiqsut Interview November 2017)

Residents also hunt caribou along the East Channel of the Colville River Delta, sometimes continuing to the ocean and hunting along the coast to Oliktok Point; coastal hunting along the coast west of the Delta was limited in Year 10. In Year 10, residents hunted along the main “Kuukpik” and connected channels, and along the Miluveach and Kachemach rivers. Residents reported scouting for and harvesting caribou near locations such as *Pisiktagvik, Nuiqsapiaq, Aanayyuk, and Helmericks:*

And one more thing, I went to Helmericks and to [local resident's] cabin and got one there. One of the islands there. A little further down to Nuiqsapiaq. And there were Porcupine Herd there.... From there I got one caribou at Pisiktagvik Island. It was a bull; one [caribou harvested]. There were Porcupine [herd caribou there], a lot of caribou. [That was at the] end of July, [and it was] just one time. (SRB&A Nuiqsut Interview November 2017)

We went out Kuukpik that one time. In August there were some caribous on the east side of the Colville [River]. Where is [former resident's] camp? Right around [Pisiktagvik]. When we went out caribous on the east side were still kind of too far. (SRB&A Nuiqsut Interview November 2017)

It was pretty close to Pisiktagvik and Miluveach [River] area. That sign that everybody always talks about. There is like a street sign near the mouth of the Miluveach [River] on the southern side. [The caribou] was about a hundred yards from that sign. It is just a street sign, like green. One of the older guys might've put it up there. (SRB&A Nuiqsut Interview November 2017)

While coastal hunting west of the Colville Delta was limited in Year 10, some Nuiqsut caribou harvesters did travel into Fish Creek by boat during the summer months:

Sometimes, with my cousin, he would take me hunting in summer time. [I hunted along] Fish Creek. Go out to this end [of Nigliq Channel], then into the Fish Creek area. I went just past the cabin, I went to that big lake that is connected to the stream. Just Fish Creek area. (SRB&A Nuiqsut Interview November 2017)

I went in [from the coast] through that Tingmeachsiovik [River]. I went in through that. That's over there, this [USGS label] is in the wrong spot. I had to go farther up because there was no caribou there, almost to Judy Creek. Yeah. [I went to] Fish Creek, [almost to] Judy Creek. Right here. Up Fish Creek without a paddle! Tingmeachsiovik, it's this, right here. The wormy [shaped] thing. I'd put that right about there. No caribous, I'd put that [use area] right about there [along Tingmeachsiovik], close to the GMT 1 road. And then quite a ways up there [Fish Creek]. When I go to Fish Creek I'm always looking. Every time I get on that boat I'm looking. There is no limit to where caribou can be. (SRB&A Nuiqsut Interview November 2017)

Another common boating destination in Year 10 was the Itkillik River; an old airstrip located near the river is a frequent turnaround point for caribou hunters. When the river is high enough, however, residents can make it much farther, and several did so in Year 10 during periods of flooding. Respondents described their Itkillik River hunting activities as follows:

I just went to that old airport [in Itkillik]. That's where I went. There were a lot of people down there. Not every day, just when I feel like going to Itkillik. Just for a day. See if I can see some caribou or some geese flying around. There are people fishing. I got two of them right at Itkillik and I didn't go farther in because there was no water at all. I just went up to the old air strip. (SRB&A Nuiqsut Interview November 2017)

What I did was I beached at the [Itkillik] River and at the top of the cabin, I looked around for caribou, and there were seven caribou right at the gravesite, and then I didn't have to go any further than that. That made it an easier catch for me. That river is crazy. It's really crooked. It burns a lot of gas. If you go 10 miles up, you burn 30 miles of gas, on a 10-mile distance. Its' so crooked—you can see that [on the map]. (SRB&A Nuiqsut Interview November 2017)

Most of my caribou hunting last year has been in Itkillik. [We travelled] until we reached the bluffs right on this side—way past the airport. Might be somewhere right around here. [I took trips] most of the summer starting in June [ending in] August. That is where the majority of my caribou hunting was, in here. Where is the old airport? I believe it might be right here. For some reason it is on that particular spot the caribou always seem to congregate there. I don't know the reasoning for it, but I would say half the time I get caribou it is right there. (SRB&A Nuiqsut Interview November 2017)

Travel upriver along the Colville was common in Year 10, with a number of individuals describing their hunting activities toward Puviksuk, Qitik, Ocean Point, and, to a lesser extent, Sentinel Hill (Umiraq). Several individuals reported taking a different channel in Year 10, one which had recently become accessible near Puviksuk. Several respondents noted high water levels during certain periods in Year 10, as well as the formation of different river channels allowed them to access areas that are not always accessible by boat. Residents described their upriver hunting activities as follows:

We went through Napasalu to get [to Puviksuk]. The river had gone down so we couldn't get through Putu anymore. We went all the way up to Umiraq. I couldn't go past that because my motor was acting up and I had to stay home for like two weeks trying to take care of my motor. I did go again once down here, just a little bit around this corner but I didn't see anything that time. There is that new river, right? I think it is right over here. It goes in and then it comes out just right over there. That new river tripped me out this year. I ended up going through it just to check it out. It's deep in there, almost 25 [feet] deep in parts. For some reason, the river this year is changing a lot. There is islands now down there [visible from town]. It is just changing a lot this year, even up here past Umiraq. It changed from Sentinel Hill all the way to Umiat Mountain. You used to be able to go get down there like it was nothing. But last year at one point we had to turn around at Umiraq. (SRB&A Nuiqsut Interview November 2017)

Yes, we always take [Napasulu] now. You can't go through Putu. Right by Puviksuk, we took this [short cut] a few times. But there is another one before Puviksuk, Kayuktisiluk right here, there is a new river. It connects to that one and goes back out. The ground just went down. When it breaks up, it was making a new channel there. It was eroded. We used to go right here and now we go over here. That one has been working itself for four years. We use that one to go on geese hunt. It never used to be there when we first came. But over the past maybe five years, it has totally changed... When the water is high enough you can go all the way [into these smaller channels above Qitik]. (SRB&A Nuiqsut Interview November 2017)

We use [the short cut by Puviksuk] all the time now. And the water was so high we were going into these little creeks. We went into one of these creeks and we came out by Kayuktisiluk. And then the next day, we went this way [through the main channel] and back the other way.

It was every day boating for like 10 days, even in rain and wind. ... There was caribou there, but they were just kind of out of reach. They were going from like the west to the Fresh Water Lake and then straight to Ocean Point or to Puviksuk and then cross and go to Itkillik. It was weird, we had to go to Itkillik River to meet the caribou this year. (SRB&A Nuiqsut Interview November 2017)

While less common, a number of individuals traveled farther upriver, past Sentinel Hill toward Anaktuvuk River, Chandler River, and Umiat. A few individuals traveled into the Chandler and Anaktuvuk rivers by boat; travel along Anaktuvuk River was more extensive than previous years. Several individuals described hunting in the Upper Colville area as follows:

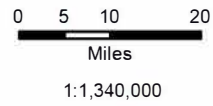
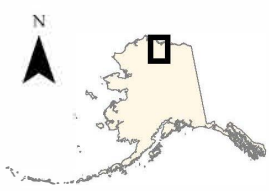
Yeah, that [shortcut by Puviksuk] is the only one we would do. That [channel] is deep enough [water] for us. We went into that. Then just the main channel all the way up to Chandler. [We] probably went like four or five turns [into the Chandler]. I was running out of gas. That one was September. Yeah, if we didn't catch any moose, it was going to be a caribou. (SRB&A Nuiqsut Interview November 2017)

The farthest I went upriver was all the way to Umiat, looking for caribou. There is a cabin there. We pitched a tent, I don't believe in cabins. We got three of them, on the way back home, probably one, two, three bends back from Umiat. That was past Chandler. So like, um, Uluksrak area, or that other place, the next bends after that. We got one in the middle here, and then from Umiuraq, on the way home by Ocean Point. (SRB&A Nuiqsut Interview November 2017)

I did make it out to Anaktuvuk twice. I kept coming out by Qitik. It was about a half mile from Qitik. Since June all the way 'til August. I went both routes [Napasalu and Putu]. We went caribou hunting all the way out to Johnny's Camp. If you can make it through Putu, you can make it through Anagavik [short cut] ...I went up past [Umiraq] twice and Umiraq was pretty much my turning around point [on the other trips]. (SRB&A Nuiqsut Interview November 2017)

The farthest we got [a caribou] was at Umiat, but we went way way down [south]. We were off the map, maybe somewhere right here. That is where we got our moose and our last two caribous—right here. And we haven't even seen [any caribou] on all the way up [closer to the community]. But yeah, those are our farthest ones. We went right to this bluff and there was a second one. (SRB&A Nuiqsut Interview November 2017)

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 1,925 polygons provided over the 10 study years combined, while Map 9 shows overlapping use areas for 10 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 the mouth of the Chandler River; 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. High overlapping use is also evident along the recently built road system between Nuiqsut, Alpine, and GMT1. The high use of the Colville River corresponds with the predominance of boat travel for caribou hunting activities. Over the course of the 10 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 10 (Map 6) differs from the cumulative Year 1 through 9 use areas (Map 8) in that during Year 10 use areas do not extend as far overland as they have some other years, nor do they extend as far upriver along the Colville River as they have in



Map 8 - Caribou Subsistence Use Areas, Years 1 - 10 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 158 active harvesters from March 2009 through November 2017.

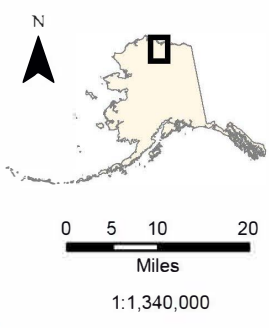
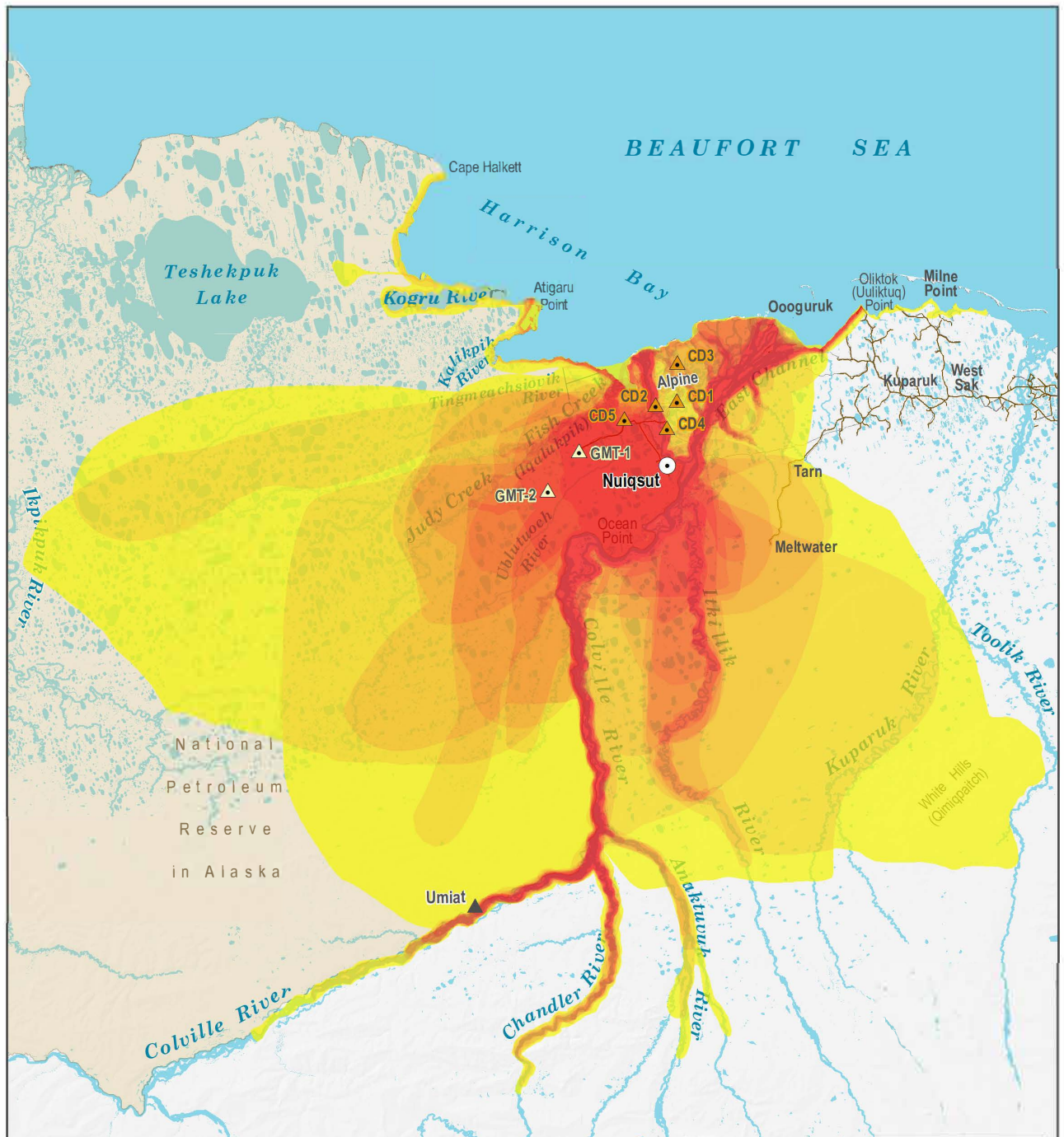
Other areas may have been used for resource harvesting.

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Years 1-10: January 2008 - October 2017

High 1925 caribou areas used by 158 respondents
Low

National Petroleum Reserve Alaska



Map 9 - Caribou Subsistence Use Areas, Years 1 - 10 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 158 active harvesters from March 2009 through November 2017.

Other areas may have been used for resource harvesting.

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National Petroleum Reserve Alaska

Number of Study Years

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

1925 caribou areas used by 158 respondents

some previous years. Other years have shown a smaller overland and riverine extent than Year 10. Similarities between Map 6 (Year 10 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, and the area west of Nuiqsut.

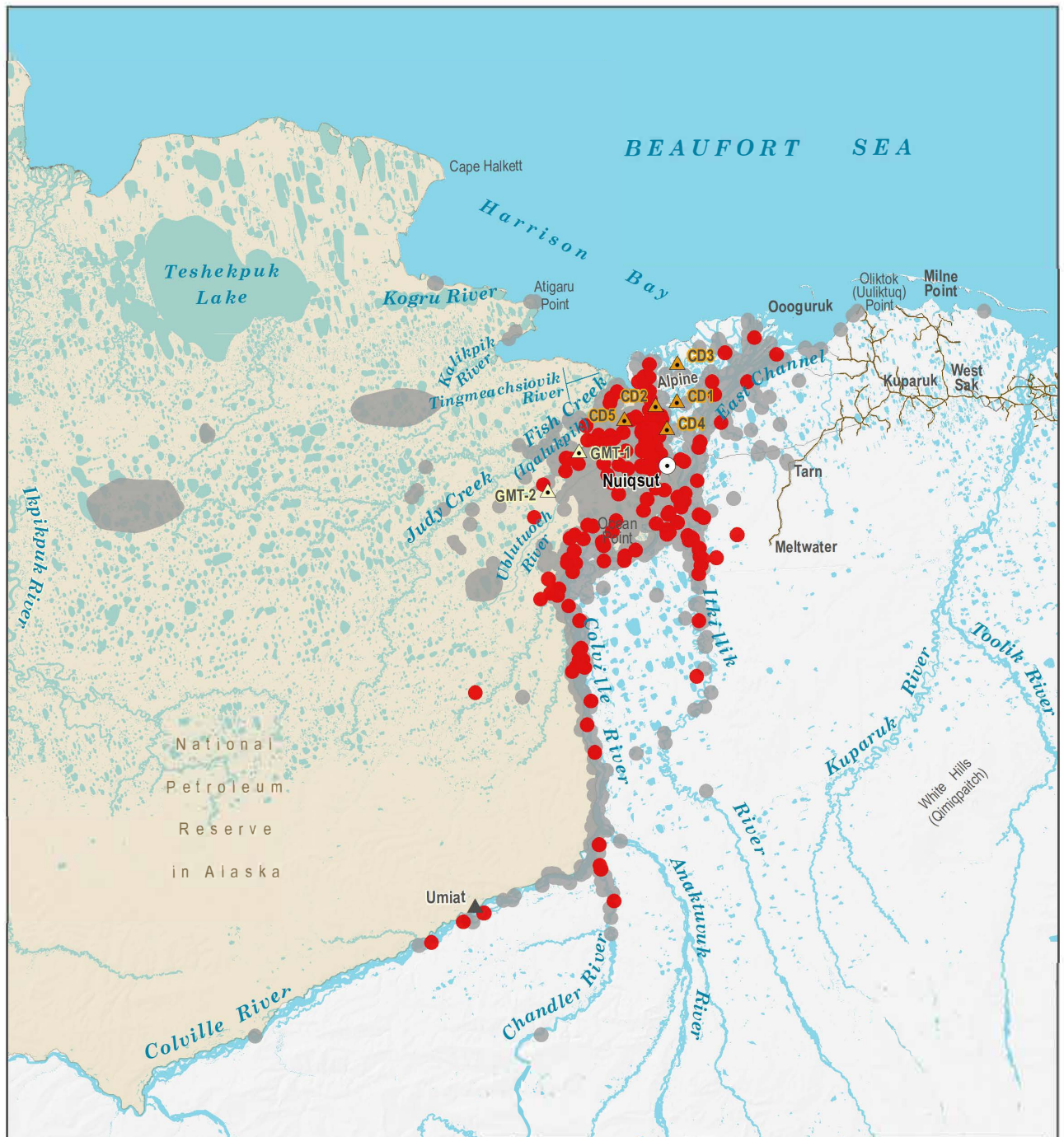
Map 9 depicts overlapping use areas for all 10 years, but instead of portraying all 1,925 polygons individually, this map includes only one polygon per study year. Areas that were used during all 10 study years are portrayed in dark red, while areas that were used during only one study year are shown in yellow. Areas used during two to nine study years are shown in various shades of yellow, orange, and red. 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 10 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 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. Sixty-two respondents reported harvesting caribou at 190 harvest locations in Year 10.

Respondents reported successful harvests in the Colville River Delta; upriver to the Umiat area, along Itkillik River and Fish Creek; and in overland areas to the west of Nigliq Channel and the community. 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 10) 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 10 study years. Over the course of the 10 study years, 149 respondents have noted 1,765 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 10 study years have occurred along the Nigliq Channel to the north of the community; along the East Channel near *Pisiktagvik*; 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 10 are similar to recent years (Years 6 through 9). Years 6 through 10 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 10, areas of moderate harvest density occur within closer distance to one another along the Nigliq Channel when compared to Years 6 through 9; however, high harvest density continues to be limited to the camp at *Nigliq*.



**Map 10 - Caribou Harvest Locations,
Years 1 - 10**

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 68 active harvesters in November 2017.

Other areas may have been used for resource harvesting.

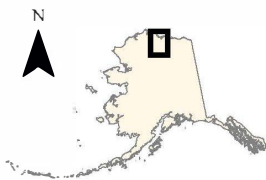
**Year 10: November 2016
- October 2017**

- 190 caribou harvest locations
- 62 respondents

**Years 1-9: January
2008-October 2016**

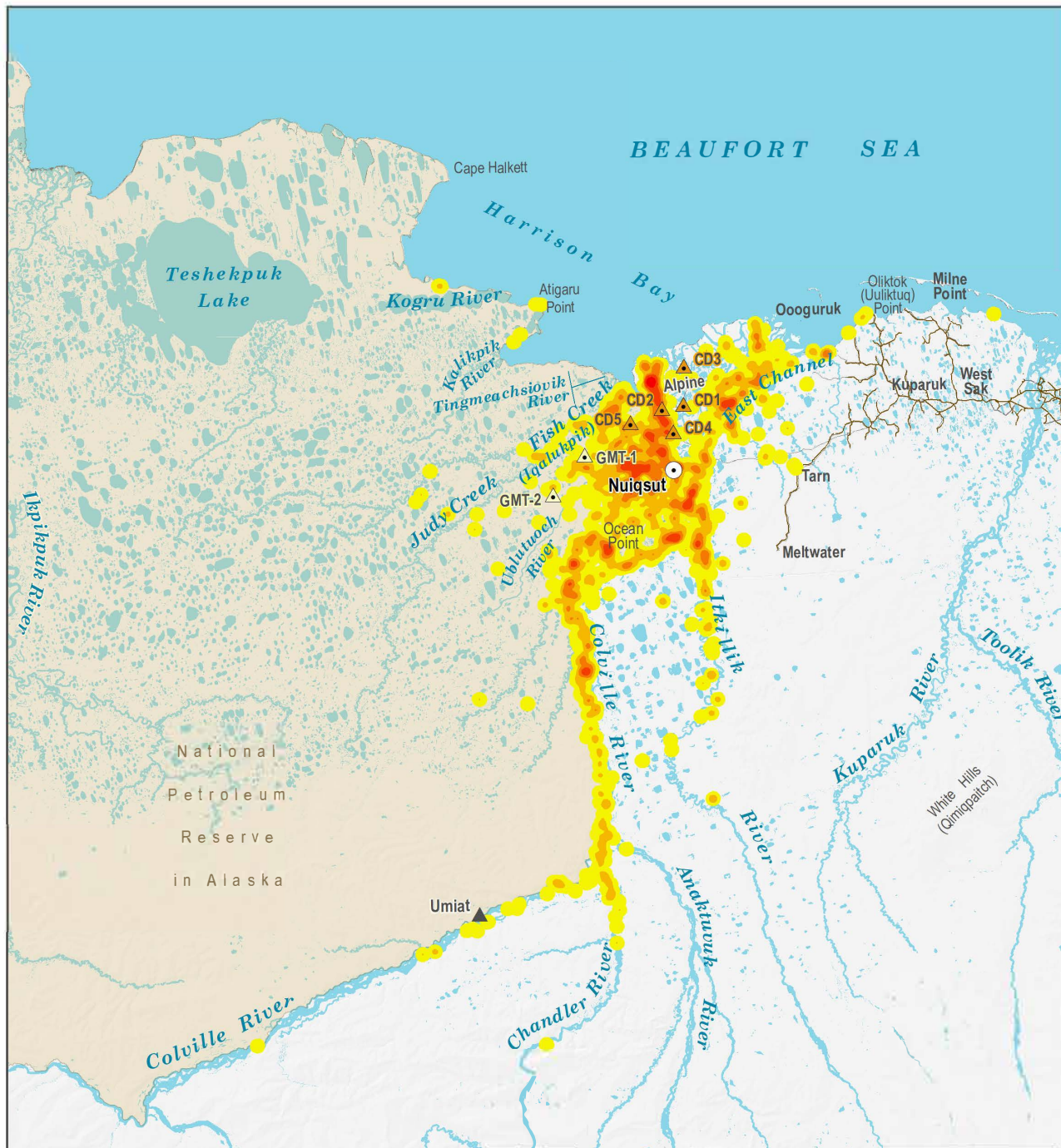
- 1614 caribou harvest locations
- 140 respondents

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1:1,340,000

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Map 11 - Caribou Harvest Density, Years 1 - 10 Combined

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuupik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 158 active harvesters from March 2009 through November of 2017.

Other areas may have been used for resource harvesting.

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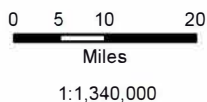
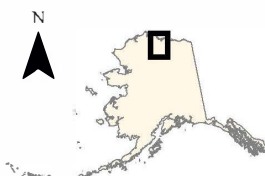
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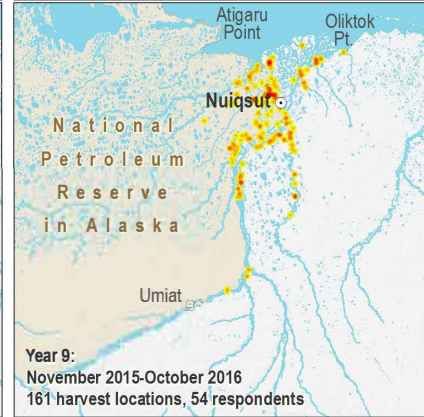
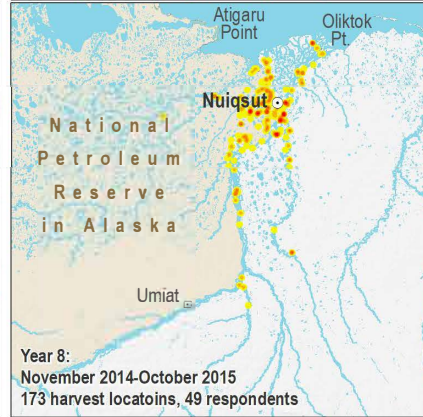
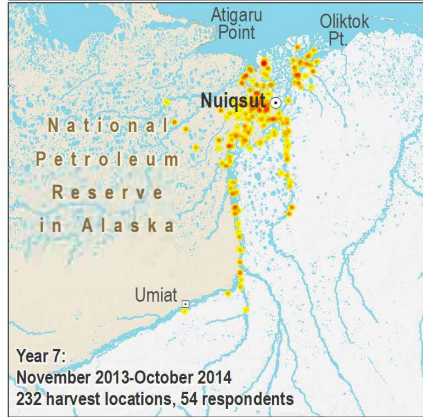
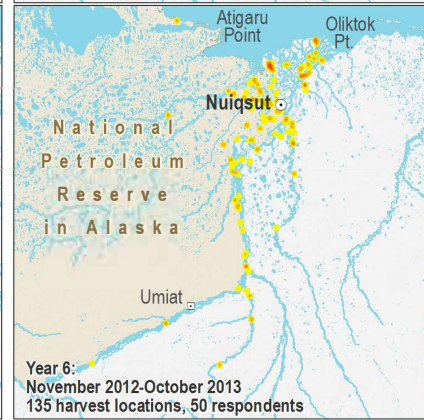
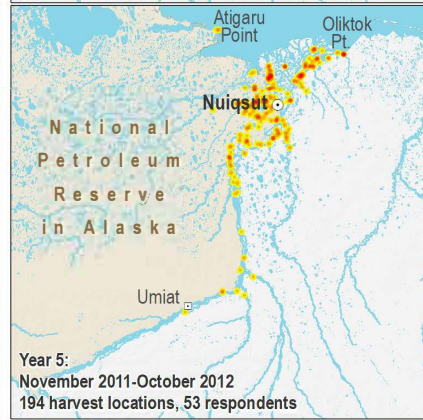
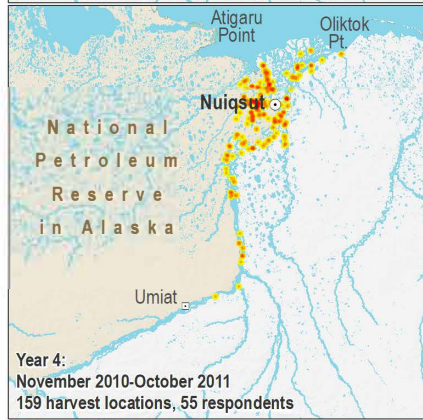
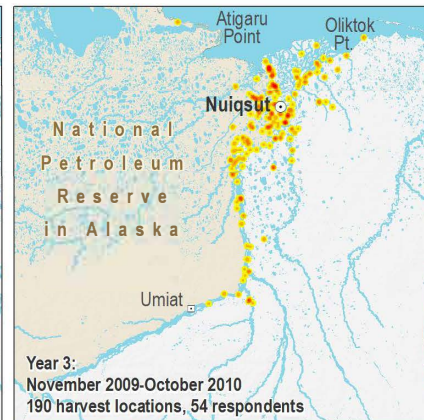
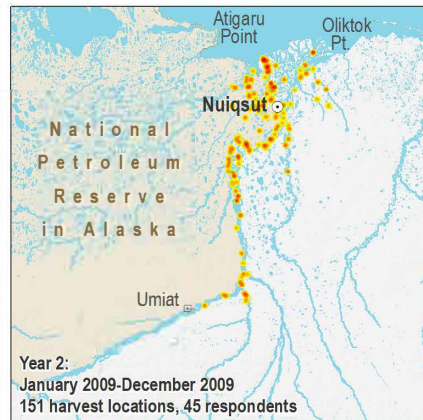
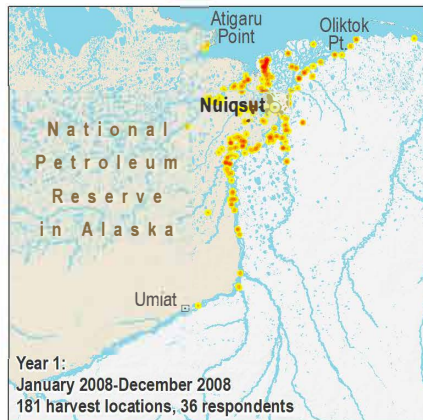
Harvest Density

- Fewer caribou harvested
-
- More caribou harvested

1765 caribou harvest locations, 149 respondents

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





Map 12 - Caribou Harvest Density: Years 1-10 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 158 active harvesters from March 2009 through November of 2017.

Harvest Density

- Fewer caribou harvested
-
- More caribou harvested

Other areas may have been used for resource harvesting.

N

0 15 30 60
Miles

SCALE: 1:1,500,000

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Year 10:
November 2016-October 2017
190 harvest locations, 62 respondents

In Year 10, a high concentration of harvests is evident at Nigliq, along the Spur road north of the community and at several locations along the road to CD5 and GMT1, along the lower portion of the Ikillik River, and at *Puviksuk*. Year 10 also showed moderate harvest concentrations near the Nigliq Channel Bridge and at various locations upriver. In general, fewer harvest locations were reported along the East Channel and directly to the west of the community when compared to previous years (see Map 12). In Years 9 and 10, a higher number of harvest locations were reported to the west of Ublutuooh River, presumably accessed via the GMT1 road, and fewer were reported to the east of the Ublutuooh River. This is consistent with harvester reports of using the GMT1 road to access caribou which were less available closer to the community.

Characteristics of Caribou Use Areas and Harvest Sites

Study participants characterized their Year 10 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

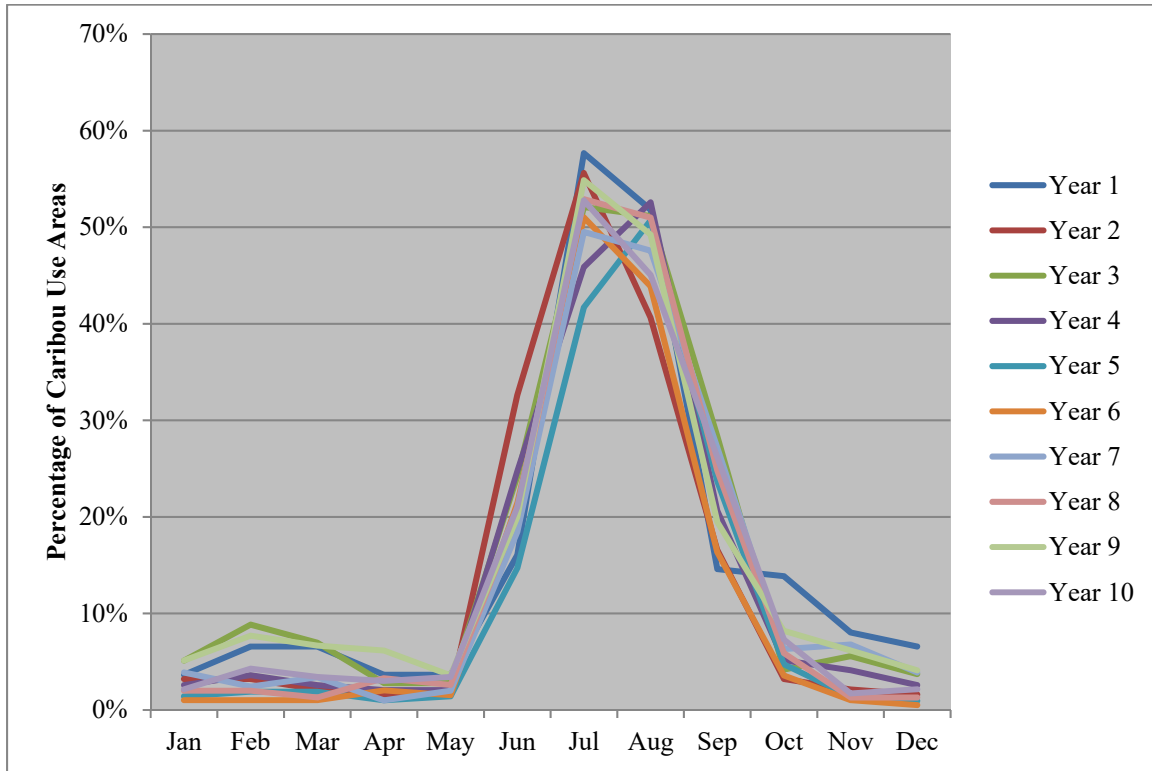
Figure 1 shows that caribou hunting activities over the 10 study years have occurred during every month of the year, with the most use areas reported in July and August. For Year 10, similar to previous years, respondents reported traveling to over 50 percent of their caribou use areas during the month of July (51 percent), with nearly 50 percent (48 percent) visited in August, and over 20 percent visited in June (21 percent) and September (22 percent). Compared to all previous study years, Year 10 shows similar levels of use areas reported during the winter months of November through April; reports of winter hunting are lower than in Year 9 which showed an increase from most previous years. Figure 2 shows the percentage of caribou harvested by respondents, by month. In most years, July and August have accounted for a majority of the harvest, and this continued to be the case in Year 10, with over 50 percent of harvest occurring during those two months. September accounted for 17 percent of the harvest, and June and October accounted for between five and 10 percent each. In Year 10, while July and August continued to be the peak harvest months, the number of reported harvests during those months was lower than any previous year except Year 9. February showed a higher percentage of harvests in Year 10 (five percent) compared to most previous study years (tied with Year 7) and represented the second highest number harvested during that month. Truck use also showed a winter peak during the month of February (see below); thus, access to the road system may explain the increased harvests during this month.

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 other major subsistence activities are not occurring (e.g., moose hunting, bowhead whaling, *qaaktaq* fishery). Caribou are also considered to taste best during the months of July, August, and into September. As one individual stated, "I like to really do my caribou hunting in August and the first week of September. Why? Because they've got more fat on them" (SRB&A Nuiqsut Interview November 2017). 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. Residents often target caribou as a secondary pursuit during the moose hunt:

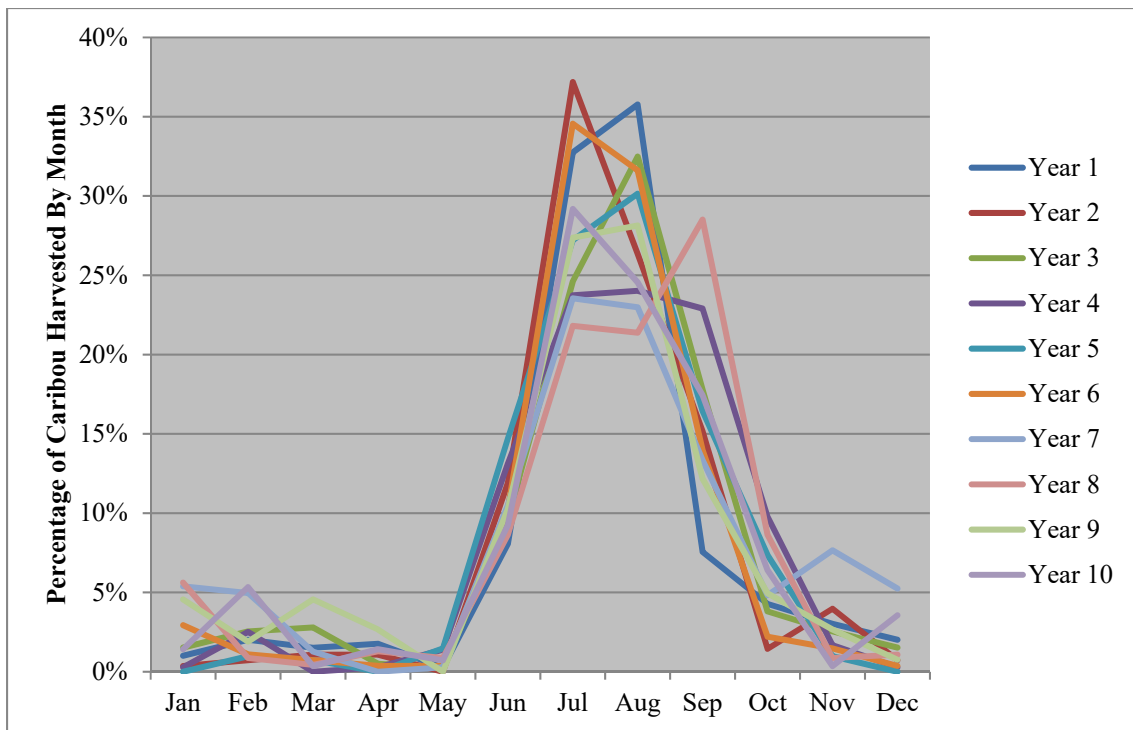
Oh, well, in August, I did go upriver one time. But that was looking for moose. We were also looking for caribou but I didn't see any because they were mostly around this area [near the mouth].... This was the beginning of August, right when moose season started. I was also checking for caribou where I got some a couple of years ago around here in Umiraq area, but there was no caribou there. (SRB&A Nuiqsut Interview November 2017)

Figure 1: Nuiqsut Percentage of Caribou Use Areas by Month, Years 1-10



Stephen R. Braund & Associates, 2019.

Figure 2: Nuiqsut Percentage of Caribou Harvested by Month, Years 1-10



Stephen R. Braund & Associates, 2019.

Harvesters note that hunting in the later summer months of August and September are sometimes preferable because the peak mosquito season has passed. Residents generally indicate a decrease in caribou hunting in the late fall/early winter (November) when bulls are rutting, although some will pursue cows during this time. Hunting of caribou occurs through the winter as residents run out of caribou meat from their summer and fall harvests. Winter caribou hunting often occurs concurrently with furbearer trapping and hunting:

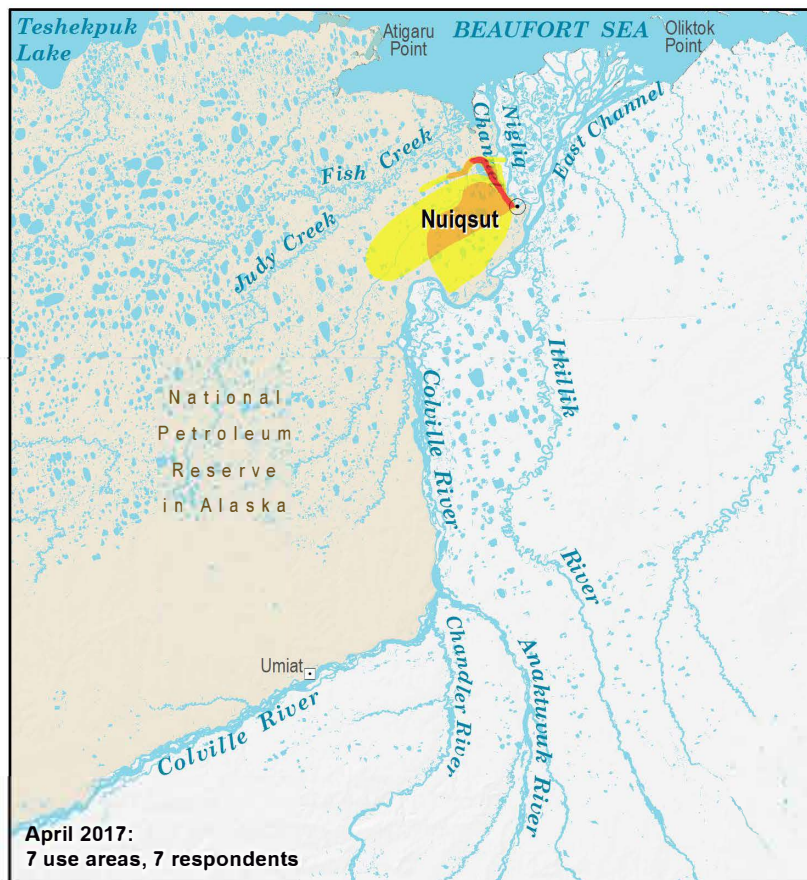
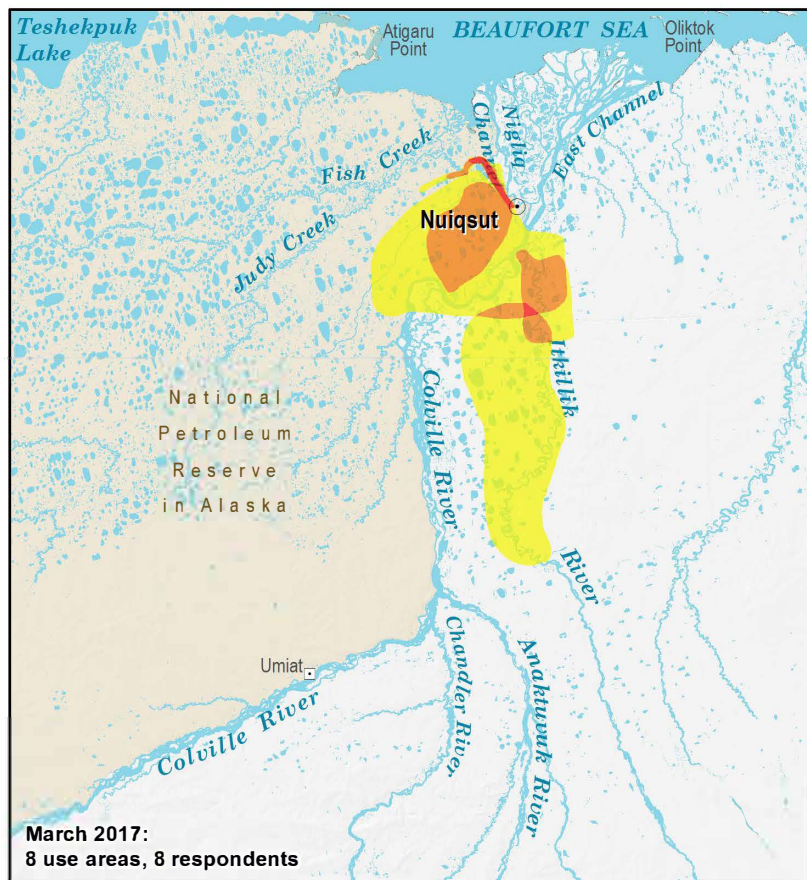
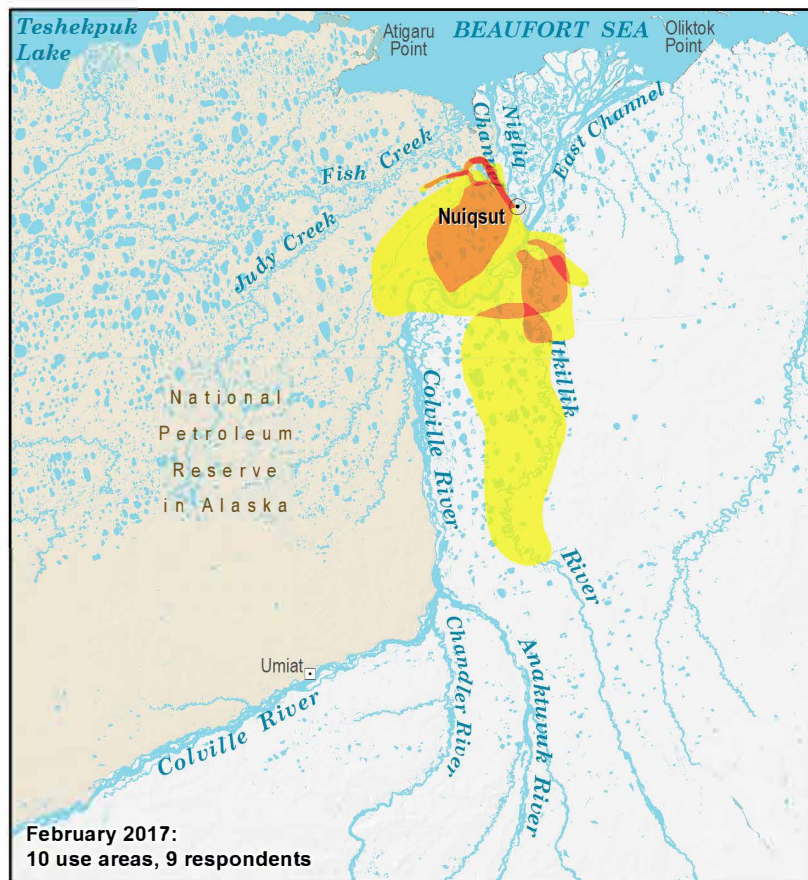
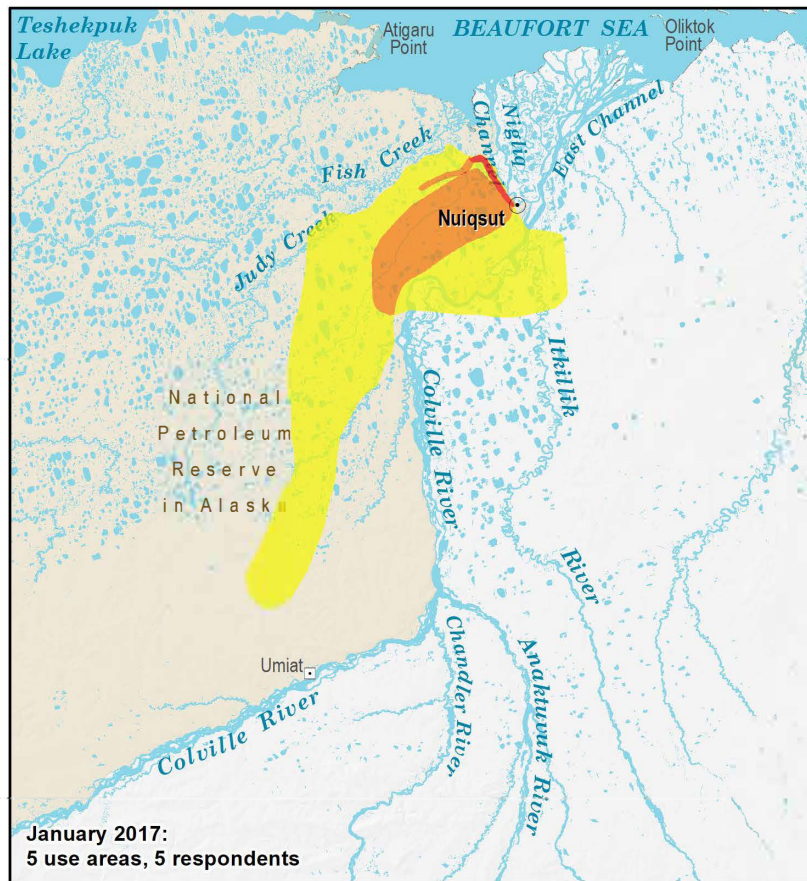
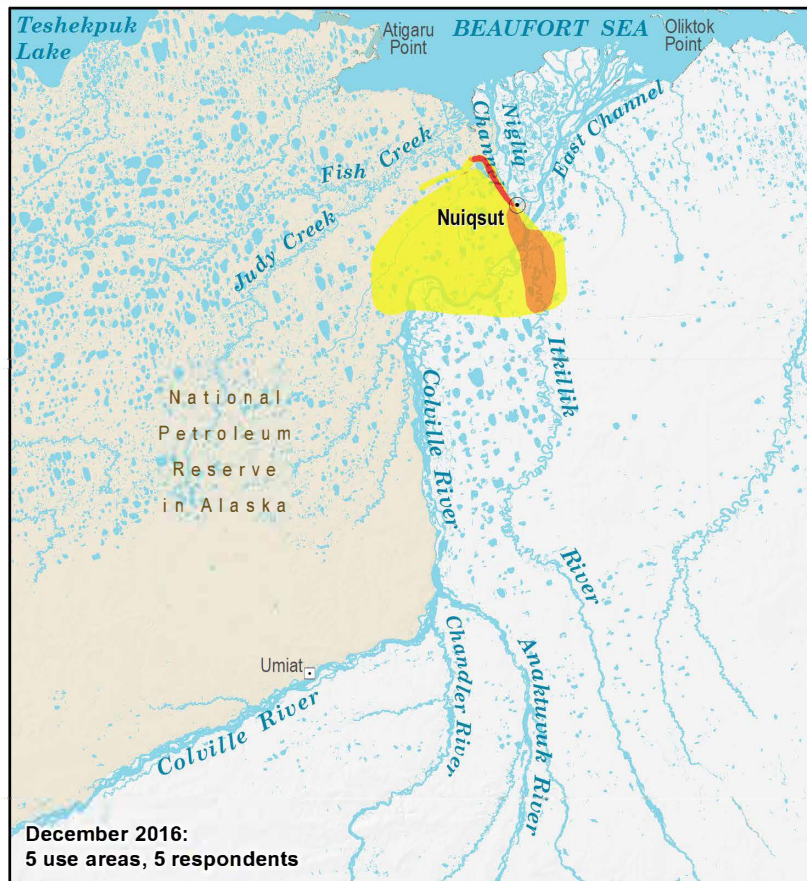
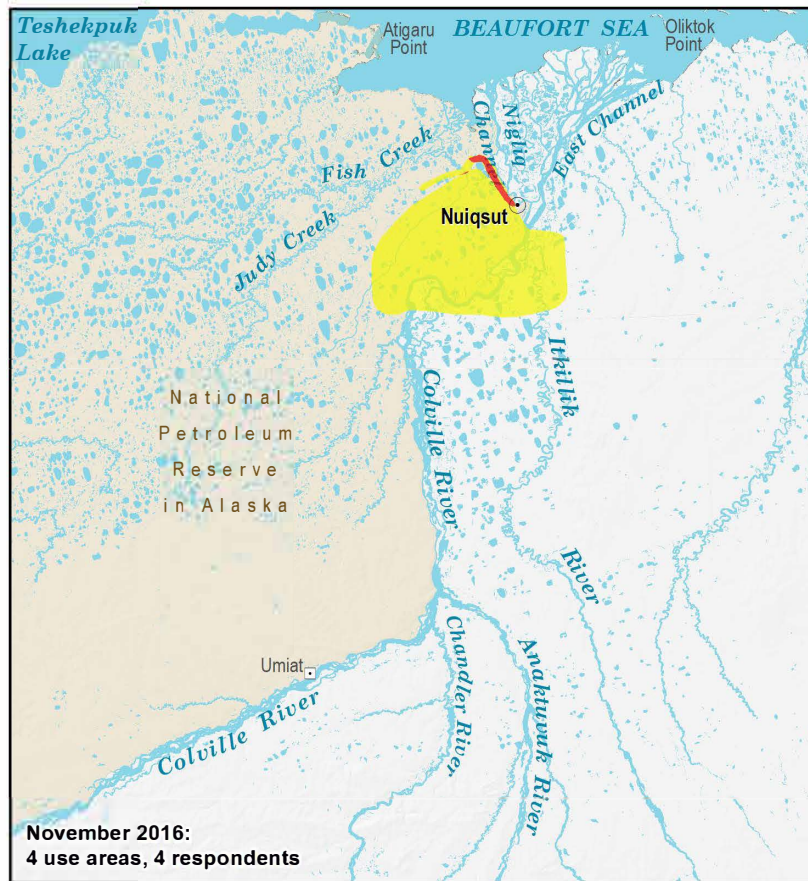
All winter – February, March, April. By the time whaling comes around, we try to—it doesn't last long enough. We try to get enough caribou [to make it through] whaling season, but it never lasts that long. So we always try to make another catch before whaling season. But this year we didn't. (SRB&A Nuiqsut Interview November 2017)

And then that one time we went out close by to this trail on Itkillik. We saw a bunch of wolverine tracks. We set some traps and the second day I went out I caught right on the edge of this flat part right here. Me and [local resident] got one, two, three—three caribou. I shot two of them, he shot one of them. Those were all females. That was February when we were setting out traps. When I looked at them, there was only 15 [caribou] in that spot. It might have looked like there were some more way out here, but I am not too sure. Whenever we go out skin hunting, we are looking for anything and everything. We were trapping until March 15, when trapping season ended. I would say the whole month I went out there, practically every day—30 times. (SRB&A Nuiqsut Interview November 2017)

Increased access to roads allows some individuals—particularly those without overland forms of transportation such as snowmachines and four-wheelers—to hunt caribou throughout the year. However, most focused hunting occurs during the summer and fall when a majority of caribou are in the area:

[Spur road hunting is] all year pretty much. There is more people luck[ier than me]. I guess, just the timing. Me, I just started going out there [on the GMT1 road] last month. I take that back, [I started going out there in] September. Uh, maybe four to five times a month [along the Spur road]? We are always going riding and we are pretty much going by the bridges, by truck and SUV. (SRB&A Nuiqsut Interview November 2017)

Map 13 through Map 16 show Year 10 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 9) as a single polygon, with all harvest locations, by month (to see maps showing Years 1 through 9 individually by month, see Appendix D). According to Year 10 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 GMT1 road, with some individuals also reporting larger overland areas accessed by snowmachine, particularly to the southwest and southeast near Itkillik River. A relatively limited number of harvest locations were reported during the November through April time period, both along the road system and to the southwest and southeast of Nuiqsut. Compared to previous years for the November through April time period (Map 17 and Map 18), Year 10 hunting activities from November to April occurred within the extent of previous years. Travel along the road system continued into May as well as at lower levels throughout June, July, and August. Construction of the GMT1 road was completed in late August/early September and the increasing use of this area during these months is evident on Map 14. Some limited use of the Nigliq Channel occurred in May by boat. In June, hunting activities shifted to concentrate more along river channels, although some road activity continued throughout the summer. June saw primarily upriver travel toward Ocean Point and travel along Nigliq Channel, with some hunting effort along the East Channel.



Map 13 Caribou Subsistence Use Areas, November - April, Year 10

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 68 active harvesters in November of 2017.

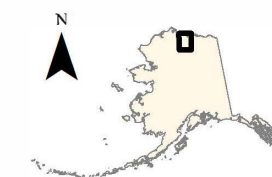
Other areas may have been used for resource harvesting.

LEGEND

Overlapping Poly gos



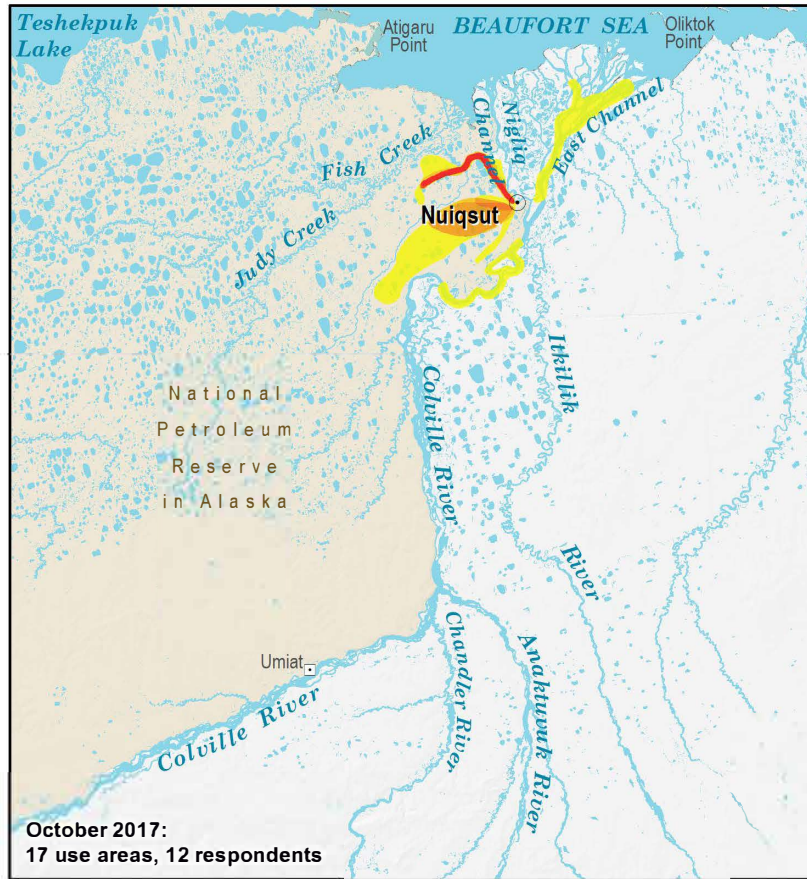
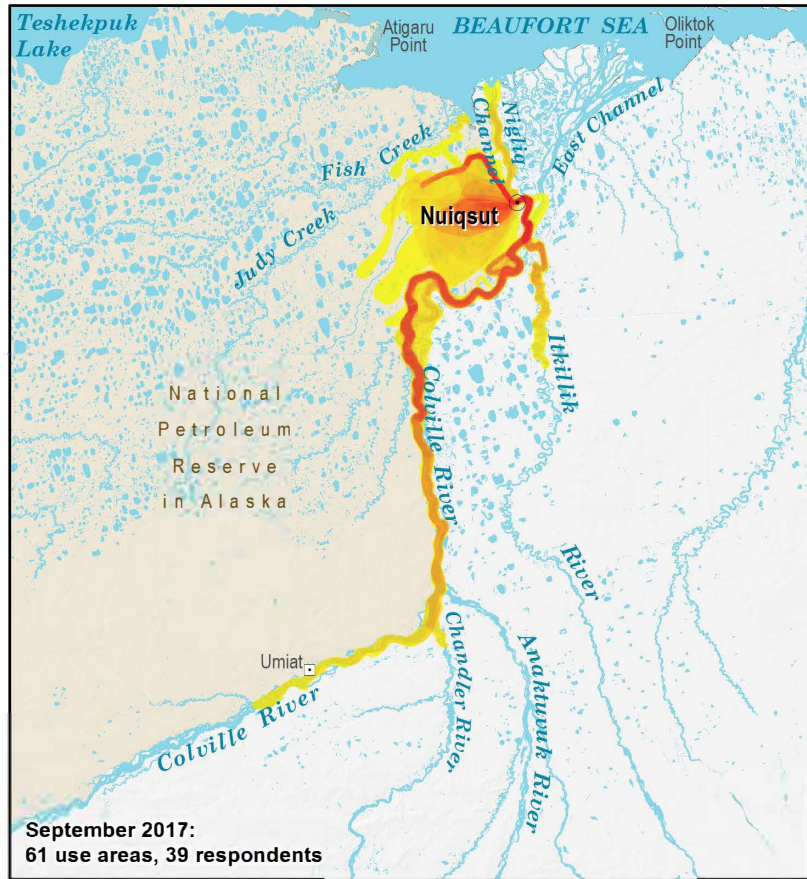
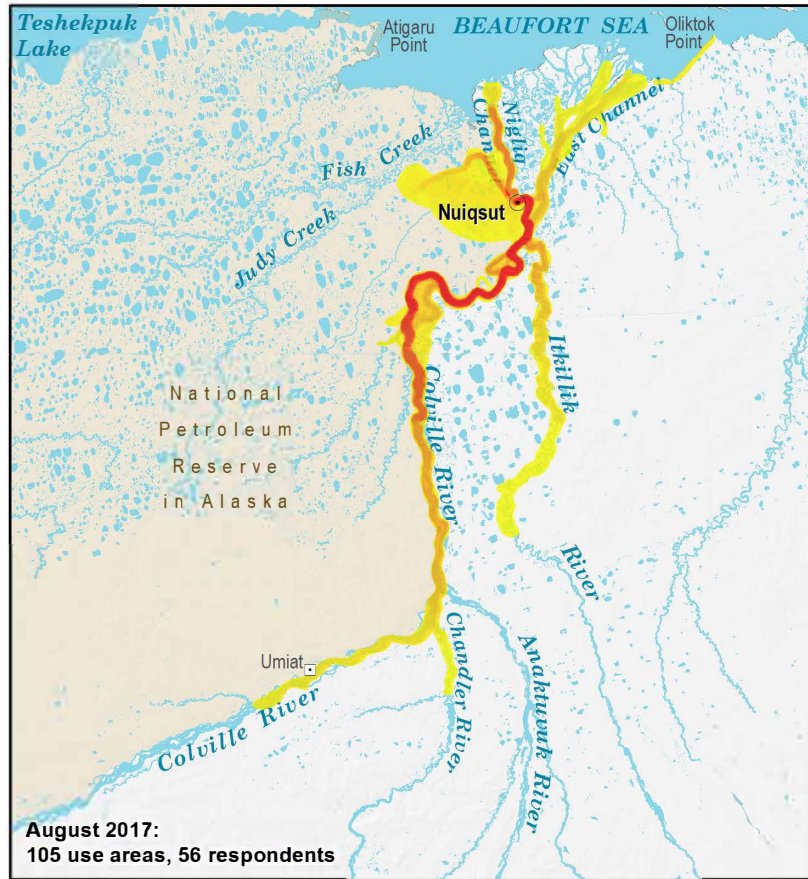
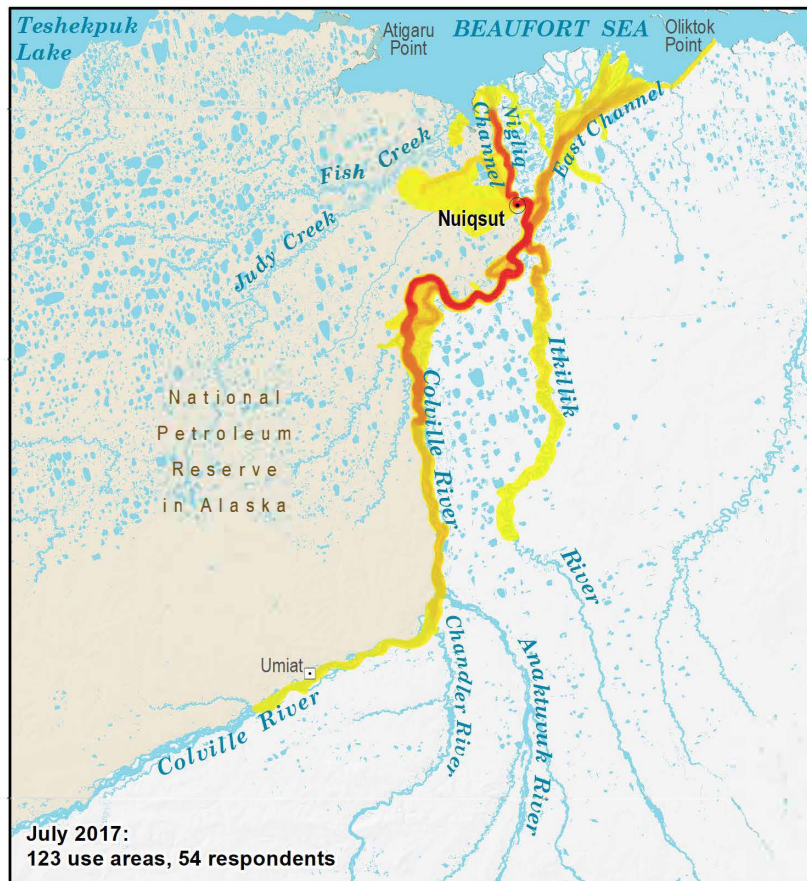
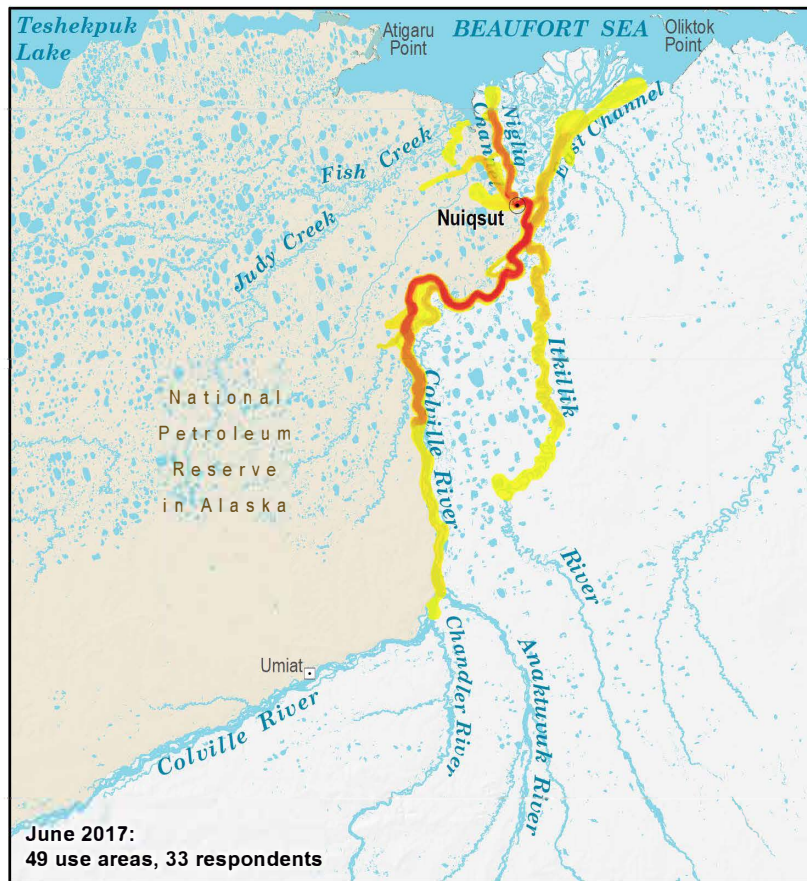
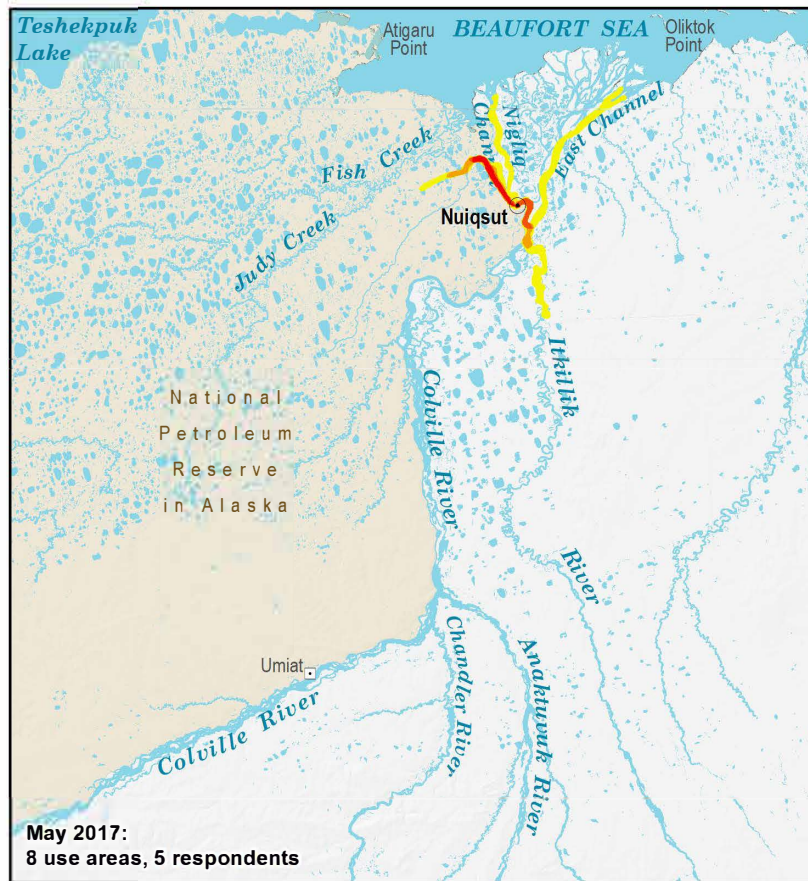
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Map 14 Caribou Subsistence Use Areas, May - October, Year 10

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 68 active harvesters in November of 2017.

Other areas may have been used for resource harvesting.

