Nuiqsut Caribou Subsistence Monitoring Project: 2019 (Year 12) Report

FINAL REPORT

Submitted to:

ConocoPhillips Alaska, Inc.

North Slope Borough Department of Wildlife Management

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EXECUTIVE SUMMARY

This report presents the 2019 (Year 12) study year data for the Nuiqsut Caribou Subsistence Monitoring Project based on research conducted by Stephen R. Braund & Associates (SRB&A) under contract to ConocoPhillips Alaska, Inc. (CPAI). Both the North Slope Borough (NSB) (2018 Rezone Ordinance for Greater Mooses Tooth 2 [GMT-2]) and Bureau of Land Management (BLM) (GMT2 Record of Decision [ROD]) stipulate that CPAI conduct a subsistence monitoring study which documents impacts of CD4 and other CPAI satellite developments on Nuiqsut residents' caribou hunting activities. CPAI activities during 2019 included winter exploration in the Willow area and geotechnical work in the Willow mine site area and by Atiġruk Point. Other winter exploration activities were conducted by another industry operator northeast and southeast of Nuiqsut. The GMT-2 gravel road was constructed by CPAI in January through April of 2019, road work continued through September/October, and the road was partially opened to hunters starting in mid-September.

This 12th annual report is based primarily on hunter observations and a household caribou harvest survey. Fieldwork to collect data for the 2019 study year began in March 2020 but was cut short as lockdowns and travel restrictions related to the COVID-19 pandemic prohibited subsequent field trips to the community. While it was not possible to conduct additional active harvester interviews remotely due to the mapping component emphasis, the study team remotely conducted additional household harvest surveys with the assistance of local liaisons and using a combination of telephone and online surveys. As a result of the pandemic, for both monitoring components, 2019 participation rates were substantially lower than previous study years. SRB&A interviewed 22 active harvesters regarding their caribou hunting activities during the 2019 study year. SRB&A also conducted caribou household harvest surveys with 41 percent of Nuiqsut households.

Data from the 2019 (Year 12) active harvester interviews complete similar data on hunting activities collected for 2008 (Year 1), 2009 (Year 2), 2010 (Year 3), 2011 (Year 4), 2012 (Year 5), 2013 (Year 6), 2014 (Year 7), 2015 (Year 8), 2016 (Year 9), 2017 (Year 10), and 2018 (Year 11). In addition, 2019 household harvest survey data complement caribou harvest data collected by SRB&A for 2010, 2011, 2012, 2013, 2015, 2016, 2017, and 2018; 2014 data from the Alaska Department of Fish and Game (ADF&G); and data collected by the NSB and ADF&G in years before 2008.

Active harvester interview participants identified 57 caribou subsistence use areas and 60 caribou harvest locations for the 2019 study year, the majority of which occurred along the Colville River (including Nigliq Channel and East Channel), along the lower portion of the Itqiliq River, and along the Nuiqsut Spur Road and CD5/GMT-1 roads north and northwest of the community. The extent of riverine travel in 2019 was smaller than many previous study years, with fewer individuals traveling upriver beyond Ocean Point. The overall extent of overland travel in 2019 was somewhat limited but similar to some previous years. The extent of road travel was higher in 2019 than previous years as a result of access to newly constructed roads. Fewer areas of high harvest density occurred in 2019, likely in part due to the smaller overall number of harvest locations reported. The concentration of harvests in 2019 was similar to recent years (Years 2012 through 2018) in that fewer areas of concentrated harvests occurred along Nigliq Channel and only moderate harvest concentration near the camp at Nigliq. Overall, a large number of caribou harvests occurred to the northwest of the community and at isolated locations on the Itqiliq River and near the mouth of the East Channel.

While certain hunting characteristics (e.g., trip frequency, duration, and travel method) have remained similar over the previous 11 study years, other characteristics, such as the timing of caribou hunting activities and hunting success within subsistence use areas, vary from year to year. In 2019, caribou hunting activities, based on multiple data variables (percentage of subsistence use areas, harvest locations, and hunting trips), peaked in the months of July and August, with the greatest activity in August. Data for 2019 show limited winter hunting and no reported activity in January and March. Across all study years, boats

have been the most common method of transportation used, 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 60 percent of 2019 subsistence use areas accessed by boat. Four-wheeler use increased in 2019 (26 percent of use areas) while truck use was on the high end compared to previous years (12 percent of use areas), reflecting the increase in road hunting. In general, over all study years, respondents take primarily day trips to their caribou subsistence use areas. In 2019, over 90 percent of caribou hunting trips occurred on same day trips. The average duration of trips to 12 pre-defined hunting areas ranged from 4.1 hours (Itqiliq River) to 52.5 hours (Fish Creek). While half of respondents took fewer than 10 hunting trips in 2019, 41 percent took between 10 and 29 hunting trips. The highest average number of hunting trips occurred in the area West of Nuiqsut (which includes roads associated with CD5, GMT-1, and GMT-2).

In 2019, harvest success in terms of the percentage of successful subsistence use areas was on the high end of previous years, with respondents reporting successful harvests at 72 percent of hunting areas, compared to between 52 percent and 78 percent in previous years. The average number of caribou harvested per subsistence use area and harvest location was also on the high end of previous study years. Data also show a decrease in the number of trips taken per caribou harvested, although the number of trips per caribou varied by area. In 2019, of the 12 pre-defined hunting areas, the area "West of Nuiqsut" accounted for the highest portion (48 percent) of caribou harvested, continuing an upward trend and higher than any previous study year. Similar to the previous study year (2018), no other area contributed more than 15 percent of the harvest in 2019. Both the Nigliq Channel and Itqiliq River areas contributed their lowest percentage of any study year, at five percent and one percent, respectively. Harvests in the Ocean Point area also declined from recent years but were within the range of previous study years. It is possible that the smaller sample size in 2019 may have affected some study results.

Harvest estimates for the 2019 study year may be somewhat inflated due to a lower number of "non-harvesting" households participating in the smaller sample. However, based on the 2019 sample, harvests were within the range of previous years and continued a trend of stable caribou harvests over time. In 2019, the community of Nuiqsut harvested an estimated 636 caribou, within the range of all previous study years (between 258 and 774 caribou), which provided an estimated 153 pounds of caribou per capita. Household uses of caribou were somewhat higher than previous years, likely a result of the smaller sample size, with 100 percent of households using caribou, and 98 percent of households attempting harvests of caribou. The difference between the percentage of households attempting to harvest (98 percent) and successfully harvesting caribou (91 percent) was seven percent, within the range of previous years (which has varied between one and 16 percent but has increased in the last decade). The percentage of Nuiqsut households who gave and received caribou (87 and 78 percent, respectively) was within the range of previous study years. In 2019, 33 percent of households indicated that they did not harvest enough caribou, although 11 percent of households indicated that while they did not harvest enough caribou, they did receive enough.

The percentage of respondents observing caribou abnormalities in 2019, at 32 percent, was within the range of previous years but the highest since 2012. Abnormal health was the primary type of observation in caribou in 2019, followed by abnormal size and quality. Disease/Infection was the most commonly reported type of abnormality by active harvesters, followed by Decrease in Resource Size.

In 2019, 36 percent of respondents reported one or more perceived development-related impacts on their caribou hunting, and 23 percent of respondents reported one or more impacts attributed to CPAI. Both development and CPAI impacts were on the low end of previous study years during the active harvester interviews, although household harvest surveys showed impact reporting within the range of previous years. In 2019, helicopter and traffic (14 percent of respondents each) and man-made structures (nine percent of respondents) were the most commonly reported impact sources and were all substantially lower than many previous study years.

Fifty-nine percent of respondents indicated they no longer hunted in or generally avoided certain areas they previously used, within the range of previous years but a decrease from 2017 and 2018 which were on the high end of all study years. Avoidance was primary attributed to development causes (including development activities [traffic, interactions with industry] and infrastructure [roads, pipelines]), followed by environmental causes (primarily changes in resource availability) and personal reasons. Fish Creek and Itqiliq River were the most frequently mentioned areas of avoidance in 2019, while, for the first time, the Alpine/Alpine Satellites area was not specifically mentioned.

ACKNOWLEDGEMENTS

Stephen R. Braund & Associates (SRB&A) would like to thank the community of Nuiqsut for their cooperation and assistance in completing 12 years of the Nuiqsut Caribou Subsistence 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. (CPAI) for providing funding and logistical support. Finally, SRB&A would like to thank the 22 Nuiqsut caribou hunters and elders who provided us with the information for the 2019 study year, and the 170 Nuiqsut residents who have participated in the 12 years of this study.

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ACRONYMS AND ABBREVIATIONS

ADF&G	Alaska Department of Fish and Game
BLM	Bureau of Land Management
CPAI	ConocoPhillips Alaska, Inc.
GIS	Geographic Information System
KSOPI	Kuukpik Subsistence Oversight Panel, Inc.
NSB	North Slope Borough
ROD	Record of Decision
SPSS	Statistical Package for the Social Sciences
SRB&A	Stephen R. Braund & Associates
TNHA	Tagiugmiullu Nunamiullu Housing Authority
USGS	U.S. Geological Survey

INTRODUCTION

The Nuiqsut Caribou Subsistence Monitoring Project is an ongoing, multi-year project meant to measure impacts on caribou hunting related to Alpine and its satellite developments. ConocoPhillips Alaska, Inc. (CPAI) initiated the Nuiqsut Subsistence Monitoring Project in response to a stipulation in the North Slope Borough's (NSB) permit to CPAI for the CD4 development. The NSB's original stipulation for CD4 required that the study occur for 10 years (NSB 2004), after which CPAI and the NSB would review the results of the study and evaluate the need for additional subsistence impact studies. Through discussions at CPAI and NSB annual review meetings and in the NSB 2018 Rezone Ordinance for GMT-2 and the Bureau of Land Management (BLM) GMT-2 Record of Decision (NSB 2018, BLM 2018), both the NSB and the BLM supported and required continuation of the Nuiqsut Subsistence Monitoring Project through the life of the GMT-1 and GMT-2 projects. Changes in the stipulations for the monitoring study are described in the revised study plan for the 2019 (Year 12) study year (SRB&A 2020b). The purpose of the subsistence monitoring project is to monitor subsistence harvester activity, harvest experiences, and hunter observations of impacts related to Alpine and its satellite developments. The intent of the project is to assemble data on caribou harvesting activities and impacts on caribou harvesting that are useful to the community of Nuiqsut, industry, and government oversight agencies. In response to the original NSB stipulation, the Year 10 report included a synthesis of the 10 years of the study. During an interim year (2018/Year 11) funded by CPAI, the study team reviewed and revised the study plan for 2019 (Year 12) and future years. This 2019 (Year 12) report represents the continuation of the Nuiqsut Caribou Subsistence Monitoring Project as required by the NSB and BLM.

CPAI activities during 2019 included winter exploration in the Willow area and geotechnical work in the Willow mine site area and by Atiġruk Point. Other winter exploration activities were conducted by another industry operator northeast and southeast of Nuiqsut. The GMT-2 gravel road was constructed in January through April of 2019, road work continued through September/October, and the road was partially opened to hunters starting in mid-September.

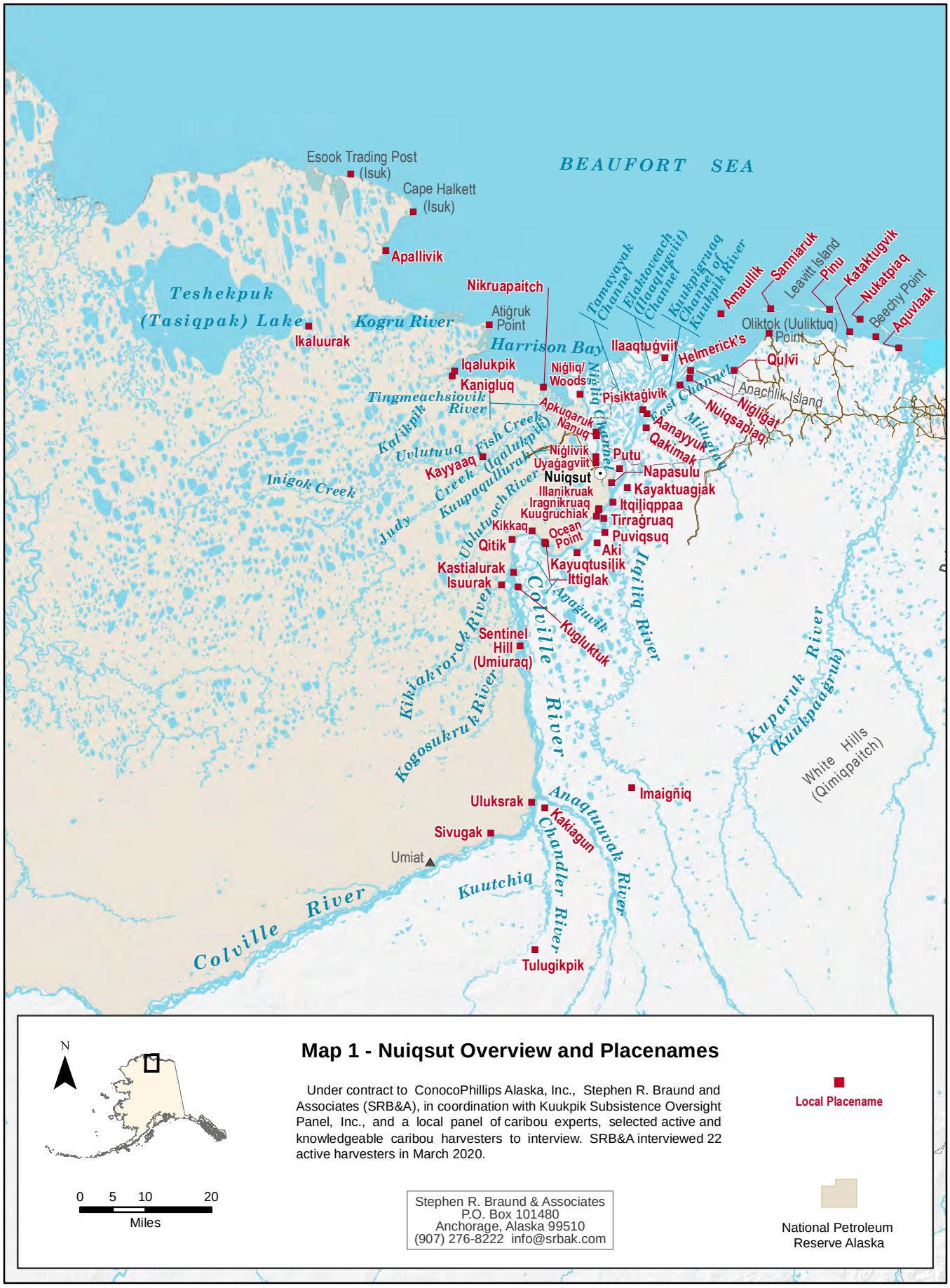
This 12th annual report is based primarily on hunter observations and household surveys in addition to existing subsistence use area and harvest information. Fieldwork for the 2019 study year began in March 2020, coinciding with the COVID-19 pandemic and resulting travel restrictions. The COVID-19 pandemic resulted in a truncated field season and a lower-than-usual response rate for 2019.

STUDY OBJECTIVES

The primary objective of this project is to monitor impacts on Nuiqsut caribou hunting related to Alpine and its satellite developments and, in doing so, to facilitate and maintain communication between the study team, Nuiqsut residents and organizations, the NSB, and CPAI. Changes to monitoring methods and objectives in Year 12, based on NSB and BLM stipulations for the GMT-1 and GMT-2 development projects, are described below under "Summary of 2019 Study Plan Revisions."

STUDY AREA

The NSB 2018 rezone ordinance stipulates that the subsistence study should consider impacts of all Alpine and associated development facilities within the Colville River Delta and adjacent areas. 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.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Cape Halkett
(Isuk)
Apallivik
Teshekpuk
(Tasiqpak) Lake
Ikaluurak
Kogru River
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East Channel
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Nuiqsapiaq
Tingmeachsiovik
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Aanayyuk
Qakimak
Kalikpik
Uvlutuuq
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Uyaġagviit
Putu
Kayyaaq
Creek
Kuupaqulluraq
Nuiqsut
Napasulu
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Tirraġruaq
Kikkaq
Ocean
Point
Puviqsuq
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Aki
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Colville
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Anaġuvik
Kugluktuk
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Sentinel
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(Umiuraq)
Kogosukruk River
Kuparuk River
(Kuukpaaġruk)
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Map 1 - Nuiqsut Overview and Placenames
Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 22 active harvesters in March 2020.
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Local Placename
National Petroleum
Reserve Alaska

Map 2 - Nuiqsut Overview and Surrounding Infrastructure

Under contract to ConocoPhillips Alaska, Inc., Stephen R. Braund and Associates (SRB&A), in coordination with Kuukpik Subsistence Oversight Panel, Inc., and a local panel of caribou experts, selected active and knowledgeable caribou harvesters to interview. SRB&A interviewed 22 active harvesters in March 2020.

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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 22 active harvesters in March 2020.

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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

METHODS

In 2009, Stephen R. Braund & Associates (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. SRB&A gathers these data 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 2019 (Year 12) to design and implement the study. Active harvester interviews and household harvest surveys for the 2019 study year gathered information for the 2019 calendar year (January through December 2019). Interviews, surveys, and meetings (including the NSB meeting in Utqiaġvik [formerly Barrow] and meetings with the Nuiqsut Caribou Panel) for the 2019 study year took place between September 2019 and September 2020. Thus, the methods describe 2019 and 2020 monitoring program activities, while the results and discussion describe caribou harvest amounts, hunting activities, and impacts for the 2019 study period (spanning from January through December 2019).

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 2019 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 in September 2019 to review the results of the 2018 (Year 11) report and to discuss upcoming (Year 12) research. During that meeting, the study team discussed the future of the Nuiqsut Caribou Panel to determine whether existing panel members wanted to continue serving on the panel beyond the initial 11 years of the study. The study team had received requests from members of the community that the study team should provide broader opportunities for community participation on the caribou panel, thus increasing representation of various age groups, families, and community entities and viewpoints. SRB&A provided surveys to panel members at the meeting regarding their desire to continue on the panel; those panel members who did not attend the September 2019 meeting subsequently received the survey via mail or email. During this process, two panel members resigned from the Nuiqsut Caribou Panel; the remaining members expressed interest in continuing to serve on the panel. In late January 2020, the study team sent letters to the City of Nuiqsut, Native Village of Nuiqsut, KSOPI, and Kuukpik Corporation, requesting that each entity nominate four individuals for the Nuiqsut Caribou Panel. The study team did not receive a response from these entities but plans to follow up once fieldwork in the community can resume. The study team will use the nominations provided by these entities to update the Nuiqsut Caribou Panel.

Study Design and Field Preparation

At the outset of this project in the first study year (beginning in 2009 for the 2008 study year), the field effort for the Nuiqsut caribou monitoring program was comprised of annual interviews with 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 2008.

In addition to the field effort, the study team incorporated several other components to the study design, including incorporation of biological data on Central Arctic Herd and Teshekpuk Herd caribou, incorporation of additional sources of Nuiqsut caribou harvest and subsistence use area data to aid in comparison of harvests and hunting patterns over time, and incorporation of traditional knowledge about caribou from existing sources.

The first 11 years of this monitoring study (2008-2018) were based on a NSB permit stipulation for CPAI's CD4 development. While the study team added monitoring components and variables during the first 11 years of research, the general structure of the monitoring plan remained the same. Prior to beginning Year

12 fieldwork, the study team prepared a revised study plan based on a review of the previous 11 years of research; comments from the community (including the Nuiqsut Caribou Panel), the NSB, and CPAI; and stipulations within recent NSB ordinances and BLM RODs (SRB&A 2020b).The study team revised the field protocols and methods for the active harvester interviews and household harvest surveys based on the 2019 study plan; these changes were implemented in 2019 and will be carried forward into future study years. Changes are detailed in that study plan and summarized in the following section.

Summary of 2019 Study Plan Revisions

Active Harvester Interviews

While the 2019 active harvester interviews collect variables similar to those collected during the first 11 years of the monitoring project, the study team implemented a number of changes to the interview protocol which affect data collection methods and analyses for some variables. First, the study team shifted to collecting certain variables, such as frequency and duration of trips, by pre-defined hunting area and by roads, rather than by the user-defined subsistence use areas identified by respondents. This allows for more accurate year-to-year comparisons of those variables by geographic area.

The restructuring of data collection beginning in 2019 also brought about new timing variables, including the number (and percentage) of hunting trips by month. As noted in the revised study plan for 2019 (Year 12), these variables allow for a more accurate representation of effort by month in contrast to measuring effort by number of user-defined subsistence use areas by month, which was previously the primary method of documenting the timing of hunting activity (SRB&A 2020b). Using percentage of subsistence use areas by month is a less accurate way to measure effort in that it is vulnerable to variation dependent on how respondents report data. For example, one person may report several small subsistence use areas while another respondent may report one larger subsistence use area.

For the 2008-2018 study years, the study team quantified changes to caribou harvesting activities (e.g., harvest amount, frequency and duration of trips, months) compared to the previous year as reported by active harvester respondents. The study team found that changes in harvest activities were best measured through quantitative analysis of individual variables, as reported by respondents, and comparison of those variables over time. Thus, in 2019 the study team removed the assessment of changes questions (e.g., "Did you harvest more or less caribou compared to last year?") in favor of comparative analysis of relevant variables (e.g., estimated number of caribou harvested based on household harvest surveys) to identify changes over time.

For the 2008-2018 study years, the active harvester protocol asked respondents directly whether they experienced impacts related to the Alpine and Alpine Satellites Developments. While in most cases respondents did not know the exact source of an impact (e.g., whose helicopter or plane disturbed their hunting activities), the study team categorized most impact responses to this question as Alpine impacts unless the respondent clearly stated another impact source (e.g., "Fish and Game") or if the impact location was clearly outside the CPAI development area (e.g., near Umiat). In 2019, the study team asked respondents about any development impact, and only assigned an impact to CPAI if the respondent clearly identified CPAI as the source. Previous years' data were also recoded to reflect this approach. The approach acknowledges the increasing presence of other developers and other actors on the North Slope, the expanding area of CPAI activities, and potentially allows for greater analysis of cumulative impacts going forward.

Finally, the study team added a question to the active harvester protocol regarding impacts to other (non-caribou) resource harvesting activities. The addition of this question was in response to the NSB rezone ordinance for GMT2, which specifies that the subsistence monitoring study address "hunters, trappers, and fishers." The new questions will help identify whether other resource harvesting activities may need to be monitored.

The study team chose not to show certain variables alongside previous similar variables, such as variables assigned to pre-defined hunting areas during the data processing stage, due to the differences in how the data were collected. However, previous years' data for these variables are still referenced where relevant.

Household Caribou Harvest Surveys

The study team made few changes to the study design for the 2019 household harvest surveys. The study moved one question from the active harvester protocol to the household harvest survey, as it pertained to household harvest amounts: "Did your household harvest enough caribou in 2019 to meet your needs?" The study team also added a follow up question to capture households who did not harvest enough caribou themselves but who received enough caribou from other households. In addition, similar to the active harvester protocol, the study team changed the wording of the question on impacts to query all development impacts rather than just those related to Alpine and Alpine Satellites, with a follow up question to query the associated development or developer.

Active Harvester Interviews

SRB&A used the active harvester protocol during annual interviews with Nuiqsut caribou hunters (see Appendix A). Prior to conducting interviews, researchers asked respondents to read and sign an informed consent form, which guaranteed the confidentiality of respondent information, anonymity of persons interviewed, and the reporting of aggregated data only (Appendix B). Similar to previous study years, the 2019 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 document the geographic extent of subsistence use 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 the first two years of the study (2008 and 2009), the active harvester interviews collected data on the previous calendar year (i.e., January through December). However, because 2010 through 2018 active harvester 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). For the 2019 study year, the study team returned to collecting data for the previous calendar year (January to December 2019), in order to align the active harvester and household harvest survey components of the study. The study team had found that having two different study periods for the two primary components of the monitoring study complicated comparison of the two data sets and reduced study efficiency.

The first section of the active harvester interviews (Caribou Hunting Activities) included mapping of 2019 subsistence use areas and harvest locations. Subsistence use areas and harvest locations are user defined by each respondent, as the extent of the respondent's search areas and location of harvest sites during the study year. Each subsistence use area is unique and drawn by the interviewer at the direction of the respondent. For each subsistence use area, the study team gathered the following variables:

- Months of use
- Transportation method
- Harvest success (in terms of whether the hunter did or did not harvest caribou in that subsistence use area in 2019)
- 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 harvest effort (frequency and duration of trips). For the 2019 study year, the active harvester interviews collected certain variables for 12 pre-defined hunting areas which the study team had developed in consultation with the Nuiqsut Caribou Panel (see "Summary of 2019 Study Plan Revisions"). Collecting variables by these pre-defined hunting areas allowed for comparison of key variables within geographic areas over time; because the size and extent of the user-defined subsistence use areas varies by respondent and by year, comparison of certain variables by subsistence use area over time is less useful. In 2019, the study team documented the following variables by 12 pre-defined hunting areas:

- Did respondent use the hunting area for caribou hunting
- Total number of trips to each hunting area
- Typical duration of trips (in hours) to each hunting area

The second section of the interview (Assessment of Harvested Caribou), gathered data about the following abnormalities in the respondent's harvested caribou in 2019:

- Abnormal health (e.g., disease/infection/color of meat)
- Abnormal quality (e.g., unusual taste, smell)
- Abnormal size (e.g., unusual 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 2019 related to development. Previous years asked respondents specifically whether they had experienced impacts related to CD4 or other Alpine Satellite developments. The Nuiqsut Caribou Panel has stressed throughout the monitoring study the importance of considering the cumulative impacts of North Slope oil and gas development to their community, rather than focusing solely on a single developer. In addition, the GMT-2 ROD states that the study may be expanded upon to document cumulative impacts (BLM 2018). Finally, the study team found that respondents often did not know the exact source of the impacts they experienced, thus reporting any development-related impacts and only sometimes specifying that CPAI was the impact source. Thus, in 2019 the study team reworded the question to address any impact on caribou hunting related to development, with follow up questions regarding to what development or developer the impact was related. The study team recoded the results of previous years' (i.e., 2008 to 2018) responses to distinguish between "development-related" and "CPAI-related" impacts, in order to make the data more comparable. The more systematic documentation of all development-related impacts also provides information on the cumulative impacts of various actors on the North Slope.

If respondents indicated that they had experienced impacts in 2019, then researchers asked them specifically about the following potential impacts:

- Helicopter traffic
- Plane traffic
- Other traffic

- Oil company personnel
- Structures (e.g., roads, pipelines)
- Security policies
- Seismic lines or activity
- Other

The study team also documented non-development related impacts (e.g., sport hunters, recreationalists) when volunteered by respondents, but these were not systematically documented. In response to the NSB rezone ordinance and BLM's ROD for GMT-2, the study team added a question about impacts to other (non-caribou) resource harvesting activities, in order to determine whether the monitoring study should be expanded to address additional resources in the future. The study team also asked whether the respondent avoided or no longer used certain areas to hunt for caribou. 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.

The results of the 2019 active harvester interviews are provided in tables and figures in the main body of this report. Maps showing individual data for previous study years are provided in Appendix C; data tables for 2008-2018 variables that were not carried forward into 2019 are provided in Appendix D; and tables providing data for all individual study years are provided in Appendix E.

Household Caribou Harvest Surveys

The study team added the harvest survey component to the monitoring plan during 2009 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 2010 and in subsequent years (Years 2011 through 2019) (see [SRB&A 2010] through [SRB&A 2020b]) for a description of the previous efforts to complete the household surveys). In 2014, the Alaska Department of Fish and Game (ADF&G) collected caribou harvest data as part of a comprehensive household survey and shared these data with SRB&A. From 2015 through 2019, the study team resumed implementation of the annual household caribou harvest survey. The 2019 household caribou harvest surveys addressed the 2019 calendar year (January 2019 through December 2019) and consisted of 10 questions regarding caribou harvests (Appendix A). The survey collected the following data for each household for the 2019 study year:

- Using, trying to harvest, and successfully harvesting caribou
- Use of roads for hunting caribou
- Number of sick or injured caribou harvested
- Giving and receiving caribou
- Harvesting enough caribou
- Development-related impacts

Respondent Selection Process

Active Harvester Interviews

In order to collect accurate data for the 2019 caribou hunting season, it was necessary to interview currently active caribou harvesters. The study team attempted contact with 2008 through 2018 respondents with the goal of achieving consistency between study years. As anticipated, not all 2008 through 2018 respondents were available to participate in 2019 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 interview a similar number 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.

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.

Study team members have periodically received comments from community residents and from Nuiqsut Caribou Panel members 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. During previous study years, the study team has consulted with the Nuiqsut Caribou Panel and the City of Nuiqsut's cultural coordinator regarding how interviews should address requests by walk-ins, and how the study team should ultimately "select" active harvesters for inclusion in the study. These consultations 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. In 2019, the study team reintroduced a question at the end of the active harvester protocol: "Are there any residents who were particularly active caribou hunters in 2019 who we should try to talk to while we are here"? This question was included on the active harvester protocol during the early years of the study to establish the list of active harvesters. The study team determined in the 2019 study plan that because the list of active harvesters in Nuiqsut may change on an annual basis and evolves over time, the study team should resume its efforts to update the active harvester list annually. The study team recorded the names of the people mentioned, tallied the number of times each individual was nominated, and used the resulting list to guide its efforts in contacting residents. The study team will continue to develop this list in future study years.

Walk-in interviews were selectively conducted only after confirming that the individual had hunted caribou during the 2019 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 walk-in interviews at that time. Fieldworkers found that these "walk-in" respondents were generally active hunters and harvesters who provided informative and thorough interviews. Based on a review of active harvester respondent data from individual study years, the highest number of walk-in respondents (33 percent of respondents) occurred in Year 1, when the study team had just begun developing its list of active harvesters. In all other study years except for one, walk-in respondents (i.e., individuals not on the active harvester list during that year) accounted for between three and 15 percent of respondents. In many cases, a walk-in respondent was later nominated or otherwise confirmed active by community members.

Household Caribou Harvest Surveys

SRB&A worked with KSOPI to create an updated household list in March 2020. Because the study team was conducting interviews for all three study components (active harvester interviews, household harvest surveys, and 10-year mapping interviews) during the March 2020 fieldtrip, researchers did not focus on conducting door-to-door household harvest surveys and instead completed household harvest surveys with willing participants following the active harvester interviews. The study team planned a second trip to focus on completing the household harvest surveys. However, due to the COVID-19 pandemic and the unprecedented travel and safety restrictions, a second in-person trip was not possible. The study team worked with KSOPI and hired two local community liaisons who helped in the process of completing additional surveys. The study team also posted on the Nuiqsagmiut Facebook Page asking residents to

participate in the survey by contacting the local liaisons or SRB&A. Finally, the study team created a survey which residents could access and fill out online and posted the link to the survey on the Nuiqsagmiut Facebook Page. The study team followed up with messages to individual household heads asking them to complete the survey. A number of community members participated by phone or via the online survey. Thus, the study team used a number of approaches to complete as many household harvest surveys as possible.

Conducting harvest surveys in the community allows the study team to physically contact or attempt contact with every household and determine their eligibility for that year's harvest survey. In some cases, the study team determines that the household is currently unoccupied, the residents are out of town for an extended period of time, or are occupied seasonal workers. The study team worked with KSOPI to establish the status of households, but other households may have been ineligible had additional fieldwork occurred. The study team identified 113 households which were believed to be permanently occupied during the 2019 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 subsistence use 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 subsistence use 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.

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 $100 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,

or they were completed by household members via an online form. When conducting the survey 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. The online survey form provided information to the individual completing the form regarding the background and purpose of the surveys. Surveys generally took less than 10 minutes.

Fieldwork Summary

Active Harvester Interviews

The study team traveled to Nuiqsut once to conduct 2019 active harvester interviews in March 2020. As shown in Table 1, SRB&A researchers interviewed 22 Nuiqsut active harvesters. The number of active harvester interviews was the lowest of all study years, a result of the shortened field season due to the COVID-19 pandemic. While the study team was able to conduct additional household harvest surveys over the phone or online, it was not possible to conduct the active harvester interviews remotely due to the mapping component.

Over the 11 previous study years, SRB&A had developed a list of 132 active caribou harvesters in Nuiqsut (Table 1), which include all residents interviewed and/or identified as active harvesters during 2008-2018 (Years 1 through 11). The study team attempted to interview respondents from previous study years again in 2019 with a focus on respondents who have participated in multiple study years or have been highly recommended as active harvesters. In 2019, the study team resumed asking respondents to recommend other active caribou harvesters to interview; the study team will use the list of nominated individuals to further inform respondent selection in the future. The list of active harvesters has evolved over time and changes from year to year (see "Respondent Selection Process" above).

Table 1: Fieldwork Summary, 2019

# of Permanent Occupied Households (2019) [1]	Population (2019)[2]	# of Persons Identified as Active Caribou Harvesters	# of Persons Eligible for Interviews	# (%) of Eligible Active Harvester Respondents Interviewed	Number of Interview Workshops	Number of Interview Trips to Community
113	487	132	129	22 (17%)	22	1

[1]Based on eligible households identified during the 2019 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 2019 household harvest surveys. Does not include estimates for schoolteacher housing, NSB housing, or other non-permanent households.

Stephen R. Braund & Associates, 2021.

Table 1 depicts the number of persons eligible for interviews during each study year. A person was not eligible for an interview if he or she did not go caribou hunting during the study year, 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 in Table 1, over the course of the study SRB&A has developed a list of 132 potentially active harvesters, 129 of whom were assumed eligible for an interview in 2019 based on the information available to the study team through consultation with KSOPI and other community residents. Other individuals may have been ineligible; the study team did not document the status of every potentially active harvester in 2019. The list of active harvesters 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 the study.

As shown in Table 2, between 19 and 28 percent of respondents from previous study years also participated in 2019 interviews. A review of the Year 12 respondent list indicates that the individuals who participated were regular participants in the monitoring study, with 73 percent having participated in interviews in at least half of all study years, and nearly one third having participated in 10 or more study years. Only one respondent had not participated in previous study years. The high study participation rate of Year 12 respondents increases the likelihood that the Year 12 results are comparable to previous study years, although the low sample due to the COVID-19 pandemic should be considered when comparing 2019 results to previous study years.

Table 2: Respondent Summary, 2008-2019

Study Year	Number of Active Harvester Respondents	Number of Respondents also Interviewed in Year 12
2008	36	7 (19%)
2009	53	13 (25%)
2010	57	11 (19%)
2011	58	14 (24%)
2012	57	16 (28%)
2013	57	13 (23%)
2014	60	14 (23%)
2015	58	12 (21%)
2016	63	13 (21%)
2017	68	12 (18%)
2018	50	12 (24%)
2019	22	-

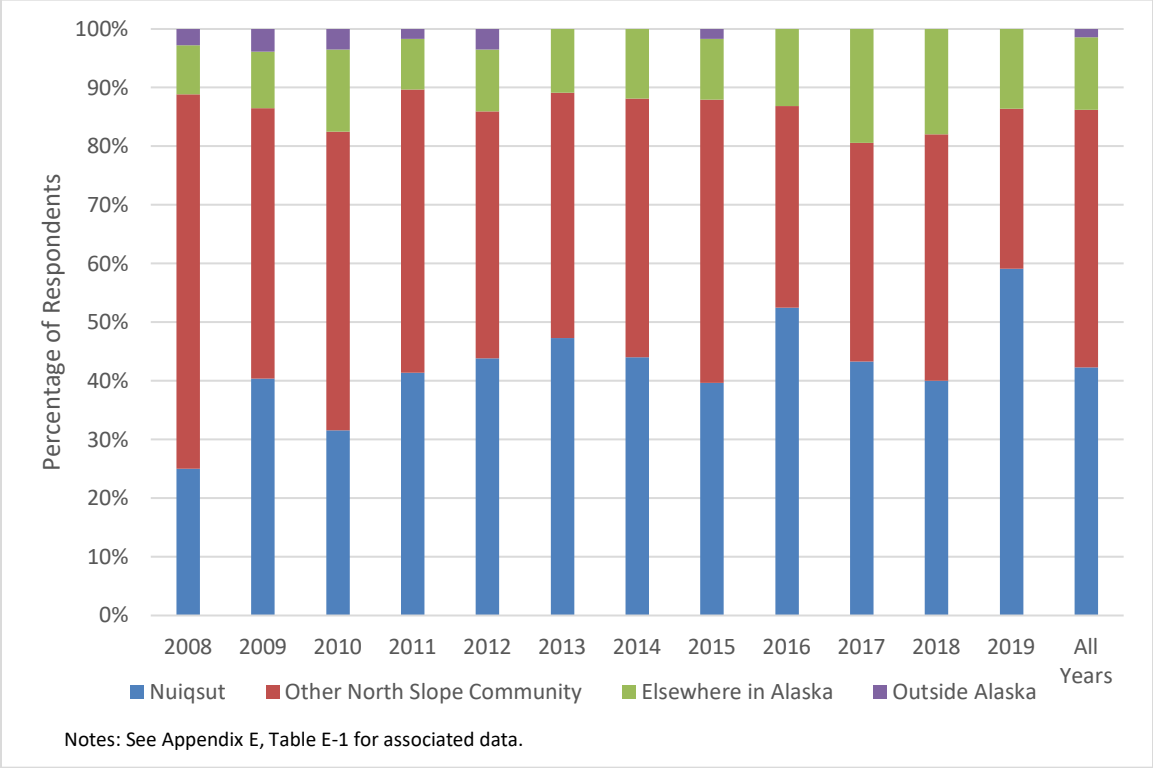
Stephen R. Braund & Associates, 2021.

The following figures and tables (Figure 1 through Figure 3; Table 3) show descriptive data for the 2008 through 2019 (Year 1 through Year 12) respondents. Associated data tables are in Appendix E Table E-1 through Table E-3. During all study years, over 80 percent of respondents were born on the North Slope (Figure 1). While still close to the average percentage range, the percentage of 2019 respondents born in Nuiqsut was the highest of all study years (59 percent) and the percentage of respondents born in Other North Slope communities was the lowest of all study years (27 percent). This may be related to the somewhat higher percentage of Year 12 respondents born in the 1980s, after the community was resettled. Differences in respondent characteristics in Year 12 could also be due in part to lower-than-average participation in the study which was a result of the COVID-19 pandemic.

The distribution of decades in which respondents were born remained fairly consistent in 2019 compared to previous years, with some differences. The percentage of 2019 respondents born in the 1950s, 1960s, and 1970s was on the low end and the percentage born in the 1980s was on the high end (Figure 2).

The large majority (86 percent) of 2019 respondents have resided in Nuiqsut for 20 or more years (Table 3). 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 from 2016 through 2018 (27, 31, and 30 percent, respectively) (Figure 3). In 2019, 14 percent of respondents were female.