LEGEND

Overlapping Poly gos

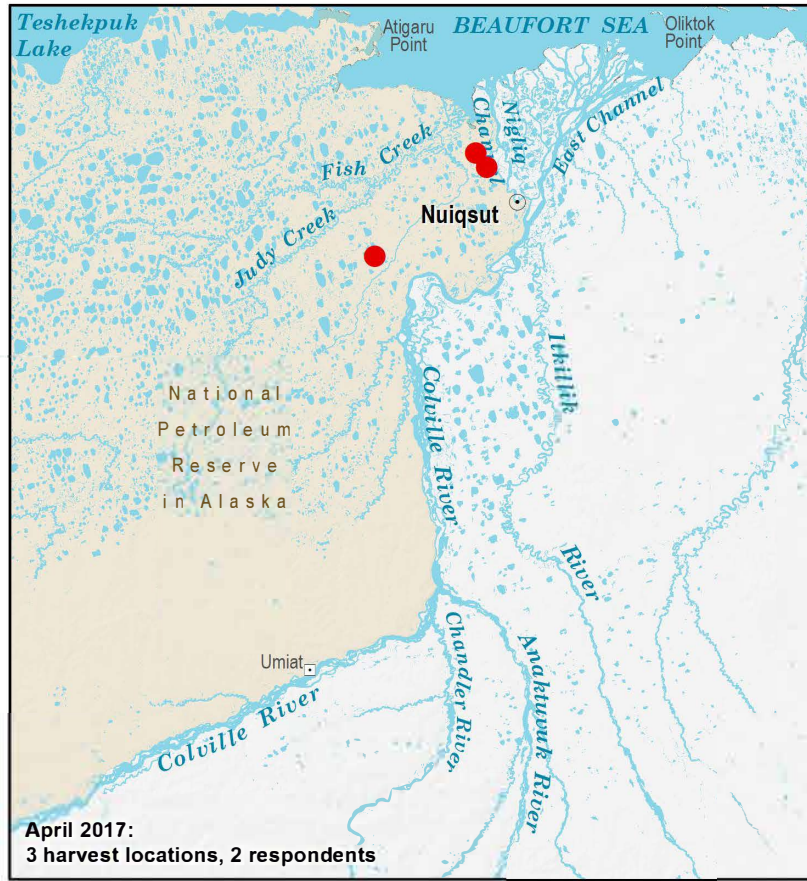
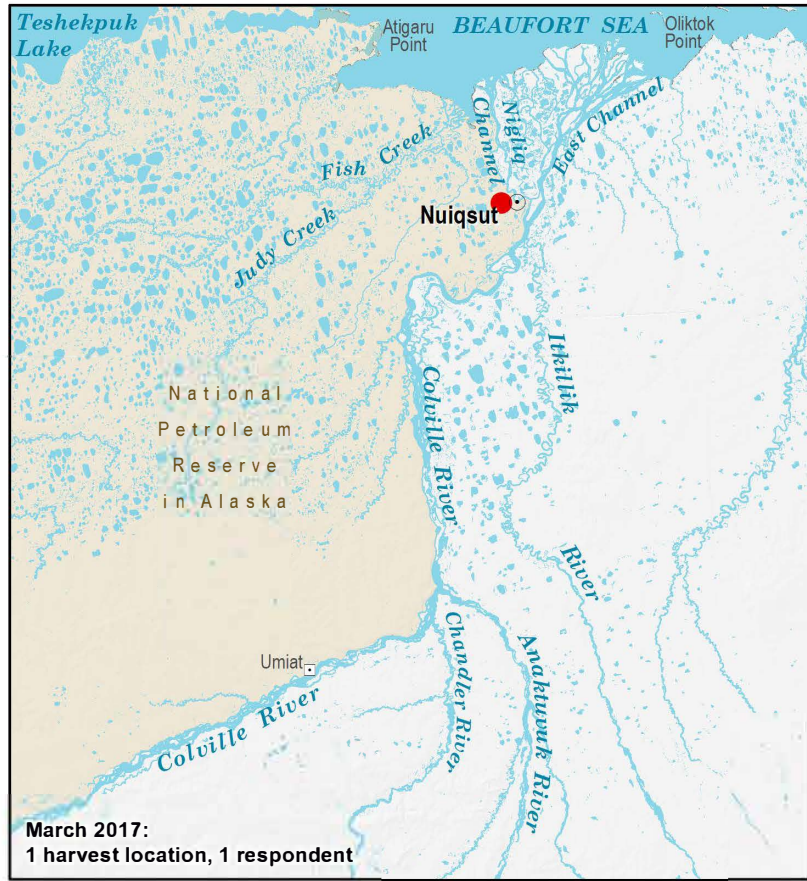
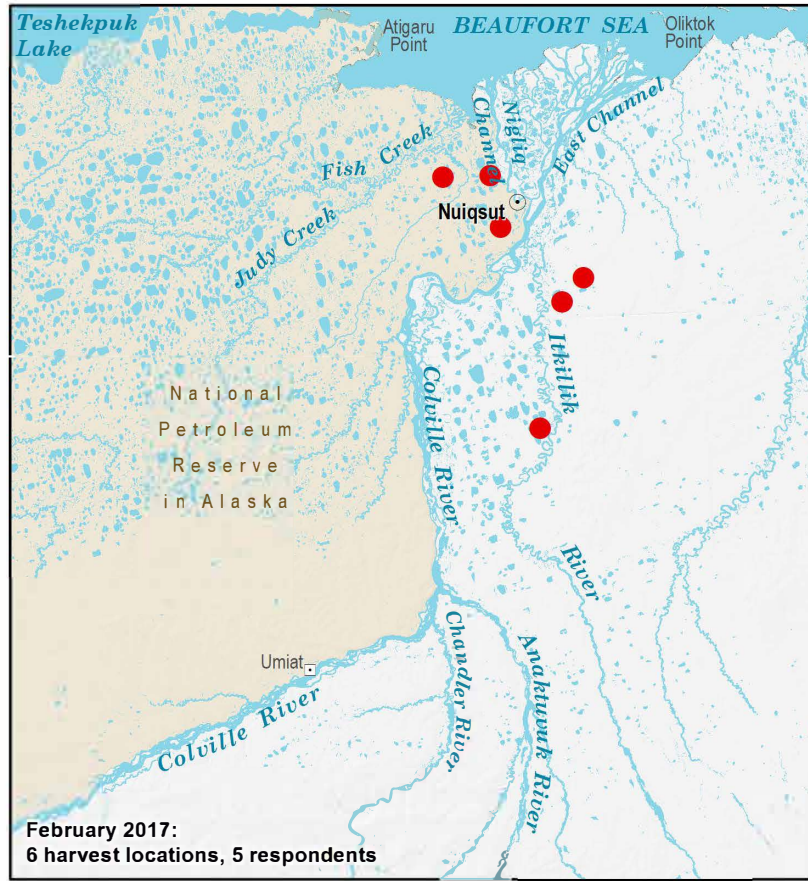
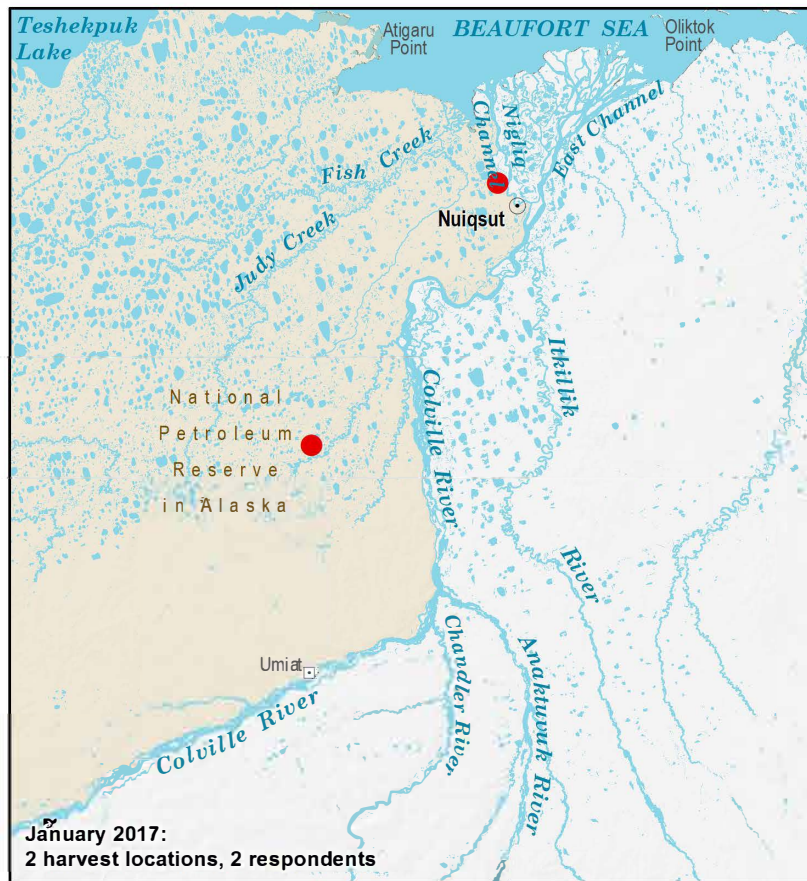
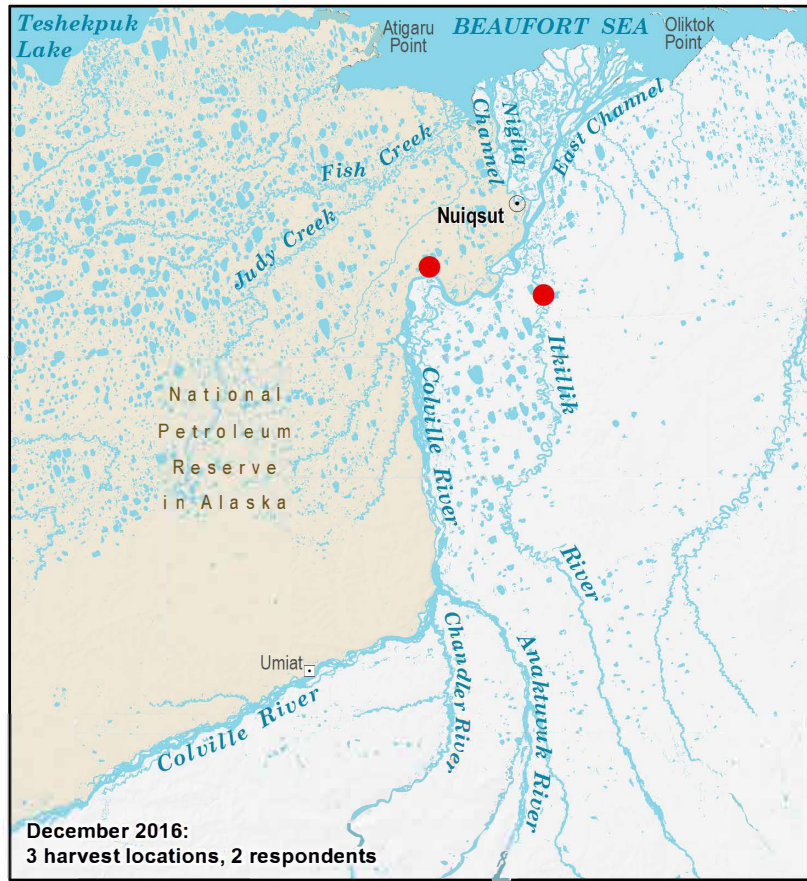


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Map 15 Caribou Harvest Locations November - April, Year 10

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 68 active harvesters in November of 2017.

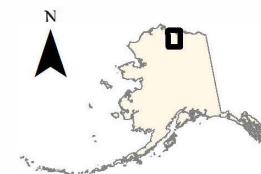
Other areas may have been used for resource harvesting.

LEGEND

Harvest Locations



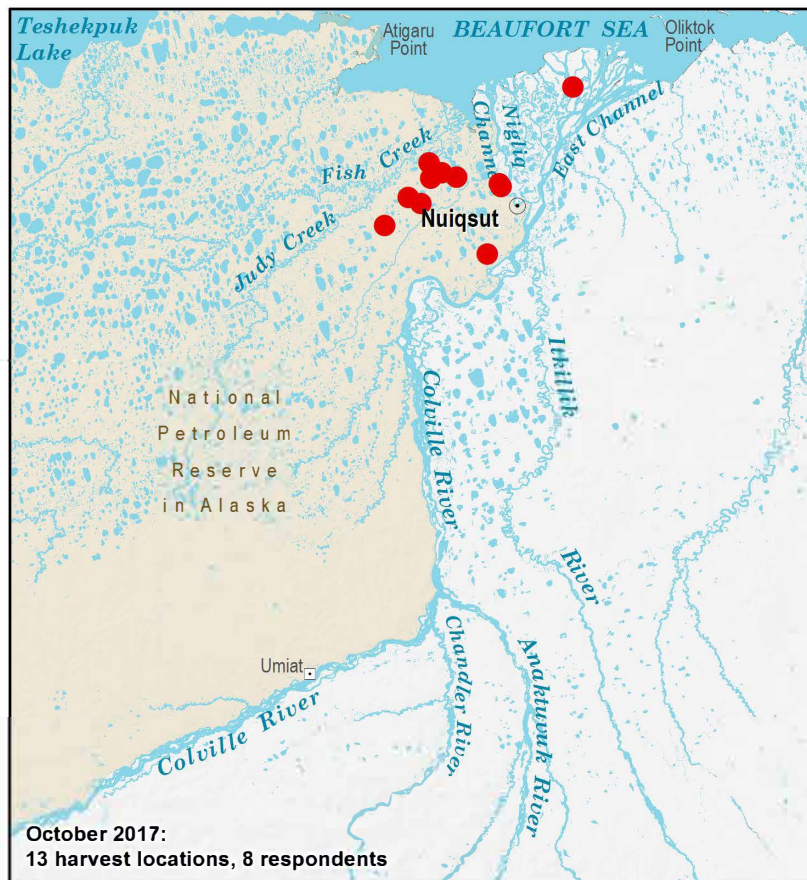
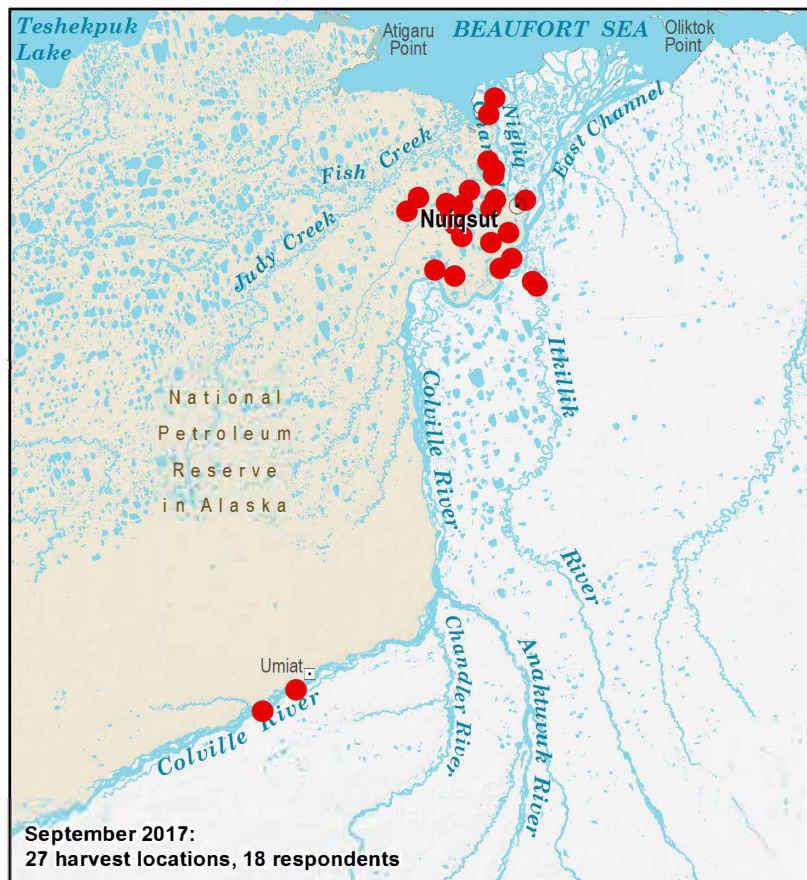
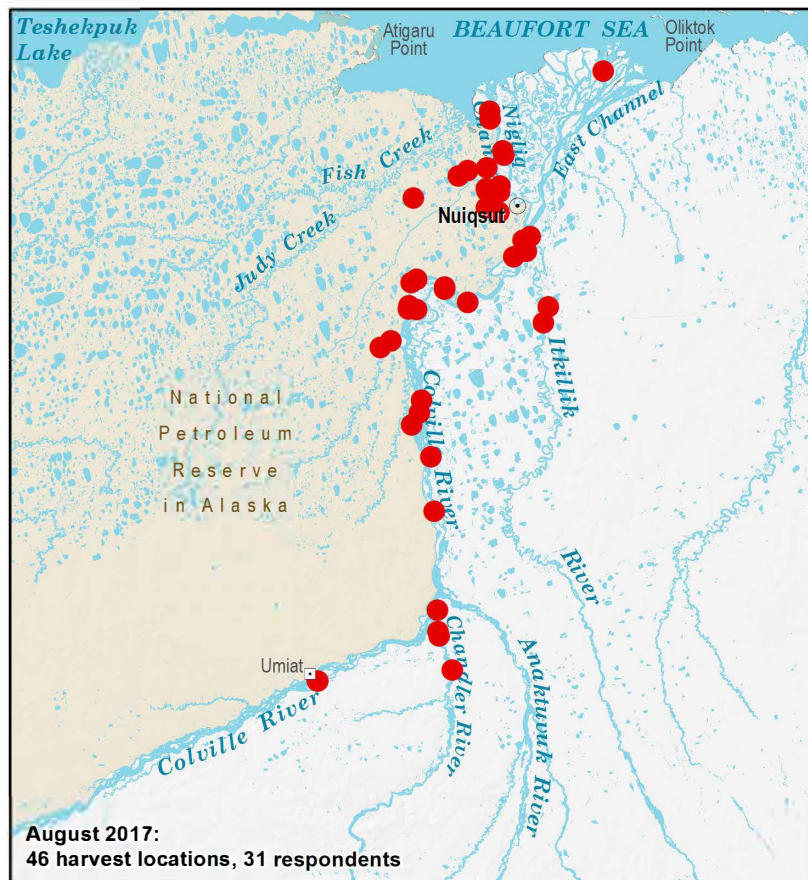
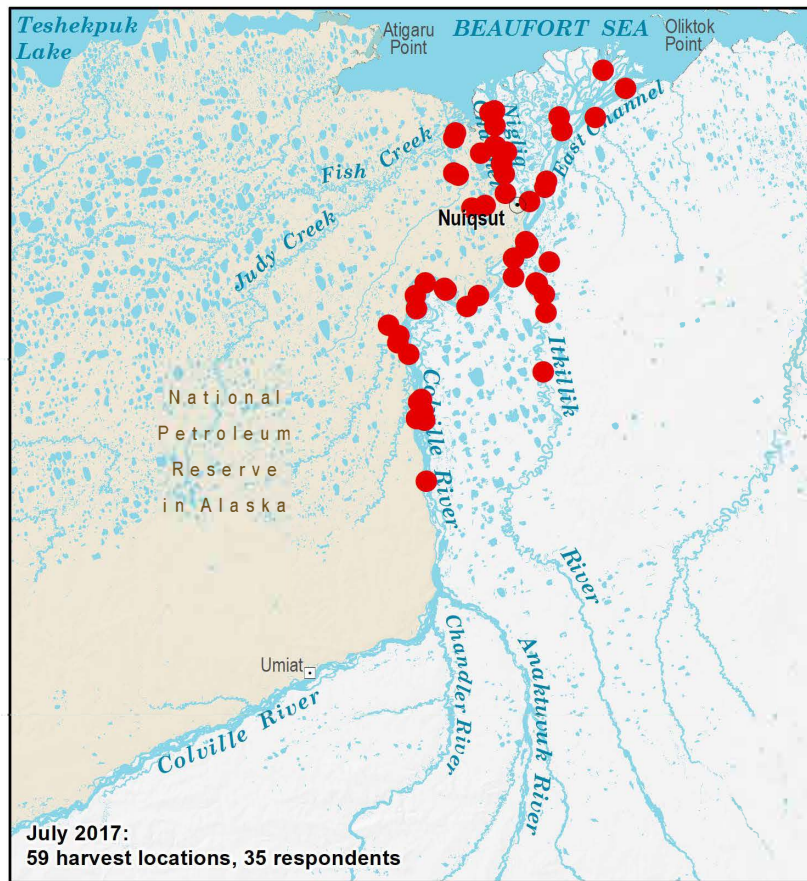
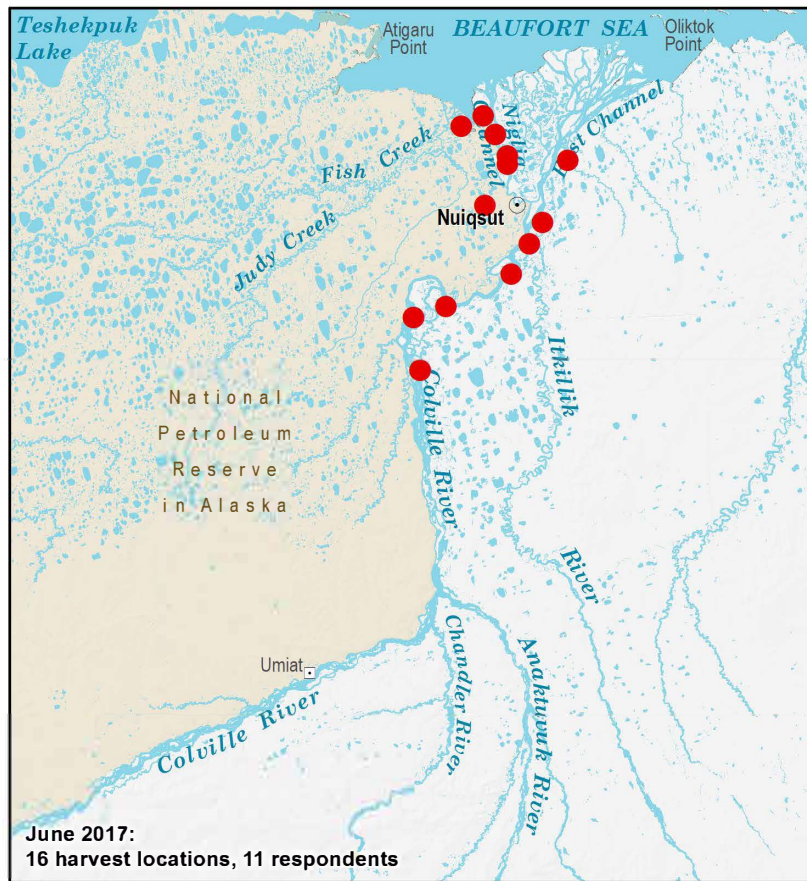
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Map 16 Caribou Harvest Locations May - October, Year 10

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 68 active harvesters in November of 2017.

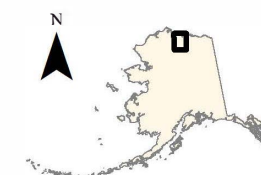
Other areas may have been used for resource harvesting.

LEGEND

Harvest Locations



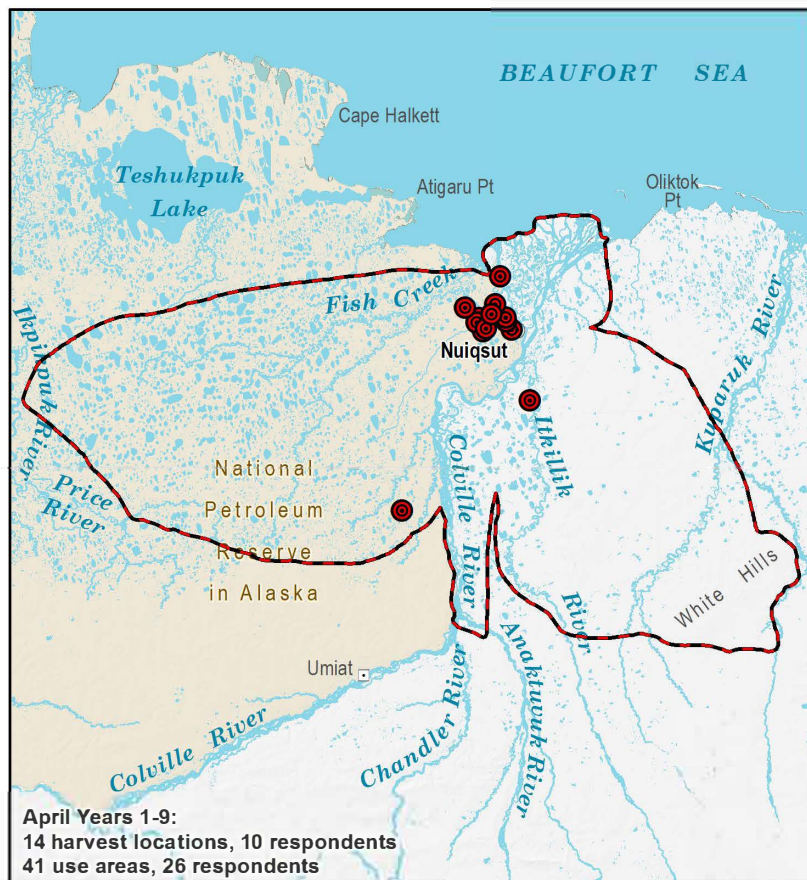
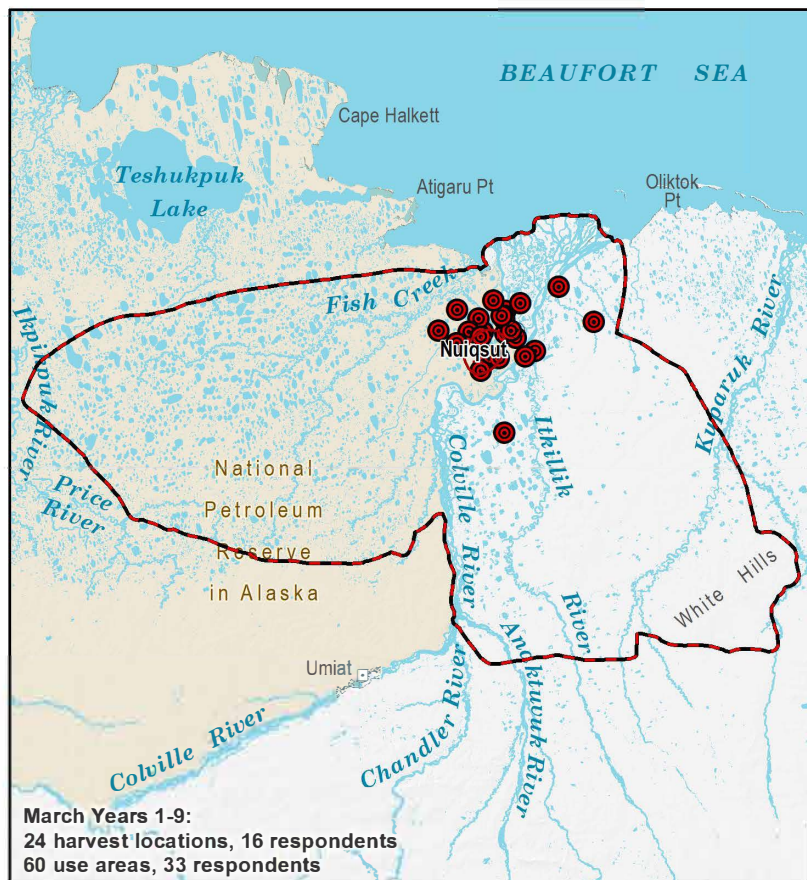
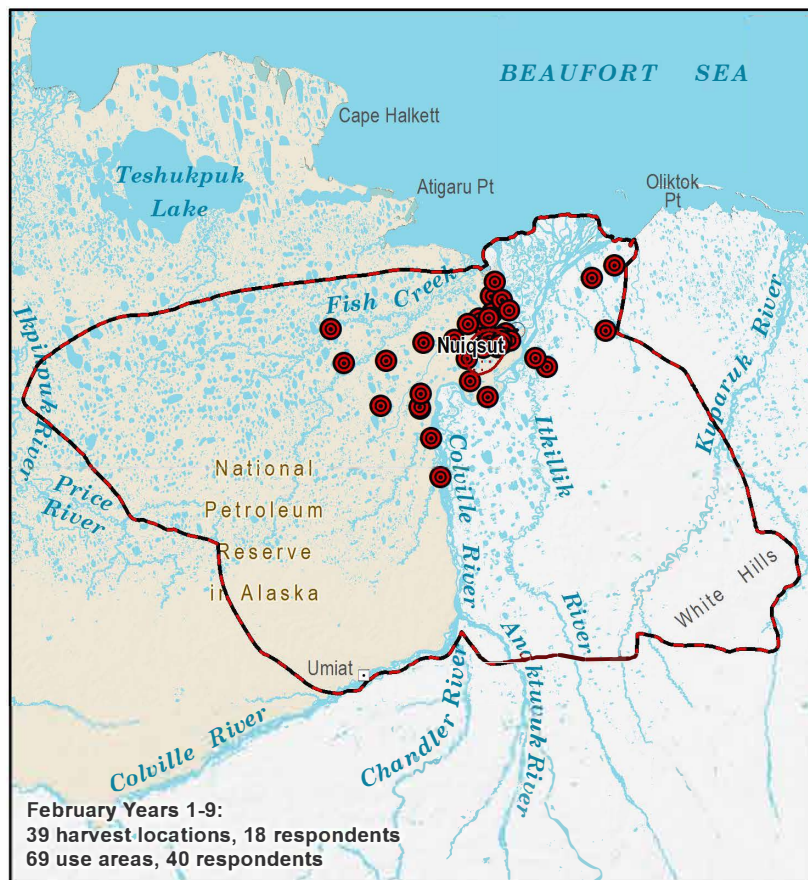
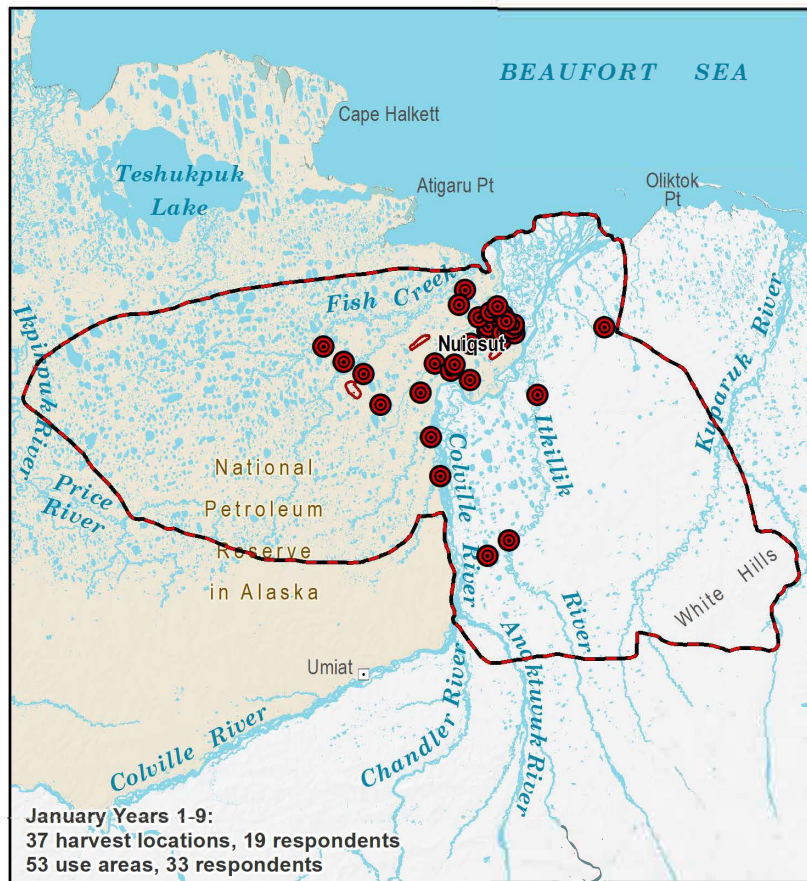
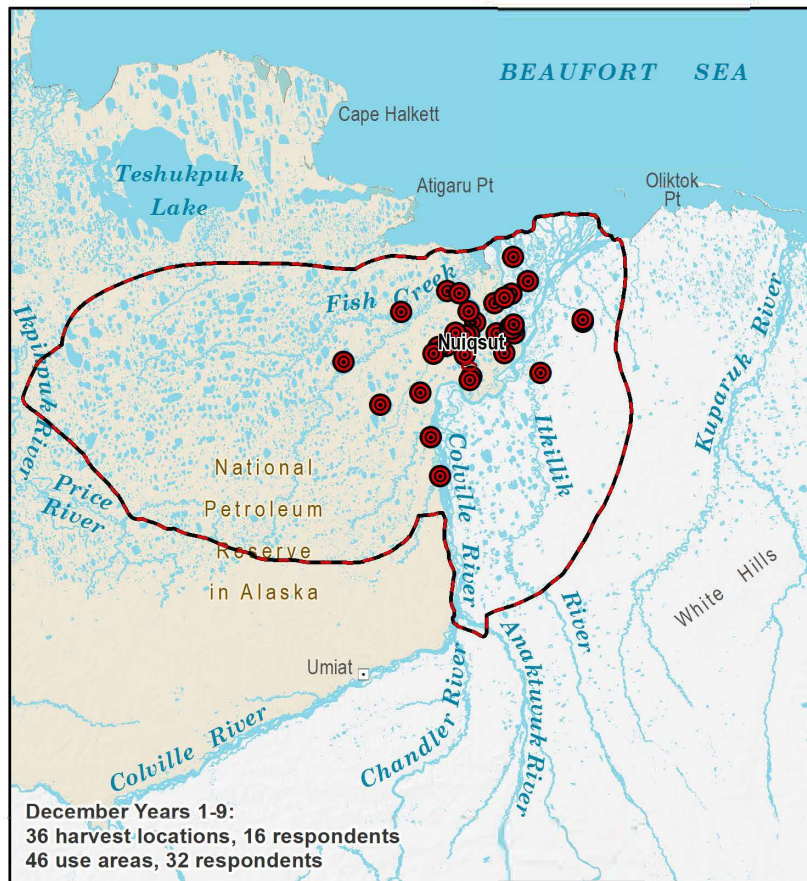
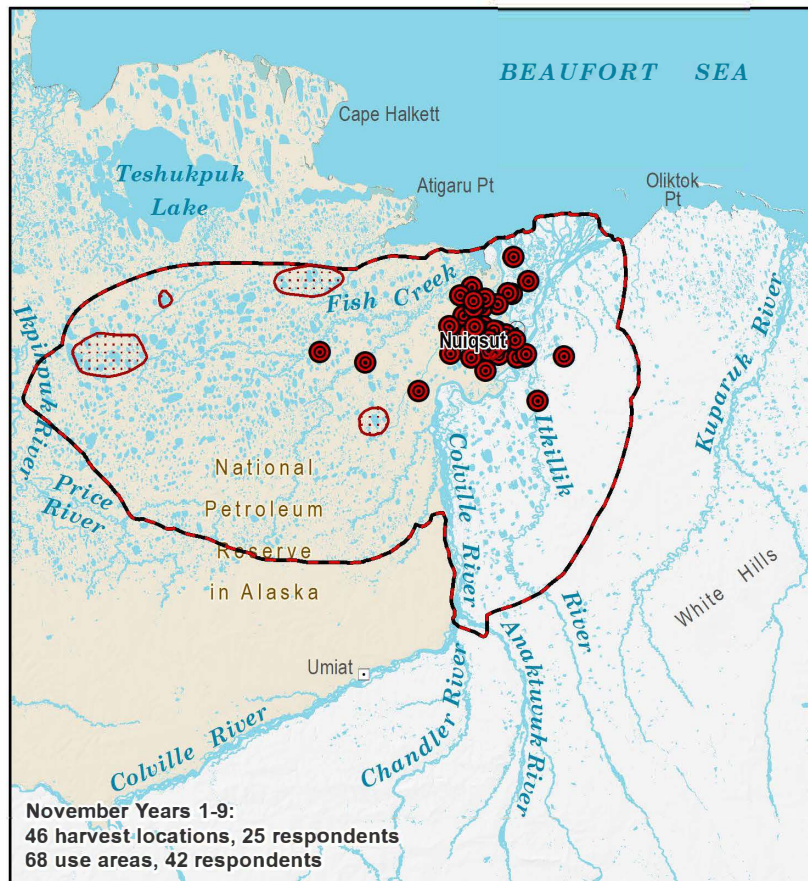
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Map 17 Caribou Harvest Locations and Use Areas, November - April, Years 1-9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik 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

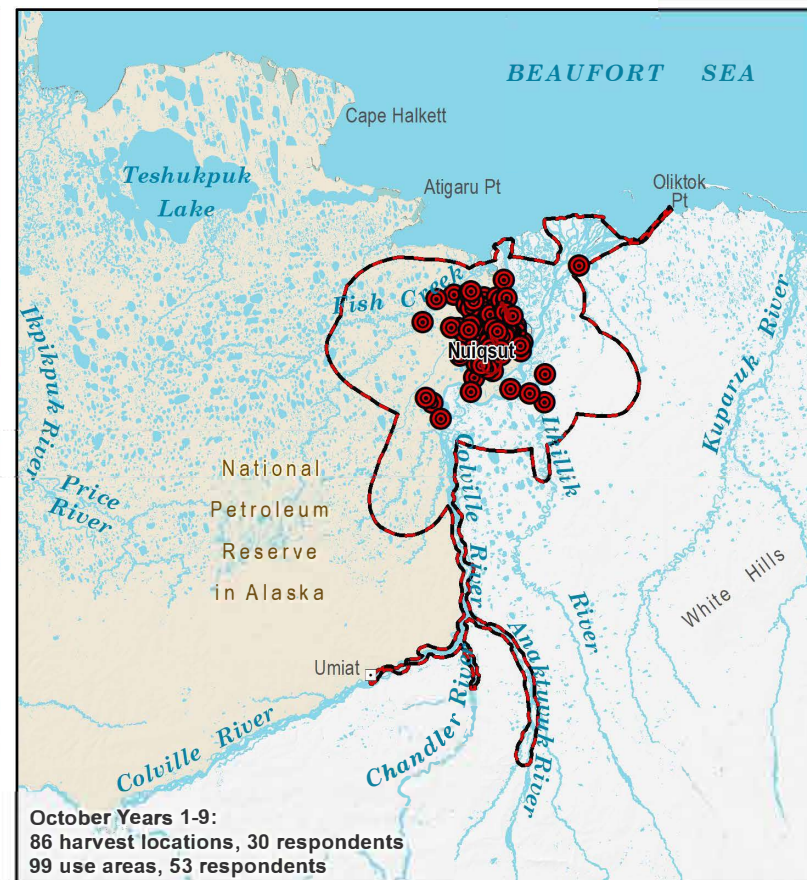
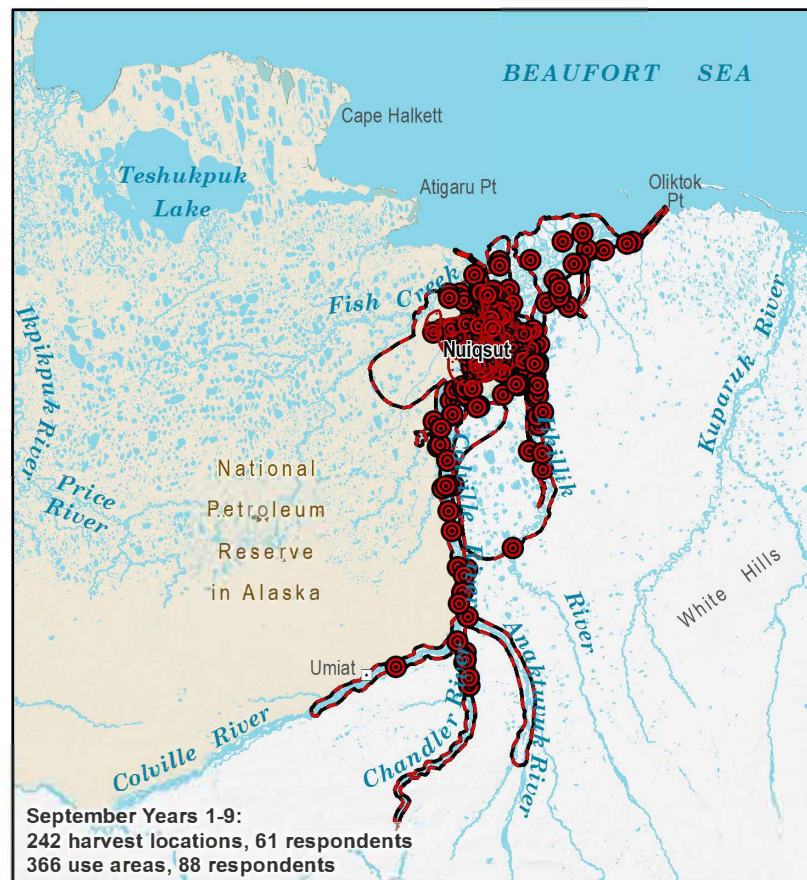
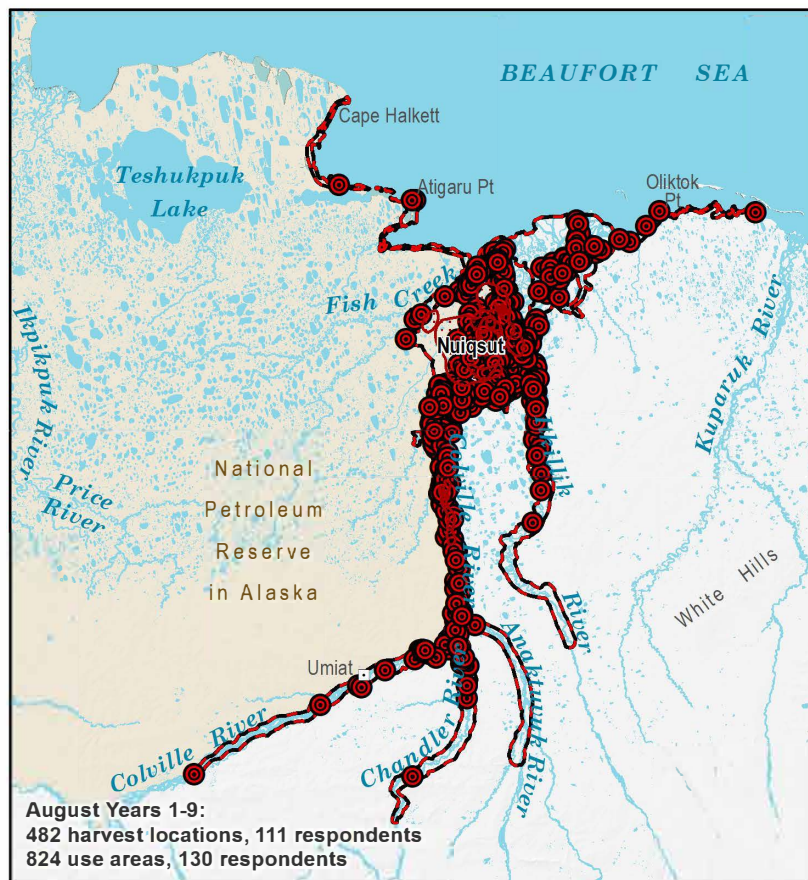
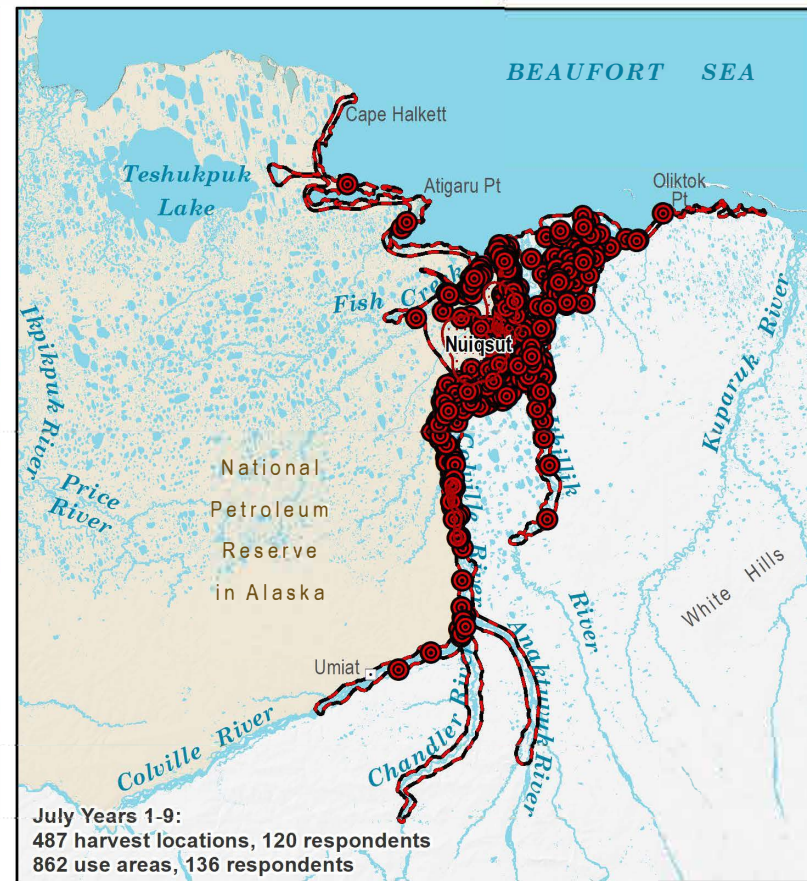
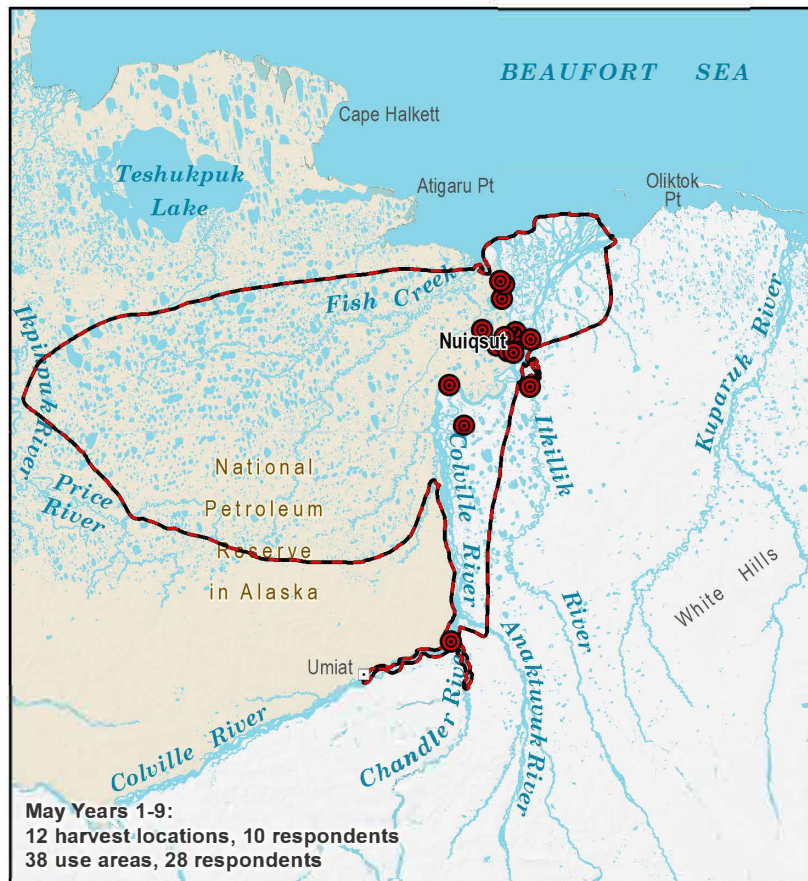


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Map 18 Caribou Harvest Locations and Use Areas, May - October, Years 1-9

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 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



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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 of the community occurred during July and August but was most prominent during September. Use of the road system increased again in September, which coincides with the opening of the GMT1 road. Harvest sites were generally located in areas of high overlap during each month, although the month of July shows a heavy occurrence of harvests along Itkillik River which is not reflected by a high amount of use area overlap during that month. Harvest locations were reported in every month. Harvests in June were focused along Nigliq Channel and upriver from the community toward Ocean Point; successful harvests increased and extended to Nigliq Channel and the East Channel in July. In August, harvests extended farther upriver toward Umiat, while residents continued harvesting caribou along Nigliq Channel and Itkillik Channel with some overland and road harvests occurring as well. September harvests occurred most frequently to the west of the community but also near the mouth of Itkillik River. Year 10 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

Boat remained the principle travel method to caribou use areas in Year 10, with 70 percent of use areas accessed using this method. 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 10. Snowmachine use areas were at an all-time low in Years 9 and 10, 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, 14 percent in Year 9, and 11 percent in Year 10 (Table 9). Four-wheeler use was reported at 16 percent of use areas, higher than the average across all years. The increased use of truck, and possibly also four-wheeler, in recent years is due to respondents' increased use of the recently constructed Spur road and roads to CD5 and GMT1.

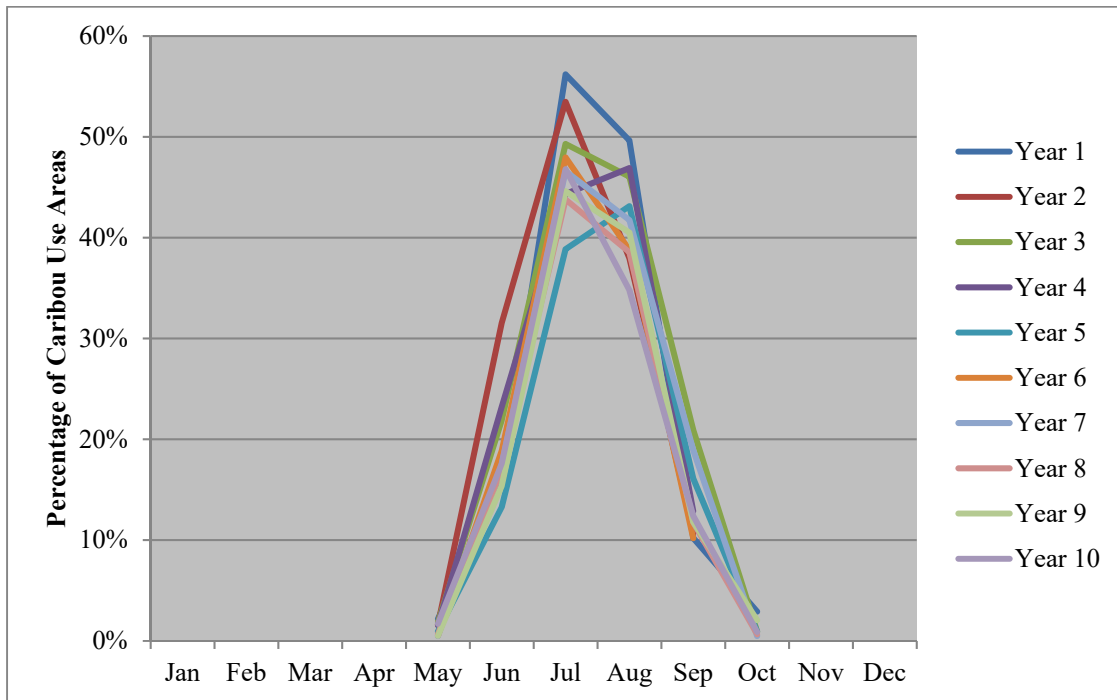
Table 9: Travel Method to Caribou Use Areas, Years 1-10

Travel Method	Percentage of Caribou Use Areas									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Boat	74%	80%	74%	80%	74%	77%	70%	65%	69%	70%
Snowmachine	22%	9%	16%	12%	8%	10%	15%	8%	6%	6%
Four-wheeler	4%	9%	9%	9%	17%	11%	14%	18%	13%	16%
Truck	2%	2%	<1%	0%	1%	1%	1%	8%	14%	11%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Stephen R. Braund & Associates, 2019.

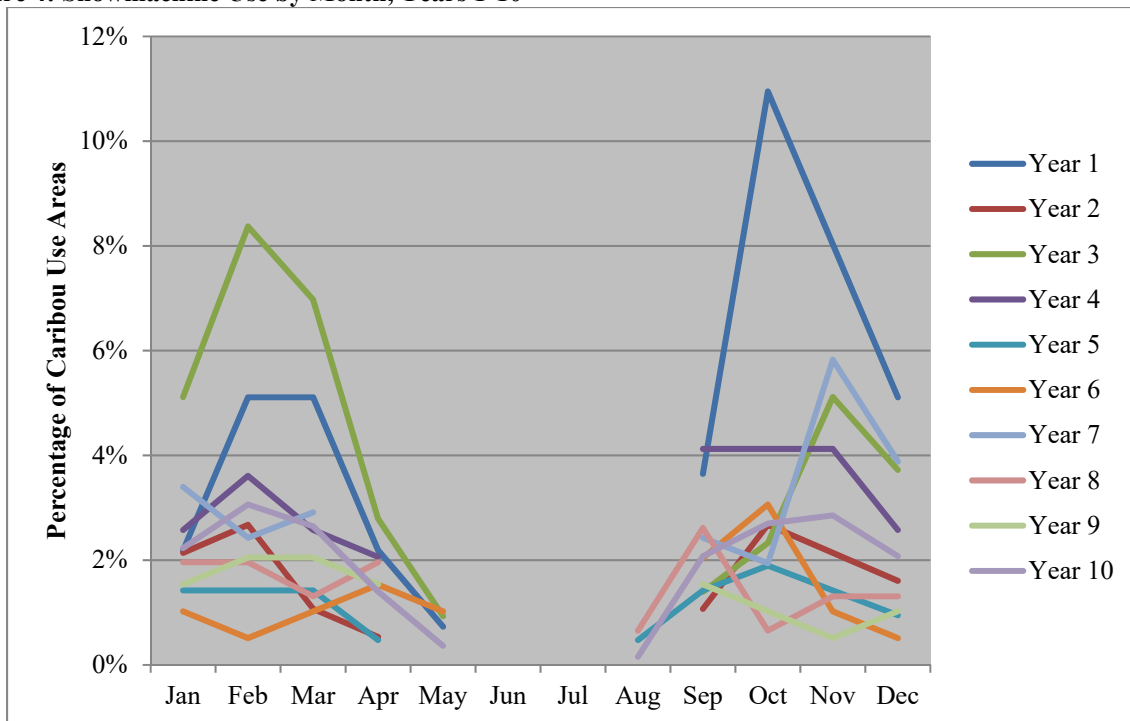
In general, boat travel begins as soon as the ice breaks up in June and continues until sometime in September when the waterways ice over again; in some years, boat travel can commence as early as May and extend as late as October. In terms of the percentage of use areas, the peak month for boat travel for Years 1, 2, and 3 was July, with Years 4 and 5 having a slightly later peak in August, and Years 6 through 10 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. Snowmachine use by active harvesters generally occurs beginning in September through April or May depending on the snow cover. During Year 10, snowmachine use occurred at varying levels from September through May, peaking in February and March (three percent of use areas) (Figure 4). As mentioned above, in Year 10, only six percent of use areas were accessed by snowmachine, tied for Year 9 as the lowest of any study year. As with boat, the extent of snowmachine travel is dependent on the weather and the availability of caribou during the winter months. During the September 2019 panel meeting, panel members noted that the decrease in snowmachine use is likely due to poor snow conditions in recent years, as well as the high cost of snowmachines. As one panel member said, “[Snowmachines] cost an arm and a leg now. It is like buying a car” (SRB&A Nuiqsut Caribou Panel Meeting September 2019).

Figure 3: Boat Use by Month, Years 1-10



Stephen R. Braund & Associates, 2019.

Figure 4: Snowmachine Use by Month, Years 1-10



Stephen R. Braund & Associates, 2019.

A number of respondents indicated that they did not have a working snowmachine in Year 10 or that they do not travel by snowmachine because of age/health reasons. As one respondent, stated, “I hardly go on a snowmachine anymore. They won’t let me go on a snow machine—they say I am too old now!” (SRB&A Nuiqsut Interview November 2017).

In Year 10, residents frequently reported using a combination of road and overland vehicles to access hunting areas to the west of the community. These activities generally involved spotting for caribou from a truck or car and either hauling or returning to the site with an overland vehicle (i.e., snowmachine or four-wheeler) once caribou were spotted. Respondents noted that the GMT1 road allows them to access areas not usually accessed using overland methods, particularly during the snow-free months:

Last month down the Spur road all the way to GMT1, we went off on snowmachine. We just drove down with the snowmachine in the back of the truck. We were looking the whole way. We just went probably a couple of miles out.... Went all the way out to the pad and took the snowmachine out. They were probably a couple of miles out from GMT1. (SRB&A Nuiqsut Interview November 2017)

Me and my sister, we drove down this way with her, and we went back to Nuiqsut and grabbed two Hondas and we took off from right here and we seen two to three caribous....We were able to get on and off [with the ATV], we had to go around these lakes to get on this side to where the caribous were. (SRB&A Nuiqsut Interview November 2017)

Oh, and over here, when I said I got caribou over here. I got four right here, and I forgot about that. I used my snowmachine on my trailer and went to GMT1 and got my snowmachine off my trailer, and then I went out there. I just spotted them there [from the road]. (SRB&A Nuiqsut Interview November 2017)

Others simply spotted caribou within walking distance of the road system and traveled by foot:

...and then I know that we caught some on the other side of that here. That was maybe 50-100 feet off the road, we didn’t walk too far. It was within walking distance but not too far off. Mainly on the Spur road. (SRB&A Nuiqsut Interview November 2017)

No [I didn’t use an ATV], I was just walking if I went on and off [the road]. Just my brother was out with the four-wheeler. I caught that one here, and then I called my brother [and said], “I need the four-wheeler” and then he came and got it. (SRB&A Nuiqsut Interview November 2017)

Boat travel was similar to previous years, although several respondents noted the use of a new channel near Puviksuk (see above under “Location of Caribou Use Areas and Harvest Sites”). In general, the distance traveled along various channels depends on water levels and the type of boat being used:

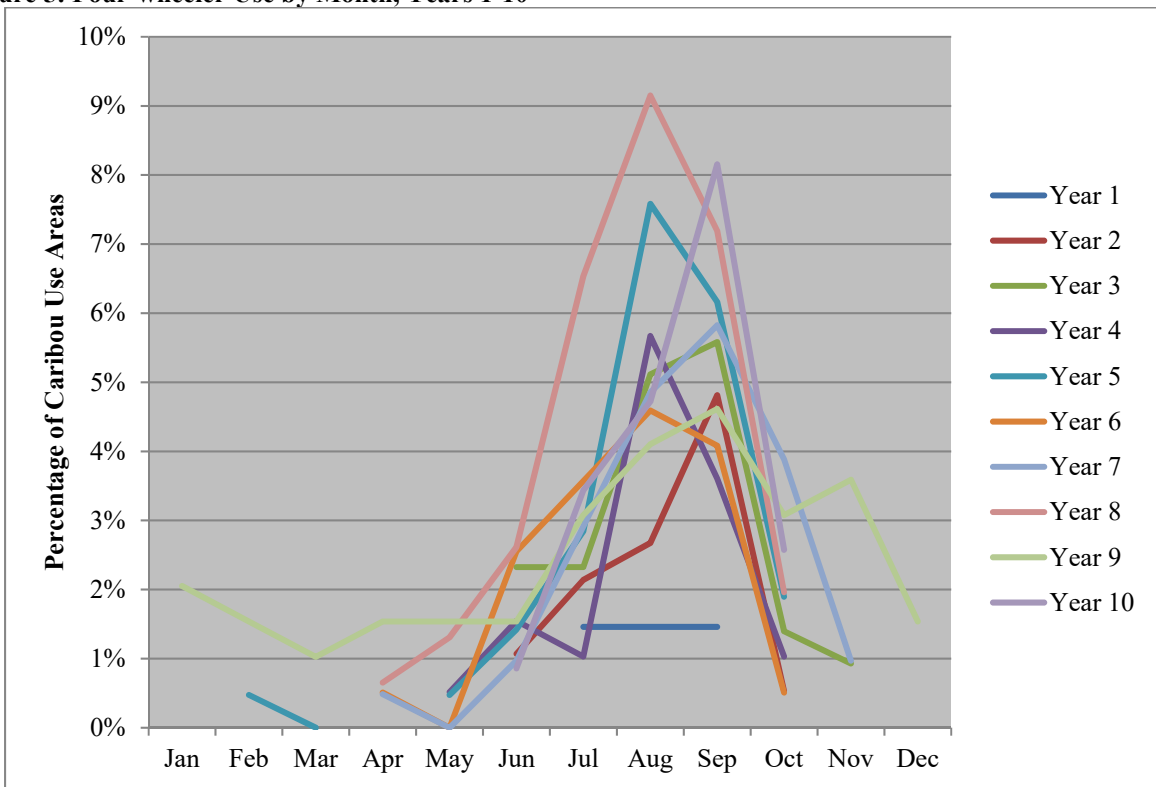
My brother just got a brand new 22 footer top of the line boat and we can get it anywhere. And I we went and checked out some other channels too. We went all the way up to that sharp bend. (SRB&A Nuiqsut Interview November 2017)

I also went to my cabin too, with my boat. I didn’t go boating very much this year, because my trailer needs to be worked on, but I went out a little. My cabin is by Helmericks. Most of these spots are just really shallow so we stayed out on the main channel. Normally, I go this way. We took Napasalu. Sometimes we can go through Putu when the river is high but not all the time. We didn’t go into Itkillik, really. (SRB&A Nuiqsut Interview November 2017)

I was on that lake down over here and I don't know where that's at on this map. It was like over here [inside Kupiklurik] I went past the bridge and I went into that lake back there. It is way back there. You can get back there. I just lucked out and got in there. I have a jet unit on my boat so I can go a lot farther than other people can go. (SRB&A Nuiqsut Interview November 2017)

Four-wheeler use is usually limited to the summer and fall months, starting in April/May and tapering off in October/November (Figure 5). While Year 9 showed year-round four-wheeler use, in Year 10 four-wheeler travel was once again limited to the summer and fall months. Four-wheeler use in Year 10 peaked strongly in September with lesser use in July, August, and October. Overall, Year 10 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.

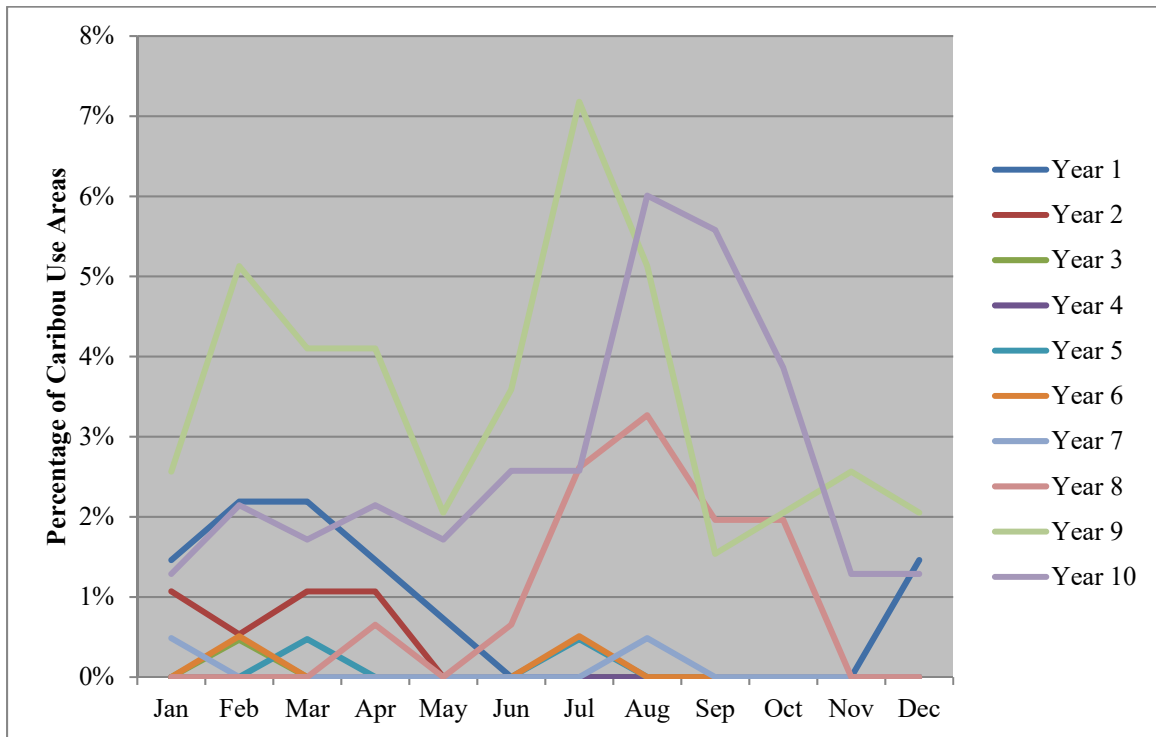
Figure 5: Four-wheeler Use by Month, Years 1-10



Stephen R. Braund & Associates, 2019.

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 beginning in Year 8 (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, CD5 road, and subsequently the GMT1 road, truck use in Years 8 through 10 increased during non-winter months. In Year 10, truck use peaked during the months of August through October when the GMT1 road opened and continued at lower levels throughout the fall, winter, and spring.

Figure 6: Truck Use by Month, Years 1-10



Stephen R. Braund & Associates, 2019.

Caribou use areas by transportation method are shown on Map 19 through Map 26. Caribou use areas by travel method for previous study years are shown in Appendix D. Map 19 shows that Year 10 respondents traveled by boat primarily along the Colville River, with high overlaps occurring along the Nigliq Channel and upriver along the Colville River to the Ocean Point area. Moderate overlapping use occurs farther upriver toward Sentinel Hill and Chandler River and along the East Channel and Itkillik River. 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 near Umiat, and in coastal areas. Boating use areas for Year 10 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 did not travel along the Anaktuvuk River by boat in Year 10.

In Year 10, 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, CD5 road, and GMT1 road (Map 21). Four-wheeler travel extended to Fish Creek. A majority of four-wheeler use areas extended directly west from the community toward the Ublutuoch River, or to the north and northwest of the community along the road system. In addition, respondents used the road system to access overland use areas to the south of the road as well as accessing areas off the end of the GMT1 road. Several individuals indicated that they did less travel to the north of the road because of the presence of pipelines on that side of the road. Low to moderate use occurred along the Nigliq channel, south of the community toward Ocean Point, and farther west toward Fish Creek. Year 10 four-wheeler activity (Map 21) was similar to Years 1 through 9 in terms of extent (Map 22), but included greater overlapping use in areas farther toward Fish Creek and along the road system.

Compared to hunting by four-wheeler, snowmachine hunting generally occurs over a larger area and varies the most from year to year. During Year 10, 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 toward Ocean



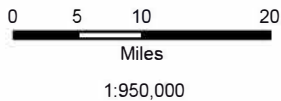
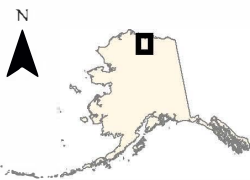
Map 19 - Method of Transportation to Caribou, Use Areas, Boat, Year 10

Year 10: November 2016 - October 2017

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 68 active harvesters in November 2017.

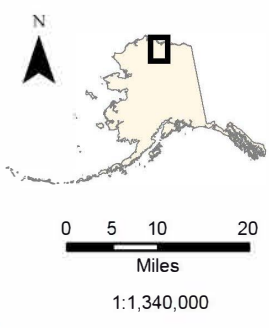
High 164 caribou areas used by 62 respondents
Low

Other areas may have been used for resource harvesting.



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Map 20 - Method of Transportation to Caribou Use Areas, Boat, Years 1-9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik 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 2017.

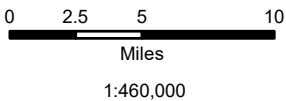
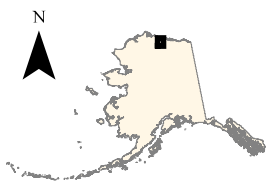
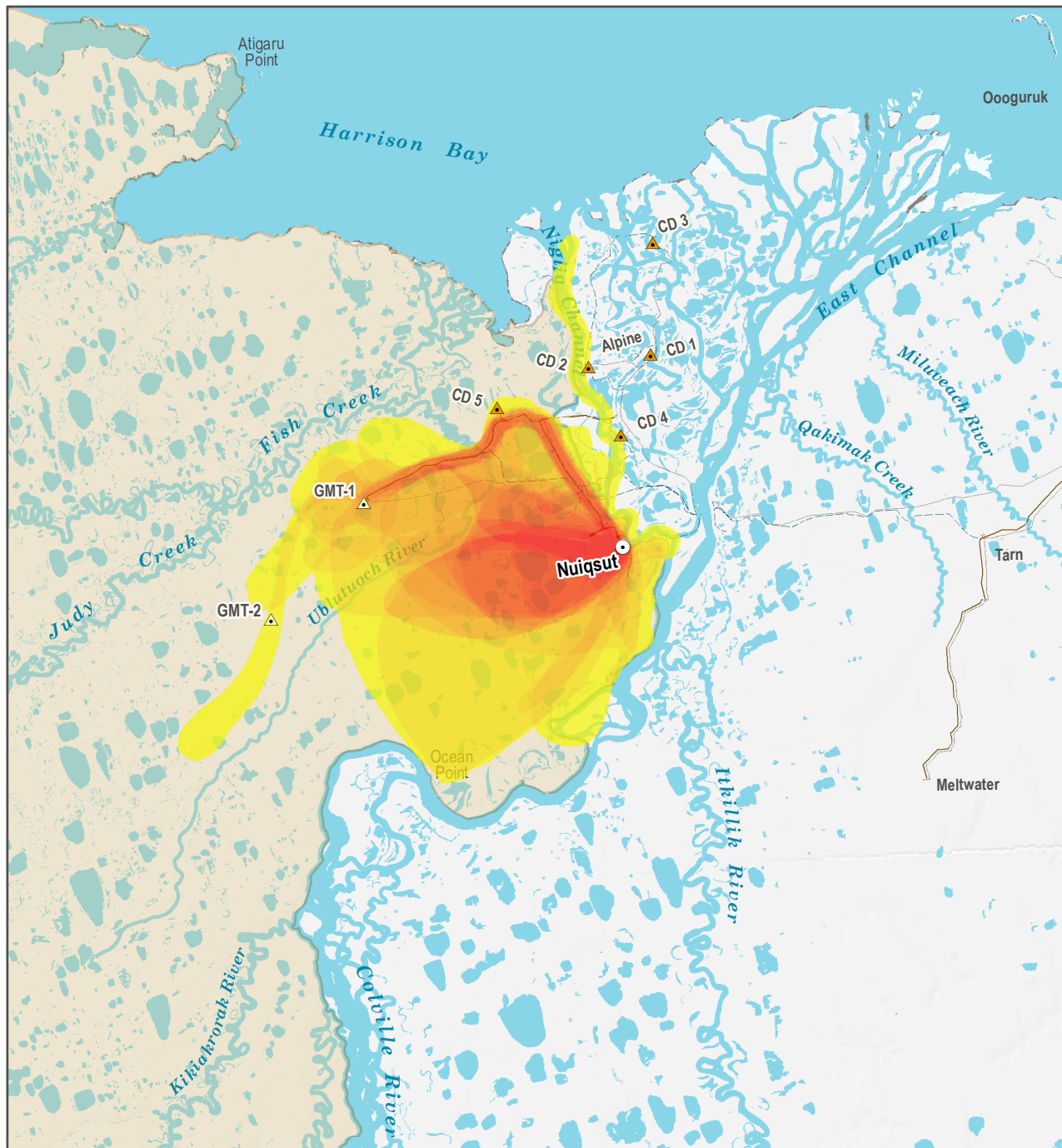
Other areas may have been used for resource harvesting.

Years 1-9: January 2008 - October 2016

 1252 caribou areas used by 144 respondents

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Map 21 - Method of Transportation to Caribou Use Areas, Fourwheeler, Year 10

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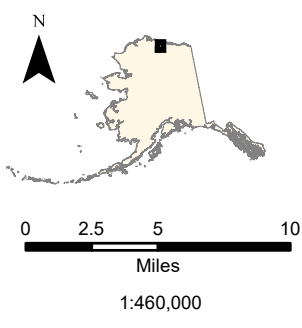
Other areas may have been used for resource harvesting.