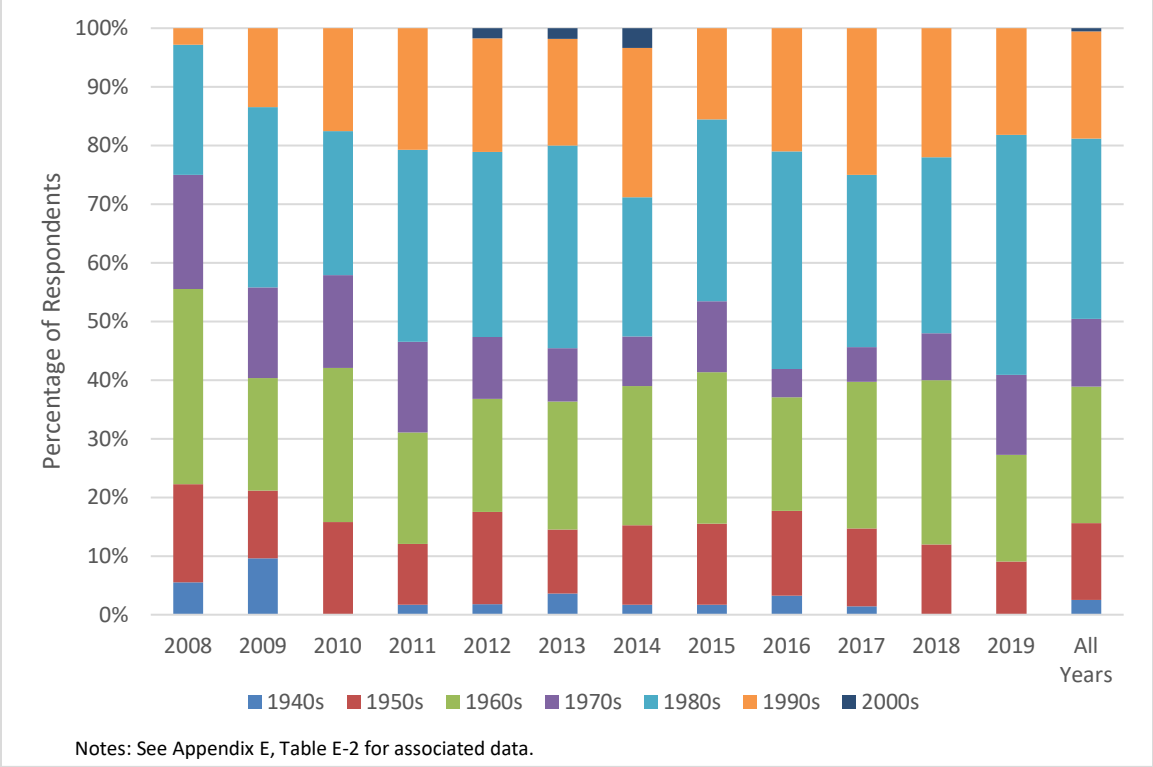
Figure 1: Respondents' Residence at Time of Birth



Notes: See Appendix E, Table E-1 for associated data.

Stephen R. Braund & Associates, 2021.

Figure 2: Respondents' Decade of Birth



Notes: See Appendix E, Table E-2 for associated data.

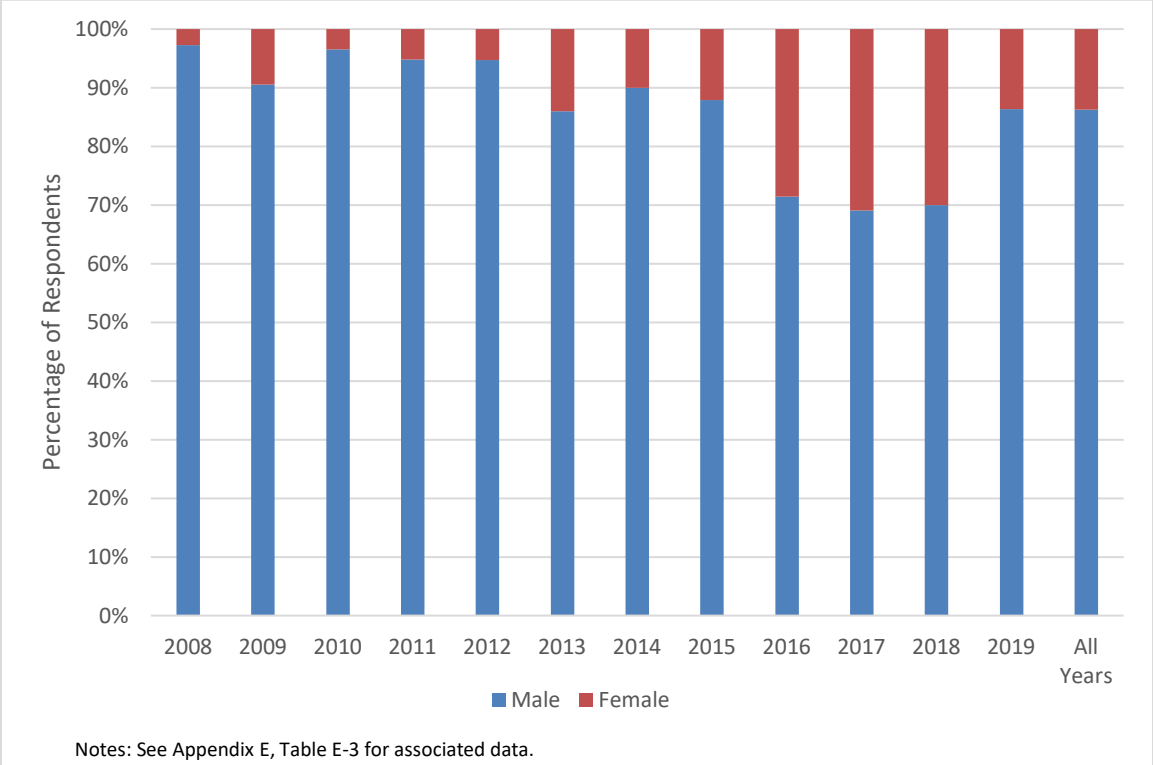
Stephen R. Braund & Associates, 2021.

Table 3: Respondents' Years of Residence in Nuiqsut, 2019

Years of Residence	Percent of Active Harvester Respondents
	2019
5 years or less	0%
6-10 years	0%
11-19 years	14%
20 plus years	86%
20 plus seasonal	0%
Total	100%
Number of Respondents	22

Stephen R. Braund & Associates, 2021.

Figure 3: Respondents' Gender



Notes: See Appendix E, Table E-3 for associated data.

Stephen R. Braund & Associates, 2021.

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 2019 year by Nuiqsut residents and were still occupied during the period in which the survey was implemented. SRB&A worked with KSOPI to update the household list for 2019. The resulting list included 115 occupied households (not including teacher and itinerant housing). Two of these households were found to be unoccupied or out of town for an extended period of time (see "Respondent Selection Process, above). Therefore, the total number of eligible households for the 2019 household surveys was 113.

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. The study team began conducting Household Caribou Harvest surveys in March 2020, but fieldwork was halted due to the COVID-19 pandemic. Because the study team was also conducting the active harvester interviews and 10-year mapping interviews during the same field trip, the number of household surveys completed during the March 2020 fieldwork was limited. The study team continued conducting household harvest surveys remotely by telephone, through local liaisons in the community, and via an online survey form posted on the Nuiqsagmiut Facebook page. Despite these efforts, the study team was unable to achieve an 80 percent response rate (Table 4).

To characterize how representative the 2019 data were of the community as a whole, the study team reviewed previous years' data and categorized Nuiqsut households into four categories: high harvesters, moderate harvesters, low harvesters, and non-harvesters of caribou. The study team calculated the average harvest (in number of caribou) of each household across all available study years, then split the harvesting households into three groups (top third, middle third, lower third). High harvester households were households which reported harvesting an average of five or more caribou; moderate harvester households harvested between three and four caribou; and low harvester households harvested between one and two caribou on average. The remaining households were "non-harvesting" and generally did not harvest any caribou during available study years. The analysis showed that compared to all years, approximately 10 percent fewer Year 12 households were "non-harvesting households," suggesting that expanding harvest estimates to the community as a whole may result in an inflated estimate because more higher harvesting households were surveyed and were the basis for the expanded community estimates. SRB&A completed a total of 46 (41 percent) household surveys in the community of Nuiqsut (Table 4).

Table 4: Nuiqsut List of Occupied Households, 2019

Type of Household	Number of Households
Original Household List	115
Unoccupied or empty at time of survey	2
Total Eligible Households	113
Surveyed Households (Percentage of Eligible Households)	46 (41%)

Stephen R. Braund & Associates, 2021.

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 for the active harvester interviews, researchers entered all of the data from the interviews, 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 for the active harvester interviews 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.
- Subsistence Use Area Table – This table contains one record per subsistence use area collected in Section A of the field protocol ("Caribou Hunting Activities"), in addition to other variables (e.g., months, transportation method) 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.
- Hunting Characteristics Table – This table contains one record per respondent and includes their responses regarding the total number of trips by month, number of overnight trips, and frequency and duration of trips to 12 pre-defined hunting areas, as collected in Section A of the field protocol.
- 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 assigned numeric codes to each observed change or observed abnormality and to respondents' explanations as to why each observed abnormality occurred. Coding of these variables allowed the study team to develop tables with frequencies of respondent observations. Appendix F provides codes used in the Access database, with examples of the types of responses each code encompasses.
- 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 impact source, month of impact, associated feature codes, and descriptions of the impact.
- Other Impacts Table – This table contains one record per respondent and includes their responses regarding impacts to other resource harvesting activities and avoidance of previously used areas. The study team coded each response (by species or cause code) so that the data could later be queried.

The resulting database contains five primary data sets. The number of records in each data set for the 12 study years is shown in Table 5.

The project database also included the following tables for the Household Harvest Surveys:

- Household Table – This table contains one record per household with the Household ID, Household Address, and status (eligibility/interviewed) in the study year.
- Harvest Survey Table – This table contains one record per household and contains the results of the caribou harvest survey.

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 codes and resulted in all data entry being checked for accuracy.

Table 5: Nuiqsut Datasets, 2008-2019

	Number of Database Records				
Study Year	Respondent characteristics (age, residence duration, place of birth)	Subsistence use areas	Harvest locations	Caribou health and condition	Impacts on harvest activities
2008	36	137	182	87	111
2009	53	187	152	67	109
2010	57	215	196	71	81
2011	58	194	162	68	72
2012	57	211	195	83	102
2013	57	196	143	51	107
2014	60	206	248	67	87
2015	58	153	173	72	83
2016	63	195	163	67	84
2017	68	233	190	74	105
2018	50	177	150	55	103
2019	22	57	60	23	28

Notes: The numbers in this table represent the number of database records within each of the associated tables (Respondent characteristics, subsistence use areas, harvest locations, caribou health and condition, and impacts on harvest activities), by study year. The number of respondents varies by study year, as does the number of subsistence use areas, harvest locations, abnormal caribou, and impacts reported by respondents.

Stephen R. Braund & Associates, 2021.

Digitizing

To facilitate digitizing, SRB&A first had all the acetate overlays from the active harvester interviews 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 57 subsistence use areas and 60 harvest locations for the 2019 study year (Table 5). 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 active harvester data consists of seven related tables, which are described above ("Data Entry"): (1) Respondent; (2) Subsistence Use Area; (3) Harvest Location; (4) Hunting Characteristics; (5) Harvested Caribou Assessment; (6) Hunting Impact and (7) Other Impacts. The Access Database resulting from entry of household harvest survey data consists of two related tables, which are described above ("Data Entry"): (1) Household and (2) Harvest Survey. 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

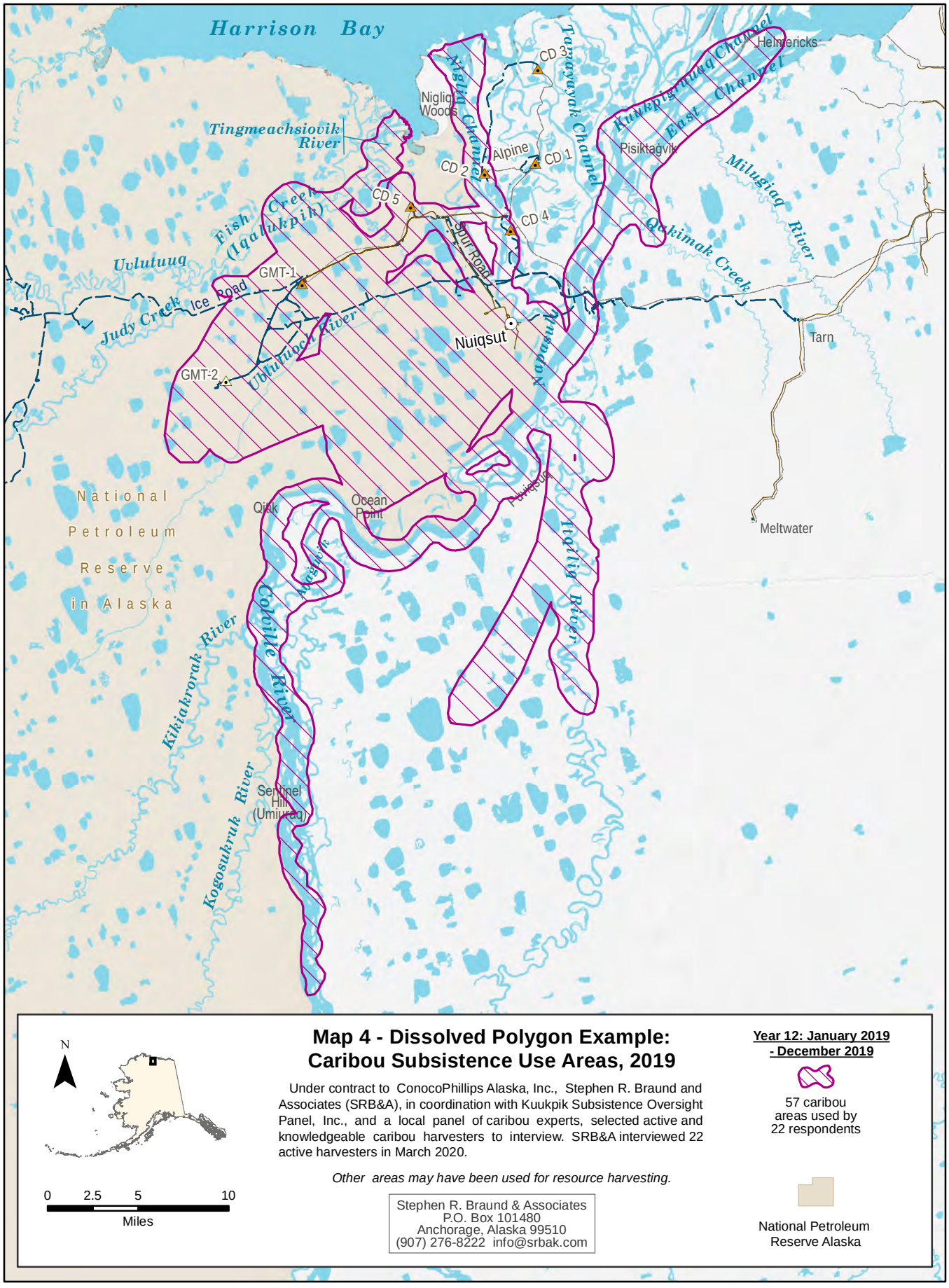
The relevant tables from the Access database were linked to the GIS database so that GIS staff could develop maps querying specific feature information. The SRB&A GIS mapping system consists of three possible methods of presenting mapped information. The first method is referred to as a "spaghetti map." The spaghetti map is made up of vectors (e.g., a point, line, or polygon) and represents overlaying all of the individual respondent outlines of 2019 caribou subsistence use 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 4. Researchers often use this method to represent subsistence use areas on maps. While this single polygon approach clearly shows the extent of the subsistence 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 5), SRB&A converts polygons (subsistence 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 subsistence use areas and other variables in this report and can be seen below, under "Caribou Subsistence Use Areas and Harvest Locations."

Household Harvest Survey Data Analysis

As noted above, 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 community harvest estimates based on the results of the household surveys, the study team used a weighting factor, which was computed by dividing the total number of eligible households for the study year (113) by the number of interviewed households (46). The study team then multiplied the sum of all reported caribou harvests by the weighting factor (approximately 2.46). The study also calculates confidence limits, expressed as a percentage using the methods described in ADF&G Technical Paper No. 426 (Brown, Braem, Mikow, Trainor, Slayton, Runfola, Ikuta, Kostick, McDevitt, Park, and Simon 2016).

In previous years, the study team operated under the assumption that the 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. However, as discussed above ("Fieldwork Summary"), in 2019 the study team determined that a limited number of "non-harvesting" households participated in the survey, likely because non-active households are less likely to volunteer participation in such surveys without direct contact from surveyors (e.g., household heads often believe they should not participate as they are not active). Thus, the study team determined that using the smaller 2019 sample to estimate a community harvest may result in an inflated community harvest estimate. The study team ran the 2019 data based on the smaller sample but discusses these results with the caveat that data may not be representative of the community as a whole and, in particular, may overestimate community participation and harvests in 2019.

To determine the total pounds of caribou harvested, the study team used a conversion factor of 117 usable 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 meetings with the NSB Department of



N

0 2.5 5 10

Miles

Map 4 - Dissolved Polygon Example: Caribou Subsistence Use Areas, 2019

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 22 active harvesters in March 2020.

Other areas may have been used for resource harvesting.

Stephen R. Braund & Associates
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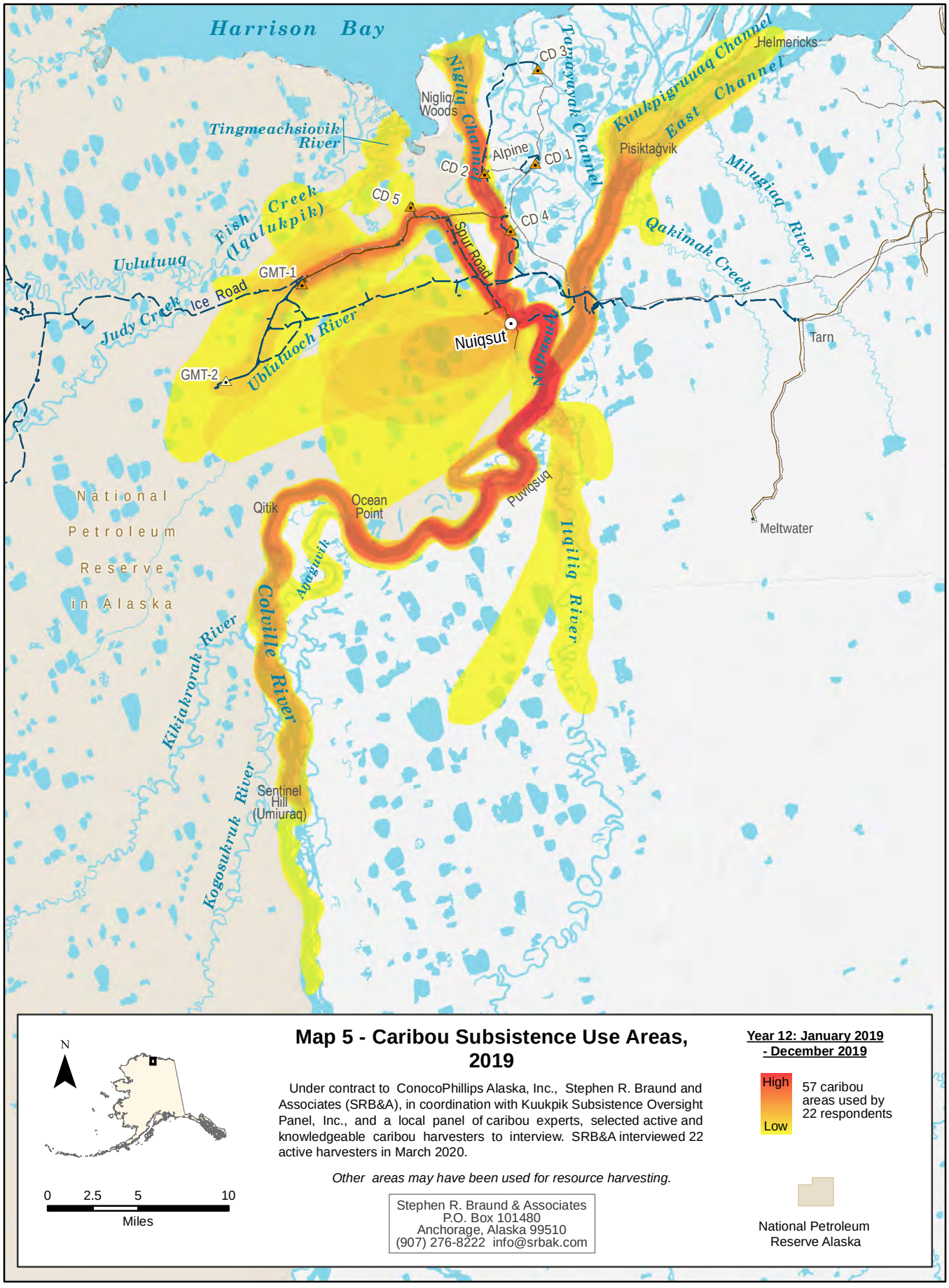
Year 12: January 2019 - December 2019

57 caribou areas used by 22 respondents

National Petroleum Reserve Alaska



Map 5 - Caribou Subsistence Use Areas, 2019

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Year 12: January 2019 - December 2019

High
Low

57 caribou areas used by 22 respondents

National Petroleum Reserve Alaska

Wildlife Management related to this project, staff members have questioned this conversion factor and expressed concern that 117 pounds seemed high; in contrast, Nuiqsut Caribou Panel members have expressed that the conversion factor may be low, noting that Nuiqsut residents use not only the meat of the caribou, but the heart, head, stomach, brains, bones (for marrow and for use in soups), and skin (for clothing and crafts). However, to facilitate comparison with other recent harvest studies which have used the 117 pound conversion factor, the study team has retained the conversion rate of 117 pounds per caribou for this study.

Data Review

SRB&A submitted a draft of the Year 12 report to CPAI and the NSB Department of Wildlife Management in March 2021 and met with CPAI and the NSB via teleconference on March 31, 2021 to review and discuss their comments on the Year 12 report. The study team also prepared a draft summary handout for the Nuiqsut Caribou Panel, which was distributed to panel members by KSOP, and met with the Nuiqsut Caribou Panel via teleconference on March 15, 2021 to review the Year 12 findings. The study team revised the Year 12 report based on comments from CPAI, NSB, and the Nuiqsut Caribou Panel, and sent the draft final report to the Nuiqsut Caribou Panel for final review. The study team finalized the Year 12 report in July 2021.

Presentation of Interview Results

This report summarizes the results of the 2019 fieldwork through analysis of the data collected during the 2019 (Year 12) active harvester interviews and household harvest surveys. The Year 12 time period covers the 2019 calendar year: January through December 2019. Beginning in Year 11, many data tables and certain figures and maps were moved to Appendices C through E with the goal of making the main body of the report more direct, succinct, and reader-friendly. Appendix C includes maps showing individual data

for previous study years. Appendix D includes data tables for variables which were either dropped from the study plan in 2019 (Year 12) or for which data collection methods have changed such that direct comparisons between years are not appropriate. Appendix E provides individual study year data for current variables. Most data tables are now in Appendix E with the report body providing data in the form of figures. In cases where it is not feasible to include all previous 11 study years' data, the figures provide 2019 data alongside an average across all study years ("All Years"). The bulk of report figures, tables, and maps are based on the active harvester interviews, as those interviews address more variables. All tables and figures based on the household harvest surveys have titles beginning with "Household Harvest Survey." Report tables and figures are based on various units of analysis, including subsistence use areas, harvest locations, pre-defined hunting areas, harvest amounts, respondents, observations, and households.

This report summarizes the results of the active harvester interviews supported by verbatim (as close as possible by typing their responses during interviews) responses of study participants. Selected quotes are provided throughout the report to provide context to study results. Appendix G provides a more comprehensive list of respondent quotes organized by topic, and Appendix H provides a summary of Nuiqsut traditional knowledge regarding caribou. While researchers attempted to obtain detailed descriptions of residents' observations, they did not try to verify the factual basis of their observations.

RESULTS

Caribou Subsistence Use Areas and Harvest Locations

This section describes the locations and characteristics of 2019 caribou subsistence use areas and harvest locations. Nuiqsut respondents reported 57 caribou subsistence use areas for the 2019 study period. In addition to providing the location of their 2019 caribou subsistence use areas, respondents identified 60 harvest locations within the subsistence use areas. The numbers of use areas and harvest locations are

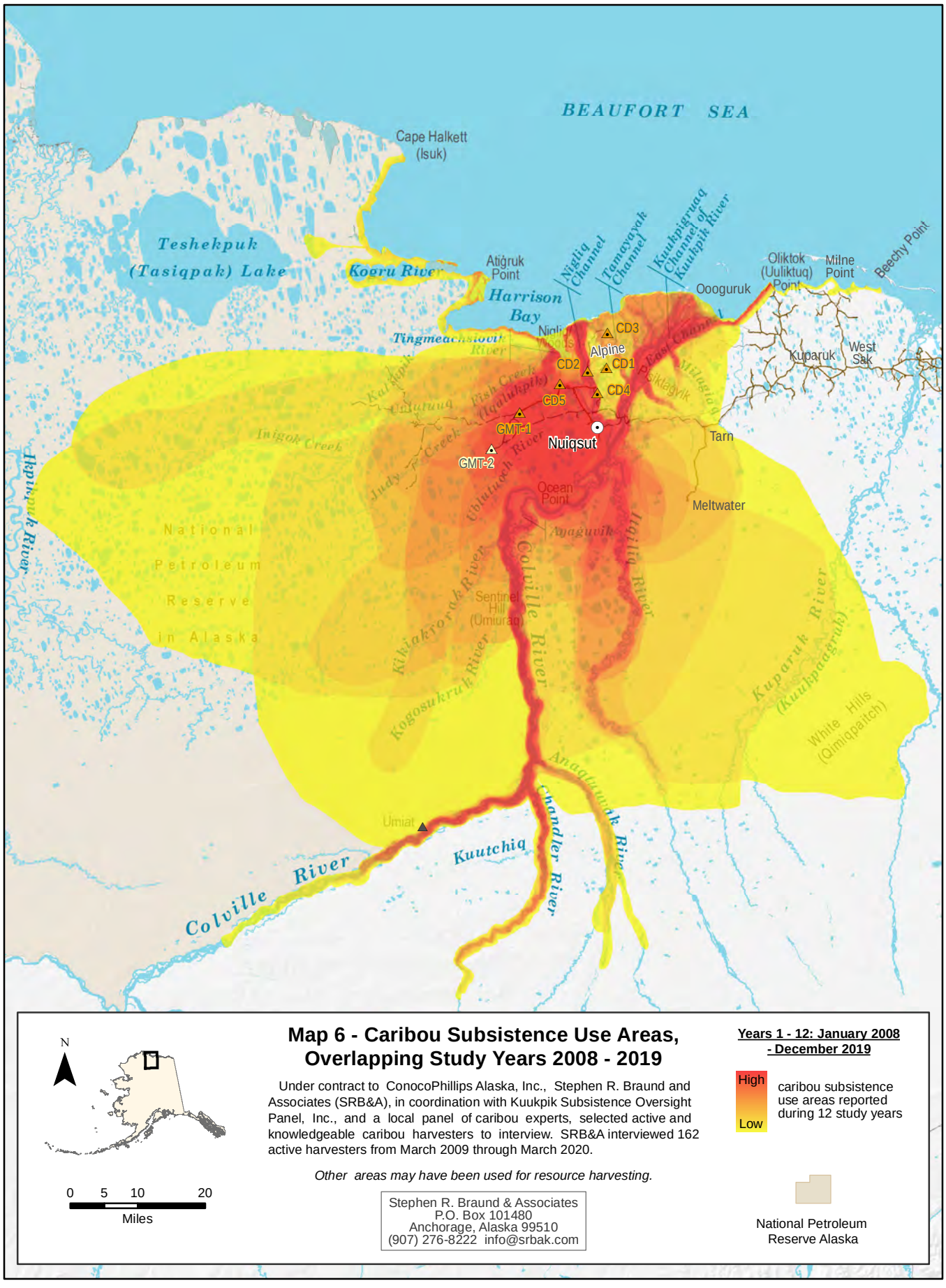
notably smaller than those provided in previous years, due to the relatively smaller number of active harvesters interviewed for the 2019 study year.

Nuiqsut 2019 caribou subsistence use areas, as reported by 22 Nuiqsut respondents, are depicted on Map 5. Combined Year 2008 through 2019 caribou subsistence use areas are depicted on Map 6. Subsistence use areas for previous study years (2008-2018) are provided in Appendix C, Map C-1 and Map C-2. During the 2019 time period (January through December of 2019), study participants reported searching for caribou along local rivers, overland to the west and south of the community, and along the road systems connected to the community. In 2019, no respondents reporting hunting for caribou in coastal areas; however, coastal hunting is generally limited to a small number of individuals or occurs opportunistically. Therefore, the lack of coastal hunting depicted on Map 6 may be a result of the low number of interviews completed for the 2019 study year.

Residents' riverine travel extended along Nigliq Channel and the East Channel of the Colville River, along Fish and Qakimak creeks, upriver along the Colville River past Umiuraq (Sentinel Hill), and along the Itqiliq River. 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 along the Itqiliq River drainage. Subsistence use areas also extended north of the community along the Spur Road and the road to CD5 and GMT-1. Overland areas also extended off of the road system toward Fish Creek, Judy Creek, and the proposed GMT-2 drillsite. The GMT-2 gravel road was constructed in January through April of 2019, and the road was partially opened to hunters starting in mid-September although soft road conditions likely resulted in limited use by hunters.

The highest numbers of overlapping caribou subsistence use areas in 2019 occurred along Nigliq Channel, upriver along the Colville River between the East Channel and Ocean Point, along the lower portion of the Itqiliq River, and along the Spur Road and GMT-1 road north and northwest of the community. A moderate number of overlapping subsistence use areas extended along the East Channel and lower Nigliq Channel, farther upriver along the Colville River to Umiuraq (Sentinel Hill), and overland directly to the west of the community. Across all study years (2008-2019; Map 6), Nuiqsut caribou hunters have traveled over a large area extending east past the Kuparuk River, west to the Ikpikpuk River, and south beyond Umiat on Colville River. Areas of high overlapping use across all study years occur along the Colville River and delta, including most Colville River tributaries. Moderate to high overlapping use has also occurred in overland areas surrounding Fish and Judy creeks, Ublutuoch and Kikiakrorak rivers, and Itqiliq River (Map 6). Caribou use areas in 2019 generally occurred within the area of high overlapping use shown on Map 6; other areas may have been used by active caribou harvesters in 2019 but were not captured due to the lower number of interviews conducted.

In terms of subsistence use areas, 2019 (Map 5) was somewhat similar to recent study years (Map 6; Appendix C, Map C-1 and Map C-2). The extent of overland snowmachine or four-wheeler travel was less than some previous years but similar to others. The extent of road travel was higher in 2019 than previous years as a result of the newly constructed GMT-2 road. The change in overland extent from year to year is often associated with a subset of hunters who hunt over large areas by snowmachine during the winter, particularly for furbearers. Often, these hunters may hunt over a large area in one year, and a smaller area the next year due to factors such as lack of time, lack of gas, lack of working snowmachine, or unsuitable snow conditions. Thus, the overall extent of subsistence use areas depicted on study maps can be greatly affected by the sample of active harvesters each year and in most years likely underrepresents total subsistence use area extent. At a March 2021 meeting, Nuiqsut caribou panel members confirmed that some Nuiqsut residents continue to travel large distances by snowmachine for caribou and other resources (e.g., furbearers). Riverine travel was less extensive than most previous study years, with few people traveling beyond Umiuraq (Sentinel Hill) on the Colville River, and somewhat limited travel along the Itqiliq River. Nuiqsut caribou panel members noted that this lack of travel along Itqiliq River could have been due to low water levels in 2019. The smaller extent of use areas in 2019 could be due in part to the truncated field season and relatively small active harvester sample.



Map 6 - Caribou Subsistence Use Areas, Overlapping Study Years 2008 - 2019

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 162 active harvesters from March 2009 through March 2020.

Other areas may have been used for resource harvesting.

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N

0 5 10 20
Miles

Years 1 - 12: January 2008 - December 2019

High
Low

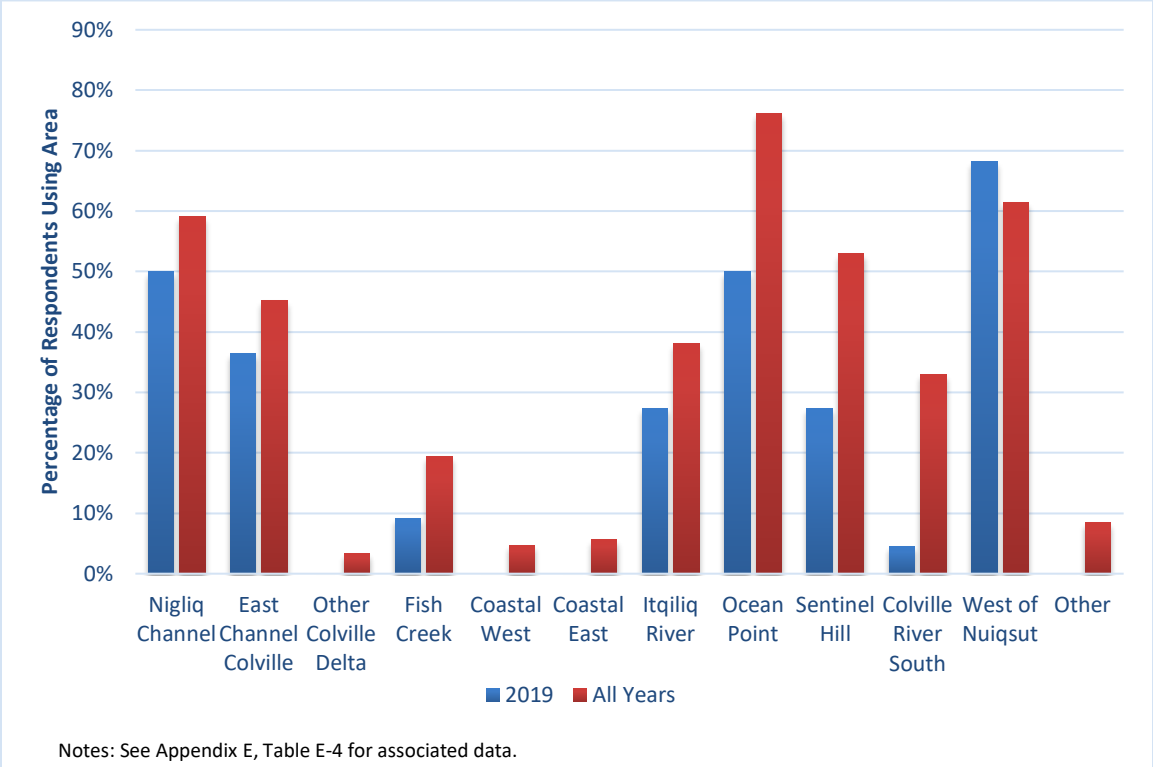
caribou subsistence use areas reported during 12 study years

National Petroleum Reserve Alaska

For the first time since the monitoring study began, riverine travel did not extend as far as Umiat in 2019. Recent study years have also seen decreased overlapping use farther upriver past Umiuraq (Sentinel Hill). Similarities between Map 5 (2019 subsistence use areas) and Map 6 (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.

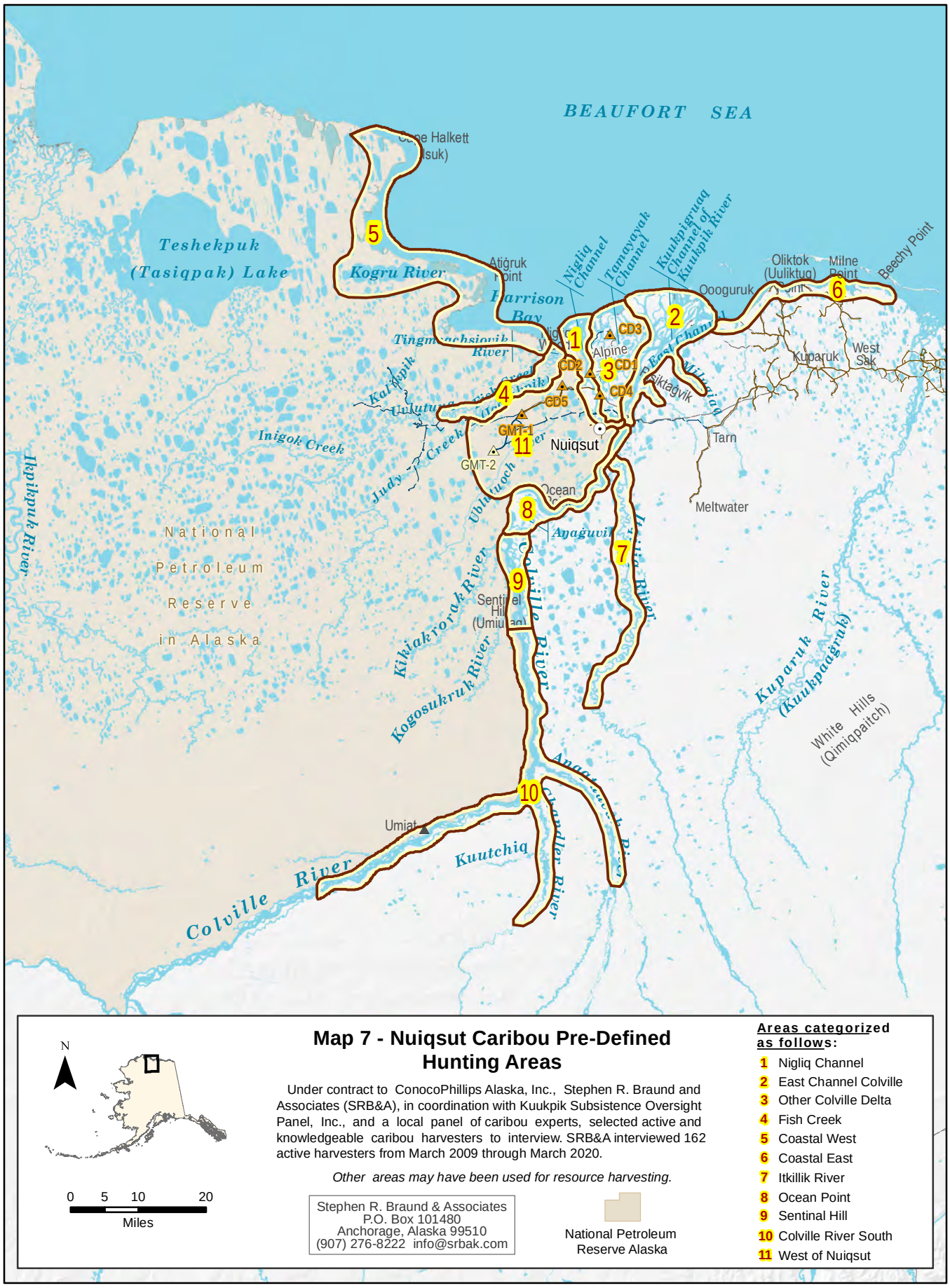
Figure 4 and Table E-4 provides data on the percentage of respondents using 12 pre-defined hunting areas (Map 7). On average across all study years (shown in red on Figure 4), the area upriver to Ocean Point has had the most use in terms of percentage of subsistence use areas and respondents, followed by the area West of Nuiqsut, Nigliq Channel, and Sentinel Hill. On average across all study years, the Ocean Point area was most commonly used (by an average of 76 percent of respondents), followed by the area West of Nuiqsut (61 percent), Nigliq Channel (59 percent), Sentinel Hill (53 percent), and East Channel (45 percent) (Figure 4). The least commonly used areas have been the Other Colville Delta, Coastal East, and Coastal West areas. In 2019, a number of areas saw a notable decrease in use compared to previous study years. Fifty percent of respondents used the Ocean Point area compared to an all years average of 76 percent; 27 percent used the Sentinel Hill Area (compared to an all years average of 53 percent); and no respondents traveled to the Colville River South Area (compared to an average of 33 percent). Overall, fewer respondents traveled upriver along the Colville River in 2019 compared to previous years (Figure 4; Appendix E, Table E-4). The only area that saw an increase in use was the area West of Nuiqsut, with 67 percent of respondents using this area compared to an average of 61 percent in previous years. While use of Nigliq Channel has decreased from earlier years of the monitoring study (an average of 70 percent respondents using in the first six years compared to an average of 50 percent in the last six years), in 2019 use of Nigliq Channel increased slightly (50 percent of respondents) over a low of 40 percent of respondents in 2018 (Appendix E, Table E-4).

Figure 4: Percentage of Respondents Using Pre-Defined Hunting Areas, 2019



Notes: See Appendix E, Table E-4 for associated data.

Stephen R. Braund & Associates, 2021.



Map 7 - Nuiqsut Caribou Pre-Defined Hunting Areas

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 162 active harvesters from March 2009 through March 2020.

Other areas may have been used for resource harvesting.

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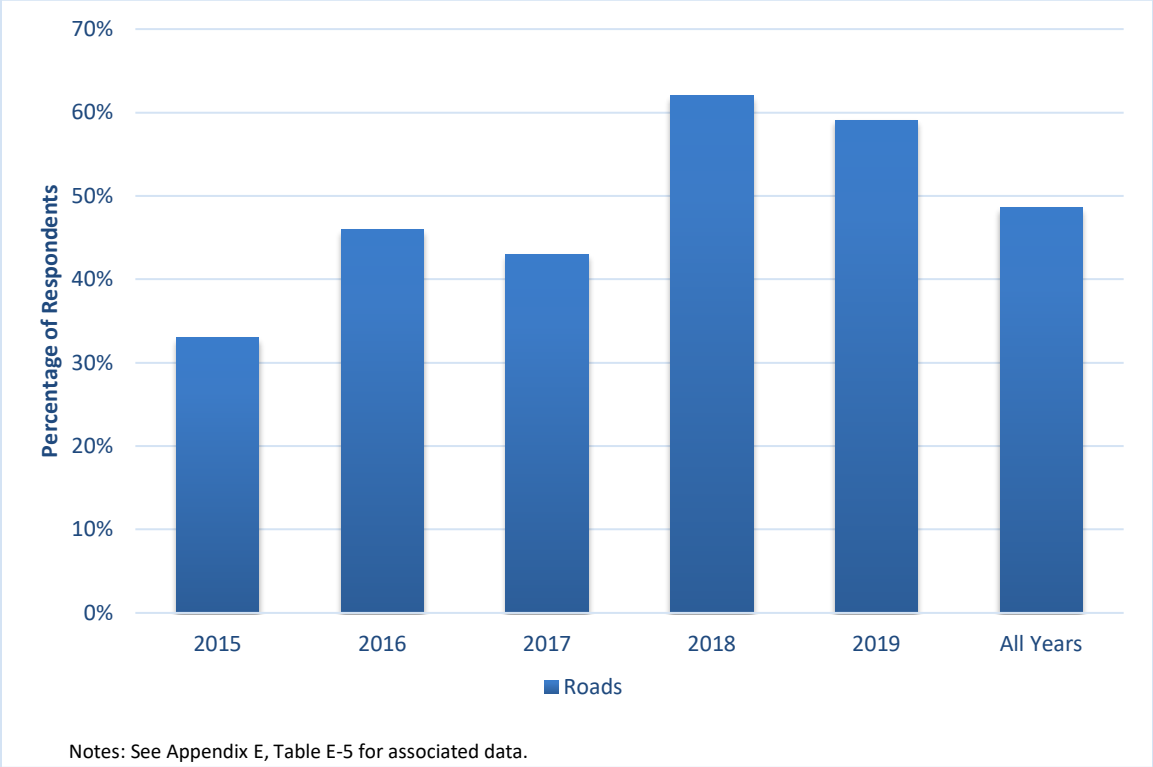
National Petroleum Reserve Alaska

Areas categorized as follows:

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

Use of the road system has increased since construction of the Spur, CD5, and GMT-1 roads, with 59 percent of respondents using the road system, similar to the previous study year (Figure 5; Table E-5). The 2019 study year saw continued use of gravel and ice roads by caribou harvesters, a relatively new hunting pattern, as compared to overland or riverine hunting patterns, which emerged in 2015 due to construction of the Spur Road and subsequent construction of the road to CD5, GMT-1, and GMT-2. The "new hunting pattern" referenced here does not necessarily refer to the use of a new, previously unused hunting area, but use of roads in areas where there were previously no roads, and the use of trucks to access hunting areas.

Figure 5: Percentage of Respondents Using Roads



Notes: See Appendix E, Table E-5 for associated data.

Stephen R. Braund & Associates, 2021.

For some hunters, there is increased access to areas they previously did not use due to prior difficulty accessing those areas and transportation requirements (e.g., snowmachines or ATVs). For other hunters, there is facilitated access to areas they may have already used, at least during certain times of year. Roads are used by residents both for hunting caribou that are located along the road, and for accessing areas farther from the community (i.e., as a "jumping off" point to access areas farther west or to travel to the Fish Creek area).

The GMT-2 road was constructed during the winter of 2019 and became partially open to hunters in September 2019 although soft road conditions may have resulted in fewer residents using this portion of the road. Thus, the majority of road travel in 2019 occurred along the Spur, CD5, and GMT-1 roads. Not only did residents hunt alongside the road system, but they also used the road to access off-road/overland areas toward Fish Creek and GMT-2. It is important to note that the area of current road development is within the community of Nuiqsut's traditional and contemporary use areas for caribou hunting as documented within this monitoring study in addition to previous subsistence use area studies (SRB&A 2019, 2010a, Brown 1979, Pedersen 1979). Thus, the increased use of roads to access hunting areas does not represent a change in hunting area for the community, but rather a new method of hunting which facilitates access for some individuals. Nuiqsut caribou panel members indicated during a March 2021 meeting that some local hunters use the road system to hunt because they do not own boats.

In past years, some respondents have expressed difficulty traveling on and off the local road system as a result of steep side slopes, including on ramps designed for providing subsistence access. CPAI made improvements to the subsistence ramps to address residents' concerns, and during the 2019 active harvester interviews one hunter noted that there had been a noticeable improvement:

> *At the beginning of June, I got like eight of them. That was for blanket toss. That was there—close to GMT-1, GMT-2. Yes, [the ramps have improved] quite a bit. Yes, [that was in June]. [I used a] truck and four-wheeler. [I took a] truck to GMT-1 and ATV to GMT-2. [That is during] August [through] October along the road.* (SRB&A Nuiqsut Interview March 2020)

In addition to using the road system to access overland areas, Nuiqsut caribou hunters also traveled directly to the west of Nuiqsut in 2019 by snowmachine or four-wheeler to hunt caribou. Snowmachine hunting occurred to the southeast of the community around Itqiliq River, while four-wheeler hunting was generally confined to an area west of the Colville River bounded by Ocean Point, Ublutuoch River, and the road system. When using the road system for four-wheeler or snowmachine access to overland areas, residents traveled on the west side of the Ublutuoch River and to the Fish (Iqalukpik) Creek area.

Use of river systems by Nuiqsut caribou hunters is generally similar from year to year, with some differences in the intensity and extent of use based on the location of caribou and navigability of rivers. In 2019, hunters reported a smaller extent of riverine travel compared to previous study years, with little use beyond Umiuraq on the Colville River and use of the Itqiliq River and Fish Creek limited to the lower portions of these drainages (Map 5). Caribou subsistence use areas for 2019 show the highest overlapping use occurring along the Colville River upriver to Ocean Point and along the upper Nigliq Channel. Moderate overlapping use occurred farther downriver on the Nigliq Channel, along the upper portion of the East Channel, and upriver along the Colville River between Ocean Point and Umiuraq. River systems with low overlapping use in 2019 included Qakimak Creek, Fish Creek, and Itqiliq River. No respondents reported using Milugiaq River or the middle Colville Delta (Tamayayak River) in 2019. Coastal hunting was not reported by 2019 respondents. It is likely that additional use of river systems occurred by hunters in 2019 which were not captured by the limited sample of respondents.

Similar to previous years, in 2019 the Nigliq Channel was a key travel corridor for ocean-bound and upriver-bound hunters, as well as a fishing and hunting area for residents. In 2019, 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, although use of the Nigliq Channel specifically for caribou hunting has decreased in recent years compared to some other river corridors.

One respondent noted the presence of road hunters to the west of Nigliq Channel, which required them to adjust their activities to ensure safety:

> *We did try to get off the boat [and go] towards the Spur Road. We walked. [There were] caribou that way, people were shooting them left and right, so we stayed underneath on the river and ducked down in our boats until they stopped shooting then we went out looking for our own. They are normally on the east side of the river.* (SRB&A Nuiqsut Interview March 2020)

Across all study years, residents have hunted caribou along the East Channel of the Colville River Delta, sometimes continuing to the ocean and hunting along the coast to Oliktok Point, particularly when picking up or dropping off individuals for Haul Road travel (Map 6). In 2019, residents hunted along the main "Kuukpik" (East) Channel, the Kuukpigruuaq Channel, and along the lower Qakimak Creek. Residents reported scouting for and harvesting caribou near locations such as Pisiktaġvik and Helmericks. Two individuals reported observing development related activity during their hunt, with one noting the presence of lights, and another noting the presence of surveyors to the east of the delta which caused them to cut their hunting trip short:

> *We scouted here [on the East Channel] too. All the way up here [northeast] until it became too shallow. All the way in that area. Going short cut after short cut. We saw lights up here. There is a place. Lot of lights on this side. That is where we saw them. But we stayed on this side [west side] of Helmericks… [We went in] August.* (SRB&A Nuiqsut Interview March 2020)

> *Me and my buddy went to Pisiktaġvik area on the east side. There was a herd on this side [east]. There were people doing survey, they had camera and backpacks. So I didn't want to shoot caribou when people were out there so we decided to leave them alone. That was in July. No, [I did not get any caribou]. They must be doing geology. They pick eggs, flowers, leaves all that.* (SRB&A Nuiqsut Interview March 2020)

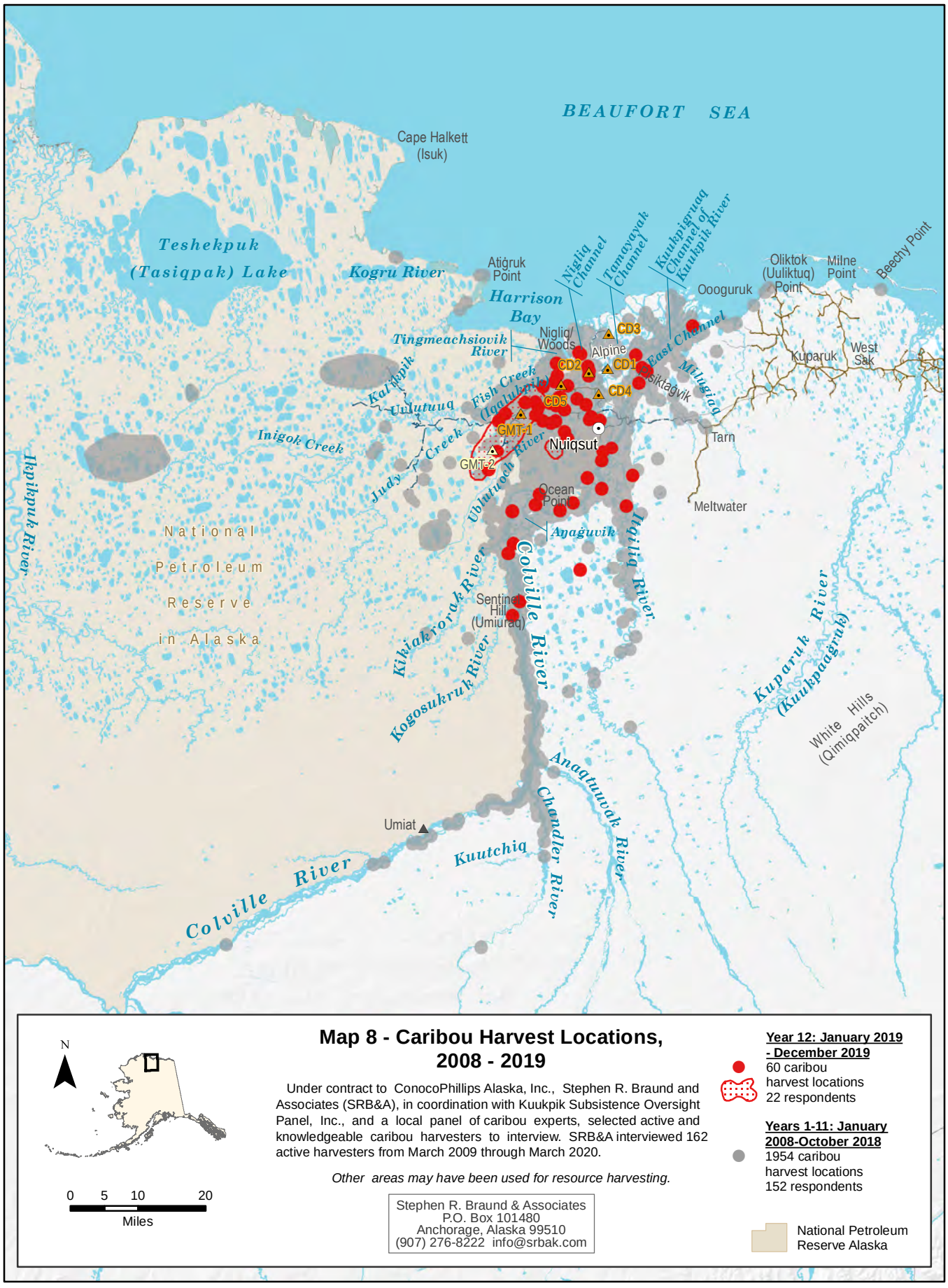
While no respondents reported coastal caribou hunting in 2019, a couple of individuals reported traveling into Fish Creek by boat. In addition to hunting caribou within the Colville River Delta, respondents travelled upriver from the community in 2019 to destinations such as Itqiliq River, Puviqsuq, Ocean Point, Qitik, and Umiuraq (Map 5). While Itqiliq River saw an increase in use in 2018, in 2019 fewer respondents used the area than in past years. One individual reported traveling into the Itqiliq River in 2019 but did not harvest any caribou, which he noted was "strange." For hunters who traveled upriver in 2019, Ocean Point and Qitik were the most common destinations, although some traveled as far as the Umiuraq area. Residents generally used the Napasulu channel to access the Upper Colville and several also used shortcuts near Puviqsuq and Ocean Point (Aŋaġuvik). Travel beyond Umiuraq is often associated with moose hunting, with residents targeting caribou on these trips as available and needed. Respondents did not report hunting in these areas in 2019 for caribou; however, moose hunting likely did occur farther upriver. One respondent described camping at Umiuraq for a week and looking for caribou while there:

> *Me and my buddy went to Umiuraq. We camped there for about a week. We got two there [at Umiuraq]. [We went] in August… We started running out of gas and headed home. I don't like going up Aŋaġuvik. There was no water, we almost got stuck. We barely made it out, we almost got stuck.* (SRB&A Nuiqsut Interview March 2020)

Map 8 shows the geographic locations of Nuiqsut caribou harvest sites, as noted by respondents during interviews using a 1:250,000 scale USGS map. The 2019 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. Twenty-two respondents reported harvesting caribou at 60 harvest locations in 2019.

Respondents reported successful harvests in the Colville River Delta; upriver toward Umiuraq, along Itqiliq River and Fish Creek; and in overland areas to the west of Nigliq Channel and the community and along the road system. A large number of caribou harvest locations are in the area to the west between the village of Nuiqsut and Fish Creek, along the road system west of the Colville Delta, and upriver toward Ocean Point. Because of the small number of respondents interviewed for the active harvester interviews in 2019, there are fewer harvest locations overall.

Map 9 shows harvest density for 2019, with areas of higher harvest concentration shown in red. SRB&A determined harvest density through the use of the Kernel Density Tool (or Point Density Tool) located in the Spatial Analyst toolbox in ArcGIS. The Kernel Density Tool creates an analysis grid, in this case using 100x100 meter cells, to calculate the magnitude per unit area (in this case the number of caribou harvested) from a point feature (harvest locations shown on Map 8) that fall within a one mile radius of each cell.



Map 8 - Caribou Harvest Locations, 2008 - 2019

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 162 active harvesters from March 2009 through March 2020.

Other areas may have been used for resource harvesting.

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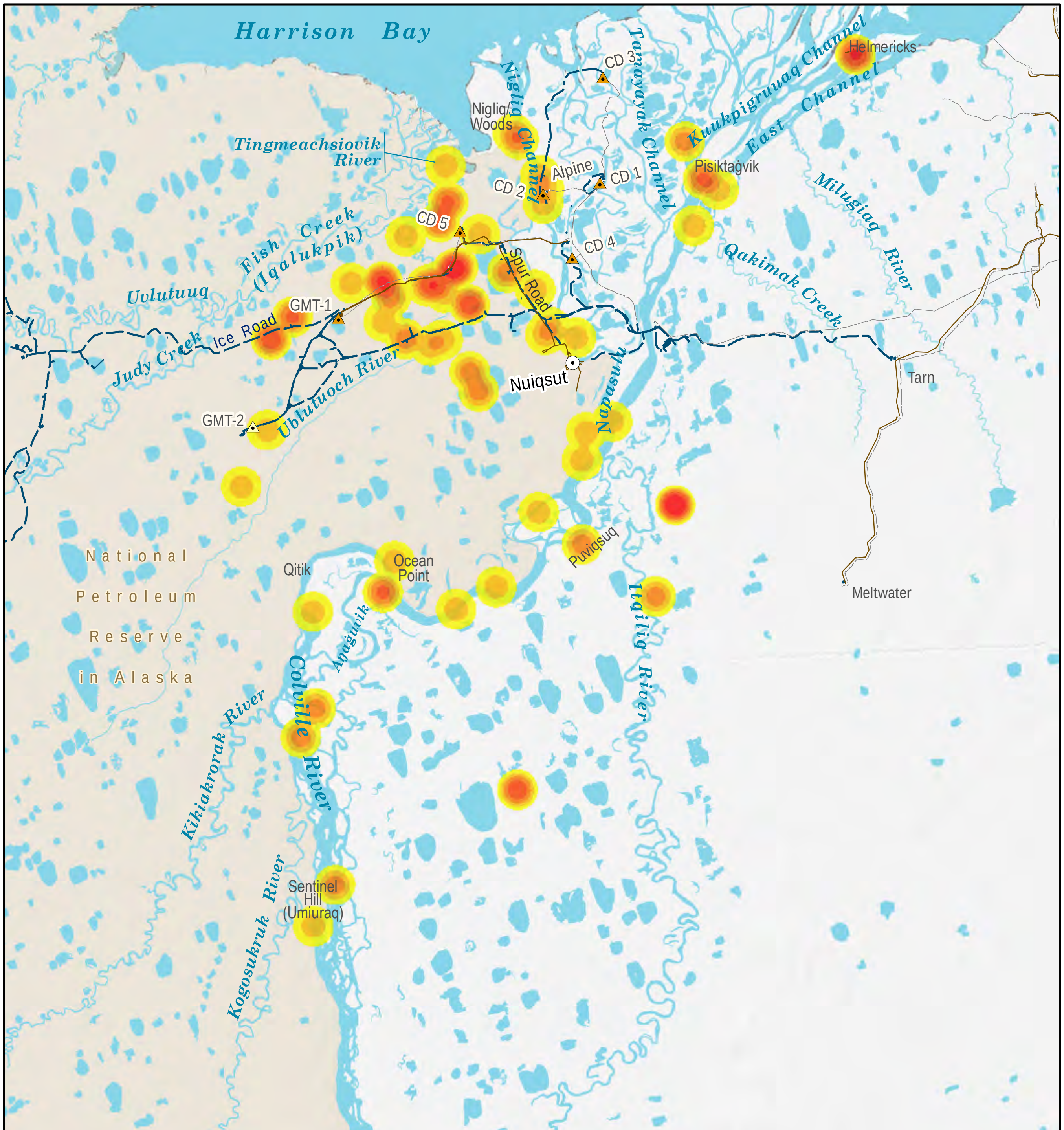
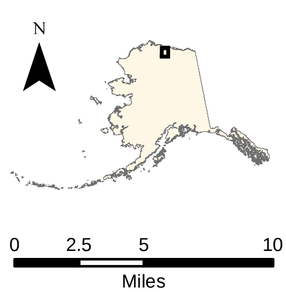
Year 12: January 2019 - December 2019
60 caribou harvest locations
22 respondents

Years 1-11: January 2008-October 2018
1954 caribou harvest locations
152 respondents

National Petroleum Reserve Alaska



Map 9 - Caribou Harvest Density, 2019



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National Petroleum Reserve Alaska

Harvest Density

- Fewer caribou harvested
- More caribou harvested

58 caribou harvest locations, 22 respondents

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

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 2019. Harvest density for all years combined is shown on Map 10, and individual previous years (2008-2018) are shown in Appendix C, Map C-4 and Map C-5.

The highest concentrations of harvest locations (shown in red) over the 12 study years (Map 10) have occurred along the Nigliq Channel to the north of the community; along the East Channel near Pisiktaġvik*;* within a 10 miles of Nuiqsut overland to the west and north; and along the Colville to the south, particularly near the mouth of Itqiliq River, in the area of Ocean Point, near the mouth of Kikiakrorak River, and near Umiuraq. In 2019, the highest concentration of harvests (shown in red) occurred to the northwest of the community along the road system, at one location along the lower portion of Itqiliq River, and at a location near the mouth of the East Channel (Map 9). Moderate harvest density (shown in orange) occurred along the Nigliq Channel near Nigliq, on the East Channel near Pisiktaġvik, in overland areas to the north and west of the community, and upriver along the Colville River at several locations. 2019 shows comparatively less harvest density than previous years, partly due to the overall lower number of harvest locations due to the limited active harvester sample. Compared to all previous years, there were fewer areas of high harvest density on Nigliq Channel, in overland (non-road accessed) areas west of the community, and upriver from the community. Fewer areas of high harvest density along Nigliq Channel has been evident in more recent study years (Years 2013 through 2018; Appendix C, Map C-5), 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 2019, the camp at Nigliq showed moderate levels of harvest density (shown in orange).

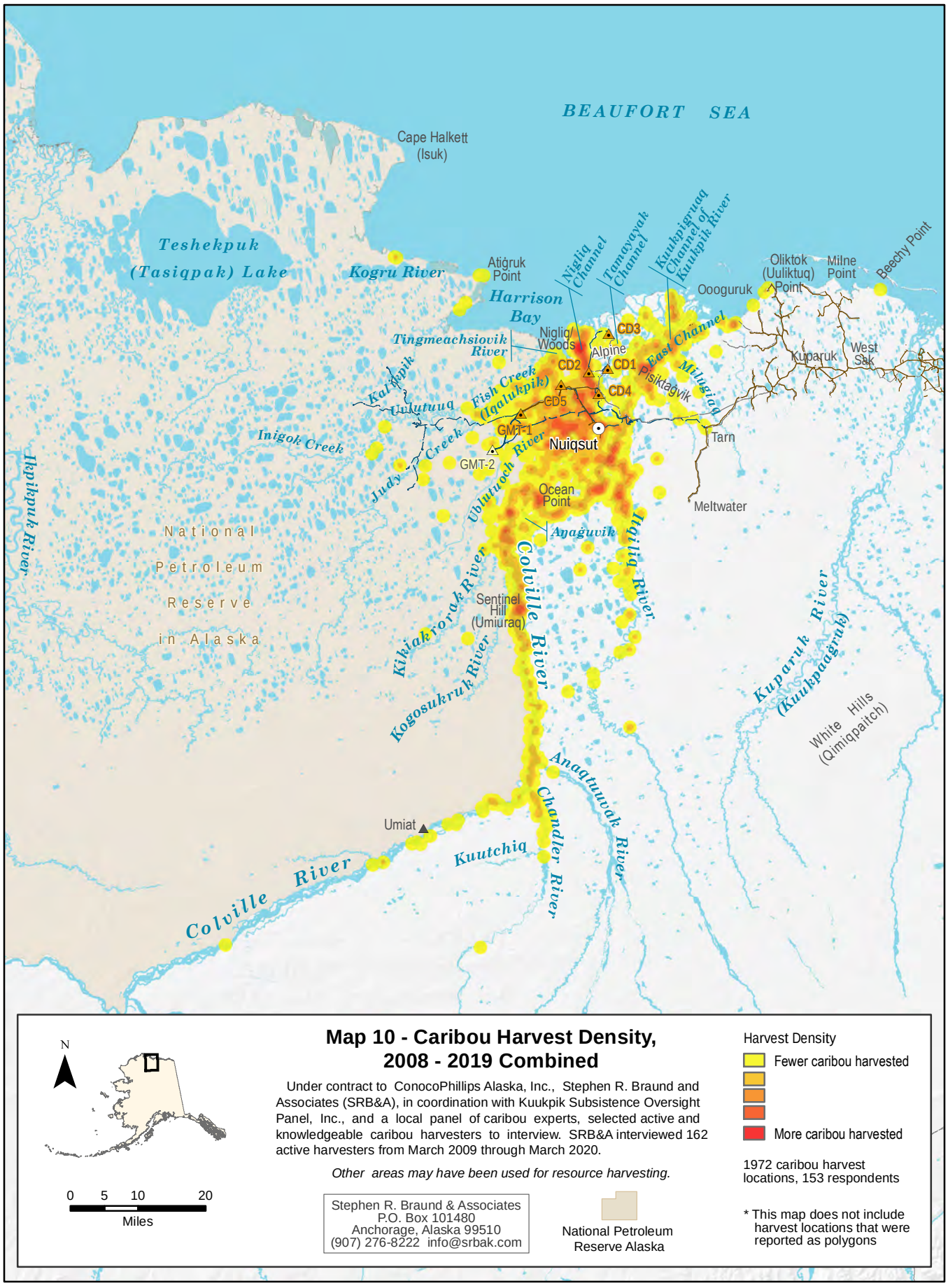
Timing of Activities

The restructuring of data collection beginning in 2019 based on the revised study plan brought about new timing variables, including the number (and percentage) of hunting trips by month (see "Summary of 2019 Study Plan Revisions"). The study team continued to collect data on the number of subsistence use areas reported by month for the 2019 study year, and these data are provided in Table E-6. Table E-6 shows that across all study years respondents have reported using caribou subsistence use areas during all 12 months. 2019 subsistence use areas were reported during every month except January and April.

Aside from the lack of hunting activity in January and April, 2019 timing characteristics are similar to previous years, with a high percentage of subsistence use areas reported during July and August. The percentage of August subsistence use areas in 2019 was particularly high, at 65 percent. This is the highest percentage of use areas ever reported for August, with previous years ranging from 41 to 53 percent, although the smaller sample size in 2019 may affect study results.

Figure 6 and Table E-28 provide data on the average number of caribou hunting trips, by month; the percentage of trips by month is provided in Table E-7. These data are similar to the 2019 data showing subsistence use areas by month. Nearly 40 percent of caribou hunting trips in 2019 occurred in the month of August, and respondents took an average of over five hunting trips during that month. Caribou hunters took, on average, less than one trip per month between October and May. Starting in June, the average number of caribou hunting trips rose to over one trip, and respondents reported an average of approximately four trips in July, five trips in August, and two trips in September (Figure 6).

Figure 7 and Table E-8 show the percentage of caribou harvested by respondents, by month. These data show a larger percentage of March harvests compared to previous years. Otherwise, the timing of caribou harvests in 2019 were similar to the average across all years (Figure 7). Similar to previous study years, July and August accounted for a majority of harvests in 2019, with over 50 percent of harvests occurring during those two months (Figure 7). September accounted for 17 percent of the harvest, June accounted for nine percent of the harvest, and November accounted for four percent of the harvest. July and August are usually the peak months for caribou harvest activity, when caribou typically migrate into the area in large numbers in search of insect relief, the rivers have opened allowing for boat travel (many residents' preferred



Map 10 - Caribou Harvest Density, 2008 - 2019 Combined

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Other areas may have been used for resource harvesting.

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N

0 5 10 20
Miles

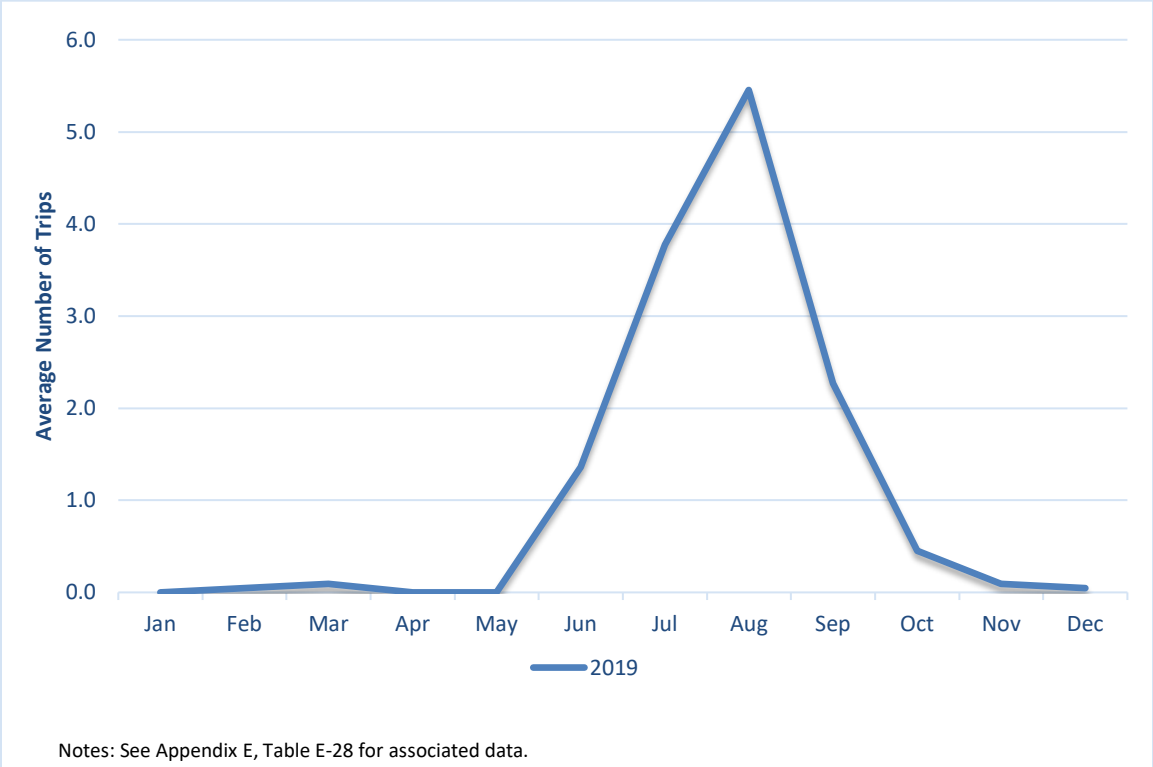
National Petroleum Reserve Alaska

Harvest Density
- Fewer caribou harvested
- More caribou harvested

1972 caribou harvest locations, 153 respondents

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

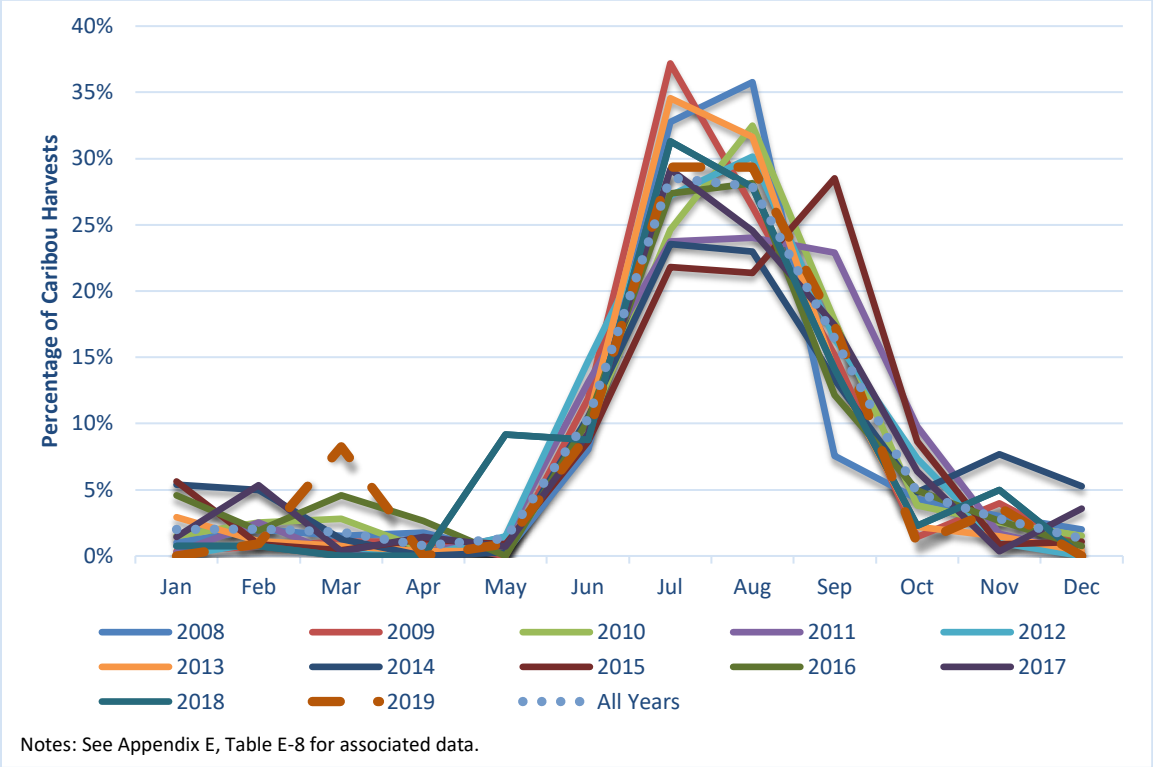
Figure 6: Average Number of Trips by Month, 2019



Notes: See Appendix E, Table E-28 for associated data.

Stephen R. Braund & Associates, 2021.

Figure 7: Nuiqsut Percentage of Caribou Harvested by Month, 2008-2019



Notes: See Appendix E, Table E-8 for associated data.

Stephen R. Braund & Associates, 2021.

method to hunt caribou), and other major subsistence activities are not occurring (e.g., moose hunting, bowhead whaling, *qaaktaq* fishery). Residents note that the caribou begin to fatten up in July and are at their fattest in August and September. Harvesters note that hunting in the later summer months of August and September are sometimes preferable because the peak mosquito season has passed.

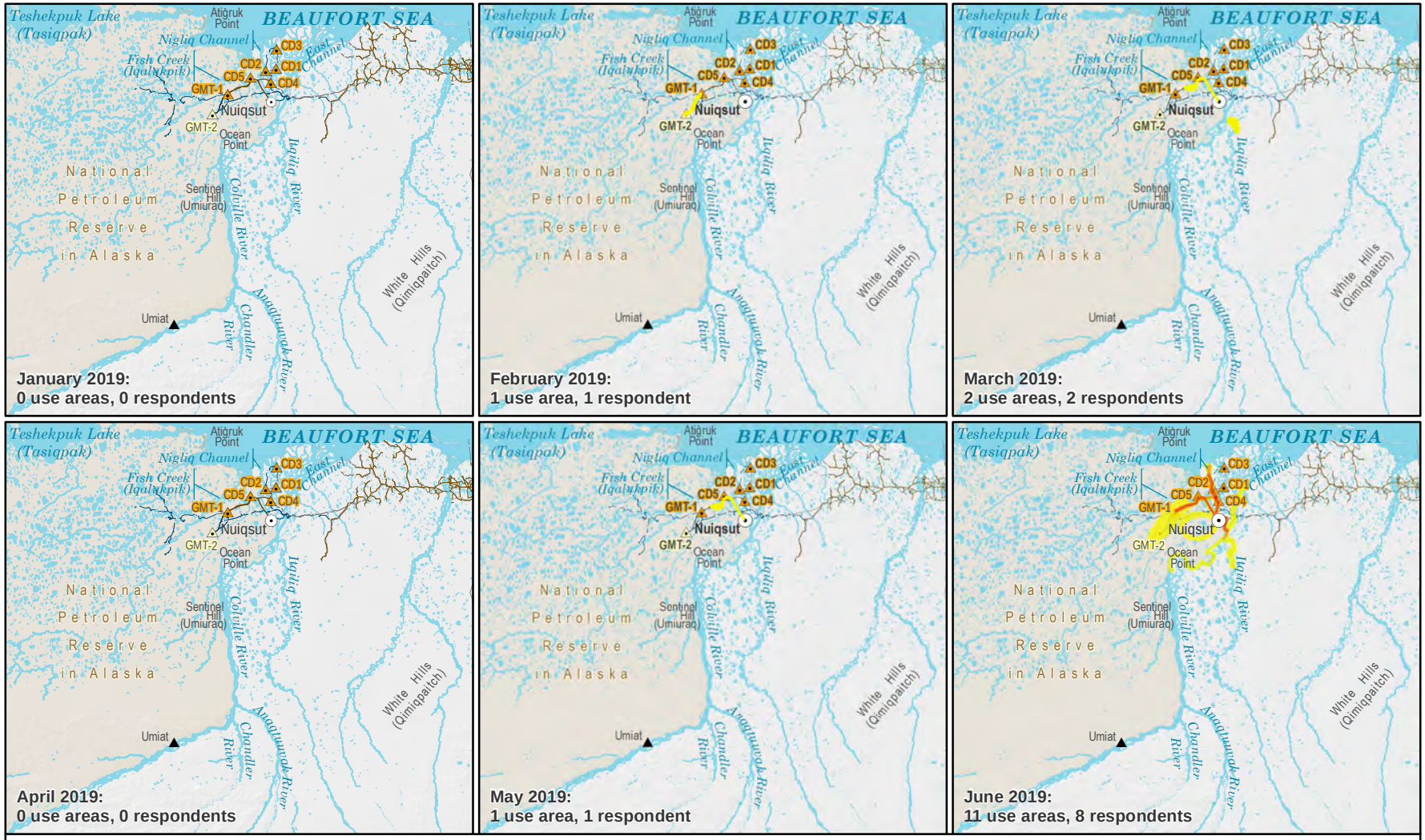
One individual also noted that water levels factor into the timing of their caribou hunting activities, noting that while water levels vary, conditions tend to be ideal in late July and early August.