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**Year 10: November 2016
 - October 2017**

High 37 caribou areas used by 27 respondents
Low


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Map 22 - Method of Transportation to Caribou Use Areas, Fourwheeler, Years 1-9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 158 active harvesters from March 2009 through November 2017.

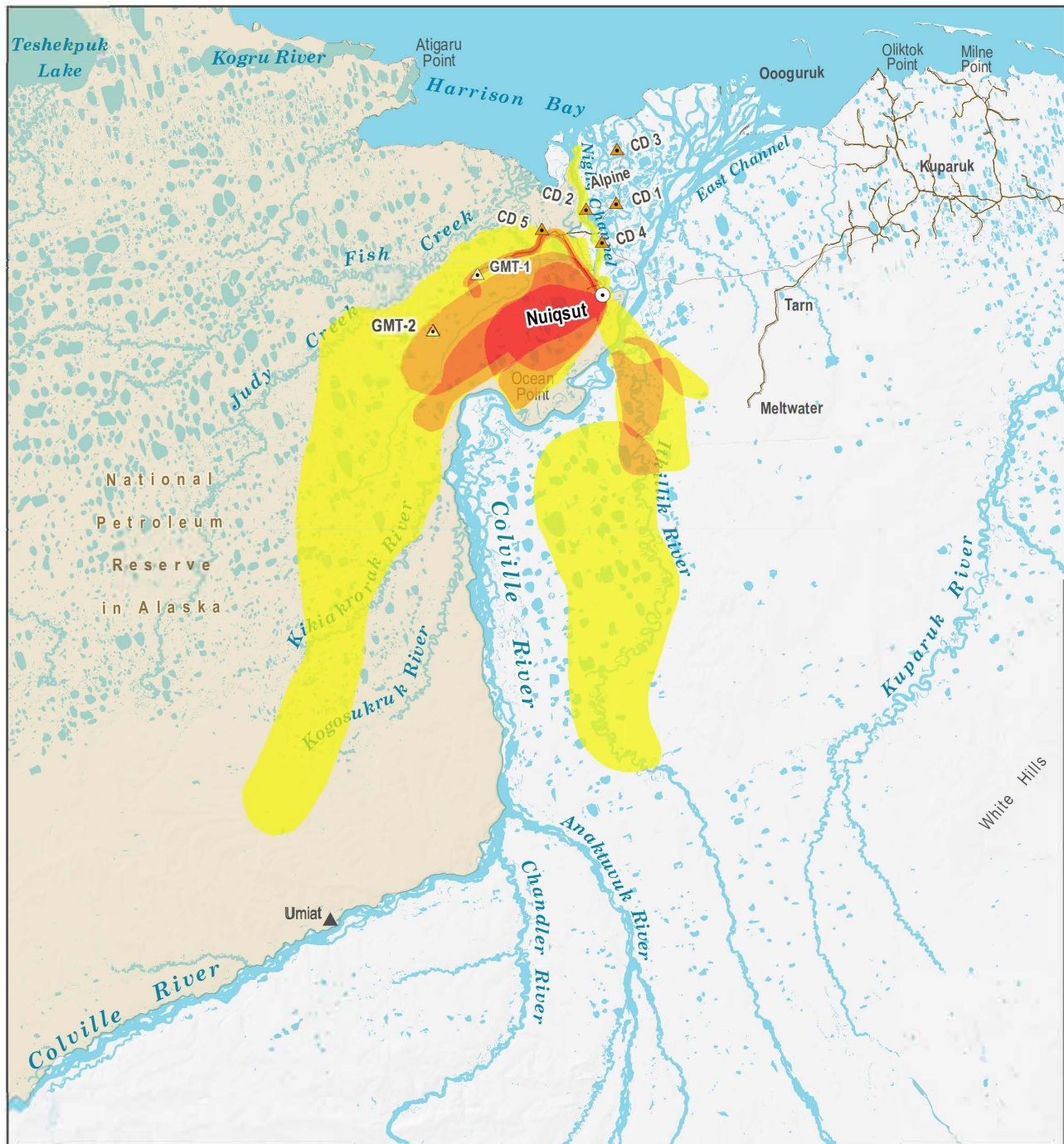
Other areas may have been used for resource harvesting.

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Years 1-9: January 2008 - October 2016

 197 caribou areas used by 65 respondents


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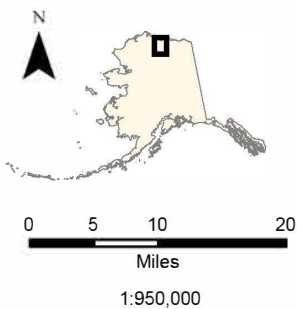
Map 23 - Method of Transportation to Caribou Use Areas, Snowmachine, Year 10

Year 10: November 2016 - October 2017

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 68 active harvesters in November 2017.

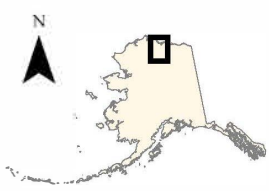
High 14 caribou areas used by 10 respondents
Low

Other areas may have been used for resource harvesting.



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Map 24 - Method of Transportation to Caribou Use Areas, Snowmachine, Years 1-9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kookipik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 158 active harvesters from March 2009 through November 2017.

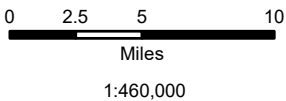
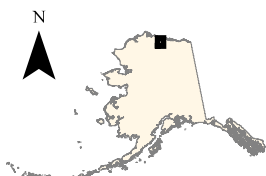
Other areas may have been used for resource harvesting.

Years 1-9: January 2008 - October 2016

 194 caribou areas used by 66 respondents

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Map 25 - Method of Transportation to Caribou Use Areas, Truck, Year 10

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 68 active harvesters in November of 2017.

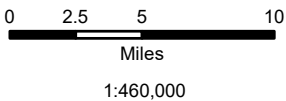
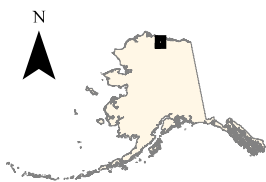
Other areas may have been used for resource harvesting.

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**Year 10: November 2016
 - October 2017**

High 25 caribou areas used by 23 respondents
Low


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Map 26 - Method of Transportation to Caribou Use Areas, Truck, Years 1-9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 158 active harvesters from March 2009 through November of 2017.

Other areas may have been used for resource harvesting.

Years 1-9: January 2008 - October 2016

 52 caribou areas used by 40 respondents

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Point (Map 23). However, individuals traveling by snowmachine also traveled farther to the southwest of the community toward Kikiakrorak and Kogosukruk rivers and to the southeast in area surrounding the Itkillik River. Some individuals also used the road system when traveling by snowmachine. In general, the extent of snowmachine use areas in Year 10 compared to Years 1 through 9 (Map 24) was much smaller than the extent of previous years, but larger than some recent study years.

As noted above, truck use by Nuiqsut caribou harvesters increased starting in Year 8 due to construction of the Spur road and subsequent construction of the Nigliq Channel bridge, road to CD5, and road to GMT1. In Year 10, truck use areas were concentrated along the Spur road, with a smaller but still moderate number of truck use areas occurring on the CD5 and GMT1 roads (Map 25). In previous years, respondents have also reported limited truck use along ice roads north of the CD5 road, east towards Tarn, and farther west to Judy Creek (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. At 57 percent of use areas, Year 10 was within the range of previous years in terms of successful use areas. In Year 10, the average number of caribou harvested per use area (1.3) was lower than 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 1.6, also lower than previous study years (between 1.8 and 2.3).

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

Success Response	Percentage of Caribou Use Areas									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Yes (successful)	78%	61%	58%	55%	64%	54%	61%	65%	53%	57%
No (unsuccessful)	22%	39%	42%	45%	36%	46%	39%	35%	47%	43%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Use Areas	137	187	215	194	211	196	206	153	195	233

Stephen R. Braund & Associates, 2019.

Table 11: Mean Number of Caribou Harvested Per Harvest Location and Subsistence Use Area, Years 1-10

Mean Number	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Mean Number Caribou Harvested Per Harvest Location	2	1.8	1.9	2	1.8	1.9	2.2	2.3	1.9	1.6
Number of Harvest Locations	182	152	196	162	195	143	248	173	163	189
Mean Number Caribou Harvested by Use Area	2.7	1.5	1.7	1.7	1.6	1.4	2.7	2.6	1.6	1.3
Number of Use Areas	137	187	215	194	211	196	206	153	195	233

Stephen R. Braund & Associates, 2019.

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.

A number of respondents discussed the reasons why they believed they were not successful in a particular area, including caribou being too far inland to access from riversides, and hunters not able to find a preferred caribou (e.g., too small, rutting). A number of individuals indicated a lack of caribou in traditional harvesting areas. Residents reported that the locations of caribou herds in Year 10 were somewhat unpredictable, or noted that the caribou were staying inland from the rivers and were therefore inaccessible to hunters:

It's just for the past how many years, just for going upriver at Ocean Point I could get four to five tuttus and they aren't there anymore. (SRB&A Nuiqsut Interview November 2017)

We saw caribou but we weren't successful because they were too far. We were at Lydia's camp but they were around here and we couldn't get to them. (SRB&A Nuiqsut Interview November 2017)

I was looking [at the East Channel], but I didn't see [any caribou] out there. That was in July. That was four trips. That was just a day [trip]. No luck out there. This year was basically just a lot of traveling [and no harvesting]. (SRB&A Nuiqsut Interview November 2017)

Others believed that development infrastructure or activities had affected their caribou hunting success in Year 10. Respondents cited an inability to harvest otherwise accessible caribou due to the presence of infrastructure, and diversion of caribou from usual hunting areas due to infrastructure (roads) or noise/activity:

I got them by CD4, on this side over by the bridge. [I harvested] two caribou. And when I was trying to harvest the caribou, as I was pointing at the caribou, I was actually pointing at the bridge too. I waited for the caribou to move, and I waited until they would move from the bank of the river to see if I could get a shot that did not have the bridge [in the way]. But that was my big concern that I would not get a shot. (SRB&A Nuiqsut Interview November 2017)

Where's CD5? We were able to pass CD5, scouting and then go back. When we saw that worker, we said, "Okay, I think we're in the wrong area" and we went back and they were happy, and it was kind of a restricted area because they were bringing gravel. We saw some [caribou] quite a ways [from the road], but we couldn't shoot them because it was towards the oil field. (SRB&A Nuiqsut Interview November 2017)

Nowadays we drive over there through the Spur road. I don't like it, 'cause the caribous don't go over there anymore, they're scared of it. I don't know where they always go nowadays, they say they're all by Fish Creek right now, away from the road. They mostly hang out over there these days, we always see caribous over here and over there. Nowadays [farther from the village]. (SRB&A Nuiqsut Interview November 2017)

Sometime in October, I was on the west side and I got only three caribou and no sign of them. I would go farther this way. And I got a caribou right around this first creek here, somewhere right around here.... That's where I got my last caribous, only three. This road is blocking the migration. They mostly want to be on the north side around here, this whole area. Then we are having a hard time crossing the creeks because they are getting wider. I am seeing caribous on the north side right now and they are migrating by Nigliq.... 45 years [I went out

west of Nuiqsut]—that’s always been my hunting area. Right in here. And only three caribous. It was like every other day [that I went hunting]. More than 30 times. I saw some guys on a four-wheeler and I said, ‘This road is blocking the migration.’ It’s so high. It’s way up there! This was in September. Nothing in October. (SRB&A Nuiqsut Interview November 2017)

This season I got four caribou and they were between Nuiqsut and Ocean Point, and the caribou are getting hard to find anymore because of the noise. I’ve been catching them on a quiet spot, and it’s between Ocean Point and Nuiqsut, right in that area. Right over here. Eight miles from here [straight west], that’s where I usually catch my caribou for the last 40 years, and I go catch here once in a while because that’s where I used to, but they’re not there—they’re disturbed. So I go check by Ocean Point and these lakes, because they’re away from all the noise and they’re not surrounded by the pipelines and CD5. (SRB&A Nuiqsut Interview November 2017)

A couple of individuals observed a lack of harvestable bulls during the early fall, indicating that the bulls had possibly rutted early in 2017:

But I kept going back and I got more along the CD6 [GMT1] road. Somewhere around this area. That is when they start moving towards the road from that side. A couple of them around here. There were hardly any bulls out here, mostly cows. Most of them were females and young bulls. [I got females]. I heard they must have been rutting early. (SRB&A Nuiqsut Interview November 2017)

We went out twice. The first time we didn’t make it out all the way but the second time we made it all the way out. The second we caught a caribou but it stank so we just left it. They don’t get stink until September maybe October usually but they were getting stink in August. (SRB&A Nuiqsut Interview November 2017)

In contrast to the comments above, some respondents such as the following reported high success rates in Year 10:

They were all bulls, just bulls. They were nice and fat caribou. They were in a group. There were lots of them, lots of caribou this year. So I just went out and got a few. Just enough to have meat. (SRB&A Nuiqsut Interview November 2017)

During the September 2019 meeting of the Nuiqsut Caribou Panel, panel members expressed the belief that community harvest success rates had declined, with one individual stating, “There has been more and more people coming to me and asking for caribou.” Another panel member added that decreased success rates could be related to the lack of fuel vouchers and resulting change in community harvest participation and methods:

Panel Member 1: The other problem might be the lack of fuel vouchers from the city. Hardly any people go out boating and set their nets. You see less people that are out boating, and you see more on the spur road, and that makes a lot of difference in why people are hunting in vehicles than out boating. We haven’t seen cash vouchers in a while now.

Panel Member 2: It has been a couple of years. It is all up to the mitigation committee. They do have a community meeting.

Panel Member 1: A portion of that used to go to the hunters for gas vouchers, but we haven’t seen that in a while. It has gone more to seeing the paper checks. But when the gas vouchers are available, there are more people hunting. (SRB&A Nuiqsut Caribou Panel Meeting September 2019)

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 1 through 10, and categorizes each area as yellow, orange, or red. The yellow areas represent the smallest percentage of the total caribou harvest (less than 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. Year 9 was the first year that the Colville River South provided less than two percent of the harvest; however, in Year 10 the area provided six percent of the harvest. The only area that has consistently provided more than 15 percent of the harvest during all 10 study years is West of Nuiqsut (Area 11); Nigliq Channel provided 17 percent of the harvest in Year 10, an increase from the previous three years (between 9 and 12 percent).

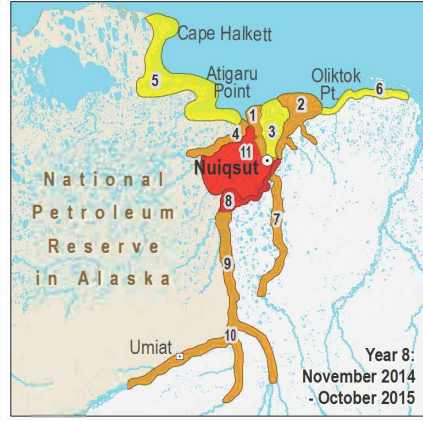
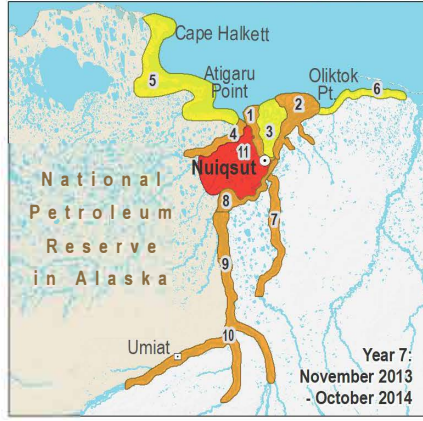
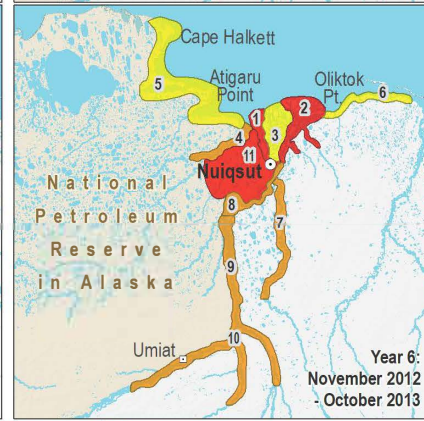
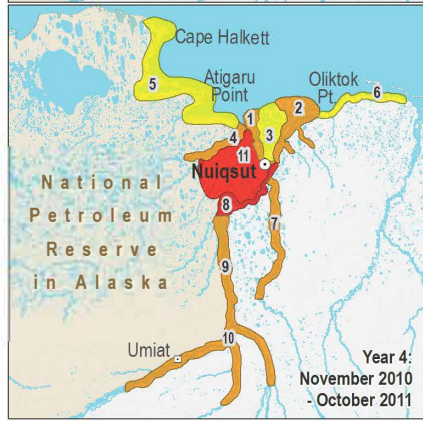
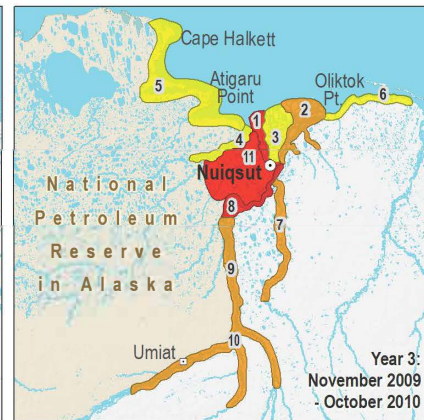
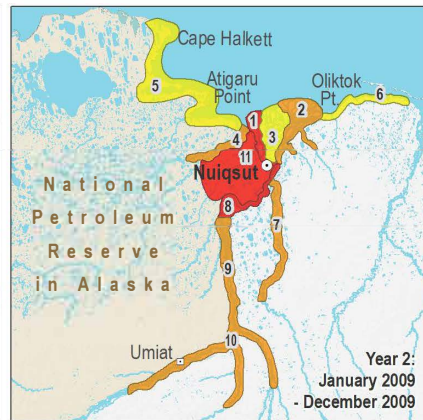
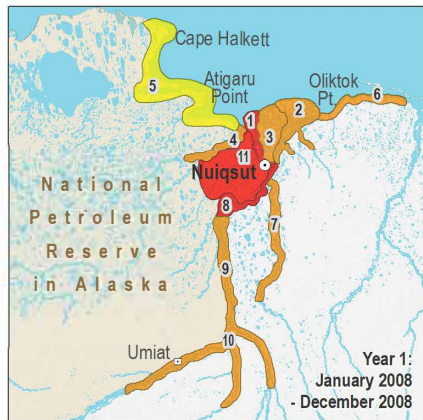
Table 12 shows that during Year 10 the area West of Nuiqsut (Area 11) accounted for the highest portion (30 percent) of caribou harvested, similar to previous years. The area West of Nuiqsut and the Nigliq Channel area were the only areas contributing more than 15 percent of the harvest in Year 10 (see Map 27). Continuing a trend from Year 9, Itkillik River accounted for 15 percent of the harvest, higher than any previous study year. In addition, the "Other" area (including all areas outside Areas 1 through 11) provided a greater percentage of the harvest than any previous study year, at nine percent. Most of these "Other" harvests occurred in overland areas around the Itkillik River and overland to the west and southwest of the community. The East Channel Colville area provided a lower percentage of the harvest compared to previous years, at four percent. The Ocean Point, Sentinel Hill, and Colville River South areas provided 12 percent, five percent, and six percent of the harvest, respectively.

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 10, 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 (15 percent) was higher in Year 10 than in any previous year, and the actual number harvested (45) was also the highest. Similarly, the percentage of harvests occurring in the area West of Nuiqsut was lower than the previous three years; while the number harvested in Year 10 (94) was lower than the previous two years (112 and 173 caribou), it was similar to Year 7 (91).

Table 13 shows the number of harvest locations by the number of caribou harvested for study years 1 through 10. 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 10, respondents reported harvesting either one or two caribou at 86 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 seven caribou were harvested at the remaining three percent of harvest locations.

Table 12: Percentage of Caribou Harvest Locations and Caribou Harvests by Caribou Hunting Area, Years 1-10

Caribou Hunting Area		Percentage of Caribou Harvest Locations										Percentage of Total Caribou Harvests									
		Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
1	Nigliq Channel	19%	18%	16%	17%	15%	23%	8%	9%	12%	18%	23%	22%	18%	15%	15%	27%	9%	10%	12%	17%
2	East Channel Colville	8%	8%	8%	12%	17%	14%	9%	8%	9%	5%	8%	8%	7%	10%	20%	18%	11%	9%	10%	4%
3	Other Colville Delta	2%	1%	2%	1%	1%	1%	0%	1%	1%	0%	2%	1%	1%	1%	2%	1%	0%	0.3%	0%	0%
4	Fish Creek	8%	7%	1%	1%	1%	3%	4%	3%	7%	2%	7%	7%	1%	2%	0%	3%	5%	3%	5%	2%
5	Coastal West	1%	0%	1%	0%	2%	1%	0%	0%	0%	0%	1%	0%	1%	0%	1%	1%	0%	0%	0%	0%
6	Coastal East	3%	0%	1%	1%	1%	0%	0%	0%	1%	0%	3%	0%	1%	1%	4%	0%	0%	0%	1%	0%
7	Itkillik River	7%	4%	5%	7%	5%	7%	8%	6%	11%	12%	6%	4%	5%	4%	4%	6%	7%	5%	11%	15%
8	Ocean Point	22%	23%	21%	19%	16%	5%	13%	17%	17%	15%	17%	20%	15%	17%	11%	4%	7%	21%	12%	12%
9	Sentinel Hill	9%	10%	8%	8%	6%	9%	6%	6%	9%	7%	9%	9%	7%	5%	3%	6%	7%	4%	8%	5%
10	Colville River South	4%	11%	10%	4%	6%	11%	8%	4%	2%	7%	3%	11%	7%	4%	3%	9%	7%	3%	1%	6%
11	West of Nuiqsut	14%	17%	23%	30%	30%	21%	37%	43%	30%	28%	18%	17%	30%	40%	34%	20%	39%	43%	36%	30%
12	Other	3%	1%	6%	1%	1%	4%	8%	2%	2%	6%	3%	1%	6%	1%	1%	4%	8%	3%	3%	9%



Map 27 - Nuiqsut Caribou Hunting Area Groups: Years 1 - 10

LEGEND

<ul style="list-style-type: none"> Less than two percent of total harvest Between two and 15 percent of total harvest Greater than 15 percent of total harvest <p><i>Other areas may have been used for resource harvesting.</i></p>	<p>Areas categorized as follows:</p> <ol style="list-style-type: none"> 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 Sentinel Hill 10 Colville River South 11 West of Nuiqsut
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N

0 15 30 60
Miles

SCALE: 1:1,500,000

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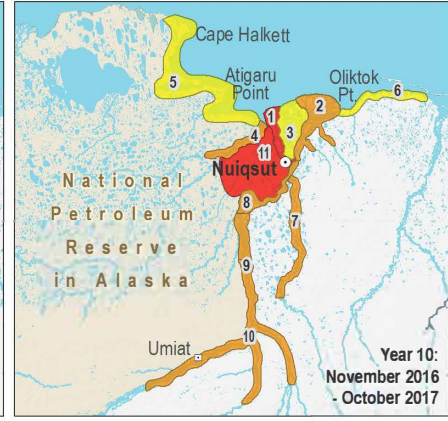


Table 13: Number of Caribou Harvested by Number of Harvest Locations, Years 1-10

# of Caribou Harvested	Number (%) of Harvest Locations									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
1	95 (52%)	75 (49%)	99 (51%)	85 (52%)	120 (62%)	66 (46%)	105 (42%)	86 (50%)	94 (58%)	115 (61%)
2	44 (24%)	48 (32%)	60 (31%)	40 (25%)	40 (21%)	42 (29%)	77 (31%)	46 (27%)	41 (25%)	48 (25%)
3	19 (10%)	16 (11%)	22 (11%)	12 (7%)	16 (8%)	24 (17%)	23 (9%)	13 (8%)	16 (10%)	15 (8%)
4	7 (4%)	8 (5%)	7 (4%)	14 (9%)	9 (5%)	8 (6%)	26 (10%)	12 (7%)	4 (2%)	6 (3%)
5	13 (7%)	4 (3%)	5 (3%)	4 (2%)	4 (2%)	1 (1%)	6 (2%)	6 (3%)	3 (2%)	2 (1%)
6	1 (1%)	1 (1%)	2 (1%)	2 (1%)	4 (2%)	1 (1%)	5 (2%)	2 (1%)	1 (1%)	1 (1%)
7	2 (1%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)	1 (1%)	1 (<1%)	1 (1%)	1 (1%)	2 (1%)
8	0 (0%)	0 (0%)	0 (0%)	2 (1%)	0 (0%)	0 (0%)	2 (1%)	1 (1%)	1 (1%)	0 (0%)
9	0 (0%)	0 (0%)	0 (0%)	1 (1%)	1 (1%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)	0 (0%)
10	0 (0%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)	0 (0%)	1 (<1%)	1 (1%)	0 (0%)	0 (0%)
11	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)	0 (0%)	2 (1%)	0 (0%)	0 (0%)
12	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (<1%)	0 (0%)	0 (0%)	0 (0%)
13	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)
15	1 (1%)	0 (0%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	1 (<1%)	1 (1%)		0 (0%)
20	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)	1 (1%)	0 (0%)

Stephen R. Braund & Associates, 2019.

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 10, at between 91 and 96 percent of use areas, but not substantially higher than previous years. In Year 10, 91 percent of trips were same day trips; six percent lasted 2-6 nights; two percent lasted one night; and one percent lasted one to two weeks. In some cases, residents stayed at camps, such as Nigliq Camp, for varying periods of time throughout the summer months but generally returned to the community periodically for work or personal reasons or to stock up on supplies before returning to camp. No caribou hunting trips in Year 10 lasted over two weeks, similar to some previous years. 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 10, respondents' longest trip lasted 1-2 weeks at one percent of use areas, two to six nights at six percent of use areas, and one night at five percent of use areas. Similar to Year 9, respondents took only same day trips to a majority (88 percent) of use areas.

In general, the data indicate an increasing trend of same day trips, rather than overnight hunting trip, which were more commonly reported in Years 1 and 2 of the study (at least one extended trip in 37 to 40 percent of use areas, compared to between 12 and 26 percent in Years 3 through 10). 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.

Table 14: Caribou Hunting Typical Trip Duration, Nuiqsut, Years 1-10

Typical Duration	Percentage of Caribou Use Areas									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
More than 2 weeks	0%	1%	0%	0%	<1%	2%	1%	0%	0%	0%
1-2 Weeks	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%
2-6 Nights	7%	15%	7%	8%	9%	10%	6%	6%	2%	6%
1 Night	5%	2%	2%	1%	2%	4%	3%	1%	2%	2%
Same Day	87%	81%	90%	90%	88%	84%	91%	93%	96%	91%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Use Areas	135	176	212	193	209	196	190	153	190	233

Stephen R. Braund & Associates, 2019.

Table 15: Caribou Hunting Longest Trip Duration, Years 1-10

Typical Duration	Percentage of Caribou Use Areas									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
More than 2 weeks	1%	2%	0%	0%	1%	2%	1%	0%	0%	0%
1-2 Weeks	3%	6%	4%	3%	2%	2%	2%	2%	1%	1%
2-6 Nights	20%	24%	12%	12%	11%	14%	9%	10%	7%	6%
1 Night	6%	5%	4%	4%	2%	8%	4%	3%	4%	5%
Same Day	70%	63%	80%	81%	85%	74%	85%	86%	88%	88%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Use Areas	97	163	211	193	208	196	188	153	190	233

Stephen R. Braund & Associates, 2019.

A couple of hunters described traveling to and from the camp at *Nigliq* for much of the summer for fishing, staying two to three days at a time, and harvesting caribou as available and needed:

[We would go for] like two or three days and then we come back home to get groceries. We start going in June. That is our fishing camp so we are always out there all summer until August. [We took] about [30] trips. Quite a bit [each month]. [Usually] we would stay two or three days. [The longest trip] was I'd say three days. (SRB&A Nuiqsut Interview November 2017)

I did [go downriver to] Nigliq. [We went to] my Grandma's camp. We stay there every July and August. We are there for fishing. [We went] July through August, I'd say like 15, 16, 17 trips at least, staying out there a week at the longest. [We usually stay for] three or four days and then come back. (SRB&A Nuiqsut Interview November 2017)

Other individuals indicate that they only camp when hunting moose:

We don't really go camping for caribou. But me and my dad went camping for moose up here though. (SRB&A Nuiqsut Interview November 2017)

Yeah, we did [go downriver] but there was none. I went maybe twice up there. They were all in August, that's because I came back in mid-August. No [I didn't camp], the only time I go camping is in moose season. (SRB&A Nuiqsut Interview November 2017)

In general, the farther an individual travels from the community by boat, the more likely they are to camp. Several individuals reported camping near Umiat in Year 10:

The farthest I went upriver was all the way to Umiat, looking for caribou. There is a cabin there. We pitched a tent, I don't believe in cabins. I went three times this summer. [We went in] July. Yep, [we stayed out for] a couple days. [We] spent the night out at end of July. (SRB&A Nuiqsut Interview November 2017)

We camped at Umiat one time [for] a couple of days. There's Umiat. My particular spot I always camp is right around here, maybe two miles from Umiat. That is where I used to camp all of the time. It has been kind of quiet this year. (SRB&A Nuiqsut Interview November 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 Chandler River 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, along the road system, and in boating areas easily accessible from the community (e.g., Colville River Delta, upriver to Ocean Point, and Itkillik River).

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; the hours spent searching for caribou has not been documented in this study. In some cases, residents may start hunting in the afternoon and then hunt all night, returning to the community the next morning. Because these individuals are not stopping and camping during their hunt, these trips are categorized as “same day trips.” One individual described a hunting trip along Itkillik River lasting approximately 16 to 18 hours:

But I did go way past the airport down to those foot hills. There are two big lakes that are connected together and that creek ties to the lakes [on Itkillik]. Those must be the two lakes that are connected. We don't know how far we went. I know there is a creek that is really deep and it is on the west part of Itkillik. It could be one of those two. I went into one of those two lakes that are connected together. I took the west fork. I know it was this big lake somewhere like this and then another one connected together. That is the farthest that I went and the majority of them were up in the foot hills way out of range. I went only once before Naluktaq [June]. We went out there like 16-18 hours round trip. They said the caribous are coming down the foot hills. (SRB&A Nuiqsut Interview November 2017)

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 over 50 percent of use areas visited between one and three times, and between 40 and 50 percent of use areas visited four or more times per year (Table 16). In Year 10, the percentage of use areas visited four or more times was 39 percent, on the low end but within the range of previous study years. Nuiqsut active harvesters were more likely to take more than 20 trips to caribou use areas in Years 3 through 10 (between four and nine percent of use areas) compared to Years 1 and 2 (zero percent) (Table 16). In Year 10, eight percent of use areas were visited more than 20 times.



Map 28 - Duration of Trip to Caribou Use Areas, One or More Nights, Year 10

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 68 active harvesters in November 2017.


Other areas may have been used for resource harvesting.

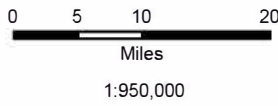
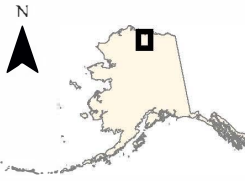
Year 10: November 2016 - October 2017

High 20 caribou areas used by 14 respondents
Low



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 National Petroleum Reserve Alaska



Map 29 - Duration of Trip to Caribou Use Areas, Same Day, Year 10

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 68 active harvesters in November 2017.

Other areas may have been used for resource harvesting.

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Year 10: November 2016 - October 2017

High 213 caribou areas used by 67 respondents
Low

National Petroleum Reserve Alaska

Table 16: Caribou Hunting Number of Trips, Nuiqsut, Years 1-10

Number of Trips	Percentage of Caribou Use Areas									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
20+			9%	7%	4%	7%	7%	8%	5%	8%
6-20 trips	30%	28%	21%	28%	16%	19%	21%	20%	23%	19%
4-5 trips	23%	21%	19%	15%	15%	13%	17%	15%	21%	12%
2-3 trips	27%	26%	27%	29%	34%	28%	26%	28%	29%	31%
1	20%	24%	24%	21%	32%	33%	28%	29%	21%	30%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Number of Use Areas	121	174	212	193	210	196	204	153	192	230

Stephen R. Braund & Associates, 2019.

In a number of cases, use areas visited more than 20 times included use areas which were easily accessible or those which are used for multiple purposes. A number of respondents reported taking frequent trips along the Spur and other connected roads, sometimes just “going for a ride” but also keeping an eye out for caribou. In addition, residents frequently travel back and forth along the Nigliq Channel to fish camp or when traveling to the ocean; these trips are often combined with caribou hunting. Other areas which are more easily accessible include those located somewhat closer to the community, such as the area West of Nuiqsut or upriver to Ocean Point. In contrast, areas which require greater preparation or are farther from the community, such as Fish Creek or the upper Colville River, are visited less often. Residents described the frequency of their caribou hunting trips in Year 10 as follows:

That was late July [on Nigliq Channel]. I probably just went two or three times, maybe one or two times. Just cruising through [Nigliq Channel] to see if I could make it. (SRB&A Nuiqsut Interview November 2017)

[I went out] maybe six times [on the East Channel]. We made multiple trips out there pretty much all summer long. Trying to get seals and caribou. June through August. They were all day trips. Once we did [have luck] when we were coming back from a seal trip. (SRB&A Nuiqsut Interview November 2017)

I check it out, but I didn't see [any caribou]. [I go to] the K pad [at the intersection of the Spur road and the CD 5 road]. That was like every other day. [I went] 15 times, yeah, probably. (SRB&A Nuiqsut Interview November 2017)

Yeah [I went down Niglig], stopping [at Nigliq camp.] That was late July or early August. [I went] like 70 [times], daily. I stayed [overnight] there a couple of times, but mostly I just came back and forth. Longest [trip] was like 24 hours. (SRB&A Nuiqsut Interview November 2017)

[We went] upriver [to] Ocean Point. Mostly like every other day? That was a lot of times. (SRB&A Nuiqsut Interview November 2017)

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. As one individual said, “[I went out] twice, maybe twice. I was having trouble with that snowmachine” (SRB&A Nuiqsut Interview November 2017).

Herd Characteristics

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 10 (92 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.

Table 17: Caribou Group Size Noted at Caribou Harvest Locations, Years 5-10

Estimated Herd Size	Percent of Harvest Locations						Percent of Caribou Harvested					
	Y5	Y6	Y7	Y8	Y9	Y10	Y5	Y6	Y7	Y8	Y9	Y10
1000-2000	2%	1%	1%	1%	3%	0%	3%	1%	1%	4%	5%	0%
500-999	1%	3%	1%	4%	0%	0%	0%	5%	1%	5%	0%	0%
100-499	3%	10%	9%	9%	8%	4%	10%	15%	15%	12%	11%	5%
81-99	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
71-80	1%	0%	1%	1%	0%	1%	1%	0%	1%	2%	0%	1%
61-70	1%	0%	0%	0%	0%	0%	2%	0%	1%	0%	0%	0%
51-60	2%	1%	2%	2%	1%	0%	3%	1%	1%	3%	1%	0%
41-50	2%	2%	3%	1%	1%	1%	4%	3%	4%	1%	2%	3%
31-40	1%	2%	2%	3%	1%	1%	0%	2%	3%	12%	3%	0%
21-30	1%	3%	4%	4%	5%	3%	2%	5%	5%	5%	6%	4%
11-20	13%	11%	14%	11%	15%	13%	14%	14%	17%	11%	22%	17%
2-10	41%	38%	42%	44%	36%	46%	42%	39%	42%	35%	37%	49%
1	34%	29%	20%	20%	31%	33%	19%	16%	9%	9%	20%	20%
Total Number	176	138	234	160	156	166	311	267	503	340	235	264

Stephen R. Braund & Associates, 2019.

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 10, this percentage declined to a study year low of 13 percent; in addition, five percent of caribou were harvested in groups of 100 or more, lower than all previous years (between 13 and 21 percent) (Table 17). Year 10 was the first year that no caribou were harvested in groups estimated at 500 or more. In general, Years 9 and 10 show respondents harvesting caribou in smaller groups than in the previous few years. Several individuals observed an increasing pattern of scattered caribou in recent years, particularly noting a lack of herds in Year 10:

Me and my dad went in here and I got two of them the first time, and I would say that was [pointing somewhere near Nanuq Lake]. I got two of them that time. One was female the other was male. That was the beginning of June. They were by themselves. Something I noticed this year was that there were more tuttu alone, they were in small groups [more] than I'm used to seeing. (SRB&A Nuiqsut Interview November 2017)

It is not like how it used to be, but they come around still. That herd that came by that we got some [meat] from [individual's harvest] was nothing but males. [The one my nephew shot] was also a male. We shared most of it with the whole family. I would say that was late July. It was in a group of about four or five of them. (SRB&A Nuiqsut Interview November 2017)

Yes [I hunted along Nigliq Channel] in June, end of June. Yeah. Two caribou, I just got two caribou. There was hardly any caribou out there this year. I didn't see herds out there, just loners, or four to five at a time. I didn't even see a 200 to 300 [count] herd. That was the first time I [didn't see large herds], this summer. (SRB&A Nuiqsut Interview November 2017)

I went down to our cabin and that is about it. Right below CD2. We just went to our cabin and waited to see what we would see out there. There were hardly any caribous that came through this summer. The first two herds went through Nigliq. The first herd they allowed them to pass. The second herd that is when [individual] caught them and people didn't even know that. They were all scattered this summer. (SRB&A Nuiqsut Interview November 2017)

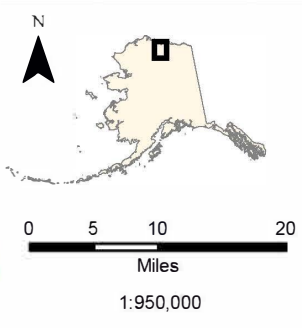
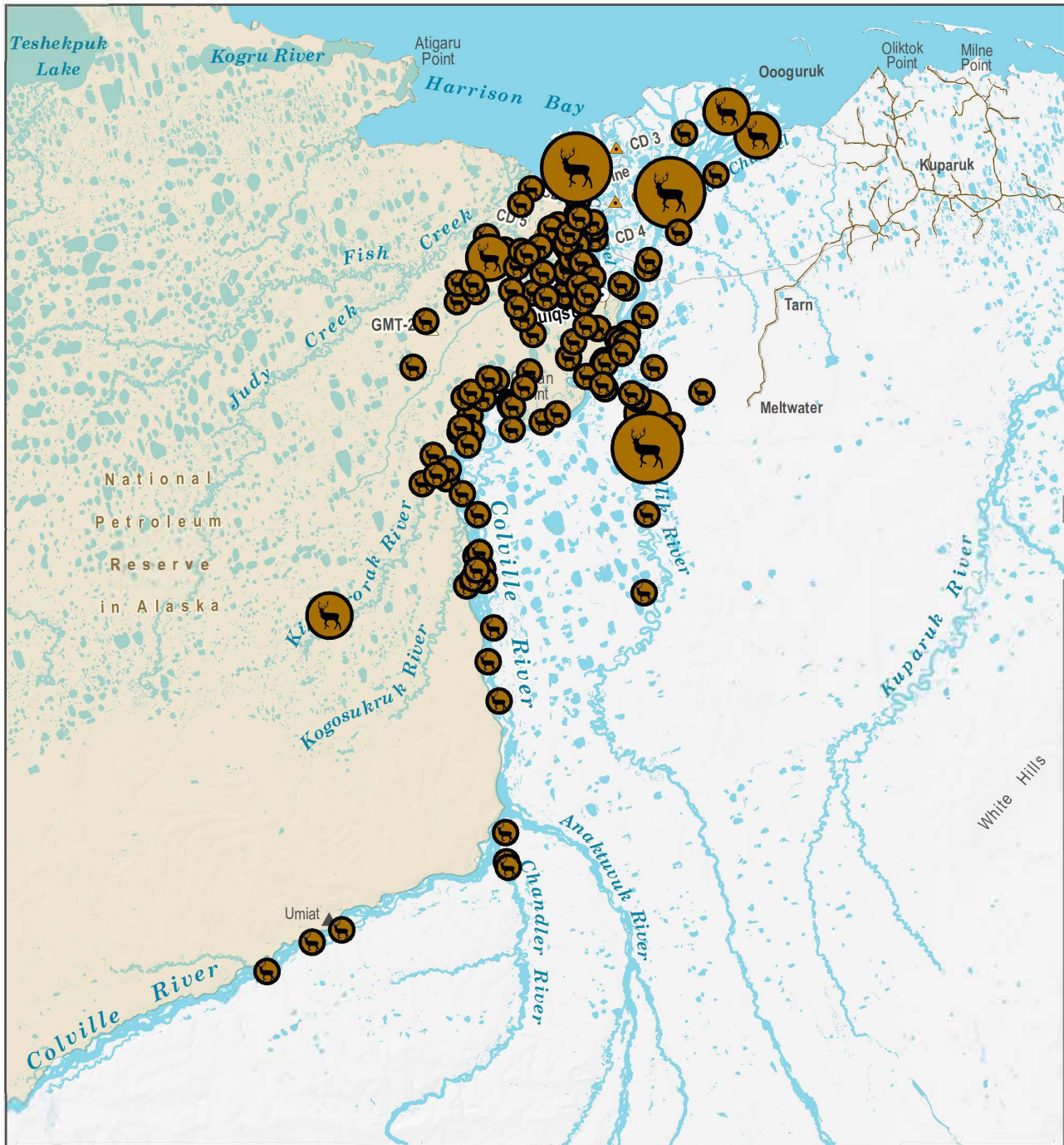
Map 30 depicts the herd size noted at reported harvest locations, more than 100 caribou depicted by large symbols, between 31 and 100 caribou depicted by medium symbols, and 1 to 30 caribou depicted by small symbols. As shown on the map, in Year 10, herds of over 100 caribou were reported to be observed along the East Channel, lower Nigliq Channel, and on the Ikillik River. Herds sized 31-100 were observed on the East Channel, to the west of the community along the road system, and to the southwest of the community near the Kikiakrorak River. In general, most caribou harvests along the river system and to the west of the community involved groups of less than 30 caribou. While the East Channel showed fewer harvest locations in general in Year 10, several herds of more than 30 caribou (and one of more than 100) were spotted there. Several individuals commented in Year 10 that while they saw larger herds to the east of the Colville River delta they never approached close enough to be harvested:

We were looking for caribou and ducks [on the East Channel] and thought we might get lucky and get a seal. We saw a lot of caribou out here [to the east]. They were just sitting here and would kind of move back and forth. In the past they would migrate out west [into the Colville River Delta]. (SRB&A Nuiqsut Interview November 2017)

Map 31 shows the sex of harvested caribou in Year 10; a majority of harvested caribou are reported as males. Females were more frequently harvested to the west of the community and along the Ikillik River. The majority of caribou harvested upriver from Ocean Point and along the East Channel were males.

Harvest Amounts (Household Harvest Surveys)

This section presents the caribou harvest data from the 2017 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 2017. The percentage of households attempting to harvest and successfully harvesting caribou has varied over time, with the percentage in Year 10 (72 percent attempting to harvest and 60 percent harvesting) within the range of the previous study years. The difference between the percentage of households attempting to harvest and successfully harvesting caribou (12 percent) was on the high end compared to previous study years. The estimated number of caribou harvested in 2017 (635) was on the higher range of previous study years. The estimated per capita harvest (164 pounds) was also within the range of previous years. As noted in Table 18, in Year 10 and other years for this study, household harvest surveys included a single particularly high harvest report which may have skewed the community estimate upward. This should be kept in mind when comparing past and future harvest estimates. 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 10 was within the range of previous years (plus or minus 16 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.



Map 30 - Caribou Group Size Noted at Harvest Locations, Year 10

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuupik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 68 active harvesters in November 2017.

Other areas may have been used for resource harvesting.

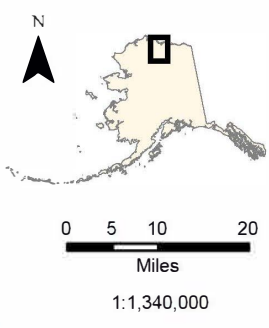
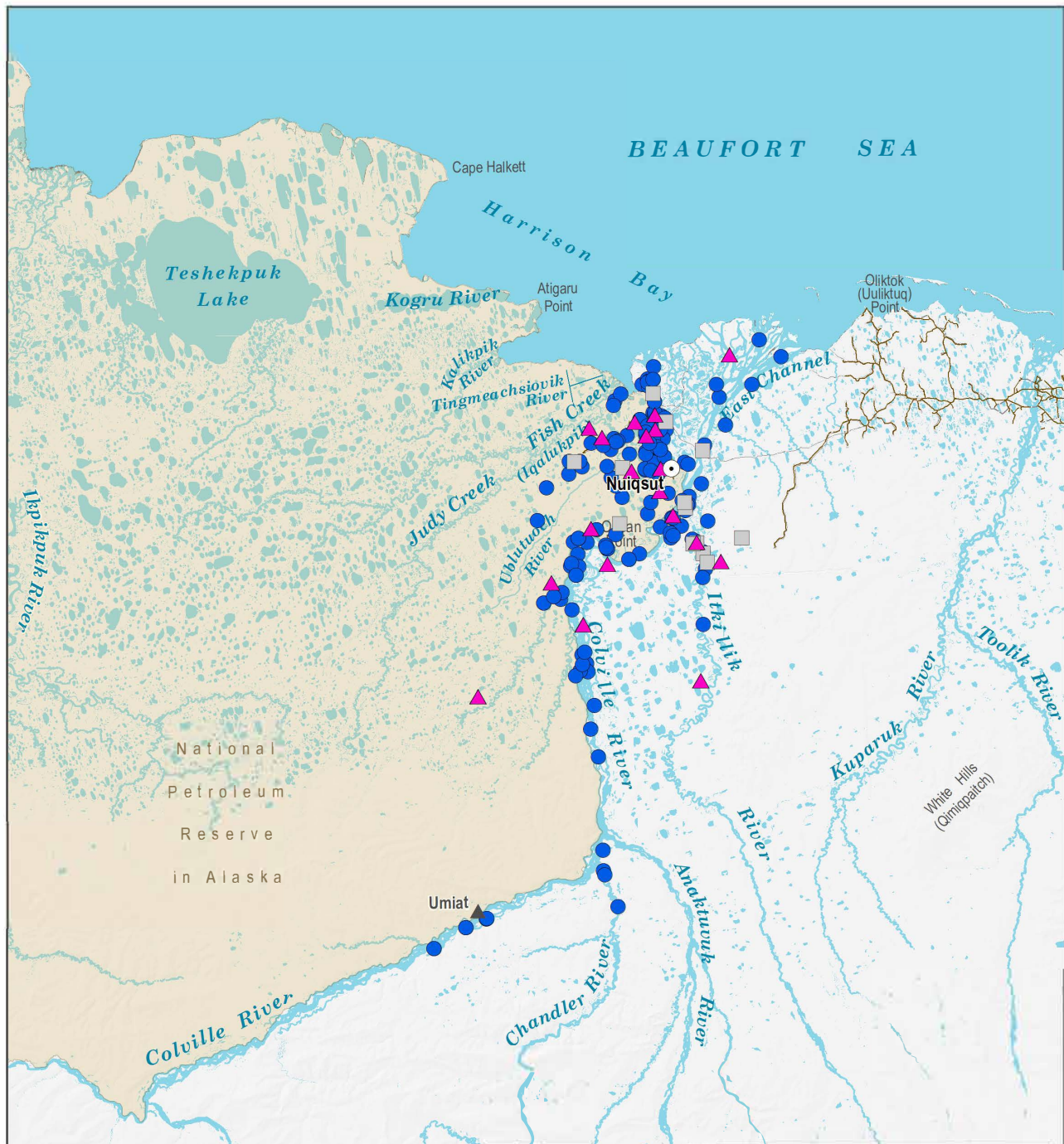
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 National Petroleum Reserve Alaska

Year 10: November 2016 - October 2017

-  1 to 30 caribou
-  31 to 100 caribou
-  101 to 300 caribou

166 caribou harvest locations
 58 respondents



Map 31 - Sex of Caribou Harvested by Location, Year 10

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 68 active harvesters in November 2017.

Other areas may have been used for resource harvesting.

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 National Petroleum Reserve Alaska

Locations where Respondents Harvested Only Female Caribou

20 locations
 15 respondents

Locations where Respondents Harvested Both Female and Male Caribou

13 locations
 11 respondents

Locations where Respondents Harvested Only Male Caribou

148 locations
 56 respondents

Table 18: Nuiqsut Caribou Harvests 1985-2017

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 <i>Unpublished</i> as cited in Braem et al. 2011
2000-01						496	57,985	453	134*		Bacon et al. 2009
2002-03	95%	47%	45%	80%	49%	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%	Brown et al. 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%	SRB&A 2018
2017	96%	72%	60%	74%	85%	635	74,338	715	164	16.1%	Y10 HH Surveys
Mean of observed values	96%	73%	67%	73%	73%	497	58,814	598	141		

Blank cells indicate data not available

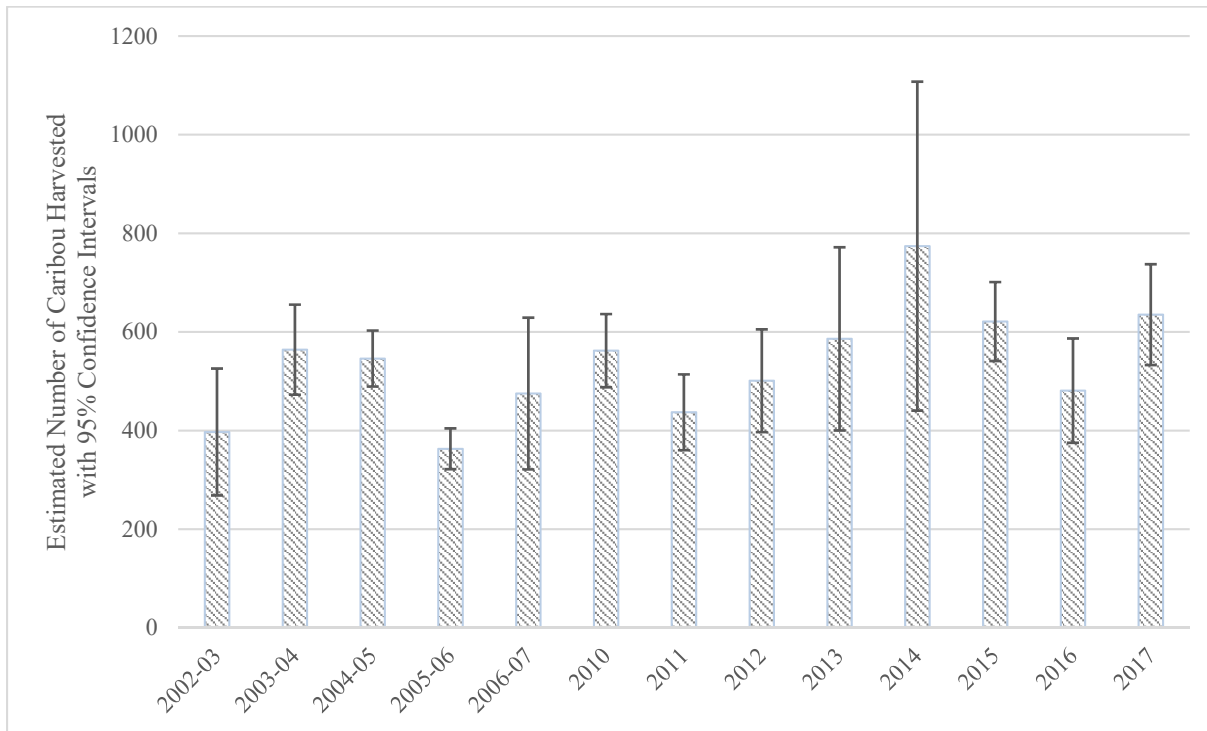
*Per capita pound estimates for the 1994-95, 1995-96, and 2000-2001 study years were not originally published but were subsequently calculated by Braem et al. (2011) based on Alaska Department of Labor and Workforce Development (ADOLWD) population estimates for those years.

***The estimates for Years 2010, 2011, 2012, 2013, 2016, and 2017 are based on averages that include a particularly high-harvesting household. In 2013, 2016, and 2017 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 these 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, 2019.

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



Stephen R. Braund & Associates, 2019.

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 from the previous year. Overall, the percentages of respondents reporting changes in hunting area, frequency, and duration in Year 10 were all on the higher end of previous study years. As shown in Table 20, respondents also indicated whether they harvested enough caribou. In Year 10, 41 percent of respondents indicated that they did not harvest enough caribou, similar to Year 9 and within the range of all previous years. In Years 1 through 9, the percentage of respondents not harvesting enough caribou ranged from 16 percent (Year 4) to 54 percent (Year 6).

Table 19: Percentage of Respondents Reporting Changes in Harvest Activities, Years 1-10

Type of Change	Percentage of Respondents									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Hunting Area Changed	31%	28%	39%	34%	36%	40%	28%	38%	38%	42%
Frequency Changed	50%	77%	65%	60%	63%	67%	70%	67%	73%	71%
Duration Changed	39%	32%	21%	21%	23%	26%	39%	28%	40%	47%
Months Changed	19%	15%	12%	21%	21%	18%	11%	20%	22%	16%
Harvest Amount Changed	75%	85%	68%	72%	54%	63%	82%	57%	81%	76%

Stephen R. Braund & Associates, 2019.

Table 20: Percentage of Respondents Reporting Not Harvesting Enough Caribou, Years 1-10

Not Harvesting Enough	Percentage of Respondents									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Reported Did Not Harvest Enough	47%	53%	21%	16%	41%	54%	32%	22%	40%	41%

Stephen R. Braund & Associates, 2019.

Changes in Harvest Amount

During Year 10 interviews, 76 percent of Nuiqsut respondents reported a change in harvest amounts, on the high end of most previous years (Table 19). Specifically, 61 percent of harvesters reported harvesting less and 15 percent reported harvesting more caribou. The other 24 percent of respondents reported harvesting the same amount as the previous year. The percent of respondents reporting a decrease in harvest amounts from the previous year is the highest since Year 2 (Table 21).

Table 21: Type of Change in Harvest Amount Compared to Previous Year, Years 1-10

Type of Harvest Amount Change	Percentage of Respondents									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Harvest More	11%	15%	21%	17%	9%	9%	30%	16%	23%	15%
Harvest Less	64%	70%	47%	55%	45%	54%	53%	41%	58%	61%
Harvest the Same	25%	15%	32%	28%	46%	37%	18%	43%	19%	24%
Number of Respondents	36	53	57	58	56	57	57	51	52	62

Stephen R. Braund & Associates, 2019.

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 10 study years, Resource Distribution/Migration factors were the most frequently cited causes for harvesting less caribou (132 observations), followed closely by causes related to Personal Factors (131 observations). Other types of causes cited by respondents have included Development Activities (36 observations), Environmental Factors (10 observations) and Hunting Success (nine observations). In Year 7 through 10, factors related to Resource Abundance (i.e., overall population levels) were also cited, consistent with recent surveys of North Slope caribou herds which have shown a decline (although recent surveys a slowdown in the decline of the TH) (Prichard et al. 2017). 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 10, Resource Availability (13 observations) was the most commonly reported individual reason for harvesting less caribou, followed by Take Fewer Trips (four observations) and Change in Distribution/Migration (three observations).

Table 22: Reasons for Decrease in Harvest Amount Compared to Previous Year, Nuiqsut, Years 1-10

Causes	Number and Percent of Observations										All Years
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	
Personal Factors Total	9	10	16	22	6	14	14	17	13	10	131
	26%	26%	53%	52%	17%	38%	36%	68%	34%	24%	36%
Personal Reasons		3	3	7	1	6	2	3	4	2	31
Lack of Transportation/Equipment	2	1	3	4		3	3	3	4	1	24
Take Fewer Trips		1	6	1	2		4	3	1	4	22
Employment/Lack of Time	1	2	2	4		2		2	1	2	16

Causes	Number and Percent of Observations										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Change in Subsistence Providers	1	1	2	4	2	1	1	2		1	15
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	6	8	15	15	16	5	16	21	132
	35%	46%	20%	19%	43%	41%	41%	20%	42%	51%	37%
Resource Availability	8	9	2	4	9	10	7	5	12	13	79
Migration Changed or Diverted	3	5			1	2	4			1	16
Farther from Riversides/Farther Inland		2			2	2	3		2	2	13
Change in Distribution / Migration		1		3	1					3	8
Farther from Community		1					2		1	2	6
Moved Out of Area			3	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	4	36
	26%	8%	7%	7%	26%	8%	8%	0%	0%	10%	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	2
Oil Drilling		1								1	2
Off Road Vehicles Disturbance					1						1
Disturbance										1	1
Noise related to mining activities										1	1
Don't Know Total	0	2	1	5	1	0	0	0	2	2	13
	0%	5%	3%	12%	3%	0%	0%	0%	5%	5%	4%
I do not know		2	1	5	1				2	2	13
Environmental Factors Total	0	3	2	1	1	1	0	0	2	0	10
	0%	8%	7%	2%	3%	3%	0%	0%	5%	0%	3%
Change in Food Availability		2									2
Predators			1						1		2
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 Total	3	0	2	0	0	1	2	0	0	1	9
	9%	0%	7%	0%	0%	3%	5%	0%	0%	2%	3%
Worse success			1			1	2			1	5
More difficult	2										2
Reduced harvest opportunities			1								1

Causes	Number and Percent of Observations										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Travel farther to harvest resource	1										1
Competition or Hunting Pressure Total	0	1	0	1	0	3	0	1	1	1	8
	0%	3%	0%	2%	0%	8%	0%	4%	3%	2%	2%
Sport Hunting Methods Disturbing Migration Routes		1							1	1	3
Competition with Sport Hunters						2					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	0	4
	0%	0%	3%	0%	6%	0%	0%	4%	0%	0%	1%
Skittish Behavior in Species			1		2			1			4
Development Infrastructure Total	1	1	0	0	1	0	0	0	0	0	3
	3%	3%	0%	0%	3%	0%	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	2	8
	0%	0%	0%	0%	0%	0%	5%	4%	8%	5%	2%
Fewer Males									3	2	5
Decrease in Species Number							2	1			3
Contamination Concerns Total	0	1	0	0	0	0	1	0	1	0	3
	0%	3%	0%	0%	0%	0%	3%	0%	3%	0%	1%
Contamination from Air Pollution		1					1				2
Contamination									1		1
Resource Health Total	0	0	0	1	0	0	1	0	0	0	2
	0%	0%	0%	2%	0%	0%	3%	0%	0%	0%	1%
Disease/Infection							1				1
Concern of Disease/Infection				1							1
Other Total	0	0	0	1	0	0	0	0	0	0	1
	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Miscellaneous				1							1
Grand Total	34	39	30	42	35	37	39	25	38	41	360

Stephen R. Braund & Associates, 2019.

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 10, Resource Distribution/Migration reasons were most frequently cited for decreased harvests, at 21 observations (51 percent of all observations), higher than any previous year. 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. In four cases, respondents specifically attributed the change in harvest amounts to Development Activities, including traffic, oil drilling, and noise from mining activities. Several individuals observed,

Because the herds that we always try to go see already passed through and they were too far to go get them. We didn't want to travel a long ways just to see if we could see a herd. We'd wait for another time to see if we could see another herd. (SRB&A Nuiqsut Interview November 2017)

All of the noises from Alpine and Prudhoe scare them off. We were able to get at least three of them when I was a kid. (SRB&A Nuiqsut Interview November 2017)

I don't see them around anymore after they opened up all those oil rigs closer to town. I think they are just going farther and farther out. They are opening up a rig over there by Putu. They are doing a lot of seismic over there. (SRB&A Nuiqsut Interview November 2017)

They were harder to find. You would have to travel farther. I don't know why [I didn't see them.] (SRB&A Nuiqsut Interview November 2017)

Under the Personal Factors category (10 observations, or 24 percent of all observations), residents indicated that personal reasons (e.g., lack of money, too busy, took fewer trips, being selective in which caribou they harvest) or a lack of transportation or equipment resulted in them harvesting fewer caribou in Year 10. Respondents described the personal factors that affected their hunting success in Year 10 as follows:

I should be ashamed of myself. I keep letting some go. Some of them were mostly female and calves. I was mainly looking for bulls or reindeer since reindeer come through every once in a great while. (SRB&A Nuiqsut Interview November 2017)

I haven't gone out as much as I usually do and when I did all the caribou I saw, I didn't want to get them. It isn't that I didn't see them. It's not that they were far. I was looking for big bulls and I have seen some caribou but they weren't to my liking. They were all scattered in Itkillik River. The big bulls that I did see they were kind of far. (SRB&A Nuiqsut Interview November 2017)

Yes. I would say it was a little less [than last year] because I didn't have my own boat. I was a little sad this summer. (SRB&A Nuiqsut Interview November 2017)

One individual commented that they are short on caribou because fewer people are sharing in recent years; this individual noted that the lack of sharing is not consistent with traditional values, saying,

Less [caribou], my freezer is empty. I'm pulling a leg on someone to get some caribou. For once they're saying, 'Sorry, even though I have caribou, I can't give any.' They're not giving because there's hardly any caribou. That's not our traditional way of life for someone to say, 'I have caribou but I'm not going to give you any.' (SRB&A Nuiqsut Interview November 2017)

In contrast, one respondent noted that sharing between communities is still strong, but sometimes leaves residents without enough caribou for themselves:

The thing is, is when Barrow is short on caribou, we share the majority of them right now. That's how we share. We don't ask. We don't let them wait [to ask], because they've been without it long enough. That's the last thing they should have to ask: "Hey, we need some caribou." You don't want them to feel like they're begging. We've got to get them this resource—"Hey, let's get it on the plane and get these people fed." It's a demand. (SRB&A Nuiqsut Interview November 2017)

Two individuals cited Resource Abundance for their decreased harvests in Year 10, specifically that there were fewer bulls available during the hunting season. No remaining category had more than one cause cited for decreased harvests in Year 10.

Table 23 shows the reasons given for harvesting more caribou in Year 10. Over the 10 study years, Personal Factors were the most common reason for harvesting more caribou, followed by Resource Distribution/Migration Factors. In Year 10, Personal Factors accounted for 56 percent of observations (five observations), followed by Hunting Success at 33 percent (three observation).

Table 23: Reasons Given for Increase in Harvest Amount Compared to Previous Year, Nuiqsut, Years 1-10

Causes	Number and Percent of Observations										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Personal Factors Total	4	6	6	7	2	1	10	3	6	5	50
	80%	75%	50%	58%	50%	33%	59%	38%	55%	56%	56%
Personal Reasons	2	2	1	5			2		3	1	16
Take More Trips	1	3	2				4	2	1	2	15
Better Transportation/Equipment			1			1	2	1	2		7
Change in Subsistence Dependents	1		1	1	1					1	5
Change in Subsistence Providers			1	1	1						3
Sharing More							2				2
Need More		1								1	2
Resource Distribution or Migration Total	1	2	5	4	2	2	3	3	3	1	26
	20%	25%	42%	33%	50%	67%	18%	38%	27%	11%	29%
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
Change in distribution/migration										1	1
Don't Know Total	0	0	0	1	0	0	2	0	1	0	4
	0%	0%	0%	8%	0%	0%	12%	0%	9%	0%	4%
I Do Not Know				1			2		1		4
Hunting Success - General Total	0	0	1	0	0	0	1	2	0	3	7
	0%	0%	8%	0%	0%	0%	6%	25%	0%	33%	8%
Better Success			1				1	2		3	7
Environmental Factors Total	0	0	0	0	0	0	0	0	1	0	1
	0%	0%	0%	0%	0%	0%	0%	0%	9%	0%	1%
Decrease in Predators									1		1
Resource Health Total	0	0	0	0	0	0	1	0	0	0	1
	0%	0%	0%	0%	0%	0%	6%	0%	0%	0%	1%
Increase in Resource Size							1				1
Grand Total	5	8	12	12	4	3	17	8	11	9	89

Stephen R. Braund & Associates, 2019.

Under Personal Factors, residents cited an increase in trip frequency (Take More Trips), followed by Personal Reasons, Change in Subsistence Dependents, and Need More:

I think from the previous year, when I make my kill across the river, maybe I did a little more searching to find where they're at. But eventually sometimes I'll run into some out there and they might teach me a shortcut, like tell me they're not over in that direction [so I don't bother searching]. We do that lots because there's other people looking for caribou too. (SRB&A Nuiqsut Interview November 2017)

We all needed it, the whole family needed it. (SRB&A Nuiqsut Interview November 2017)

I was more successful and I went out more this year. When I had my time to take a break from rescue, I tried to go out hunting. (SRB&A Nuiqsut Interview November 2017)

Several individuals reported harvesting more caribou because the caribou were more available in their hunting areas or because, more generally they, had better hunting success. As one individual said, “[I got]

more than last year. I was more successful and I went out more this year. When I had my time to take a break from [work], I tried to go out hunting” (SRB&A Nuiqsut Interview November 2017).

Changes in Trip Frequency

As shown in Table 24, the percentage of harvesters reporting a change in trip frequencies has varied over the 10 study years, from 50 percent (Year 1) to 77 percent (Year 2). In Year 10, 71 percent of respondents reported a change in the frequency of their hunting trips, within the range of previous years; a higher percentage of respondents reported taking fewer trips, at 45 percent, than more trips (26 percent). The percentage of respondents taking fewer trips in Year 10 is higher than previous years.

Table 24: Type of Change in Trip Frequency Compared to Previous Year, Nuiqsut, Years 1-10

Type of Trip Frequency Change	Percentage of Respondents									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Take More Trips	25%	36%	32%	24%	27%	25%	30%	25%	37%	26%
Take Fewer Trips	25%	42%	33%	34%	36%	42%	40%	42%	37%	45%
Take Same Number of Trips	50%	23%	35%	41%	38%	33%	30%	33%	27%	29%
Number of Respondents	36	53	57	58	56	57	57	52	52	62

Stephen R. Braund & Associates, 2019.

Reasons for a decrease in trip frequency are provided in Table 25. Personal Factors were the most frequently cited causes (accounting for 71 percent of observations), including the more general Personal Reasons and Employment/Lack of Time (nine observations each), followed by Lack of Transportation/Equipment (five observations) and Change in Harvest Methods (two observations). Personal Reasons involved local harvesters having to reduce their caribou hunting activities due to medical problems, or needing to assist in family matters during Year 10. A number of individuals also cited Employment/Lack of Time, indicating that they had less time for hunting because of recent changes in their employment status:

I went a lot less this year than I usually go. Work has been keeping me away from hunting this year. (SRB&A Nuiqsut Interview November 2017)

I had to take care of my daughter and get a job to help take care of her. Every once in a while I would go up there to check it out. When I got the chance, at least. (SRB&A Nuiqsut Interview November 2017)

Table 25: Reasons for Decrease in Trip Frequency, Years 1-10

Causes	Number and Percent of Observations										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Personal Factors Total	9	16	19	22	17	21	18	20	14	25	181
	90%	80%	95%	88%	71%	75%	67%	83%	58%	71%	76%
Personal Reasons	2	2	8	10	8	10	4	6	7	9	66
Employment/Lack of Time	3	3	5	7	4	6	9	4	5	9	55
Lack of Transportation/Equipment	4	10	6	5	4	2	2	7	2	5	47
Change in Subsistence Providers					1	1	1	2			5
Better Transportation/Equipment						1	1				2
Change in Harvest Methods										2	2
Change in Subsistence Dependents						1		1			2
Change in Transportation Method							1				1
Need Less		1									1
Resource Distribution or Migration Total	0	4	1	1	3	3	4	1	5	4	26
	0%	20%	5%	4%	13%	11%	15%	4%	21%	11%	11%

Causes	Number and Percent of Observations										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Resource Availability		4			2	3	2	1	4	3	19
Change in Distribution/Migration					1					1	2
Farther from Community							1				1
Closer to Community							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	4	17
	0%	0%	0%	0%	4%	14%	7%	8%	17%	11%	7%
Increased Cost of Living/Expenses					1	4	2	2	4	4	17
Don't Know Total	0	0	0	2	1	0	1	0	0	0	4
	0%	0%	0%	8%	4%	0%	4%	0%	0%	0%	2%
I Do Not Know				2	1		1				4
Environmental Factors Total	1	0	0	0	0	0	2	0	1	0	4
	10%	0%	0%	0%	0%	0%	7%	0%	4%	0%	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	1	3
	0%	0%	0%	0%	4%	0%	0%	4%	0%	3%	1%
Development					1						1
Disturbance								1			1
Traffic Disturbance										1	1
Hunting Success - General	0	0	0	0	0	0	0	0	0	1	1
	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0.4%
Better Success										1	1
Development Infrastructure Total	0	0	0	0	1	0	0	0	0	0	1
	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%	0.4%
Oil Field Infrastructure					1						1
Grand Total	10	20	20	25	24	28	27	24	24	35	237

Stephen R. Braund & Associates, 2019.

Several individuals indicated that they took fewer trips due to lack of adequate transportation/equipment or funds (specifically a lack of money to purchase gas). Several individuals made similar comments regarding these factors:

Cause my boat—nothing is wrong with my boat—but my trailer and my axel needs work on the trailer. (SRB&A Nuiqsut Interview November 2017)

I don't know, I think just motor problems. But I got my motor fixed so I am ready for next year. (SRB&A Nuiqsut Interview November 2017)

I don't know why, maybe a gas issue. I didn't have much funding to go out this summer. (SRB&A Nuiqsut Interview November 2017)

One individual noted that a lack of caribou in the area, combined with the high cost of fuel, kept him from hunting as much as usual, saying, “The gas here is too expensive, there’s no point in going out if you know you’re not going to catch anything” (SRB&A Nuiqsut Interview November 2017).

In four cases, respondents 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 Table 26) and illustrates the differing hunter responses to similar conditions. Respondents noted that unpredictable caribou

movement in Year 10 resulted in reduced hunting success, which they responded to by hunting less frequently to save on gas:

The population is there but the rest of the group is confused, running around trying to find their trail again. When they come by the HDD river crossing, they're starting to get lost around the manmade barricades. You know? I'm starting to spend more gas. And then I do it on a daily basis, but it drains you out real quick. (SRB&A Nuiqsut Interview November 2017)

[I took fewer trips] because when we hear there's no caribou over there, it's senseless for us to waste gas because it's so expensive. (SRB&A Nuiqsut Interview November 2017)

Table 26: Reasons for Increase in Trip Frequency Compared to Previous Year, Years 1-10

Causes	Number and Percent of Observations										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Personal Factors Total	1	6	16	9	10	8	13	5	10	6	84
	8%	35%	80%	60%	63%	47%	76%	50%	56%	43%	54%
Personal Reasons		6	7	7	5	3	6	3	6	4	47
Better Transportation/Equipment			7	2	1	2	5	1	2		20
Need More			2		1		1		2	2	8
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	7	49
	50%	41%	20%	27%	25%	41%	12%	30%	28%	50%	31%
Resource Availability	4	7	2	4	3	6	2	2	5	6	41
Migration Changed or Diverted	2										2
Moved out of Area			1		1						2
Farther from Riversides/Farther Inland						1				1	2
Moved into Area			1								1
Farther from Community								1			1
Development Activities Total	3	2	0	0	2	1	1	0	0	0	9
	25%	12%	0%	0%	13%	6%	6%	0%	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	0	2
	0%	6%	0%	7%	0%	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	0	3
	0%	0%	0%	7%	0%	6%	0%	0%	6%	0%	2%
Increase in predators						1			1		2
Weather				1							1

Causes	Number and Percent of Observations										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Development	1	0	0	0	0	0	0	0	1	0	2
Infrastructure Total	8%	0%	0%	0%	0%	0%	0%	0%	6%	0%	1%
Roads/Ice Roads									1		1
Pipeline	1										1
Economic Factors Total	1	0	0	0	0	0	0	1	0	0	2
	8%	0%	0%	0%	0%	0%	0%	10%	0%	0%	1%
Mitigation Funds	1							1			2
Resource Behavior	0	0	0	0	0	0	1	0	0	0	1
Total	0%	0%	0%	0%	0%	0%	6%	0%	0%	0%	1%
Skittish Behavior in Species							1				1
Hunting Success - General	0	0	0	0	0	0	0	1	1	0	2
	0%	0%	0%	0%	0%	0%	0%	10%	6%	0%	1%
Worse Success									1		1
Reduced Harvest Opportunities								1			1
Competition or Hunting Pressure Total	0	1	0	0	0	0	0	0	0	0	1
	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Competition with Sport Hunters		1									1
Other Total	0	0	0	0	0	0	0	0	0	1	1
	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	1%
Miscellaneous										1	1
Grand Total	12	17	20	15	16	17	17	10	18	14	156

Stephen R. Braund & Associates, 2019.

In contrast, a couple of individuals indicated that they hunted less because of better communication regarding the whereabouts of the caribou herds in Year 10:

Respondent 1: [I took fewer trips because] people told me where the caribou were at.

Respondent 2: I think there is more of that this year, everybody started communicating about the hunting, where the good and bad spots were. (SRB&A Nuiqsut Interview November 2017)

Over the 10 study years, Personal Factors have been the most frequently cited causes of an increase in trip frequency, followed by Resource (Table 26). In Year 10, respondents most commonly cited Resource Distribution/Migration factors (seven observations)—specifically, Resource Availability (six observations) and Farther from Riversides (one observation). Personal Factors, including the more general Personal Reasons and Need More, were cited in six cases.

Those who identified Resource Distribution or Migration causes for their increase in trip frequency attributed their need to conduct additional trips due to caribou being unavailable in the areas where they typically find them (Resource Availability):

I probably went more times, a little more. Because there was no caribou there for a while. Everybody tells me, no there's no caribou out there. But I know they're out there. They're too lazy. (SRB&A Nuiqsut Interview November 2017)

It was more. I was trying to look for caribou. They were still too far. Some people get lucky when they go out and they're just right by the river. (SRB&A Nuiqsut Interview November 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 10 (four observations), followed by Need More (two observations) (Table 26).

I needed to, I needed more caribou. (SRB&A Nuiqsut Interview November 2017)

I can't just sit in Nuiqsut staring at the wall. I love it out there. A lot. (SRB&A Nuiqsut Interview November 2017)

More because I need more meat, I need more fish. I filled up my freezer for winter supplies. (SRB&A Nuiqsut Interview November 2017)

Changes in Trip Duration

Forty-seven percent of Year 10 respondents reported a change in the duration of their hunting trips in Year 10, substantially higher than previous study years, with 35 percent reporting longer trips compared to between 8 and 33 percent during all previous study years (Table 27). The percentage of respondents taking shorter trips was 11 percent, within the range of previous years.

Table 27: Type of Change in Trip Duration, Nuiqsut, Years 1-10

Type of Trip Duration Change	Percentage of Respondents									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Take Longer Trips	33%	25%	9%	12%	13%	16%	19%	8%	29%	35%
Take Shorter Trips	6%	8%	12%	7%	11%	11%	19%	20%	12%	11%
Take Same Duration Trips	61%	68%	79%	81%	77%	74%	61%	72%	60%	53%
Number of Respondents	36	53	57	58	56	57	57	50	52	62

Stephen R. Braund & Associates, 2019.

As shown in Table 28, the reasons given for taking longer hunting trips totaled 28 observations, higher than previous years, including Resource Distribution or Migration (19 observations; higher than any previous study year), Personal Factors (5), Economic Factors (2), and Development Activities and Development Infrastructure (1 observation each). Those individuals who reported taking longer trips for Resource Distribution/Migration causes generally indicated that the caribou were less available during the previous study year or that their movements were less predictable. Five individuals reported traveling farther to harvest caribou, resulting in longer trips:

Scouting out, looking for them. Usually you can see them all the time where they're at. You can literally have a couple of gallons of gas and say, 'Hey, I'm gonna run and grab those couple of caribou and then come right back,' but you can't do that no more. (SRB&A Nuiqsut Interview November 2017)

Because the caribous were farther out than in the last few years. The last few years they've been close to the roads. (SRB&A Nuiqsut Interview November 2017)

It seems like they are migrating later than usual and there is a lot of waiting and waiting. With the Teshekpuk herd we would normally have an abundance of caribou here. That means we are hurting. The majority of them were on the east side at Milne Point. They were there all summer. But not on the west side. No insect relief areas. (SRB&A Nuiqsut Interview November 2017)

Table 28: Reasons for Taking Longer Trips Compared to Previous Year, Years 1-10

Causes	Number and Percent of Observations										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Resource Distribution or Migration Total	10	5	1	4	5	8	8	1	2	19	63
	63%	56%	20%	57%	63%	73%	73%	25%	17%	68%	57%
Resource Availability	4	3		3	2	6	4		2	7	31
Farther from Riversides/Farther Inland		1			1	2	4			2	10
Travel Farther to Harvest Resource	1	1	1	1	1			1		5	11
Migration Changed or Diverted	5										5
Farther from Community										2	2
Change in Distribution/Migration										2	2
Later Migration/Arrival					1					1	2
Personal Factors Total	0	3	3	3	3	3	3	2	8	5	33
	0%	33%	60%	43%	38%	27%	27%	50%	67%	18%	30%
Personal Reasons		3	3	3	1	1	3	2	7	3	26
Better Transportation/Equipment					1	1					2
Change in Transportation Method					1				1		2
Take Fewer Trips										2	2
Sharing More						1					1
Development Activities Total	5	0	0	0	0	0	0	0	0	1	6
	31%	0%	0%	0%	0%	0%	0%	0%	0%	4%	5%
Helicopter Traffic Disturbance	2										2
Airplane Traffic Disturbance	2										2
Development	1									1	2
Hunting Success - General Total	1	0	1	0	0	0	0	0	0	0	2
	6%	0%	20%	0%	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	4
	0%	11%	0%	0%	0%	0%	0%	25%	0%	7%	4%
Increased Cost of Living/Expenses		1						1		2	4
Environmental Factors Total	0	0	0	0	0	0	0	0	1	0	1
	0%	0%	0%	0%	0%	0%	0%	0%	8%	0%	1%
Weather									1		1
Development Infrastructure Total	0	0	0	0	0	0	0	0	1	1	2
	0%	0%	0%	0%	0%	0%	0%	0%	8%	4%	2%
Roads/Ice Roads									1	1	2
Grand Total	16	9	5	7	8	11	11	4	12	28	111

Stephen R. Braund & Associates, 2019.

The primary reasons for taking shorter trips over all study years were related to Personal Factors (Table 29), including Personal Reasons in general and Lack of Transportation/Equipment. In a couple of cases, respondents indicated that they took shorter trips because of resource availability, with one indicating that they were more available (and therefore they did not have to search as long), and another indicating that they were less available (and they did not want to waste gas):

The caribou were closer and I just had the luck of the time I guess. (SRB&A Nuiqsut Interview November 2017)

We would have stayed out longer if there was more, but there was hardly any caribous. (SRB&A Nuiqsut Interview November 2017)

Table 29: Reasons for Taking Shorter Trips Compared to Previous Year, Years 1-10

Causes	Number and Percent of Observations										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Personal Factors Total	2	2	6	3	5	3	2	2	6	4	35
	100%	100%	86%	60%	56%	50%	22%	20%	86%	50%	54%
Personal Reasons	1		5	2	4	1		1	3	2	19
Employment/Lack of Time	1	1			1	1	1		2		7
Lack of Transportation/Equipment		1	1	1		1			1	2	7
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	2	15
	0%	0%	14%	20%	22%	17%	33%	50%	0%	25%	23%
Resource Availability			1	1	2	1	2	3		1	11
Farther from Riversides/Farther Inland							1				1
Harvest Resource Closer to Community								1			1
Closer to Shore								1			1
Closer to Community										1	1
Economic Factors Total	0	0	0	0	1	2	2	2	0	1	8
	0%	0%	0%	0%	11%	33%	22%	20%	0%	13%	12%
Increased Cost of Living/Expenses					1	2	2	2		1	8
Environmental Factors Total	0	0	0	0	1	0	1	1	0	0	3
	0%	0%	0%	0%	11%	0%	11%	10%	0%	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	0	1
	0%	0%	0%	20%	0%	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	2
	0%	0%	0%	0%	0%	0%	11%	0%	0%	13%	3%
Better Success							1			1	2
Development Infrastructure Total	0	0	0	0	0	0	0	0	1	0	1
	0%	0%	0%	0%	0%	0%	0%	0%	14%	0%	2%
Roads/Ice Roads									1		1
Grand Total	2	2	7	5	9	6	9	10	7	8	65

Stephen R. Braund & Associates, 2019.

Changes in Use Area

As shown in Table 19, 42 percent of harvester respondents reported that their hunting area was different in Year 10, on the high end of previous study years (between 28 percent and 40 percent of harvesters). Twenty-nine percent of Year 10 Nuiqsut caribou harvester respondents reported a using new or different areas, higher than any previous study year (Table 30). In addition, six percent of individuals reported traveling farther to harvest caribou and four percent reported a smaller hunting area, both within the range of previous years.

Table 30: Type of Change in Use Area, Nuiqsut, Years 1-10

Type of Use Area Change	Percentage of Respondents									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Use Area Changed	6%	19%	14%	29%	29%	28%	16%	15%	7%	2%
Smaller Hunting Area	11%		11%		4%		4%	8%	5%	5%
Expanded Use Area			7%		4%	11%	7%	2%	7%	
Travel Farther to Harvest Resource	14%	4%	5%	2%				6%		6%
Utilizing New or Different Areas			2%				2%	6%	19%	29%
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%	62%	58%
Number of Respondents	36	53	57	58	56	57	57	52	42	62

Stephen R. Braund & Associates, 2019.

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. Over all 10 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. In Year 10, however, Resource Distribution/Migration Factors were the most commonly cited reasons for a change in use area (32 percent of observations), followed closely by Development Infrastructure (29 percent of observations; specifically, Roads/Ice Roads). Environmental Factors (21 percent of observations) and Personal Factors (11 percent of observations) were also cited.

Table 31: Reasons Given for a Change in Use Area, Years 1-10

Causes	Number and Percent of Observations										All Years
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	
Personal Factors Total	4	4	19	15	13	12	8	7	8	3	93
	24%	25%	83%	68%	46%	44%	40%	37%	47%	11%	43%
Personal Reasons	1	1	10	11	6	3	2	4	1	3	42
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	9	56
	35%	44%	9%	9%	43%	30%	20%	21%	12%	32%	26%
Resource Availability	1	2		1	4	8	3	3	2	6	30
Migration Changed or Diverted	4	2			1						7
Change in Distribution/Migration		1		1	3			1		2	8
Farther from Community		1			1					1	3
Moved Out of Area			2								2
Closer to Community							1				1

Causes	Number and Percent of Observations										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
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	6	31
	6%	19%	9%	18%	7%	7%	15%	21%	24%	21%	14%
Shallower Rivers/Lakes			1	3		1	2	1	1	2	11
River Channel Changed						1		3	3	4	11
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	0	17
	24%	6%	0%	5%	4%	19%	15%	11%	0%	0%	8%
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	0	3
	0%	0%	0%	0%	0%	0%	5%	11%	0%	0%	1%
I Do Not Know							1	2			3
Development Infrastructure Total	2	0	0	0	0	0	0	0	3	8	13
	12%	0%	0%	0%	0%	0%	0%	0%	18%	29%	6%
Roads/Ice Roads	1								3	8	12
Pipeline	1										1
Economic Factors Total	0	1	0	0	0	0	1	0	0	1	3
	0%	6%	0%	0%	0%	0%	5%	0%	0%	4%	1%
Increased Cost of Living/Expenses		1					1			1	3
Competition or Hunting Pressure Total	0	0	0	0	0	0	0	0	0	1	1
	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%
Sport Hunting and Fishing										1	1
Grand Total	17	16	23	22	28	27	20	19	17	28	217

Stephen R. Braund & Associates, 2019.

Several hunters in Year 10 attributed their change in use area to resource distribution or migration causes, indicating that they traveled farther or used different areas because they could not find caribou:

A little bit different, I don't usually go up Itkillik. But it was bad caribou this year, it sucked, I don't usually go up there. (SRB&A Nuiqsut Interview November 2017)

No, it was different. I heard that caribous were farther south up in Itkillik. People went up Colville, I don't know how far they went up Colville, hoping to see a small herd somewhere close by. When we got to the lake we were hoping to see the caribous in the foot hills over

there. That is why we went through the west fork. (SRB&A Nuiqsut Interview November 2017)

It was [different]. The year before, my hunt was across the river over here, by the pipeline. And there was nothing to be seen over there. And then that pipeline over there, the HDD river crossing, it's a real disturbance to anything over there. That pipeline is reflected – it reflects the sun, it's too bright. Anything that reflects catches the eye of a caribou, and those are the things they're scared of—light and reflections. (SRB&A Nuiqsut Interview November 2017)

Year 10 was the first year with the GMT1 road in place, and a number of hunters reported using the road to hunt caribou, noting that this was a new hunting area for them; however, a couple indicated that the road affected their use area in different ways:

It was harder to get through all of this [sand bar area] and the way the tundra had dried up where the ice roads were was harder to travel on. We just started [going on the road] this summer. (SRB&A Nuiqsut Interview November 2017)

[My area was] small, kinda small [because of the road]—there's people up there! People we don't know! Hunters or workers! You never know. That's my complaint. (SRB&A Nuiqsut Interview November 2017)

Finally, several individuals commented that various changes to river channels in Year 10, as well as high water levels, allowed them to access areas they previously could not. Several individuals described,

Oh yeah, [the water] was high and everybody have a chance to go in these little places where they can't usually go. We went in a little creek here where you could go in, there is an old airport somewhere here. You can go in there when the water is so high. (SRB&A Nuiqsut Interview November 2017)

We never went this way before on the little creeks but the water was so high we came out over here. There was very high water. (SRB&A Nuiqsut Interview November 2017)

I went to a couple of new areas, because that river changed. You can't do it the same every year, you've got to change it up. (SRB&A Nuiqsut Interview November 2017)

Personal Factors cited in Year 10 included Personal Reasons (three observations), and Lack of Transportation/Equipment (one observation). One hunter described the impact that a lack of employment had on his hunting area in Year 10:

I didn't go as far with the boat. I didn't get to Fish Creek. And I didn't go up to Pisiktaġvik. And I didn't go hunting with a snowmachine. For my part I was unemployed a lot of the months and I could not afford the gas. Gas, gas, gas. (SRB&A Nuiqsut Interview November 2017)

Changes in Hunting Months

Sixteen percent of Nuiqsut caribou harvester respondents reported a change in their hunting months in Year 10, within the range of previous years (between 12 percent and 21 percent) (Table 19). In all cases, these respondents reported a general change within their normal harvest season, rather than an overall shift in the timing of their hunting season (Table 32). Over the 10 study years, Personal Factors were the most commonly cited reasons for a change in harvest seasons, and this trend held true in Year 10, with five observations (Table 33). In Year 10, residents cited Personal Factors including general Personal Reasons, Need More, Better Transportation/Equipment, Employment/Lack of Time, and Lack of Transportation/Equipment.

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	Y10
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%	20%	16%
Harvest Season Same	81%	85%	88%	79%	79%	82%	89%	82%	78%	84%
Number of Respondents	36	53	57	58	56	57	57	50	51	61

Stephen R. Braund & Associates, 2019.

Table 33: Reasons Given for a Change in Harvest Season, Years 1-10

Causes	Number and Percent of Observations										All Years
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	
Personal Factors Total	4	5	5	12	8	7	4	7	3	5	60
	57%	63%	71%	86%	67%	70%	67%	88%	38%	50%	67%
Lack of Transportation/Equipment	2	2	2	3	6	3	1			1	20
Personal Reasons		2		7	1	1	2	4	2	1	20
Employment/Lack of Time	2		1	2		1				1	7
Better Transportation/Equipment			2		1					1	4
Need More						1	1	1		1	4
Change in Subsistence Dependents		1						1			2
Change in Subsistence Providers						1					1
Need Less								1			1
Change in transportation method									1		1
Resource Distribution or Migration Total	3	2	2	1	2	1	1	0	2	3	17
	43%	25%	29%	7%	17%	10%	17%	0%	25%	30%	19%
Resource Availability		2	1		2	1	1		2		9
Later Migration/Arrival	3										3
Earlier Migration/Arrival										2	2
Change in Distribution/Migration				1						1	2
Moved Out of Area			1								1
Environmental Factors Total	0	0	0	0	2	1	0	0	2	0	5
	0%	0%	0%	0%	17%	10%	0%	0%	25%	0%	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	0	1
	0%	13%	0%	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	0	2
	0%	0%	0%	7%	0%	0%	17%	0%	0%	0%	2%
I Do Not Know				1			1				2
Hunting Success - General Total	0	0	0	0	0	1	0	0	0	0	1
	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	1%
Better Success						1					1
Development Infrastructure Total	0	0	0	0	0	0	0	1	0	2	3
	0%	0%	0%	0%	0%	0%	0%	13%	0%	20%	3%
Roads/Ice Roads								1		2	3
Economic Factors Total	0	0	0	0	0	0	0	0	1	0	1
	0%	0%	0%	0%	0%	0%	0%	0%	13%	0%	1%
Increased cost of living/expenses									1		1
Grand Total	7	8	7	14	12	10	6	8	8	10	90

Stephen R. Braund & Associates, 2019.

Two individuals discussed a change in the timing of their hunt in Year 10 due to Personal Factors:

They had no caribou for the feast, so I went out to help them [in December]. But I might do that more now! (SRB&A Nuiqsut Interview November 2017)

That [timing] was the same, except that if I had a snowmachine I would be hunting during the winter. It broke down, it's finally now getting worked on. (SRB&A Nuiqsut Interview November 2017)

Other reasons cited for a change in hunting months included Resource Distribution/Migration Causes, and Development Infrastructure Causes, including Roads, Earlier Migration/Arrival, and Change in Distribution/Migration, with residents noting that increased access to roads in addition to a change in the timing of caribou availability affected when they went hunting:

Usually we get them by then. But they came in pretty late. Like the end of June and July is when they started coming in. It is a bit later than we normally get them in every summer. (SRB&A Nuiqsut Interview November 2017)

It is getting harder for us. But [yeah, typical]. We start hunting caribou in June right as the ice breaks up. It was early, one of the earliest break ups. Last year it was the end of May. (SRB&A Nuiqsut Interview November 2017)

This year, for me, this one on the Spur road was kind of weird, because we usually don't get any [during that time]. Some people do hunt year-round, and some people [hunt in] spring time. (SRB&A Nuiqsut Interview November 2017)

Harvested Enough Caribou

In Year 10, 41 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 Years 7 and 8, a smaller percentage of respondents reported harvesting enough caribou in Years 9 and 10. Respondents discussed a variety of reasons for not harvesting enough caribou during the Year 10 study period, often referring back to their reasons for harvesting fewer caribou in Year 10 (see Table 22). Respondents discussed a variety of reasons for not harvesting enough caribou during the Year 10 study period. The primary reasons were a lack of caribou in the area and harvesters sharing much of their caribou with other households:

We did not have adequate caribou because I have to feed two families other than my own. (SRB&A Nuiqsut Interview November 2017)

Not really, I was short. I'm behind on my servicing for Barrow [sharing with Barrow residents]. They sent me the bullets and I haven't satisfied them yet. When I went to Barrow on a boat last year, I did bring some with me to Barrow, I killed them on the way over. (SRB&A Nuiqsut Interview November 2017)

That's not quite enough, I would have liked to get more, and I give them out to people, like elders who don't catch, I take a share, and then it goes to the elders. (SRB&A Nuiqsut Interview November 2017)

Vast majority of what we get, we give to the elders of Nuiqsut. Seventy to 85 percent we give to them, or needy families. Two days ago [my son] got some by Nigliq and I cut it up and all we have left of it is a piece of meat maybe that big [8 inches square]. We just keep enough for

us. We give my elderly mom a lot. And me and [my son] decide who we are going to give to. (SRB&A Nuiqsut Interview November 2017)

No [not enough]. Just not many [caribou] around and I didn't get out. Not many around. Just a few here and there. (SRB&A Nuiqsut Interview November 2017)

We're going to hurt! Usually we get 13 in our freezer and we have five this year. And some of our neighbors will ask for caribou and we will give it and that really hurts us there too. (SRB&A Nuiqsut Interview November 2017)

Other respondents indicated that they had to rely on others in the community for caribou meat since they did not harvest enough themselves:

Not enough. We are basically getting caribous from other family members. (SRB&A Nuiqsut Interview November 2017)

No. I had to let my brother bring some over. I don't have enough. One of my brothers will bring some over even though we don't ask for some. (SRB&A Nuiqsut Interview November 2017)

Others reported harvesting enough even if it was not as much as they would have liked. As two respondents stated,

It was not as much as we normally get, but it was enough, we stretched it out. We didn't have as much as we would like to have, but we are making it. (SRB&A Nuiqsut Interview November 2017)

Yes. I told my nephew, that guy who was just here, that I didn't have enough, and he brought me some caribou. They're young men. They know how to feed [us] caribou. That young nephew, he call me and ask if I got caribou and I said no, and he bring me some caribou. (SRB&A Nuiqsut Interview November 2017)

Observations of Harvested Caribou Health and Condition

The percentage of respondents reporting one or more “abnormalities” in caribou has ranged from 18 percent to 64 percent over all study years; while Years 8 and 9 had the lowest percentage of respondents observing abnormalities, at 21 and 18 percent, respectively, Year 10 showed the highest percentage of respondents reporting abnormal caribou since Year 5, at 29 percent (Table 34). The number of harvested caribou with abnormalities in Year 10 (28 caribou) was within the range of previous years, which ranged from 14 (Year 4) to 74 (Year 1, when a large number of caribou were identified as particularly skinny) (Table 35). As with most other years, health problems were the primary type of observation in caribou in Year 10 (68 percent of observations), followed by abnormal size (39 percent of observations) (Table 35). In Year 10, respondents reported using 32 percent of caribou identified with abnormalities (nine of 28), within the range of previous years, which ranged from 26 percent to 100 percent (Table 35); 64 percent of those caribou had size-related abnormalities and 24 percent had health-related abnormalities.

As shown in Table 36, the most commonly observed abnormalities in Year 10 were Disease/Infection (18 observations) followed by Decrease in Resource Size (14 observations); Change in Texture of Meat (3 observations); Change in Smell of Meat (two observations); and More Parasites, Physical Abnormalities, and Fur Less Thick (one observation each).

Table 34: Respondent Observations of Abnormalities in Harvested Caribou, Nuiqsut, Years 1-10

Type of Abnormality	Percentage of Respondents									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Health	47%	26%	18%	26%	33%	16%	15%	16%	14%	22%
Other	3%	4%	0%	0%	4%	4%	5%	2%	2%	3%
Parasites	22%	2%	5%	3%	4%	0%	2%	0%	0%	1%
Quality	8%	4%	4%	10%	14%	4%	0%	10%	2%	3%
Size	28%	11%	18%	16%	26%	12%	8%	5%	5%	10%
One or More Abnormalities	64%	38%	40%	29%	44%	25%	22%	21%	19%	29%
Number of Active Harvester Respondents	36	53	57	58	57	57	60	58	63	68

Stephen R. Braund & Associates, 2019.

Table 35: Number and Percent of Abnormal Caribou by Type of Abnormality, Nuiqsut, Years 1-10

Type of Abnormality	Number (%) of Abnormal Caribou										Number (%) of Abnormal Caribou Used									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Health	24 (32%)	16 (47%)	13 (35%)	23 (85%)	30 (60%)	9 (64%)	19 (83%)	18 (51%)	11 (69%)	19 (68%)	4 (17%)	4 (25%)	2 (15%)	10 (43%)	7 (23%)	6 (67%)	2 (11%)	2 (11%)	2 (18%)	2 (23%)
Other	1 (1%)	2 (6%)	0 (0%)	0 (0%)	2 (4%)	2 (14%)	3 (13%)	4 (11%)	1 (6%)	2 (7%)	0 (0%)	100%	-	-	0 (0%)	1 (50%)	2 (67%)	4 (100%)	1 (100%)	0 (0%)
Parasites	13 (18%)	5 (15%)	8 (22%)	3 (11%)	2 (4%)	0 (0%)	1 (4%)	0 (0%)	0 (0%)	1 (4%)	11 (85%)	5 (100%)	7 (88%)	0 (0%)	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 (7%)	2 (67%)	1 (50%)	2 (100%)	1 (17%)	1 (9%)	1 (50%)	-	0 (0%)	1 (100%)	0 (0%)
Size	43 (58%)	9 (26%)	16 (43%)	12 (44%)	33 (66%)	7 (50%)	10 (43%)	14 (40%)	4 (25%)	11 (39%)	38 (88%)	8 (89%)	14 (88%)	1 (8%)	20 (61%)	3 (43%)	2 (20%)	12 (86%)	4 (100%)	7 (64%)
One or More Abnormalities	74	34	37	27	50	14	23	35	16	28	52 (70%)	20 (59%)	25 (68%)	11 (41%)	25 (50%)	9 (64%)	6 (26%)	18 (51%)	7 (44%)	9 (32%)

Stephen R. Braund & Associates, 2019.

Table 36: Types of Observed Abnormalities, Nuiqsut, Years 1-10

Observed Abnormality	Number of Observations										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Disease/Infection	24	12	13	20	29	7	17	16	6	18	162
Decrease in Resource Size	36	9	12	12	33	6	10	14	4	14	150
Change in Texture of Meat		3		4	8	1		3	6	3	28
Change in Smell of Meat	2	1		5	6	1		5	1	2	23
Fewer Parasites	10		7								17
Increase in Resource Size	5		4								9
Physical Abnormalities		3			1			4		1	9
More Parasites	3		1	3	1					1	9
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
Fur Less Thick							1			1	2
New Species in Region		1									1
Abnormal Resource Death	1										1
Less Fat	1										1

Stephen R. Braund & Associates, 2019.

A number of those who observed Disease/Infection noted pus or a slimy substance in the ribs and legs of the caribou and discolored organs and/or meat³:

The meat on the hind end on the chest area had green and yellow between the meat and the skin, it had like thick kind of jelly stuff, it's hard to [describe]. We brought it over and showed it to my mom, and she said, 'Get rid of it, don't even try to feed it to the dogs.' (SRB&A Nuiqsut Interview November 2017)

That one had green pus. That was out here on Itkillik. It covered the quarters. There has been a lot of them showing up that have had the green pus. [Individual] was complaining because he ended up throwing a lot of it away. Mine wasn't so bad. (SRB&A Nuiqsut Interview November 2017)

[The sick one] was just alone too. I don't know what was going on with it but maybe it had like pneumonia or something it had a lot of green stuff in its lungs and it was super underweight. We gutted it and when we got to the lungs that's when we found out it was sick. Lots of green mucus. (SRB&A Nuiqsut Interview November 2017)

Yeah it was alone and then the family realized that it was sick. When me and my dad were cutting it up we didn't realize that it was sick, but then when we came home my dad was finding all these tumors throughout the body. And then when I was cutting the tendons to cut the legs off there was like this yellow puss that was coming out and usually when you are cutting the tendons there is nothing coming out, just like a little fluid. And it smelled funny. (SRB&A Nuiqsut Interview November 2017)

³ These observations likely include instances of Brucellosis, a common disease in the Teshekpuk and Central Arctic Herd that is characterized by pus-filled swellings and swollen joints.

Observations of a Change in Texture of Meat were generally reported in combination with observations of Disease/Infection and 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:

The first time we noticed that one was a sick one was when my brother tried to cut the skin off the leg and my brother noticed that it was brownish. And then when I saw that, I decided that we [should] quit and just try to get the liver out and bring that for sampling, but then it was too hard. I never seen one that sick before, and we decided to just leave it, it was that bad. [We] cut the head off and leave it. (SRB&A Nuiqsut Interview November 2017)

Yeah. As soon as I took the skin off the leg, the layer right under the meat, it was brown. And we left that out there. (SRB&A Nuiqsut Interview November 2017)

Those who observed a Decrease in Resource Size indicated that the caribou they harvested had less than the usual amount of fat, or they were underweight in association with disease/infection:

Yeah, they just weren't fat like they should be. I mean, they were good, they just didn't have any fat. (SRB&A Nuiqsut Interview November 2017)

[The sick one] was just alone too. I don't know what was going on with it but maybe it had like pneumonia or something it had a lot of green stuff in its lungs and it was super underweight. We gutted it and when we got to the lungs that's when we found out it was sick. Lots of green mucus. (SRB&A Nuiqsut Interview November 2017)

One individual reported harvesting a caribou had numerous bot flies and resulting infections, which were confirmed by the NSB Department of Wildlife Management:

That one was sick. It had numerous bot flies, stings on it. There was an actual bot fly stuck to its side. It had growths about this big [golf ball sized] maybe twenty of them, majority of them were here in the groin area. It had one actual bot fly stuck in its side. And then the legs had yellow pus on all its joints. Nope, [we didn't keep that one] we contact NSB wildlife and sent them a sample and they mentioned that it was from bot flies. (SRB&A Nuiqsut Interview November 2017)

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:

I don't know why but it probably ate something, something bad. But it was down by Umiat and there is a lot of crap down there. A lot of contaminated areas. I have never caught such a sick one. (SRB&A Nuiqsut Interview November 2017)

I don't think that it really has to do with the construction, I think that it has to do with the climate changes. I wouldn't say that it affects them, it affects where they go, and how they change their migration. So I wouldn't say it has to do all with the oil field. I think that they are just trying to change so that they can adapt just a little bit. Hopefully next year I will know more about where everything is. (SRB&A Nuiqsut Interview November 2017)

There was one caribou that I was helping [butcher] and it had some issues, you could see it when you get the skin off. In the joint areas, the whole joint was infected from the exterior to

the interior of the bones and stuff. And there was one [infected] area in the brisket area, it was pusy and the bones were red and it had a different texture to it. All of the joints, hips, wrists, brisket [were infected]. If I had to try to pinpoint [the location of infection], it was where two bones connect with softer tissue all of those areas. It came back and I was helping butcher it. I asked him questions about it. I asked him if it was the only caribou and he said no, there was a dozen more. He said it ran a little bit, but it wasn't fast. He said he thought it gave itself up to him, sacrificed himself. But when we got it home it was really infected. That is the bio accumulation. [The caribou] are getting the bad plants and eating it. If they are getting contamination in the air all the way from Prudhoe to Barrow. They are doing studies and they are picking up air quality pollution from Prudhoe all the way to Barrow. It's got to be in the ground already. Our previous leaders have [spoken] up and we are supposed to be able to adjust and fix it now. There are people starting to be more awakened to the impacts. It's tough. (SRB&A Nuiqsut Interview November 2017)

Several individuals indicated that all of the caribou they harvested during the Year 10 time period were healthy:

No they were good this year, they were healthy. When I shoot that caribou and skin it and see if I can see some disease like I used to see and there was none. They were healthy, clean. (SRB&A Nuiqsut Interview November 2017)

I haven't seen a sick caribou in a while. Maybe since last year or so. (SRB&A Nuiqsut Interview November 2017)

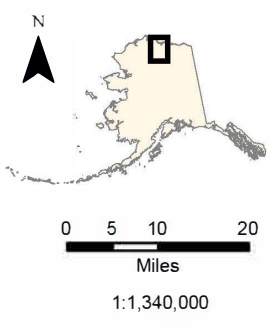
The locations where Year 10 respondents reported harvesting caribou they perceived to be abnormal are depicted in red on Map 32, and locations identified during previous study years are shown in gray. For the Year 10 time period, respondents reported harvesting “abnormal” caribou primarily to the overland area west of the community, north along the Spur road, and along the Ikillik River. Other locations where abnormal caribou were harvested occurred along the Nigliq Channel and upriver from the community on the Colville River near Ocean Point, Umiat, and on the Chandler River. As shown on Map 33, over all study years, the locations where respondents have harvested abnormal caribou are similar to the locations where they have harvested healthy caribou. During the Year 10 household harvest survey, respondents were asked whether any of the caribou they harvested were sick or injured. In Year 10, 21 percent of households reported harvesting sick caribou, the highest percentage since Year 5 and consistent with a higher percentage of Year 10 active harvesters reporting abnormalities compared to recent years (Table 37 and Table 34). The number of sick caribou reported was also higher than previous study years, at 57 caribou, which accounted for 11 percent of all caribou harvested. It is important to note that a high number of sick caribou were reported by a single household, which also reported a particularly high harvest in 2017.

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%)
2017 (Year 10)	21%	57 (11%)	2 (4%)

Notes: ADF&G data for 2014 (Year 7) not reported due to low response rate.

Stephen R. Braund & Associates, 2019.



Map 32 - Harvest Locations where Respondents Harvested Abnormal Caribou, Years 1 - 10

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 158 active harvesters from March 2009 through November 2017.

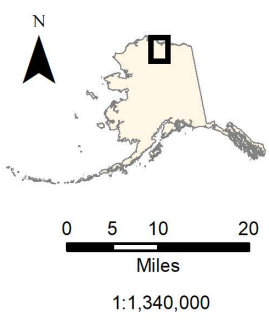
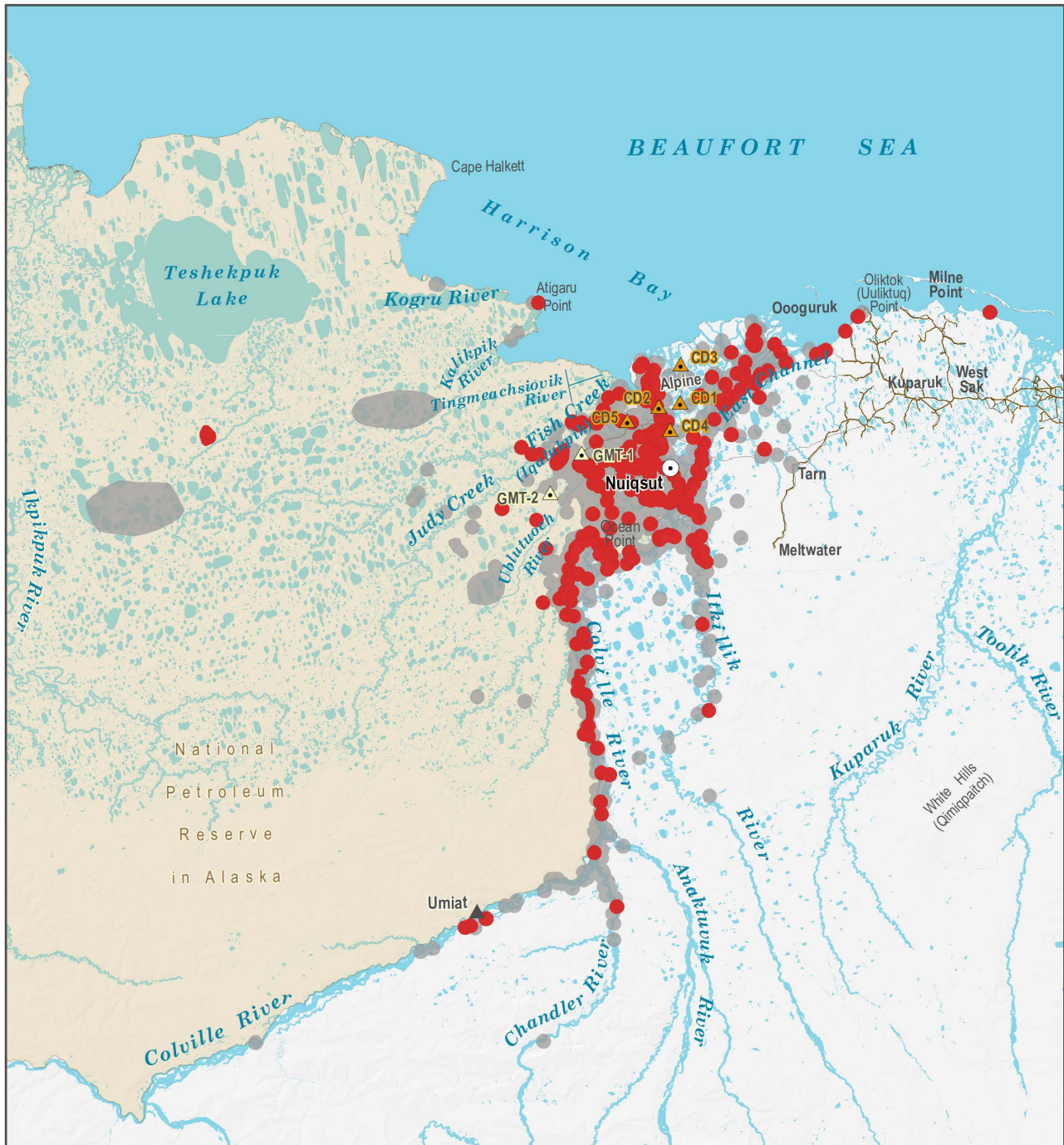
Other areas may have been used for resource harvesting.

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- Year 10: November 2016 - October 2017**
- 25 caribou harvest locations
- 19 respondents

- Years 1-9: January 2008-October 2016**
- 241 caribou harvest locations
- 74 respondents

- National Petroleum Reserve Alaska



Map 33 - Harvest Locations where Respondents Harvested Abnormal Caribou and Healthy Caribou, Years 1 - 10

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 158 active harvesters from March 2009 through November 2017.

Other areas may have been used for resource harvesting.

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- Years 1-10: January 2008 - October 2017**
- 266 abnormal caribou harvest locations
- 85 respondents

- Years 1-10: January 2008-October 2017**
- 1925 healthy caribou harvest locations
- 158 respondents

- National Petroleum Reserve Alaska

Impacts on Harvesting Activities

In Year 10, 51 percent of respondents reported one or more perceived Alpine-related impacts on their caribou hunting⁴, higher than the previous three years but within the range of all other study years (Table 38; Figure 8). The number of impact observations (63) was also higher than the previous three years (between 29 and 42 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, man-made structures were the most commonly reported impact, reported by 26 percent of respondents and accounting for 29 percent of impact observations. In most other years, helicopter traffic was the most commonly reported impact by a substantial margin. In Year 10, 21 percent of respondents reported helicopter impacts, and helicopter impact observations accounted for 22 percent of observations. Reports of impacts related to helicopter traffic and man-made structures were followed by reports of other traffic (15 percent of respondents), plane traffic (12 percent of respondents), and other impacts (10 percent of respondents) (Table 38). The percentage of respondents reporting helicopter impacts in Year 10 (21 percent) was on the low end of previous years, which have ranged from 13 percent of respondents reporting helicopter impacts (in Years 9) to 61 percent of respondents (in Year 1). The percentage of respondents reporting “other” impacts was higher than any previous year, and the percentage reporting impacts related to man-made structures was highest since Year 2. In Years 1 and 2, respondents were more likely to report impacts related to man-made structures—specifically pipelines—than in subsequent years. This may be in part due to Year 1 collecting data on changes that started since the beginning of the Alpine development and because 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 a somewhat higher prevalence of reported impacts during the Year 10 active harvester interviews, the percentage of households reporting Alpine-related impacts during Year 10 household surveys declined to 29 percent from 41 percent in Year 9 (previous years have ranged from between 21 percent and 44 percent). Year 10 also showed 11 percent of households reporting avoidance of development areas altogether, higher than previous study years (Table 39). This percentage may actually be higher, as these observations were volunteered by respondents and not cued during the survey. Figure 9 shows the number of reported impacts on caribou hunting of all types by month for the 10 study years, and Figure 10 through Figure 17 show individual impact reports by month for the 10 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 most years are June, July, and August, the same months as peak caribou hunting activity (Figure 9, Figure 1). However, in Year 10, impact reports were more evenly distributed throughout the year, with peak impacts occurring from June through September. July and September showed the highest number of impact reports, at 16 observations each. Helicopter impacts peaked in June and July, with seven and eight observations of impacts each, but occurred from May through September (Figure 10). Reported airplane impacts occurred at low levels year-round, with slightly higher impact reports in July and September (Figure 11). Other traffic impacts occurred from August through October (Figure 12). Man-made structure impacts were reported year-round, with a slight peak in June, August, and September (Figure 13). In Year 10, “Other” impacts were reported at low levels year-round with a peak from January through March (Figure 16).

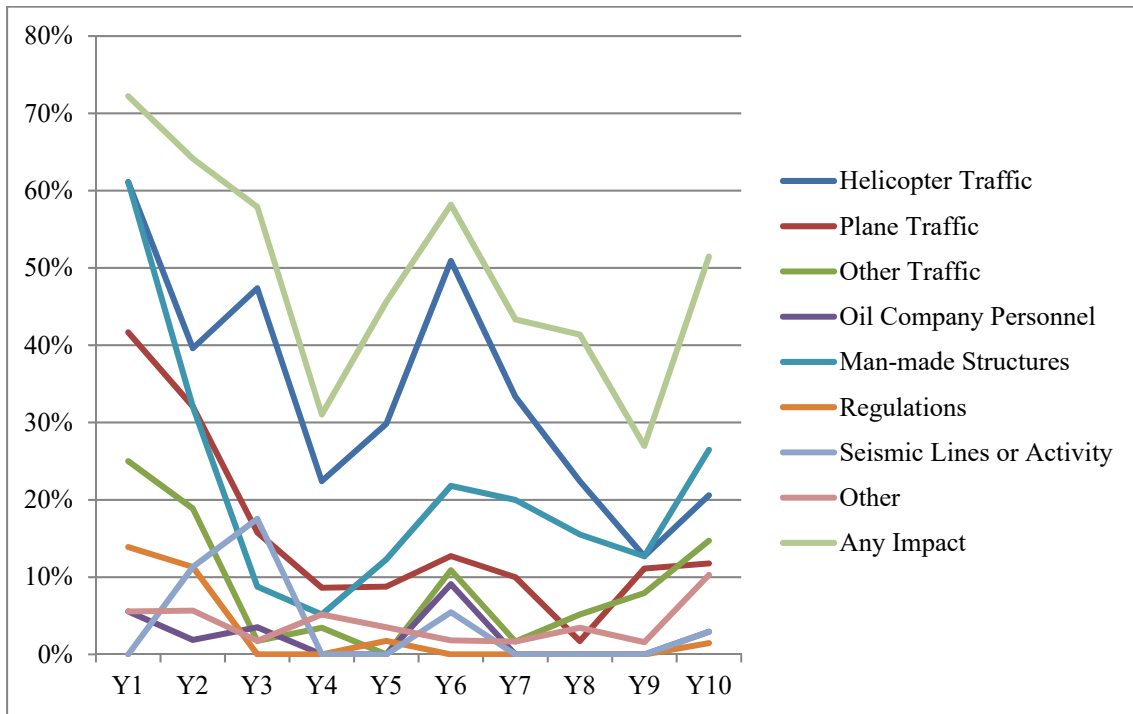
⁴ The impacts discussed in this section are those that respondents believed were related to Alpine activities. It is not possible to verify the source of all impacts, and in some cases respondents were unsure of the source of an impact.

Table 38: Respondent Reported Alpine-Related Impacts on Caribou Hunting, Nuiqsut, Years 1-10

Type of Alpine-Related Impact	Percent of Respondents										Percent of Observations									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Helicopter Traffic	61%	40%	47%	22%	30%	51%	33%	22%	13%	21%	28%	26%	49%	54%	55%	46%	48%	52%	28%	22%
Plane Traffic	42%	32%	16%	9%	9%	13%	10%	2%	11%	12%	22%	21%	16%	18%	18%	12%	14%	3%	24%	13%
Other Traffic	25%	19%	2%	3%	0%	11%	2%	5%	8%	15%	10%	12%	2%	7%	0%	9%	2%	10%	17%	16%
Oil Company Personnel	6%	2%	4%	0%	0%	9%	0%	0%	0%	3%	2%	1%	4%	0%	0%	7%	0%	0%	0%	3%
Man-made Structures	61%	32%	9%	5%	12%	22%	20%	16%	13%	26%	30%	22%	9%	11%	18%	19%	33%	29%	28%	29%
Regulations	14%	11%	0%	0%	2%	0%	0%	0%	0%	1%	6%	7%	0%	0%	3%	0%	0%	0%	0%	2%
Seismic Lines or Activity	0%	11%	18%	0%	0%	5%	0%	0%	0%	3%	0%	7%	18%	0%	0%	4%	0%	0%	0%	3%
Other	6%	6%	2%	5%	4%	2%	2%	3%	2%	10%	2%	4%	2%	11%	5%	1%	2%	6%	3%	13%
Any Impact	72%	64%	58%	31%	46%	58%	43%	41%	27%	51%										
No Impact	28%	36%	42%	69%	54%	42%	57%	59%	73%	49%										
Number of Respondents/ Observations	36	53	57	58	57	55	60	58	63	68	87	82	55	28	38	67	42	31	29	63

Stephen R. Braund & Associates, 2019.

Figure 8: Percentage of Respondents Reporting Impacts by Study Year



Stephen R. Braund & Associates, 2019.

Table 39: Impact Observations, Household Harvest Surveys

Year ¹	Percentage of Nuiqsut Households		
	Alpine-related Impacts	Other Impacts ²	Avoiding Alpine Area ²
2010 (Year 3)	39%	-	-
2011 (Year 4)	21%	9%	9%
2012 (Year 5)	32%	18%	4%
2013 (Year 6)	33%	8%	10%
2015 (Year 8)	43%	4%	2%
2016 (Year 9)	41%	1%	3%
2017 (Year 10)	29%	2%	11%

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, 2019.

Figure 9: Reported Impacts by Month, Years 1-10

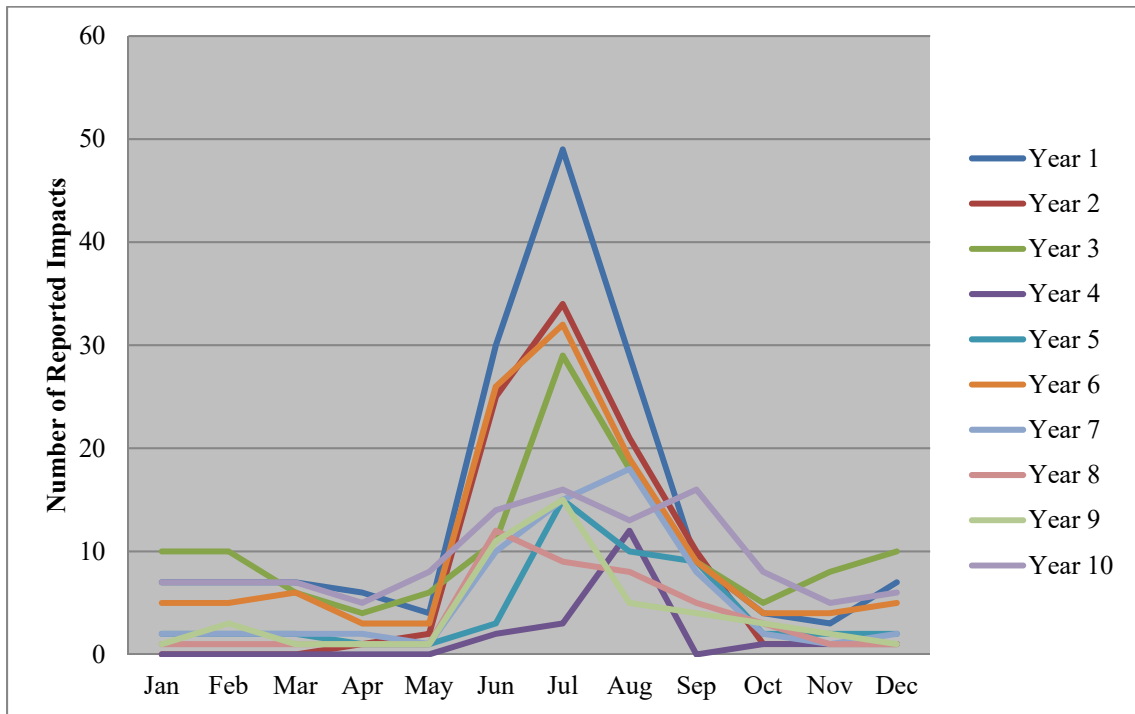


Figure 10: Reported Helicopter Impacts on Caribou Harvest Activities by Month: Years 1-10

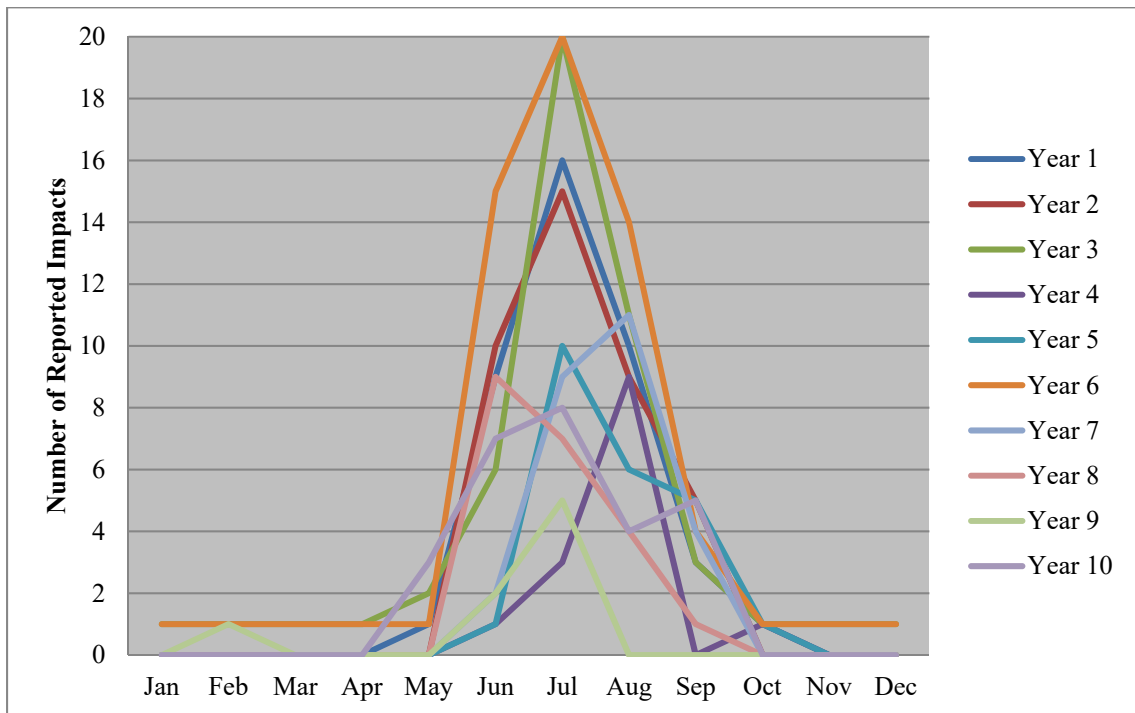


Figure 11: Reported Airplane Impacts on Caribou Harvest Activities by Month: Years 1-10

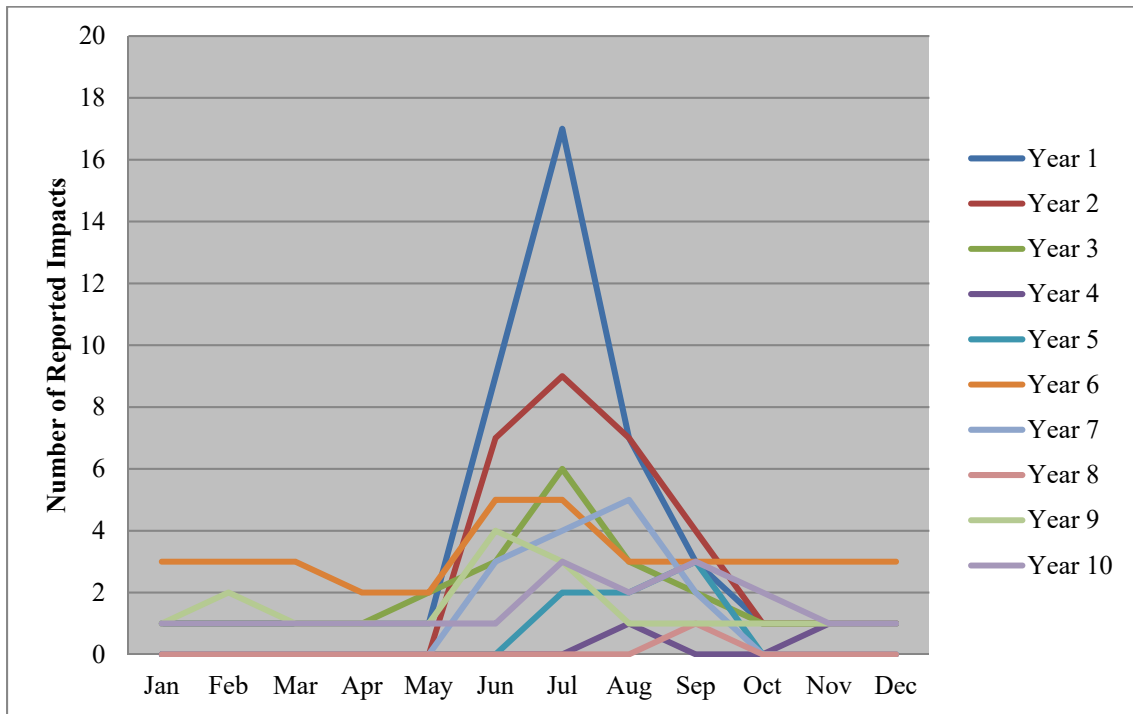


Figure 12: Reported Other Traffic Impacts on Caribou Harvest Activities by Month: Years 1-10

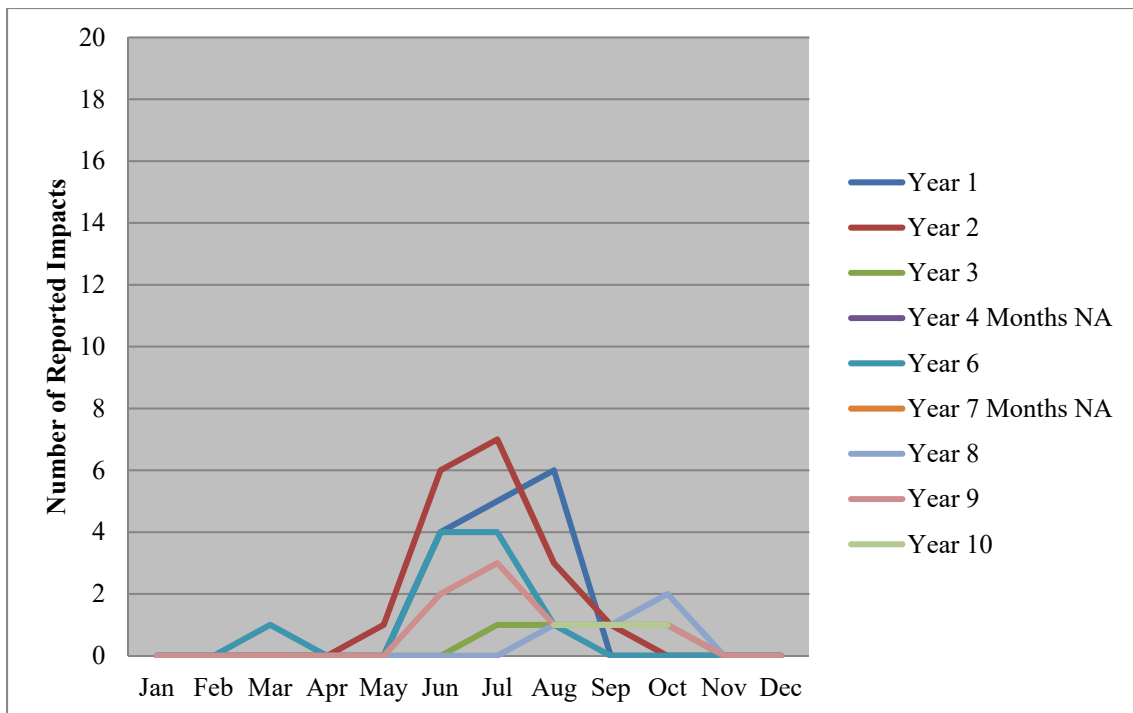


Figure 13: Reported Oil Company Personnel Impacts on Caribou Harvest Activities by Month: Years 1-10

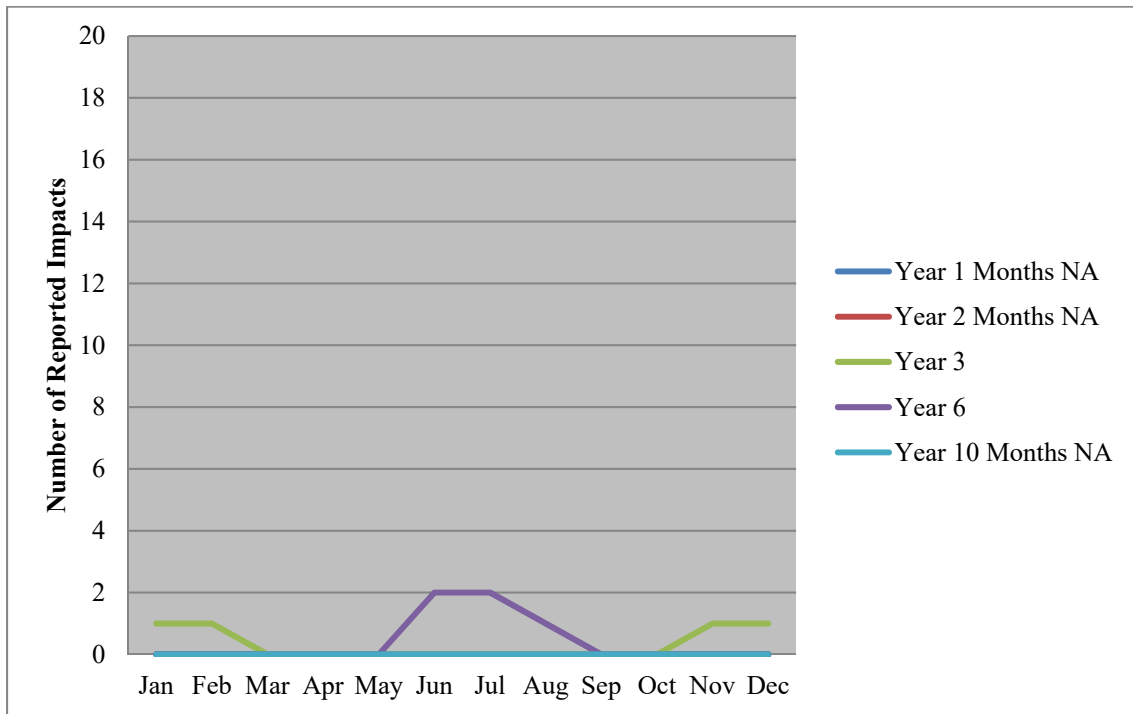


Figure 14: Reported Man-Made Structure Impacts on Caribou Harvest Activities by Month: Years 1-10

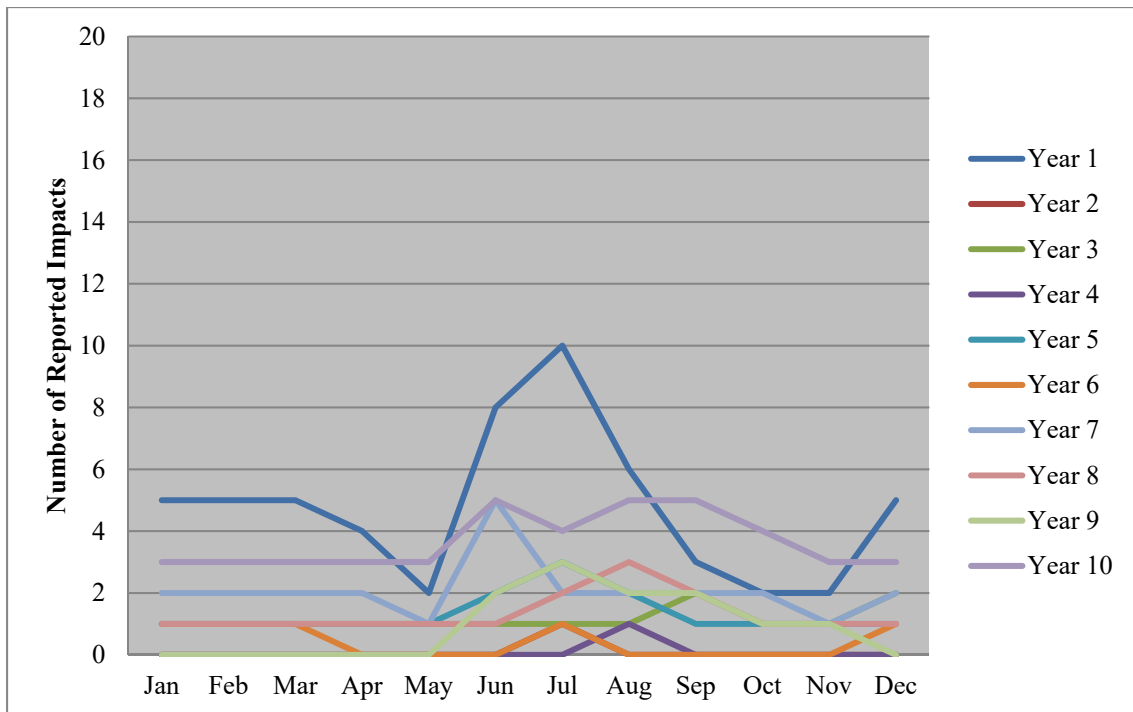


Figure 15: Reported Regulation Impacts on Caribou Harvest Activities by Month: Years 1-10

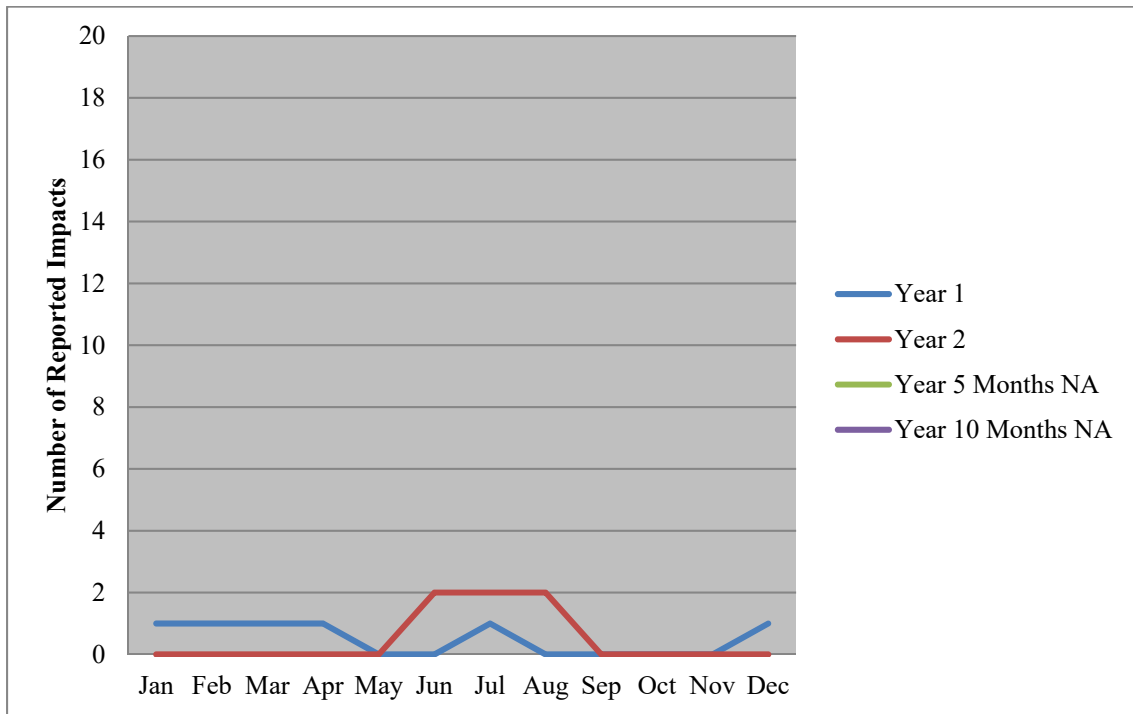


Figure 16: Reported Other Impacts on Caribou Harvest Activities by Month: Years 1-10

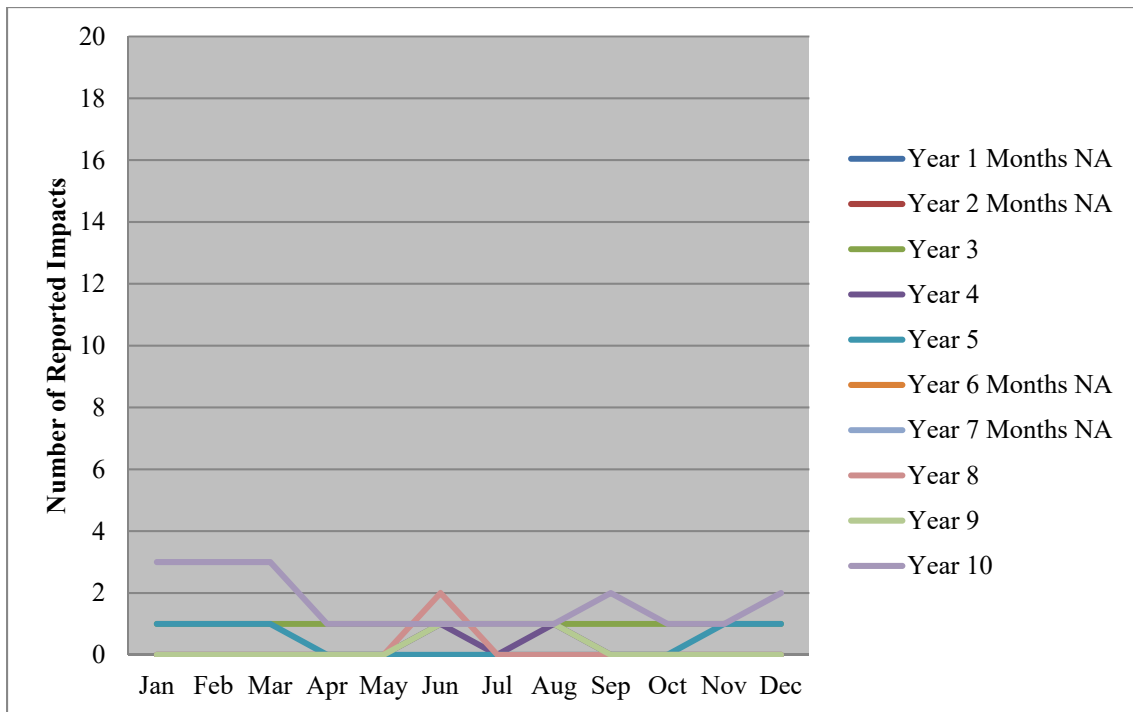
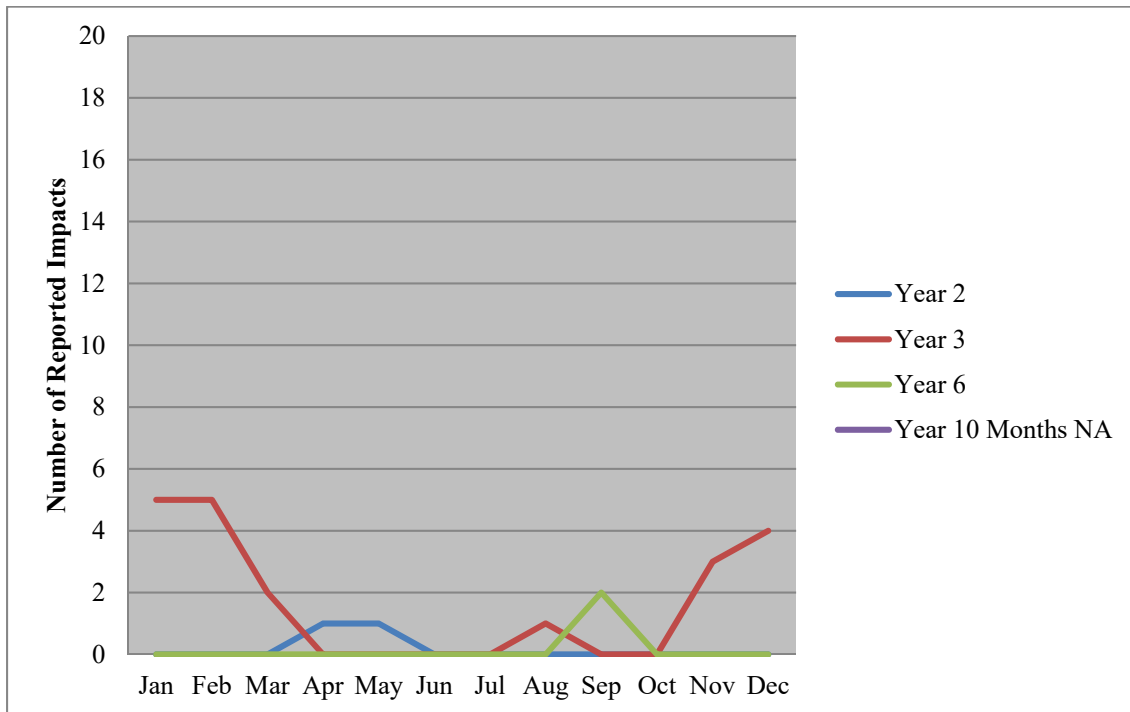


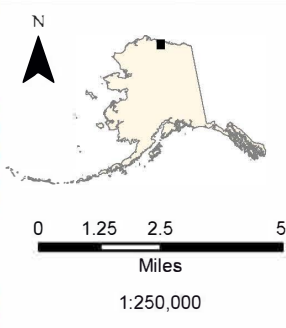
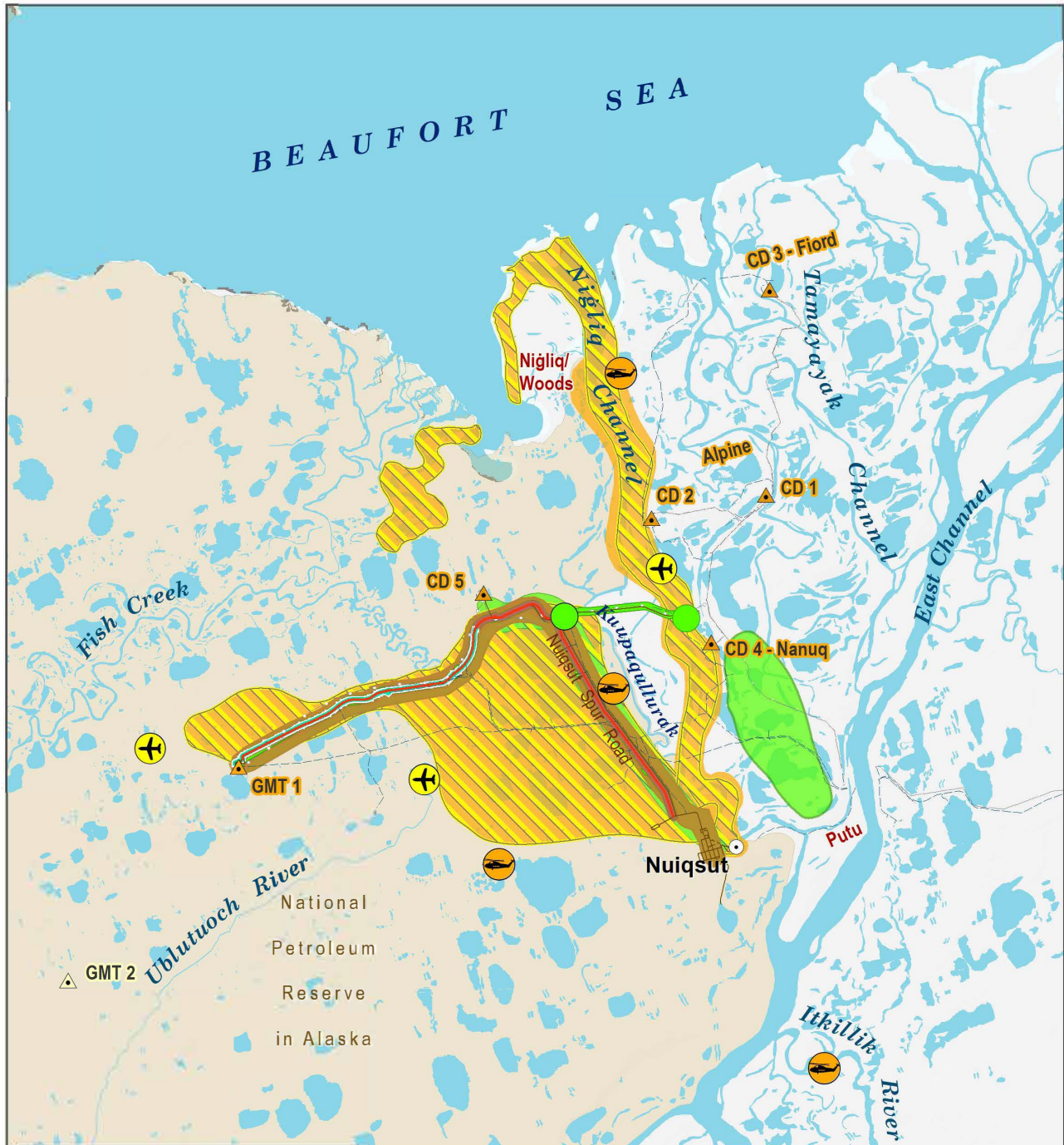
Figure 17: Reported Seismic Line and Activity Impacts on Caribou Harvest Activities by Month: Years 1-10



Map 34 shows the locations of Alpine-related impacts reported by Year 10 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 34, impacts in Year 10 were primarily reported along the Nigliq Channel, to the west of the community, and along the existing road system. Impacts related to manmade structures were reported along the Spur road, road to CD5, along the Nigliq Channel bridge (including the *Kuupaqullurak* crossing), and near pipelines east of the community. Air traffic impacts were also reported along Nigliq Channel, in a large area to the west of the community and surrounding the road system, along Fish Creek, and on Ikillik River (Map 34).