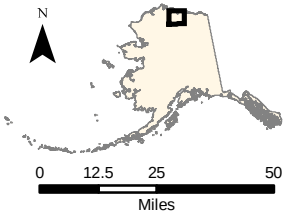
> *When the water goes low, I don't go out. But when its high, I go out. There's [a] lot [of] water. In [the] first week of July there lots [of] mosquitoes I don't like to go then. I like to go at the end of the month. [I went hunting] seven days in July. Maybe 15 times [in August], when the water goes low, I don't go out, but when its high I go out.* (SRB&A Nuiqsut Interview March 2020)

Map 11 through Map 14 show 2019 caribou subsistence use areas and harvest locations by month. Appendix C, Map C-6 through Map C-9 show overlapping subsistence use areas and harvest density for previous study years (2008-2018) by month. According to 2019 active harvester interviews, active harvester respondents reported limited activity during the winter/spring months of January through May, although a couple of respondents hunted caribou toward Fish Creek, along the road system, and near the mouth of the Itqiliq River (Map 11). Compared to previous years for the January through April time period (Appendix C, Map C-6), 2019 hunting activities occurred within the extent of previous years, but were limited by comparison. Hunting activities increased in June, with residents hunting primarily along the road system to GMT-1 and along the Nigliq Channel. Use of the Nigliq Channel started in June and continued at moderate to high levels into September (Map 12). Starting in July and continuing into August, respondents' riverine hunting expanded into the East Channel and upriver to Umiuraq. Road hunting continued during these months, and overland hunting west of the community occurred as well and continued into the months of September and October. Aerial surveys conducted in 2019 in the GMT and Alpine areas showed the greatest densities of caribou near Nuiqsut during the postcalving (June 16-24) and late summer (August 8 through September 14) time periods. A high density of caribou was also observed occurred during the fall migration period (September 16-November 30) although the majority of caribou were located to the north of the GMT1 road and closer to Fish Creek, consistent with a majority of hunting activity occurring along the road system during the month of September. Surveys were not conducted during the mosquito harassment season (June 25-July 15) when many residents reported hunting (Prichard, Welch, and Macander 2020).

Compared to previous study years, for the summer through fall months (Appendix C, Map C-7), riverine travel was less extensive and there was a greater emphasis on road travel. Road and overland hunting continued at low levels in November and December. In previous years (Appendix C, Map C-7), the months of October through December saw more substantial overland use.

As shown on Map 13 and Map 14, a small number of harvest locations were reported in February, March, and May, with the number of harvest locations increasing slightly in June. In June, isolated harvests occurred along the road system, on the East Channel, near Ocean Point, and on Itqiliq River. In July harvest locations increased and continued to occur along the road system, including a large harvest polygon extending off of the GMT-1 road. Harvests also increased along the river system in July, on Nigliq Channel, the East Channel, and upriver to Umiuraq. Harvests occurred in similar areas in August, with the exception of no harvest locations reported on the East Channel. Harvests shifted toward the overland area west of Nuiqsut starting in September through December. Harvest sites were generally located in areas of moderate to high overlap during each month (Map 11 and Map 12). Compared to previous years (Appendix C, Map C-8 and Map C-9) 2019 harvest locations were within the extent of previous years' harvest locations.





Map 11 Caribou Subsistence Use Areas, January - June, 2019

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 22 active harvesters in March of 2020.

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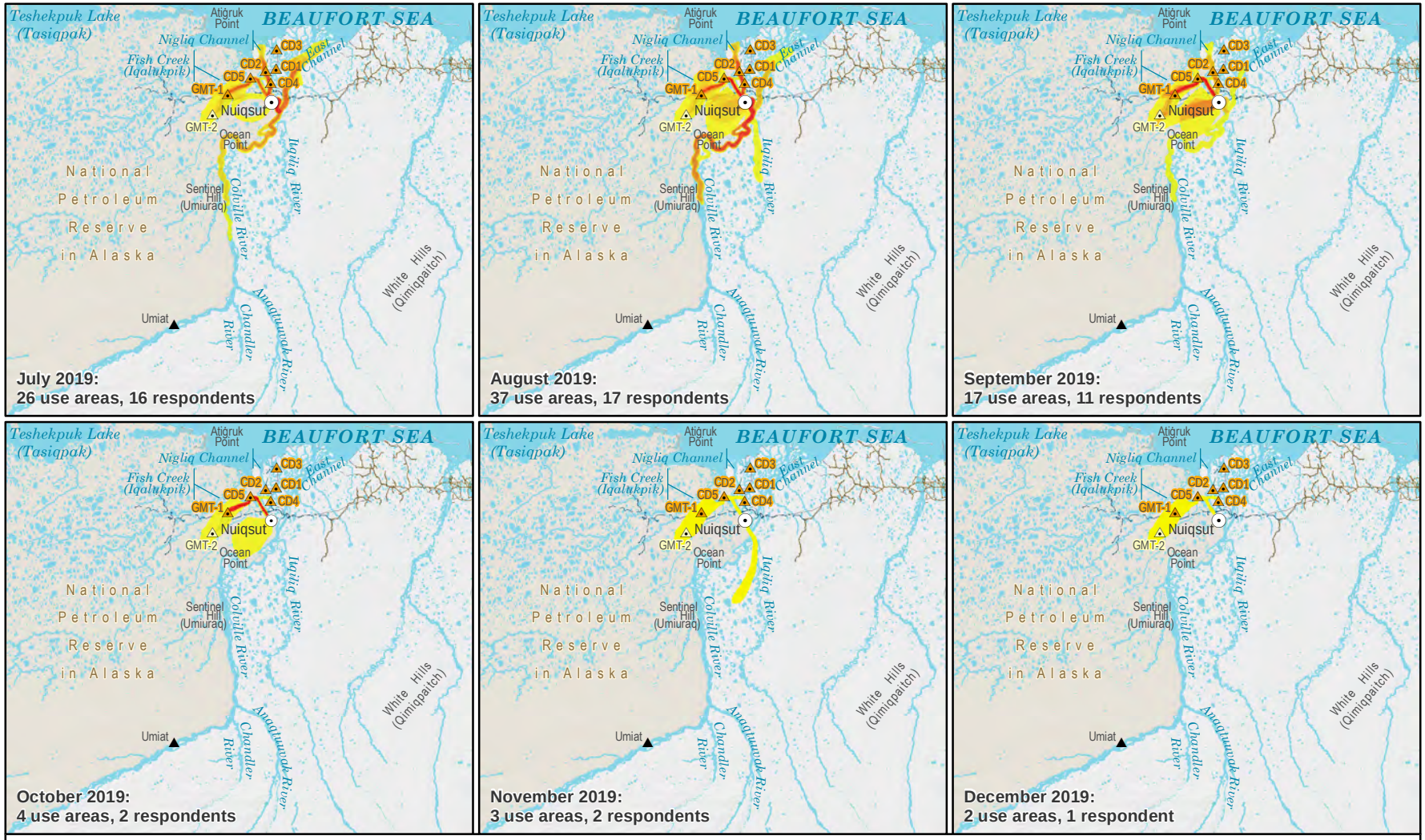
Other areas may have been used for resource harvesting.

National Petroleum Reserve Alaska

2019

High

Low



Map 12 Caribou Subsistence Use Areas, July-December, 2019

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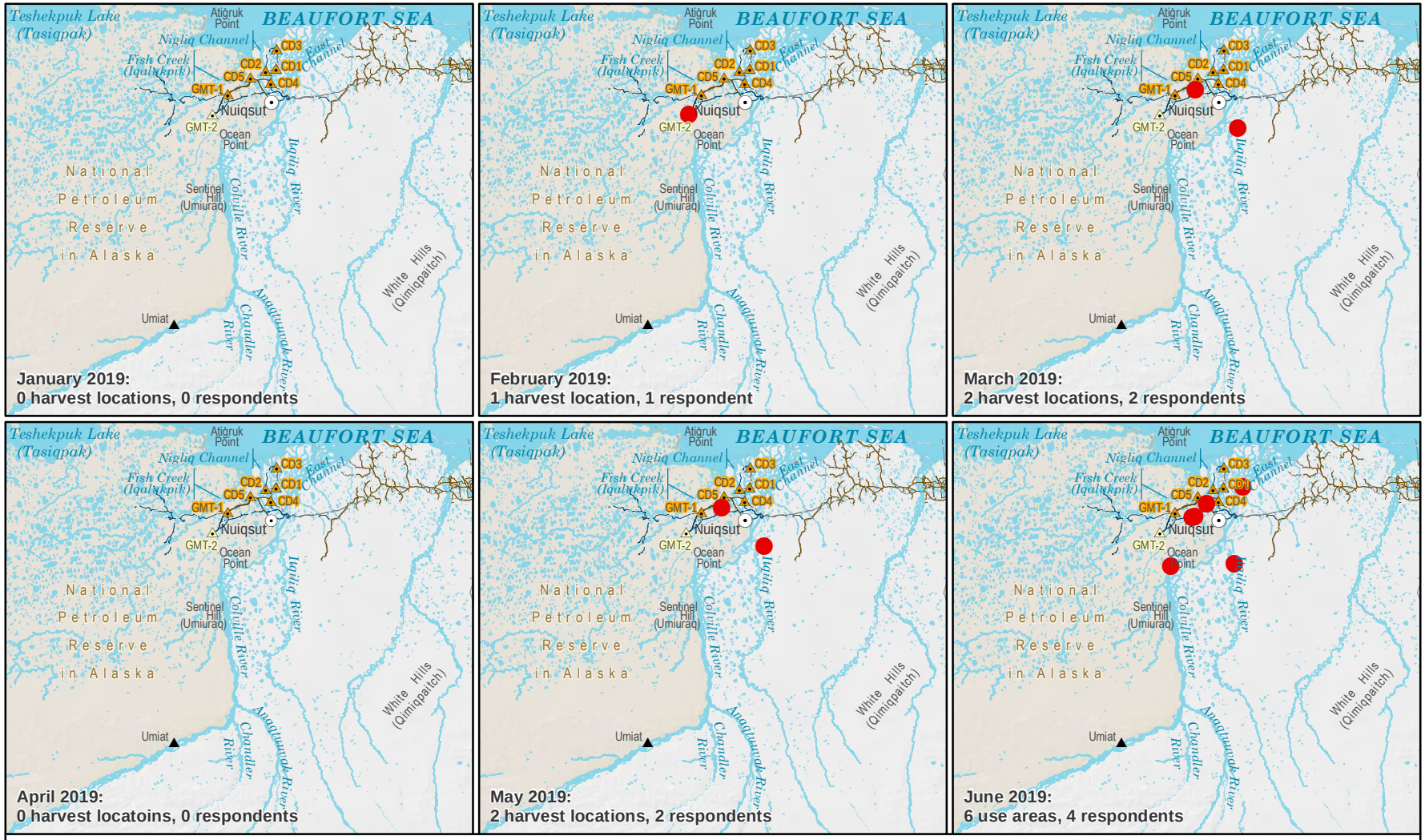
National Petroleum Reserve Alaska

2019

High

Low



Map 13 Caribou Harvest Locations, January - June, 2019

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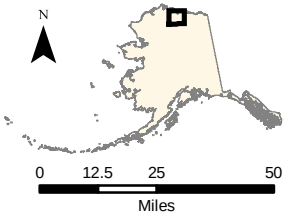

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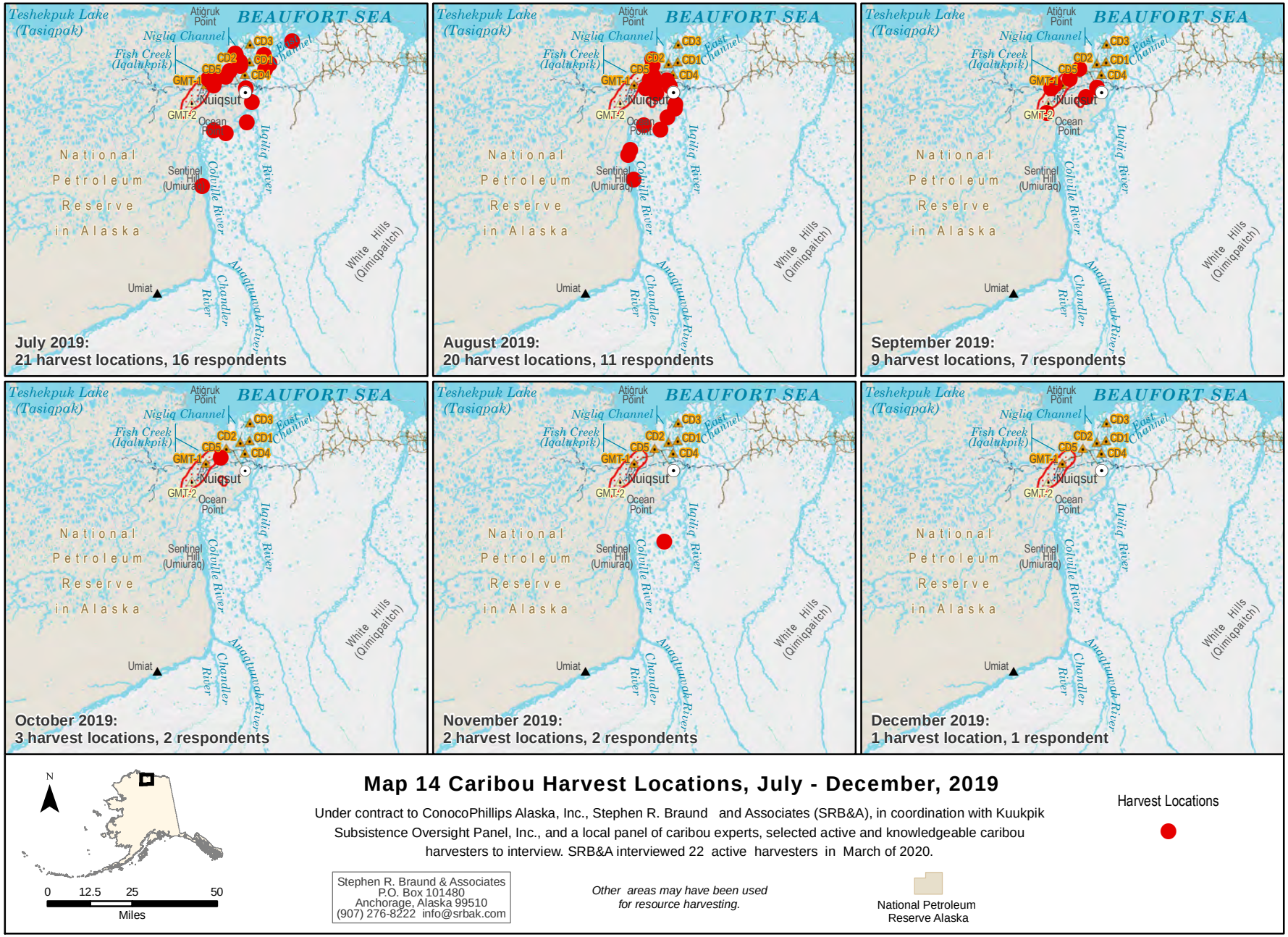
Other areas may have been used for resource harvesting.

National Petroleum Reserve Alaska

Harvest Locations



Map 14 Caribou Harvest Locations, July - December, 2019

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 22 active harvesters in March of 2020.

Harvest Locations

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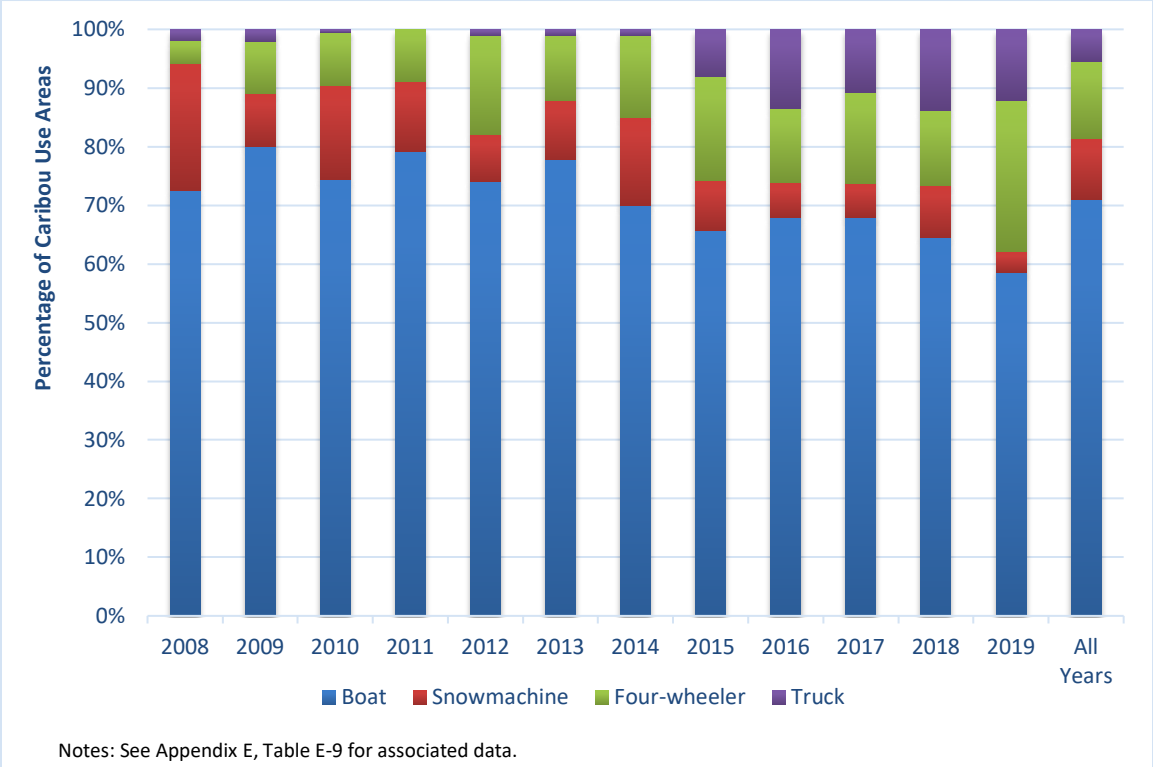
Other areas may have been used for resource harvesting.

National Petroleum Reserve Alaska

Travel Method

Across all study years, boat has been the primary method of travel to caribou subsistence use areas (Figure 8; Table E-9). Boat remained the principle travel method to caribou subsistence use areas in 2019, with 60 percent of subsistence use areas accessed using this method. Four-wheeler was the second most commonly used travel method in 2019 (26 percent of use areas), followed by truck (12 percent of use areas), and snowmachine (four percent of use areas). Use of boats for caribou hunting has declined slightly over time, from a high of 80 percent of subsistence use areas during the 2009 and 2011 study year, to 70 percent in 2014, and 60 percent in 2019. Snowmachine use has also decreased while use of four-wheelers and truck have increased. Increased truck use has coincided with the construction of roads in the region beginning in 2015 (Figure 8).

Figure 8: Nuiqsut Travel Method to Caribou Subsistence Use Areas, 2008-2018



Notes: See Appendix E, Table E-9 for associated data.

Stephen R. Braund & Associates, 2021.

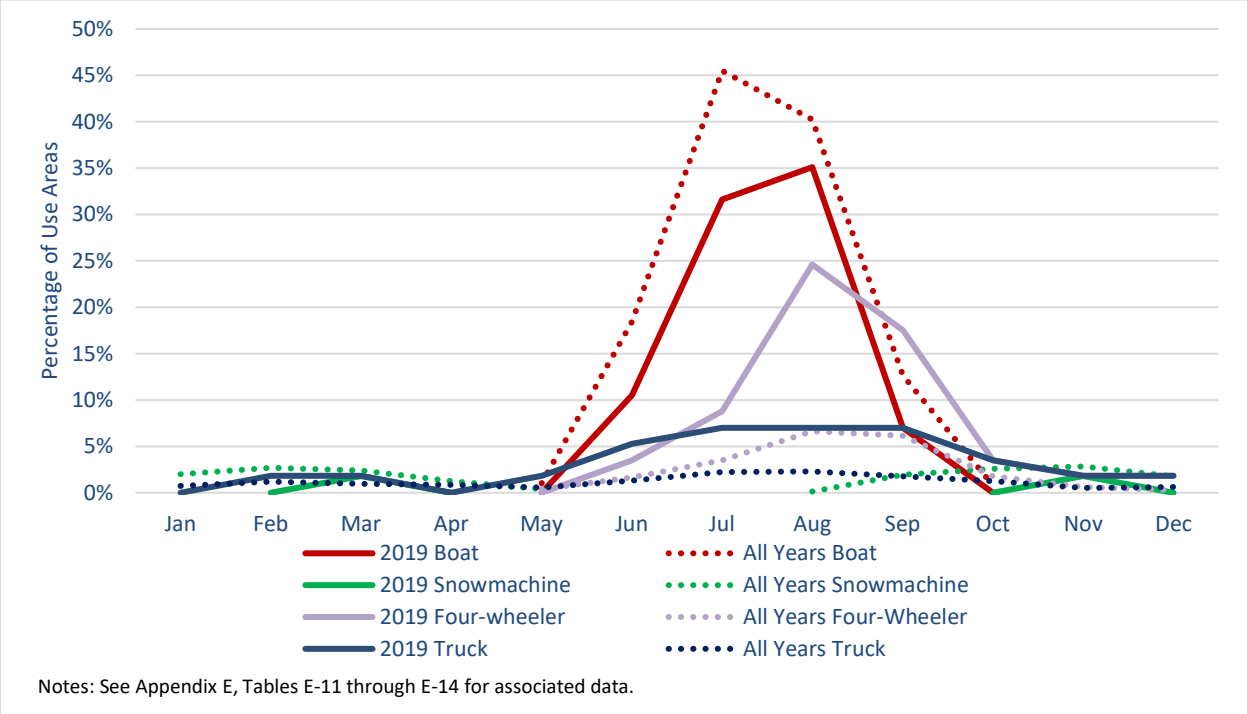
Four-wheeler use was reported at 26 percent of subsistence use areas, which is double the average across all years. The increased use of truck, and likely also four-wheeler, in recent years is due to respondents' increased use of the Spur Road and roads to CD5, GMT-1, and GMT-2 (which was partially opened to hunters in September of the 2019 hunting season). Changes in the distribution of caribou may also factor into the increased use of the roads, with some respondents observing that the caribou tend to stay to the west and north of the road system.

Another respondent noted the cost savings associated with using trucks versus boats, saying, "We've mostly been hunting on the road, it's easier and you save gas. I think it's a waste [of gas] to go by boat" (SRB&A Nuiqsut Interview March 2020). A number of others noted that the roads provide an easy access to hunting grounds. However, in past years as well as in 2019 interviews, a few participants have commented that subsistence hunters are restricted from using the roads. This misunderstanding, while uncommon, has persisted and may be due to confusion regarding changes in road hunting policies or perceptions that while hunting is technically allowed, it is discouraged. Additionally, some respondents have reported general avoidance of the road areas due to high levels of industrial activity.

In general, boat travel begins as soon as the ice breaks up in June and continues until freeze-up, sometime in September; in some years, boat travel can commence as early as May and extend as late as October. In terms of the percentage of subsistence use areas, the peak month for boat travel for all study years is July, followed by August, June, and September (Figure 9; Table E-11 through Table E-14). In 2019, the peak month for boat travel was August; across all study years boating has more commonly peaked in July. 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 subsistence use areas during each ice-free month.

Across all study years, snowmachine use by active harvesters generally occurs beginning in September through April or May depending on the snow cover (Figure 9). Peak snowmachine usage typically occurs in early winter (October/November) and late winter (February and March). While 2019 loosely followed this pattern, snowmachine use occurred only during the months of March and November, whereas snowmachine travel typically occurs continuously, if at lower levels, throughout the winter (Figure 9). As with boat, the extent of snowmachine travel is dependent on snow/travel conditions and the availability of caribou during the winter months.

Figure 9: Nuiqsut Travel Method to Caribou Subsistence Use Areas by Month, 2019



Notes: See Appendix E, Tables E-11 through E-14 for associated data.

Stephen R. Braund & Associates, 2021.

In 2019, residents reported using a combination of road and overland vehicles to access subsistence use areas to the west of the community. Few subsistence use areas required a separate access method, although small number of areas were accessed first by four-wheeler or truck, presumably along the road system (Table E-10). Residents commonly used trucks or cars to spot caribou from the road. If caribou are spotted close to the road, residents typically hunt them on foot and haul the meat back to their vehicles. If farther from the road, residents used overland vehicles—either towed on trailers or retrieved once caribou are spotted—to access harvest sites. The GMT-1 and GMT-2 roads can be used to access areas not typically accessible using overland methods, particularly during the snow-free months as long-distance travel on four-wheelers can be rough on both hunters and vehicles. Four-wheeler use is generally limited to the summer and fall months, starting in April/May and tapering off in October/November (Figure 9). However, along with some previous study years (2012, 2016), 2019 showed some winter four-wheeler use at lower

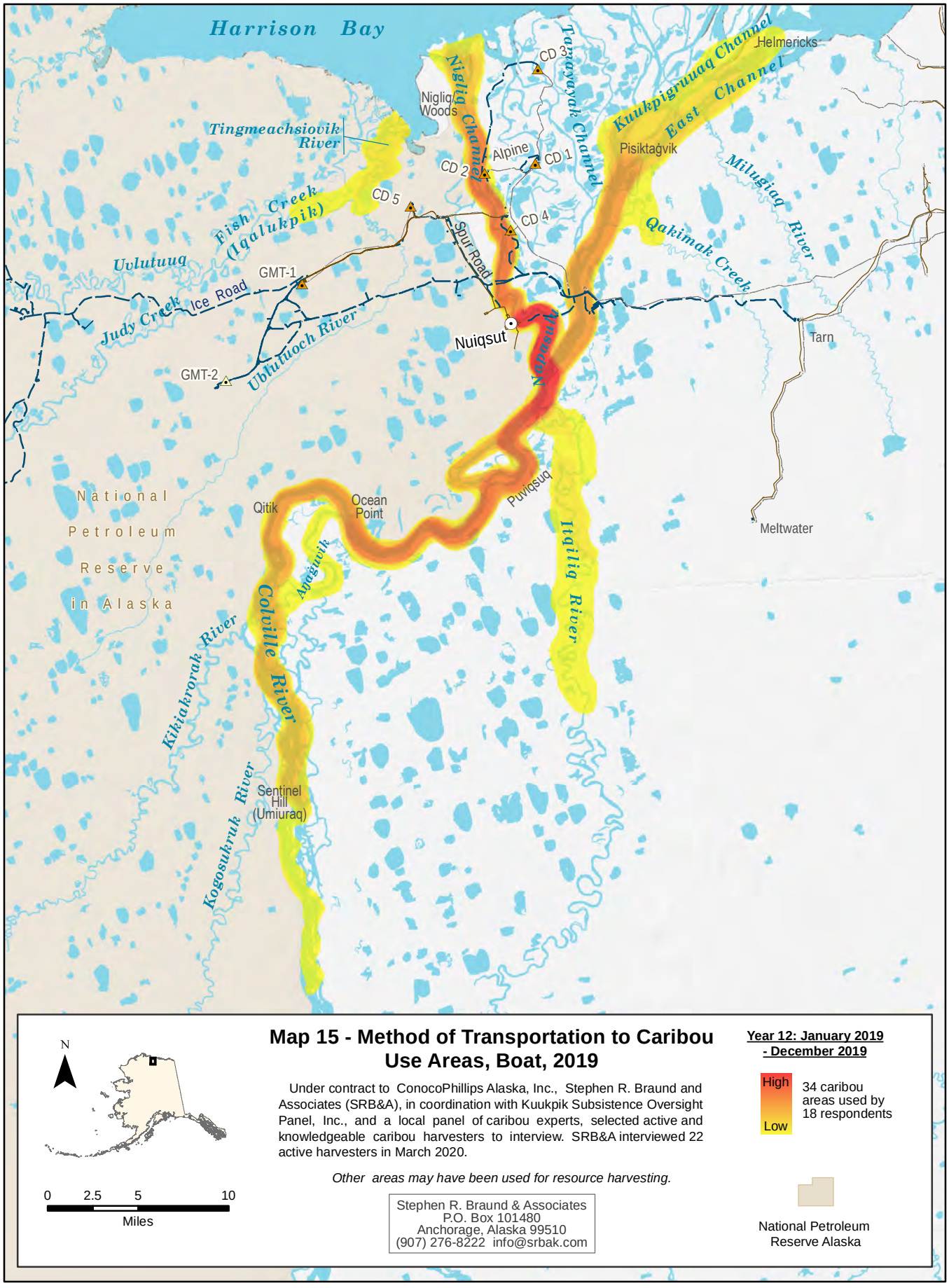
levels during the months of November and December. Four-wheeler use in 2019 peaked overwhelmingly in August with 25 percent of subsistence use areas accessed using this method, compared to an average of less than 10 percent across all study years. Recent years have shown somewhat higher levels of four-wheeler use compared to earlier study years, with 2019 accounting for the greatest levels of four-wheeler use at 26 percent of use areas (Figure 8).

Roads allows residents—particularly those without overland forms of transportation such as snowmachines and four-wheelers—to hunt caribou throughout the year. However, residents must either harvest the caribou close to the road or have means to access them from the road. As shown in Figure 9, truck travel across all years has occurred year-round with somewhat higher levels of truck use in the summer months. In 2019, no truck travel was reported by respondents during the months of January or April, but a greater percentage of subsistence use areas were accessed using truck during the summer and fall months of June through October. 2019 shows the highest percentage of subsistence use areas accessed by truck during the months of July, August, and September.

Caribou subsistence use areas by transportation method are shown on Map 15 through Map 18. Caribou use areas by travel method for previous study years are show in Appendix C, Map C-10 through Map C-13. Map 15 shows that in 2019 respondents traveled by boat primarily along the Colville River, with high overlaps occurring upriver to the mouth of Itqiliq River, and moderate overlaps occurring farther upriver to Ocean Point and along the Nigliq and East channels. Fewer overlapping subsistence use areas occurred on Fish Creek, Qakimak Creek, Itqiliq River, in the lower portions of Nigliq Channel and East Channel, and upriver beyond Umiuraq. Boating use areas for 2019 are somewhat similar to those for previous years (Map C-10), but do not include coastal subsistence use areas and do not extend as far upriver. Previous study years have shown more extensive travel along drainages including Fish Creek and the Upper Colville, Milugiaq, Itqiliq, Anaqtuuvak, and Chandler rivers.

In 2019, four-wheeler areas were located west of the Colville River near the community and to the northwest of the community along and extending from the Spur Road, CD5 road, GMT-1 road, and recently constructed GMT-2 road (Map 16). Four-wheeler travel extended as far as Fish Creek in the north and to the Ocean Point in the south. A majority of four-wheeler subsistence 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 earlier study years, areas of high overlapping four-wheeler use were generally limited to areas south of the CD5 and GMT-1 road system and east of the Ublutuoch River (Appendix C, Map C-11). Recent years have seen an increase in overlapping use along the along the road system and farther toward Fish Creek, as roads have facilitated access to these areas for some hunters. In 2019, respondents used the road system to access overland subsistence use areas to the south and north of the road as well as accessing areas off the end of the GMT-1 road, thus expanding the area of high overlapping use accessed by four-wheeler. The GMT-2 road was under construction for much of 2019 but was partially opened to hunters starting in September 2019. In 2019, four-wheeler activity (Map 16) was similar to previous years (2008-2018) in terms of extent (Appendix C, Map C-11), but included greater overlapping use 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 2019, the area of snowmachine use was much less extensive than in the past and was limited to two subsistence use areas located to the southeast of Nuiqsut along the Itqiliq River (Map 17). In the past, areas of high overlapping use have occurred in this area along the Itqiliq River but also to the west and southwest of the community. In general, the extent of snowmachine subsistence use areas in 2019 compared to previous years (2008-2018) was much smaller than the extent of all previous years, and smaller than most recent study years (Appendix C, Map C-12). This is consistent with a general decrease in the use of snow machines for caribou hunting in recent years which has been attributed to poor snow conditions as well as the high cost of snowmachines (SRB&A 2019).



Map 15 - Method of Transportation to Caribou Use Areas, Boat, 2019

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Other areas may have been used for resource harvesting.

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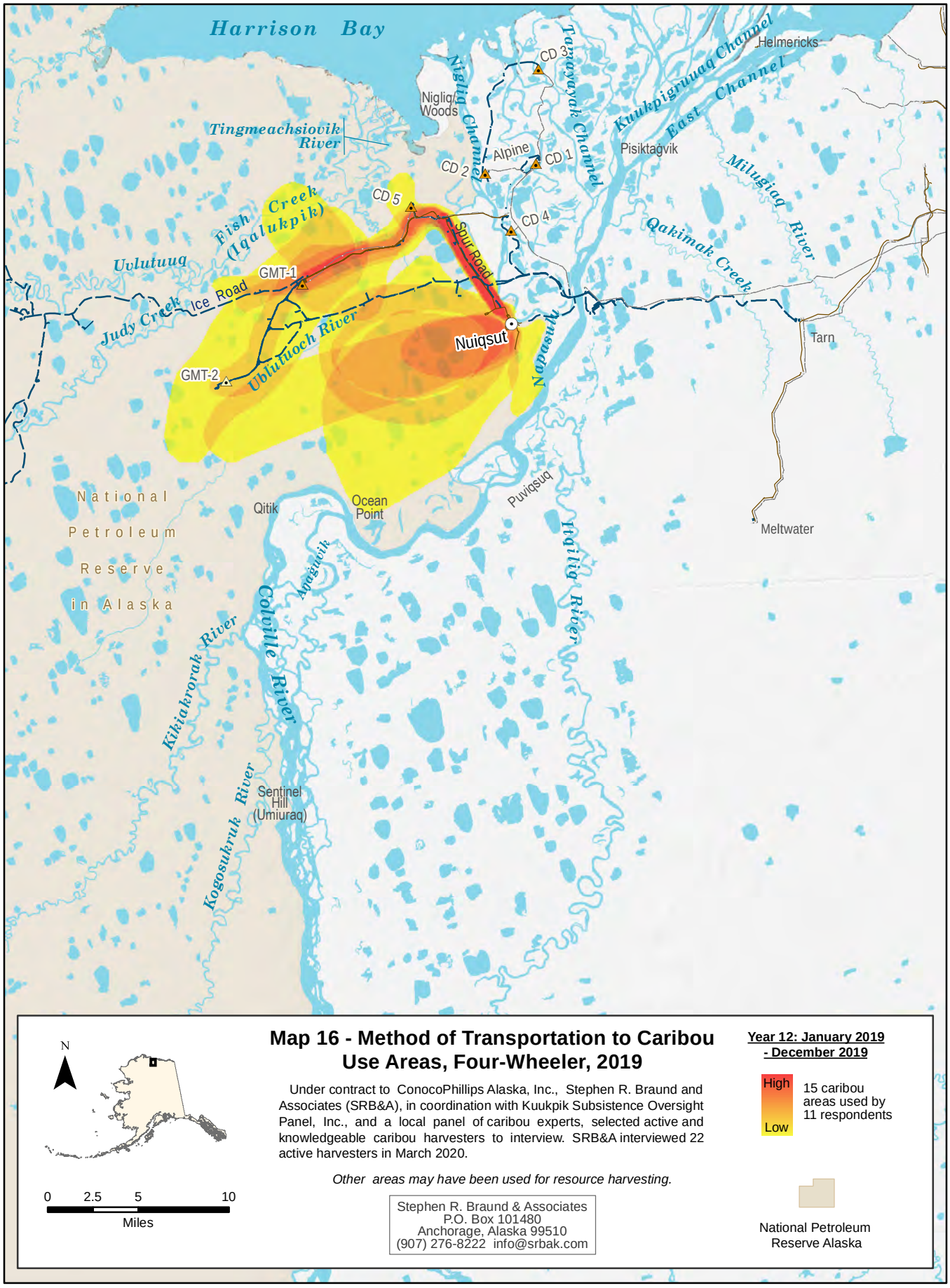
Year 12: January 2019 - December 2019

High
Low

34 caribou areas used by 18 respondents

National Petroleum Reserve Alaska



Map 16 - Method of Transportation to Caribou Use Areas, Four-Wheeler, 2019

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Other areas may have been used for resource harvesting.

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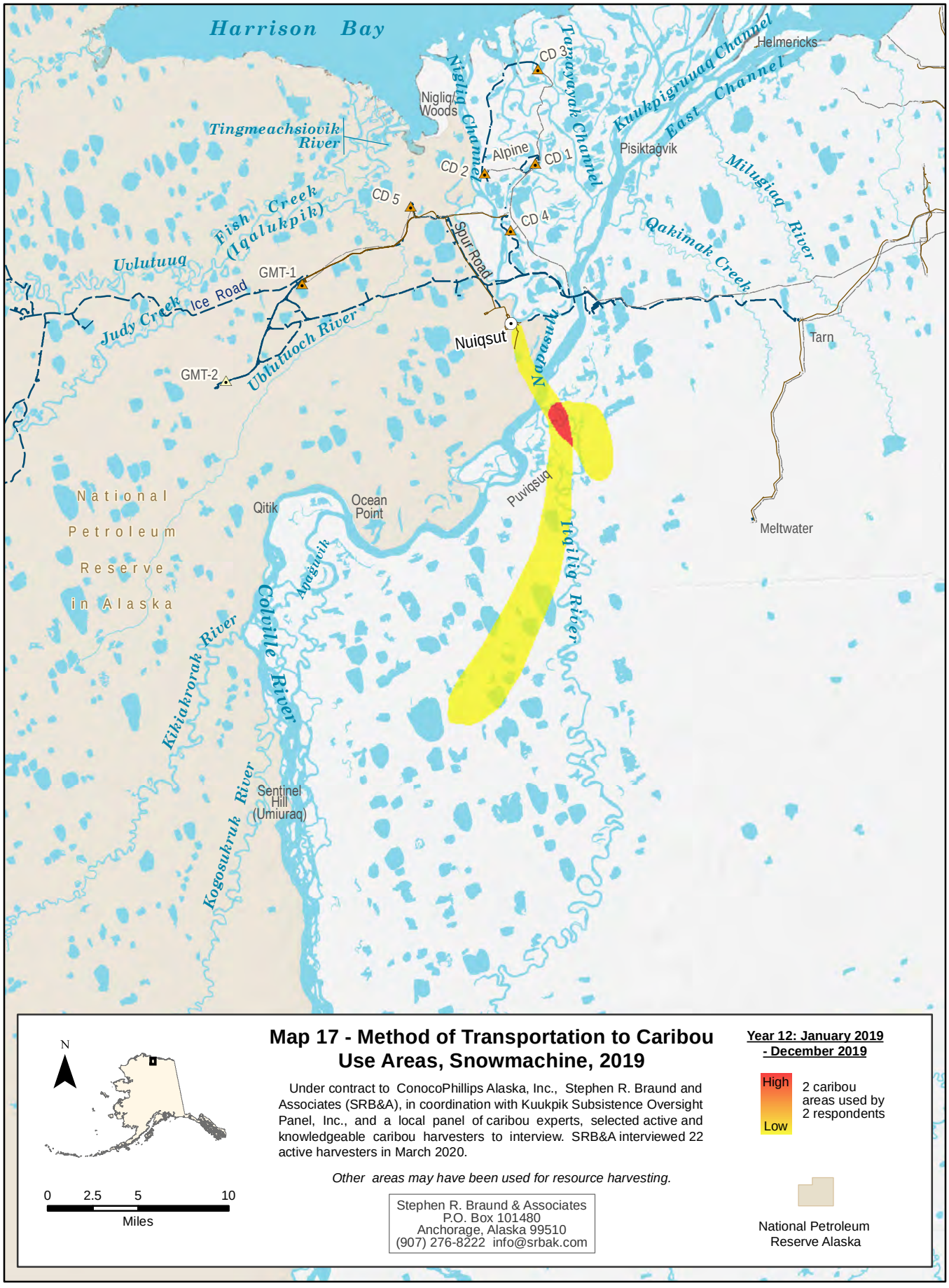
(907) 276-8222 info@srbak.com

Year 12: January 2019 - December 2019

High
Low

15 caribou areas used by 11 respondents

National Petroleum Reserve Alaska



Map 17 - Method of Transportation to Caribou Use Areas, Snowmachine, 2019

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 22 active harvesters in March 2020.