Impacts of Helicopter Traffic

As shown in Table 38, 21 percent of respondents reported helicopter impacts in Year 10, a smaller percentage than most previous years. Helicopter impacts accounted for 22 percent of the reported impacts during the Year 10 study period (Table 38). In recent years, respondents have suggested that construction of the CD5 and GMT1 roads have decreased (although not eliminated) the need for helicopter traffic associated with development, which may have led to the lower reports of impacts Years 8 through 10. One respondent observed in Year 10, “For the first time I heard people say that there was not that much chopper activity around here. That was the first time” (SRB&A Nuiqsut Interview November 2017).



Map 34 - Perceived Alpine Related Impacts, Year 10

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 68 active harvesters in November of 2017.

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National Petroleum Reserve Alaska

LEGEND

	10 helicopter impacts 10 respondents
	10 structure impacts 10 respondents
	7 other traffic impacts 7 respondents
	6 plane impacts 6 respondents
	1 regulation impact 1 respondent
	1 other impact 1 respondent

Those individuals who did report helicopter related impacts described circumstances similar to those discussed in past study years, with helicopter traffic (particularly when at low altitudes) causing skittish behavior in caribou or displacing them altogether, thus reducing hunting success.

And one of the choppers looked like it was chasing the caribou and we don't know why. It looked like it was blue and white. But I am sure whoever it was will deny it. But they were just herding them. I don't know if it's those people from Alpine. But it looked like they were chasing them. (SRB&A Nuiqsut Interview November 2017)

I have watched myself, especially where the ASRC mine site is. Geese hunting and going in here, we will see the caribou, and we watch the chopper coming into the vicinity and the caribous will take off. And every bird within a two-mile radius of the chopper coming in they will take off. And those caribou will take off too. Everything. So these helicopters that are conducting these studies on the river—every time I see them, the aircraft has an effect on [the caribou], they scatter. [This year] I didn't see it as much as I did before. (SRB&A Nuiqsut Interview November 2017)

The helicopters, it's a nuisance. They say they're bringing it in to clean their areas [after ice road season]. Why can't they clean it at a different time, not when the caribou are coming through? They showed us four different helicopters we need to be aware of at the meeting. If you're an early morning person you can hear them flying. They're always be going this way, going that way, and coming back over this way. That could be an impact also, because they're flying there before the herd is coming. They always start in May until September, I believe. They always tell us it's going to be ConocoPhillips, Alpine – not state troopers—wildlife service, and then one more. There's four of them. (SRB&A Nuiqsut Interview November 2017)

The helicopters—there was a couple times that we were waiting for the tuttus and then they [helicopters] flew over. It was right in here [in Ikillik]—we were on top of the cabin waiting for that tuttu to come closer, and then [the helicopter] flew between us and those tuttus took off the other way away from us. It was in June. (SRB&A Nuiqsut Interview November 2017)

We got one on that road, but the thing is, when we were going for it, there was a helicopter that came from Alpine and [the caribou] got up and ran and went to the other side of the road and he shot it even though you are not supposed to because he had no choice. (SRB&A Nuiqsut Interview November 2017)

While most individuals reported direct impacts of helicopter traffic on caribou behavior and movement, others simply indicated that the presence of helicopters is an impact to their overall subsistence experience. Observations by respondents of the types of helicopter activities associated with impacts included garbage clean-up, general flying, and surveying/monitoring studies. When asked to describe the helicopters causing the impacts, respondents most commonly reported “Unknown Owner” (eight observations), followed by “Blue and Red” (two observations), and various other descriptions with one observation each (Table 40).

Table 40: Respondent Descriptions of Helicopters Associated with Impacts, Nuiqsut, Years 3-10

Helicopter Descriptions	Number of Observations								
	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Helicopters - Unknown Owner	9	7	4	9	6	4	5	8	52
Blue and White Helicopter	8	6	10	9	5	1	2	1	42
Alpine Helicopter	4		5	6	5	6		1	27
Air Logistics Helicopter	4		2	3		1			10
ConocoPhillips Helicopter	1				1	2		1	5
Helicopter, Blue		1			1	2			4

Helicopter Descriptions	Number of Observations								
	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Helicopter, Blue and Orange		1		1					2
Red Helicopter	1						1		2
Blue and Red Helicopter								2	2
Red and Black Helicopter				1					1
Yellow Helicopter					1				1
Other Oil Company Helicopter				1					1
Airplane - Unknown Owner				1					1
Green and Yellow Helicopter								1	1
Green and White Helicopter					1				1
Total	27	15	21	31	20	16	8	14	152

Stephen R. Braund & Associates, 2019.

Impacts of Airplane Traffic

Impacts related to airplane traffic were reported by 12 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. Active harvesters described Year 10 impacts related to airplane traffic as follows:

Well, it's the same old—the air traffic cut down, besides the twin otter. It's going back and forth, [between] Alpine, here, Deadhorse. Well, then again, you hardly ever see caribou up there on the north side. [The flights are] weekly. I guess it's not every day. (SRB&A Nuiqsut Interview November 2017)

Yeah, the road and that twin otter flight. That twin otter needs to be put to a stop. They need to start using that road. Back and forth to Nuiqsut. There is no airport at those two pads, they can't land. There would have been airstrips if we hadn't have asked for a road. And they changed that to go ahead and have them build a road instead of having the airstrips. That would have been worse. (SRB&A Nuiqsut Interview November 2017)

We would go up here, and then go to the pad, and then when we saw those caribou there, that's when the plane showed up and he scared them back to where we couldn't get them. That was August. That was a small one. We went after them caribou over here, and then we lost those from the plane, so we went back this way, and then we came somewhere in between, and traveled all the way around there and then came back. (SRB&A Nuiqsut Interview November 2017)

Just the planes flying by, here and there. That was downriver [along Nigliq Channel]. [In July]. It was kind of small and white, I couldn't really see [the plane]. We could hear that. That was about here. In between there. We were just out there to take a look around and look for caribou, and then that plane go by, so we went a little farther, then we turned around. We seen some but they were too far, the plane probably scared them. (SRB&A Nuiqsut Interview November 2017)

When asked to describe the airplane affecting their caribou hunting activities, respondents reported “Unknown Owner” (three observations), followed by Alpine Airplane (two observations), and Twin Otter (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	Y10	All Years
Airplane - Unknown Owner	2	3		3	2		3	3	16
Alpine Airplane		1	2	2	4		2	2	13
Cargo Airplane	4	1	1	2		1			9
Twin Otter	1		2					2	5
Shared Services Airplane			2						2
White Airplane							2	1	3
Supercub	1								1
Cessna				1					1
Yellow Airplane	1								1
Total	9	5	7	8	6	1	7	8	51

Stephen R. Braund & Associates, 2019.

While the above individuals report that airplane traffic affects caribou availability, others indicate that the caribou are unaffected by plane traffic. In the following quotes, one individual noted that caribou do not seem to react to airplane traffic, while another indicated that they have become used to air traffic in the region:

Always – they [airplanes] are always around. Air traffic mostly. Planes. There were planes out there. From Kuparuk to Alpine, I’ve seen a lot of that. The caribou don’t get scared mostly, they just stand around. They are more scared of the mosquitoes. (SRB&A Nuiqsut Interview November 2017)

No [impacts], not that I know of.... It seems pretty much normal nowadays to hear an airplane out there. (SRB&A Nuiqsut Interview November 2017)

Impacts of Other Traffic

Fifteen percent of respondents reported impacts related to other traffic (i.e., not helicopters or airplanes) in Year 10. These observations accounted for 16 percent of Alpine impact observations (Table 38), higher than most previous years. In most cases, participants noted that road traffic on recently built roads to CD5 and GMT1 and along the Spur road causes caribou to avoid the area, or reduces hunting success in the vicinity of the roads. One individual also expressed concern about the dust caused by road traffic and potential impacts on caribou health. Respondents provided the following descriptions of the impacts of road traffic on their caribou hunting activities in Year 10:

Traffic. The road itself, too. Before CD5, like on that over here you’ll see a whole bunch over here and hardly anybody is coming right here. We used to just stick by the lakes and now we have to go way out. During their migration, both ways—going this way and coming back [is when the road affects them]. August and September and October. Up until the first week of November maybe. They just didn’t want to come any closer to the road. They wanted to be at least a couple miles from it. The ones that you can see from the road. (SRB&A Nuiqsut Interview November 2017)

There was a couple of times that where the Spur road is, then people are going out hunting, and they want to shoot the tuttus, but there is either a rig or a truck going past. I remember there could be tuttu there, and then they can’t shoot. It’s kind of odd when there is just shooting

without any conflicts or anything in the way, and that does get kind of frustrating, too. (SRB&A Nuiqsut Interview November 2017)

All of the traffic is causing the lack of caribou. It is causing an economic problem for me, myself. I am thinking it is where they are going inland more to the new road, to the new pad out there. There was a lot more vehicles out there. The normal road traffic usually comes around but when you have 20, 30 really giant trucks and all of the support vehicles out there I am just concerned about my ability to put food on the table. (SRB&A Nuiqsut Interview November 2017)

Respondent 1: The damn 18-wheelers, the dust!

Respondent 2: The dust very much affects us.

Respondent 1: They didn't slow down, they didn't think, maybe they should slow down because we're opening up the animal.

Respondent 2: Some of the older people won't wash their caribou, they like the blood on it so having the dust on that affects them. (SRB&A Nuiqsut Interview November 2017)

Impacts of Oil Company Personnel

A small percentage of respondents (three percent) reported experiencing impacts related to oil company personnel in Year 10 (Table 38). One individual reported concerns about the increase in oil company personnel in the region and the potential safety issues associated with hunting near oil development. Another reported being approached by oil company personnel when they were hunting along the road, saying, "They got on to us about hunting along the road and said they could do a law suit" (SRB&A Nuiqsut Interview November 2017).

Impacts of Man-made Structures

Impacts related to man-made structures were reported by 26 percent of Year 10 respondents, which was higher than in Years 3 to 9 (between five and 22 percent) (Table 38). As shown in Table 42, roads/bridges accounted equally for the majority of the 18 man-made structure impact observations, followed by an equal number of pipeline and general infrastructure observations (four observations each). Roads and bridges have emerged as a reported impact in the last several study years, since the CD5, GMT1, and connected Spur road were built.

Table 42: Descriptions of Sources of Man-Made Structures Associated with Impacts, Nuiqsut, Years 3-10

Man-Made Structure Descriptions	Number of Observations								
	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Pipeline	2	1	6	7	3	1	4	4	28
Roads and Bridges					3	6	4	10	23
Infrastructure	1	1	1	6	1	2		4	16
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	18	77

Stephen R. Braund & Associates 2019.

Impacts associated with man-made structures as reported by Year 10 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 and roads blocking hunters from shooting

at caribou, and changes in caribou distribution and behavior due to the presence of bridges, roads, and pipelines. Several individuals repeated a concern from Year 9 that the new roads are too high and therefore act as a barrier to both caribou and hunter movement⁵:

The most impact is right there at the road. It's like they built a China Wall. There is no berm. When it starts from CD4, CD2—it's way up there! And it doesn't even have any flat area around there. It's just right on the Colville. They said they are going to build it lower. Eight miles worth of 5 feet height. They say it is going to drop to one foot but it still hasn't. (SRB&A Nuiqsut Interview November 2017)

They did a bad job on those ramps, maybe smooth them out. And there are no ramps going this way on the Kuukpik Road [Spur road] so you have to be careful when you go down and you have to really lean forward when you start to go up. They need to fix them up a little better. They are like 90 degrees instead of 45. And maybe the caribous will see those too and climb through there. (SRB&A Nuiqsut Interview November 2017)

Respondents also noted that the roads and associated infrastructure create more situations where hunters have to take human safety into account. One individual described the difficulties associated with hunting near human activity and man-made infrastructure as follows:

I waited for the caribou to move, and I waited until they would move from the bank of the river, to see if I could get a shot that did not have the bridge [in the way], but that was my big concern that I would not get a shot. And there was some trucks passing by on the bridge, slowly, and I had to wait until they crossed the bridge. I think they were watching us trying to catch the caribou. And I waited for them. (SRB&A Nuiqsut Interview November 2017)

I do know that when we go on the Spur road it does get kind of hard because we can't shoot towards the pipeline because it's illegal. So, it does get kind of hard with that kind of stuff. (SRB&A Nuiqsut Interview November 2017)

Respondents also expressed the belief that the presence of the GMT1 and Spur roads, in addition to associated traffic and hunting activities, has resulted in changes to caribou distribution in the region which requires residents to use the roads to access herds that are located farther north and west:

It is going to continuously have a growing affect. The migration pattern is going to change as soon as they get this GMT2. That is a larger area that hunters will be able to access and that is where they migrate from. It's this whole structure [road system] that comes through here. We have the pac man affect here. It is just spreading [mimes the pack man travelling through and eating all the caribou]. A lot of people are mad that the road is there and they think that the road itself is blocking the caribou. I don't think that's true, I think it is the hunters. (SRB&A Nuiqsut Interview November 2017)

The road over here, the K Pad is an impact. Eight miles from us. That's the very grazing spot of the caribou, and it isn't anymore. They put the K Pad right where the caribou grazes. It's actually right there. This road goes all the way that way. We can't even cross it. They put these ramps over the roads, but we have to find them. You have to follow the road until you find them, and they're a couple miles apart. They call that Tingmeasovich area. They were in that area all year round, supposedly. Those are the local ones, the ones that don't follow the

⁵ Since the November 2017 interviews, CPAI worked with the community to make improvements to the ramps

migration. And they were there by K Pad, at those two big lakes there where they used to hang out. (SRB&A Nuiqsut Interview November 2017)

The road itself, too. Before CD5, like on that [area] over here you'll see a whole bunch over here and hardly anybody is coming right here. We used to just stick by the lakes and now we have to go way out. During their migration, both ways—going this way and coming back [is when the road affects them]. August and September and October. Up until the first week of November maybe. They just didn't want to come any closer to the road. They wanted to be at least a couple miles from it. The ones that you can see from the road. (SRB&A Nuiqsut Interview November 2017)

The caribou are staying on the north side and the west side of CD5 and the northwest side of GMT road. The ones that people see on the south side are coming from the south west side. They made a u-turn and went back towards Ocean Point. Cause that's why most of the people are using this road to hunt all summer long right through fall time. People are still going down there to look for some caribou. Summer and fall time. I have not heard of anybody using that road to hunt for caribou in winter. I think it is blocking them from the river on their way to GMT1 [the Spur road]. I think it is in migration and insect relief time. June, July, and August. Maybe September. I think most of the impacts are on the east side. Most of the activities are non-stop, on-going, 24/7. And that is impacting the caribous, making the not want to go westward. (SRB&A Nuiqsut Interview November 2017)

Several individuals discussed impacts related to roads and pipelines more generally, noting an overall impact on caribou availability near Nuiqsut:

Lot of change, hardly caribou coming, too many pipelines like I just told you. So many pipes all over. When you try to travel, you have to go a long way now. It costs a lot of gas money. (SRB&A Nuiqsut Interview November 2017)

Not since we first came [have I seen a large herd of caribou]. Even 10 years later they [the caribou herds] started to get smaller and then thirty years later, like half. Thirty years later they started putting up the pipelines [Alpine] and they don't come through here. Maybe it is the pipeline or the road hunters deflecting them. They are being deflected away. But I will tell you right now, what interests me is that the big bull caribous, they seem to be here [farther south], but they used to be here [closer to the village]—we used to watch them going back and forth here before the pipeline structures were set up. We used to be able to see the dust from them going back and forth during the summer. When we were small we used to see that but because of the pipeline structures, we haven't seen them. For the last two years I have been looking for where they went and I finally found them here [down by Chandler]. (SRB&A Nuiqsut Interview November 2017)

While this section focuses on the negative impacts of man-made structures on caribou hunting activities, several hunters in Year 10 reported continued use of roads for caribou hunting. One respondent noted that the new roads in the region had a positive impact in that they allowed hunters to travel farther to access the caribou herds, saying, “One of the positive impacts is that we are allowed to travel farther and still get these herds. It's a positive impact” (SRB&A Nuiqsut Interview November 2017).

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 10 study years, between three and 34 percent of reported caribou harvests have occurred within 2.5 miles of infrastructure, and between 12 and 65 percent of respondents have reported harvesting caribou within 2.5 miles of infrastructure.

Year 8 through 10 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, CD5 road, and GMT1 road by residents to hunt caribou. The percentage of caribou harvested within 2.5 miles of infrastructure (34 percent) was higher than 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%)
Year 10	106 (34%)	40 (65%)

¹ Each year is analyzed based on permanent infrastructure present during that year. In Year 10, infrastructure related to the CD5 and GMT 1 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, 2019.

Impacts of Regulations

One percent of respondents reported impacts related to regulations in Year 10 (Table 38). This individual noted that they were unable to use the Kuukpik-owned Spur road because they were unwilling to sign the required waiver.

Impacts of Seismic Lines

Two individuals (three percent) reported experiencing impacts under the impact category of seismic lines in Year 10 (Table 38). Both individuals indicated that seismic activities may have had an effect on caribou availability:

We have concerns about too much seismic going on out there. That is probably something that makes them so easy to spook. They will be doing more seismic here in the future. (SRB&A Nuiqsut Interview November 2017)

Yeah. Ohh...maybe seismic or drilling? Yeah. No, I did not see any activities – there was none while I was out there. That’s how come all the caribou are gone because of that [seismic]. We’re blaming them. (SRB&A Nuiqsut Interview November 2017)

Impacts of Other

A higher than usual percentage of respondents in Year 10 (10 percent) reported impacts which did not fit under the seven impact categories discussed above. “Other” impacts which were reported by active caribou harvesters included blasting associated with gravel mining, noise from construction activities and equipment, noise from drilling, and the creation of caribou hunting corridors (which deflect caribou) with construction of the CD5 and GMT1 roads:

I blame the daily explosion for no caribou here, because they have better hearing than us, they could probably hear for 10 miles. You can feel the boom and it shakes the whole house. Maybe that's why there's no caribou around during ice road season from March to April. It's a good 60 to 90 days that we go through daily blasting. (SRB&A Nuiqsut Interview November 2017)

The impacts that I observed was the yellow cloud of pollution above Nuiqsut. Years ago, when you looked to the east there was only one place where you could see that [pollution]. But now it's becoming more and more evident. I work in Prudhoe Bay, but now in the spring when we start looking west from Prudhoe to where Nuiqsut is, then we start getting the haze over here. The pollution. That's what I call it. I do [think the pollution affects the caribou]. Yeah. In terms of the health, it impacts our health. And the molecules from that pollution fall down onto the tundra, and then in turn we eat the caribou, and it is on the food that they are eating. And that's unfortunate. (SRB&A Nuiqsut Interview November 2017)

We always tell them [other hunters] let the first ones cross and the other ones will follow. The first herd was about thirty of them and some people were greedy and they deflected them. A lot of people from Nuiqsut were using their four-wheelers to meet the caribou on this side [using the road to access the first wave of caribou]. (SRB&A Nuiqsut Interview November 2017)

A lot of the equipment out on the lakes and stuff when they are out there clearing the lakes [for the ice road]. [Local resident] could see them clearing out the equipment from the lakes and it looked like the caribou were running from them. (SRB&A Nuiqsut Interview November 2017)

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, 13 percent of Nuiqsut respondents reported at least one type of non-Alpine impact in Year 10, lower than most previous years but within the range of all study years (from five percent of respondents [Year 3] to 54 percent [Year 5]). All of these reported impacts were related to airplane and helicopter traffic (60 percent and 40 percent of observations, respectively). Non-Alpine impacts in Year 10 focused on general air traffic, including commercial flights, sport hunting guides, and surveys conducted by government agencies:

Yeah, I did [experience impacts]. It was an airplane counting caribou, [ADF&G]. I was at my cabin, it came in flying really low from the south. It was a disturbance. It pissed me off and made me go a different direction. It was Fish and Game. (SRB&A Nuiqsut Interview November 2017)

Table 44: Non-Alpine Impacts on Caribou Hunting, Nuiqsut, Years 1-10

Type of Non-Alpine Impact	Percent of Respondents										Percent of Observations									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Helicopter traffic	11%	9%	2%	7%	32%	13%	13%	16%	6%	6%	22%	45%	33%	40%	43%	32%	45%	35%	29%	40%
Plane traffic	17%	6%	4%	5%	28%	15%	13%	16%	8%	9%	39%	27%	67%	40%	34%	36%	40%	42%	35%	60%
Other traffic	3%	0%	0%	0%	4%	4%	2%	2%	0%	0%	6%	0%	0%	0%	4%	9%	5%	4%	0%	0%
Oil company personnel	0%	0%	0%	0%	5%	0%	2%	0%	0%	0%	0%	0%	0%	0%	6%	0%	5%	0%	0%	0%
Man-made structures	6%	4%	0%	0%	2%	2%	0%	2%	2%	0%	11%	18%	0%	0%	2%	5%	0%	4%	6%	0%
Regulations	3%	0%	0%	0%	4%	2%	0%	0%	3%	0%	6%	0%	0%	0%	4%	5%	0%	0%	12%	0%
Seismic lines or activity	0%	2%	0%	2%	0%	0%	0%	0%	2%	0%	0%	9%	0%	10%	0%	0%	0%	0%	6%	0%
Other	8%	0%	0%	2%	5%	5%	2%	7%	3%	0%	17%	0%	0%	10%	6%	14%	5%	15%	12%	0%
Any impact	31%	15%	5%	16%	54%	29%	27%	31%	19%	13%										

Stephen R. Braund & Associates, 2019.

I just only saw a chopper around here by Ocean Point. I don't know whose chopper it was, but they kept landing out here. They were coming from either Alpine or out here by Kayaktusuluk because they kept turning that way. No, [it didn't affect the caribou] because I don't think there were any around. It doesn't really bother the caribous because I think they got used to hearing the choppers. I don't see them running around now, I just see them look up. Maybe the one time is when they are trying to corral them and collar them. (SRB&A Nuiqsut Interview November 2017)

There was a few planes but I don't know if they had to do with the oil field because they were all on this side [way upriver]. There was this one time where a plane was flying on the river, lower than the cliff. As soon as it saw us it started going up and up so we couldn't see the plane numbers. (SRB&A Nuiqsut Interview November 2017)

We were scouting on the edge of the bluff over here and a big ass DC 6 flew right over us and scared the crap out of us. Right in this area right here [near Anaktuvuk River] right on the bluff right here. If there was an elderly lady out there she probably would have died. It was SO LOUD. I bet it was from Umiat to Deadhorse. They were bringing all of their supplies because they want to have an oil rig out there. There was one time when we were out there that the lights were on in Umiat and we could see it from way over here. (SRB&A Nuiqsut Interview November 2017)

During the September 2019 Nuiqsut Caribou Panel meeting, panel members noted that CPAI is not the only source of impacts in the area and discussed the increasing presence of sport hunters in the region. Panel members noted that several Anaktuvuk Pass hunters were on their way to Nuiqsut that day, to hunt for caribou due to the lack of caribou in the Anaktuvuk Pass area. Two panel members believed that sport hunting is the primary cause of the lack of caribou for Anaktuvuk Pass hunters.

Panel Member 1: There are more sports hunters utilizing Umiat than ever before. That continues to be a safe haven for sports hunters.

Panel Member 2: Trophy hunters have helicopters searching for the bulls for them. They come back down with a rubber raft.... That is part of the problem with AKP and Nuiqsut [not getting their caribou].

Panel Member 1: [Sports hunters are getting worse]; they are diverting them and putting them in smaller groups. They scatter.

Panel Member 2: There was even a chopper at the old airport that belonged to a private company over at the old airport at Itkillik. That is the airport that they normally use for industry. The state opened that up to public. So we are not just dealing with industry, we are dealing with private and commercial hunters. The state has no say on state lands. No matter how much you tell them it goes in one ear and out the other. (Nuiqsut Caribou Panel Meeting September 2019)

Reported Avoidance of Use Areas

As shown in Table 45, the percentage of Year 10 respondents who reported no longer using or avoiding certain areas (75 percent) was higher than Years 6 through 9 (between 51 and 61 percent). The remaining 25 percent of respondents indicated there had been no change in their hunting area over time. The increase in reported avoidance during the active harvester interviews is consistent with an increase in the percent of households who reported avoiding the Alpine area during the Year 10 household harvest surveys. In Year 10, the most commonly mentioned places avoided were the East Channel (nine observations) followed closely by Alpine/Alpine Satellites and Fish Creek (eight observations each); Nigliq Channel (five observations); and *Kuupaqullurak* and *Pisiktagvik* (three observations each). Other areas with more than one observation each included the Colville Delta, Nanuq, Tamayayak Channel, Upper Colville River, West of Nuiqsut, Spur road, and Umiraq (Table 46).

Table 45: Respondents Reporting Avoidance of Previously Used Hunting Areas, Years 6-10

Avoid Areas?	Y6	Y7	Y8	Y9	Y10
No	39%	42%	42%	49%	25%
Yes	61%	58%	58%	51%	75%
Total	100%	100%	100%	100%	100%

Stephen R. Braund & Associates, 2019.

Table 46: Places of Avoidance – Observations, Years 6-10

Place	Number (%) of Observations					
	Y6	Y7	Y8	Y9	Y10	All Years
Alpine/Alpine Satellites	13 (29%)	11 (30%)	8 (21%)	4 (11%)	8 (13%)	44 (20%)
Fish Creek	4 (9%)	3 (8%)	1 (3%)	5 (14%)	8 (13%)	21 (10%)
East Channel	3 (7%)		3 (8%)	2 (6%)	9 (14%)	17 (14%)
Nigliq Channel	4 (9%)	1 (3%)	3 (8%)	1 (3%)	5 (8%)	14 (6%)
Colville Delta	2 (4%)	2 (5%)	3 (8%)	4 (11%)	2 (3%)	13 (6%)
<i>Kuupaqullurak</i>		3 (8%)	3 (8%)	4 (11%)	3 (5%)	13 (6%)
Nanuq			4 (10%)	4 (11%)	2 (3%)	10 (5%)
Tamayayak Channel	3 (7%)	3 (8%)	1 (3%)		2 (3%)	9 (4%)
Upper Colville River	1 (2%)	2 (5%)	3 (8%)	1 (3%)	2 (3%)	9 (4%)
West of Nuiqsut	2 (4%)	2 (5%)	1 (3%)	1 (3%)	2 (3%)	8 (4%)
Itkillik River	1 (2%)	3 (8%)		2 (6%)	1 (2%)	7 (3%)
Spur road		1 (3%)	2 (5%)	1 (3%)	2 (3%)	6 (3%)
<i>Pisiktagvik</i>			1 (3%)	1 (3%)	3 (5%)	5 (2%)
Shallow Areas	3 (7%)					3 (1%)
East of Colville Delta		1 (3%)	1 (3%)		1 (2%)	3 (1%)
Kachemach River	1 (2%)			1 (3%)	1 (2%)	3 (1%)
<i>Puviksuk</i>	2 (4%)				1 (2%)	3 (1%)
Anaktuvuk River		2 (5%)				2 (1%)
East of Colville River	1 (2%)			1 (3%)		2 (1%)
East of Nigliq Channel	1 (2%)		1 (3%)			2 (1%)
Teshekpuk Lake	1 (2%)			1 (3%)		2 (1%)
Various Areas		2 (5%)				2 (1%)
<i>Nigliq</i>				2 (6%)		2 (1%)
Oliktok Point			1 (3%)		1 (2%)	2 (1%)
<i>Nuiqsupiaq</i>			1 (3%)		1 (2%)	2 (1%)
Umiraq					2 (3%)	2 (1%)
Atigaru Point	1 (2%)					1 (<1%)
Chandler River		1 (3%)				1 (<1%)
Kuparuk River	1 (2%)					1 (<1%)
Lake near Kachemak	1 (2%)					1 (<1%)
<i>Tingmeachsiovik</i>			1 (3%)			1 (<1%)
Eskimo Island			1 (3%)			1 (<1%)
Ikpiqpuk River				1 (3%)		1 (<1%)
Niglivik					1 (2%)	1 (<1%)
Kayuktisiluk					1 (2%)	1 (<1%)
Ulusrak					1 (2%)	1 (<1%)
West of Colville River					1 (2%)	1 (<1%)
Miluveach River					1 (2%)	1 (<1%)
Nuiqsut					1 (2%)	1 (<1%)
Location not captured					1 (2%)	1 (<1%)
Total Observations	45	37	40	37	63	220

Stephen R. Braund & Associates, 2019.

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 71 cause observations, compared to 63 location observations. As shown in Table 47, Development Causes were most commonly cited (34 observations), followed by Environmental Causes (23 observations), and Personal Reasons (10 observations). A somewhat lower percentage of avoidance observations in Year 10 were attributed to development causes, and a somewhat higher percentage were attributed to environmental causes—specifically, changes in resource availability.

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 Nigliq Channel, East Channel, Colville Delta, Tamayyak River, *Kuupaqullurak*, *Nanuq*, and the Spur road for development reasons.

Table 47: Causes of Avoidance, Years 6-10

Causes	Number of Observations					
	Y6	Y7	Y8	Y9	Y10	All Years
Development Causes	32 (60%)	28 (60%)	36 (72%)	26 (53%)	34 (48%)	156 (58%)
Development Activities	8	5	14	13	16	56
Development Infrastructure	7	12	12	4	13	48
Development-General	4		6	5	3	18
Security Restrictions	4	3	3	3	2	15
Contamination Concerns	6	4				10
Safety Concerns	3	4	1	1		9
Environmental Causes	18 (34%)	9 (19%)	12 (24%)	14 (29%)	23 (32%)	76 (28%)
Resource Availability	6	6	9	13	17	51
Environmental Factors	12	3	3	1	6	25
Personal Reasons	2 (4%)	10 (21%)	2 (4%)	8 (16%)	10 (14%)	32 (12%)
Don't Know	1 (2%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)	1 (1%)
Cause Not Captured	0 (0%)	0 (0%)	0 (0%)	1 (2%)	3 (4%)	4 (1%)
Total Observations	53	47	50	49	71	270

Stephen R. Braund & Associates, 2019

Table 48: Causes Cited for Avoidance by Place – Year 10

Place	Environmental Causes		Development Causes					Personal Reasons	Cause Not Captured	Do Not Know	Total
	Environmental Factors	Resource Availability	Development Activities	Development Infrastructure	Development - General	Security Restrictions	Safety Concerns				
Alpine/Alpine Satellites			2	4	1	1	1		2		11
East Channel		5		2			1	1			9
Fish Creek	4	1						3		1	9
Nigliq Channel		2	3								5
West of Nuiqsut			1	1				1	1		4

Place	Environmental Causes		Development Causes					Personal Reasons	Cause Not Captured	Do Not Know	Total
	Environmental Factors	Resource Availability	Development Activities	Development Infrastructure	Development - General	Security Restrictions	Safety Concerns				
Kuupaqullurak			3								3
Pisiktagvik		2	1								3
Spur road			1	1							2
Tamayayak Channel		1		1							2
Upper Colville River								2			2
Nanuq				2							2
Colville Delta			2								2
Umiraq		1						1			2
Ulusrak		1						1			2
Kayuktisiluk		1									1
West of Colville River								1			1
Itkillik River	1										1
Miluveach River			1								1
Nuiqsut		1									1
Oliktok Point		1									1
East of Colville Delta				1							1
Kachemach River			1								1
Nuiqsupiaq		1									1
Puviksuk	1										1
Niglivik			1								1
Total	6	17	16	12	1	1	2	10	3	1	69

Stephen R. Braund & Associates, 2019.

In addition to reporting avoidance of Alpine/Alpine Satellites specifically, a number of individuals reported avoiding certain geographic areas, such as the Colville Delta, Nigliq Channel, Nanuq, and *Kuupaqullurak*, for primarily development-related reasons, many of which are related to Alpine/Alpine Satellites. Reasons for avoiding these areas included the traffic/noise associated with these areas, a lack of caribou due to development activities or infrastructure, concerns about shooting near infrastructure and human activity, and a general desire not to hunt near development infrastructure:

It's been a couple of years since I seen caribou in this area, that Kuupaqullurak area, I used to go through that a lot, I used to catch all the time in there, but not anymore. Vehicle traffic. (SRB&A Nuiqsut Interview November 2017)

Well, we used to use the Colville a lot before they discovered Kuparak and they would be coming in from the east even after they discovered Alpine, but it's hard for them to come through here these days. (SRB&A Nuiqsut Interview November 2017)

Nanuq. Because there's a bridge there. No camping there. And it is right at our camp. There's the bridge and our camp is right there. We used to spend all summer long out there. And by the time it melted until it was cool time. We'd be there all summer long. (SRB&A Nuiqsut Interview November 2017)

Nanuq area where the bridge is the Conoco Bridge. The caribou used to go through there all the time and they don't anymore. It's because of the bridge and the existing oil field. We used to camp right up there at Nanuq and fish. (SRB&A Nuiqsut Interview November 2017)

Yeah, at the Tamayaruk River. Because there is too many pipelines around and buildings. I used to always go down out Nigliq and go through Tamayaruk this way, around this. But I can't shoot this way now [due to development]. It's always better to go through there but you only can when it's really flooded. It is pretty shallow. (SRB&A Nuiqsut Interview November 2017)

This whole area here [west of Nuiqsut], all the way to the pad [GMT1]. Because more hunters are using the road. It is easier for the hunters to get there. And the caribou are being pushed away from the hunters trying to hunt them. And that is about eight miles. (SRB&A Nuiqsut Interview November 2017)

Over here, I don't bother [hunting]. Where I used to go hunt caribou at Kuupaqullurak to that mouth. Me and [hunting partner] used to go out there to what they called Niglivik. Me and [hunting partner] used to go there just for a day and there are hardly any caribous out there anymore because there is traffic from the road. I think those caribous are too close to the road and they are towards the road, so we don't want to shoot them. We don't want to hurt anybody. We can see trucks and cars and water trucks we don't want to shoot the rifle towards them. That bullet might go anywhere so we don't do that. We don't break the law. (SRB&A Nuiqsut Interview November 2017)

Respondents also reported avoiding certain areas, including the East Channel and *Pisktaġvik*, associated with other (non-CPAI) development activities. Several residents noted a general lack of caribou and too much development activity along the East Channel:

I do kind of miss around Pisigtagvik area. I think the reason is because they are doing too many studies over there. Too many studies. Too many helicopters. I remember telling you that one year I was about to shoot some caribou and the helicopter came through and scared them off. (SRB&A Nuiqsut Interview November 2017)

This place [East Channel.] [There are] too many oil fields I think, I don't even go that way no more. (SRB&A Nuiqsut Interview November 2017)

Over here [in the East Channel]. They are looking for some oil out here. And there is too much happening over there. It just used to be full of caribou all the time. (SRB&A Nuiqsut Interview November 2017)

In addition to avoiding areas for development reasons, a number of active harvesters indicated that they no longer used certain places due to a general lack of caribou in those areas. In these cases, respondents did not elaborate as to why they believed caribou were no longer in those areas. Residents cited resource availability as a cause for avoiding the East Channel, Tamayayak river, Fish Creek, and *Pisiktaġvik*:

I used to go in this area [East Channel/Middle Colville] a lot but not anymore. Before I go out that way I would ask around and see if anyone got any out there, so I wouldn't go check

out there if I didn't hear anyone got any [Tamayayak area], or this other creek out here that goes out. And I heard that other people got sick caribou out there, too. (SRB&A Nuiqsut Interview November 2017)

I just haven't gone downriver in at least, jeez, three years. I just haven't gone down there, I just would if I heard that there are caribou down there. But I just haven't heard that they were down there. (SRB&A Nuiqsut Interview November 2017)

I didn't do too much hunting this summer. I didn't go to Fish Creek at all. I heard there was nothing over there. (SRB&A Nuiqsut Interview November 2017)

East Channel. Every time I go, I don't see any. Some people do and some people don't but they are always on the move. And probably Kuupaquullurak and parts of [Nigliq Channel]. I haven't gone to Fish Creek in a couple years. I just didn't want to go that way. (SRB&A Nuiqsut Interview November 2017)

Pisigtagvik. The caribous used to be abundant there, but they are not anymore. Nigliq—the caribous used to be abundant here are now more abundant here [further upriver]. Up here, [Umiat area] it is more exciting because you never know what you are going to see. (SRB&A Nuiqsut Interview November 2017)

Finally, Personal Reasons, including a lack of funds to buy gas, a lack of equipment such as snowmachines, and personal preference, were cited for avoidance of areas such as Fish Creek, the upper Colville River, the area West of Colville River, and the East Channel:

Yeah, we used to go all the way up here [to Umiraq]. We can't really afford the gas anymore. I am the only person who works and they don't do gas vouchers like they used to. This is just as far as we go based on what we can afford. (SRB&A Nuiqsut Interview November 2017)

Colville River, all the way into Kikiakroak [West of Colville channel]. I used to do my hunting over there. Winter time I would go over there. I haven't been there in how many years and I go up here in the summer. [I don't go there] because I don't have a snow machine for winter. (SRB&A Nuiqsut Interview November 2017)

During the winter time we would snow machine way out here [to the west]. I haven't really gone out that way for at least 12 or 15 years. I don't have a snowmachine right now. (SRB&A Nuiqsut Interview November 2017)

General Observations Regarding Status of Caribou Herds in Year 10

This section summarizes residents' general Year 10 observations relevant to the behavior, distribution, or migration of caribou in 2017. 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 2017?" In Year 10, 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

Observations regarding caribou availability in Year 10 were similar to those made in Year 9—in short, that there were fewer caribou available within residents' hunting areas. A number of individuals indicated that,

as a result, they were unable to harvest the desired amount of caribou in Year 10 or had to work harder to harvest enough:

I never seen any other caribous this summer. It was hard. It was a hard summer and that is hard on my family. A long time ago I used to be fat. And me noticing that how it used to be and how it is now. I got no more solitude out there. (SRB&A Nuiqsut Interview November 2017)

I used to love going upriver, and then the places over here, but the only time we only go upriver now is just to go camping and look for moose. Because when I first come here, every trip up we would get three or four [caribou], and we could pick and choose and we would know that we would always get meat. But now it is tedious—you have to really look for them, and it never used to be like that. (SRB&A Nuiqsut Interview November 2017)

Yes [they were less available] where I hunt, anyways. Back in the day I used to be able to go to my cabin and come up Fish Creek and have my pick of whatever caribou I wanted, you know—the biggest one or the one with the nicest rack. But nowadays, it's 'Where are they?' It's upsetting. (SRB&A Nuiqsut Interview November 2017)

I flew on a chopper all the way to Chandler. We saw a moose way in there. No caribou at all. Somewhere uphill we cut across and went to Umiat. And then towards Judy Creek. And then after, back to Nuiqsut. And no tuttus around. No tracks either. (SRB&A Nuiqsut Interview November 2017)

One individual expressed that the recent migratory changes were part of a larger natural cycle, and noted that the shift from nomadic to centralized lifestyles resulted in migratory changes having a greater impact on hunters:

Not really [anything else to comment about], just that the migration changed a little bit. But on top of that, my dad told me that the migration is never going to be the same. He had to remind me a long time ago [that] we were nomadic people and used to have to move with the caribou herds. I noticed around in the Barrow area, and Atqasuk and Wainwright area they are getting a lot of caribou, so they are probably just over there. (SRB&A Nuiqsut Interview November 2017)

In addition to caribou being generally unavailable in Year 10, a couple of residents commented on specific changes in caribou behavior within their hunting areas, including caribou staying inland from riversides, arriving in the Colville River area earlier than usual, and exhibiting unusual behavior:

This summer the caribous travelled through after break up, usually they travel through before break up. July is when they started coming from the east side. The caribous were out of range. We waited in how many places, but a lot of them were too far from the river, even on the west side. (SRB&A Nuiqsut Interview November 2017)

I sure miss the herd that passed by – I'm still so upset. I miss[ed] the herd, I like to see the herd cross and this is my first time missing it. I kinda feel like I have no food in my freezer [that is] caribou. The migration was ahead. They were way early. I like to watch them cross! You couldn't tell if they're a healthy herd—[whether] it's going to be a good year or a bad year. (SRB&A Nuiqsut Interview November 2017)

There was a couple of caribou that I thought were a bit brave if you asked me. There were a couple that weren't really scared. They just kind of stood there while we shot towards them. I thought that was kind of weird. (SRB&A Nuiqsut Interview November 2017)

Respondents discussed the increasing presence of oil and gas exploration and development in the region and its effects on caribou distribution, movement, and behavior. The following respondents blamed development infrastructure and activities for the decreasing availability of caribou in their hunting areas:

It's just that they aren't around the last two years, it's just more activities going around, and I see caribou are probably going to the south. Instead of coming through from the east or the west, they are going to the south side. We never seen any Porcupine herd coming in this year, and then the Western herd, but we only seen caribou in the south. But not from the east [which is what they expect]. Yeah, I think the development has something to do with that change. We used to have thousands of caribou coming through our town, but they don't come through like that anymore. (SRB&A Nuiqsut Interview November 2017)

There are studies that I have seen from ABR. The ABR studies show that once development got started, science has proved that they moved their calving farther south. And oil and gas development is doing the same thing. I would like to see that all the people that are doing the studies around here would come together in one room and analyze the impact together and not just the caribou. It would be nice to see all the scientists come together to talk about that in the community center. And we could ask questions. The western world has always told us that they have to see that in black and white, and they should start with the traditional knowledge as their baseline. That Teshekpuk Lake is one of those things that really, really shouldn't be touched because of the importance to calving grounds. (SRB&A Nuiqsut Interview November 2017)

Yeah, they were basically passing through. We've got this Puviksuk over here, where they just discovered oil, and they want to put a test well over there, and that's where we hunt them. And now they want to drill over there, the caribou are going to get confused again. The caribou use these trails on a yearly basis and never forget. They seem to use the same route for their migration. They make it this far and they get criss-crossed about these roads. (SRB&A Nuiqsut Interview November 2017)

I don't know—Is that where it's going to be? We have some other cabins over at Fish Creek, and we hear a lot about that, stuff going on over there [oil activities]. I just know that Alpine being there has stopped the caribou from migrating to Fish Creek. From when I was young. I mean it just stopped them coming to town, like the loud noises. This year we had one caribou come to town and it was scared. I think that all those noises cause that. It used to be open, and there was no noises. (SRB&A Nuiqsut Interview November 2017)

Residents also discussed other impacts associated with oil and gas development in the previous year, including the visual effects of development infrastructure, seismic activities within wolf and wolverine hunting areas, and potential contamination associated with development:

I will say this: from where my cabin is, it's an awful sight to see CD5, because it's just right there. It's very, very close. And when they are drilling and they hit the bedrock, it's loud. I can hear that from my cabin. It's an eyesore, and it's just very upsetting. (SRB&A Nuiqsut Interview November 2017)

They did the seismic-ing within 500 feet of my cabin, and I could see people all over. It was a complete disturbance. And when that gets disturbed, it takes those animals—they're going to come back, and it's going to take a while for them to get used to what disturbed them before. (SRB&A Nuiqsut Interview November 2017)

Well, a couple of weeks ago, my son went for a drive out on the Spur road and they got a caribou but it was sick. It looked healthy but when they shot it, it had pus, green pus in the meat, like Jell-O. Jell-O-y and green. He gutted it out there because it was sick. That sick caribou could have been from the Project Chariot area. We never know. It has got to be from their food. Kind of like us. The cancer is coming from our diet. We don't know if it's the fish or the caribou. (SRB&A Nuiqsut Interview November 2017)

Two individuals discussed concerns related to the impacts of road hunters on caribou movement. While in the past these concerns were primarily related to sport hunters along the Dalton Highway, some Nuiqsut harvesters have recently observed similar impacts closer to the community involving local residents along industry roads. Two individuals discussed the impacts of roads on caribou availability as follows:

Yeah we keep wanting to know what the heck? Where are the caribou? But I will tell you the truth: I am a traveler. When I am not home, I pick up my truck and take a trip down the haul road and the haul road is really bad [because of] caribou hunters. The caribou who are supposed to come here up north, they [are getting killed on the haul road]. The last few years my husband and I have been traveling and we have to get stuff to get ready for Nulukatuk and we saw a lot of caribou hunters on the haul road and it's really bad. We always tell them let [the first group] go first, the bigger ones are in the back. And what do they do? They shoot the first ones they see and then scare off the rest and that's why we hardly have caribou. (SRB&A Nuiqsut Interview November 2017)

I'd like to express that the path of the migration, it comes through this whole area from Ocean Point all the way to the west. If you walk this way from Ocean Point, you can see all of the different trails, compact trails from the caribou. This road being here is allowing the hunters... It is the Dalton Highway type of scenario where you have the hunters all along the road up and down and the caribou are just not passing. (SRB&A Nuiqsut Interview November 2017)

A couple of individuals commented on the lack of fat on caribou they harvested in Year 10, and one attributed the decrease in fat content to increased energy expenditures from natural and development-related stressors:

They've been healthy and the behavior – they're basically, their behavior is awkward. They're under stress of being hunted both ways – from humans and wolves. If you just found them, a herd of caribou, well they just got done running [all] spring, from something [chasing] them around. When I approach seven caribou, they just got done running from something toward me. [Running] from a different purpose, maybe a wolverine or wolf. They're already under stress by the time I catch them. They're under stress always. [When they are under stress] their meat gets less lean, more worked up...losing too many calories, just got through burning its fat. You can tell a sense of overstressing a caribou. In minutes and within hours, it will lose its fat if you let a caribou run around for no reason, it just lost a good amount of storage for the winter. The way we respect our caribou is we try not to let them run around for no reason. You want them to be healthy and dominant for that 40-below stretch [during the winter]. (SRB&A Nuiqsut Interview November 2017)

While comments from hunters more commonly addressed a lack of caribou in Year 10, a couple of individuals noted relatively high success rates during their caribou hunting activities.

This year, there was Porcupine [caribou] from the northeast heading toward the southwest. There was a whole pile of them. At Pisiktaġvik area, there was a load of them. There were too many to count. Over maybe 1,000. They were going towards Barrow. I was at Pisiktaġvik area and they were all gathered on the other side and there was a whole pile of them and we just let them cross. They were crossing through his island. They mostly cross here. One time I went

to Pisiktaġvik with my mom and my auntie and there were a lot of caribou—Porcupine. They were all over the place. They mostly hang around here. (SRB&A Nuiqsut Interview November 2017)

The herd seems to be big enough that we could make it out there and they would still be crossing; there was a lot of times when me and my brother caught a lot of caribou out there, and then in fall time we would catch them upriver. And then the beginning of the year, over here, when the herd starts passing by, we would catch them all the time. And on GMT1 road, there was more caribou over there this last year, that is where we would see all the caribou this past year. (SRB&A Nuiqsut Interview November 2017)

Summary – Year 10

SRB&A, with the Nuiqsut Caribou Panel, has completed 10 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-eight active harvesters were interviewed in Year 10.

These respondents reported 233 caribou use areas for the Year 10 time period (November 2016 to October 2017). They also identified 190 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 Channel, upriver along the Colville River to Sentinel Hill, along the lower portion of the Ikillik River, and along the Spur road and CD5/GMT1 roads north and northwest of the community. Compared to all previous study years, Year 10 was relatively similar. The extent of overland travel was similar to Years 5, 6, and 8 with use areas extending somewhat farther south, almost to Umiat. Year 10 shows relatively limited use of Fish Creek and less use of the upper Colville River (beyond Sentinel Hill) when compared to some previous years. A hunting pattern, which emerged in Year 8 and continued in Year 10, was the use of the Spur road and CD5/GMT1 roads to hunt caribou. The road system showed substantial overlapping use in Year 10.

The concentration of harvests in Year 10 were somewhat similar to recent years (Years 6 through 9). Years 6 through 10 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. Year 10 also showed the lowest amount of harvest concentration along the East Channel compared to all previous years. Overall, a large number of caribou harvests took place at Nigliq, along the Spur road and GMT1 roads north and northwest of the community, and to the south and southeast of the community along Ikillik River and near *Puviksuk*.

July and/or August have been the peak hunting months during almost every study year, including Year 10. In Year 10, while July and August continued to be the peak harvest months, the number of reported harvests during those months was lower than any previous year except Year 9. Year 10 showed a somewhat higher percentage of use areas reported during the winter month of February when compared to most previous years, except for Year 7.

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 10, respondents used boat to access 70 percent of caribou use areas. Snowmachine use areas were at an all-time low in Years 9 and 10, 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, 14 percent in Year 9, and 11 percent in Year 10. The increased use of truck is due to respondents' increased use of the recently constructed Spur road and connected CD5/GMT1 roads. Similar to previous years, respondents took primarily same day trips to a majority (91 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 10 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 10 was within the range of previous years, at 57 percent of use areas reported as successful. However, the mean number of caribou harvested by harvest location (1.6) and use area (1.3) was lower than previous years.

Based on household caribou harvest surveys for the 2017 study year, the estimated number of caribou harvested in 2017 (635 caribou; 164 pounds per capita) was on the high range of previous study years, although the percentage of households unsuccessfully attempting harvests of caribou (12 percent) was higher than the previous few years. Over the 10 study years, harvest levels have remained stable.

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, with Year 10 on the higher end for changes in hunting area, frequency, and duration. In Year 10, 41 percent of respondents indicated that they did not harvest enough caribou, similar to Year 9 and within the range of previous years (between 16 and 54 percent).

The percentage of respondents observing caribou abnormalities in Year 10 was the highest since Year 5, at 29 percent, while the number of caribou harvested with abnormalities was within the range of previous years. The Year 10 increase in the percentage of respondents reporting sick or injured caribou was also evident in the 2017 household survey, with 21 percent of households harvesting sick caribou, the highest percentage of households since Year 5.

Fifty-one percent of harvesters in Year 10 reported one or more Alpine-related impacts on caribou hunting, an increase over the previous three years but within the range of previous years. For the first time, helicopter traffic was not the most commonly reported impact source during active harvester interviews. Instead, man-made structures were the most commonly reported impact, with 26 percent of respondents reporting these impacts. Twenty-one percent of respondents reported helicopter impacts in Year 10. Active harvesters also reported impacts related to other traffic (e.g., trucks), plane traffic, and “other” impacts. Despite a somewhat higher prevalence of reported impacts during the Year 10 active harvester interviews, the percentage of households reporting Alpine impacts in 2017 decreased to 29 percent while the percentage of households volunteering (i.e., not cued) reports of avoidance of development areas rose to 11 percent.

Seventy-five percent of respondents indicated that they no longer hunted in or generally avoided certain areas they previously used, somewhat higher than the previous four study years. Fish Creek, Alpine/Alpine Satellites, East Channel, Nigliq Channel, Colville Delta, *Kuupaqullurak*, and *Pisiktagvik* areas were the most frequently mentioned. A somewhat lower percentage of avoidance observations in Year 10 were attributed to development causes, and a somewhat higher percentage were attributed to environmental causes—specifically, changes in resource availability.

Similar to Year 9, a general observation made by a number of Nuiqsut respondents in Year 10 was that there were few caribou around throughout the study year and hunters had to work harder, stay out longer, or go out more frequently to find caribou. Residents observed that the caribou seemed more dispersed and did not follow their usual migration patterns. A number of individuals attributed the changes to increasing development activities including air and road traffic and the presence of infrastructure (e.g., roads) to the north and west of the community.

Synthesis: Monitoring Impacts and Change in Caribou Hunting Activities over Time

As noted previously, this report presents the 10th year of the subsistence monitoring study required by the NSB in their permit for the CD4 development. NSB’s permit stipulation for this study required that monitoring occur over a period of 10 years; at the end of the 10 years, the results of the study would be synthesized and the need for additional research would be evaluated based on that synthesis. Up to this point, this report has provided the results of the Year 10 active harvester interviews and household harvest

surveys, similar to reports for previous study years. The following sections provide a synthesis and analysis of all 10 years of the study, including new analyses of monitoring data and incorporation of existing sources of data (see above, under “10-Year Synthesis and Analysis” for a more detailed discussion of associated methods). The study team will review this Year 10 report and synthesis with the NSB, document recommendations for future research, and prepare a study plan for future research which will be reviewed by the NSB.

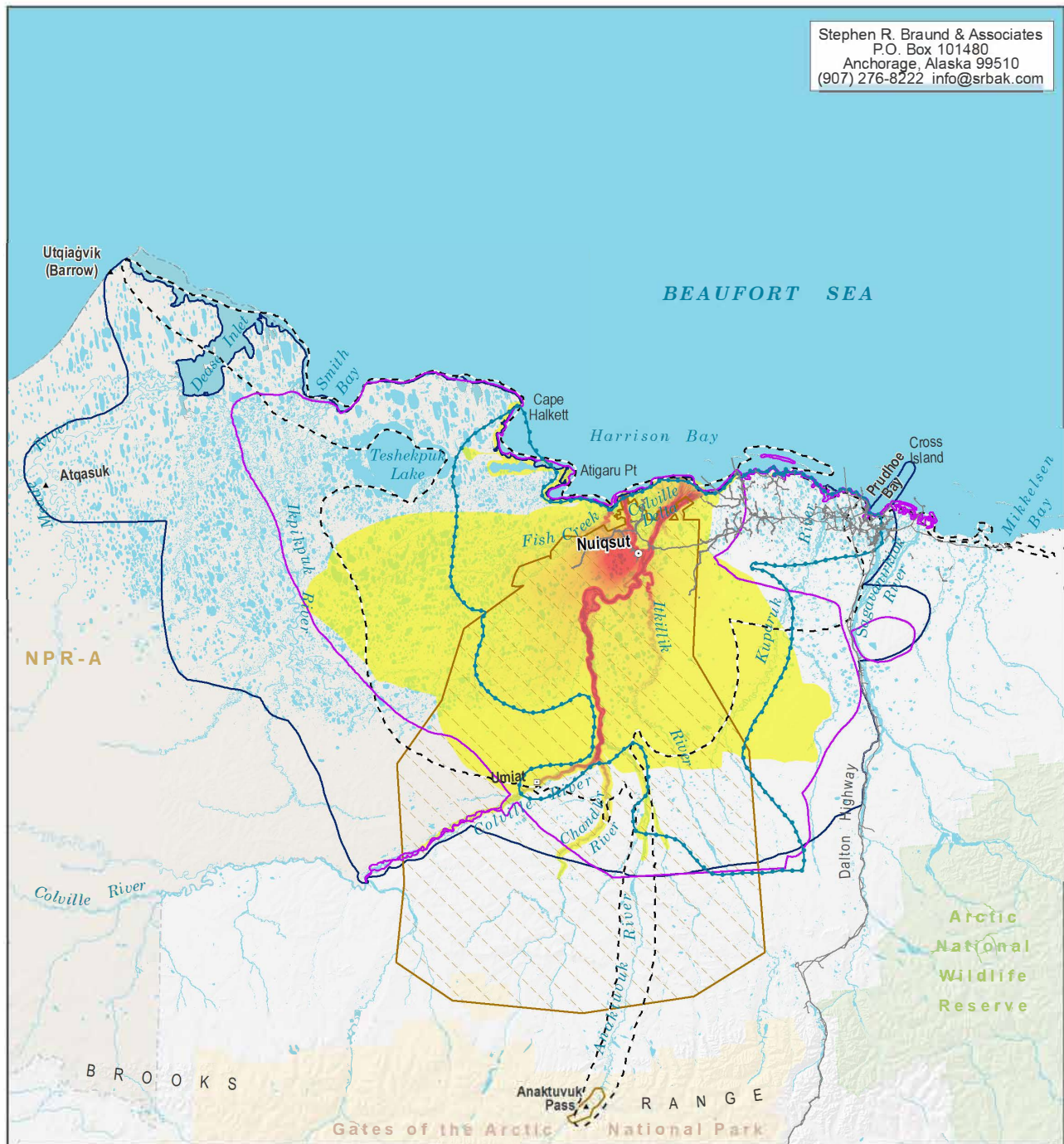
Hunting Areas and Harvest Locations

A discussion of Prehistoric and Historic caribou hunting patterns, based on ethnographic accounts and traditional knowledge, is provided under “Traditional Knowledge of Caribou and Caribou Hunting Patterns Over Time.”

Available caribou subsistence use area data for the community of Nuiqsut for all time periods are provided on Map 35. These data show the most recent data collected for this study (Years 1 through 10), 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). Harvester observations in combination with use area data indicate a shift away from the Prudhoe Bay/Kuparuk development areas over time. This shift can be explained by 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. Certain time periods (e.g., data for the 1995-2006 time period) 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 Paisanich* defined the community’s area of current intensive subsistence use as extending from Teshekpuk in the west to the Sagavanirktok River in the east, and Umiat in the south, while an area of extended use occurred over a much larger area. Although the area of “current intensive subsistence use” was for resources as a whole, individual use area maps in the same document indicate that caribou was the only resource targeted in the Prudhoe Bay area by study participants. The caribou use areas documented in Nuiqsut caribou subsistence monitoring study occur in an area similar to the area of intensive use documented in the *Paisanich*, 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 36). A subsequent map (Map 37) compares caribou use areas for the two time periods zoomed out to the outer extent of the 2008-2017 time period. 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 annual 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/Utqiagvik), hence a substantially larger overland use area extent. In addition, the data represent slightly different time frames (a 12 year period versus a 10 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 36 depicts the top category of overlapping use (reflecting a higher number of overlapping respondents), and the yellow depicts the lowest category of

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Map 35 - Caribou Subsistence Use Areas, Years 1-10 with Comparative Data

Years 1-10: January 2008 - October 2017
 High 1925 caribou areas used by 158 respondents
 Low
 Source: SRB&A 2019

Source: Pedersen 1979
 Caribou, Lifetime prior to 1979

Source: Pedersen 1986
 Caribou, 1973-1986

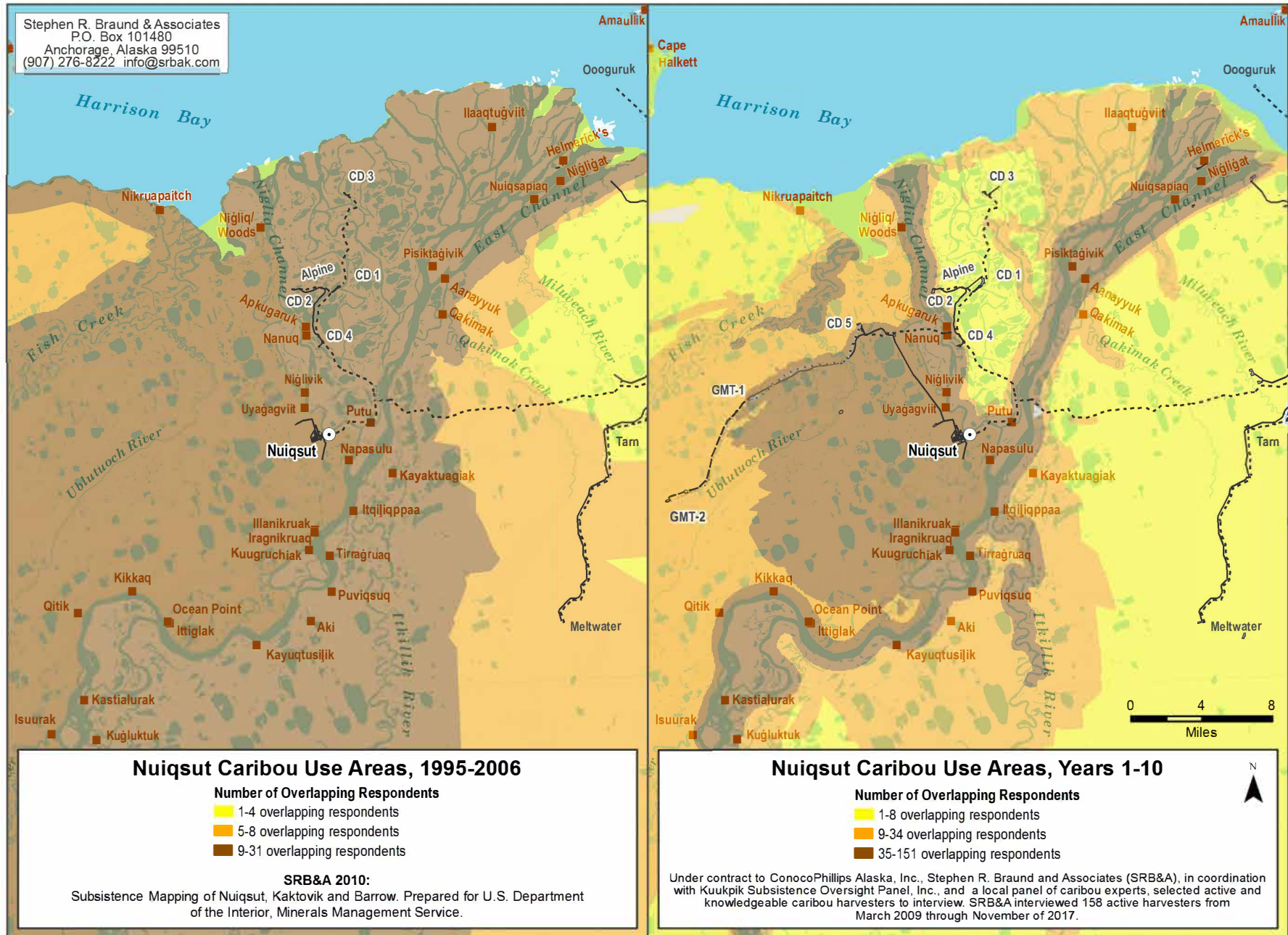
Source: BLM 2004
 Caribou, 1994-2003

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

Source: Brown et al. 2016
 Caribou, 2014

Scale: 0 12.5 25 50 Miles
 1:2,600,000

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Nuiqsut Caribou Use Areas, 1995-2006

- Number of Overlapping Respondents**
- 1-4 overlapping respondents
 - 5-8 overlapping respondents
 - 9-31 overlapping respondents

SRB&A 2010:

Subsistence Mapping of Nuiqsut, Kaktovik and Barrow. Prepared for U.S. Department of the Interior, Minerals Management Service.