Other areas may have been used for resource harvesting.

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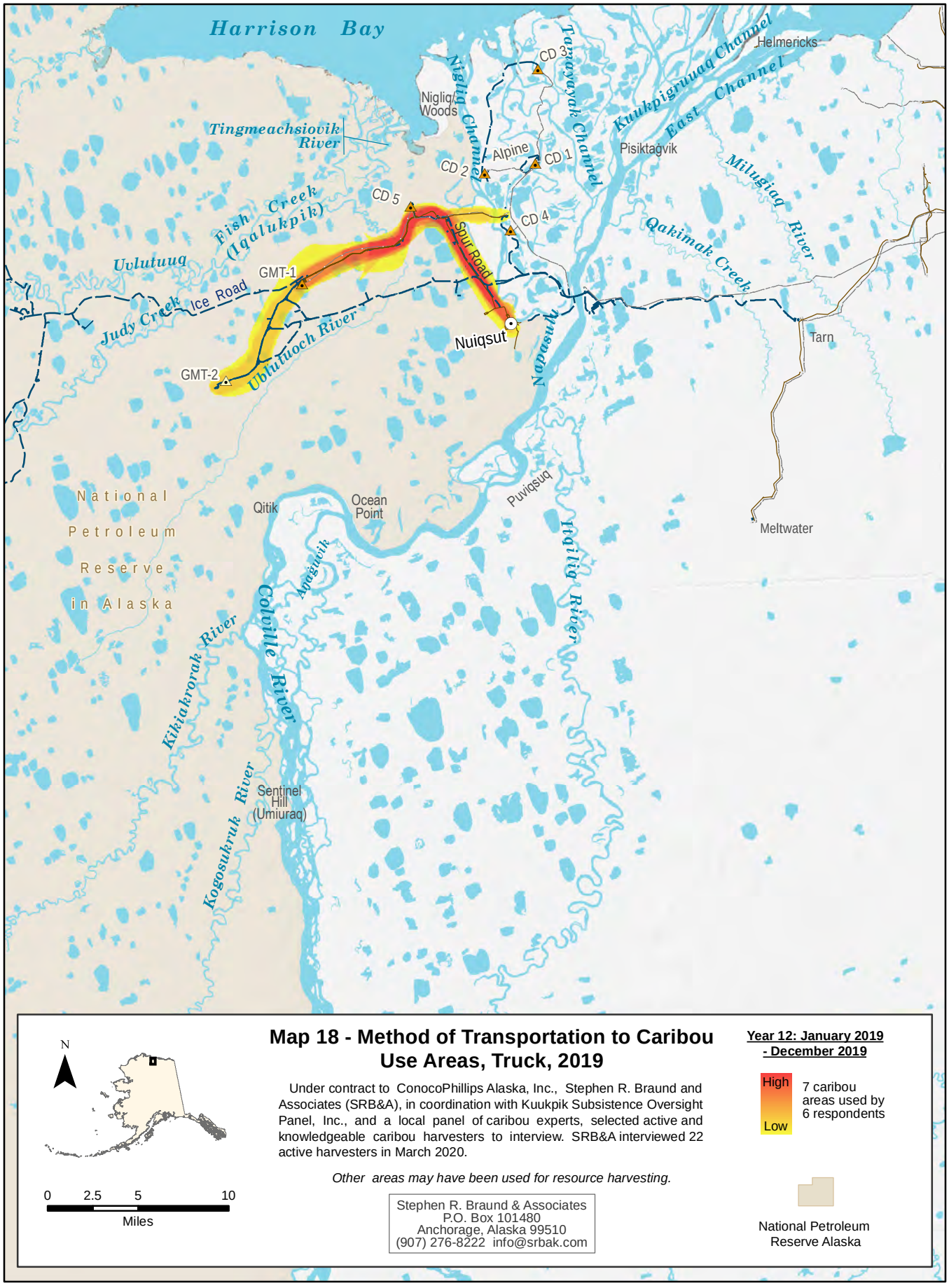
Year 12: January 2019 - December 2019

High
Low

2 caribou areas used by 2 respondents

National Petroleum Reserve Alaska



Map 18 - Method of Transportation to Caribou Use Areas, Truck, 2019

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 22 active harvesters in March 2020.

Other areas may have been used for resource harvesting.

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Year 12: January 2019 - December 2019

High
Low

7 caribou areas used by 6 respondents

National Petroleum Reserve Alaska

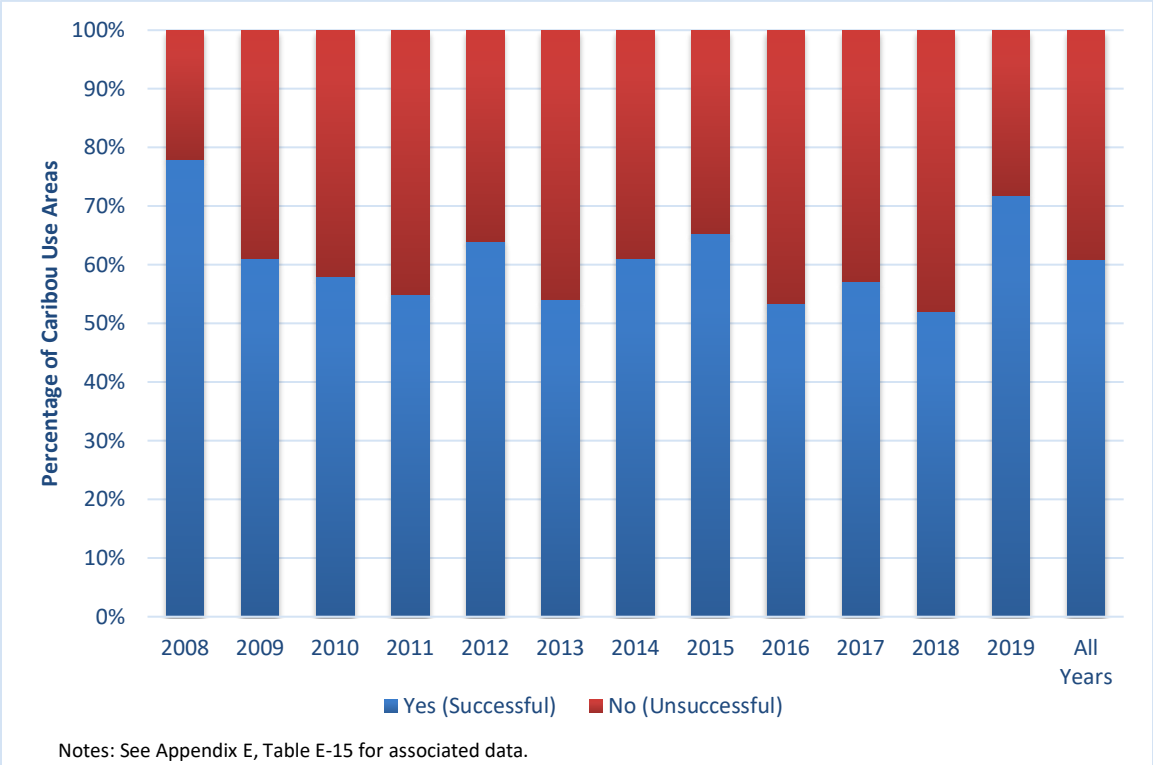
As noted above, truck use by Nuiqsut caribou harvesters increased starting in 2015 due to construction of the Spur Road and subsequent construction of the Nigliq Channel bridge, road to CD5, road to GMT-1, and road to GMT-2 (in 2019). In 2019, truck subsistence use areas were concentrated equally along the Spur Road, road to CD5, and road to GMT-1, with a slight decrease in use toward GMT-1. Areas of low to moderate overlap were also reported along the road corridor to GMT-2; respondents reported using these areas both before and after the gravel road was constructed in September 2019. A small number of use areas were reported along the road system to CD4 (Map 18). Use of the CD5, GMT-1, and GMT-2 roads was higher in 2019 than in previous study years (Appendix C, Map C-13).

Differences in the maximum extent of subsistence use 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 subsistence use 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. In 2019, the relatively small active harvester sample may have contributed to the notable differences in the extent of overland travel.

Harvest Success

Figure 10 and Table E-15 show the percentage of caribou subsistence use areas in which respondents reported successful harvests. Over time, the percentage of subsistence use areas where respondents report successful harvests has declined slightly across all previous study years, from 78 percent of subsistence use areas successful in 2008 to a low of 52 percent in 2018. In 2019, there was an uptick, with respondents reporting successful harvests at 72 percent of subsistence use areas. In 2019, the average number of caribou harvested per subsistence use area (2.9) and harvest location (2.75) was higher than in all previous study years (Figure 11, Table E-16).

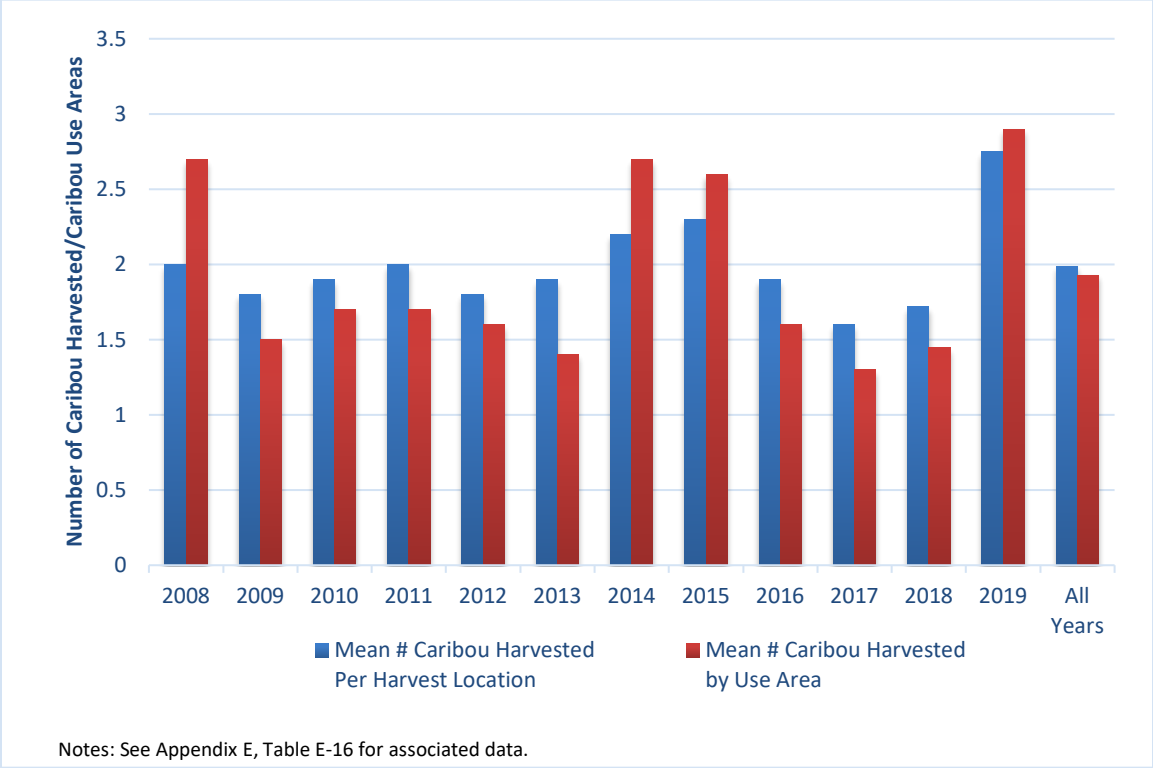
Figure 10: Percentage of Caribou Subsistence Use Areas in which Respondents Reported Successful Harvests, Nuiqsut



Notes: See Appendix E, Table E-15 for associated data.

Stephen R. Braund & Associates, 2021.

Figure 11: Mean Number of Caribou Harvested by Subsistence Use Area and Harvest Location



Notes: See Appendix E, Table E-16 for associated data.

Stephen R. Braund & Associates, 2021.

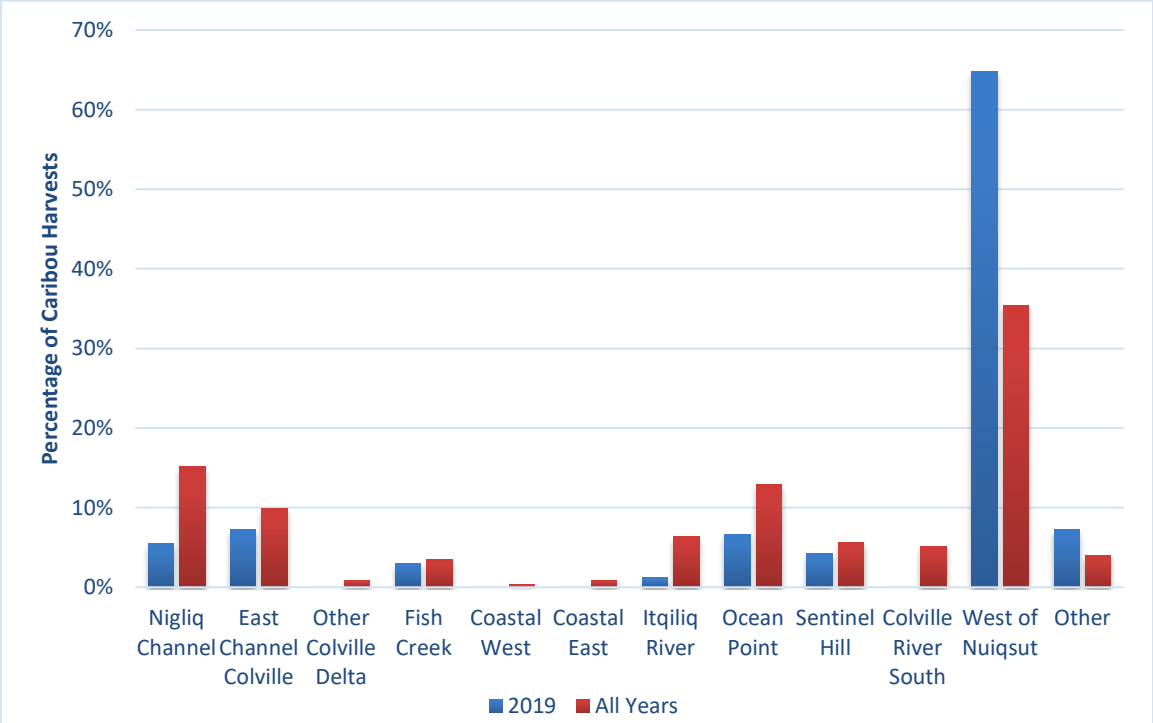
The increase in average number of caribou harvested per harvest location was inflated as a result of one respondent providing a large harvest polygon where he harvested a large number of caribou over the course of six months. When this harvest polygon is removed from the analysis, the average number of caribou harvested per harvest location is closer to two, within the range of previous study years.

In previous years, the average number of caribou harvested per subsistence use area ranged from 1.3 to 2.7, and the average number of caribou harvested per harvest location ranged from 1.6 to 2.3. There does not seem to be a direct correlation between the percentage of successful caribou subsistence use areas and other variables such as community harvest amounts, in that an increase/decrease in community harvest amounts during a given year does not necessarily correspond with an increase/decrease in the percentage of successful caribou subsistence use areas. This could indicate that the data in Figure 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?) and harvest patterns (i.e., were harvest activities focused in a single area such as a single road corridor?), rather than overall harvest success.

A number of respondents discussed their hunting success in 2019, indicating that the distribution/availability of caribou within traditional subsistence use areas, in addition to hunting access, affected their success. Residents reported frequent success along the road system, with one individual returning to an area of the road near GMT-2 over the course of multiple months and harvesting caribou each time. Residents also described hunting along the river system, with two noting that hunting caribou along the river sometimes requires long waits for the caribou herds to cross.

Figure 12 (Table E-18) and Figure 13 (Table E-19) show the percentage of harvested caribou and average number of trips per harvested caribou, by 12 pre-defined hunting areas for the 2019 study year and, where available, on average across all study years (see Table E-17 through Table E-19 for all associated individual study year data). 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

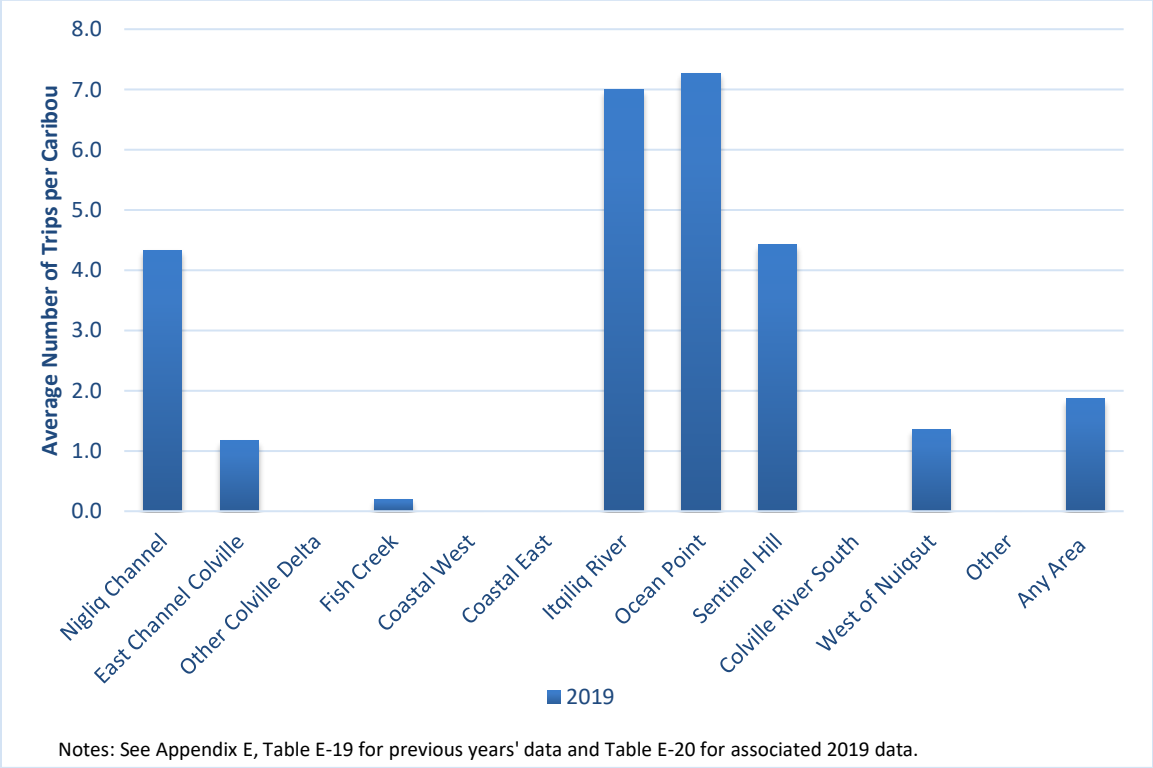
Figure 12: Percentage of Caribou Harvests by Caribou Pre-Defined Hunting Area



Notes: See Appendix E, Table E-18 for associated data.

Stephen R. Braund & Associates, 2021.

Figure 13: Average Number of Trips Per Caribou Harvested by Pre-Defined Hunting Area, 2019



Notes: See Appendix E, Table E-19 for previous years' data and Table E-20 for associated 2019 data.

Stephen R. Braund & Associates, 2021.

Nuiqsut, upriver to Sentinel Hill, upriver to Umiat); the pre-defined hunting areas were reviewed by the Nuiqsut Caribou Panel for accuracy and appropriateness (see Map 7). The Coastal West area (Area 5) is the only area that has accounted for less than two percent of the total harvest during all individual 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 five percent of the harvest (Figure 12). Over the first 11 years of the study, areas along the Colville River upriver from the community (Ocean Point, Sentinel Hill, Colville River South, Itqiliq River), generally provided between two and 15 percent of the harvest over previous study years, with Ocean Point accounting for less of the harvest over time, and Itqiliq River providing for more of the harvest over time.

In 2019, harvests in the Itqiliq River dropped to one percent, the lowest percentage of all study years and following several years of peak harvests in that area, although the smaller sample size in 2019 may affect study results (Figure 12). Harvests in the Ocean Point area continued to decline from previous years, with the area accounting for seven percent of the harvest compared to between four and 21 percent in previous years (Appendix E, Table E-18). The Nigliq Channel area accounted for a low of five percent of the harvest in 2019, compared to between nine and 25 percent in previous years. Areas which remained within the range of previous years in terms of their contribution to the total harvest included the East Channel Colville (seven percent), Fish Creek (three percent), Sentinel Hill (four percent), and Other (seven percent) areas. The decline in harvest contribution within a number of pre-defined hunting areas in 2019 corresponded with a substantial increase in harvests in the area West of Nuiqsut, which includes the road system. Harvests in the area West of Nuiqsut ranged from 18 and 17 percent of the harvest in 2008 and 2009, respectively, to a high of 65 percent in 2019, an increase of 20 percent over the next highest study year (2018). The smaller sample size in 2019 may affect study results; however, 2018 was the first full year that the GMT-1 road was in place, and in 2019 the road to GMT-2 was constructed and was open to partial use by the end of the year. The increased use of roads for hunting likely contributes to the increased use of and harvests within the area West of Nuiqsut.

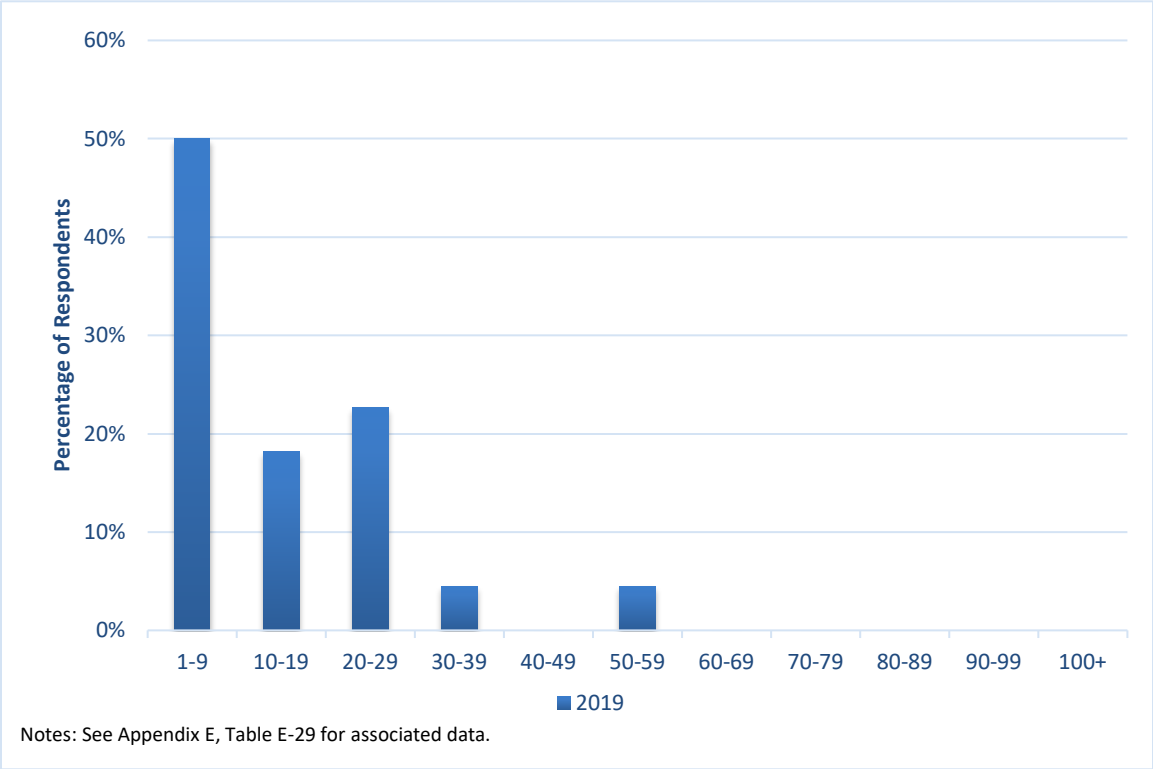
Another measure of success is the average number of trips taken per caribou harvested within each pre-defined hunting area. A higher number of trips per harvested caribou can be interpreted as a lower success rate in an area, as it shows that hunters may have to expend more effort per caribou or that fewer caribou are taken on any one trip. Other factors that may affect the number of trips to an area include the duration of trips (e.g., a respondent may take multiple shorter trips to an area rather than a single longer trip), ease of access (e.g., a respondent may take more trips to an easily accessible area, such as along the road system, regardless of success rate), use of an area for other purposes (e.g., multiple trips to and from fishing sites while also hunting caribou), and distribution of caribou in an area (e.g., large-sized herd versus scattered). As shown on Figure 13, Ocean Point showed the highest average number of trips (i.e., least successful) taken per caribou (7.3 trips), followed by Itqiliq River (7.0), Sentinel Hill (4.4), and Nigliq Channel (4.3). The areas with the lowest numbers of trips taken per caribou (i.e., most successful) include Fish Creek, East Channel Colville, and area West of Nuiqsut. A similar variable was collected during previous study years (2008-2018) using somewhat different data collection methods (Table E-19). These data show a somewhat higher number of trips taken per caribou overall (between 2.2 and 4.6) and for a number of individual pre-defined hunting areas. The only pre-defined hunting area where 2019 respondents took a higher number of trips per caribou (compared to most previous study years) was Itqiliq River. The number of trips per caribou was much lower for the Sentinel Hill and Colville River South areas, as was overall hunting trips to those areas (Table E-19, Table E-20).

Frequency of Trips

Along with other timing variables, the data collection method for frequency of trips shifted to show data based on the 12 pre-defined hunting areas instead of user-defined subsistence use areas, in addition to the total annual trips per respondent. This method prevents variation based on how respondents choose to report their subsistence use areas (i.e., one large subsistence use area versus multiple smaller subsistence use areas)

and results in data that are more accurately comparable from year to year. A majority of respondents (50 percent) took a total of between one and nine caribou hunting trips during the 2019 hunting year, with another 41 percent of respondents taking between 10 and 29 caribou hunting trips (Figure 14, Table E-29). The remaining 10 percent of respondents took between 30 and 39 trips (five percent) and between 50 and 59 trips (five percent).

Figure 14: Number of Caribou Hunting Trips Taken by Respondents in 2019



Notes: See Appendix E, Table E-29 for associated data.

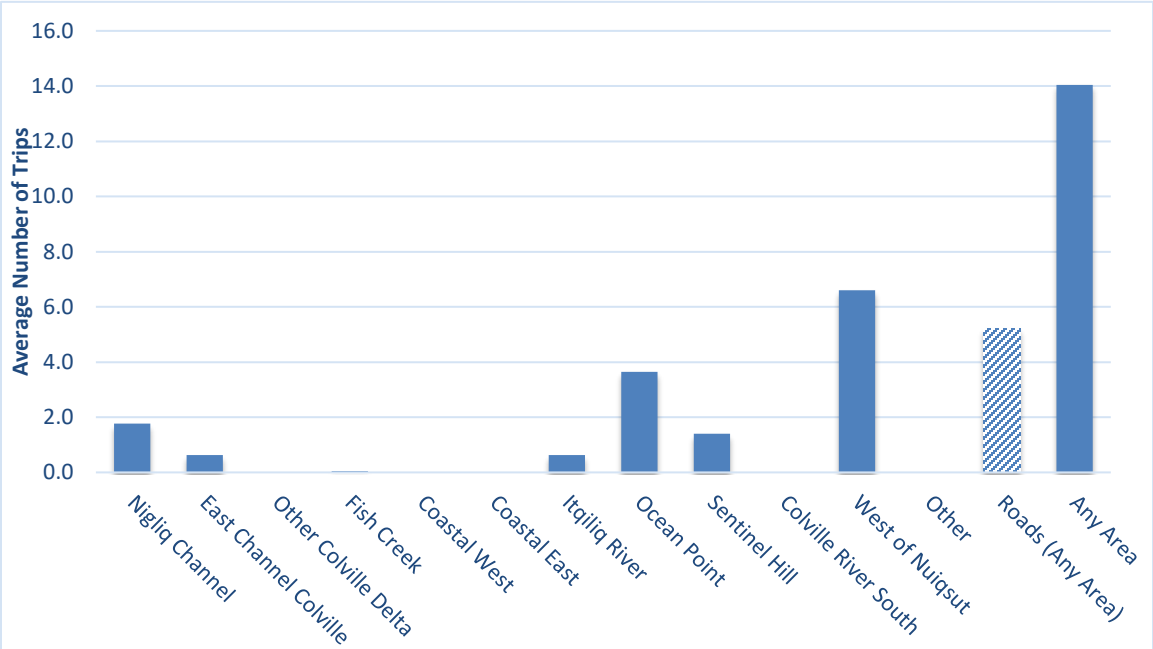
Stephen R. Braund & Associates, 2021.

Figure 15 and Table E-21 show the average number of trips reported by harvester for each of the 12 pre-defined hunting areas, for the 2019 study year, in addition to the average number of trips along roads. Data for pre-defined hunting areas may include road hunting activities, if the pre-defined hunting area includes roads. However, data on "Roads" is for road hunting activities as a whole, and may include hunting activities within any of the pre-defined areas that contain roads. It shows that the average number of trips was highest (6.6 trips) for the area West of Nuiqsut, followed by Ocean Point (3.6 trips), Nigliq Channel (1.8 trips), Sentinel Hill (1.4 trips), Itqiliq River and East Channel Colville (0.6 trips each), and Fish Creek (less than 0.5 trips).

The percentage of trips to pre-defined hunting areas, in addition to the percentage of trips using roads, are shown in Appendix E (Table E-23 and Table E-24) and reflect a similar pattern of use. A similar variable was collected during previous study years (2008-2018) using somewhat different data collection methods (Table E-21). Data from past years has shown that respondents have taken the greatest number of trips, on average, to the Ocean Point area, followed by the area West of Nuiqsut; however, in recent years (2015-2018) the number of trips to the area West of Nuiqsut has surpassed those to Ocean Point (Table E-21). The increasing average frequency of trips to the West of Nuiqsut is likely influenced by construction and operation of a road system connecting the community of Nuiqsut to nearby drillsites. While roads, including ice roads, are not unique to the area West of Nuiqsut, the Spur Road, CD5 road, GMT-1 Road, and GMT-2 Road are all located within Predefined Area 11 (West of Nuiqsut) and are used often for caribou hunting.

Figure 15, which shows the average number of trips for roads as a separate dataset (as roads may occur within any of the 11 pre-defined areas), illustrates the relatively high number of average road hunting trips (5.2) per harvester in 2019.

Figure 15: Average Number of Trips Reported by Harvester by Pre-Defined Hunting Area, 2019



Notes: See Appendix E, Table E-21 for previous years data (2008-2018) and Table E-22 for associated data. While roads, including ice roads, occur in the highest frequency in the area West of Nuiqsut, they are not unique to that area and can occur within any of the eleven pre-defined areas or other areas. Totals for pre-defined use areas do not include roads, which is a separate but comparable dataset.

Stephen R. Braund & Associates, 2021.

Pre-defined hunting areas with the highest number and percentage of visits are typically those which are easily accessible or those which are used for multiple purposes. Thus, respondents frequently reported taking multiple hunting trips along the local road system (Figure 16 and Table E-23). In 2019, over 35 percent of caribou hunting trips were taken along roads (within any of the pre-defined areas, but primarily within Area 11 [West of Nuiqsut]. This is somewhat higher than in previous study years, where the percentage of trips taken on roads ranged from 16 percent to 30 percent for an average of 25 percent (Table E-23). A number of respondents described using the road for caribou hunting frequently throughout the hunting season. As one respondent described, "Almost every day, we're riding out there [on the road]. As long as we have gas we're out there" (SRB&A Nuiqsut Interview March 2020).

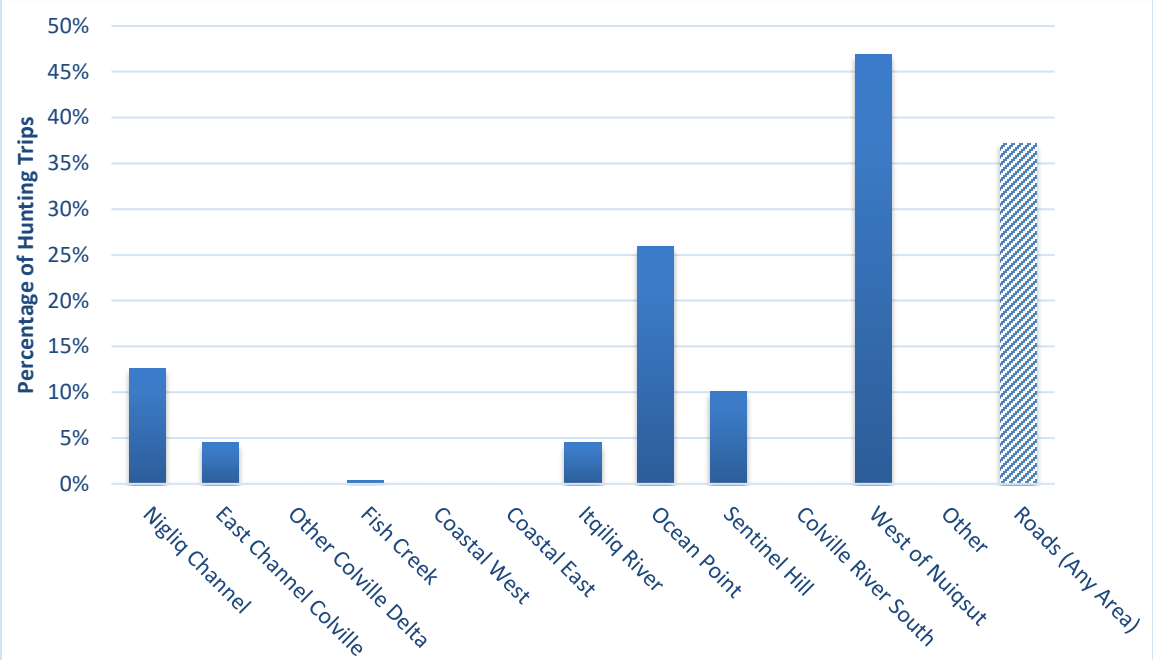
Another respondent reported taking joint fishing and caribou hunting trips to Nigliq Channel, using the road system to access an area close to the Nigliq River bridge:

> *I don't know I had my net right by the bridge. [I went to Nigliq a] couple times maybe five or six times. I talked to couple people over there and they didn't see any [caribou]. They spend time over there. [It is] usually about an hour round trip [to Nigliq].* (SRB&A Nuiqsut Interview March 2020)

Residents reported taking trips to other easily accessible areas located somewhat close to the community. These areas include four-wheeler areas West of Nuiqsut, the Nigliq Channel, Itqiliq River, and upriver to Ocean Point. Areas which require greater preparation or which are more difficult to access, such as Fish Creek or the upper Colville River, are generally visited less frequently. During the March 2021 meeting,

Nuiqsut Caribou Panel members noted that use of Fish Creek by boat has decreased in recent years, because the river channels have changed and become more shallow.

Figure 16: Percentage of Trips by Pre-Defined Hunting Area



Notes: See Appendix E, Table E-23 for previous years data (2008-2018) and Table E-25 for associated data. While roads, including ice roads, occur in the highest frequency in the area West of Nuiqsut, they are not unique to that area and can occur within any of the eleven pre-defined areas or other areas. Totals for pre-defined use areas do not include roads, which is a separate but comparable dataset.

Stephen R. Braund & Associates, 2021.

Duration of Trips

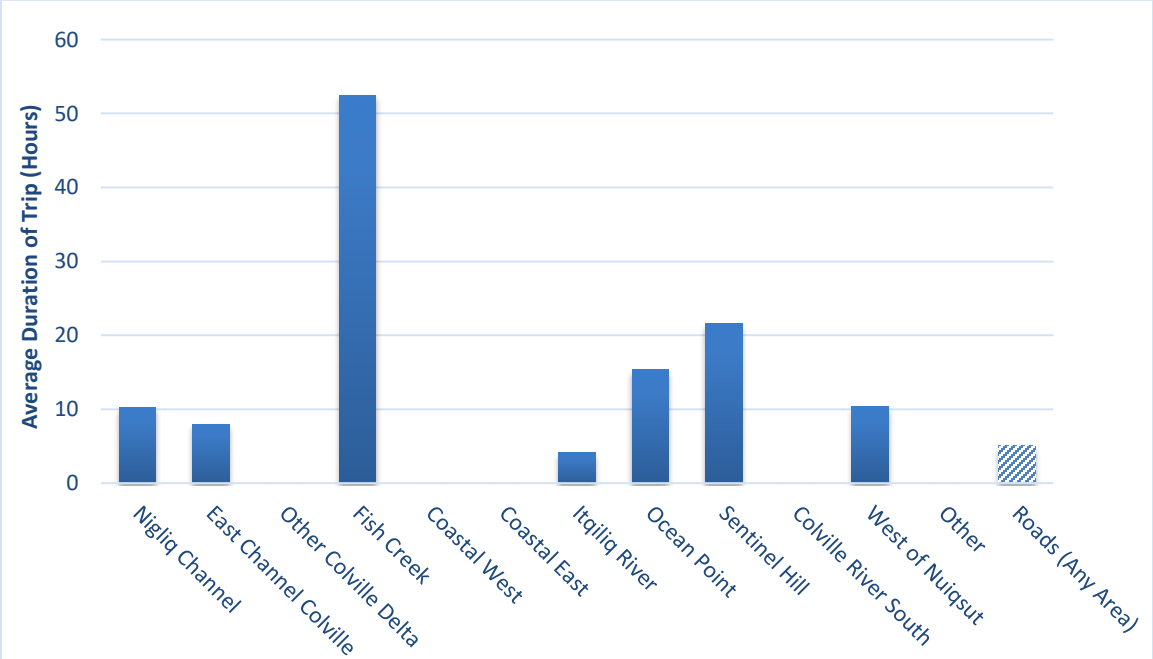
The typical duration of caribou hunting trips has maintained a similar pattern across all study years. Residents typically take day trips to over 80 percent of their caribou subsistence use areas (Table D-6). As discussed above (Summary of 2019 Study Plan Revisions), in 2019 the study team shifted to collecting duration by pre-defined hunting areas, rather than by user-defined subsistence use areas. In 2019, 89 percent of respondents reported taking day trips only and of all caribou hunting trips reported by participants, 99 percent were day trips (Table E-25 and Table E-26). In previous study years, all "same day" trips were lumped into one category for duration. However, beginning in Year 12, duration was recorded in typical number of hours, which more accurately represents the high number of day trips in addition to the wide variation in duration of same day trips. In 2019, the longest trips were those taken to the Fish Creek area, which lasted, on average, approximately 53 hours, although these data are based on only two harvesters with vastly different trip durations. Trips taken to all other pre-defined hunting areas lasted less than 24 hours and ranged between approximately four hours (trips taken to Itqiliq River) and 22 hours (trips taken to Sentinel Hill) (Figure 17).

Road hunting trips lasted an average of five hours. Work and personal commitments are often cited as a reason for taking shorter day trips, while weather, recreation, associated or co-occurring hunting and gathering activities (e.g., moose hunting and fishing), and efficient use of gas are often cited as reasons for taking longer day trips or overnight trips (See Appendix F, *Duration of Trips*).

Participants also noted that transportation method can be a factor in trip duration. For example, travel by four-wheeler along the road system tends to take quite a bit longer than travel by vehicle. Being successful

can also extend the length of trips due to the time needed to process the caribou. As one respondent described, "It took me two hours to cut up the caribou about a half hour to pack [the caribou] on [the] sled. About four hours [total for the Nigliq trip]" (SRB&A Nuiqsut Interview March 2020).

Figure 17: Average Duration of Trips by Pre-Defined Hunting Areas, 2019



Notes: See Appendix E, Table E-27 for associated data. While roads, including ice roads, occur in the highest frequency in the area West of Nuiqsut, they are not unique to that area and can occur within any of the eleven pre-defined areas or other areas. Totals for pre-defined use areas do not include roads, which is a separate but comparable dataset.

Stephen R. Braund & Associates, 2021.

In general, the data indicate an increasing trend of same day trips, rather than overnight hunting trips which were more commonly reported in the early years of the study (2008-2013) (Appendix D, Table D-6). In 2019, few respondents reported caribou hunting trips farther upriver toward Sentinel Hill or Umiat, although these hunting trips also likely occurred among other hunters who did not participate in the 2019 active harvester interviews. According to respondents, camping is usually reserved for longer upriver trips, particularly during moose hunting season. Residents often hunt caribou as available during moose hunting trips. As one individual described, "[I] just [took] one [trip]. Yes [we camped]. Just one night, we heard there was a moose out there, but we couldn't find it" (SRB&A Nuiqsut Interview March 2020).

Previous study years documented duration by user-defined subsistence use area and illustrated a general pattern of day trips for overland (i.e., snowmachine, four-wheeler, and truck) trips and nearby boating trips. Overnight trips generally occurred on trips extending farther upriver or to nearby fish camps (e.g., Nigliq) (see previous monitoring reports for maps depicting subsistence use areas by trip duration). 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, money available for fuel, and associated subsistence activities are the primary factors that determine trip duration.

Herd Characteristics

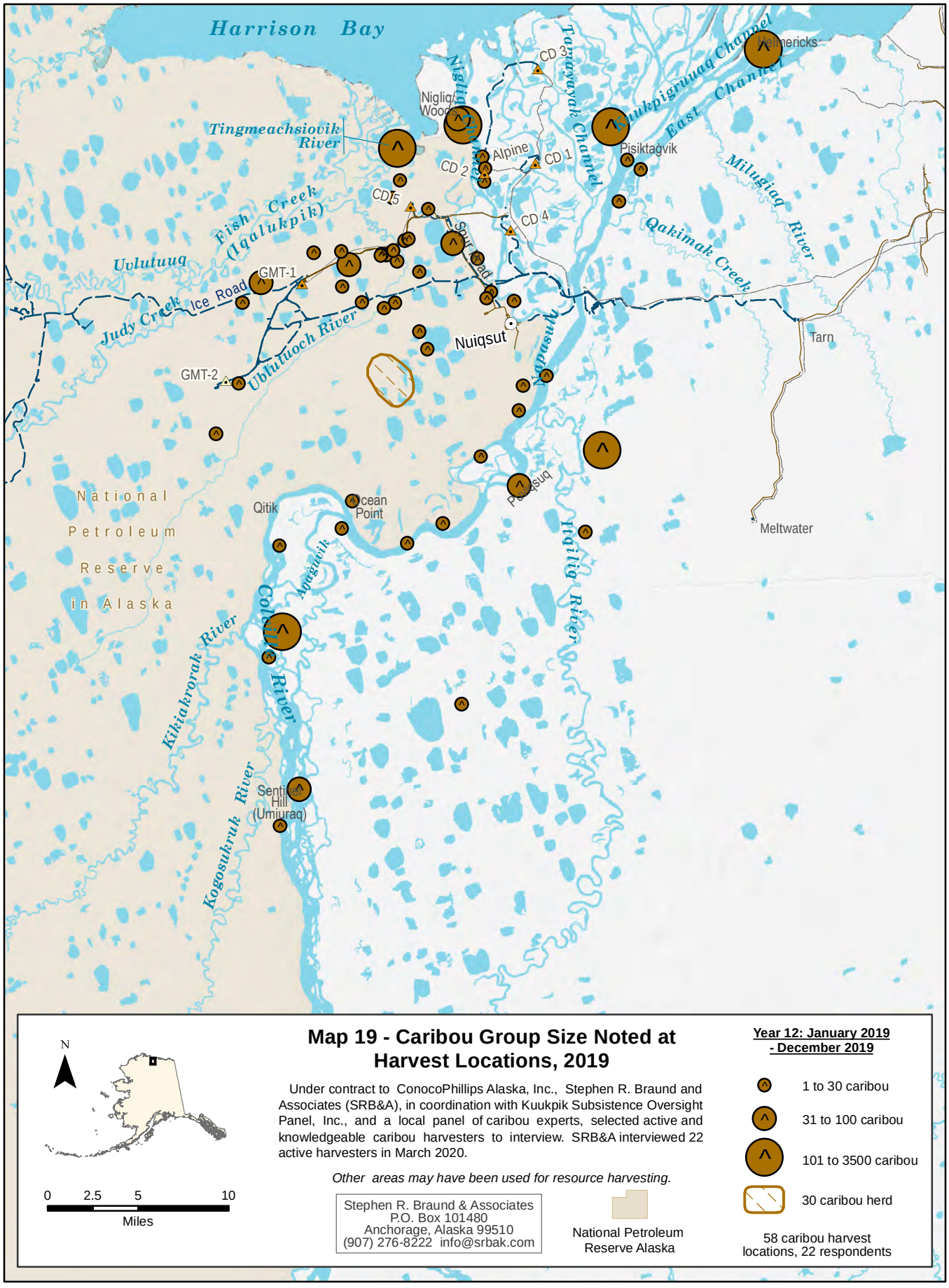
As discussed in Prichard et al. (2020), the primary herds that occur within the Colville River drainage are the Teshekpuk Herd (TH) and Central Arctic Herd (CAH). The Colville River Delta is generally on the eastern periphery of the TH and the western periphery of the CAH. Most TH caribou winter on the coastal

plain, usually to the west of the Colville River, with approximately 30 percent of TH females wintering in the Brooks Range (Alex Prichard, personal comm. 2021). 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, while many CAH have wintered to the north of the Brooks Range or even on the coastal plain, and remaining north longer into the fall and early winter (Prichard et al. 2020). In 2019, from late fall through winter, TH caribou were concentrated to the southwest of Nuiqsut and along the Colville River to Umiat, providing harvest opportunities for hunters with snowmachines (Brian Person, personal comm. 2021). Few winter harvests were reported during 2019 active harvester interviews, although this may have been due to the truncated field season and resulting lower participation by winter snowmachine hunters.

Both the TH and CAH populations grew steadily from the 1990s until around 2010, after which both herds experienced a substantial decline. Surveys in 2015 and 2017 have since shown a modest increase in the TH and CAH populations, with the CAH estimated at approximately 30,000 caribou in 2019 and the TCH estimated at 55,600 in 2017. The CAH population has experienced a more precipitous decline and more modest rebound compared to the TCH. 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 periods of high use of the Colville River area by the TH and CAH. 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., Atiġruk 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 subsistence use 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. 2020). Residents time the hunt to avoid harvesting male caribou during the rut, which affects the taste of the caribou. Overall, TH caribou are more frequently available within the community of Nuiqsut's current subsistence use area.

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 response to this concern, the monitoring study documents the size of the herd or group in which each caribou is harvested. Group size at harvest locations is displayed on Map 19. In 2019, residents reported harvesting most caribou from groups of 10 or fewer (64 percent of harvest locations) (Table E-30). Groups of 11-20 accounted for 14 percent of harvest locations. The percentage of caribou harvests in groups of more than 20 dropped in recent years with respondents reporting these herd sizes at only 10 and 11 percent of harvest locations in 2017 and 2018, respectively. In 2019



Map 19 - Caribou Group Size Noted at Harvest Locations, 2019

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 22 active harvesters in March 2020.

Other areas may have been used for resource harvesting.

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National Petroleum Reserve Alaska

Year 12: January 2019 - December 2019

- 1 to 30 caribou
- 31 to 100 caribou
- 101 to 3500 caribou
- 30 caribou herd

58 caribou harvest locations, 22 respondents

N

0 2.5 5 10
Miles

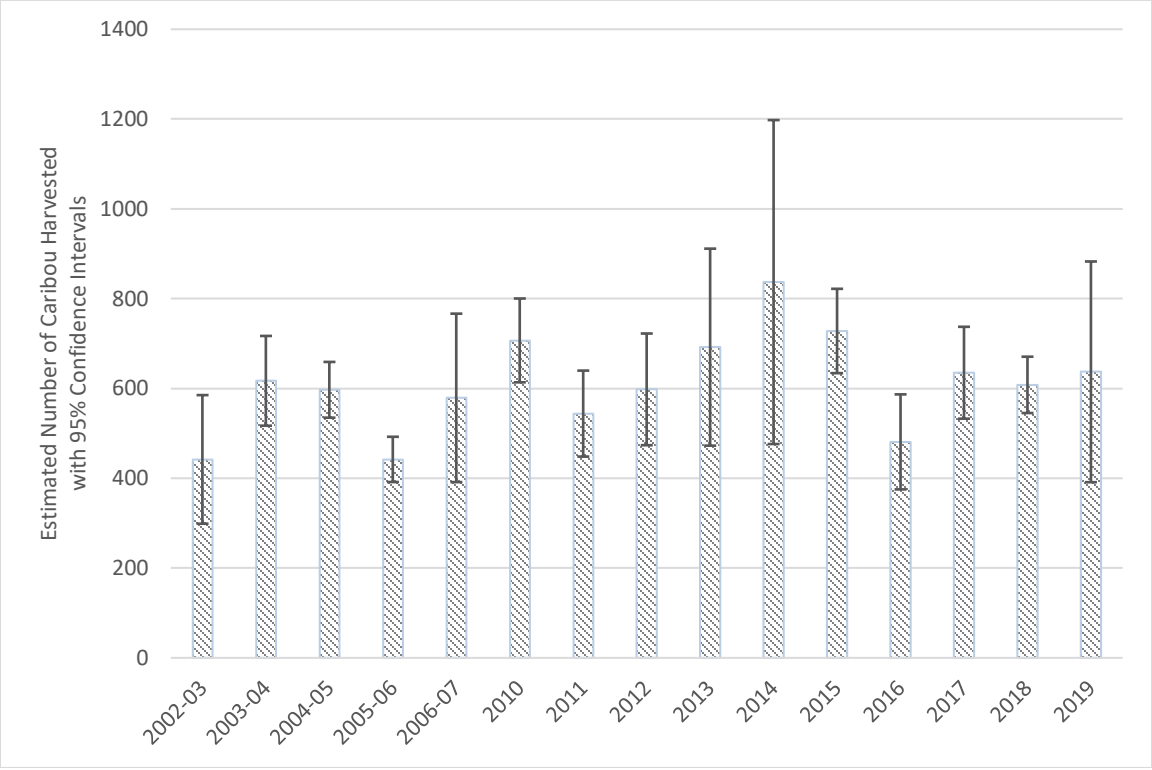
groups of 20 caribou or more were reported at 22 percent of harvest locations. Similarly, while no groups of over 500 caribou were reported for the 2017 and 2018 study years, in 2019 three percent of harvest locations were associated with herds of 1,000 to 2,000 caribou.

As shown on Map 19, herds of over 100 caribou were observed at various locations on Fish Creek, Nigliq Channel, East Channel, Itqiliq River, and upper Colville River. Some groups of between 31 and 100 caribou were also spotted along the road system, near Nigliq on the Nigliq Channel, and upriver near Umiuraq and Puviqsuk. The majority of harvests along the road and to the west of the community were associated with groups of 1 to 30 caribou (Map 19). Herd size is strongly tied to the time of year, with caribou congregating in large groups primarily during the mosquito harassment period (Prichard et al. 2020). In 2019, the majority of active harvester observations of large herds (more than 100 caribou) occurred in the months of July and August. Map 20 shows the sex of harvested caribou in 2019; a majority of harvested caribou are reported as males. Females were harvested to the west and northwest of the community along the road system, on the East Channel, and in an overland area to the west of Itqiliq River. Females were more frequently harvested in the winter (November through March) months.

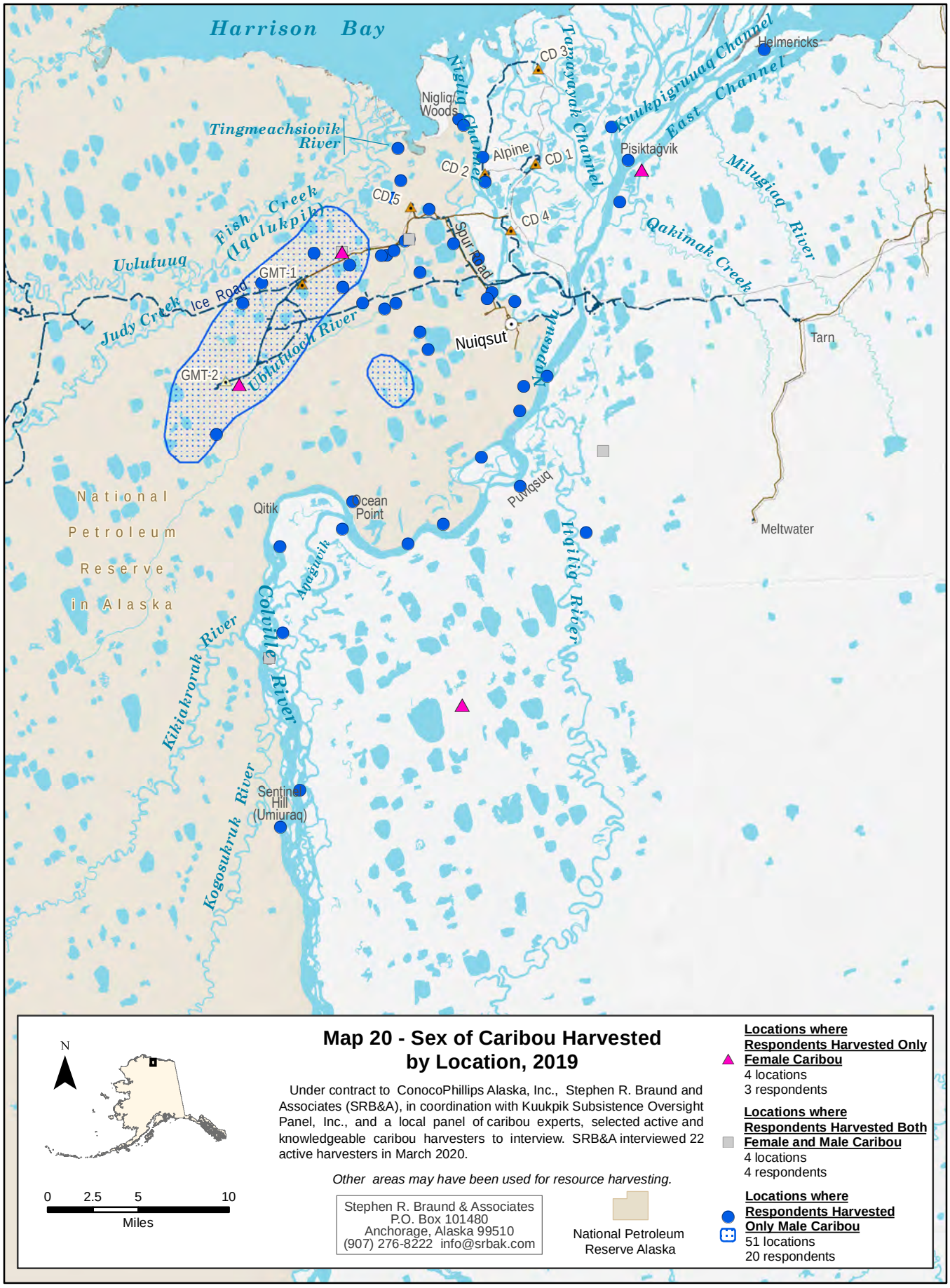
Harvest Amounts (Household Harvest Surveys)

This section presents the caribou harvest data from the household caribou harvest surveys in Nuiqsut conducted for this monitoring study alongside harvest data available from ADF&G and NSB harvest studies from. The response rate for the 2019 household harvest surveys was low (41 percent) and therefore harvest estimates based on these data may be less reliable due to a wide confidence interval (+/-38.6%) (Figure 18). Table 6 and Figure 18 compare harvest information over time. As discussed above ("Fieldwork Summary," "Household Caribou Harvest Surveys"), in 2019 the study team determined that a limited number of "non-harvesting" households participated in the survey, likely because non-active households are less likely to volunteer participation in such surveys without direct contact from surveyors (e.g., household heads often believe they should not participate as they are not active).

Figure 18: Estimated Caribou Harvests with Confidence Intervals, Nuiqsut, Available Study Years



Stephen R. Braund & Associates, 2021.



Map 20 - Sex of Caribou Harvested by Location, 2019

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 22 active harvesters in March 2020.

Other areas may have been used for resource harvesting.

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National Petroleum Reserve Alaska

Locations where Respondents Harvested Only Female Caribou
4 locations
3 respondents

Locations where Respondents Harvested Both Female and Male Caribou
4 locations
4 respondents

Locations where Respondents Harvested Only Male Caribou
51 locations
20 respondents

Table 6: Household Harvest Surveys - Nuiqsut Caribou Harvests 1985-2019

Year	Percent Using	Percent Attempting to Harvest	Percent Harvesting	Percent Giving	Percent Receiving	Estimated Harvest	Estimated Pounds Harvested	Mean Household Pounds	Per Capita Lbs	95% Confidence Interval (+/-)	Source
1985	98%	90%	90%	80%	60%	513	60,021	790	150	NA	ADF&G (2019)
1992		81%				278	32,551	310	78	NA	Fuller and George (1999)
1993	98%	74%	74%	79%	79%	672	82,169	903	228	NA	Fall and Utermohle (1995)
1994-95						258	30,186	364	73*	NA	Brower and Hepa (1998)
1995-96						362	42,354	455	99*	NA	Braem et al. (2011)
1999-00						413			112	NA	Pedersen and Taalak Unpublished as cited in Braem et al. (2011)
2000-01						496	57,985	453	134*	NA	Bacon, Hepa, Brower, Pederson, Olemaun, George, and Corrigan (2011)
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%	
2004-05	99%	62%	61%	81%	96%	546	63,882	597	147	10.4%	
2005-06	100%	60%	59%	97%	96%	363	42,471	442	102	11.4%	
2006-07	97%	77%	74%	66%	69%	475	55,575	579	143	32.4%	
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 (2016)
2016	96%	76%	67%	79%	81%	481	56,277	592	132	22.0%	SRB&A (2017)
2017	96%	72%	60%	74%	85%	635	74,338	715	164	16.1%	SRB&A (2018)
2018	99%	84%	74%	88%	88%	608	71,113	658	157	10.3%	SRB&A (2019)
2019	100%	98%	91%	87%	78%	636	74,439**	658	153	38.6%	SRB&A 2019 HH Surveys
Mean (All Years)	97%	74%	69%	75%	75%	508	58,623	601	149		

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 (Braem et al. 2011) based on Alaska Department of Labor and Workforce Development (ADOLWD) population estimates for those years.

**These study years had low response rates; thus, results and community-wide estimates should be viewed with this in mind.

The study team determined that using the smaller 2019 sample to estimate a community harvest may result in an inflated community harvest estimate. Thus, the harvest data in Table 6 may overestimate community harvests and participation for 2019.

The percentage of households using caribou has remained at or above 90 percent during every available study year since 1985 and was on the high end at 100 percent in 2019. The percentage of households attempting to harvest and successfully harvesting caribou has varied over time, with the percentage in 2019 (98 percent attempting to harvest and 91 percent harvesting) on the high end, possibly due to the small 2019 sample weighted toward active harvester households. The difference between the percentage of households attempting to harvest and successfully harvesting caribou (seven percent) was within the range of previous years (which varied between one and 16 percent but has increased somewhat over time). The estimated number of caribou harvested in 2019 (636) was on the higher range of previous study years but may be somewhat inflated due to the low sample size in 2019 which represented fewer non-harvesting households than previous study years. The estimated per capita harvest (153 pounds) was within the range of previous years. Confidence limits for available study years are shown in Figure 18 and Table 6. As these data show, the 95 percent confidence interval for 2019 was on the high end of previous years (plus or minus 38.6 percent), indicating lower confidence in the estimates. The only year with a higher confidence interval occurred in 2014 when ADF&G conducted comprehensive household surveys and had a high refusal rate.

In a number of study years, the household harvest surveys included a household with a particularly active harvester. This "super-harvester household" harvested up to one third of all reported harvests for the community in some years, raising concerns that the community harvest estimates were skewed upwards during these years, or that years when the household did not participate would show a substantial drop in community harvests as a result of this one household not participating. In some years, due to personal reasons, this household did not hunt or harvest caribou. In recent years, this super harvester has not been an active hunter in the community. The study team reviewed the household harvest data to determine how the lack of hunting by this household affected (or did not affect) overall community harvests. Overall community harvests did not substantially decline in years when this usually high harvesting household did not hunt. The study team found that in years when this household did not harvest caribou, the average harvest of the remaining active households in the community increased by almost one caribou. These data suggest that harvesters adapt and respond to the needs of the community by increasing or decreasing their harvesting efforts accordingly. Previous research has explored how super harvester households in a community evolve over time as roles shift for various economic and personal reasons (Kofinas, BurnSilver, Magdanz, Stotts, and Okada 2016).

Starting in 2019, the study team moved its question regarding whether a household harvested enough caribou from the active harvester interviews to the household harvest surveys. The study team determined that this question would be best asked during the household surveys, as the question asks for household-level data. The study team also added a question to distinguish between households who did not harvest enough caribou and households who did not harvest enough caribou but received enough caribou from other households. In 2019, 67 percent of households indicated that they harvested enough caribou in 2019, while 33 percent of Nuiqsut households indicated that they did not harvest enough caribou, within the range of previous years (Table 7; Table D-10). Eleven percent of respondents did not harvest enough, but did receive enough caribou, while the remaining 22 percent did not harvest or receive enough caribou for their households in 2019.

Table 7: Household Harvest Surveys - Percentage of Households Harvesting Enough Caribou, 2019

Study Year	Harvested Enough	Did not Harvest Enough, but Received Enough	Did not Harvest or Receive Enough	Total Households
2019	67%	11%	22%	46

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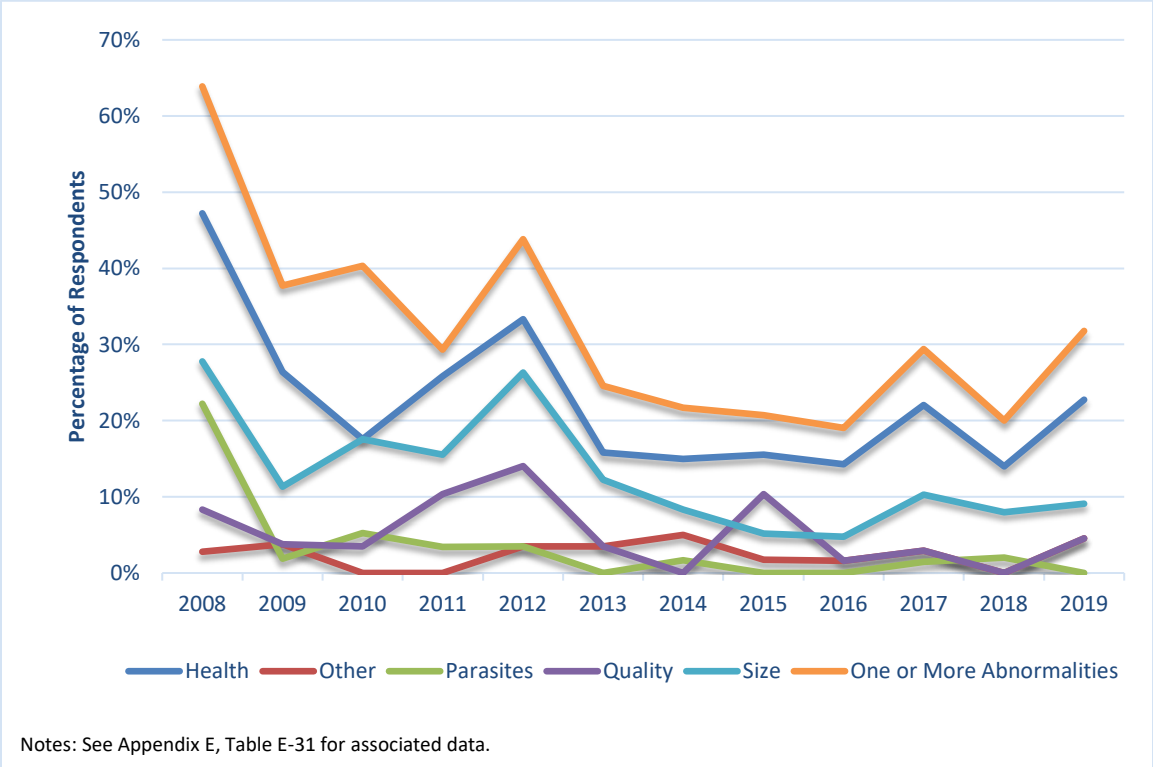
Observations of Harvested Caribou Health and Condition

This section reports results by percentage of respondents, number/percentage of abnormal caribou, and percentage of observations (where respondents may provide multiple observations under a single variable). As shown in Figure 19 and Table E-31, the percentage of respondents reporting one or more abnormalities in caribou has varied from 19 percent (in 2016) to 64 percent (in 2008) over all study years. The percentage of respondents reporting abnormalities was somewhat higher during the first five years of the study (2008-2012), at between 29 and 64 percent, declining to between 19 and 32 percent during the 2013-2019 time period (Figure 19 and Table E-31). In 2019, 32 percent of respondents reported harvesting one or more caribou with abnormalities, the highest percentage since the 2012 study year although the smaller sample size in 2019 may affect study results. Health problems are generally the most commonly reported abnormality, followed by size.

Figure 19: Respondents Observing Abnormalities in Harvested Caribou, 2008-2019



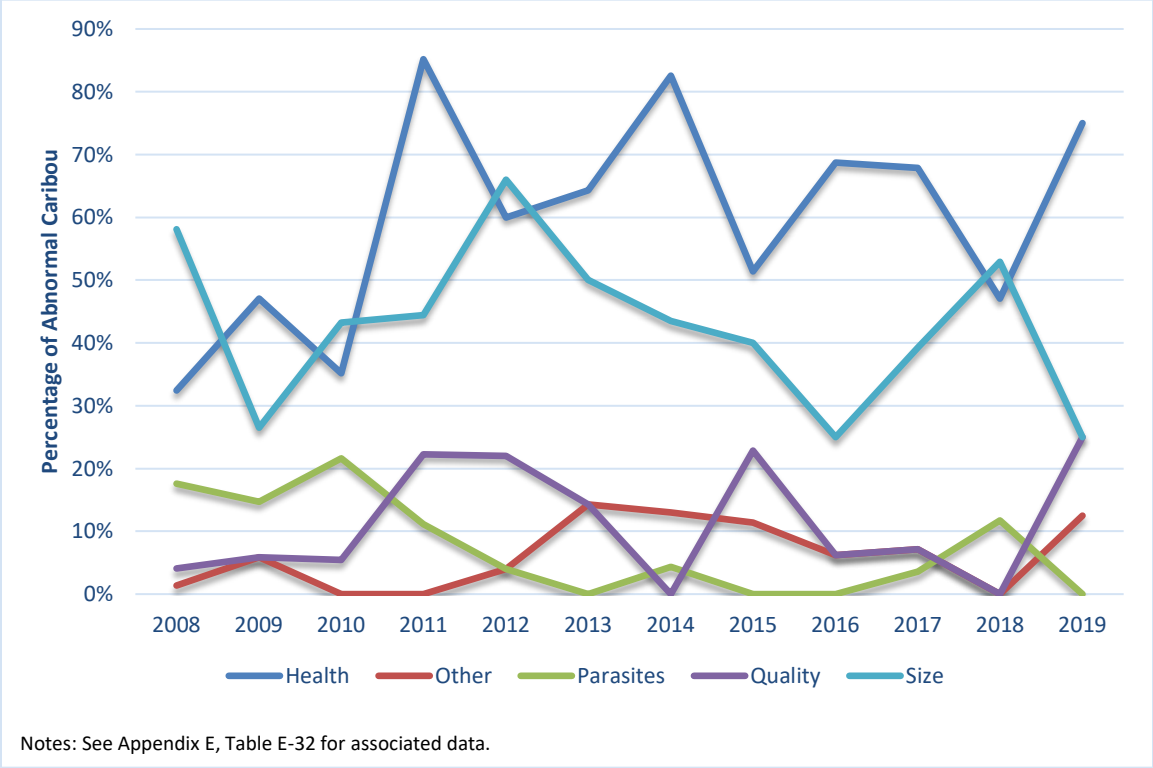
Notes: See Appendix E, Table E-31 for associated data.

Stephen R. Braund & Associates, 2021.

In 2019, responses followed this pattern, with 75 percent of abnormal caribou categorized as having health problems and 25 percent categorized as being an abnormal size (Figure 20 and Table E-32). Another 25 percent of abnormal caribou had abnormalities related to quality (taste/smell), higher than previous years (Figure 20). Respondents reported using 38 percent of caribou identified with abnormalities (Table E-33), specifically 50 percent of caribou with size-related abnormalities, 17 percent of caribou with health-related abnormalities, and 100 percent of caribou with other abnormalities.

As shown in Figure 21 and Table E-34, the most commonly reported abnormality observations (as opposed to the percentage of respondents) in 2019 were Disease/Infection (43 percent), Change in Texture of Meat (29 percent), and Decrease in Resource Size (14 percent). “Other observations” of abnormalities in 2019 included physical abnormalities or fur less thick at seven percent each (Table E-34). Respondents who reported a decrease in resource size generally reported harvesting caribou that had less fat than usual or that seemed skinny to an unhealthy extent.

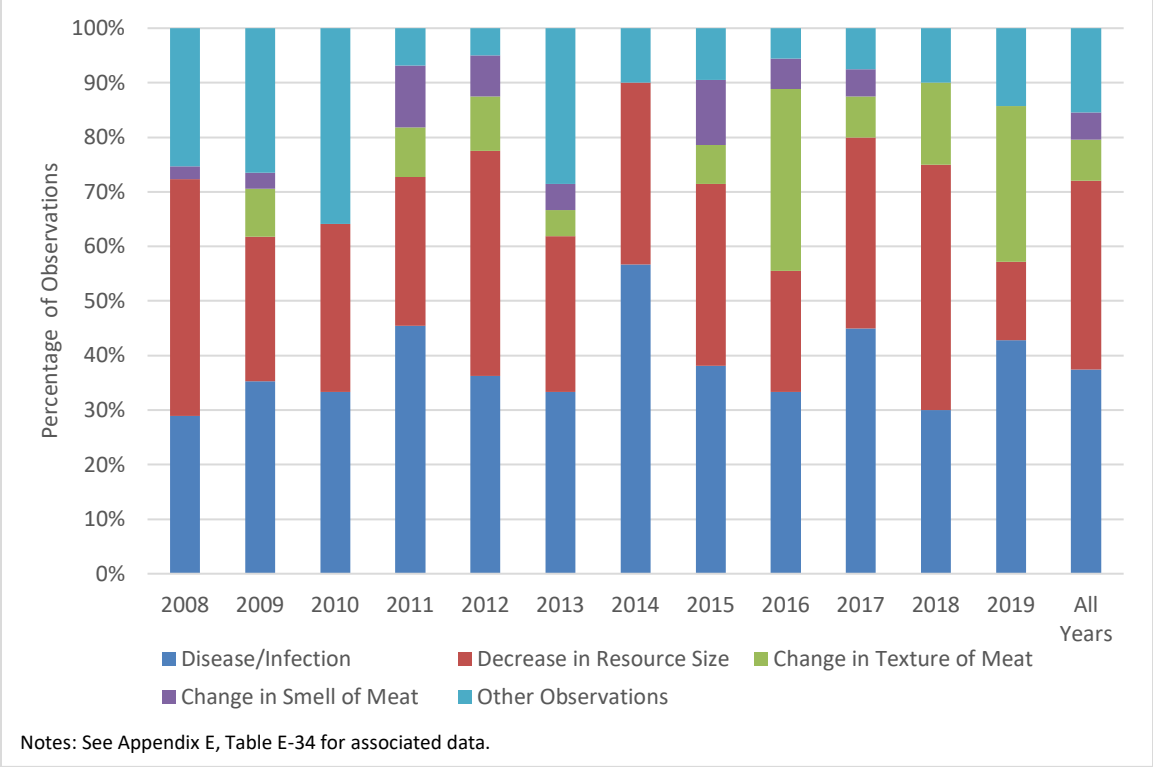
Figure 20: Percentage of Abnormal Caribou by Type of Abnormality, 2008-2019



Notes: See Appendix E, Table E-32 for associated data.

Stephen R. Braund & Associates, 2021.

Figure 21: Types of Observed Abnormalities, 2008-2019



Notes: See Appendix E, Table E-34 for associated data.

Stephen R. Braund & Associates, 2021.

One respondent noted the effects of these abnormalities on their skin sewing activities, saying, I use the skin for sewing, but this year I was only able to make yo-yos because it was too skinny [the caribou hide]" (SRB&A Nuiqsut Interview March 2020). 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 meat, while others identified joints as areas where disease or infection were most apparent:

> *I got one sick caribou. I shot it and it was sick. It had real purple meat, yellowish. I think it was at Fish Creek at the end of August. I just skinned it and left it. I didn't want [to] take it home. There were six caribou but I only got one but it was sick so I didn't want [to] take it.* (SRB&A Nuiqsut Interview March 2020)

Other participants who observed Disease/Infection described unusual problems with internal organs, including the lungs and liver:

> *One of the caribou, on the liver, had white spots on the liver. I think it's from [right near Spur Road] I took the liver and sent a picture of liver to [North Slope Borough Department of Wildlife Management]. Because I cook and eat the liver. Sometimes I ferment the liver to get a strong taste. And according to what [NSB Department of Wildlife staff] told me, was there was some kind of worm. [I] used the caribou but not the liver. And that's the best part, you get a lotta nutrients from the liver.* (SRB&A Nuiqsut Interview March 2020)

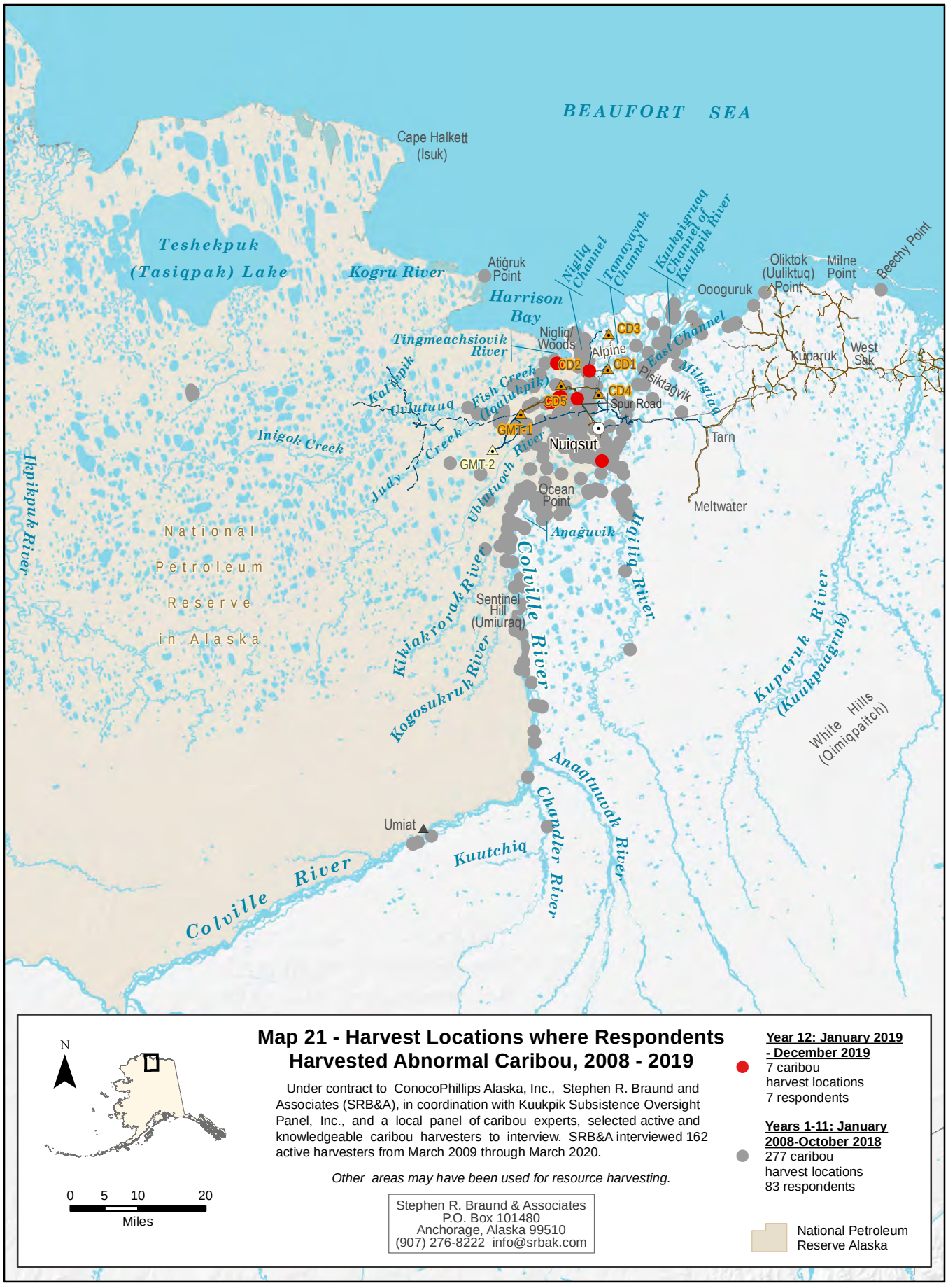
The locations where respondents reported harvesting caribou perceived to be abnormal during the 2019 study year are depicted in red on Map 21, and locations identified during previous study years (2008-2018) are shown in gray. For 2019, respondents reported harvesting "abnormal" caribou along the Spur Road and road to GMT-1, on Nigliq Channel near CD2, near the mouth of Fish Creek, and upriver near the mouth of Itqiliq River. Locations of abnormal caribou were concentrated closer to the community than in some previous years, although overall harvests were also concentrated closer to the community and along the road system.

During the 2019 household harvest survey, households were asked whether any of the caribou they harvested were sick or injured. In 2019, 15 percent of households reported harvesting sick caribou, within the range of previous years (Table 8). The number of sick caribou reported was the lowest of any previous study years, at 10 caribou, which was likely a result of the low response rate for the 2019 household harvest surveys. Households reported using 20 percent of the sick caribou they harvested, similar to the previous study year (2018) but higher than other previous years.