Nuiqsut Caribou Use Areas, Years 1-10

- Number of Overlapping Respondents**
- 1-8 overlapping respondents
 - 9-34 overlapping respondents
 - 35-151 overlapping respondents

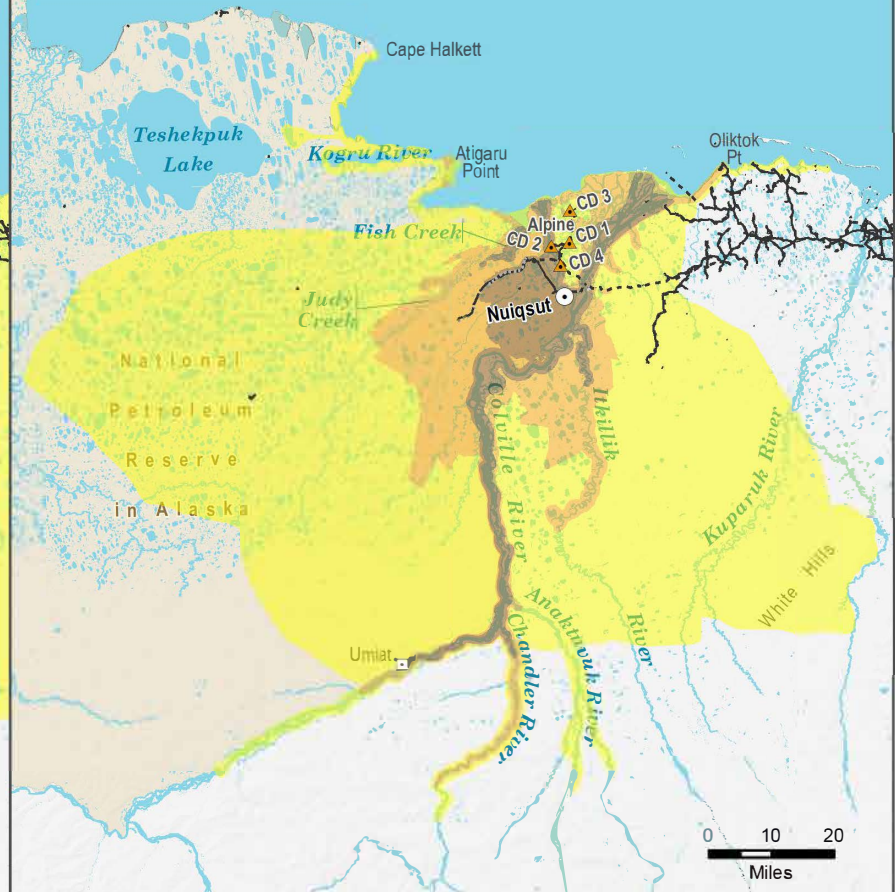
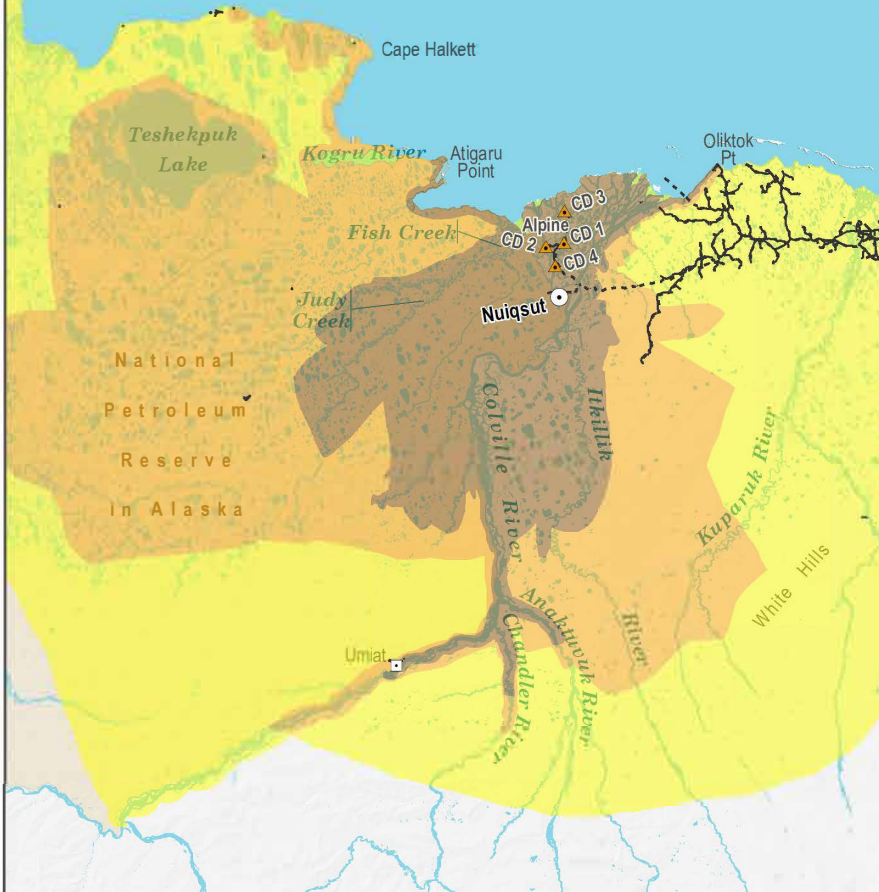
Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 158 active harvesters from March 2009 through November of 2017.

Map 36 Comparative Use Areas, Current Area of Development

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BEAUFORT SEA



Nuiqsut Caribou Use Areas, 1995-2006

Number of Overlapping Respondents

- 1-4 overlapping respondents
- 5-8 overlapping respondents
- 9-31 overlapping respondents

SRB&A 2010:

Subsistence Mapping of Nuiqsut, Kaktovik and Barrow. Prepared for U.S. Department of the Interior, Minerals Management Service.

Nuiqsut Caribou Use Areas, Years 1-10

Number of Overlapping Respondents

- 1-8 overlapping respondents
- 9-34 overlapping respondents
- 35-151 overlapping respondents



Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 158 active harvesters from March 2009 through November of 2017.

Map 37 Comparative Use Areas, 1995-2006 and 2008-2017

overlapping use (reflecting a smaller number of overlapping respondents). The method used to apply breaks to the subsistence use area data is based on 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 and area northwest of the community in more recent years. 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 general, more recent (2008-2017) use areas occur in a more confined area than those documented for the 1995-2006 time period, indicating a change in hunting patterns over time. In a meeting of the Nuiqsut Caribou Panel, several panel members also discussed 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.

Comparison of the two data sets may be interpreted as conflicting with harvester reports of going "farther" in recent years, as the outer extent of the community's more recent (2008-2017) use area is smaller. However, the outer extent of a community's subsistence use area is generally represented by a small number of hunters, reflects the farthest those individuals went over a given time period, and should not be relied upon to make overall conclusions about hunting patterns for a community. In addition, the largest, most expansive use areas are usually those accessed by snowmachine; in the case of Nuiqsut, most caribou hunting occurs in the summer and fall, by boat, four-wheeler, and in recent years, truck. Thus, when hunters report "going farther," they may be referring to distance along river channels, or overall miles travelled on a four-wheeler within a relatively confined area. These changes may not be reflected in the outer extent of community use areas. During the September 2019 meeting with the Nuiqsut Caribou Panel, panel members noted that the outer extent may be underrepresented in some years, as not all hunters in town are interviewed for the mapping portion of the study. However, one individual noted that in general, the decrease in extent could be attributed to changes in hunting patterns among the younger generation, saying, "And the younger hunters don't travel as far as the older hunters. Be it lack of knowledge or something else" (SRB&A Nuiqsut Caribou Panel Meeting September 2019). The same individual later noted that "back in the mid-90s, there were a lot more fur hunters hunting wolverines, foxes, wolves," when discussing the decreased use of snowmachine for overland caribou hunting.

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 (for any resource) in 1994-95, followed by Nigliq Channel and the Nuiqsut area. For the 1999-2000 time period (Pedersen Unpublished), Fish Creek provided a smaller portion of the overall caribou harvest compared to other hunting areas. Instead, Ocean Point, Umiraq (Sentinel Hill), and Nigliq were the top harvest areas. For the 2003-2007 time period, Braem et al. (2012) reported harvest amounts by emically-defined caribou hunt areas similar to those shown on Map 27. In that study, across all study years, areas contributing at least 10 percent to the

harvest included the Nuiqsut Area (including the Nigliq Channel near the community and area directly west of the community), Fish Creek area, Nigliq area, and upriver toward Ocean Point (“Tiragroak-Kayuktusilik Area”). Most areas show substantial variation from year to year in terms of harvest amounts. However, the areas which have consistently provided a high proportion of overall caribou harvests include the Nuiqsut area, Nigliq Channel, Fish Creek, and Ocean Point area. Comparison of the data for the 1993, 1994-95, 1999-00, and 2003-2007 time periods to data from this monitoring study indicates that the 2008-2017 time period saw increased harvests in the East Channel Colville area, the upper Colville River (south of Sentinel Hill), and the area west of Nuiqsut. Other areas that show lesser use for the 2008-2017 time period include Fish Creek and possible Nigliq Channel (data are not directly comparable). Other areas that show fewer overlapping use areas in the Nuiqsut Caribou Subsistence Monitoring study (i.e., the middle Colville River delta and large overland areas to the west beyond Fish Creek, southwest, 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.

As discussed above, changes in use areas can occur as a result of avoidance due to industry or human activity; environmental changes which reduce access to an area; changes to state or federal hunting regulations; changes in the availability of resources within a previously used area; and personal reasons. Self-reported avoidance of use areas was documented in Years 6 through 10 of the monitoring study. As reported under “Reported Avoidance of Use Areas” (Table 45), between 51 percent and 75 percent of Nuiqsut caribou harvester respondents reported avoiding at least one previously used area during the study years.

The most commonly avoided areas over all 10 years included Alpine/Alpine Satellites (29 percent of respondents), East Channel (13 percent), Fish Creek (12 percent), and Nigliq Channel (11 percent) (Table 49). As shown in Table 49, while the percentage of respondents reporting direct avoidance of Alpine/Alpine Satellites decreased somewhat in Years 9 and 10, the percentage of respondents avoiding the East Channel, Fish Creek, and Nigliq Channel increased in Year 10. In general, avoidance of different areas, including Nigliq Channel, Alpine/Alpine Satellites, and Fish Creek has fluctuated from year to year.

Table 49: Percentage of Respondents Reporting Avoidance by Place

Places	Percent of Respondents					
	Y6	Y7	Y8	Y9	Y10	At Least One Year
Alpine/Alpine Satellites	23%	19%	15%	7%	13%	29%
East channel	5%		6%	3%	14%	13%
Fish Creek	7%	5%	2%	8%	13%	12%
Nigliq channel	7%	2%	6%	2%	8%	11%
Kuupaquallurak		5%	6%	7%	5%	9%
Colville Delta	4%	4%	6%	7%	3%	7%
Upper Colville River	2%	4%	6%	2%	3%	7%
Nanuq			8%	7%	3%	6%
West of Nuiqsut	4%	4%	2%	2%	3%	5%
Itkillik river	2%	5%		3%	2%	4%
Spur road		2%	4%	2%	3%	4%
Tamayayak Channel	5%	5%	2%		3%	4%
Pisiktagvik			2%	2%	5%	3%
East of Colville Delta		2%	2%		2%	2%
Kachemach River	2%			2%	2%	2%
Puviksuk	4%				2%	2%
Shallow areas	5%					2%
Anaktuvuk River		4%				2%
Oliktok Point			2%		2%	2%
East of Colville River	2%			2%		2%
Nuiqsupiaq			2%		2%	2%
Teshkepuk Lake	2%			2%		2%

Places	Percent of Respondents					
	Y6	Y7	Y8	Y9	Y10	At Least One Year
Various Areas		4%				2%
Nigliq				3%		2%
Umiraq					3%	2%
Atigaru Point	2%					1%
Chandler River		2%				1%
East of Nigliq channel	2%		2%			1%
Kuparuk River	2%					1%
Lake near Kachemak	2%					1%
Tingmeachsiovik			2%			1%
Eskimo Island			2%			1%
Ikpiq River				2%		1%
Niglivik					2%	1%
Kayuktisilik					2%	1%
Ulusrak					2%	1%
West of Colville River					2%	1%
Miluveach River					2%	1%
Nuiqsut					2%	1%
Location not captured					2%	1%
Total Number of Respondents	57	57	52	61	64	123

Stephen R. Braund & Associates, 2019.

During all study years, nearly one-half of respondents report avoiding areas for development reasons (Table 50). The percentage of respondents reporting avoidance of use areas due to a general lack of caribou in those areas (resource availability) has increased over the five years with available data. A tendency to avoid areas due to development does not vary widely by age group, although respondents born in the 1990s were somewhat less likely to report development-related avoidance (Table 51). Individuals born in the 1990s may be less likely to avoid development infrastructure as they are accustomed to the presence of development near their community and within their hunting grounds. Individuals born in the 1950s and 1960s are the most likely to report avoidance for development reasons.

Table 50: Percentage of Respondents Reporting Avoidance by Cause

Causes	Percent of Respondents					
	Y6	Y7	Y8	Y9	Y10	At Least One Year
Development Causes	37%	35%	46%	31%	36%	48%
Development Activities	14%	9%	27%	21%	25%	24%
Development Infrastructure	12%	21%	23%	7%	20%	26%
Contamination Concerns	11%	7%	0%	0%	0%	6%
Security Restrictions	7%	5%	6%	5%	3%	9%
Safety Concerns	5%	7%	2%	2%	0%	5%
Development-General	7%	0%	12%	8%	5%	12%
Environmental Causes	26%	16%	15%	21%	30%	36%
Resource Availability	11%	11%	17%	21%	27%	28%
Environmental Factors	21%	5%	6%	2%	9%	11%
Personal Reasons	4%	18%	4%	13%	16%	20%
Do not know	2%	0%	0%	0%	2%	2%
Cause not captured	0%	0%	0%	2%	5%	2%
Total Respondents	57	57	52	61	64	123

Stephen R. Braund & Associates, 2019.

Table 51: Percentage of Respondents Reporting Avoidance by Age Group

Decade Born	Percent of Respondents	
	Avoided in at Least One Study Year	Avoided for Development Reasons in at Least One Study Year
1940s	29%	29%
1950s	80%	67%
1960s	60%	50%
1970s	47%	33%
1980s	57%	43%
1990s	57%	20%
2000s	0%	0%

Stephen R. Braund & Associates, 2019.

When reviewing these data during the September 2019 meeting with the Nuiqsut Caribou Panel, one panel member discussed his own avoidance of the *Kuupaquullurak* Slough and noted the subsequent impacts on his ability to pass on knowledge about that area to the younger generations:

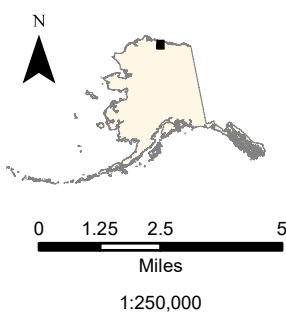
Kuupaquullurak, I used to go there before the bridge and the boom crossing the creek. I don't go through there anymore. That part [of passing on knowledge about that area] is gone for me. (SRB&A Nuiqsut Caribou Panel Meeting September 2019)

Because the Nuiqsut Caribou Subsistence Monitoring Project and associated data collection did not begin until after construction of Alpine Satellites CD1 through CD4 was complete, pre-development data on caribou harvest levels in those areas are not available. Thus, it is not possible to provide pre- and post-development comparisons – such as number of caribou harvested by harvest location - for those (CD1 through CD4) developments. However, it is possible to provide such pre- and post-development comparisons for areas west of Nigliq Channel, including areas surrounding the Nigliq Channel bridge, Spur Road, CD5 road and pad, and GMT1 road, which were all constructed at least six years after data collection began. Such comparisons can help understand whether harvests or harvest activity has decreased or increased within project vicinities from baseline conditions. As shown in Table 52, harvests in the area of infrastructure built after the monitoring study began (Map 38) have varied on annual basis but have not experienced notable changes—either upward or downward—since construction of roads and bridges to the west of the Nigliq Channel.

Table 52: Percentage of Caribou Harvesters and Harvests within 2.5 Miles of Nigliq Bridge, Spur Road, CD5 Road and Pad, and GMT1 Road

Study Year	# (%) of Caribou Harvested	# (%) of Respondents Harvesting Caribou	Development Action/ Infrastructure
Year 1	41 (11%)	15 (42%)	
Year 2	45 (16%)	16 (36%)	
Year 3	64 (18%)	25 (46%)	
Year 4	62 (19%)	26 (47%)	
Year 5	75 (22%)	25 (47%)	
Year 6	72 (26%)	26 (52%)	
Year 7	60 (11%)	20 (36%)	Construction of CD5, Nigliq Channel bridge, and Spur Road
Year 8	55 (14%)	22 (45%)	CD5, Nigliq Channel bridge, and Spur Road completed
Year 9	71 (23%)	23 (43%)	
Year 10	79 (25%)	34 (55%)	Construction of GMT1 road and operational (3 months)

Stephen R. Braund & Associates, 2019.









Map 38 - 2014 to 2017 Infrastructure Analysis Area

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiġ Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 158 active harvesters from March 2009 through November of 2017.

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ConocoPhillips Alaska, Inc. (COP) Infrastructure

-  Infrastructure Analysis Area
-  Local Placename
-  COP Existing Pad
-  Above Ground Pipeline
-  Gravel Footprint
-  National Petroleum Reserve Alaska

The area has accounted for between 11 percent (in Years 1 and 7) and 26 percent of the total harvest (in Year 6), with pre-construction harvests ranging from between 11 and 26 percent of the total harvest and post-construction harvests ranging from between 11 percent and 25 percent, similar to post-construction harvests. After a slight decrease in harvests in Years 7 and 8 (the first two years of construction), harvests rose slightly in Years 9 and 10. The percentage of respondents harvesting caribou in the area increased slightly in Year 10; however, the percentage of caribou harvested did not increase substantially.

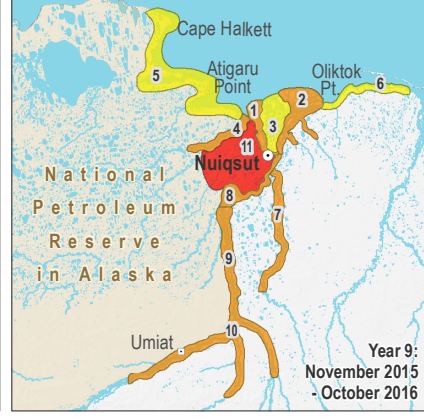
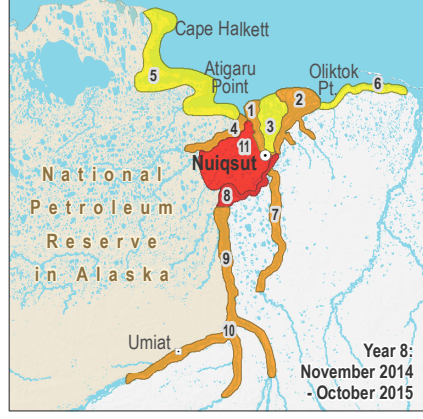
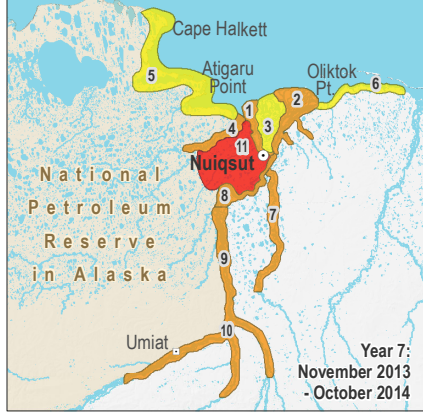
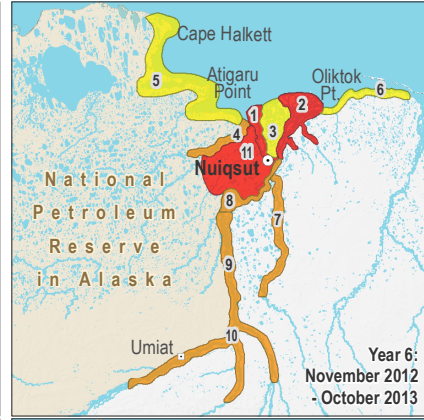
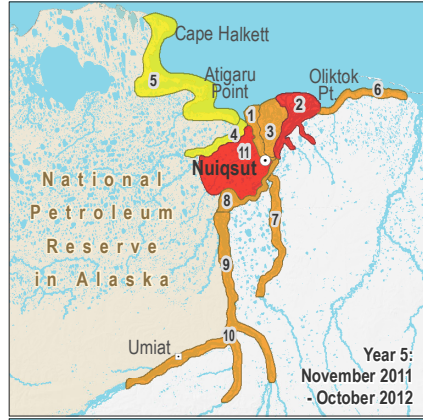
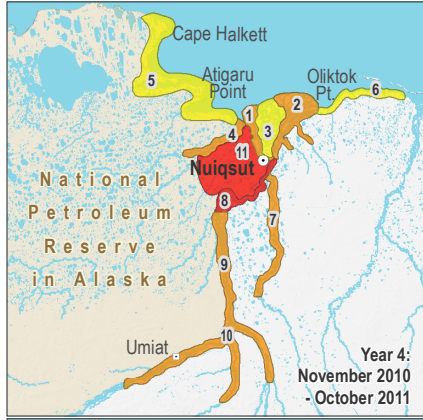
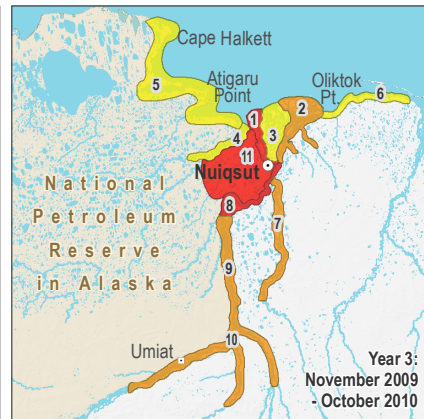
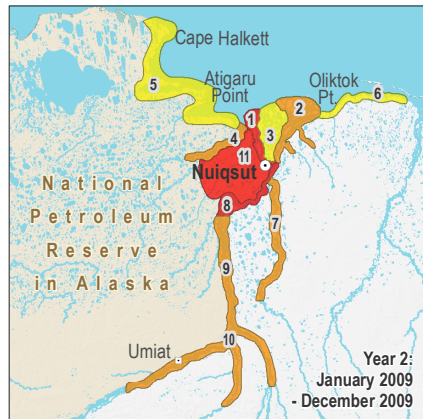
Using the hunting area groups depicted on Map 39 (reproduced from Map 27) and in Table 12, Table 53, Table 54, and Table 55 provide information about use of the 12 hunting area groups in terms of the percentage of respondents using these areas, the percentage of hunting trips to each area, and the average number of hunting trips taken to each area per respondent. Analyzing the data by these hunting groups allows for more direct comparison of these variables over time.

The most commonly used areas over the 10 years, in terms of the percentage of respondents, are the Ocean Point area (93 percent of respondents using), Nigliq Channel (85 percent), and area west of Nuiqsut (71 percent) (Table 53). While all areas show annual variation in use, recent years have shown a decrease in the percentage of active harvester respondents using the Nigliq Channel (from between 63 and 75 percent in Years 1 through 6 to between 41 percent and 54 percent in Years 7 through 10). Other areas showing decreased use in recent years (Years 7 through 10) include Fish Creek and the Coastal West area. The percentage and average number of trips to each area also vary from year to year, with Nigliq Channel showing decreased effort in terms of trip frequency (from between 28 and 32 percent in Years 1 through 6 to between 11 and 23 percent in Years 7 through 10), and the area West of Nuiqsut showing increased trip frequency (from between 13 and 22 percent in Years 1 through 6 to between 27 and 41 percent in Years 7 through 10) (Table 54). The average number of trips to Nigliq Channel decreased somewhat over time, while the average number of trips to the area West of Nuiqsut increased (Table 55). The overall number of hunting trips remained relatively stable over all 10 years, with the exception of Year 1 where residents reported a higher overall number of trips (28 trips versus between 17 and 21 during all other years). Review of these data indicate a greater number of “opportunistic” trips reported in Year 1 (over 30 percent) compared to more recent years (between 15 and 20 percent); opportunistic trips include those where caribou hunting is not the primary purpose of the trip (e.g., traveling back and forth to check fish nets; hauling materials to and from cabin site). As shown in Table 56, the total and average number of trips using roads has increased since construction of the Spur road and CD5/GMT1 roads, with an average of six trips taken along the road system in Year 10 compared to three trips in Year 8.

The following sections discuss uses of and changes in each of the 12 Nuiqsut caribou hunting areas over time.

Nigliq Channel

The Nigliq Channel area includes the area of Nigliq Channel from the community of Nuiqsut downriver to the Beaufort Sea (see Map 39, Area 1). *Nigliq*, located near the mouth of the channel, was traditionally an annual trading site which brought together Iñupiat from inland and coastal areas (SRB&A 2018b). The Nigliq Channel has frequently been characterized by community residents as a key crossing area for caribou migrating in the summer. For caribou hunting, the Nigliq Channel is used primarily during the open water months of June through September, although the area is also important during other times of the year, particularly during the fall (October/November) Arctic cisco fishery. The channel is a primary route to the Beaufort Sea, where residents hunt seals, eiders, and sometimes caribou along the coast, although shallow waters in the fall can limit travel during that time. Multiple current and traditional camps are located along the Nigliq Channel. The camp at *Nigliq*, also known as Woods Camp, is owned by elder Lydia Sovalik and is inhabited through the summer months by various community members who set nets for broad whitefish while also waiting for caribou herds to cross nearby. Because it is a key route to the ocean and because of importance of the area for other subsistence activities, respondents often report hunting caribou on Nigliq Channel opportunistically during other activities. In Year 10, the Nigliq Channel had the highest number of trips characterized as “opportunistic” when compared to other hunting areas.



Map 39 - Nuiqsut Caribou Hunting Area Groups: Years 1 - 10

LEGEND

<ul style="list-style-type: none"> Less than two percent of total harvest Between two and 15 percent of total harvest Greater than 15 percent of total harvest 	<p>Areas categorized as follows:</p> <ul style="list-style-type: none"> 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 Sentinel Hill 10 Colville River South 11 West of Nuiqsut
--	--

Other areas may have been used for resource harvesting.

SCALE: 1:1,500,000

0 15 30 60 Miles

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Table 53: Percentage of Respondents Reporting Use Areas by Hunting Area Group

Hunting Area	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	At Least 1 Year
Nigliq Channel	75%	72%	63%	74%	68%	65%	53%	41%	52%	54%	85%
East Channel Colville	47%	47%	53%	47%	54%	51%	48%	31%	46%	34%	65%
Other Colville Delta	3%	8%	7%	2%	4%	5%	2%	0%	0%	1%	9%
Fish Creek	42%	34%	23%	19%	7%	32%	18%	14%	13%	9%	37%
Coastal West	14%	6%	5%	3%	9%	7%	8%	0%	2%	0%	8%
Coastal East	11%	9%	9%	3%	4%	4%	5%	3%	11%	4%	15%
Itkillik River	42%	40%	42%	38%	42%	30%	30%	33%	43%	43%	55%
Ocean Point	67%	85%	79%	90%	79%	75%	82%	76%	75%	85%	93%
Sentinel Hill	58%	74%	67%	48%	60%	63%	53%	47%	44%	46%	69%
Colville River South	28%	45%	54%	36%	42%	53%	38%	28%	17%	25%	58%
West of Nuiqsut	69%	53%	65%	53%	60%	53%	60%	64%	57%	62%	71%
Other	6%	17%	19%	3%	5%	7%	20%	2%	2%	6%	20%
Number of Harvesters	36	53	57	58	57	57	60	58	63	68	157

Notes: See Map 39 for display of the location of the 12 hunting area groups.

Stephen R. Braund & Associates, 2019.

Table 54: Total Percentage of Trips by Hunting Area Group

Hunting Area	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Nigliq Channel	28%	30%	30%	32%	31%	29%	19%	23%	11%	19%	25%
East Channel Colville	8%	14%	12%	9%	10%	13%	16%	8%	12%	5%	11%
Other Colville Delta	0%	2%	3%	1%	1%	0%	0%	0%	0%	0%	1%
Fish Creek	6%	6%	3%	6%	1%	8%	6%	1%	1%	0%	4%
Coastal West	2%	2%	2%	2%	1%	0%	1%	0%	0%	0%	1%
Coastal East	1%	6%	1%	0%	0%	1%	2%	1%	4%	2%	2%
Itkillik River	4%	10%	9%	7%	7%	4%	7%	6%	12%	13%	8%
Ocean Point	35%	32%	29%	30%	27%	33%	33%	32%	30%	23%	30%
Sentinel Hill	30%	28%	27%	21%	23%	26%	23%	22%	18%	14%	23%
Colville River South	7%	19%	21%	15%	14%	20%	19%	12%	9%	6%	14%
West of Nuiqsut	14%	13%	22%	19%	21%	14%	27%	35%	41%	37%	25%
Other	2%	6%	5%	4%	1%	2%	10%	1%	2%	3%	4%
Total Trips	1,008	1,005	1,211	1,139	1,019	1,014	1,190	970	1,049	1,439	11,044

Notes: See Map 39 for display of the location of the 12 hunting area groups.

Stephen R. Braund & Associates, 2019.

Table 55: Average Number of Trips per Respondent by Hunting Area Group

Hunting Area	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Nigliq Channel	8	6	6	6	5	5	4	4	2	4	5
East Channel Colville	2	3	3	2	2	2	3	1	2	1	2
Other Colville Delta	0	0	1	0	0	0	0	0	0	0	0
Fish Creek	2	1	1	1	0	1	1	0	0	0	1
Coastal West	1	0	1	0	0	0	0	0	0	0	0
Coastal East	0	1	0	0	0	0	0	0	1	0	0
Itkillik River	1	2	2	1	1	1	1	1	2	3	2
Ocean Point	10	6	6	6	5	6	6	5	5	5	6
Sentinel Hill	8	5	6	4	4	5	5	4	3	3	5
Colville River South	2	4	5	3	3	4	4	2	1	1	3
West of Nuiqsut	4	2	5	4	4	2	5	6	7	8	5
Other	1	1	1	1	0	0	2	0	0	1	1
All Areas	28	19	21	20	18	18	20	17	17	21	20
Number of Harvesters	36	53	57	58	57	57	60	58	63	68	
Notes: See Map 39 for display of the location of the 12 hunting area groups.											

Stephen R. Braund & Associates, 2019.

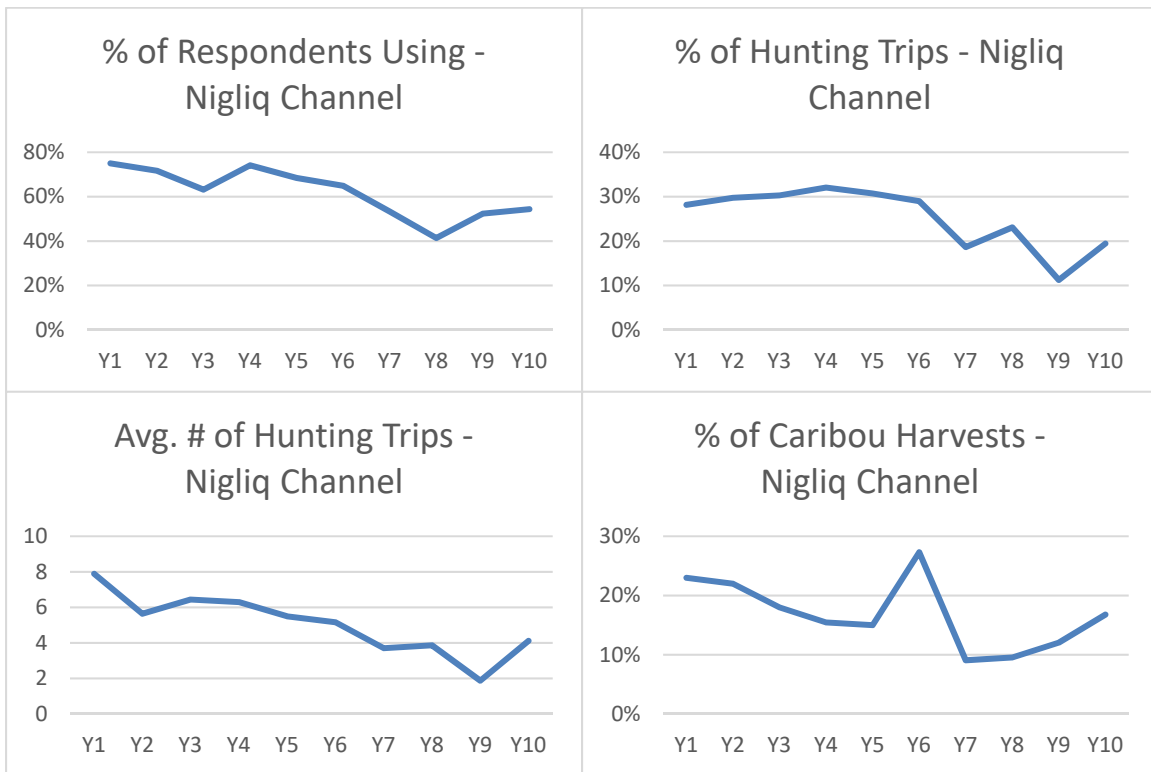
Table 56: Total and Average Number of Trips Using Roads

Number of Trips	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Total Number								159	315	396	870
Average Number per Respondent								3	5	6	5

Various changes have occurred along the Nigliq Channel over the years. Construction of Alpine and Alpine Satellites introduced development into previously undeveloped areas in the Colville River delta. In particular, CD1, located near a traditional camp at Nanuq, and CD2 and CD4, were constructed relatively close to existing hunting and fishing areas on Nigliq Channel. Accompanying development of these sites was an increase in traffic (air, boat, and truck), human activity, and infrastructure along the Nigliq Channel. Construction of a bridge across Nigliq Channel and *Kuupaqullurak*, a slough off of the channel, began in 2014 (Year 7) and was completed in 2015 (Year 8). The bridge connected CD1 to new developments west of the Colville Delta including CD5 and, later, GMT1. A Spur road paralleling the Nigliq Channel was also constructed by Kuukpik Corporation in Years 7 and 8. Elders and other residents have noted that the Nigliq Channel was once a predictable place to harvest caribou, as large herds would move into the Colville River on an annual basis (see “Traditional Knowledge of Caribou in the Colville River Delta”). Some residents believe that development to the east of the Nigliq Channel, including Alpine/Alpine Satellites, Kuparuk, and Prudhoe Bay, have resulted in less frequent and smaller crossing events in the Colville River delta (see above, under “Traditional Knowledge of Caribou in the Colville River Delta”).

While Nigliq Channel has been one of the most commonly used hunting areas during the 10 years of the monitoring study (85 percent using the area during at least one year), use of the Nigliq Channel in recent years has decreased, both in terms of the percentage of respondents using the area and the amount of effort in terms of number of trips, although Year 10 showed a slight uptick in trips (Figure 18). The decrease in effort and use associated with the Nigliq Channel coincides with construction of the Nigliq Channel bridge in Year 7 and could thus be associated with avoidance of increased development activities and infrastructure.

Figure 18: Use of Nigliq Channel Area Over Time



Avoidance of Nigliq Channel and associated areas such as the Alpine/Alpine Satellites Developments, Nanuq, and *Kuupaqullurak*, has been reported by respondents primarily for development reasons but also for a perceived lack of caribou in those areas (Table 48). The decrease in use of the Nigliq Channel could also be related to an increase in hunting opportunities to the west of the community, particularly the road system which was constructed in Year 7 and usable in Year 8. Harvests on the Nigliq Channel have varied over the 10 study years; while Years 1 through 7 indicated an overall decline in harvests in this area, the last several study years have shown an upward trend in harvests.

East Channel Colville

The East Channel Colville area (see Map 39, Area 2) includes the eastern channels of the Colville River Delta including what is often referred to as the Kuukpik (*Kuukpikgruaq*) Channel and the Elaktoveach (*Ilaaqtugviit*) Channel, and two tributaries of the East Channel: the Miluveach River and Kachemach Creek. The Nigliq Channel and East Channel are the two boating routes to the Beaufort Sea, and residents often travel in one and out the other when traveling to the ocean during the summer months. The East Channel is also a destination for caribou hunters hoping to harvest Central Arctic Herd caribou as they migrate from east to west. Residents frequently characterize *Pisiktagvik* as a traditional crossing area for caribou, although in recent years harvesters have noted that crossing events at *Pisiktagvik* are less frequent and predictable. In addition to caribou hunting on the East Channel, Nuiqsut residents also use the East Channel during the fall Arctic cisco fishery (although the Nigliq Channel is the primary Arctic cisco harvest location), to harvest grayling at certain times of the year, and during the spring for eider. The East Channel is home to previous settlements of the Kuukpikmiut, including *Nuiqsapiaq*.

The East Channel area has seen increased exploration and development activity in recent years, not only associated with Alpine-related air and ice road traffic, but with other developers to the east of the Colville Delta. A commercial Arctic cisco fishery once operated near the mouth of the East Channel at the Helmericks homesite; however, the commercial fishery ceased operations after 2002 (Seigle et al. 2018).

Use of the East Channel Colville area has varied from year to year, with between 34 percent and 54 percent of harvester respondents using the area on an annual basis and 65 percent using the area during at least one year of the monitoring study (Figure 19). Years 8 and 10 show a decrease in the percentage of harvesters using the area as well as the percentage and average number of hunting trips occurring in the area (Figure 19). Year 10 saw a peak in the number and percentage of respondents reporting avoidance of the East Channel, with a majority of observations (five) citing a lack of resource availability and a smaller number (three) citing development causes. Nuiqsut harvesters generally report traveling to the East Channel when they hear of herds approaching from the east; however, in recent years residents note that these reports are less common and in Year 10 few harvests occurred in this area (Figure 19). As discussed above (Nigliq Channel), residents have expressed concern that development to the east of the Colville River delta has reduced the size and frequency of crossing events by Central Arctic Herd caribou.

Other Colville Delta

The Other Colville Delta area (see Map 39, Area 3) includes the various drainages of the Colville River Delta occurring between the Nigliq Channel and East Channel Colville areas. The entire Colville Delta, including the middle Colville Delta area, has traditionally been used by residents of Nuiqsut for subsistence hunting of caribou, wolf, and wolverine. The Other Colville Delta area includes the Tamayayak Channel and pads, pipelines, and ice roads associated with the CD1 and CD3 developments. As shown in Map 36, use of the Other Colville Delta area for caribou hunting has decreased over time. Throughout the 10 years of the monitoring study, use of the Other Colville Delta by Nuiqsut respondents has been relatively limited, with between zero and eight percent of respondents using the area on an annual basis and residents taking less than one hunting trip on average each year. Harvests within this area generally account for less than two percent of the harvest in this (Figure 20) and previous studies (Pedersen et al. 2000, Pederson Unpublished, Brower and Hepa 1998).

Figure 19: Use of East Channel Area Over Time

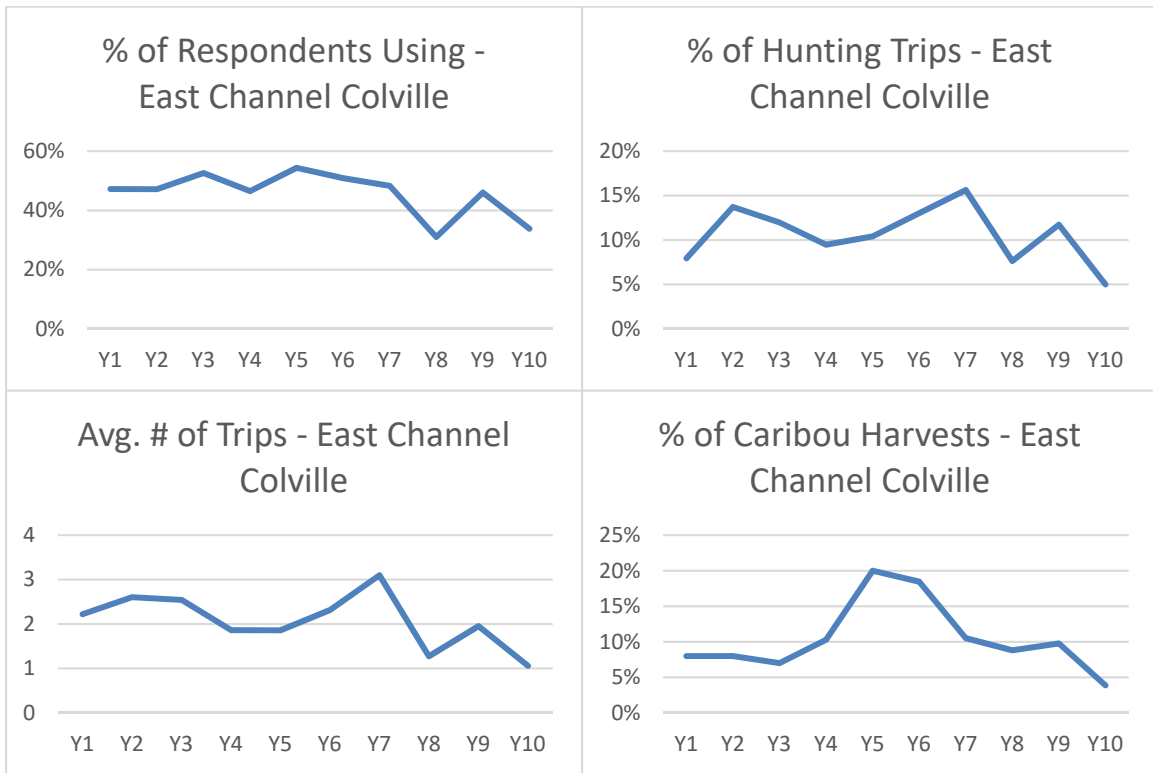
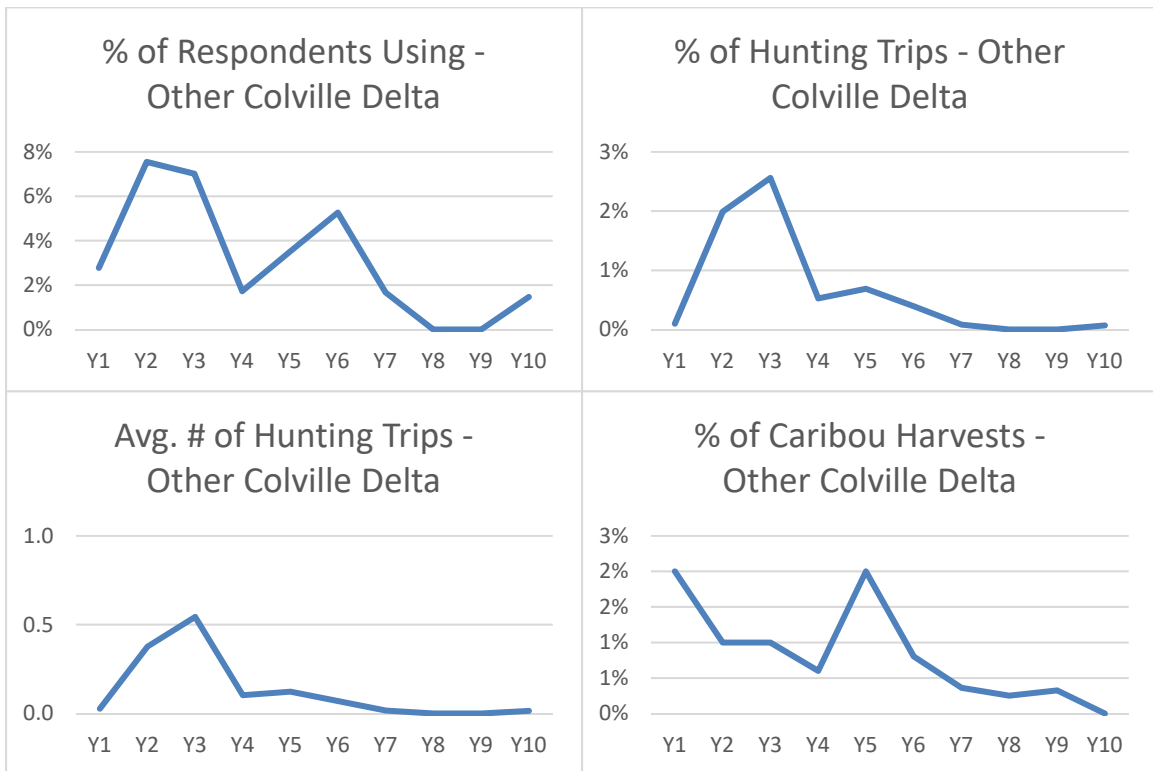


Figure 20: Use of Other Colville Delta Area Over Time



Use of this area was particularly low in Years 8 through 10 (Figure 20). Data for the 1995-2006 time period indicate that use of the Other Colville Delta area for caribou hunting occurred primarily during the winter months by snowmachine and, in the summer, was limited to use of the Tamayyak Channel by boat (SRB&A 2010b). In more recent years, winter use of the Other Colville Delta area has been rare, although some active harvesters continue to access the Tamayyak Channel by boat during certain years. Decreased use of the area by snowmachine could be related to the presence of a north-south pipeline and ice road; local residents have reported difficulty crossing under pipelines by snowmachine, particularly in areas with snowdrifts. Avoidance of Tamayyak Channel as well as the Colville Delta as a whole has been reported by respondents during certain years, with residents citing both development and environmental causes. Respondents have noted that some of the channels of the middle Colville Delta have become less accessible due to lower water levels but also because of the presence of pipeline crossings.

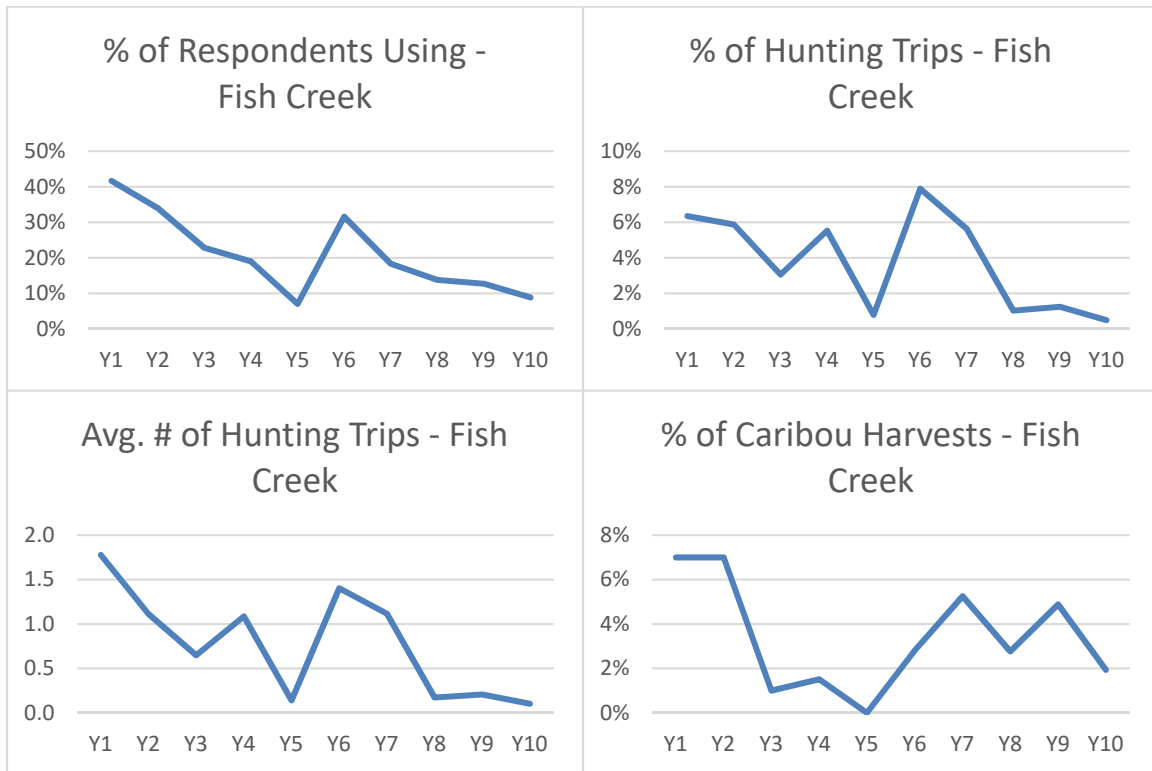
Fish Creek

The Fish Creek area (see Map 39, Area 4) is a traditionally important hunting and fishing ground for Nuiqsut residents and is the location of several camps and cabins which are used at various times of the year for hunting and fishing. Some residents have fish camps at Fish Creek where they set nets for broad whitefish (*aanaakliq*) during the summer months. The Fish Creek area is also important during the spring geese hunt. Caribou hunting in the Fish Creek area generally occurs during the summer months when residents travel to the area by boat or in the winter when residents access the area overland by snowmachine. When traveling by boat, community hunters generally do not travel beyond the confluence of Fish and Judy creeks although river conditions may allow such travel during certain years.

While development infrastructure has stopped short of the Fish Creek drainage, residents indicate an increase in overall development activity to the east and in proximity of Fish Creek, in recent years. In particular, residents have cited exploration activity—particularly helicopter traffic—associated with the CD5, GMT1, and GMT2 developments. Development of CD5 and GMT1 have also introduced infrastructure which are visible from certain locations on Fish Creek. In addition to development-related impacts, residents have also reported changes in the river channels in Fish Creek and near the mouth, including the nearshore waters outside the mouth, which have made access more difficult. Residents have consistently reported a decrease in the availability of caribou near Fish Creek, particularly during the summer, over the 10 years of the monitoring study.

During interviews for the 1995-2006 comprehensive mapping study conducted from 2004 through 2006, several individuals reported decreased use of Fish Creek, citing a lack of funds for gas as well as increased development activity to the east which reduced the availability of caribou. Decreased use of Fish Creek was also evident in a 1999-2000 study conducted by the ADF&G which showed a drop in harvests in this area, although a subsequent study for the 2003-2007 time period showed an increase in Fish Creek harvests. In general, decreased use of Fish Creek has continued over the course of the monitoring study, with fewer than 10 percent of active harvesters reporting use of Fish Creek in Year 10 compared to around 40 percent in Year 1 (Figure 21). A peak in Year 6 may have been associated with an overall decrease in harvest success that year; for example, one individual cited increased use of Fish Creek in Year 6 due to a lack of success closer to the community. In Years 8 through 10, Nuiqsut respondents took an average of less than one trip yearly to the Fish Creek area for caribou hunting. Harvests in the Fish Creek area have varied over the 10 study years, but generally account for less than 10 percent of the overall harvest. After a high of seven percent of the harvest in Years 1 and 2, harvests saw a sharp decline between Years 3 and 5, and somewhat higher harvests in Years 6 through 9. Ten percent of Nuiqsut caribou harvester respondents have reported avoiding the Fish Creek area during one or more years of the monitoring study, citing causes related to environmental factors, development factors, and personal reasons (Table 49). In Year 10, a majority of individuals who reported avoiding Fish Creek cited difficulties accessing the area due to shallower waters; one individual cited a lack of caribou in the area.

Figure 21: Use of Fish Creek Area Over Time



Coastal West

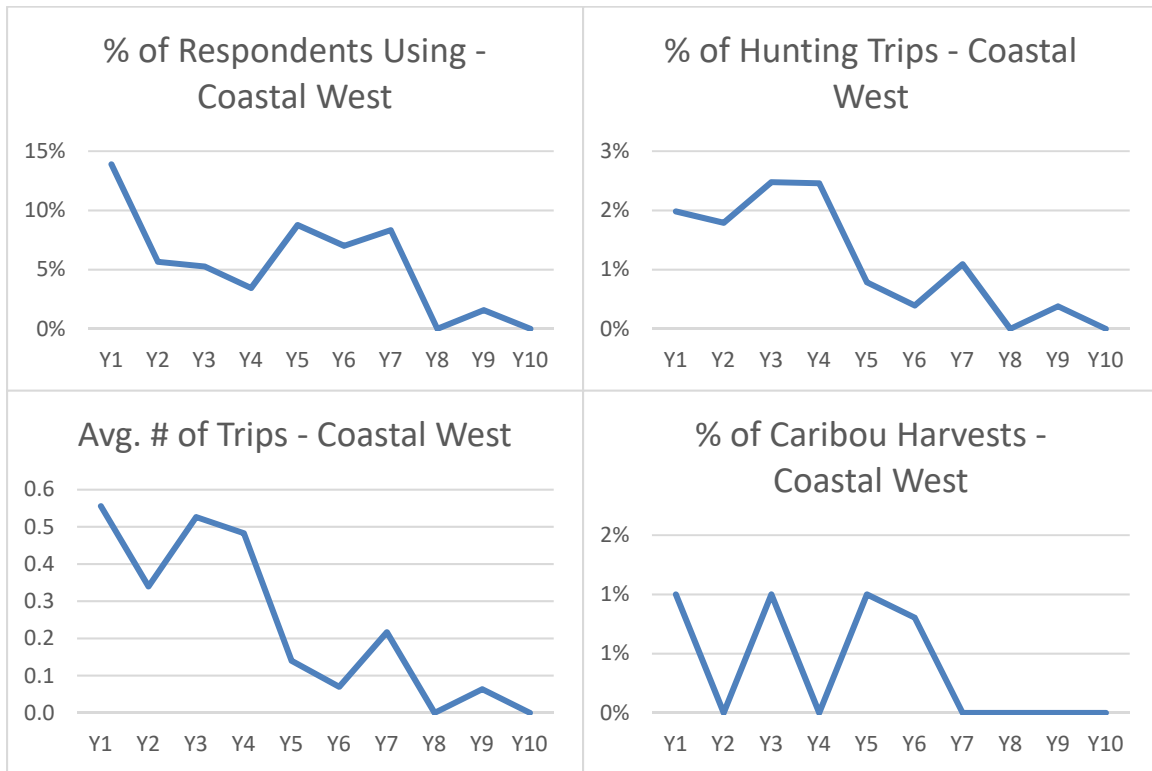
The Coastal West area (see Map 39, Area 5) includes the coast from the mouth of Fish Creek west to Cape Halkett and includes the mouth of Kogru River and Atigaru Point. The Coastal West area is known as an insect relief habitat for the Teshekpuk Caribou Herd during the summer months. Nuiqsut hunters thus travel by boat along the coast west of their community to look for caribou during the summer months; these activities are often combined with ocean-based hunting for seals and eiders. The primary changes to the Coastal West area reported by Nuiqsut respondents has been a decrease in caribou along the coast at expected times and increased sedimentation/shallow waters which decrease access to the coast.

As shown in Map 39, the Coastal West area has contributed a small amount to the total harvest over the study years (one percent or less) and is used less frequently (between zero and three percent of respondents) than all other hunting areas except for the Other Colville Delta area. Over the course of the monitoring study, use of the Coastal West area has declined from over 10 percent of respondents to less than five percent in Years 8 through 10 (Figure 22). The Coastal West area generally accounts for less than one percent of the total caribou harvest on an annual basis (Figure 22).

Coastal East

The Coastal East area (Map 39, Area 6) extends along the coast east of the Colville Delta to the mouth of the Kuparuk River. The Coastal East area includes several traditional camps, including Oliktok Point and Beechey Point, which were used by the Kuukpikmiut prior to development of Prudhoe Bay and where several Nuiqsut elders lived prior to resettlement of the Nuiqsut area in 1973. Use of the Coastal East area occurs primarily during the summer months as residents travel east of the Colville Delta by boat, looking for caribou along the coast. While the overland area east of the Colville Delta was once used by Nuiqsut harvesters looking for caribou, wolf, and wolverine by snowmachine, the past several decades have seen reduced use of this area which has been attributed to avoidance of the Prudhoe Bay and Kuparuk oil fields.

Figure 22: Use of Coastal West Area Over Time



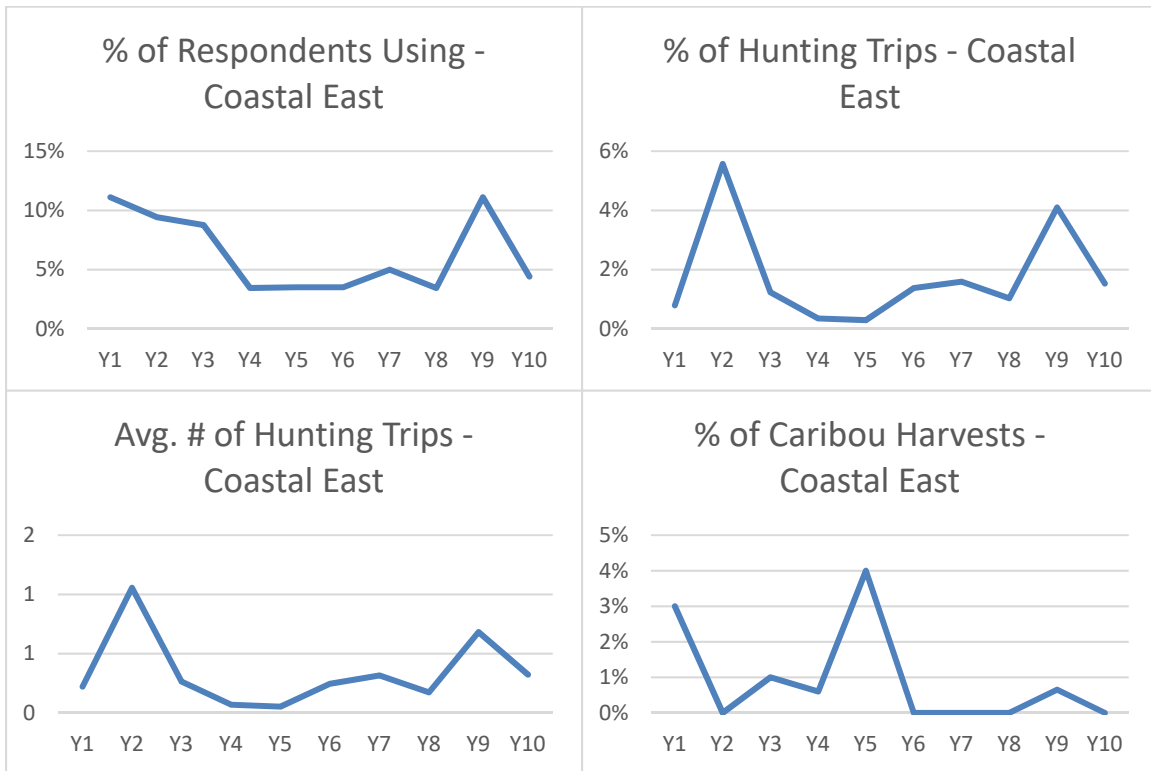
Similar to the Coastal West area, the Coastal East area generally contributes less than two percent of the total annual caribou harvest. Residents often hunt caribou in the Coastal East area while traveling to or from Oliktok Point to drop off or pick up residents or supplies from the terminus of the Dalton Highway. Residents have discussed the various changes that have occurred in the Coastal East area, with a particular emphasis on the increase in infrastructure along the coast and the loss of traditional sites—including ancestral burials—to development (SRB&A 2018b).

Use of the Coastal East area over the 10 years of the monitoring study has varied but stayed somewhat stable over time, with between three and 11 percent of respondents reporting use of the area on an annual basis (Figure 23). Residents generally take an average of one or fewer caribou hunting trips to the Coastal East area annually. Harvests within the Coastal East area have varied from between zero and four percent of the total harvest, with recent years (Years 6 through 10) accounting for less than one percent (Figure 23).

Itkillik River

Itkillik River, a tributary of the Colville River located upriver from the community of Nuiqsut, is a key hunting and fishing location for the community and the location of an ancestral settlement (*Itqilippaa*). The Itkillik River is located to the east of the Colville River and drains into the Colville upriver from the Delta; the river is only accessible by boat, or by snowmachine in winter. A number of Nuiqsut residents recall childhoods spent at *Itqilippaa* prior to resettlement, and the Nukapigak family owns an allotment and cabin(s) at the site (SRB&A 2018b). Residents hunt in the Itkillik River area (Map 39, Area 7) during the summer by boat and during the winter by snowmachine. Nuiqsut residents also use the Itkillik River area for hunting of moose, wolf, wolverine, and fishing. The mouth of the Itkillik River is particularly important as a fishing location for burbot during the winter months (SRB&A 2010b).

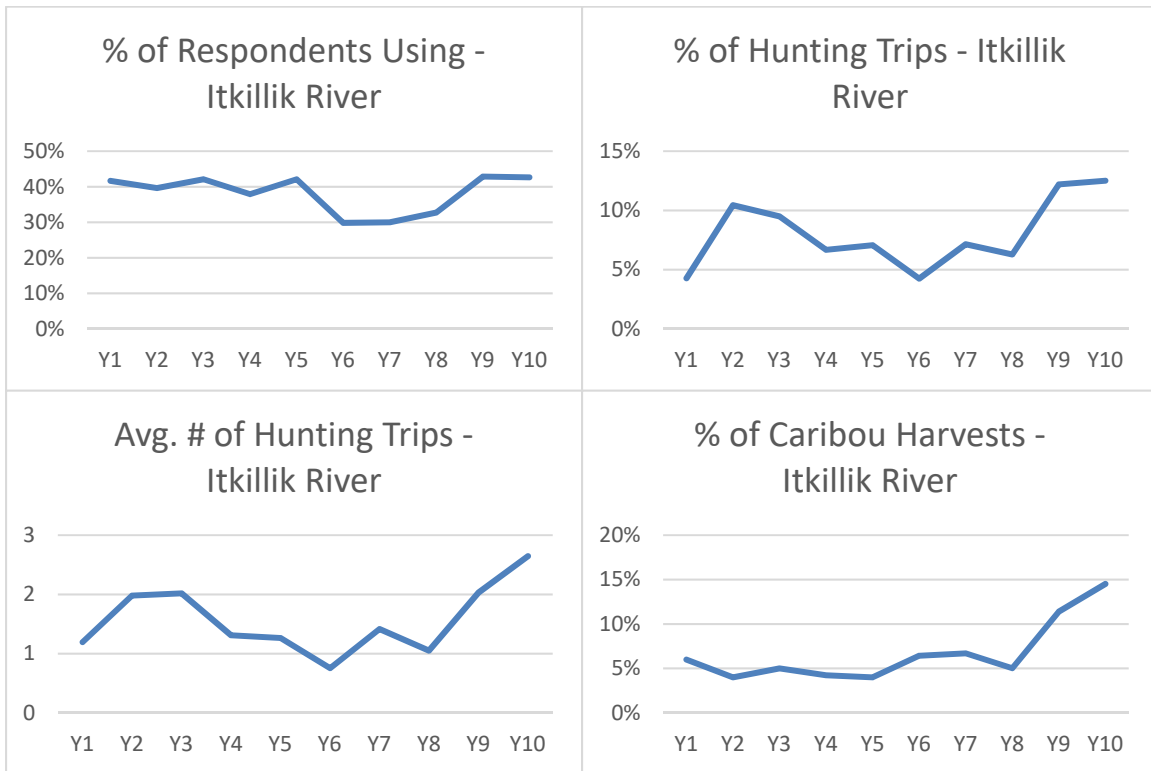
Figure 23: Use of Coastal East Area Over Time



Changes in the Itkillik River area have included an increase in air and plane traffic; development exploration occurs to the east of the Itkillik River but few direct impacts resulting from oil and gas exploration have been reported in that area. Residents note that travel along the Itkillik River can vary widely depending on annual river conditions (e.g., water depth) and the type of boat being used. Residents with jet boats, for example, are able travel farther upriver. An old air strip located approximately six air miles from the mouth of the river is an important feature which is often a turnaround point for hunters.

As noted on Map 39, the Itkillik River area has consistently contributed between two and 15 percent of the total annual caribou harvest over the course of the monitoring study, with the area providing a high of 15 percent of the harvest in Year 10. Use of the Itkillik River area has stayed stable or increased over the course of the monitoring study, with between 30 percent and 43 percent of Nuiqsut respondents reporting use of the area on an annual basis (Figure 24). The number of hunting trips to Itkillik River rose slightly during Years 9 and 10. In Year 10, residents took an average of over three trips to the Itkillik River area. Nuiqsut residents have indicated an increase in the number of caribou in the Itkillik River area over the years, with some indicating that development in and east of the Colville River delta has diverted caribou to the south as they approach the delta from the east. Harvests along the Itkillik River have shown a slight upward trend in recent years, accounting for over 10 percent of the harvest in Years 9 and 10 (Figure 24). Despite a perception that more caribou are in the area, Nuiqsut harvesters often indicate that those caribou are inaccessible due to staying at higher elevations or farther from the riverside. Respondents have also noted an increase in accessibility along the Itkillik River due to high water levels in recent years.

Figure 24: Use of Itkillik River Area Over Time



Ocean Point

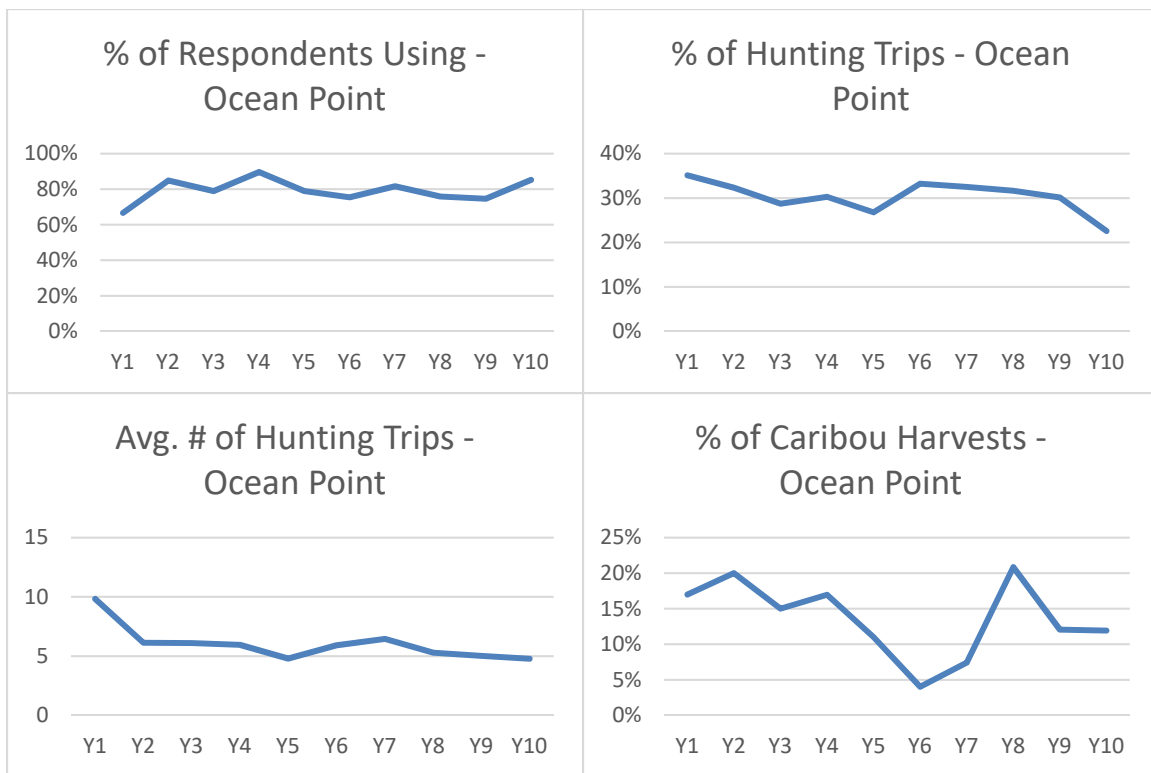
The Ocean Point area (Map 39, Area 8) extends along the Colville River between the outlet of the Nigliq Channel and the mouth of the Kikikakrorak River. The area includes several important ancestral sites and landscape features including *Tirragruaq*, *Puviqsuk*, *Kayuqtusilik*, Ocean Point, and *Qitik*. Residents generally use the Ocean Point area to hunt caribou during the summer and fall months when traveling upriver by boat, although residents also access adjacent overland areas to the north and west by four-wheeler in the summer and fall and surrounding areas by snowmachine during the winter. The Ocean Point area is also important for wolf, wolverine, and moose hunting, as well as fishing for various species of fish such as Arctic grayling and Dolly Varden.

Changes within the Ocean Point area over the course of the 10 years of the monitoring study have included increased development activity, including seismic exploration and exploratory drilling, within the area. In addition, residents indicate that changes to river channels are relatively common in the Ocean Point and that certain areas—such as a shortcut near Ocean Point called *Anaguvik*— are only accessible when water levels are high enough. The Ocean Point area shows relatively consistent use over the study years, with between 67 and 90 percent of respondents reporting use of the area on an annual basis (Figure 25). The number of trips to the Ocean Point area has also stayed relatively stable over time after a decrease between Year 1 (an average of 10 hunting trips annually) and Year 2 (six hunting trips annually). Since then, the average number of trips to Ocean Point has ranged from five to six trips annually. The area showed a slight decrease from previous years, in terms of percentage of overall hunting trips, in Year 10. Harvests in the Ocean Point area vary substantially from year to year, accounting for between four and 21 percent of the total harvest (Figure 25).

The Ocean Point area is considered by residents a relatively easy day trip from the community and therefore is commonly used by hunters who cannot take longer trips upriver either due to a lack of funds or time. In

addition, hunters travel through the Ocean Point area when traveling farther upriver toward Sentinel Hill or Umiat and are therefore frequently using this area for travel and hunting.

Figure 25: Use of Ocean Point Area Over Time

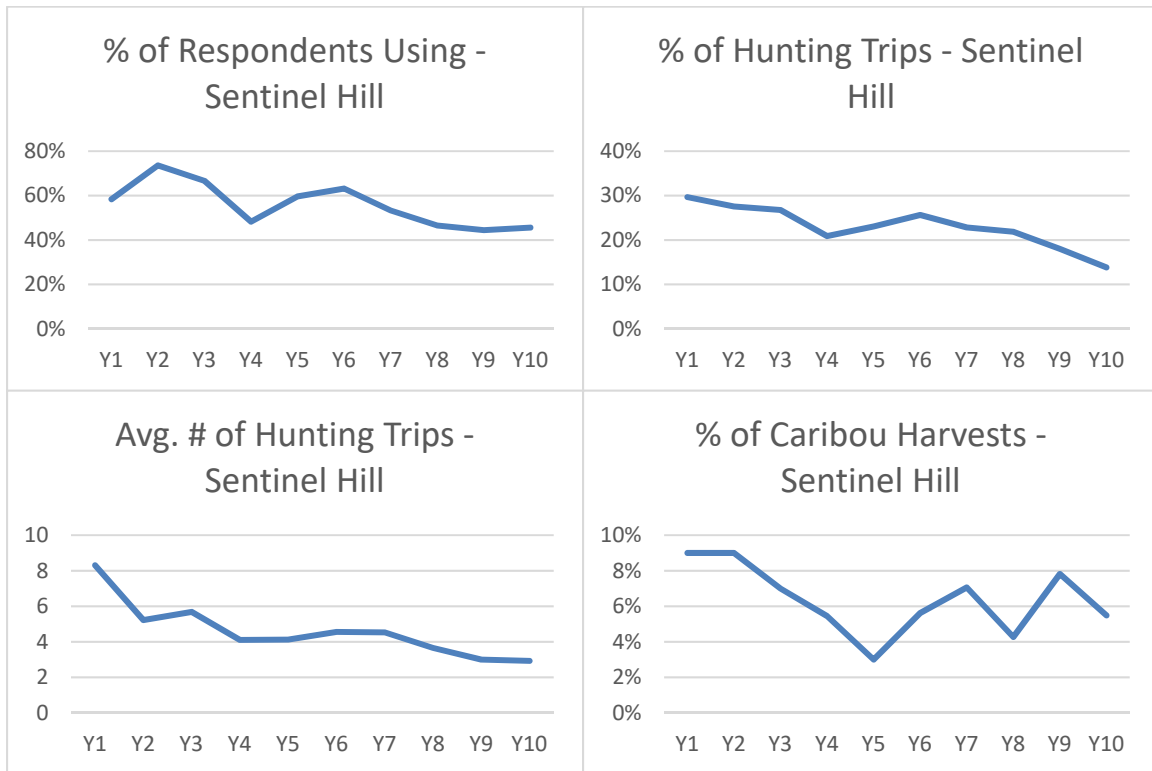


Sentinel Hill

The Sentinel Hill area (Map 39, Area 9) extends along the Colville River between the mouth of Kikiakrorak River and Sentinel Hill (or *Umiuraq*). *Umiuraq* is a traditional camping site for the community of Nuiqsut where several families have camp sites or cabins. Residents often use *Umiuraq* as a base for hunting farther upriver, particularly during the moose hunting season in August and September, which is also combined with caribou hunting and fishing. Nuiqsut hunters may also use the Sentinel Hill area in the winter months while hunting wolf and wolverine, in addition to caribou as needed.