Table 8: Household Harvest Survey Households Reporting Sick/Injured Caribou

Study Year	% of HH Reporting Sick/Injured Caribou	Sick/Injured Caribou*		Sick/Injured Caribou Used by HH	
		#	%	#	%
2011	18%	21	6%	3	14%
2012	24%	40	10%	6	15%
2013	17%	33	7%	1	3%
2015	15%	15	3%	1	7%
2016	11%	26	7%	2	8%
2017	21%	57	11%	2	4%
2018	17%	27	6%	5	19%
2019	15%	10	4%	2	20%
All Years	18%	219	7%	20	9%
Notes: ADF&G data for 2014 (Year 7) not reported due to low response rate.					

Stephen R. Braund & Associates, 2021.



Map 21 - Harvest Locations where Respondents Harvested Abnormal Caribou, 2008 - 2019

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 162 active harvesters from March 2009 through March 2020.

Other areas may have been used for resource harvesting.

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Year 12: January 2019 - December 2019
7 caribou harvest locations
7 respondents

Years 1-11: January 2008-October 2018
277 caribou harvest locations
83 respondents

National Petroleum Reserve Alaska

Impacts on Harvesting Activities

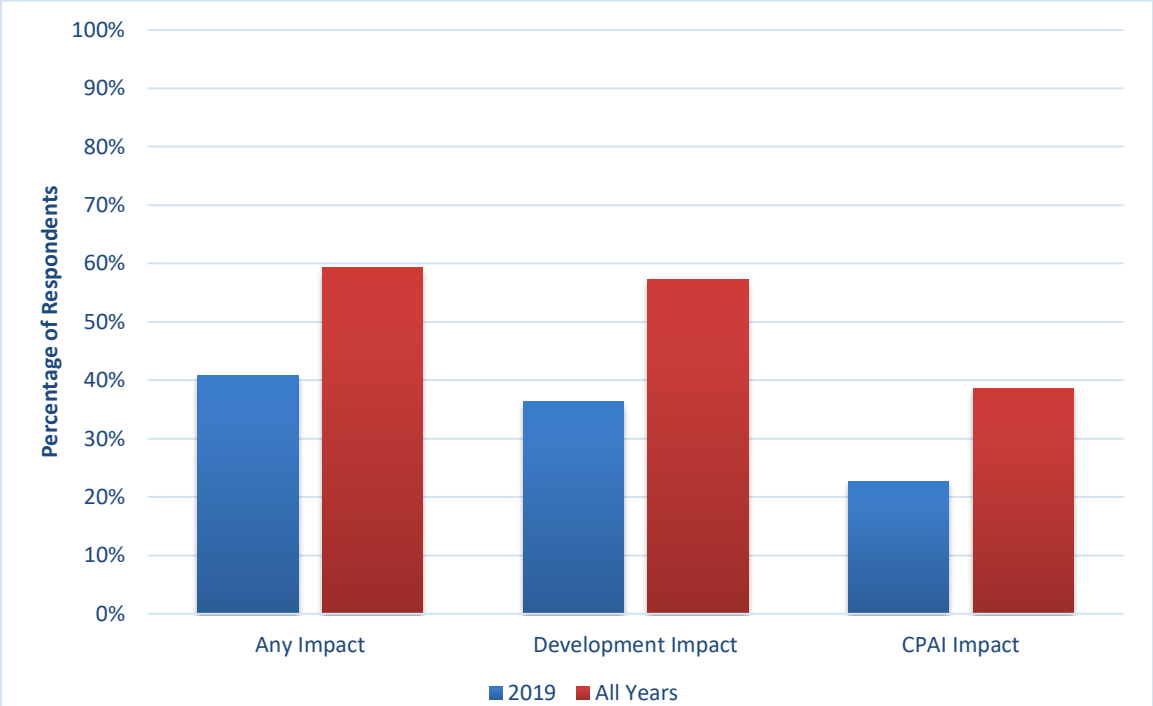
This section reports results by percentage of respondents, percentage of observations (where respondents may provide multiple observations under a single variable), and percent of households (household surveys only). Throughout all previous study years, the study team asked respondents to describe any impacts related to CD4 or other Alpine Satellites. However, it became apparent that there was a tendency for respondents to list any development-related impacts regardless of their connection to Alpine or CPAI. During data analysis for the first 11 years of the Project, the study team distinguished impacts related to Alpine Satellites and those related to other development projects or activities using the assumption that if the impact occurred well outside of the area of Alpine activity, it was not an Alpine Impact. Respondents would also sometimes specify that an impact was not related to Alpine. However, using this method, all other impacts were listed as Alpine Impacts, even if the respondent did not specifically attribute the impact to Alpine. Thus, previous study years' results likely overstated impacts related specifically to Alpine and understated impacts related to other development sources. Beginning in Year 12, the study team began asking about development-related impacts versus only asking about CPAI impacts, to ensure that all development-related impacts were documented. An effort was then made within the interview process to identify the source of the impacts. This change in wording helps to identify known CPAI impacts versus impacts that may have occurred from other development activity. As development over the last 12 years has increased on the North Slope, there are additional developers and other various activities in the area. It has therefore become even more important to make every effort to distinguish between different sources of impacts and to attribute impacts to a specific developer only when data are available to do so.

In order to accurately compare data from Year 12 with all previous study years, the study team re-coded previously reported impacts to match the new categories of "Any Impact," "Development Impact," or "CPAI Impact." A number of impacts which had previously been coded as an Alpine-related impact were re-coded as Development Impacts, as the respondent had not specifically attributed the impact to CPAI or Alpine. As shown in Figure 22 and Table E-35, in 2019, 36 percent of respondents reported one or more Development Impacts, and 23 percent specifically attributed impacts to CPAI. Reported impacts were on the low end of previous years; the average across all study years shows that 59 percent of respondents reported Development Impacts and 39 percent reported CPAI Impacts. Data from all study years shows the percentage of respondents reporting development-related impacts varying annually after a peak of 83 percent of respondents in Year 1, when the study team documented impacts experienced since the beginning of the Alpine development. The percentage of respondents reporting CPAI impacts has also varied since a peak in Year 1 (Table E-35). The 2019 study year showed a decline in reported development-related impacts after an increase in reported impacts in 2017 and 2018.

This may be due to the fact that exploration and construction activities have lessened in areas closer to the community, with exploration and construction in 2019 mainly taking place at GMT-2 and near Atiġruk Point and the proposed Willow development, all of which are located farther from the community than other CPAI developments in the area. A decrease in reported impacts may also be due to the fact that certain sources of impacts are also seen as having some benefit to participants so, for instance, roads may be less likely to be listed as an impact by community members. However, both groups (road users and non-road users) showed an increase in reported man-made structure impacts from Year 9 through Year 11. Thus, differences in 2019 data could be related to the small active harvester interview sample.

As noted above, the percentage of respondents reporting development impacts in 2019 was the lowest of all study years (36 percent) but similar to the 2011 and 2016 study years (Figure 23 and Table E-38); the smaller sample size in 2019 may have affected study results. In contrast, the percentage of respondents reporting development impacts in the previous study year (2018) was relatively high (68 percent), particularly those reporting impacts from man-made structures which, at 40 percent (Figure 23), was the highest it had been since the start of the Nuiqsut Caribou Subsistence Monitoring Project in 2008.

Figure 22: Percentage of Respondents Reporting Impacts



Notes: See Appendix E, Table E-35 for associated data.

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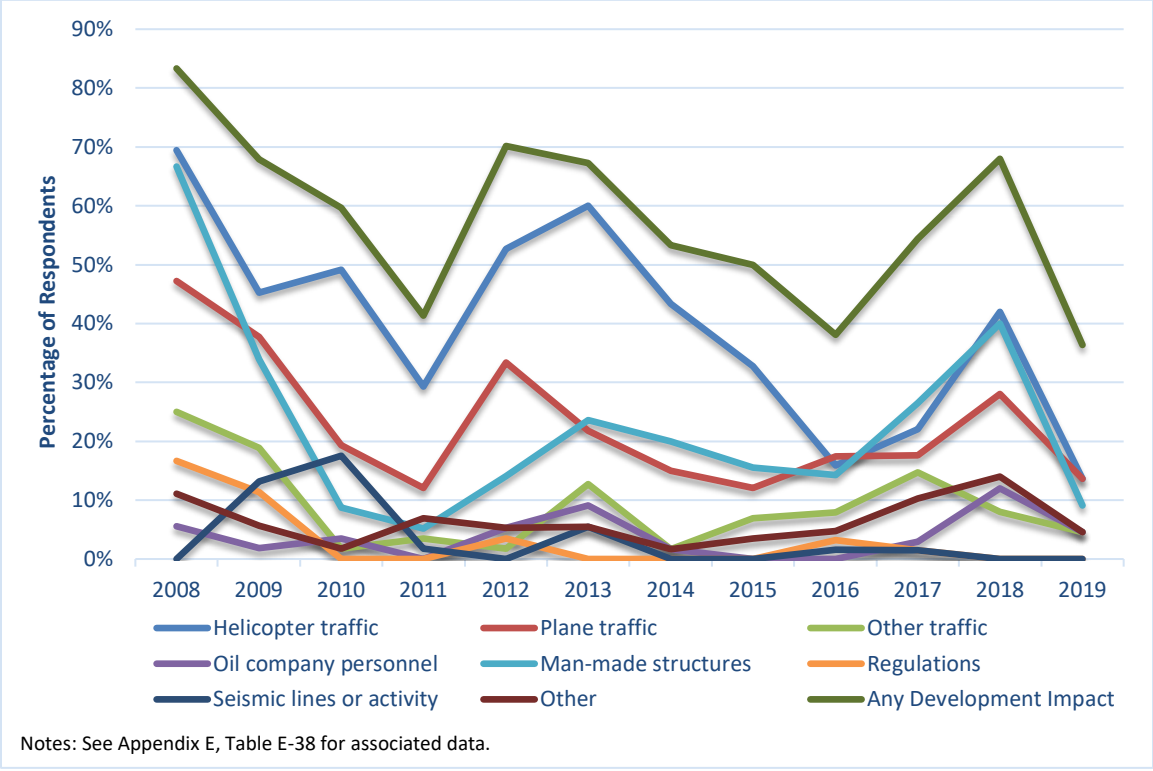
Figure 23: Percentage of Respondents Reporting Development-Related Impacts by Study Year



Notes: See Appendix E, Table E-38 for associated data.

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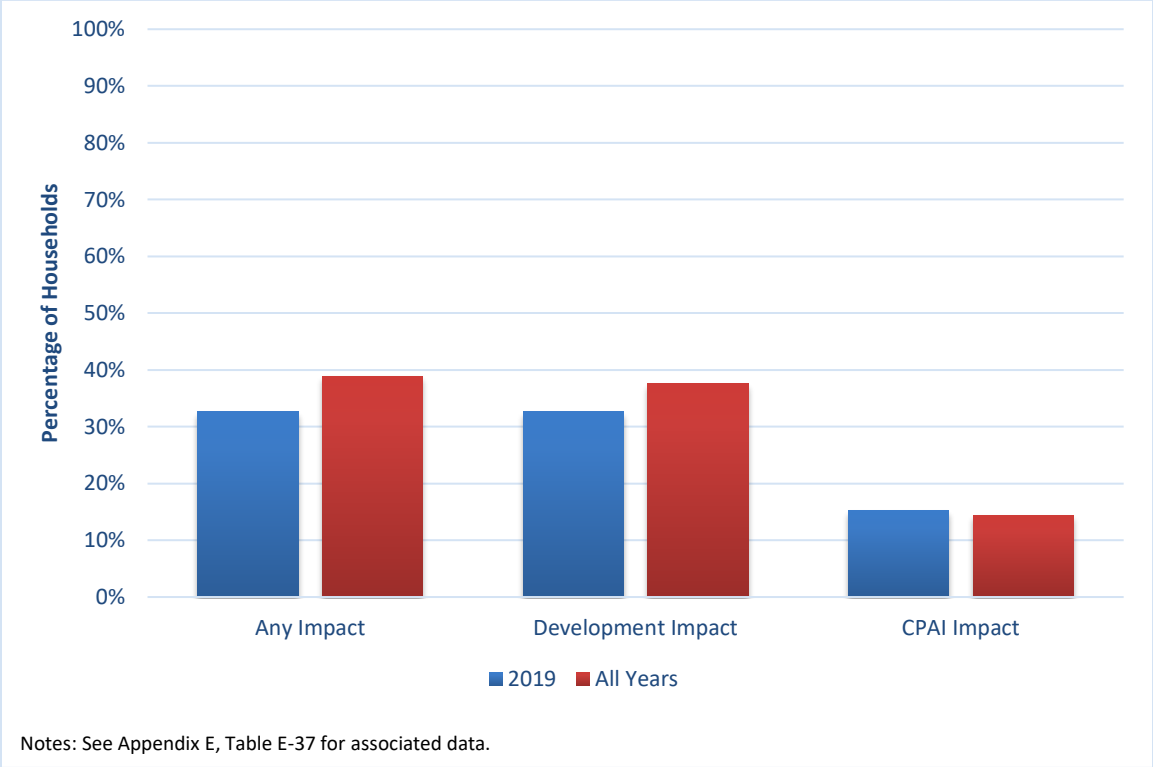
In 2019, this percentage (respondents reporting impacts from man-made structures) declined to nine percent of respondents (Figure 23). The significant decrease in man-made structure impacts from the 2018 to 2019 season may have been due to structural improvements that CPAI made to the ramps that allow hunters to cross the roads more easily. The percentage of respondents reporting impacts related to helicopter traffic and plane traffic (14 percent each) was also on the low end of all study years (Figure 23, Table E-38). Of the reported 2019 impacts, helicopter traffic made up the highest percentage of impact observations (33 percent) followed by plane traffic (25 percent), and man-made structures (17 percent). Impacts related to other traffic, oil company personnel, and "other" sources accounted for eight percent of observations each (Table E-39).

While the active harvester interviews showed a decline in the percentage of respondents reporting impacts, household harvest survey data show the percentage of households reporting development impacts (33 percent) within the range of previous study years (between 29 percent and 49 percent) (Figure 24 and Table E-37). At 15 percent, the percentage of households reporting CPAI impacts was also within the range of previous study years but lower than the previous study year (2018).

Figure 24: Household Harvest Survey Impact Observations

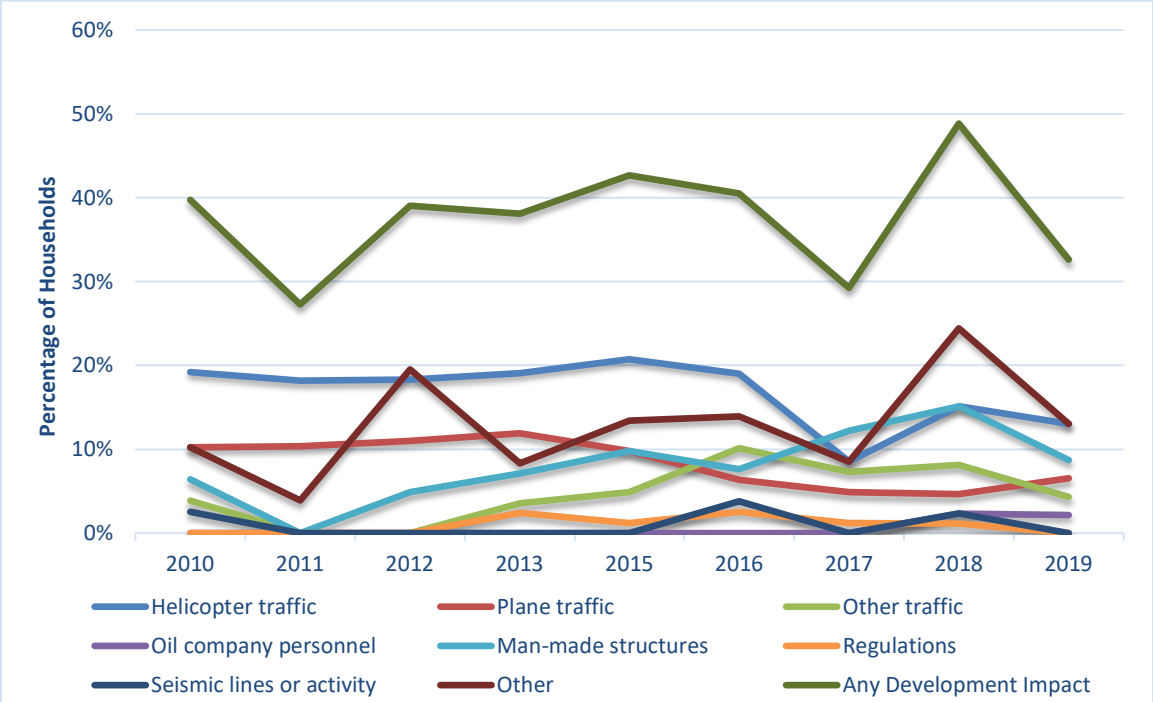


Notes: See Appendix E, Table E-37 for associated data.

Stephen R. Braund & Associates, 2021.

During household harvest surveys, the most commonly reported types of impacts, in terms of the percentage of households, were helicopter traffic and "Other" impacts (usually "general development" impacts) at 13 percent of households each, followed by man-made structures at nine percent, and plane traffic at seven percent (Figure 25 and Table E-40). Figure 26 and Table E-41 show the percentage of reported impacts (in terms of impact observations) on caribou hunting by month for all study years. Respondents do not always provide a specific 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 26, Figure 6). In 2019, the peak occurred in July and August which both showed 60 percent of reported impacts,

Figure 25: Household Harvest Survey Observations of Development-Related Impacts by Impact Type



Notes: See Appendix E, Table E-40 for associated data.

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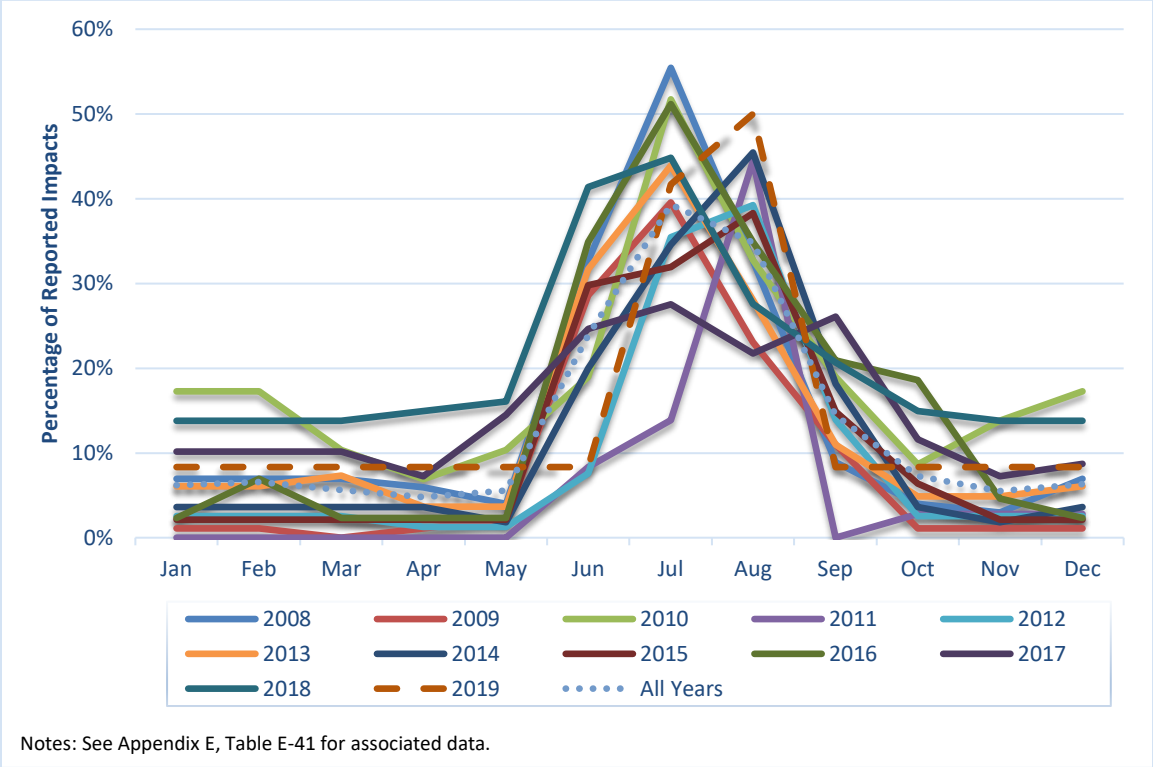
Figure 26: Percentage of Reported Impacts by Month



Notes: See Appendix E, Table E-41 for associated data.

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somewhat higher than the all years average for these months. In general, a higher percentage of impacts were reported as "year-round" in 2019 than in most previous study years.

Map 22 shows the locations of development-related impacts reported by respondents in 2019. In some cases, respondents could not identify the location of an impact, noted that the impact was more general (e.g., general air traffic throughout the hunting season), 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 over the 12 study years, 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 22, development-related impacts in 2019 were reported along the existing road system, on the Nigliq Channel, on the Colville River near Ocean Point, and east of the Colville Delta near between Qakimak Creek and Milugiaq River. Impacts related to man-made structures and other traffic (e.g., trucks) were located along the road to GMT1, plane and helicopter impacts were reported along Nigliq Channel and upriver along the Colville River, and a personnel impact was reported along the East Channel.

Impacts of Helicopter Traffic

As shown in Figure 23 and Table E-38, 14 percent of active harvester respondents reported helicopter impacts in 2019, lower than previous study years which have ranged from 16 to 69 percent. Helicopter impacts accounted for 33 percent of the reported impacts during the 2019 study period, similar to recent years (Table E-39). In recent years, respondents suggested that construction of the CD5 and GMT-1 roads had decreased (although not eliminated) the need for helicopter traffic associated with development, which led to lower reports of impacts beginning in 2015. The 2018 study year was a notable exception, with 42 percent of respondents reporting helicopter impacts. Efforts have been made by CPAI to reduce helicopter impacts by adopting a number of measures such as daily flight plans to community entities and local residents and hunters via KSOPI and a local Subsistence Representative; daily helicopter coordination conference calls between community representatives and helicopter operators; and documentation of complaints from local hunters by KSOPI.

A number of respondents have commented in recent years that helicopter impacts have been on the decline. One 2019 participant noted that helicopter traffic and associated impacts have begun to settle down while another commented on the lack of helicopter impacts during the 2019 season:

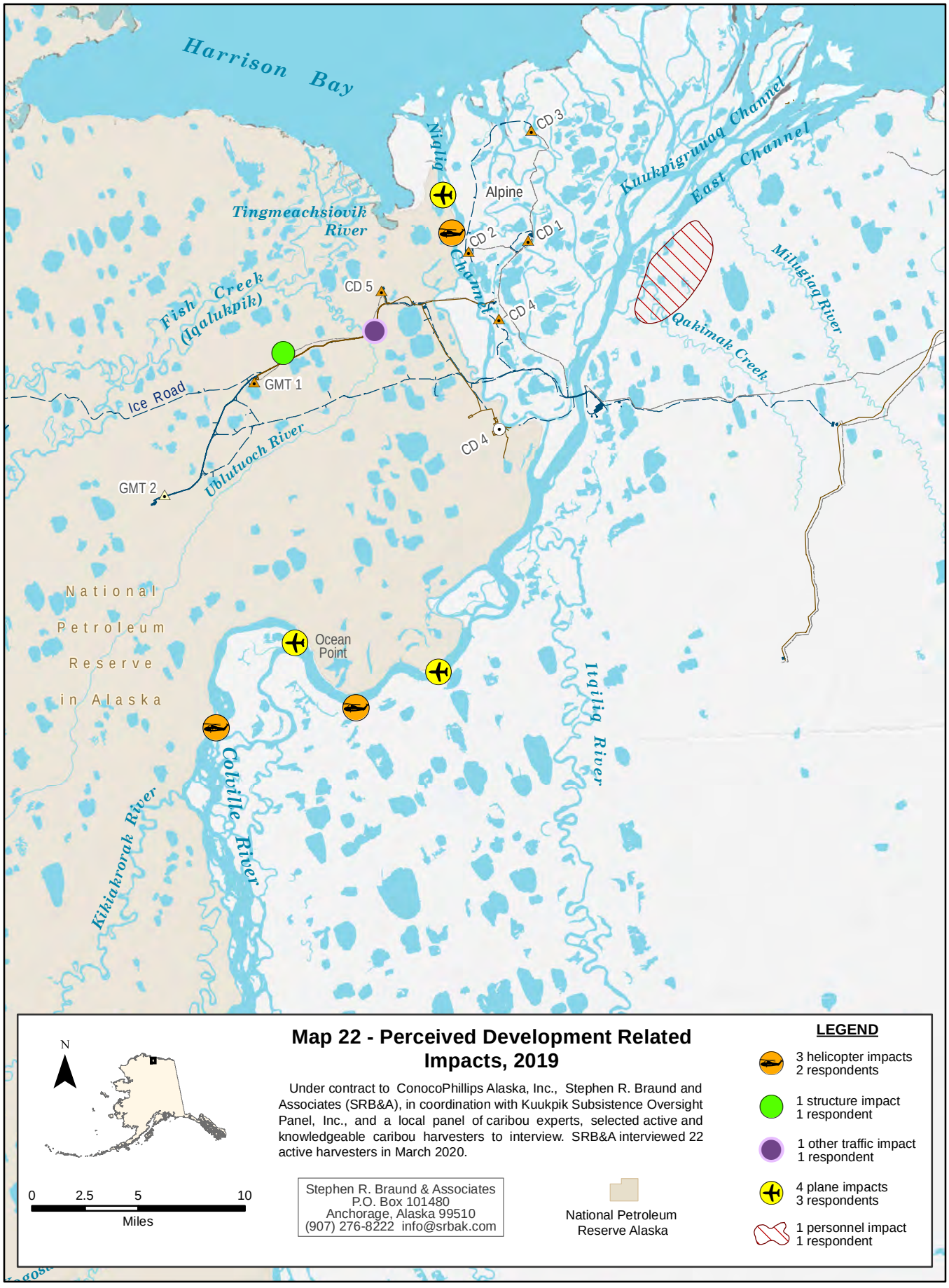
> *Well like I said earlier. The first 10 years was pretty hard with the development, [now things are] settling down, they're [caribou] starting to come around.* (SRB&A Nuiqsut Interview March 2020)

> *No helicopters, no other people on ground being disturbative. It was a good season.* (SRB&A Nuiqsut Interview March 2020)

However, some participants did report experiencing helicopter impacts during the 2019 season, including the following respondents who described persistent helicopter traffic near Pisiktaġvik and in between Nuiqsut and Alpine:

> *Last year there was so many helicopters. How come they go on the right season? When we go camping, hunting there's helicopters flying everywhere. There was helicopter on Pisiktaġvik area. There was so many caribou on [the] east side of Pisiktaġvik.* (SRB&A Nuiqsut Interview March 2020)

When asked to describe the helicopters causing the impacts, respondents were not able to identify who the helicopters belonged to. All helicopter impacts were therefore categorized as "Unknown Owner" (Table E-42).


Harrison Bay
Niglig Channel
CD 3
Alpine
CD 2
CD 1
Kuukpigruuaq Channel
East Channel
Tingmeachsiovik River
Fish Creek (Iqalukpik)
CD 5
CD 4
Miluqtuq River
Qakimak Creek
GMT 1
Ice Road
Ublutuoch River
CD 4
GMT 2
National Petroleum Reserve in Alaska
Ocean Point
Itqiliq River
Kikiakrorak River
Colville River
N
0 2.5 5 10
Miles
Map 22 - Perceived Development Related Impacts, 2019
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 22 active harvesters in March 2020.
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National Petroleum Reserve Alaska
LEGEND
3 helicopter impacts
2 respondents
1 structure impact
1 respondent
1 other traffic impact
1 respondent
4 plane impacts
3 respondents
1 personnel impact
1 respondent

Impacts of Airplane Traffic

Impacts related to airplane traffic were reported by 14 percent of respondents, on the low end but within the range of previous study years (Figure 23; Table E-38). Impacts related to plane traffic accounted for 25 percent of impact observations in 2019 (Table E-39). Residents noted that plane traffic impacts occurred near Qitik, Kayuqtusiḷik, and the Alpine landing strip. Non-development-related airplane traffic was also reported by one participant who was impacted by Helmerick's personal airplanes. As in previous years, a number of the development-related airplane impacts were said to have directly interrupted a potentially successful caribou hunt:

> *And there was a plane. I think they are [scaring the caribou] because I hardly see any caribou there this year. That was in August.* (SRB&A Nuiqsut Interview March 2020)

> *[There was] a plane [at] Kayuqtusiḷik. I was coming on to a caribou [to shoot it] and a plane came. It circled around and I lost my chance to get it [the caribou]. I don't know who those people are.* (SRB&A Nuiqsut Interview March 2020)

When asked to describe the development-related airplane or airplanes affecting their caribou hunting activities, respondents reported "Unknown Owner" for a majority of their observations (67 percent) and "Alpine Airplane" for 33 percent of their observations (Table E-43).

Impacts of Other Traffic

Five percent of respondents (one individual) reported impacts related to other traffic (i.e., not helicopters or airplanes) in 2019, similar to previous study years (Figure 23; Table E-38). Other Traffic impact observations accounted for eight percent of development-related impact observations, higher than the previous study year (2018), but on par with other recent study years (Table E-39). One participant described their other traffic impacts, noting fast-moving trucks along the road that do not slow down when they observe hunting activities:

> *Too many trucks driving. They didn't try to slow down. That was [in] August. They didn't slow down or nothing. There was just too many of them. But that was it.* (SRB&A Nuiqsut Interview March 2020)

Impacts of Oil Company Personnel

Five percent of respondents (one individual) reported impacts related to oil company personnel in 2019 (Figure 23; Table E-38). This individual reported encountering a large number of surveyors while out hunting and stated that when they encounter surveyors and other oil company personnel, they "just don't bother" hunting due to safety concerns.

Impacts of Man-made Structures

Impacts related to man-made structures were reported by nine percent of active harvester respondents in 2019 (Figure 23; Table E-38). While the percent of respondents was relatively low (percent of respondents have ranged from five to 61 across all study years), man-made structures still accounted for 17 percent of all impacts reported in 2019 (Table E-39). In general, impacts related to man-made structures dropped substantially in 2019 after a rise in 2017 and 2018, which could be due to improvements in road/ramp design and communication regarding road use policies; the increasing use of the road by local residents and resulting view of the road as beneficial to subsistence hunters; the relatively small 2019 sample; or some combination of the three. When discussing these results during a March 2021 Nuiqsut Caribou Panel meeting, panel members noted that while CPAI reduced impacts through improvements to the ramps, some of the ramps are still difficult to use due to steep slopes. As shown in Table E-44, roads and bridges accounted for 50 percent of the 2019 reported impacts, while pipelines accounted for the other 50 percent

of reported man-made structure impacts. Impacts related to roads and bridges have been reported yearly for the last five study years, since the CD5, GMT-1, and connected Spur roads were built. In 2019, construction of the GMT-2 road took place, and the road was opened for partial use starting in September. Pipelines have accounted for between 11 and 75 percent of man-made structure impacts across all study years (Table E-44). In 2019, participants provided observations regarding changes in caribou distribution and behavior due to the presence of bridges, roads, and pipelines. As in previous years, some respondents commented that caribou avoid crossing under pipelines or over roads:

> *[The] pipeline [has impacted me] because I've seen a couple caribou that didn't want to cross [the pipeline]. They would turn back northwest. That's probably the only thing I thought of is the pipeline. They didn't want to cross underneath. [This was] probably in August.* (SRB&A Nuiqsut Interview March 2020)

While questions regarding impacts on caribou hunting generally elicit comments on the negative impacts of development infrastructure and activity, a number of hunters noted in 2019 that they used roads for caribou hunting, and for many, roads facilitated access to hunting areas. While the current road system is within Nuiqsut's traditional and contemporary subsistence use area, roads have provided easier access to these areas at times when these hunting areas were previously difficult to access (e.g., spring, summer), and for residents who do not have access to off-road vehicles (e.g., ATVs and snowmachines). Thus, the area has seen an overall increase in the frequency of use by local residents, in addition to an increase in the number of hunters who use those areas, as a result of road construction. During the 2018 household harvest surveys and in response to requests from the BLM in association with the Supplemental Environmental Impact Statement for the GMT-2 Development, the study team added questions regarding road use in order to better characterize use of the road system for the community as a whole. These questions remained on the survey for the 2019 study year.

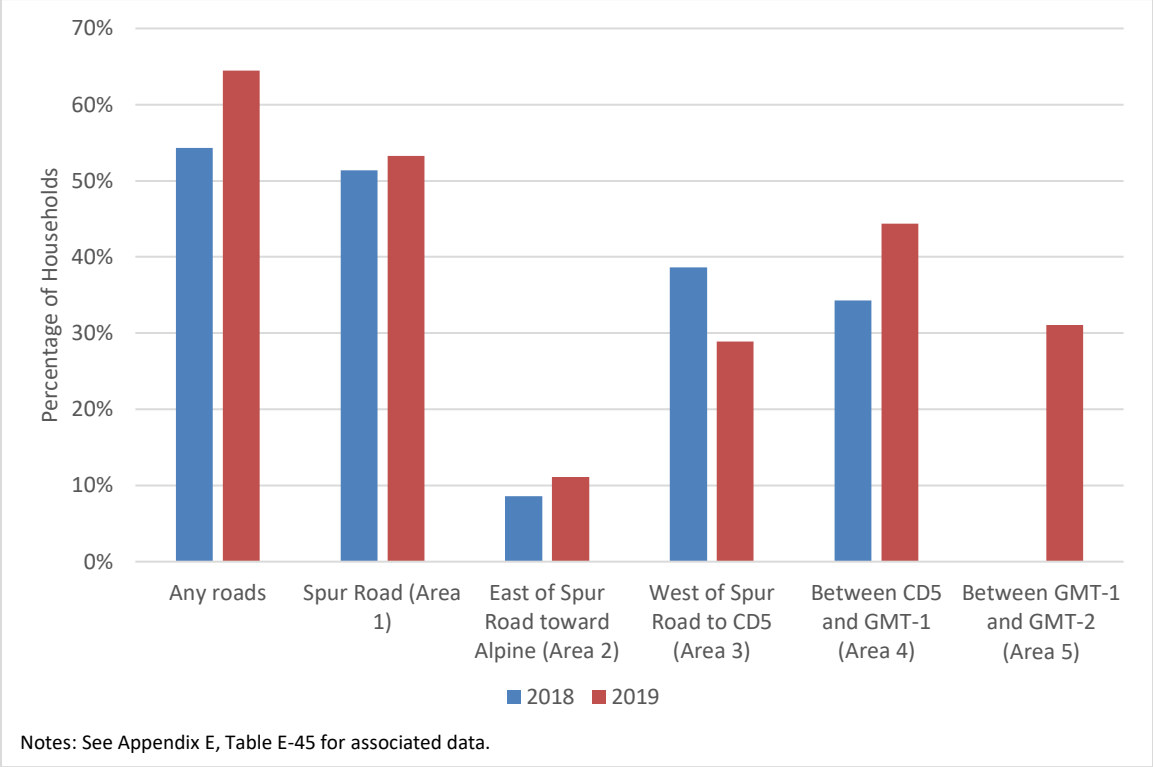
As shown in Figure 27 and Table E-45, 64 percent of households reported using the road system to hunt caribou in 2019, somewhat higher than the previous study year (54 percent) although the number may be slightly inflated due to the lack of non-harvester households participating in the 2019 survey. Use of roads lessened somewhat with distance from the community, although more households used the areas between CD5 and GMT-2 than the area between the Spur Road and CD5 (Map 22). In addition, the percentage of households using the road east of the Spur Road toward Alpine was substantially lower than other road sections during both 2018 and 2019. In both years, approximately one half of households reported using the Spur Road to hunt. It is unknown why fewer households use certain portions of the road system; however, possible reasons for decreased use include distance from the community, more concentrated nature of drill sites and roads in certain areas, or the relative lack of caribou in certain areas (e.g., in the middle Colville River Delta). Overall caribou herd densities increase with distance to the west of the community. In order to access the roads connecting Alpine, CD5, and GMT-1 by vehicle, one must travel along the Spur Road; hence, use of this area is naturally higher than use of other road areas; however, in some cases respondents did not use the Spur Road for hunting but rather for accessing subsistence use areas along other road areas.

Of the households who used roads in 2019, 31 percent cited the ease of access to subsistence use areas as their reason for using the road, while 28 percent mentioned the lack of access to non-road methods of transportation (i.e., did not have a boat or snowmachine) (Table E-46). Regarding use of roads, several household survey respondents cited the speed and ease with which they can harvest caribou. As one elderly respondent put it, "[The roads] are more smooth [and] I'm getting old. [The caribou] are less scared from all the development. [The] ramps on GMT-1 are good" (SRB&A Nuiqsut Household Harvest Survey 2020):

Others noted that they did not have other, non-road, forms of transportation such as boats, snowmachines, or four-wheelers in 2019, indicating that the road allowed these individuals to initiate caribou hunts in 2019. As one respondent described, "[I had] no access to boat or Honda, so I use a car and walk and hunt. [The

road is] more accessible, but still [there is] lots of traffic and dust, lots of dust" (SRB&A Nuiqsut Household Harvest Survey 2020).

Figure 27: Household Harvest Survey Use of Roads by Road Area, 2018-2019



Notes: See Appendix E, Table E-45 for associated data.

A total of 21 percent of households reported using roads due to the availability of caribou along the road system (Table E-46). A couple of respondents noted that the caribou were more available near the roads than in other areas. During a March 2021 Nuiqsut Caribou Panel meeting, panel members observed that the caribou more frequently stay on the west or north side of the road system rather than migrating into the area directly west of the community. The panel noted that community residents know when the caribou will hit the road system, similar to knowing when the caribou will hit the river system. Thus, when caribou do not migrate toward the river system, hunters use the road system to access herds instead. As one individual observed, "That's where the caribou were" (SRB&A Nuiqsut Household Harvest Survey 2020).

Of those households who did not use roads in 2019, 44 percent cited the availability of non-road modes of transportation (e.g., boats) to hunt caribou, while 19 percent indicated a personal preference for not using roads (Table E-46). In summary, a majority of households used roads to hunt caribou in 2019, primarily citing the ease of use and the lack of availability of other (non-road) transportation methods. Thus, hunters – particularly those without non-road modes of transportation (boats, snowmachines) and those with a lack of time – benefit from use of the road system to hunt caribou.

While impacts related to man-made infrastructure, including hunter avoidance, have occurred over the study years, Nuiqsut hunters continue to harvest caribou in proximity to these areas. 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 GMT-1 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. The GMT-2 road was not included in the analysis for the 2019 monitoring study year as it was under construction for most of 2019 and only partially operational beginning in September 2019. As shown in Table 9, harvests in the area of infrastructure built after the monitoring study began (Map 23) have varied on an annual basis with an increase in both 2018 and 2019 over previous years (35 and 38 percent of caribou harvested compared to between 11 and 26 percent in previous years).

The percentage of respondents harvesting caribou within the infrastructure area in Year 12 (64 percent) was also higher than previous years (Table 9). Thus, the data indicate that while caribou have always been harvested in substantial numbers within the currently developed area, recent road construction has likely increased the amount harvested within that area.