While there has been relatively limited oil and gas exploration in the Sentinel Hill area, residents have reported increased air traffic in the area associated with scientific research and sport hunting guides. Use of the Sentinel Hill area has decreased somewhat over the 10 years of the monitoring study with a peak in use in Years 1 through 3, a decline in Year 4, and varying degrees of use between Years 5 and 10. Despite the decreased effort in the Sentinel Hill area, it remains an important hunting area, with over 40 percent of respondents using the area during each year of the monitoring study (Figure 26). In Year 10, respondents took an average of three caribou hunting trips to the Sentinel Hill area. The Sentinel Hill area has provided between three and eight percent of the total caribou harvest during individual study years; after a decline between Years 2 and 5, the area’s harvest contribution has remained relatively steady (Figure 26). Over the years, some respondents have reported traveling upriver beyond Ocean Point less often due to a lack of gas or transportation, a lack of time, environmental factors (e.g., unable to navigate due to shallow water) or due to a perceived lack of caribou farther upriver.

Figure 26: Use of Sentinel Hill Area Over Time



Colville River South

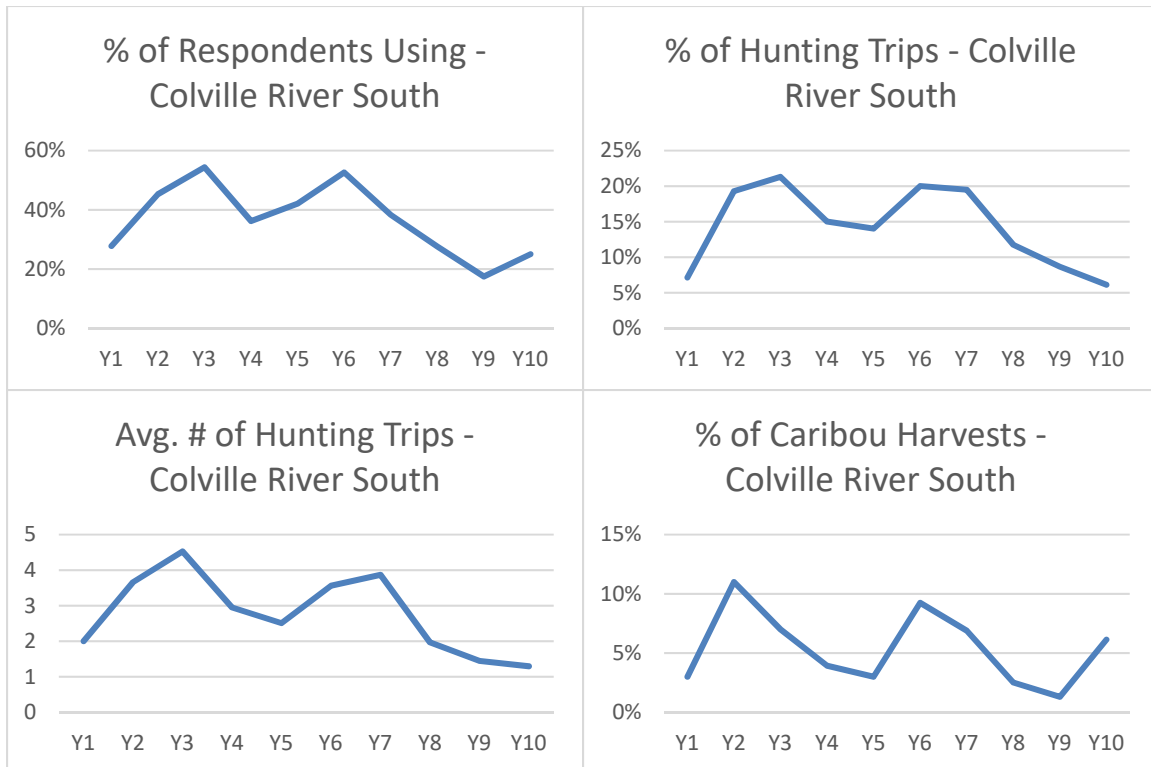
The Colville River South area extends along the Colville River from Sentinel Hill past Umiat, as well as along the Chandler and Anaktuvuk rivers (Map 39, Area 10). Use of the Colville River South area for caribou hunting is generally limited to the summer/fall months of July through September, with a particular emphasis on August and September when residents travel to the area for moose hunting. Caribou hunting in the Colville River South area occurs primarily by boat. However, for active hunters of wolf and wolverine, the area is also commonly used during the winter months of November through March. These individuals sometimes report harvesting caribou on these trips as needed. The Colville River South area includes several key areas for the community, including the Chandler River where some community residents have cabins or camp sites, *Uluksrak*, *Sivugak*, and the former Navy site at Umiat which now serves as a base for research and oil and gas exploration.

Over the 10 years of the monitoring study, residents have noted an increase in air traffic in the Colville River South area, particularly when the State of Alaska was researching a potential road corridor between the Dalton Highway and Umiat. Residents also report frequent air traffic in the area associated with hunting guides and recreational users. An ongoing concern in the Colville River South area is contamination associated with Navy dumpsites and abandoned wells. Residents have reported finding old drums floating downriver or appearing along eroded river banks. In some years, concerns associated with contamination have resulted in residents reducing harvests of species, such as burbot, which are believed to be contaminated.

Use of the Colville River South area is somewhat lower than use of the Ocean Point and Sentinel Hill areas, which are closer to the community of Nuiqsut. In the 10 years of the monitoring study, the percentage of respondents using the Colville River South area has been highly variable, ranging from 17 percent of respondents (in Year 9) to 54 percent of respondents (in Year 3) (Figure 27). Years 9 and 10 showed a decrease from previous years in the percentage of respondents using the area, as well as the number of trips

taken to the area (one, compared to between two and five in previous study years). Harvests in the Colville River South area have also varied widely across the 10 study years, accounting for between one and 11 percent of the total caribou harvest (Figure 27). Five percent of respondents have reported avoidance of the Upper Colville Area during at least one study year, citing environmental causes (e.g., shallow water) and personal reasons (e.g., lack of time or funds), contamination concerns at Umiat, and lack of caribou in the area.

Figure 27: Use of Colville River South Area Over Time



West of Nuiqsut

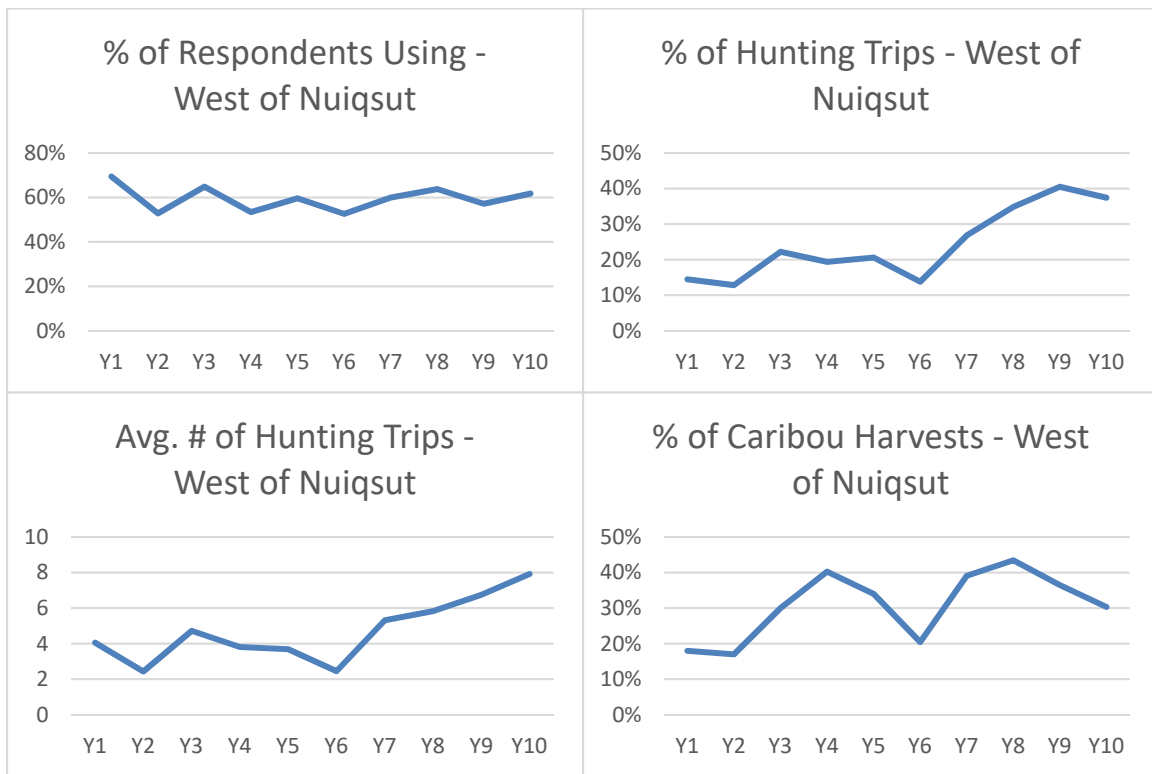
The West of Nuiqsut area (Map 39, Area 11) is bounded by the Nigliq Channel/Colville River in the east, Fish Creek/Judy Creek in the west, and Ocean Point in the south, and includes the community of Nuiqsut. The area is accessed primarily by four-wheeler in the summer/fall and snowmachine in the winter months. Since Year 8 (2014/2015), use of road vehicles has increased within the West of Nuiqsut area due to construction of the Kuukpik-owned Spur road and subsequent construction of the roads to CD5 and GMT1. Construction of these roads has also increased access into the area during times when snowmachine or four-wheeler travel were less ideal or for individuals who do not have access to overland modes of transportation. The West of Nuiqsut area has traditionally been a key hunting area for caribou. Elders have described the importance of this area to the annual caribou harvest, noting that the Teshekpuk and Central Arctic herds sometimes comingle in this area during the fall after having migrated from the west (Teshekpuk) and east (Central Arctic) in the summer.

Various changes have occurred to the West of Nuiqsut area over the 10 years of the monitoring study. Oil and gas exploration occurred west of Nuiqsut beginning in 1998, a number of years before development began, bringing with it impacts related to helicopter and airplane traffic, as well as seismic activities. Construction of the Kuukpik Spur road, in addition to initial construction of CPAI’s CD5 project, began in Year 7. Construction of CD5 and associated roads, pads, and bridges (including the Nigliq Bridge) was completed in Year 8. Construction of GMT1 began in Year 9 and the GMT1 road was accessible to local

residents starting in Year 10. In addition to construction of the CD5 and GMT1 developments in the area West of Nuiqsut, exploration in that area and farther west has continued. In recent years, Nuiqsut caribou hunters have expressed concerns about the impacts of the CD5 and GMT1 roads on the availability of caribou closer to the community and have reported impacts related to the road and pipeline structures themselves (e.g., difficulty crossing roads, difficulty hunting due to the presence of pipelines). Many Nuiqsut hunters now use the Spur road, in addition to the CD5 and GMT1 roads, to hunt caribou. Some of these individuals view the road as a benefit, particularly if they previously had limited access to a boat, four-wheeler, or snowmachine. Others view use of the road as a necessity, indicating that the caribou are less available closer to the community due to hunting and traffic along the road, as well as the road structure itself. Finally, a number of respondents have reported that they do not use roads to hunt caribou, either due to personal feelings about road hunting (and its incompatibility with traditional hunting methods) or due to avoidance of industry in general.

Use of the West of Nuiqsut area, in terms of the percentage of respondents using, has remained relatively stable over the 10 study years, with between 53 and 69 percent of respondents using the area on an annual basis (Figure 28). While the percentage of respondents using the area has remained stable, the percentage and average number of hunting trips taken to the area has risen substantially since construction of the Spur, CD5, and GMT1 roads. In Years 1 and 2 of the monitoring study, hunting trips in the area West of Nuiqsut accounted for around 15 percent of all trips taken, whereas in Years 9 and 10, they accounted for around 40 percent.

Figure 28: Use of West of Nuiqsut Area Over Time



Much of the increase in trips to the area West of Nuiqsut can be explained by a corresponding increase in the number of road hunting trips. In Years 9 and 10, approximately 30 percent of caribou hunting trips occurred on roads (Table 57). The average number of hunting trips in the area West of Nuiqsut has doubled from four annual hunting trips in Year 1 to eight in Year 10. As noted above, while some individuals have reported avoidance of the area West of Nuiqsut or avoidance of associated areas (e.g., Spur road) (see Table 49), others have increased their use of the area due to the access provided by the Spur, CD5, and GMT1

roads. In terms of harvest amounts, the area West of Nuiqsut has been one of the most productive areas across the 10 study years, providing between 17 and 36 percent of the caribou harvest. In general, the area has shown an upward trend in harvests with annual variation (Figure 28).

Table 57: Data on Road Use, Years 8 through 10

Road Use	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
% of Respondents Using Roads								33%	46%	43%
% of Hunting Trips along Roads								16%	30%	28%
Avg. # of Hunting Trips on Roads								3	5	6

Stephen R. Braund & Associates, 2019.

Other

The Other area includes all areas outside the 11 hunting area groups shown on Map 39. The Other area is accessed primarily by snowmachine in the winter months; however, residents may also access Other areas by boat, particularly those located farther upriver than depicted in the areas on Map 39. Primary uses of Other areas include winter furbearer (e.g., wolf and wolverine) and caribou hunting. Caribou are sometimes secondary targets during wolf and wolverine hunts. Snowmachine hunting areas generally occur to the west of the community toward the Fish and Judy creeks in addition to Teshekpuk Lake; southwest of the community in an area surrounding the Kikiakrorak and Kogosukruk rivers and toward Umiat; and southeast of the community in an area surrounding the Itkillik River and sometimes extending to the Kuparuk River. While the Other area may not be part of Nuiqsut’s core caribou hunting area on an annual basis, it is still an important source of caribou for the community, particularly during years when residents experience reduced success during the summer/fall hunt.

Various changes have occurred in Other areas over the 10 years of the monitoring study. Oil and gas exploration and development has continued to occur east of the Colville River Delta as well as expanding west into the NPR-A and toward Teshekpuk Lake. Exploration to the south of the community, including research on a proposed road to Umiat which would facilitate oil and gas exploration in that area, has also occurred over the last 10 years.

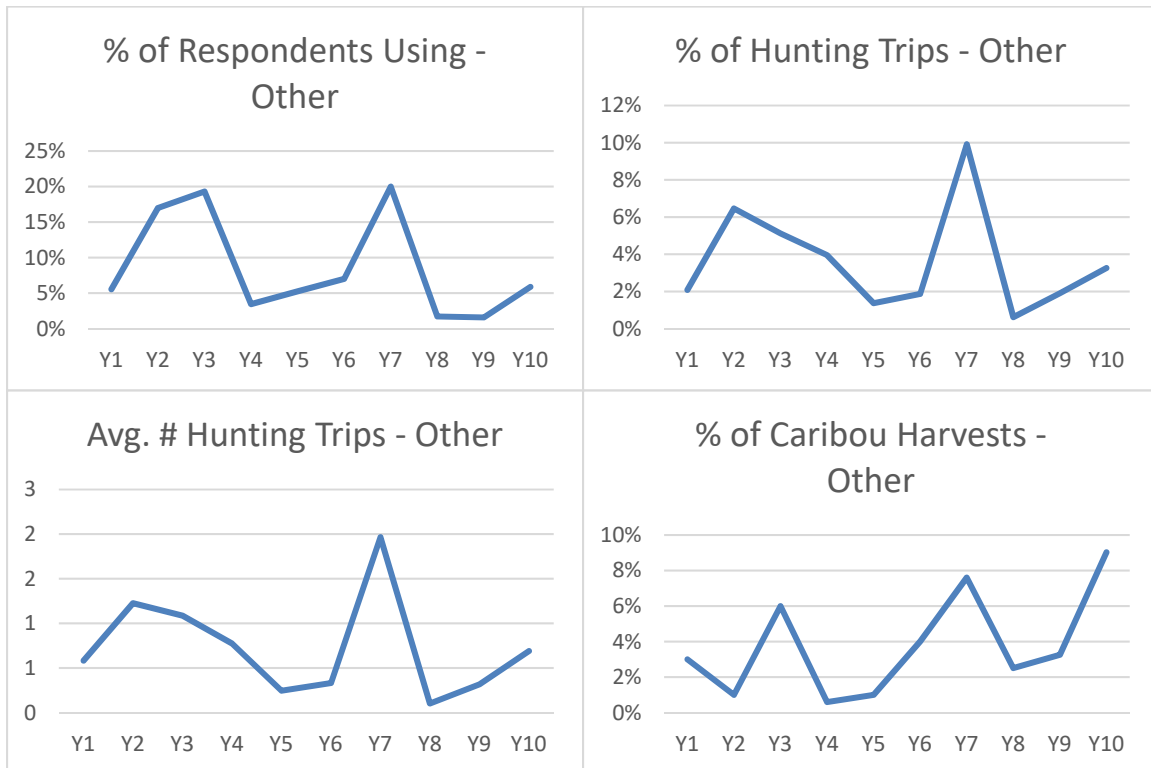
Use of Other areas, in terms of the percentage of respondents using, has varied over the 10 study years, with between two and 20 percent of respondents using the area on an annual basis (Figure 29). The percentage and average number of hunting trips taken to the area has also varied over the 10 study years, with a peak in Year 7. Years 9 and 10 show a slight increase over a low in use of the Other area in Year 8. In addition, the Other area has shown a slight upward trend in harvests with considerable annual variation (Figure 29).

Summary

While annual variation in the use of different hunting areas is a natural response to yearly changes in resource distribution/migration and weather and terrain conditions, longer-term changes may also occur in response to outside forces such as development and human activity. In the longer term, subsistence use area data and observations from local hunters clearly indicate a shift since the 1970s away from heavily developed areas near Prudhoe Bay. In addition, more recent caribou subsistence use areas (2008-2017) show more constricted overland uses when compared to the expansive overland uses reported in a 1995-2006 time period. While the smaller use areas may be due in part to methodological differences (i.e., documenting one-year use areas for a single resource vs. documenting where hunters went over 10 years for various different resources), it may also be a product of the increasing use of four-wheelers and trucks and the decreasing use of snowmachines in recent years. Smaller changes in the use of hunting areas, beyond annual variation, are also evident in comparison of hunting patterns over time. These changes

include decreased use of a number of areas, including Nigliq Channel, Fish Creek, Coastal West, and Colville River South, and increased use of areas to the area West of Nuiqsut and a recent increase in use of the Itkillik River area. These changes are likely due to a combination of factors, including hunter avoidance of areas associated with development, increased access to areas west of the community via gravel roads, changes in the distribution or availability of caribou within hunting areas, environmental changes, and changes in community hunting patterns resulting from changes in primary modes of transportation. Despite the change in traditional hunting patterns and the decreased use of certain areas, the community has maintained its harvests of caribou over time.

Figure 29: Use of Other Area Over Time



Characteristics of Hunting and Harvesting Activities

Timing of Subsistence Activities

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.”

An analysis of data on the timing of caribou hunting/harvesting activities since the 1970s is provided in Table 58. Data from the 1970s show caribou hunting activities spread throughout the year with moderate to high activity year-round, and high activity concentrated in the months of March to June, August to October, and December. Beginning in the 1990s, data on the timing of subsistence activities show a shift to a more concentrated hunting pattern, with peak hunting activities in July and August, moderate activity in June and September to October, and limited activity at all other times of the year. Figure 30 compares timing data from two more recent time periods: 1995-2006 (SRB&A 2010b) and 2008-2017. The figure shows that while the overall timing of subsistence activities peaks at similar times (June through September), more recent data for the 2008-2017 period show less activity between the months of October through May. Data on the percentage of caribou harvests reflect a similar pattern, with the vast majority of caribou harvested during the months of June through September (Figure 2; Braem et al. 2011). In terms of harvester participation, the percentage of respondents hunting during the winter months has decreased substantially in recent years, while, the percentage of respondents hunting in the months of June and July has increased. During the 2008-2017 time period, over 90 percent of respondents reported hunting in the months of June and July (Figure 31). The decrease in winter hunting corresponds with a decrease in use of snowmachines in recent years (see “Travel Method,” below). Reasons for decreased winter hunting could include reduced snow cover resulting in less suitable conditions for snowmachine travel and changes in winter availability of caribou near the community; the last several years have show increased winter hunting and harvests, likely due to increased road access for caribou hunters.

Travel Method

Figure 32 shows the percentage of hunting trips by travel method over the 10 years of the caribou subsistence monitoring study. The data show that across all study years, the majority of caribou hunting trips have been taken by boat. However, the use of boat has decreased since Year 7, with the percentage of trips taken by truck and four-wheeler increasing. The increase in truck and ATV hunting trips corresponds with the introduction of gravel roads into the Nuiqsut area.

Figure 33 shows the percentage of use areas by transportation method for the 1995-2006 and 2008-2017 time periods and indicates a similar trend in terms of greater use of four-wheelers and trucks and lesser use of snowmachines in recent years. The percentage of respondents using different travel methods is shown in Figure 34. The figure shows a substantial decline in the use of snowmachines with a substantial increase in the use of four-wheelers and truck. Use of boat has remained steady at nearly 100 percent of respondents. To test a possible theory that the increasing use of ATVs and decreasing use of snowmachines is related to the aging out of older hunters and increasing engagement from younger hunters, particularly in the monitoring study, Table 59 shows the percentage of use areas by age group and travel method for the 10 study years combined. The data show that the use of various travel methods do not vary substantially by age group, aside from a slightly lower use of four-wheelers among those individuals born in the 1940s and 1950s compared to those born in the 1960s or later, and a slightly higher use of boats among individuals born in the 1940s and 1950s.

Table 58: Timing of Caribou Hunting and Harvesting Activities, 1970s through 2010s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1960s	No Data											
1970s	[Shaded cells indicating activity]											
1980s	No Data											
1990s	[Shaded cells indicating activity]											
2000s	[Shaded cells indicating activity]											
2010s	[Shaded cells indicating activity]											
	Sources:	1970s show data from Brown 1979 (pre-1975); Hoffman et al. 1988 (pre-1975); Libbey et al. 1979 (pre-1975). 1990s show data from Fuller and George 1999 (1992); Brower and Hepa 1998a (1994-95); Bacon et al. 2009 (1995-96); SRB&A 2010b (1995-2005). 2000s show data from Bacon et al. 2009 (2000-01); Braem et al. 2011 (2002-03, 2003-04, 2004-05, 2005-06, 2006-07); EDAW Inc. 2008 (2004); SRB&A 2010b (1995-2005); SRB&A 2018 (2008, 2009). 2010s show data from Brown et al. 2016 (2014); SRB&A 2019 (2010-2017)										
		Limited activity and/or harvests										
		Moderate activity and/or harvests										
		High activity and/or harvests										

Stephen R. Braund & Associates, 2019.

Figure 30: Percentage of Caribou Use Areas by Month, 1995-2006 and 2008-2017

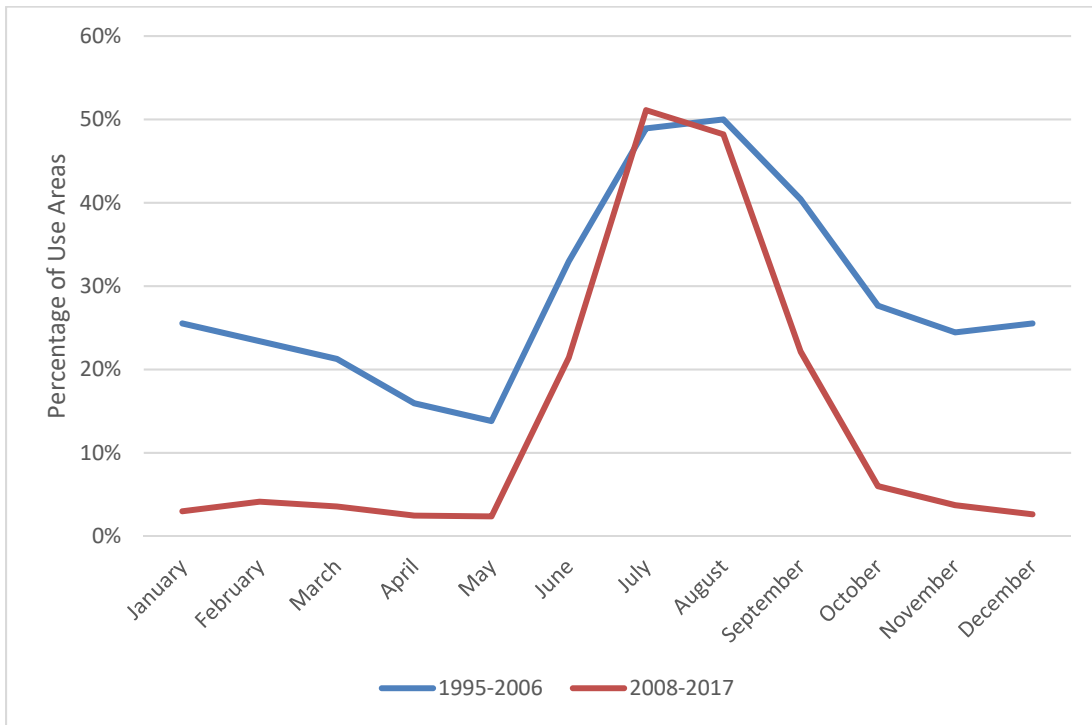


Figure 31: Percentage of Respondents Reporting Hunting Activity by Month, 1995-2006 and 2008-2017

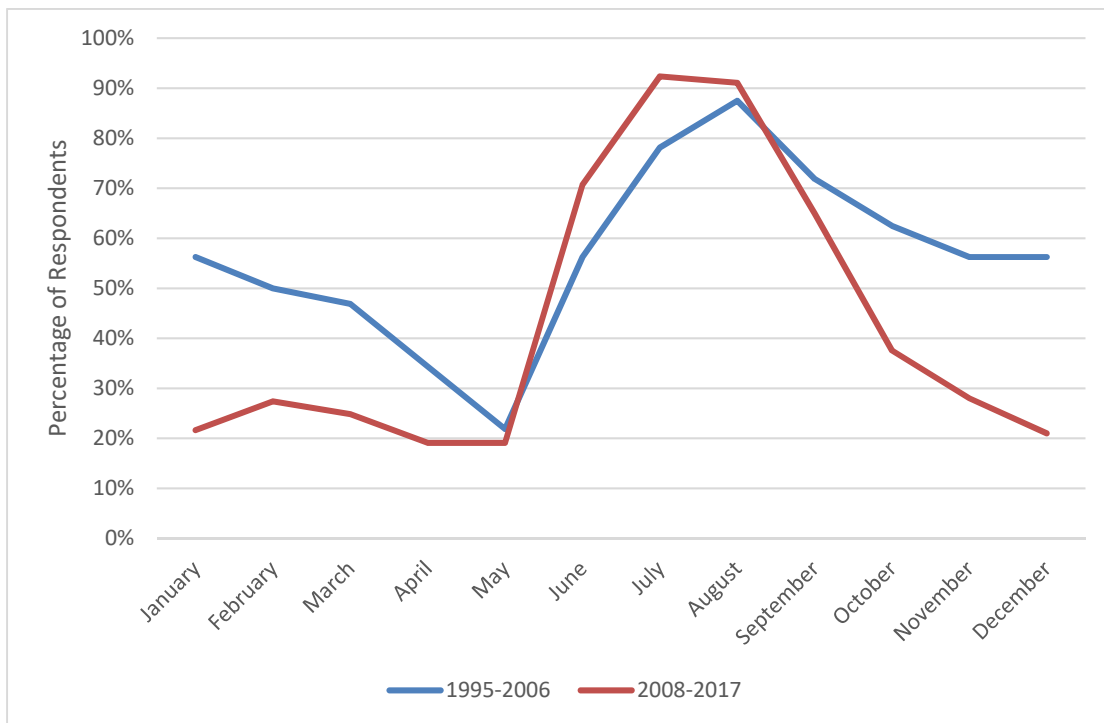


Figure 32: Percentage of Caribou Hunting Trips by Travel Method

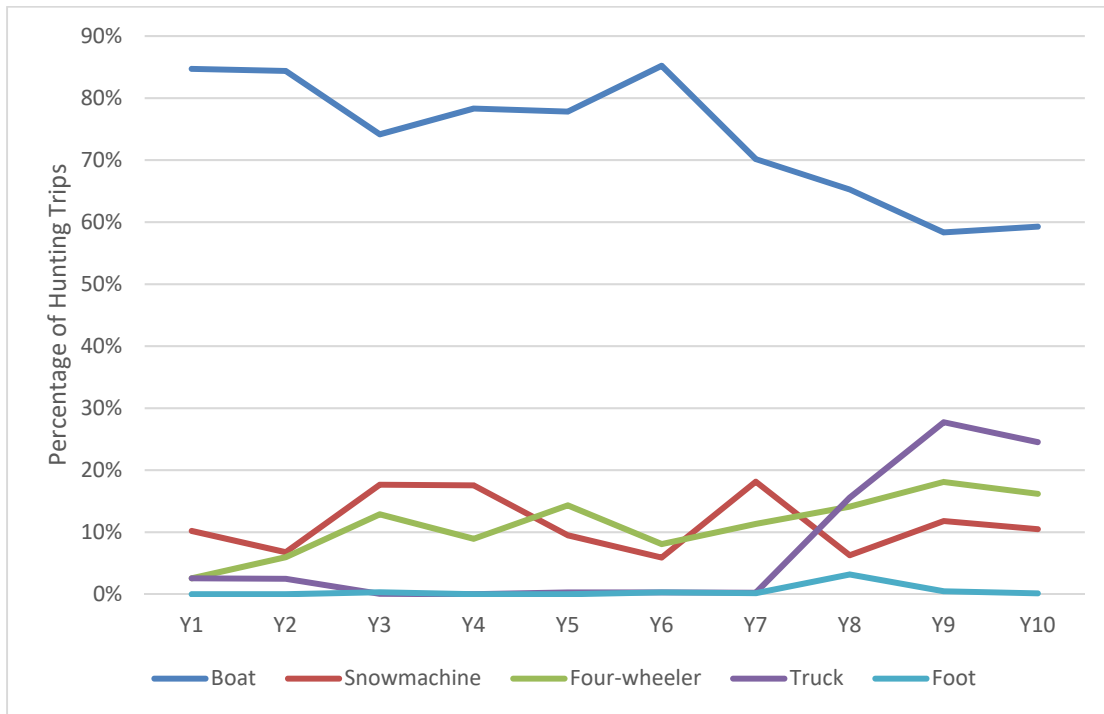


Figure 33: Percentage of Use Areas by Transportation Method, 1995-2006 and 2008-2017

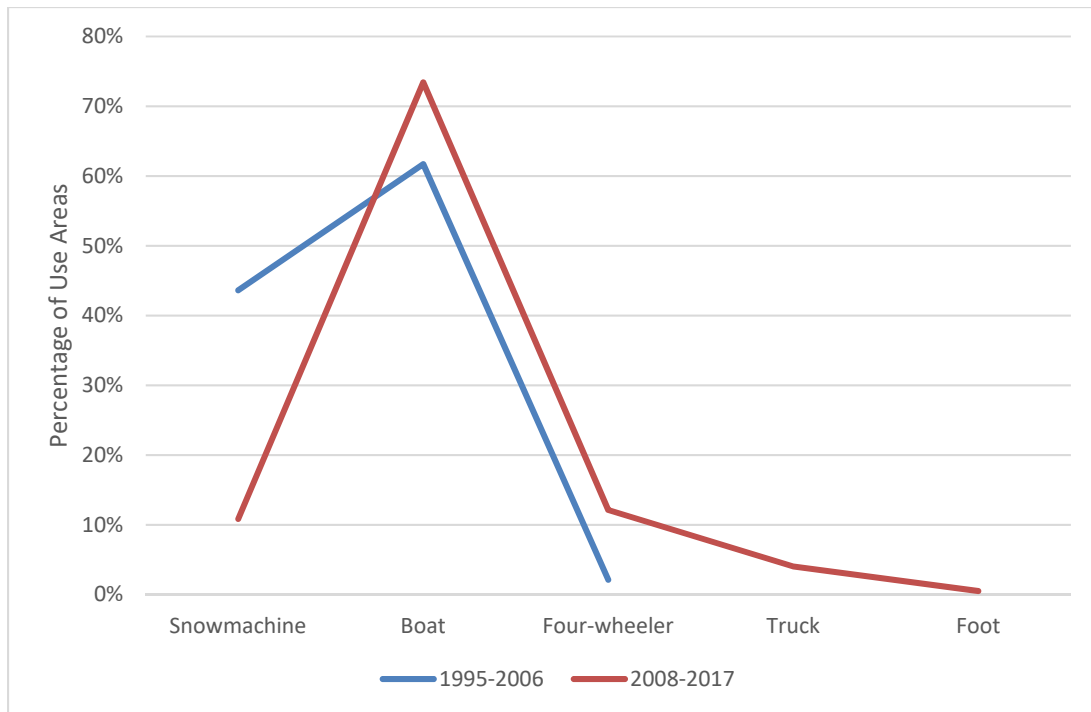


Figure 34: Percentage of Respondents Using Transportation Method, 1995-2006 and 2008-2017

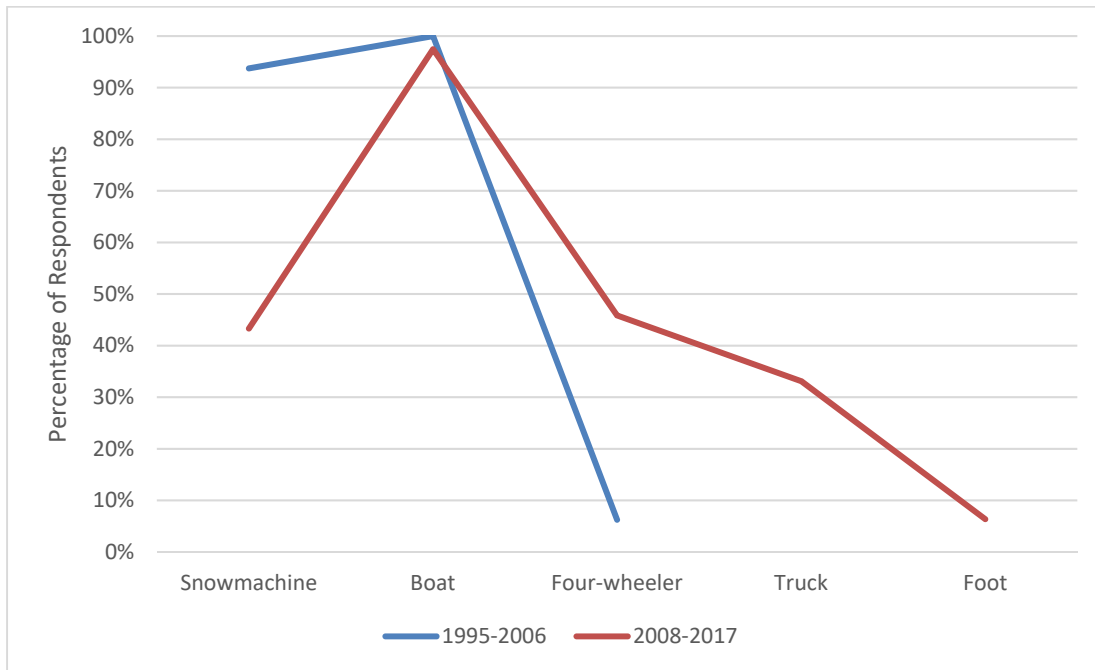


Table 59: Percentage of Use Areas by Travel Method and Age Range

Decade Born	Percentage of Use Areas				
	Boat	Snowmachine	Four-wheeler	Truck	Foot
1940s	85%	11%	4%	0%	0%
1950s	83%	9%	6%	2%	0%
1960s	74%	14%	10%	4%	0%
1970s	75%	12%	8%	5%	0%
1980s	69%	10%	17%	5%	1%
1990s	72%	10%	14%	5%	1%
2000s	83%	8%	8%	0%	0%

Stephen R. Braund & Associates, 2019.

Braem et al. (2012) documents the percentage of households using specific travel methods for caribou hunting during each study year between 2003-2007. The data show a possible decrease in snowmachine use starting in 2005-06, with between 56 and 69 percent of households using snowmachines in 2003-2005 and between 17 percent and 36 percent from 2005-2007. These data also show an increase in ATV use during those same study years, from around four percent during the 2003-2005 study years to 4.3 percent in 2006 and 12 percent in 2007 (Braem et al. 2011, Appendix J). This is consistent with the decreasing use of snowmachines and increasing use of ATVs documented over the 10 years of the monitoring study.

Harvest Success

Harvest success can be measured in a variety of ways, including through qualitative descriptions by harvesters (i.e., harvester perceptions of success), total number of caribou harvested by a community, effort (e.g., number of trips) per harvest unit, the number of caribou harvested by area, and the percentage of households/harvesters reporting successful harvests. This section provides an overview of harvest success over time using several of these metrics.

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)

Characterizations of harvest success and caribou availability within Nuiqsut hunting areas are notably different in recent years. Residents frequently report difficulty locating caribou within their hunting areas and indicate that they spend longer hunting or travel farther to find caribou. As discussed above (“Hunting Areas and Harvest Locations”), while subsistence use area maps may seem to conflict with reports of traveling farther to harvest caribou due to the outer extent of use areas being smaller, increased effort in terms of distance traveled or effort expended may not be reflected in the extent of use areas. Instead,

residents may cover more miles within their usual hunting areas when traveling by boat or four-wheeler. While the number of caribou harvested by the community has remained stable over time (see Table 18), overall community success in terms of number harvested does not necessarily capture individual harvest success. For example, while the community may continue to harvest similar levels of caribou, individual harvesters may spend more time hunting caribou or a larger proportion of harvests may be concentrated among a smaller group of super harvesters. In some years, certain particularly active harvesters have indicated a need to increase their harvest due to decreased hunting success by other, less active households.

Table 60 shows a possible measure of hunting success in terms of harvest amounts and frequency of hunting trips (i.e., effort per caribou harvested). The average number of trips taken per harvested caribou has varied over the 10 years of the monitoring study, although Year 10 shows the highest number of trips per caribou (i.e., the lowest harvest success per trip), at 4.6 compared to between 2.2 and 3.7 during all previous study years. It is important to note that this measure does not take into account the duration of hunting trips; thus, it is possible that while data reflect an increase in number of trips per successful harvest, the duration of those trips may have decreased (e.g., a greater frequency of shorter trips taken due to the accessibility of the road). In terms of the percentage of use areas in which respondents report a successful harvest, the data show annual variation in all of the 12 hunting area groups over the 10 study years (Table 61). Of the areas commonly used by respondents, the areas upriver from the community (e.g., Ocean Point, Sentinel Hill, Colville River South), in addition to the area West of Nuiqsut, show the highest percentage of successful use areas.

Table 60: Caribou Harvest Success: Harvest Trips and Number of Caribou

Harvest Success Variables	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Average # Caribou Harvested Per Trip	0.37	0.28	0.30	0.29	0.34	0.27	0.46	0.41	0.29	0.22	0.32
Average # of Trips to Harvest a Caribou	2.7	3.6	3.3	3.4	2.9	3.7	2.2	2.4	3.4	4.6	3.1

Stephen R. Braund & Associates, 2019.

Table 61: Percentage of Successful Use Areas by Hunting Area

Hunting Area	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Nigliq Channel	89%	38%	55%	53%	61%	54%	45%	52%	40%	53%	53%
East Channel Colville	76%	70%	59%	54%	74%	53%	59%	79%	47%	38%	60%
Other Colville Delta	0%	50%	100%	100%	100%	100%	0%	-	-	0%	71%
Fish Creek	60%	61%	27%	27%	50%	35%	58%	63%	75%	50%	49%
Coastal West	50%	0%	14%	0%	60%	25%	0%	-	0%	-	19%
Coastal East	50%	100%	40%	50%	100%	0%	33%	50%	29%	0%	46%
Itkillik River	80%	43%	34%	55%	35%	50%	55%	74%	61%	64%	54%
Ocean Point	96%	85%	76%	65%	68%	60%	71%	66%	62%	56%	69%
Sentinel Hill	95%	88%	81%	64%	70%	58%	79%	72%	66%	68%	74%
Colville River South	90%	88%	84%	52%	71%	52%	83%	75%	73%	59%	72%
West of Nuiqsut	74%	77%	70%	71%	70%	69%	76%	70%	63%	69%	71%
Other	100%	56%	83%	33%	0%	80%	83%	100%	100%	100%	74%
Any Area	78%	61%	58%	55%	64%	54%	61%	65%	53%	57%	60%
Total Use Areas	107	114	125	107	134	106	125	100	104	133	1,155

Stephen R. Braund & Associates, 2019.

Table 62 specifically shows the percentage of successful use areas along the road system (for Years 8 through 10), which ranges from 55 percent to 67 percent. The percentage of active harvester respondents reporting successful harvests of at least one caribou has remained relatively stable over time, at between 80 and 100 percent of respondents (Table 63). Years 8 and 9 were on the low end of successful harvesters, at 84 and 86 percent, respectively, while in Year 10, 91 percent of respondents reported harvesting one or more caribou. Year 1 shows the highest percentage of respondents (100 percent) successfully harvesting caribou.

Table 62: Percentage of Successful Use Areas, Roads

Road Success	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	All Years
Roads								55%	67%	65%	
Total Use Areas								20	33	34	

Stephen R. Braund & Associates, 2019.

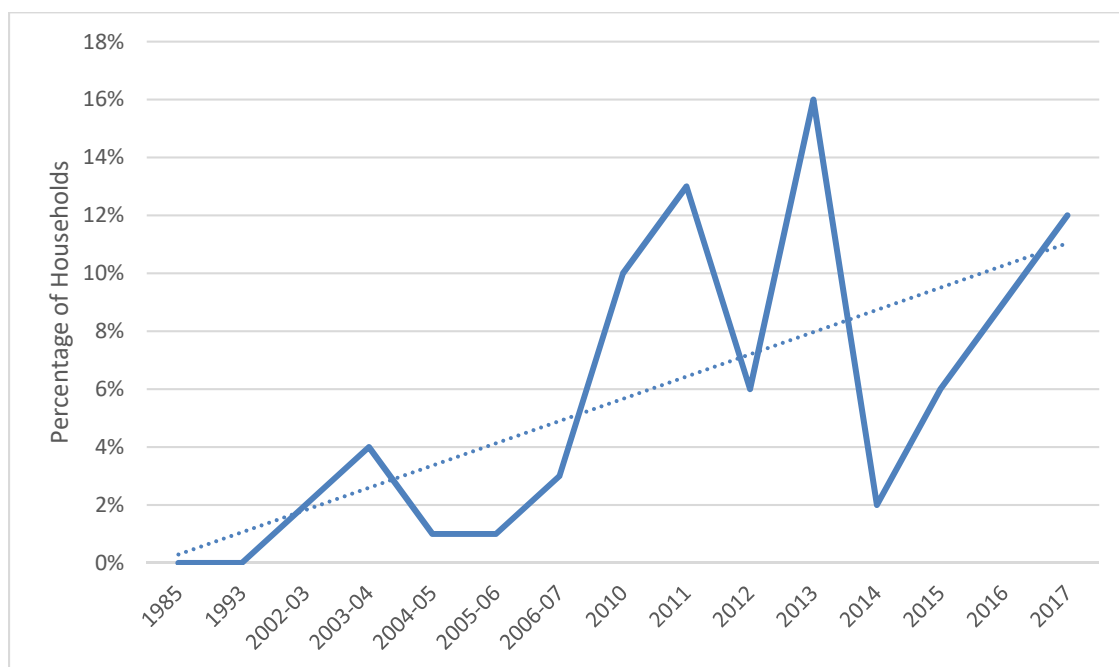
Table 63: Percentage of Respondents Reporting Successful Harvests

Harvester Success Variables	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	At Least 1 Year
Successful Harvesters	100%	85%	95%	93%	93%	88%	95%	84%	86%	91%	94%
Number of Harvesters	36	53	57	58	57	57	60	58	63	68	157

Stephen R. Braund & Associates, 2019.

Data from the household harvest surveys provide a similar metric of success, but at the household level (See Table 18; Figure 35). The data show an increase in the percentage of unsuccessful households starting in 2010. Prior to 2010, the percentage of unsuccessful households ranged from zero to four percent. Starting in 2010, the percentage of unsuccessful households has ranged from two to 16 percent. Despite the increase in unsuccessful households, overall harvest numbers have remained stable. These data suggest an increasing concentration of harvests within a smaller proportion of households (see below, Harvest Amounts).

Figure 35: Percentage of Unsuccessful Caribou Hunting Households, Available Study Years



Herd Characteristics

As discussed in Prichard et al. (2018), the primary herds that occur within the Colville River drainage are the Teshekpuk Herd (TH) and Central Arctic Herd (CAH). The Colville River Delta is generally on the eastern periphery of the TH and the western periphery of the CAH. The TH caribou winter on the coastal plain, usually to the west of the Colville River, while the CAH generally winters south of the Brooks Range (outside of Nuiqsut's general hunting area), which explains the focus of winter hunting to the west and southwest of the community. In some recent years, TH caribou have wintered farther to the south and east of the community (Prichard et al. 2018). Both the TH and CAH populations grew steadily until around 2010, after which both herds experienced a substantial decline. Surveys after 2015 have since shown a modest increase in the TH and CAH populations. VHF, Satellite, and GPS collar data show that the Colville River Delta primarily sees caribou from the CAH, whereas the area west of the Colville River (and community) primarily sees TH caribou. However, both herds sometimes travel to the west and east of the Colville River.

The timing of the caribou hunt in Nuiqsut generally coincides with the primary movements of both herds into the area. Winter (December through April) is spent hunting TH caribou in their wintering grounds to the west and southwest of the community, although hunters have often indicated over the course of the monitoring study that the herd is farther west than they want to travel. Limited caribou hunting occurs during the spring (May and early June) when the caribou are migrating to calving grounds west and east of the delta; community members are generally busy hunting geese at this time. In addition, travel conditions are sometimes a limiting factor in the spring due to melting snow and inaccessible rivers. During the mosquito season (late June through early July), the caribou from the two herds move to coastal areas to the west and east of the community, with some CAH caribou traveling into the delta where residents hunt them by boat; when available, residents can sometimes find large herds along the East Channel. While communities traditionally hunted in coastal areas west of the delta during this insect relief season, residents note that these coastal areas (e.g., Atigaru Pt. and Cape Halkett) have been difficult to access in recent years due to sedimentation along the coast. The oestrid fly season (July and early August) brings larger numbers of caribou from both herds into the community's primary hunting area along the Colville River (including the delta), and this coincides with the community's peak hunting and boating season. In late summer (August through mid-September), the TH caribou remain to the west of the community as well as along the upper Colville River. Some CAH caribou continue to move into the upper portions of the river. This season coincides with increased overland hunting (by four-wheeler) to the west of the community and increased effort upriver from the community, particularly in combination with moose hunting. During the fall migration (mid-September through November), overland hunting intensifies with the migration of TH caribou into areas to the west of the community (Prichard et al. 2018; Figures 8 and 9). Overall, TH caribou are more frequently available within the community of Nuiqsut's current hunting area.

Figure 36 shows the average hunter-estimated size of caribou groups associated with Nuiqsut caribou harvests by month. The figure shows that the average herd size peaks at over 90 animals in July, with all other months average at less than 30 caribou. Thus, based on hunter experiences, caribou are most concentrated during the month of July, and scattered into smaller groups during all other months. The community primarily harvests male caribou with some variations by month (Figure 37). The months of March and November (when males are rutting) are the only months where female caribou are harvested in equal or greater quantities than males.

Figure 36: Average Herd Size of Harvested Caribou by Month, 2008-2017

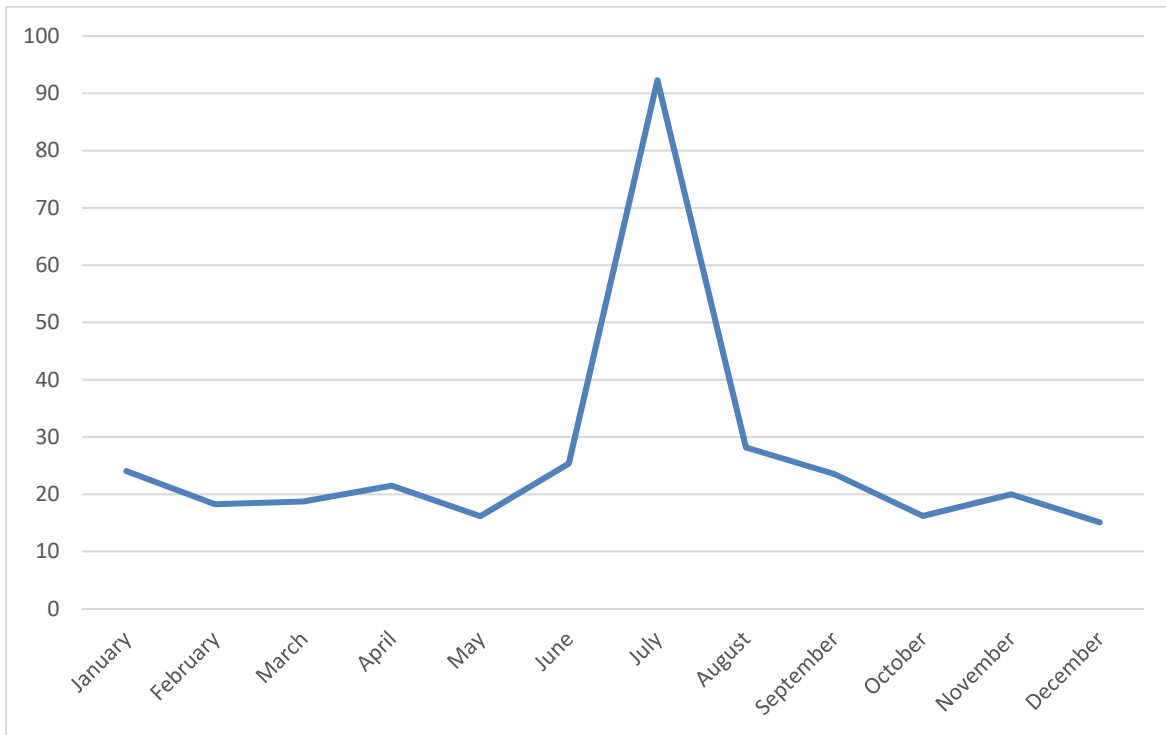
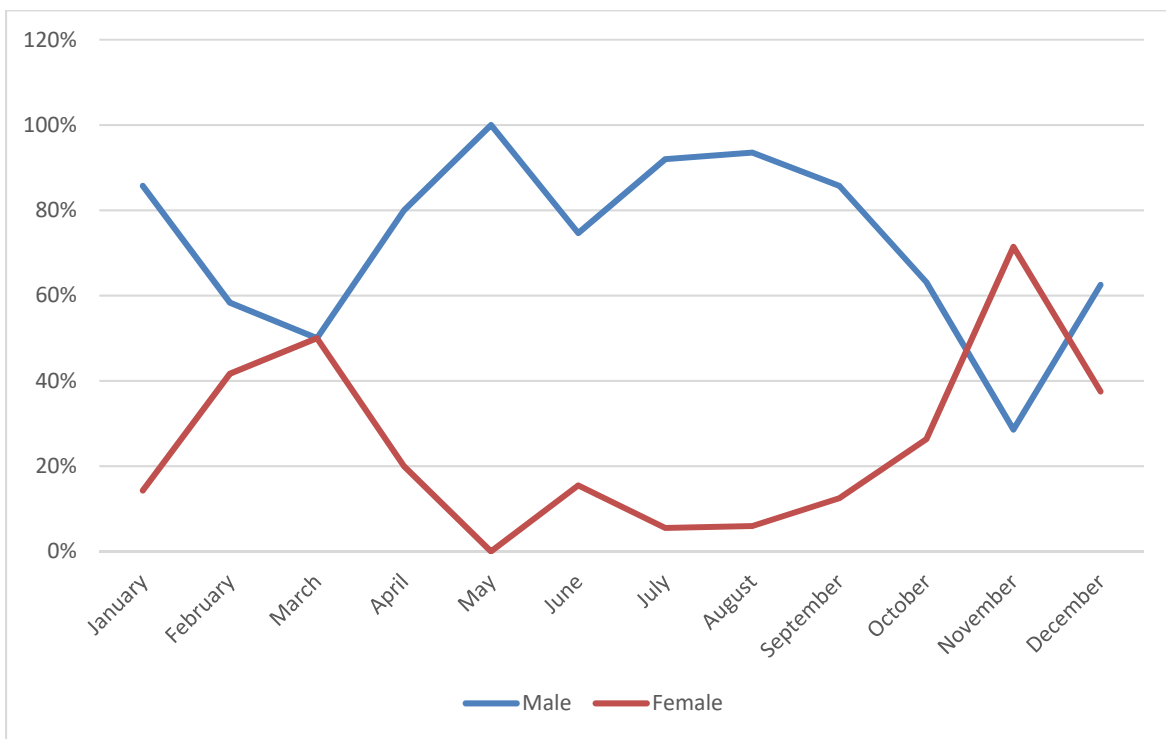


Figure 37: Percentage of Caribou Harvests by Month and Sex, 2008-2017



Harvest Amounts

Throughout the 10 years of the Nuiqsut Caribou Subsistence Monitoring Project, overall community harvests have remained strong, despite community reports of increased difficulty harvesting caribou and, according to some metrics, decreased harvests success rates (e.g., an increase in the average number of hunting trips [effort] per harvested caribou). As shown in Figure 38, per capita harvests of caribou have varied over time but overall has remained relatively stable. While the trendline indicates a slight increase in per capita harvests, when taking confidence intervals into account (which are only available for years 2003 through 2017), harvests appear relatively stable at between 100 and 200 pounds per capita annually. Figure 39 shows the contribution of key Nuiqsut resources to the subsistence harvest during available study years between 1985 and 2014. In the context of other resource harvests, caribou harvests have contributed between 22 percent and 38 percent of the annual harvest across study years with available data (since 1985); during the most recent study year (2014), caribou contributed 28 percent of the total subsistence harvest. While the contribution of caribou toward the total harvest has remained somewhat stable, the contribution of bowhead whale has risen since 1985, while the contribution of other key resources such as Arctic cisco and broad whitefish, has declined slightly over time.

Figure 40 shows the percentage of households harvesting more, less, and the same amount of caribou compared to the previous study year. The analysis includes only households which participated in two consecutive years of the household surveys (and for which comparison is possible). The data show that the percentage of households harvesting more or less caribou generally reflects an increase or decrease in per capita harvests during a given year. For example, 2011 and 2016 both show a low point in per capita harvests and these years also show the greatest percentage of households harvesting fewer caribou compared to the previous study year. In four of six study years, a greater percentage of households harvested more caribou than harvested less.

Figure 38: Nuiqsut Per Capita Harvests of Caribou, 1985-2017

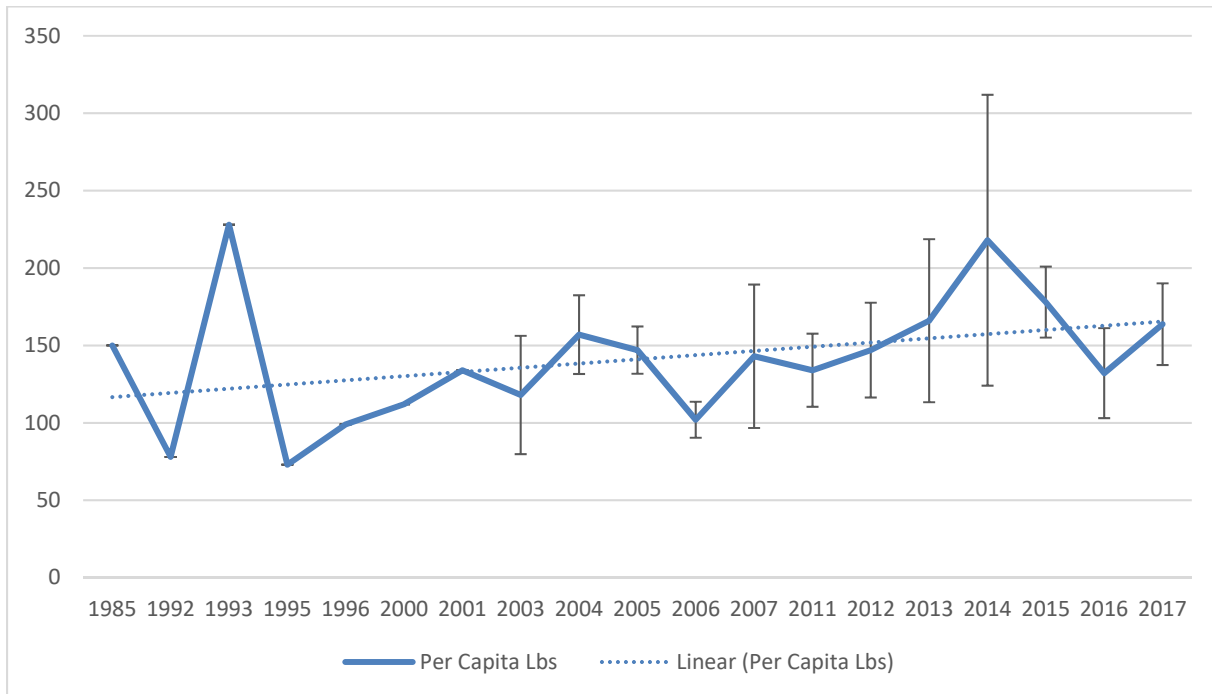


Figure 39: Nuiqsut Resource Contribution, Key Resources, 1985-2014

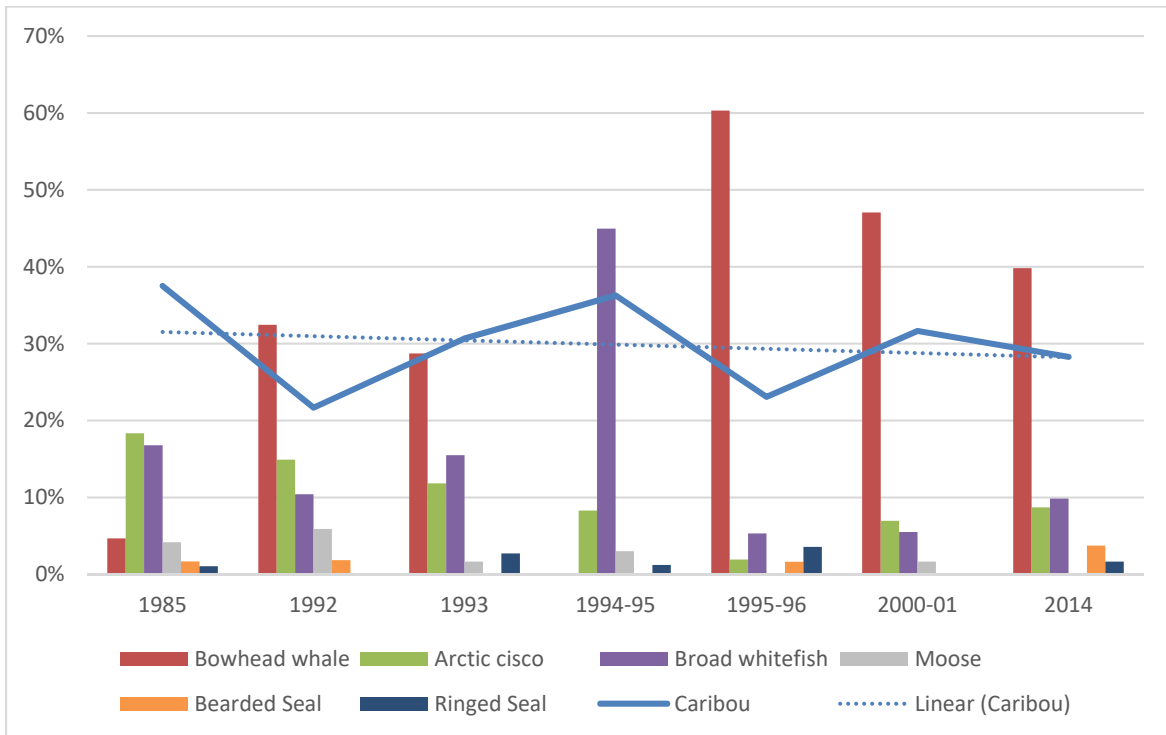
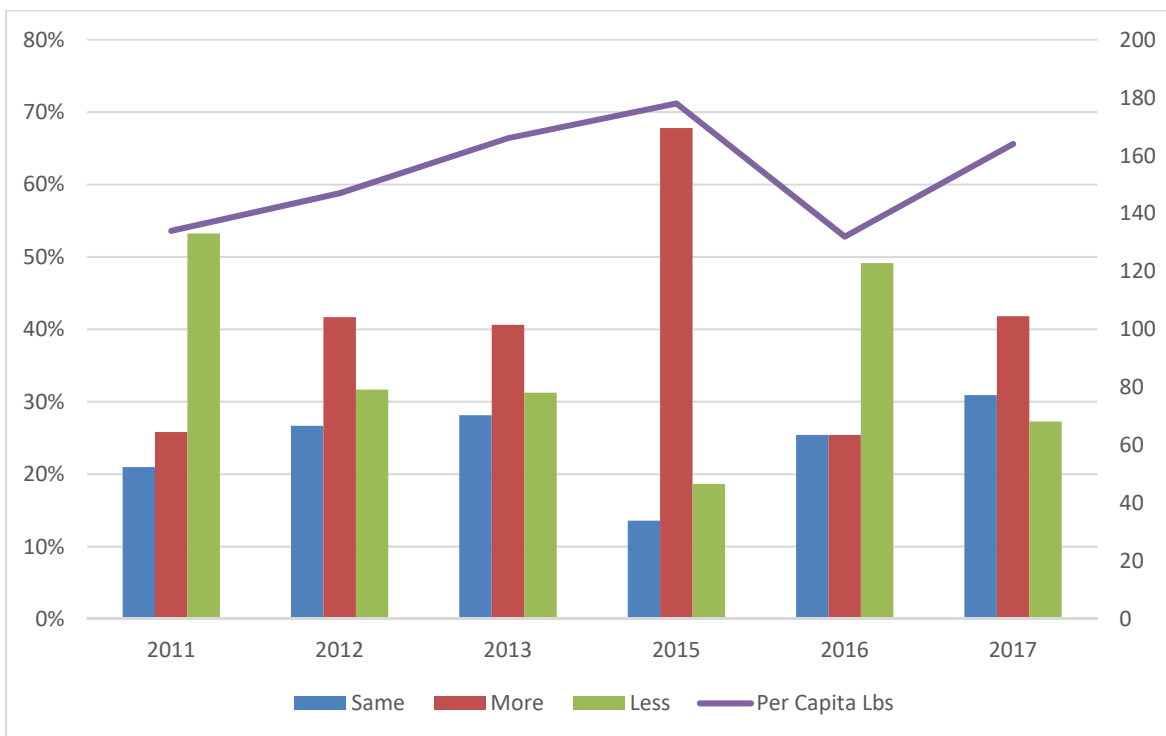


Figure 40: Previous Year Household Harvest Comparison, Caribou, 2011-2017



The concept of “super-harvesters” or “super-households” was first examined by Wolfe (1987) who posited that in rural Alaska communities a majority of subsistence foods (about 70 percent) are harvested by a smaller set (about 30 percent) of households and distributed throughout the community. Such a pattern, referred to as the “30-70” rule, has been replicated in various studies since the 1980s. More recently, Wolfe et al. (2009) conducted an analysis of subsistence harvest data for 67 rural Alaskan communities, including eight Iñupiaq communities (although none on the North Slope). His analysis found that harvests are even more concentrated for individual resource categories. For example, while the top third of households contributed 76 percent of the total subsistence harvest (74.3 percent among the Iñupiat); for big game, the percentage harvested by the top third of households rose to 87.9 percent (81.5 percent among the Iñupiat). An analysis of Nuiqsut caribou harvest data shows the top third of households contributing between 75 percent and 89 percent of the caribou harvest across available study years between 2010 and 2017, with the bottom third harvesting between zero and two percent (Table 64).

Table 64: Nuiqsut Household Contribution to Caribou Harvest

Study Year	Contribution to Community Caribou Harvest		
	Top Third	Middle Third	Bottom Third
2010	75%	23%	2%
2011	86%	14%	0%
2012	84%	16%	0%
2013	89%	11%	0%
2015	76%	21%	2%
2016	82%	18%	0%
2017	89%	11%	0%

Stephen R. Braund & Associates, 2019.

Overall, there has been no discernible change in the distribution of caribou harvests among the top third, middle third, and bottom third of households between 2010 and 2017. Kofinas et al. (2016) notes that “super-household” status is somewhat flexible and may change over time to various factors including employment, age, health, income, and resource availability. The report also notes that a large-scale change in resource availability or employment levels could cause sudden shifts in the role of super-households in a community which could have more widespread effects on a community’s subsistence food sources. Thus, documenting the contribution of individual households to the overall subsistence harvest may be a key monitoring component in the future.

Impacts on Harvesting Activities

The primary method for documenting the impacts of Alpine and Alpine Satellites Developments on Nuiqsut caribou harvesting activities has been through self-reports by active harvesters. Certain impacts, such as changes in use of traditional use areas, decreased or increased subsistence effort, and changes in harvesting success or resource availability can be measured through other variables but are more difficult to attribute to a specific development (or non-development) activity. Thus, the most direct way of measuring the impacts of oil and gas development on subsistence users is by documenting their own experiences.

The percentage of respondents who have reported experiencing Alpine-related impacts has varied across the 10 study years. Year 1 documented all impacts since construction of Alpine up to the Year 1 time period and therefore likely overstate the impacts experienced during that study year. From Years 2 through 10, the percentage of respondents experiencing impacts ranged from 27 percent (in Year 9) to 64 percent (in Year 2). Impact reports peaked in Years 2 and 3; Year 6; and again in Year 10 (Table 38). As shown in Table 65, 75 percent of respondents have reported experiencing impacts during at least one study year between 2008-2017. Because not every participant has participated in every study year, the percentage of harvesters

experiencing impacts over a 10 year period may actually be higher than 75 percent. The primary impacts reported across all study years were helicopter-related (57 percent), followed by man-made structures (42 percent), and plane traffic (31 percent) (Table 65).

Table 65: Percentage of Respondents Reporting Alpine-Related Impacts During at Least One Year, Years 1 through 10

Type of Impact	Percentage of Respondents
Helicopter	57%
Plane traffic	31%
Other traffic	23%
Oil company personnel	8%
Man-made Structures	42%
Regulations	8%
Seismic lines or activity	12%
Other	12%
Any impact	75%
No impact	25%
Total # of Respondents	128

Stephen R. Braund & Associates, 2019

Table 66 shows the percentage of respondents reporting impacts by decade of birth to determine whether impact perceptions or experiences vary by age group. Because the number of participants from the 1940s and 2000s age ranges are limited (i.e., a limited sample), this discussion focuses on individuals born between the 1950s and 1990s. There was no discernible trend in terms of age group and likelihood to report impacts. Respondents born in the 1950s were the least likely to have reported an impact during one or more years (33 percent of respondents) while respondents born in the 1970s were the most likely to have reported an impact (56 percent). For individuals born in the 1960s, 1980s, and 1990s, approximately 40 percent of harvesters reported experiencing an impact on their caribou hunting during at least one year.

Table 66: Percentage of Respondents Reporting Alpine-Related Impacts, by Age Group

Decade of Birth	Reporting Impacts in at Least One Year
1940s	100%
1950s	33%
1960s	43%
1970s	56%
1980s	40%
1990s	40%
2000s	100%
Total # of Respondents	128

Stephen R. Braund & Associates, 2019

Household harvest surveys also documented whether household members experienced impacts on their caribou hunting associated with the Alpine/Alpine Satellites developments. While the types of impacts were not cued, the responses of interviewed households were recorded on survey forms and later coded to reflect the types of impacts being reported (if available) (Table 67). Similar to the active harvester interviews, reports of impacts related to man-made structures increased in Years 8 through 10, in conjunction with construction of the Spur, CD5, and GMT1 roads. Reports of helicopter traffic remained steady from 2010 through 2016 and then dropped in Year 10. Across all study years, 43 percent of Nuiqsut households have

Table 67: Percentage of Households Volunteering Reports of Alpine-Related Impacts 2010-2017

Impact Type	2010	2011	2012	2013	2015	2016	2017	At Least One Year
Helicopter Traffic	18%	14%	15%	15%	21%	19%	9%	43%
Airplane Traffic	9%	6%	9%	8%	10%	6%	5%	24%
Other Traffic	3%			4%	5%	10%	7%	15%
Oil Company Personnel								
Man-Made Structures	6%		4%	6%	10%	8%	12%	23%
Regulations				2%	1%	3%	1%	5%
Seismic Lines Activity	1%					4%		5%
Other	9%	3%	13%	4%	12%	13%	9%	31%
Any Impact	38%	21%	28%	30%	41%	42%	30%	63%
Number of Households	78	77	82	84	82	79	82	131

Stephen R. Braund & Associates, 2019.

reported impacts related to helicopter traffic, 31 percent reported “other” impacts (including general or non-specified impacts), 24 percent reported impacts related to airplane traffic, and 23 percent reported impacts related to man-made structures. Sixty-three percent of households have reported any type of impact during at least one study year.

During a NSB-funded study regarding the impacts and benefits of oil and gas development to subsistence harvesters, which included interviews conducted in 2007, 97 percent of Nuiqsut active harvester respondents cited personal experiences with the impacts of oil and gas development, most commonly reporting impacts associated with difficulty hunting (79 percent of respondents), displacement of wildlife (73 percent), contamination/extraction of materials (70 percent), and disruption of wildlife (64 percent) (SRB&A 2009). The study documented experiences throughout one’s lifetime and for all subsistence activities. For all study communities, while impacts experiences dated to the 1920s, impact reports rose precipitously starting in 1998.

The data show that the majority of households and active harvesters have experienced impacts on their caribou hunting related to the Alpine and Alpine Satellites developments over the 10 years of the Nuiqsut Subsistence Caribou Monitoring study. The prevalence of reported impacts varies from year to year and likely depends on a number of factors, including activity levels among developers and researchers in the region, the proximity of development activity to caribou hunting areas, the general availability of caribou within the community’s core hunting area (i.e., hunters may be more likely to perceive impacts when caribou are unavailable), and the existence of counterbalancing mitigative factors (e.g., availability of fuel vouchers, access to the road system to access hunting areas). While impacts associated with the Alpine/Alpine Satellites developments have not affected caribou hunting to the extent that community harvest amounts have decreased, the data suggest changes in caribou hunting patterns (e.g., decreased use of certain traditional hunting areas) and increased effort associated with hunting (e.g., an increase in the number of trips taken to harvest caribou) could be at least partly attributable to development in the region. Other factors that have likely affected hunting patterns in the community include changes in available technologies, changes in resource availability, and climate change.

Nuiqsut’s continued and stable harvests of caribou are testament to the adaptability of the community to the changes occurring around them. While overall harvests of caribou remain high, it is important to consider the impact that altered hunting patterns and hunting success could have on the community’s cultural and social well-being. Reduced use of traditional hunting areas due to avoidance or the availability of more easily accessible areas (i.e., roads) can result in fewer opportunities to pass on traditional knowledge about those areas, and a gradual loss of knowledge about traditional lands. Other factors associated with increased modernization and decreased interest by the younger generation could also contribute to the loss of knowledge about traditional areas (SRB&A 2018b). The loss of knowledge about traditional areas due to decreased use is a concern that is often voiced by community leaders, with residents stressing the need to protect and document knowledge of traditional hunting grounds, even when those areas are no longer in use (SRB&A 2018b). Increased time and effort associated with hunting may also cause social stress associated with need for increased time and funds, increased risks to safety, and decreased harvest success.

Conclusions

This section provides a summary of key findings of the monitoring study associated with subsistence hunting areas, harvest locations, the timing of subsistence activities, travel method, harvest success, herd characteristics, harvest amounts, and impacts on caribou hunting activities. These key findings are based on the data currently available; continued data collection will likely provide additional meaning and context for the various changes which have been observed in Nuiqsut caribou hunting and harvesting activities over time. In addition, it is important to note that community harvesting patterns are constantly changing and adapting to different environmental, economic, and social factors. Thus, the conclusions below provide a

current snapshot of the status of Nuiqsut caribou hunting and harvesting patterns in the context of available historic and contemporary data.

- **Subsistence Use Areas/Harvest Locations**
 - Nuiqsut subsistence use areas have shifted away from development over time. Documented subsistence use areas, ethnographic descriptions of historic use, and harvester descriptions of hunting patterns over time indicate a shift away from the Prudhoe Bay/Kuparuk development areas.
 - Recent, smaller shifts in subsistence use areas are evident in the immediate vicinity of the Alpine/Alpine Satellites area, and hunter avoidance of these areas has been reported as a result of development activities and infrastructure. Nearly one-half of harvesters have reported avoidance of previously used hunting areas due to development during at least one study year. Despite avoidance by some hunters, harvests of caribou continue to occur in the vicinity of certain infrastructure, particularly along roads.
 - Recent data indicate increased use of hunting areas to the west of the community, and decreased use of traditional hunting areas such as Nigliq Channel, Fish Creek, and the upper Colville River, although use of Nigliq Channel saw a slight increase in Year 10. Changes in use of hunting areas are likely due to a combination of factors, including avoidance of development activity, increased road access, changes in resource distribution, and environmental changes.
 - Road access has increased access for some residents into caribou hunting areas west of the community. However, to date, this increased access has not resulted in increased harvests within the vicinity of the road system. Areas surrounding the Spur Road were heavily used prior to the existence of the road. In addition, data on harvests surrounding the GMT-1 road are limited to three months of data. Hunting patterns will likely continue to change and adapt to the increasing presence of roads.
- **Timing of Subsistence Activities**
 - Nuiqsut caribou hunting activities are generally timed with the seasonal availability of caribou in accessible hunting areas.
 - Recent years have shown decreased winter hunting activity. This is likely a result of a combination of factors including decreased snowmachine use (in favor of four-wheelers) for overland travel; poor snow conditions in recent years; and, in some years, a lack of caribou within reachable distance from the community.
- **Travel Method**
 - Boat has remained the primary mode of transportation to caribou hunting areas, although recent years have seen a slight decrease in boat use. Snowmachine use has declined, while use of four-wheelers has increased. The use of trucks to hunt caribou has risen sharply since the construction of gravel roads.
- **Harvest Success**
 - While overall community harvest amounts remain high, some metrics suggest a recent decrease in harvester success in terms of effort per caribou harvested and percentage of successful households. A greater percentage of households report unsuccessful hunting efforts in more recent harvest surveys (i.e., since 2010). Harvest success shows annual variation across all hunting areas.
- **Herd Characteristics**
 - Hunters report seeing the highest numbers of caribou in July, which coincides with the migration of caribou into the community's core hunting area. During other months, caribou are reported to occur in smaller groups of less than 30.

- The community of Nuiqsut overwhelmingly harvests bull caribou, with harvests of females occurring primarily in November and March.
- **Harvest Amounts**
 - Community harvests of caribou have remained high with a slight upward trend of per capita harvests. Caribou contributes between 22 and 38 percent toward the total subsistence harvest during available study years.
 - The majority of caribou harvests are concentrated within a relatively small number of households. Between 2010 and 2017, one-third of households harvested between 75 and 89 percent of the total caribou harvest. As indicated by the high rates of giving and receiving caribou, these harvests are shared throughout the community.
- **Impacts on Harvesting Activities**
 - A majority of study participants (75 percent) have reported experiencing impacts of the Alpine/Alpine Satellites developments over the 10 years of the monitoring study.
 - Reported impacts vary from year to year and likely depend on factors such as annual development activity levels, mitigation measures, and resource availability.
 - While helicopter traffic has been the primary reported impact across all study years, man-made structures (e.g., roads, pipelines) supplanted helicopter traffic as the most reported impact during the most recent year of the monitoring study.
 - Impacts have not affected overall community harvest levels but may have affected harvester success and effort on an individual basis.
 - Impacts will continue to occur as development expands within the region. The existence of mitigative measures such as road access may help offset, but not eliminate, impacts for some hunters.
 - Additional impacts which are harder to quantify but have been expressed by community residents include a feeling of being boxed in by development, social stress and conflict associated with impacts of development on subsistence, impacts to hunters' experiences on the land, and loss of knowledge about traditional places.

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**APPENDIX A: NUIQSUT CARIBOU MONITORING PROTOCOL, ACTIVE
HARVESTER INTERVIEW YEAR 10**

NUIQSUT CARIBOU MONITORING PROTOCOL, 2017

Date _____

Respondent Name _____

Respondent Birth date _____

Birthplace _____

Years in Community _____

SECTION A: CARIBOU HUNTING ACTIVITIES, NOVEMBER 2016 – OCTOBER 2017

1. Did you go caribou hunting between November 2016 and October 2017? YES ___ NO ___ (IF NO, INTERVIEW OVER)

2. Where did you hunt for caribou between November 2016 and October 2017? (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)	Size of Herd
POLY 1											
POLY 2											
POLY 3											
POLY 4											
POLY 5											

3. Compared to 2016, was your hunting area different in 2017? YES _____ NO _____

3a. [IF YES], HOW? _____

3b. [IF YES], WHY? _____

4. Compared to 2016, was the # of hunting trips in 2017 the same, less, or more? LESS _____ SAME ____ MORE _____

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

5. Compared to 2016, was the duration of trips in 2017 the same, less, or more? LESS _____ SAME ____ MORE _____

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

6. Compared to 2016, were the months you hunted for and harvested caribou in 2017 different? YES _____ NO _____

6a. [IF YES], HOW? _____

6B. [IF YES], WHY? _____

7. Compared to 2016, was the # of caribou you harvested in 2017 the same, less, or more? LESS _____ SAME ____ MORE _____

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

8. Did your household harvest enough caribou in 2017 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, 2017

1. Thinking about the caribou you shot or harvested in 2017, 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, 2017

1. In 2017, 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 2017, 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, 2017

1. Was there anything else abnormal about the behavior, distribution, or migration of caribou in 2017? YES _____ NO _____

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

APPENDIX B: NUIQSUT CARIBOU MONITORING INFORMED CONSENT, YEAR 10

Stephen R. Braund & Associates

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907-276-8222 (Phone); 907-276-6117 (Fax)
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Nuiqsut Caribou Subsistence Monitoring Project - Year 10 November 2017 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 10th year of the study.

While in your community, we would like to interview knowledgeable subsistence harvesters about their caribou subsistence use between November 2016 and October 2017. 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
<i>How Codes</i>		
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.
<i>Why Codes</i>		
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").

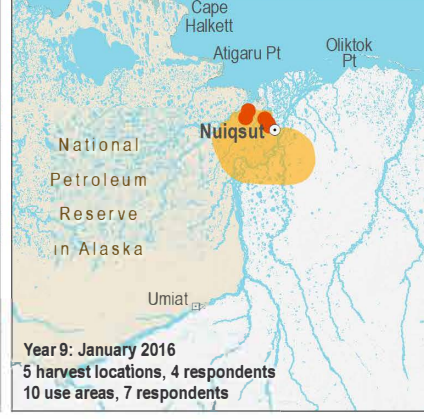
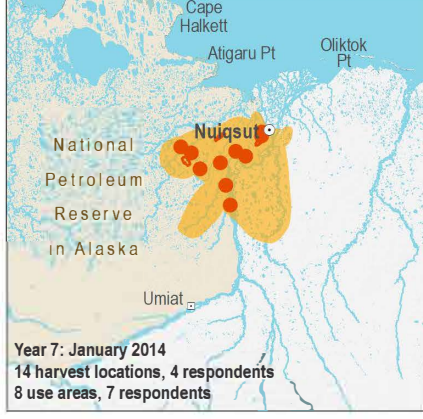
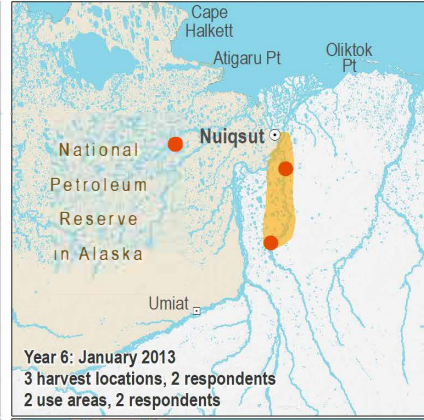
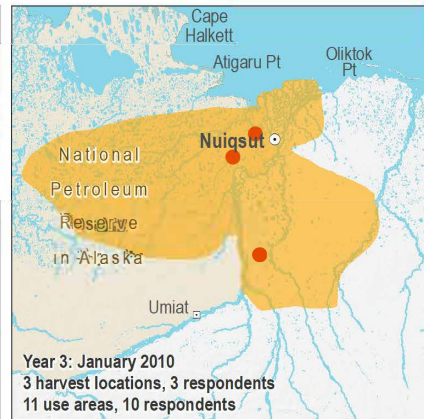
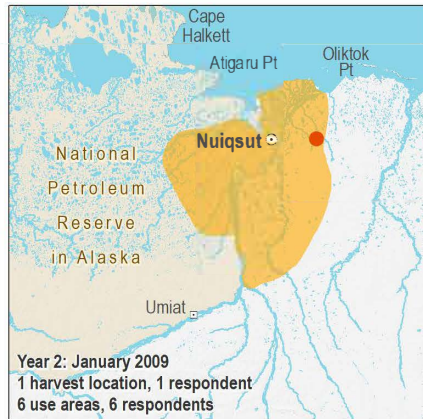
Numeric Code	Code Name	Notes
856	Change in Food Availability	Respondent reported a change in the availability or type of food caribou eat. Used to describe an animal moving to another area in search of better feeding grounds (i.e., "the caribou overgrazed the area and moved west to find better feeding").
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
<i>How Change</i>		
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
<i>Why Change</i>		
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.

**APPENDIX D: USE AREAS AND HARVEST LOCATIONS BY MONTH AND
TRANSPORTATION METHOD, YEARS 1-9**



Appendix Map 1 Caribou Harvest Locations and Use Areas, January, 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.

Harvest Locations



Use Areas



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Appendix Map 2 Caribou Harvest Locations and Use Areas, February, Years 1 - 9

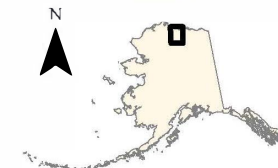
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Harvest Locations

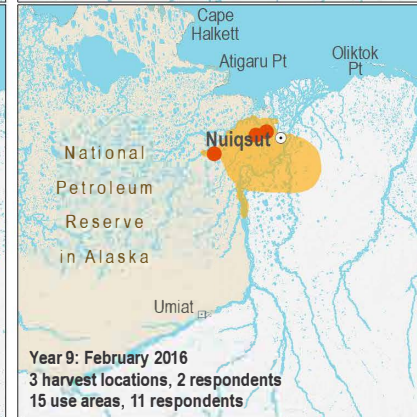
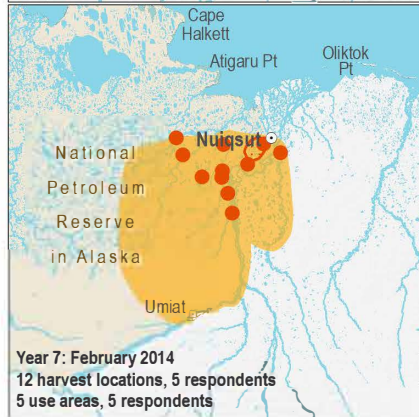
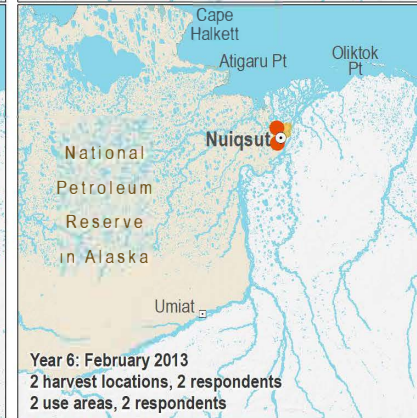
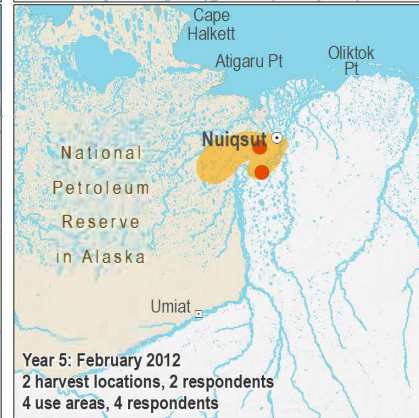
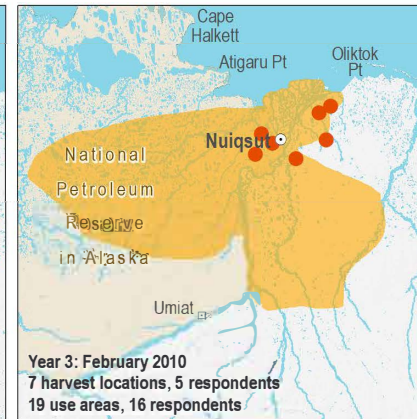
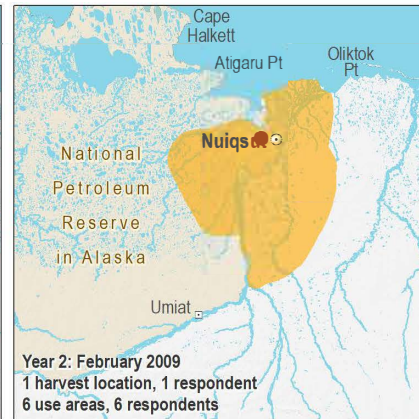
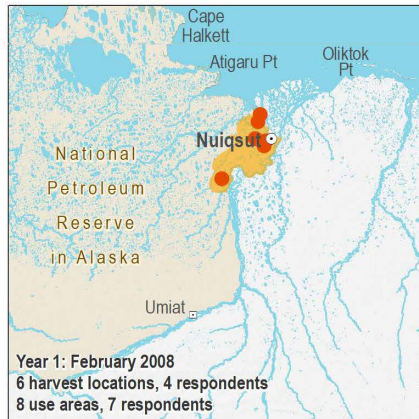
Use Areas

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Appendix Map 3 Caribou Harvest Locations and Use Areas, March, Years 1 - 9

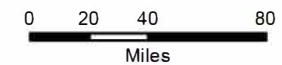
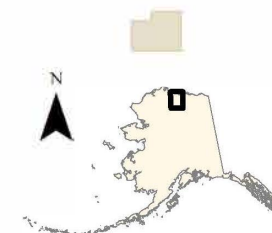
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Other areas may have been used for resource harvesting.

Harvest Locations

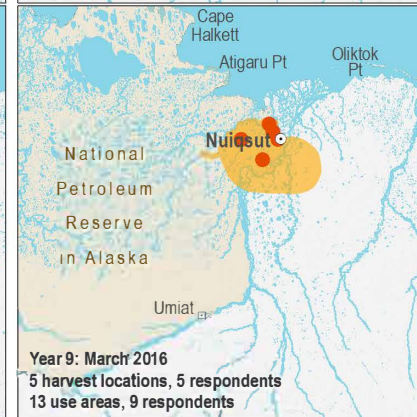
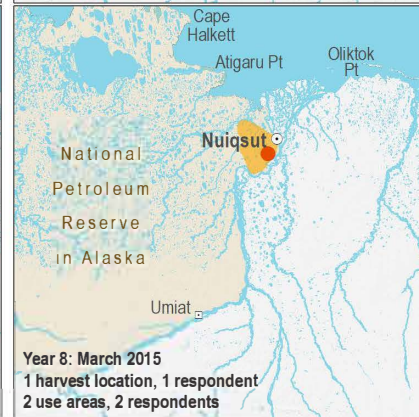
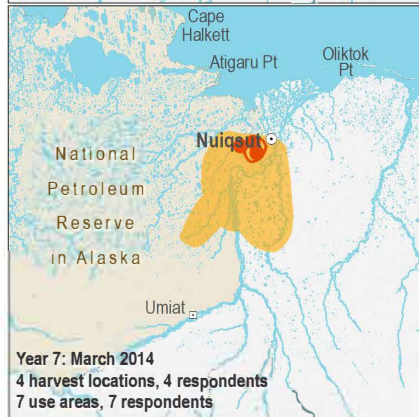
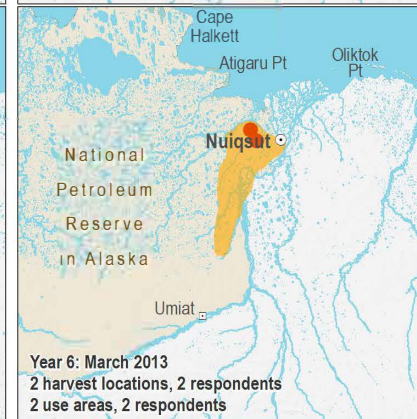
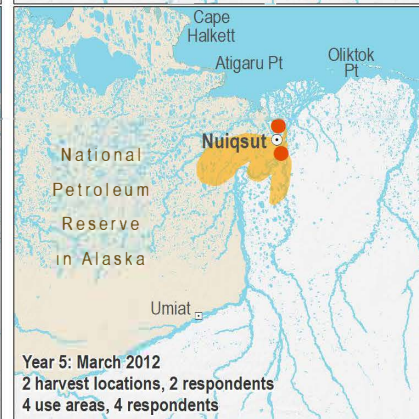
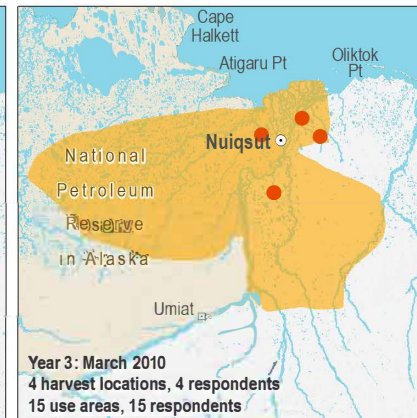
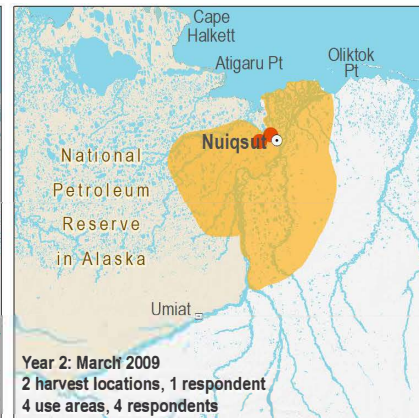
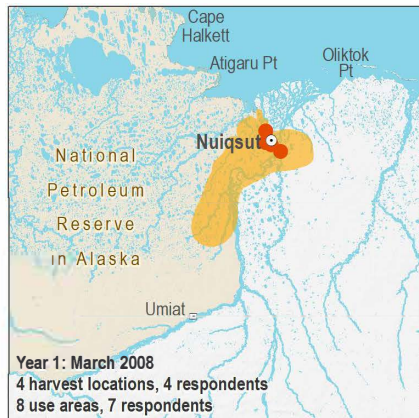
Use Areas

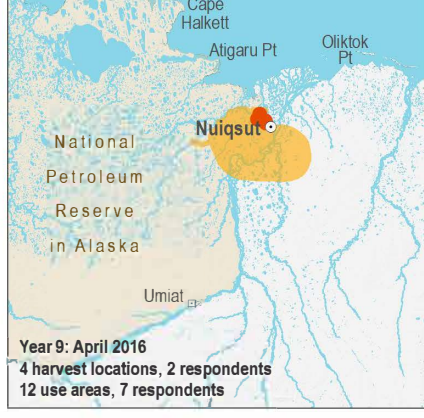
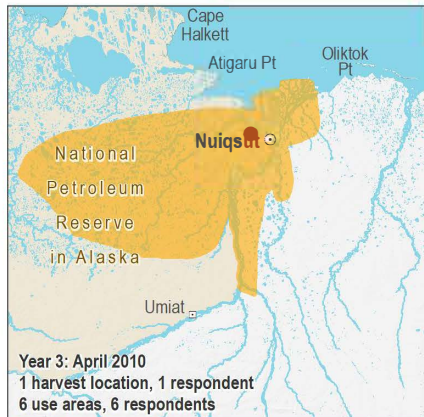
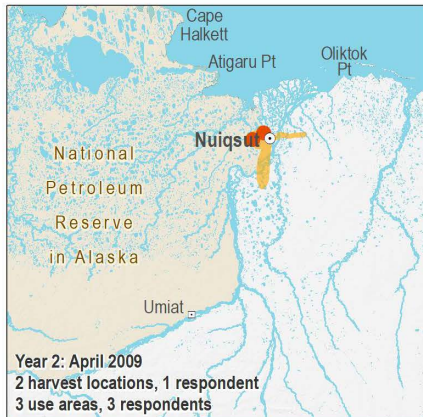
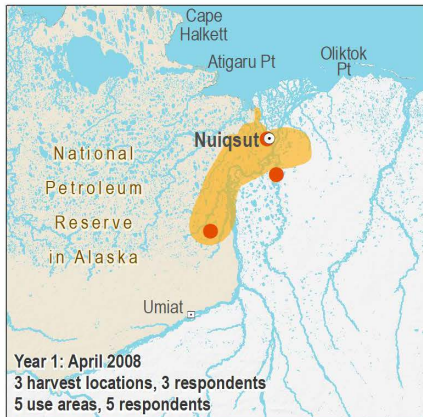
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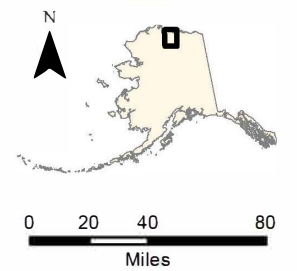


Appendix Map 4 Caribou Harvest Locations and Use Areas, April, Years 1 - 9

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.

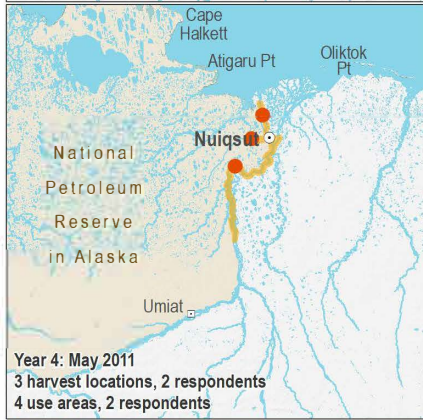
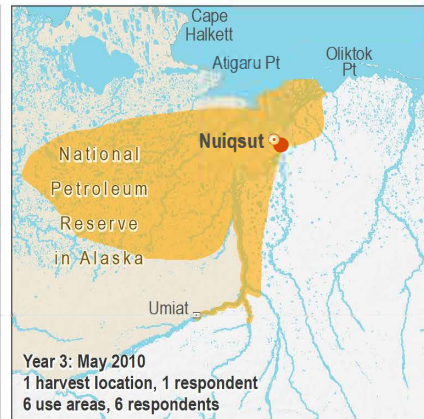
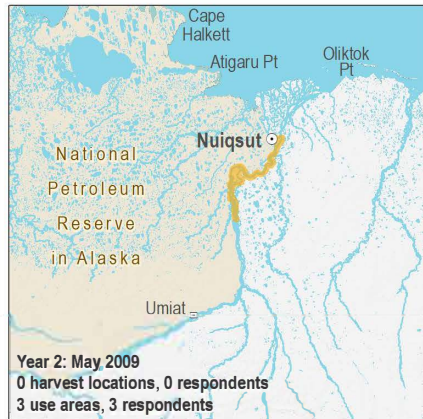
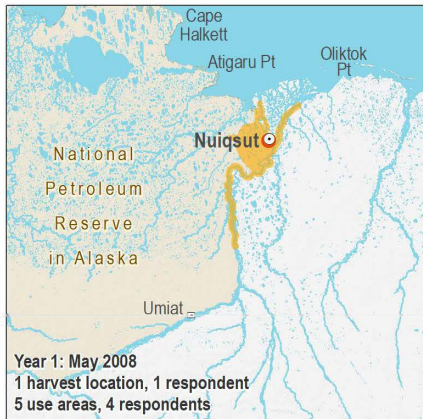
Other areas may have been used for resource harvesting.

- Harvest Locations
- Use Areas
- National Petroleum Reserve Alaska



SCALE: 1:1,500,000

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Appendix Map 5 Caribou Harvest Locations and Use Areas, May, 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.

Harvest Locations



Use Areas



National Petroleum Reserve Alaska



SCALE: 1:1,500,000

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Appendix Map 6 Caribou Harvest Locations and Use Areas, June, Years 1 - 9

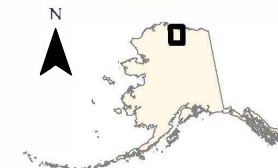
Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 148 active harvesters from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

Other areas may have been used for resource harvesting.

Harvest Locations

Use Areas

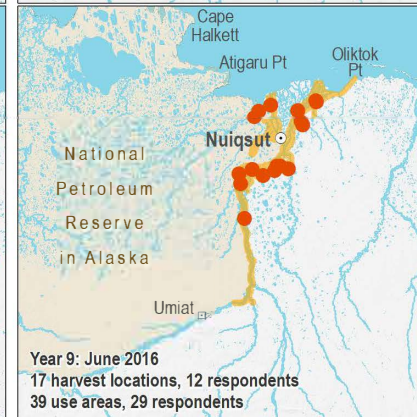
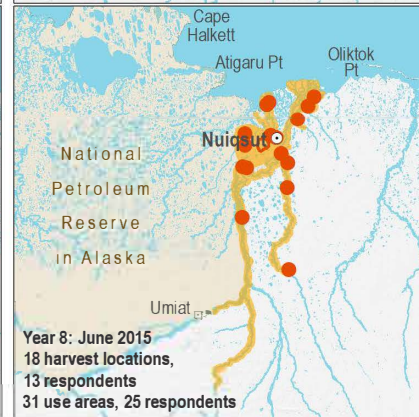
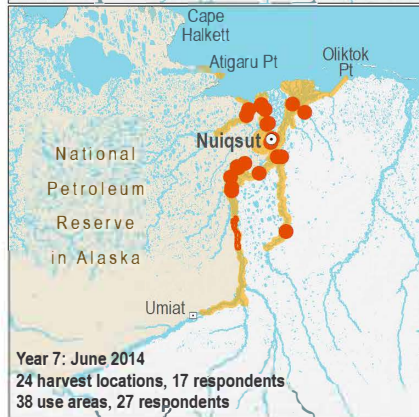
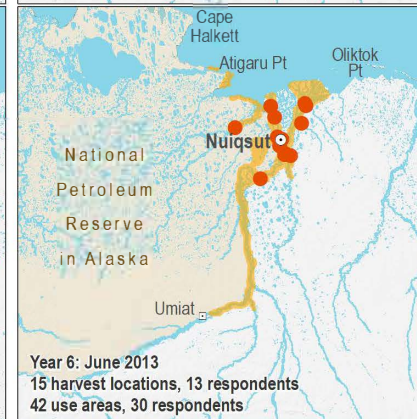
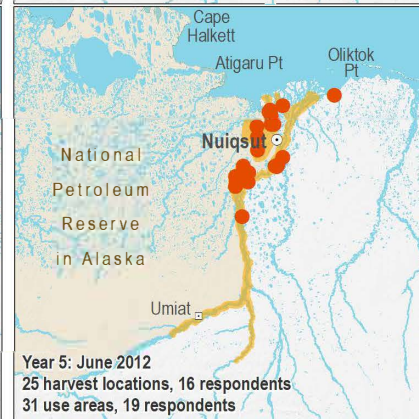
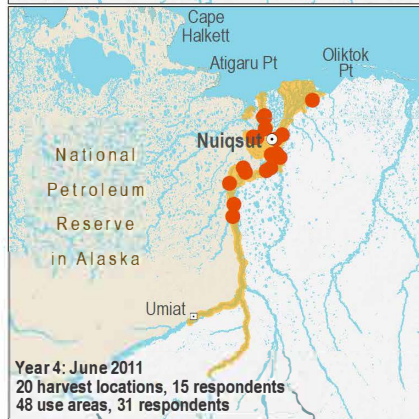
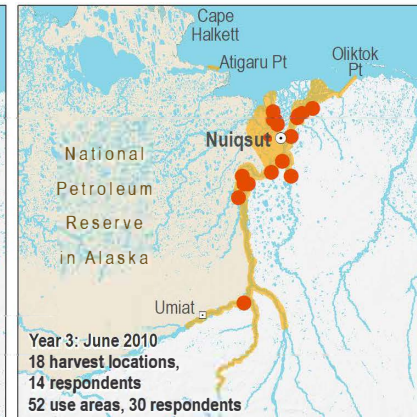
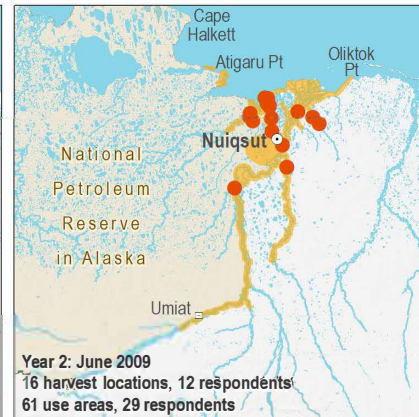
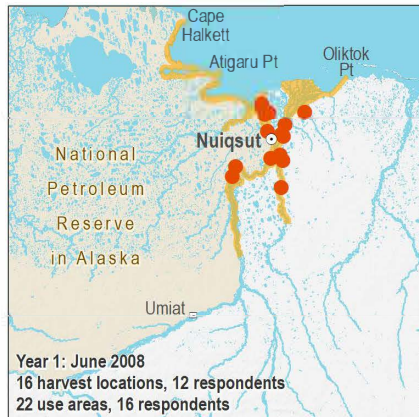
National Petroleum Reserve Alaska



0 20 40 80
Miles

SCALE: 1:1,500,000

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Appendix Map 7 Caribou Harvest Locations and Use Areas, July, 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.

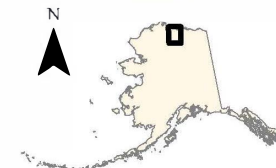
Harvest Locations



Use Areas

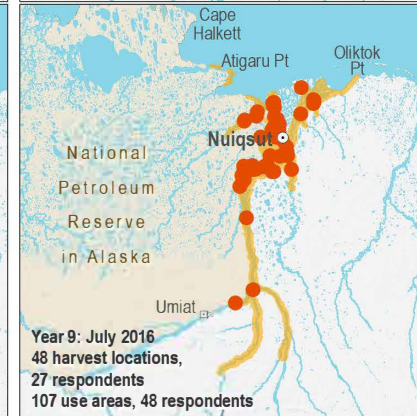
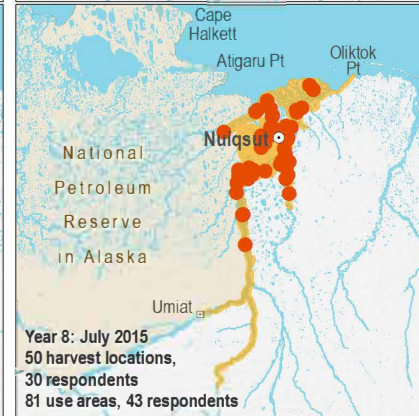
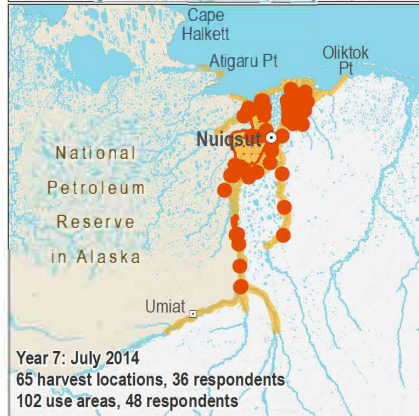
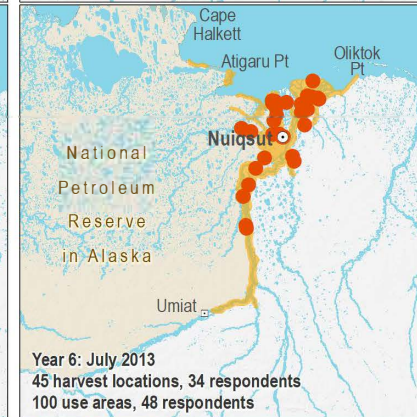
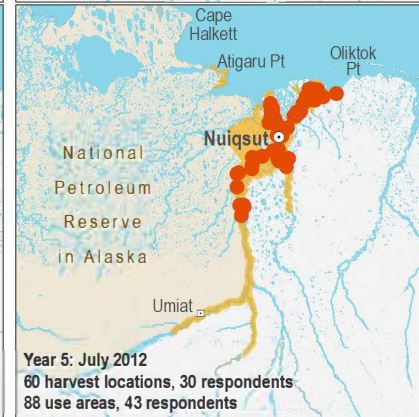
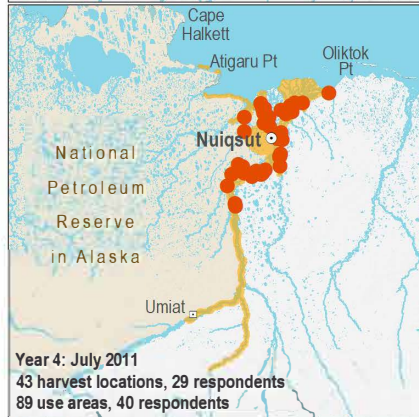
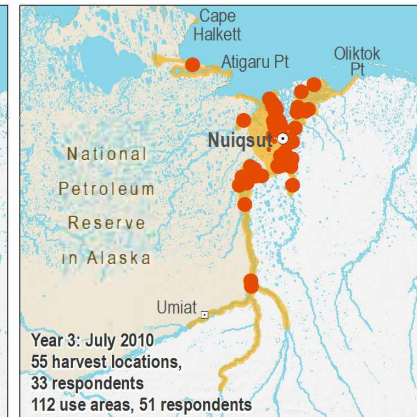
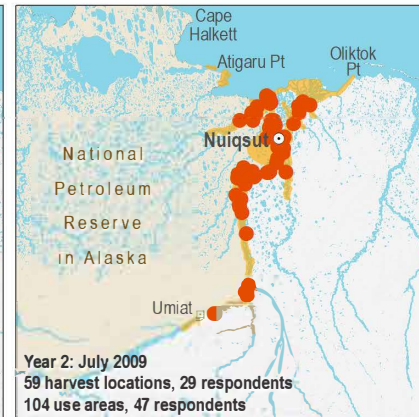
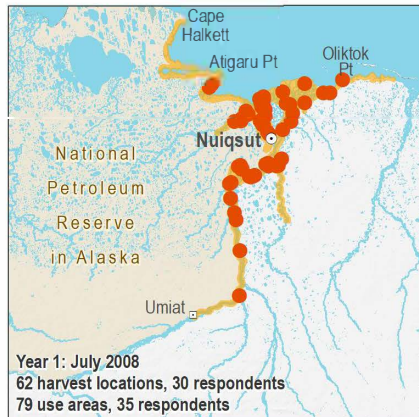


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Appendix Map 8 Caribou Harvest Locations and Use Areas, August, Years 1 - 9

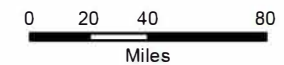
Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 148 active harvesters from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

Other areas may have been used for resource harvesting.

Harvest Locations

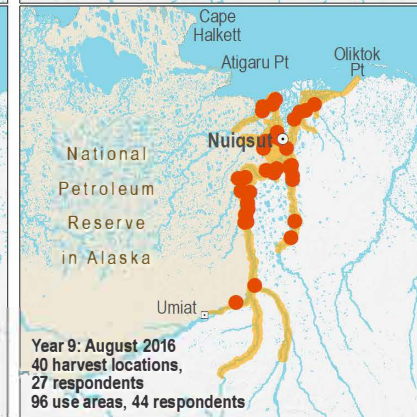
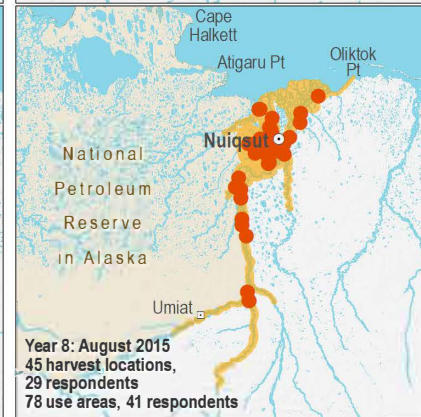
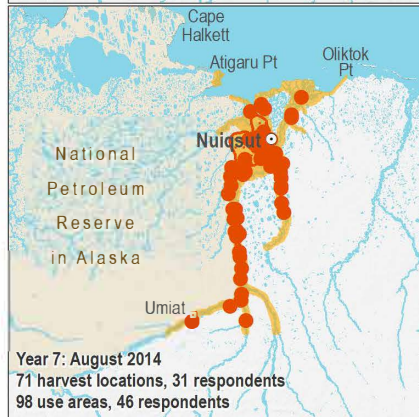
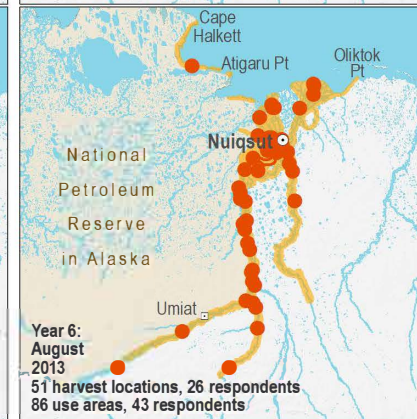
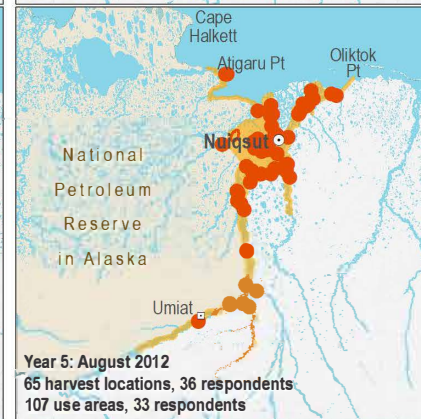
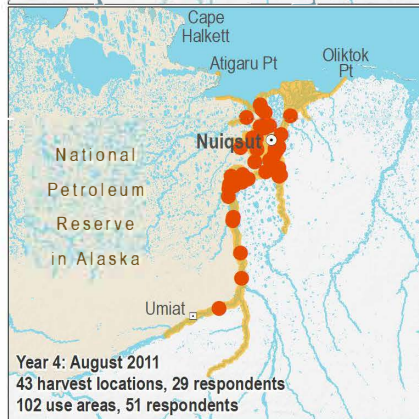
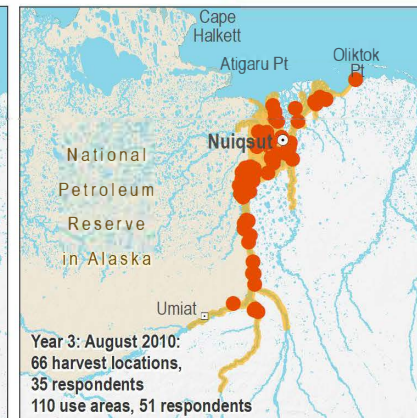
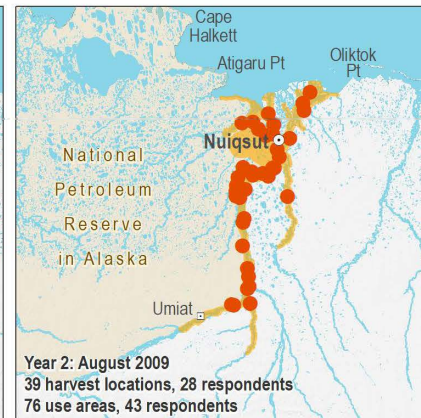
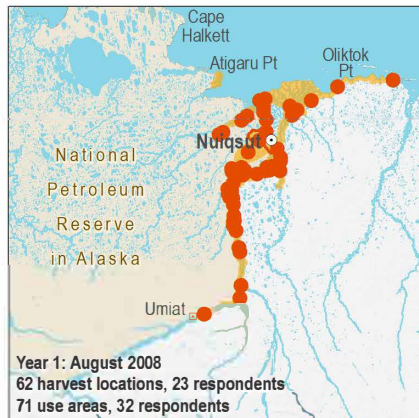
Use Areas

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SCALE: 1:1,500,000

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Appendix Map 9 Caribou Harvest Locations and Use Areas, September, 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.

Harvest Locations



Use Areas

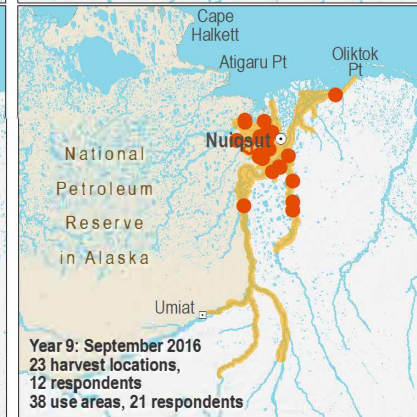
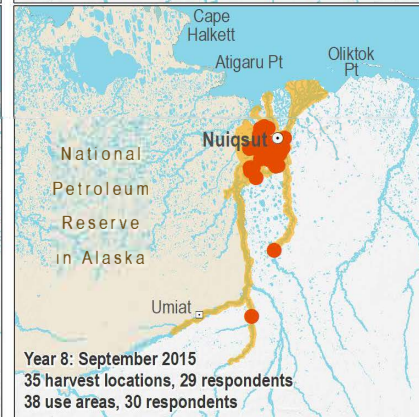
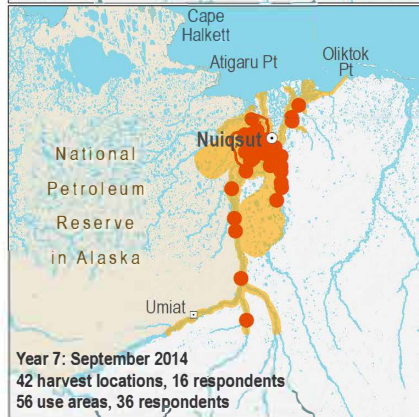
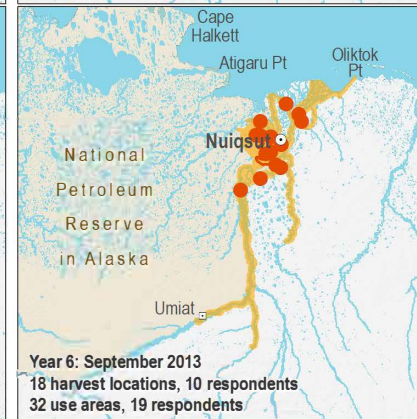
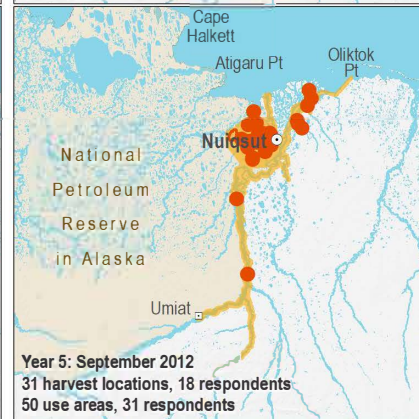
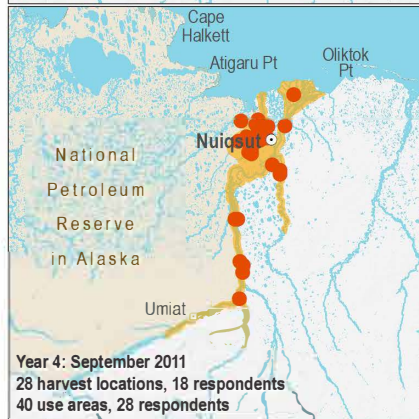
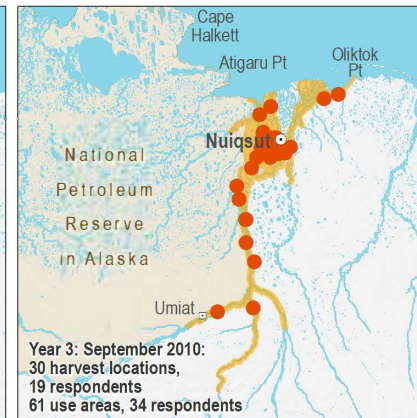
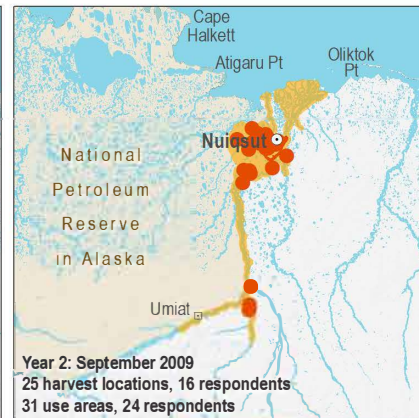
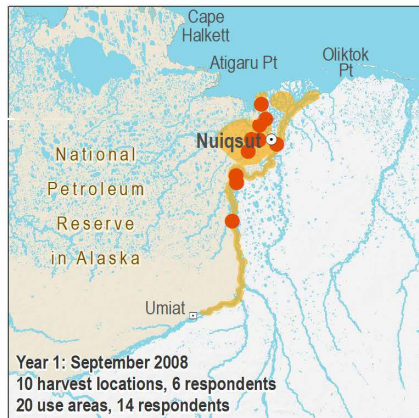


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Appendix Map 10 Caribou Harvest Locations and Use Areas, October, Years 1 - 9

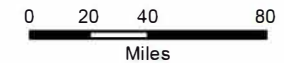
Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 148 active harvesters from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

Other areas may have been used for resource harvesting.

Harvest Locations

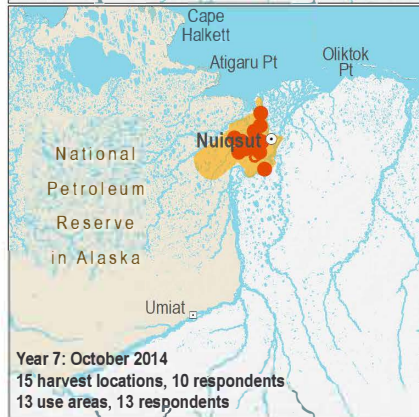
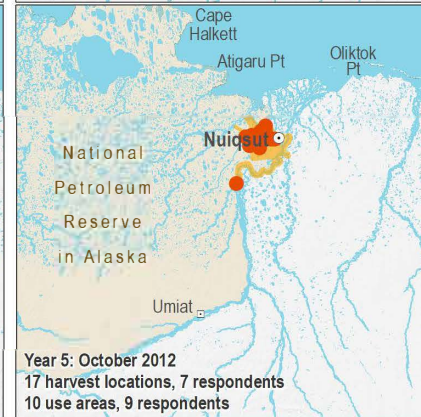
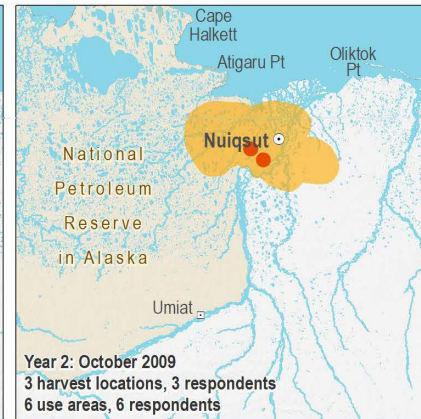
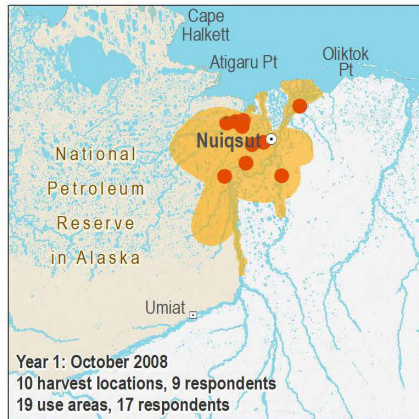
Use Areas

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SCALE: 1:1,500,000

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Appendix Map 11 Caribou Harvest Locations and Use Areas, November, 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.

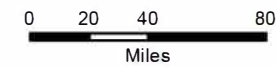
Harvest Locations



Use Areas

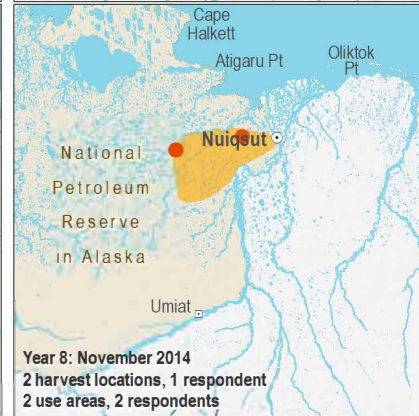
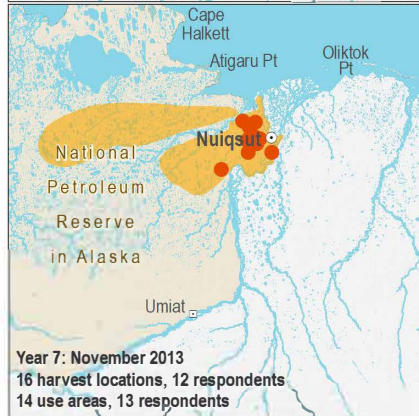
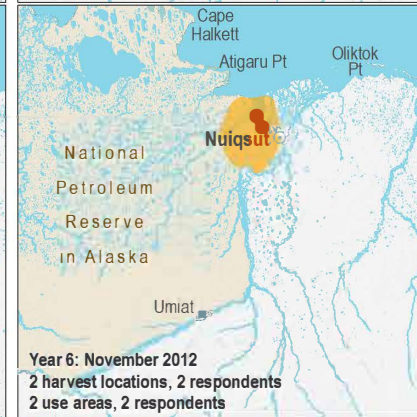
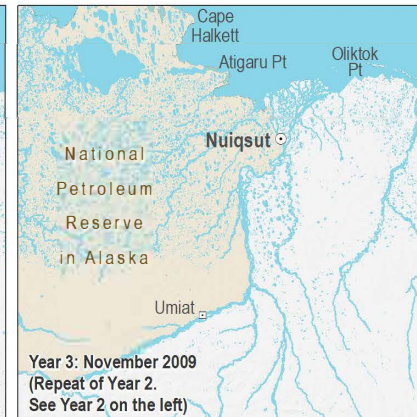
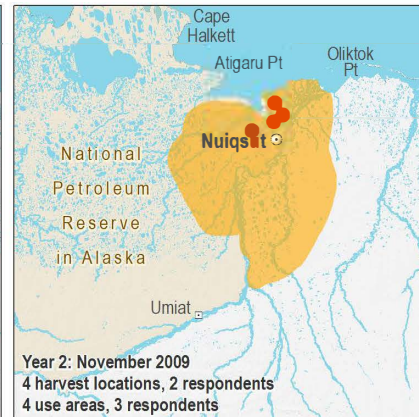
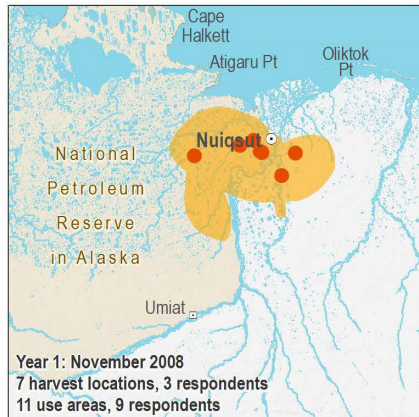


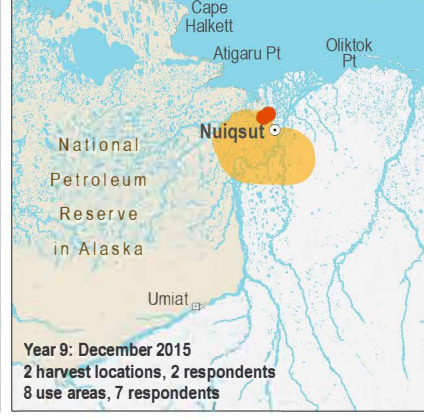
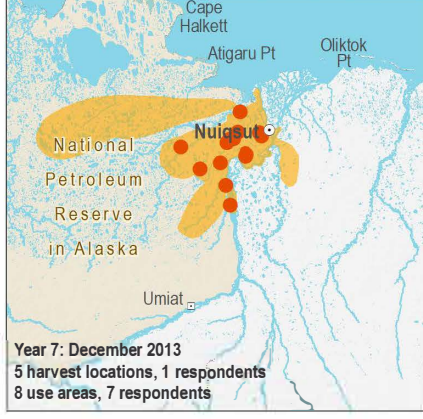
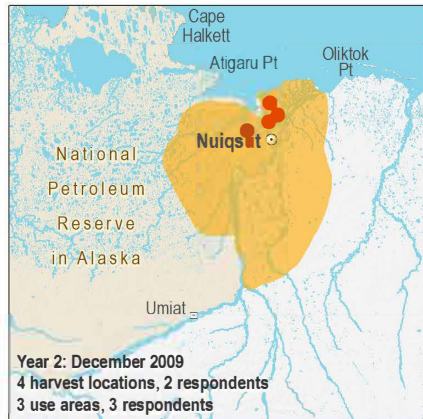
National Petroleum Reserve Alaska



SCALE: 1:1,500,000

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Appendix Map 12 Caribou Harvest Locations and Use Areas, December, 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.

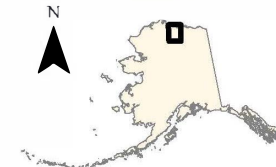
Harvest Locations



Use Areas

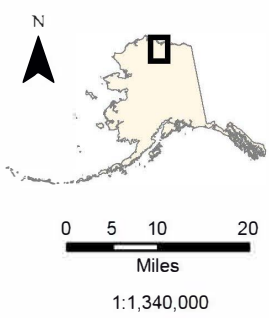


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Appendix Map 13 - Method of Transportation to Caribou Use Areas, Boat, Years 1-9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik 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 2017.

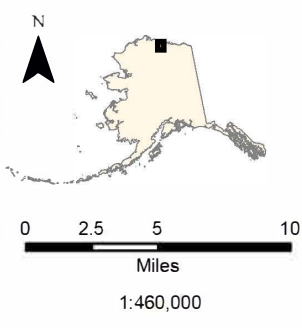
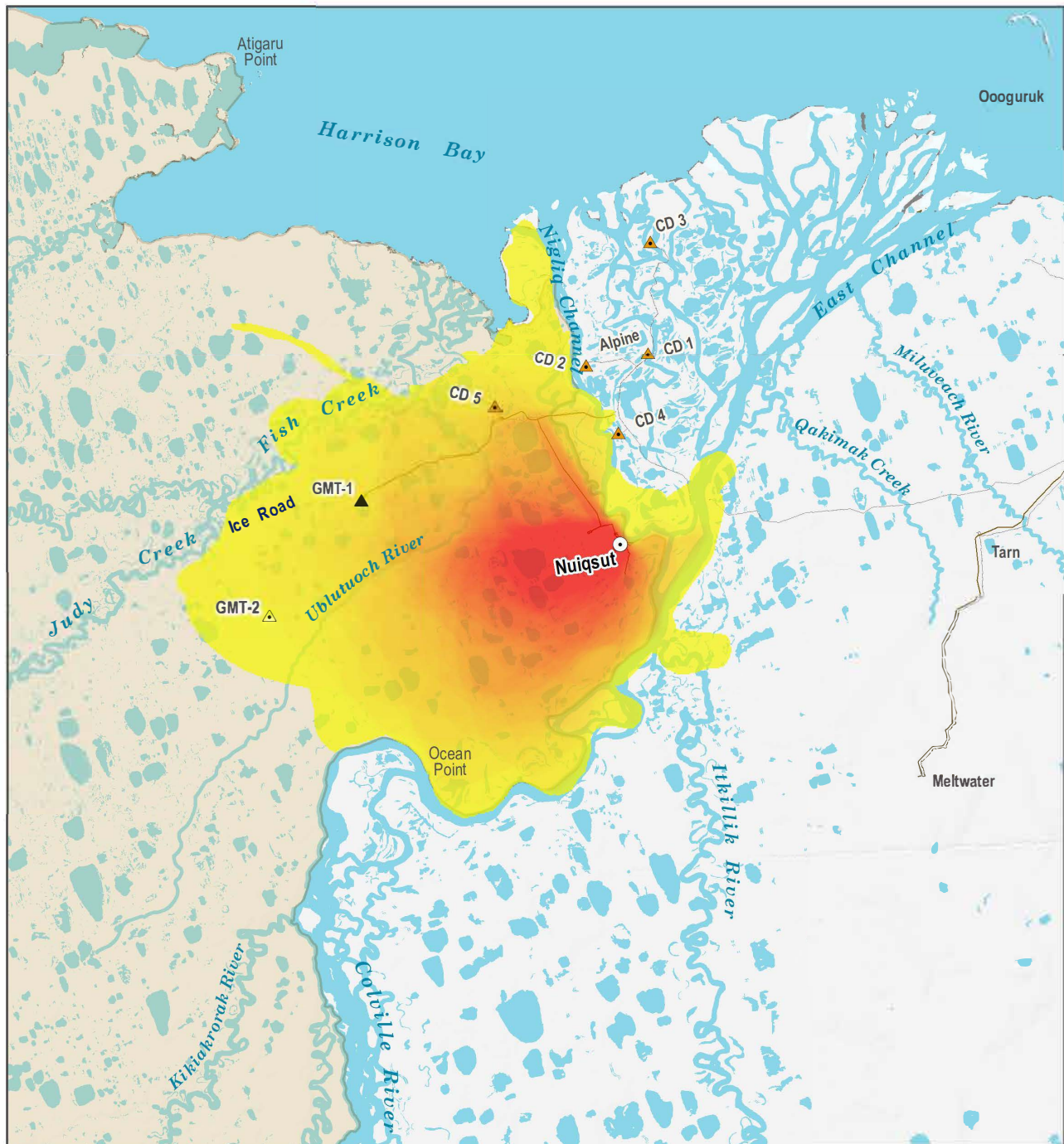
Other areas may have been used for resource harvesting.

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Years 1-9: January 2008 - October 2016

High 1252 caribou areas used by 144 respondents
Low

National Petroleum Reserve Alaska



Appendix Map 14 - Method of Transportation to Caribou Use Areas, Fourwheeler, Years 1-9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 158 active harvesters from March 2009 through November 2017.

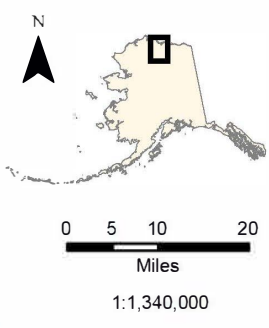
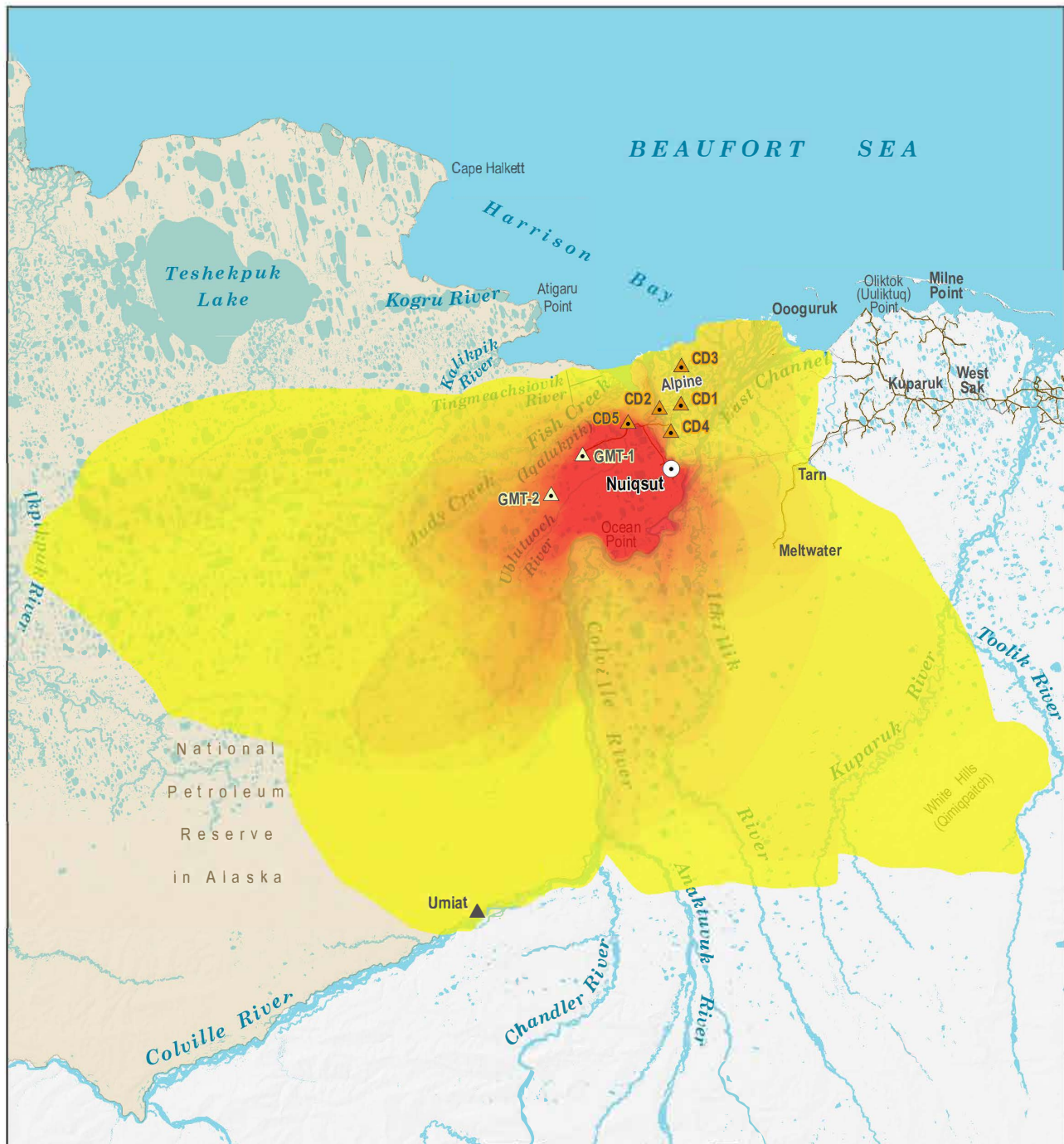
Other areas may have been used for resource harvesting.

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Years 1-9: January 2008 - October 2016

High 197 caribou areas used by 65 respondents
Low

National Petroleum Reserve Alaska



Appendix Map 15 - Method of Transportation to Caribou Use Areas, Snowmachine, Years 1-9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 158 active harvesters from March 2009 through November 2017.

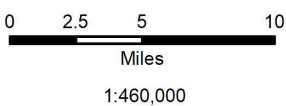
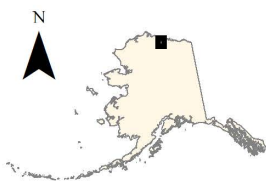
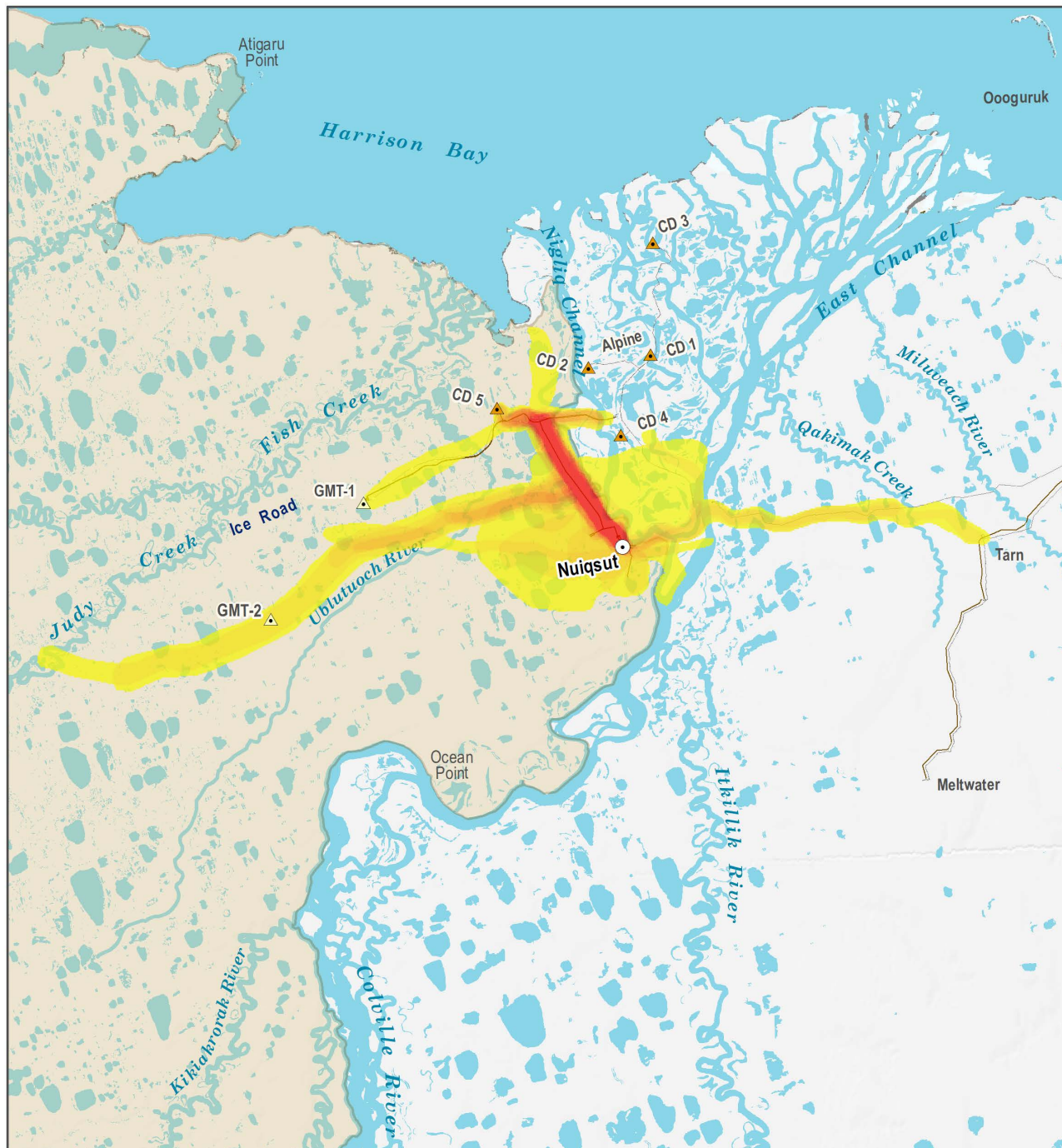
Other areas may have been used for resource harvesting.

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Years 1-9: January 2008 - October 2016

High 194 caribou areas used by 66 respondents
Low

National Petroleum Reserve Alaska



Appendix Map 16 - Method of Transportation to Caribou Use Areas, Truck, Years 1-9

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpiik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 158 active harvesters from March 2009 through November of 2017.

Other areas may have been used for resource harvesting.

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Years 1-9: January 2008 - October 2016

High 52 caribou areas used by 40 respondents
Low

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