Table 9: Percentage of Caribou Harvesters and Harvests within 2.5 Miles of New Alpine-Related Infrastructure (2014-2019)

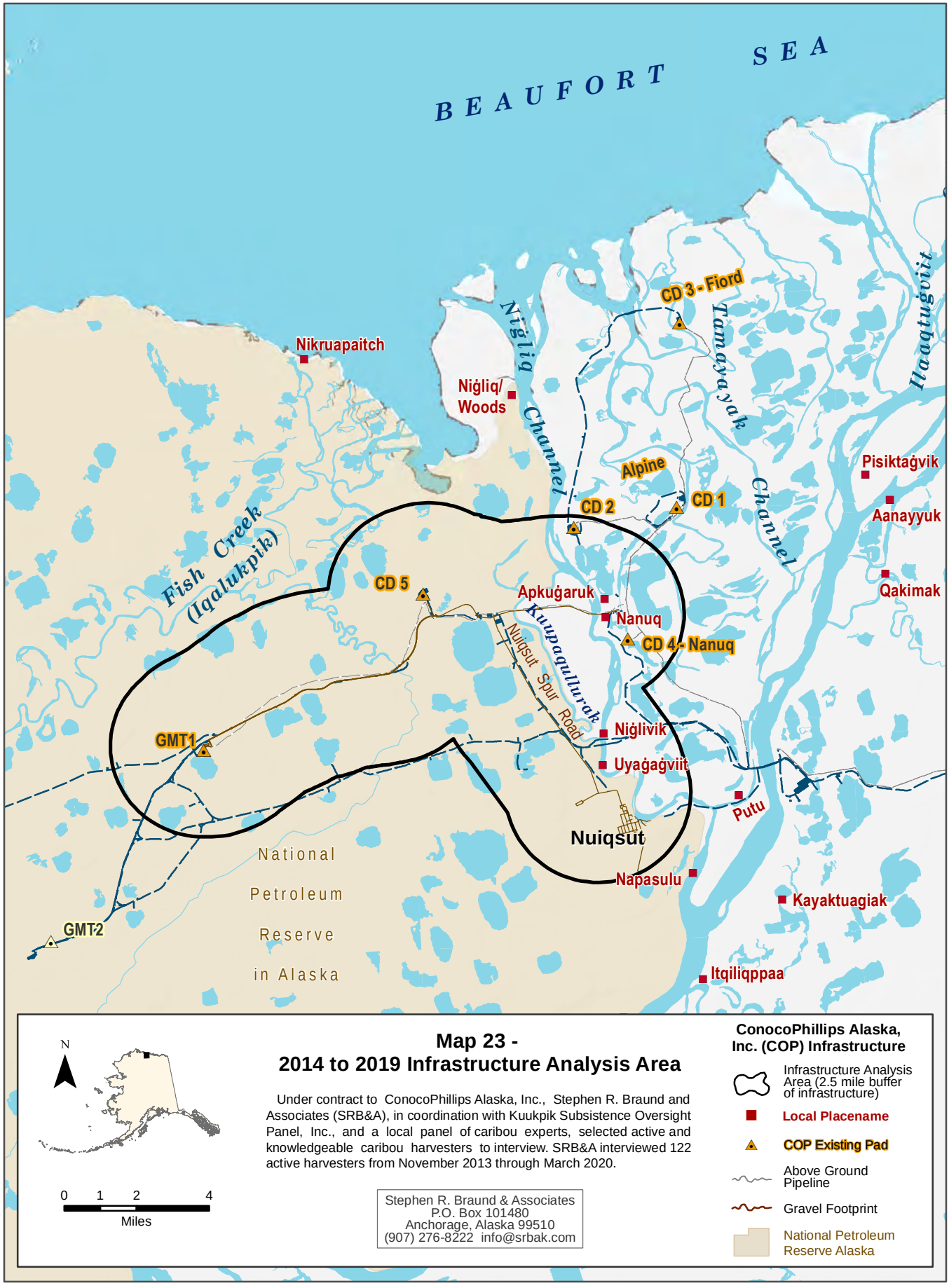
Study Year	Number (%) of Caribou Harvested	Number (%) of Respondents Harvesting Caribou	Development Action/ Infrastructure
2008	41 (11%)	15 (42%)	
2009	45 (16%)	16 (36%)	
2010	64 (18%)	25 (46%)	
2011	62 (19%)	26 (47%)	
2012	75 (22%)	25 (47%)	
2013	72 (26%)	26 (52%)	
2014	60 (11%)	20 (36%)	Construction of CD5, Nigliq Channel bridge, and Spur Road
2015	55 (14%)	22 (45%)	CD5, Nigliq Channel bridge, and Spur Road completed
2016	71 (23%)	23 (43%)	
2017	79 (25%)	34 (55%)	Construction of GMT-1 road and operational (3 months)
2018	90 (35%)	25 (54%)	Construction of GMT-1 pipelines and begin GMT-1 drilling and operation.
2019	45 (38%)	14 (64%)	Construction of GMT-2 road and operational (3.5 months)

Stephen R. Braund & Associates, 2021.

Other Impacts

Five percent of respondents (one individual) reported other development-related impacts in 2019 (Figure 23; Table E-38). This individual reported experiencing general impacts of development on his caribou hunting success, noting an overall decline in the availability of caribou:

> *There are hardly any [caribou], they hardly come around close anymore. Maybe because it was wrong timing [that we searched for them]. I was looking at 17 to 20 caribou and harvesting and sending [them] to my family in Anchorage. This year I didn't send anything at all. Now I'm saying they should have a public meeting because they feed us [at public meetings]. Cause the store [bought food] is expensive.* (SRB&A Nuiqsut Interview March 2020)



Map 23 - 2014 to 2019 Infrastructure Analysis Area

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 122 active harvesters from November 2013 through March 2020.

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ConocoPhillips Alaska, Inc. (COP) Infrastructure

- Infrastructure Analysis Area (2.5 mile buffer of infrastructure)
- Local Placename
- COP Existing Pad
- Above Ground Pipeline
- Gravel Footprint
- National Petroleum Reserve Alaska

Impacts on Other Resource Harvesting Activities

A small number (18 percent) of 2019 active harvester respondents indicated that they had experienced impacts to other resource harvesting activities, specifically citing impacts to harvests of moose, seals, broad whitefish, sculpin, and cisco (one observation each) (Table 10 and Table 11).

Table 10: Percentage of Respondents Reporting Other Resource Impacts, 2019

Study Year	% of Respondents Reporting Other Resource Impacts	Total Number of Respondents
2019	18%	22

Stephen R. Braund & Associates, 2021.

Table 11: Other Resource Impacts, Species Observations

Species	Percent of Observations 2019
Moose	20%
Seals	20%
Broad Whitefish	20%
Sculpin	20%
Cisco	20%
Total Observations	5

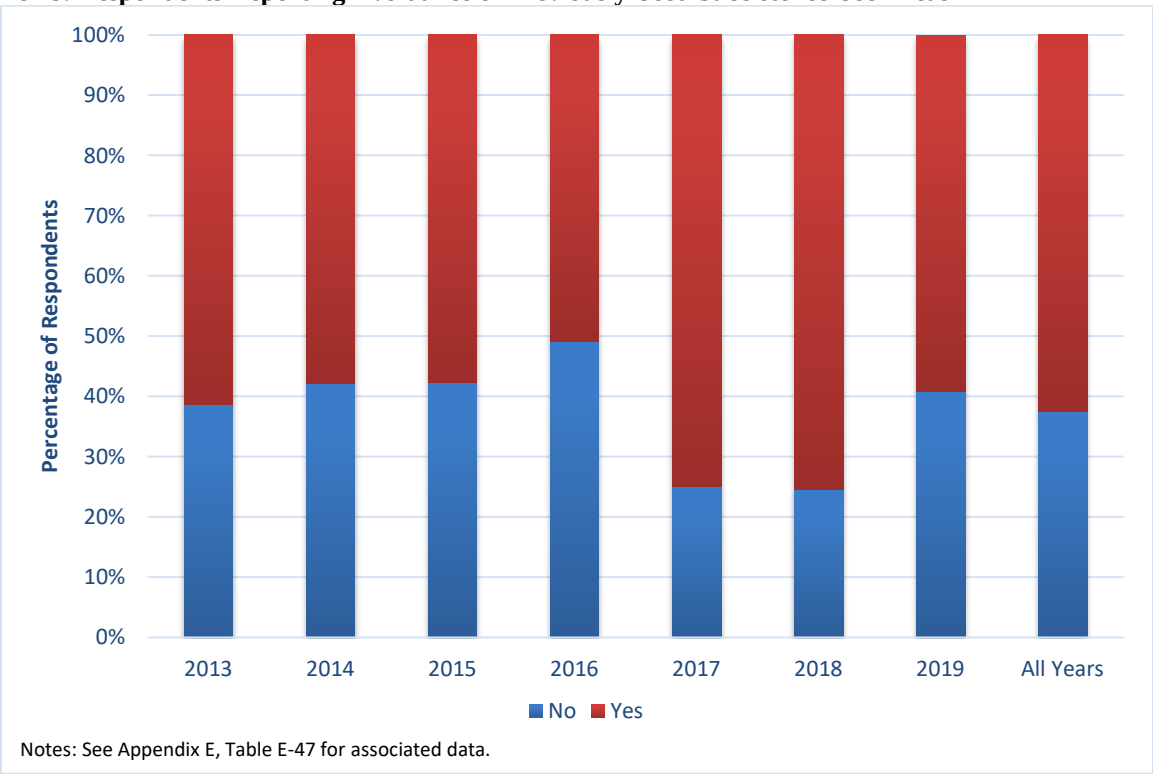
Stephen R. Braund & Associates, 2021.

Reported Avoidance of Subsistence Use Areas

As shown in Figure 28 and Table E-47, the percentage of respondents who reported no longer using or avoiding certain areas in 2019 (59 percent) was within the range of previous years and lower than the previous two years (76 and 75 percent, respectively). This decrease in reported avoidance during the active harvester interviews is consistent with a decrease in the percentage of households who volunteered they avoided the CPAI development area during the 2019 household harvest surveys (Table E-37). In 2019, the most commonly mentioned places avoided were Fish Creek (18 percent of respondents) and Itqiliq River (nine percent of respondents). All other locations were mentioned by one respondent (five percent) and included East Channel, West of Nuiqsut, Nuiqsut, Judy Creek, Freshwater Lake, Qitik, and Colville River (Figure 29 and Table E-49). Reports of avoidance of Fish Creek and Itqiliq River in 2019 were higher than previous years (Figure 29; Table E-48 and Table E-49).

The causes cited for avoiding certain areas (in terms of percentage of respondents) are shown in Figure 30, with related data provided in Table E-50 and Table E-51. The percentage of respondents citing development causes in 2019 (23 percent) was lower than previous individual study years, which ranged from between 31 and 47 percent of respondents (Figure 30; Table E-51). Specific to development causes, in 2019 respondents most frequently cited development activities (18 percent), followed by development infrastructure (nine percent of respondents), and contamination concerns (nine percent) (Table E-51). Environmental factors and personal reasons were both cited by 18 percent of respondent in 2019 (Table E-51). As a percent of observations (as opposed to respondents), in 2019 Development Causes were most commonly cited (50 percent of observations), followed by Environmental Causes (25 percent), and Personal Reasons (25 percent) (Table E-50). A higher percentage of avoidance observations were attributed to Personal Reasons in 2019. The percentage of observations attributed to development causes and environmental causes were within the range of all individual study years.

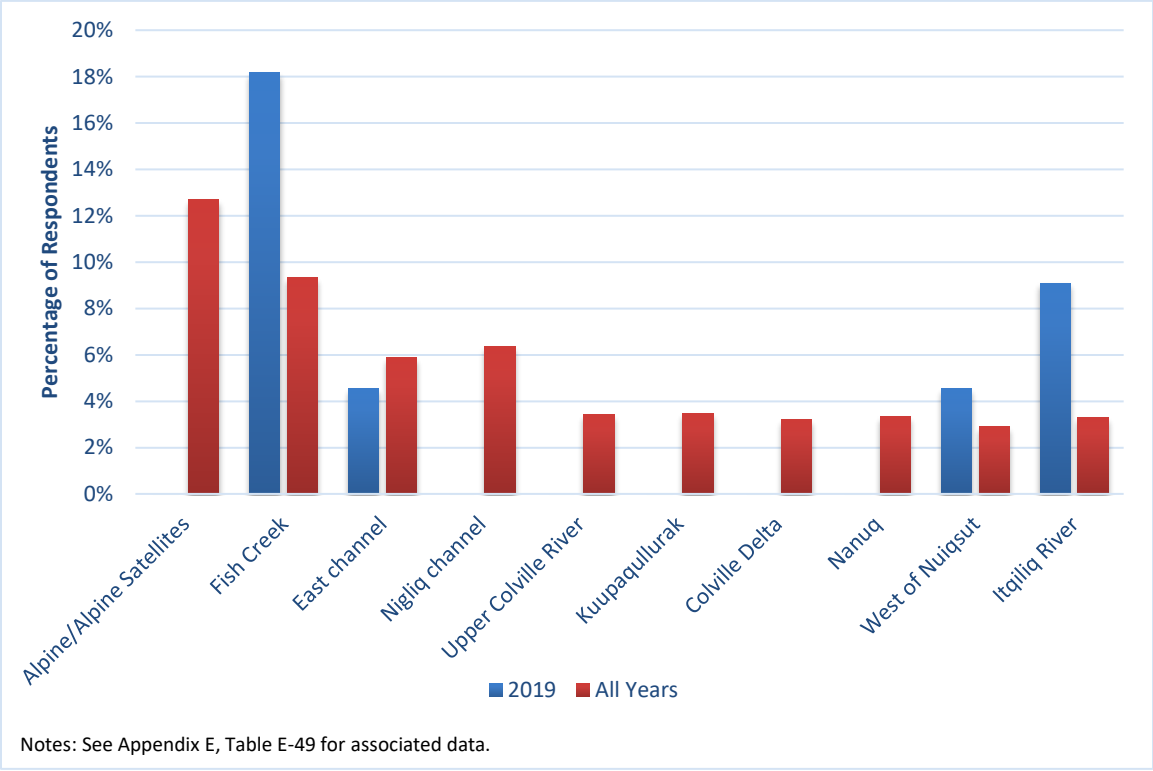
Figure 28: Respondents Reporting Avoidance of Previously Used Subsistence Use Areas



Notes: See Appendix E, Table E-47 for associated data.

Stephen R. Braund & Associates, 2021.

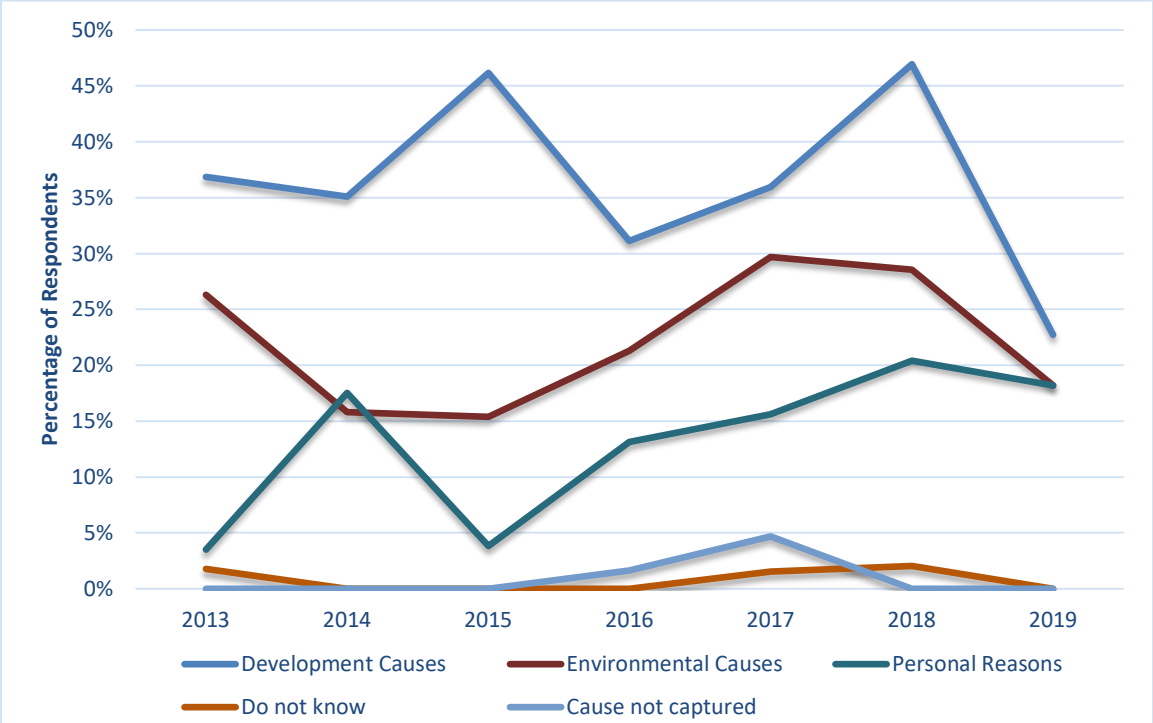
Figure 29: Avoidance Locations by Percentage of Respondents (3% or Higher)



Notes: See Appendix E, Table E-49 for associated data.

Stephen R. Braund & Associates, 2021.

Figure 30: Causes of Avoidance – Percentage of Respondents



Notes: See Appendix E, Table E-51 for associated data.

Stephen R. Braund & Associates, 2021.

As shown in Table E-52, the causes cited for avoiding the Fish and Judy Creek areas were primarily development causes including development activities, development infrastructure, and contamination concerns. One respondent also reported avoiding the area "west of Nuiqsut" due to development infrastructure but noted that while they avoid the overland area west of Nuiqsut, they use the road system because of changes in resource availability. Several individuals described avoiding these areas because of the presence of infrastructure (and resulting impacts to access and resource availability), increased traffic and activities, and resulting contamination concerns, as follows:

> *[I avoid] Fish Creek. [It's] too developed, too much stuff in the way. I think I'll try to go to our traditional fishing spots to check how the Arctic grayling and broad whitefish are, because the Nigliq is smaller than the Colville. The buffering in Fish Creek, there's not going to be any buffering [at Nigliq], or the buffering [in the water] might kill the fish because there's not enough water to filter the pH [from the buffering].* (SRB&A Nuiqsut Interview March 2020)

> *Yes [gesturing west of Nuiqsut]. Because they get intercepted here [along the road]. You have to use that road to catch caribou in the fall now. I don't even like to go out there [on the road]. It just doesn't feel right. But if you want to catch caribou before freeze-up, you have to use that road.* (SRB&A Nuiqsut Interview March 2020)

Two individuals reported reduced use of the Fish Creek area due to environmental factors that affect their ability to access hunting grounds by boat. Similarly, respondents attributed avoidance of Itqiliq River in 2019 to environmental factors, noting that shallow conditions affected their ability to use the drainage. This is consistent with metrics which showed decreased use of this drainage in 2019:

> *[I avoided] Itqiliq River. It's okay in early July, but it's really shallow. The river will go down and you're stuck. Everybody goes up and down [Itqiliq] real quick.* (SRB&A Nuiqsut Interview March 2020)

Development causes were also cited as the cause of avoidance for the East Channel and Freshwater Lake, with one individual noting an increase in development activity to the east of the Colville River, and another reporting increased traffic and dust near the Freshwater Lake which makes the area less desirable for hunting. Personal reasons were cited as a cause for avoidance of Nuiqsut, Qitik, and Colville River. Personal reasons for avoiding previously used subsistence use areas include negative histories or associations with areas, lack of fuel or proper equipment, and lack of time due to employment.

General Observations Regarding Status of Caribou Herds in 2019

This section summarizes residents' general observations regarding caribou behavior, migration, and distribution for the 2019 study year. While previous sections discussed caribou herd distribution, migration, health, and behavior in the context of the 2019 hunting season and impacts on hunting, this section captures more general herd characteristics that were observed during the active harvester interviews and are not addressed elsewhere in this report. At the conclusion of each interview, residents were asked, "Was there anything else abnormal about the behavior distribution, or migration of caribou in 2019?" Those who did not report abnormalities generally commented that the caribou and caribou hunting season had been normal. As one participant commented, "They [caribou] were actually the same last year. They went [to] the same places. Pretty normal" (SRB&A Nuiqsut Interview March 2020).

Of the participants who provided observations regarding caribou behavior, migration, and distribution in 2019, four commented on resource health, while three commented on resource distribution, one commented on changes in caribou abundance, and one reported abnormal behavior. Reports of abnormal caribou health during the 2019 hunting season included harvesting caribou with less fur, parasites, infected meat and organs, and foul smells. In most cases respondents' observations pertained to individual harvested caribou (see "Observations of Harvested Caribou Health and Condition"). However, several individuals had noted overall trends in caribou herds:

> *The skin. There was not much fur. [It was] like they didn't grow their hair back or something. And when you're skinning the caribou, it plucks off so easily. That's what made me stop skinning that one caribou cause the hair was falling off. And there was one caribou that had the biggest heart for the smallest body. It was fat [the heart]. We ate it, but the body was small [compared to size of the heart].* (SRB&A Nuiqsut Interview March 2020).

> *These caribous were limping, and half of their antlers were gone, limping all the time. I always see some limping. You can tell when they are in the herd, the horns go up and down, [you] can really see them limping. No [idea why they were like that].* (SRB&A Nuiqsut Interview March 2020).

Observations of abnormal distribution and migration of caribou included herds not crossing under pipelines, caribou avoiding construction and not migrating to the coast as is typical, and caribou distribution being farther from the community than in previous years. One respondent commented that the Teshekpuk and Central Arctic herds have not traveled as far to the east and west as in previous years,

> *I know some of them—there was few [caribou] that didn't want to go more east. The others stayed on the east side; they didn't want to go west. They would stick around here [east side]. A small herd went through Nigliq, but there weren't a whole bunch. They went back over and stuck around the small river over here [east side]. I forgot what they call it; it starts with a K though. They stuck around the ocean. (SRB&A Nuiqsut Interview March 2020)*

Respondents also noted that migration and movement patterns had changed over time with increasing infrastructure in the region:

> *There used to be migration [of caribou around the coast]. With all the new construction and building [they have not gone to the coast]. They [caribou] like to go down to the coast.* (SRB&A Nuiqsut Interview March 2020)

> *I think they're just starting to realize what's out there. The pipeline and whatnot. They're starting to stay on south side of the pipeline, but some are on north side too up there.* (SRB&A Nuiqsut Interview March 2020)

Although some participants provided comments on a decreased local abundance of caribou ("[I've] just hardly seen any [caribou] this year") one individual commented that they saw more caribou in 2019. The participant indicated that the increased abundance of caribou in the area may have been due to reduced helicopter traffic:

> *Last year there was more [caribou]. There was no helicopter flying and there was more caribou and that was good. First week of July and first week of August to [the] end of August. They go off and on, off and on.* (SRB&A Nuiqsut Interview March 2020).

Summary – 2019

SRB&A, with the Nuiqsut Caribou Panel, has completed 12 years of monitoring of impacts of CD4 and other CPAI satellite developments on Nuiqsut residents' caribou hunting activities, the 12th year representing the 2019 study year. The monitoring data are based on interviews with a sample of active Nuiqsut caribou harvesters as well as household harvest surveys. Twenty-two active harvesters were interviewed for the 2019 study year and household harvest surveys were conducted with 41 percent of households. In 2019, participation rates were substantially lower than usual due to the COVID-19 pandemic halting travel to and fieldwork in the community. Review of the active harvester interview sample shows that nearly three-quarter of 2019 participants had participated in interviews in a least half of all study years, increasing the likelihood that the Year 12 results are comparable to previous study years. The household harvest surveys included a smaller proportion of "non-harvesting" households which may result in the survey results inflating community harvest estimates. All 2019 results were presented with these caveats in mind.

During the active harvester interviews, respondents reported 57 caribou subsistence use areas for the 2019 time period (January to December 2019). They also identified 60 successful harvest locations. The number of subsistence use areas and harvest locations reported in 2019 were lower than in previous years due to the lower participation rates. The majority of caribou hunting and harvesting activities occurred along the Colville River (including Nigliq Channel and East Channel), along the lower portion of the Itqiliq River, and along the Spur Road and CD5/GMT-1 roads north and northwest of the community. Compared to all previous study years, 2019 was similar but showed a smaller extent of riverine and overland subsistence use areas than some previous study years. In 2019, few people reported traveling beyond Umiuraq on the Colville River, which may have been due to a smaller active harvester sample in 2019. A hunting pattern, which emerged in 2015 and continued through 2019, was the use of the Spur Road and CD5/GMT-1 roads to hunt caribou; some use of the ice road and (in late 2019) gravel road to GMT-2 road was also reported. The road system showed substantial overlapping use in 2019. The road was used by a majority (59 percent) of active harvesters and, in particular, provided access to individuals without access to overland (e.g., snowmachine/four-wheelers) or riverine (i.e., boats) forms of transportation.

Fewer areas of high harvest density were evident in 2019, likely due to the low 2019 active harvester sample and relatively low number of reported harvest locations. In particular, fewer areas of high harvest density were reported along Nigliq Channel, in overland (non-road accessed) areas west of Nuiqsut, and upriver from the community. Decreased harvest density along Nigliq Channel follows a trend that began in 2012,

with fewer areas of high harvest density along Nigliq Channel with the exception of the camp at Nigliq. In 2019, the camp at Nigliq showed moderate harvest concentrations at Nigliq camp. Overall, a large number of caribou harvests occurred to the northwest of the community, and at isolated locations on the Itqiliq River and near the mouth of the East Channel.

July and/or August have been the peak hunting months during almost every study year, including 2019. In 2019, while July and August continued to be the peak harvest months, the month of August showed a particularly high percentage of subsistence use areas. New timing variables which measure timing in terms of the number of hunting trips showed a similar pattern to the percentage of subsistence use areas by month, with hunting trips peaking in July and August. Nearly 40 percent of 2019 hunting trips occurred in August, with respondents taking an average of five trips during that month. 2019 showed a somewhat lower percentage of subsistence use areas and hunting trips during the winter months, and no reported hunting activity in January or April, despite the road access which in recent years has facilitated winter hunting activity. Similar to recent study years, boat use declined in 2019 although it remained the principle travel method to caribou subsistence use areas, at 60 percent of use areas. Use of four-wheeler increased substantially in 2019 (26 percent of subsistence use areas) and use of trucks to use areas remained similar to recent years, which have shown a general increase in truck use since 2015. The increased use of truck and four-wheeler is due to respondents' use of the recently constructed Spur Road and connected roads to CD5, GMT-1, and GMT-2.

Data collection methods for trip duration changed in 2019 to account for the wide variation in length of same-day trips and to measure trip duration in hours to pre-defined hunting areas, instead of by the number of subsistence use areas. Similar to previous years, respondents took primarily same day trips (over 90 percent of hunting trips). Average trip length was longest to Fish Creek (approximately 53 hours) and otherwise ranged from approximately four hours (Itqiliq River) to 22 hours (Sentinel Hill). The average trip length during road hunting trips was five hours. The data collection method for frequency of hunting trips also changed in 2019 to document frequency by pre-defined hunting areas. Half of respondents took between one and nine hunting trips in 2019, while an additional 41 percent took between 10 and 29 caribou hunting trips. Respondents took the highest average number of trips to the area West of Nuiqsut, which includes road hunting areas. Harvest success in terms of the percentage of successful subsistence use areas was on the high end of previous years, at 72 percent of subsistence use areas reported as successful. The mean number of caribou harvested by harvest location and subsistence use area were also on the high end of previous years.

Based on household caribou harvest surveys for the 2019 study year, the estimated number of caribou harvested in 2019 (636 caribou; 153 pounds per capita) was within the range of previous study years, as was the percentage of households using caribou. These numbers may be somewhat inflated due to a lack of participation from non-harvesting households in 2019 and an overall low response rate. Harvest estimates for 2019 have a high confidence interval (e.g., low level of confidence). The percentage of Nuiqsut households who gave and received caribou (87 and 78 percent, respectively) was within the range of previous years. In 2019, 33 percent of households indicated that they did not harvest enough caribou.

The percentage of respondents observing caribou abnormalities in 2019 was within the range of previous years, at 32 percent, but the highest since 2012. The smaller sample size in 2019 may have affected study results. As with previous years, health-related problems were the most commonly reported abnormality. In 2019, 41 percent of active harvesters reported one or more development-related impacts on caribou hunting, 23 percent of which were specifically attributed to CPAI. Both development-related and CPAI-related impacts were on the low end compared to previous years which show an average of 59 percent of respondents reporting development-related impacts, and 39 percent reporting CPAI impacts. In 2019, helicopter and plane traffic (14 percent of respondents each) and man-made structures (nine percent of respondents) were the most commonly reported impact sources but showed a substantial decrease after an increase in 2018. A small number of active harvesters also reported impacts related to "other" impacts, oil

company personnel, and other traffic (e.g., trucks). Household harvest survey data showed impact reports within the range of previous study years.

Fifty-nine percent of respondents indicated they no longer hunted in or generally avoided certain areas they previously used, within the range of previous study years but lower than the previous two study years (2017 and 2018). The Fish/Judy Creek and Itqiliq River areas were the most frequently mentioned. The Alpine/Alpine Satellites area was not mentioned by 2019 respondents as an area of avoidance. A majority of avoidance observations were related to development causes, followed by environmental causes, and personal reasons.

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APPENDIX A: NUIQSUT CARIBOU SUBSISTENCE MONITORING PROTOCOLS, ACTIVE HARVESTER INTERVIEW AND HOUSEHOLD HARVEST SURVEY

NUIQSUT CARIBOU MONITORING PROTOCOL, 2019 STUDY YEAR

Respondent ID _____
Respondent Name _____
If new respondent record the following:
Respondent Birth Date _____
Residence at Birth_____
Years in Community _____

Interviewer Initials _____
Note Taker Initials _____
Date of Interview _____
HH # _____
HH Survey? YES _____NO_____
HH ID_____

SECTION A: CARIBOU HUNTING ACTIVITIES, January 2019 – December 2019

1. Did you go caribou hunting between January 2019 and December 2019? YES___ NO___ [IF NO, INTERVIEW OVER OR IF ELDER CONDUCT TRADITIONAL KNOWLEDGE INTERVIEW]

2. Where did you hunt for caribou between January 2019 and December 2019? [DRAW HUNTING AREAS ON MAP]

[FOR EACH CARIBOU HUNTING POLYGON, RECORD THE FOLLOWING INFORMATION ON THE PROTOCOL]:

	Use Areas			Harvest Locations					
	Months	**Transportation Method(s) (including access method if different from search)**	**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/ Unknown)**	**Harvest months (by harvest location)**	**Size of Herd**
POLY 1				Pt. _____					
				Pt. _____					
				Pt. _____					
				Pt. _____					
				Pt. _____					
POLY 2				Pt. _____					
				Pt. _____					
				Pt. _____					
				Pt. _____					
				Pt. _____					
POLY 3				Pt. _____					
				Pt. _____					
				Pt. _____					
				Pt. _____					
				Pt. _____					

	Use Areas			Harvest Locations					
	Months	Transportation Method(s) (including access method if different from search)	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/ Unknown)	Harvest months (by harvest location)	Size of Herd
POLY 4				Pt. _____					
				Pt. _____					
				Pt. _____					
				Pt. _____					
				Pt. _____					
POLY 5				Pt. _____					
				Pt. _____					
				Pt. _____					
				Pt. _____					
				Pt. _____					
POLY 6				Pt. _____					
				Pt. _____					
				Pt. _____					
				Pt. _____					
				Pt. _____					
POLY 7				Pt. _____					
				Pt. _____					
				Pt. _____					
				Pt. _____					
				Pt. _____					

3. Thinking about all of the caribou hunting you did between January 2019 and December 2019, how many hunting trips did you take in…

# Caribou Hunting Trips											
Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**

4. Of all of your 2019 caribou hunting trips, how many were camping (overnight) trips? _

[PLACE MYLAR OVERLAY SHOWING PRE-DEFINED USE AREAS ON THE MAP. MARK YES OR NO FOR EACH PRE-DEFINED USE AREA, DENOTING WHETHER THE RESPONDENT USED THE AREA].

5. For each of these pre-defined hunting areas that you used last year, we will record number of trips and duration of trips. [RECORD WHETHER RESPONDENT HARVESTED CARIBOU BASED ON THE PRESENCE/ABSENCE OF USE AREAS WITHIN PREDEFINED AREA]

	Predefined Area	Use Area? [Yes or No]	Total Number of Trips	Typical Duration of Trips [in hours]
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			
12	Other			

6. [IF APPLICABLE], How many hunting trips did you take using roads? _____

7. [IF APPLICABLE] What was the typical duration of your road hunting trips, in hours? _____

SECTION B: ASSESSMENT OF HARVESTED CARIBOU, 2019

1. Thinking about the caribou you shot or harvested in 2019, were any of them abnormal in the following ways? (If none, Skip to Section C)

Health (disease, infection)	**Quality** (unusual taste, smell)	**Size** (unusual fat content)	**Parasites/Flies** (unusual # of parasites)	**Other**

2. For each caribou with the above observations or for multiple caribou with the same observations, we will record the following information:

Location [RECORD HARVEST LOCATION POINT INFORMATION HERE]**:** _________
Number of Abnormal Caribou at Location [IF SAME TYPE OF ABNORMALITY]**:**____
Please describe the abnormality: ____

____

____

Did you use this caribou? YES _______ NO _______

Location [RECORD HARVEST LOCATION POINT INFORMATION HERE]**:** _________
Number of Abnormal Caribou at Location [IF SAME TYPE OF ABNORMALITY]**:**____
Please describe the abnormality: ____

____

____

Did you use this caribou? YES _______ NO _______

Location [RECORD HARVEST LOCATION POINT INFORMATION HERE]**:** _________
Number of Abnormal Caribou at Location [IF SAME TYPE OF ABNORMALITY]**:**____
Please describe the abnormality: ____

____

____

Did you use this caribou? YES _______ NO _______

SECTION C: IMPACTS ON CARIBOU HUNTING, 2019

1. In 2019, did you experience any impacts on your caribou hunting related to development? ____YES __ NO

[IF YES, MARK IMPACT POINTS ON MAP, MAKING SURE TO REMOVE THE PRE-DEFINED USE AREA OVERLAY] THEN RECORD THE FOLLOWING INFORMATION:

In 2019, did you experience any impacts related to development…	Yes or No	Impact Location Point	Month(s) When Impact Occurred	Please describe	What development or developer was this impact related to?
Helicopter traffic*					
Plane traffic*					
Other traffic (e.g., ground, vessel traffic)					
Oil company personnel					
Structures (e.g., roads, pipelines)					
Security policies					
Seismic lines or activity					
Other					

***For helicopter and plane traffic, collect data about color of aircraft and aircraft number, if possible**

2. In 2019, did you experience any development impacts to your hunting or harvesting activities for resources other than caribou?

YES _____NO _____ [IF YES] PLEASE DESCRIBE: _____

_____

_____

_____

3. Are there any areas where you used to hunt for caribou that you no longer use or avoid? YES_____ NO _____

9a [IF YES], Where? _____

9b [IF YES], Why?_____

SECTION D: ADDITIONAL OBSERVATIONS ABOUT CARIBOU, 2019

2. Was there anything else abnormal about the behavior, distribution, or migration of caribou in 2019? YES___ NO ____

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

_____

_____

_____

_____

_____

3. Are there any residents who were particularly active caribou hunters in 2019 who we should try to talk to while we are here?

_____

_____

_____

NUIQSUT HOUSEHOLD CARIBOU HARVEST SURVEY FOR 2019

In the North Slope Borough's 2018 rezone ordinance to ConocoPhillips Alaska, Inc. (CPAI) and in the Bureau of Land Management's 2018 Record of Decision for the GMT2 Project, CPAI is required to continue implementing a subsistence monitoring program to document the impacts Alpine and Alpine Satellite developments on Nuiqsut subsistence hunting and harvesting. CPAI contracted Stephen R. Braund & Associates to monitor Nuiqsut caribou harvests to fulfill this requirement. SRB&A is working with KSOPI and a panel of Nuiqsut caribou experts to implement the monitoring program. Part of this program is to record yearly harvests and uses of caribou by the community of Nuiqsut so that these harvests and uses can be compared over time. Your individual information will remain anonymous.

HH #: _____ Person Responding to Survey (check one): _____Head of HH _____ Other Adult HH member
Interviewer: _____ Date: _____ Number of People in HH: _____

Between January and December 2019…

1. Did you or anyone in your household use caribou (e.g., harvested, received, or utilized in the home)? _____ YES _____ NO

2. Did you or anyone in your household try to harvest caribou? _____ YES _____ NO (If NO, Skip to Q7)

3. Did anyone in your household use roads to hunt for caribou in 2019?

_____ YES (IF YES, WHY?) _____

_____

_____ NO (IF NO, WHY?) _____

_____

_____ DON'T KNOW

3a. [IF YES], please identify which road segments household members used for caribou hunting in 2019 [SHOW MAP AND CHECK APPROPRIATE SEGMENTS]:

AREA 1 (spur road) ____ YES _____ NO _____ DON'T KNOW

AREA 2 (road east of the spur road toward Alpine) _____ YES _____ NO _____ DON'T KNOW

AREA 3 (road west of the spur road to CD5) _____ YES _____ NO _____ DON'T KNOW

AREA 4 (road between CD5 and GMT1) _____ YES _____ NO _____ DON'T KNOW

AREA 5 (road between GMT1 and GMT2) _____ YES _____ NO _____ DON'T KNOW

4. Did you or anyone in your household successfully harvest caribou? _____ YES _____ NO (If NO, Skip to Q7)

5. How many caribou did your household harvest (only harvested or shot by residents in your household; do not count other households' harvests) in 2019? _____

6. How many of your harvested caribou were sick or injured? _____ How many of those caribou did you use? _____

7. Did you or anyone in your household receive caribou from other households? _____ YES _____ NO

8. Did you or anyone in your household give caribou to other households? _____ YES _____ NO

9. Did your household harvest enough caribou to meet your needs? _____ YES _____ NO

9a. [IF NO], did you receive enough caribou from other households for your needs? _____ YES _____ NO

10. Did any development-related activities in 2019 make your household's caribou hunting more difficult? __ YES _____ NO

10a. (If YES) Please describe what happened (including associated developments/developers): _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

APPENDIX B: NUIQSUT CARIBOU SUBSISTENCE MONITORING INFORMED CONSENT

Stephen R. Braund & Associates

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info@srbak.com

Nuiqsut Caribou Subsistence Monitoring Project - Year 12

Active Harvester Interview Informed Consent Form

Description of the Study
Stephen R. Braund & Associates (SRB&A) has been contracted by ConocoPhillips Alaska, Inc. (CPAI) to conduct a subsistence monitoring project in Nuiqsut. Based on the North Slope Borough (NSB) 2018 Rezone Ordinance and the Bureau of Land Management (BLM) Record of Decision (ROD) for the Greater Moose's Tooth Two (GMT2) Unit, CPAI is to continue funding a subsistence study that investigates the impacts of all Alpine and associated developments, activities, and infrastructure to Nuiqsut subsistence hunters. CPAI previously funded the first 11 years of this study in response to a requirement in the NSB's CD4 permit. The purpose of the research is to document baseline subsistence information, monitor changes in subsistence activities, and document changes to subsistence patterns and harvest levels resulting from Alpine and all associated developments. 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 12th year of the study.

While in Nuiqsut, SRB&A would like to interview knowledgeable subsistence harvesters about their caribou subsistence use between January and December of 2019. We would also like to document the observations 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 all Alpine and related developments on Nuiqsut subsistence use, with a focus on caribou. 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.

Confidentiality and Anonymity
Individual harvester information will remain confidential and only aggregated data will be displayed on maps or in a report. Your name will not be used in our study without your written 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.

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.

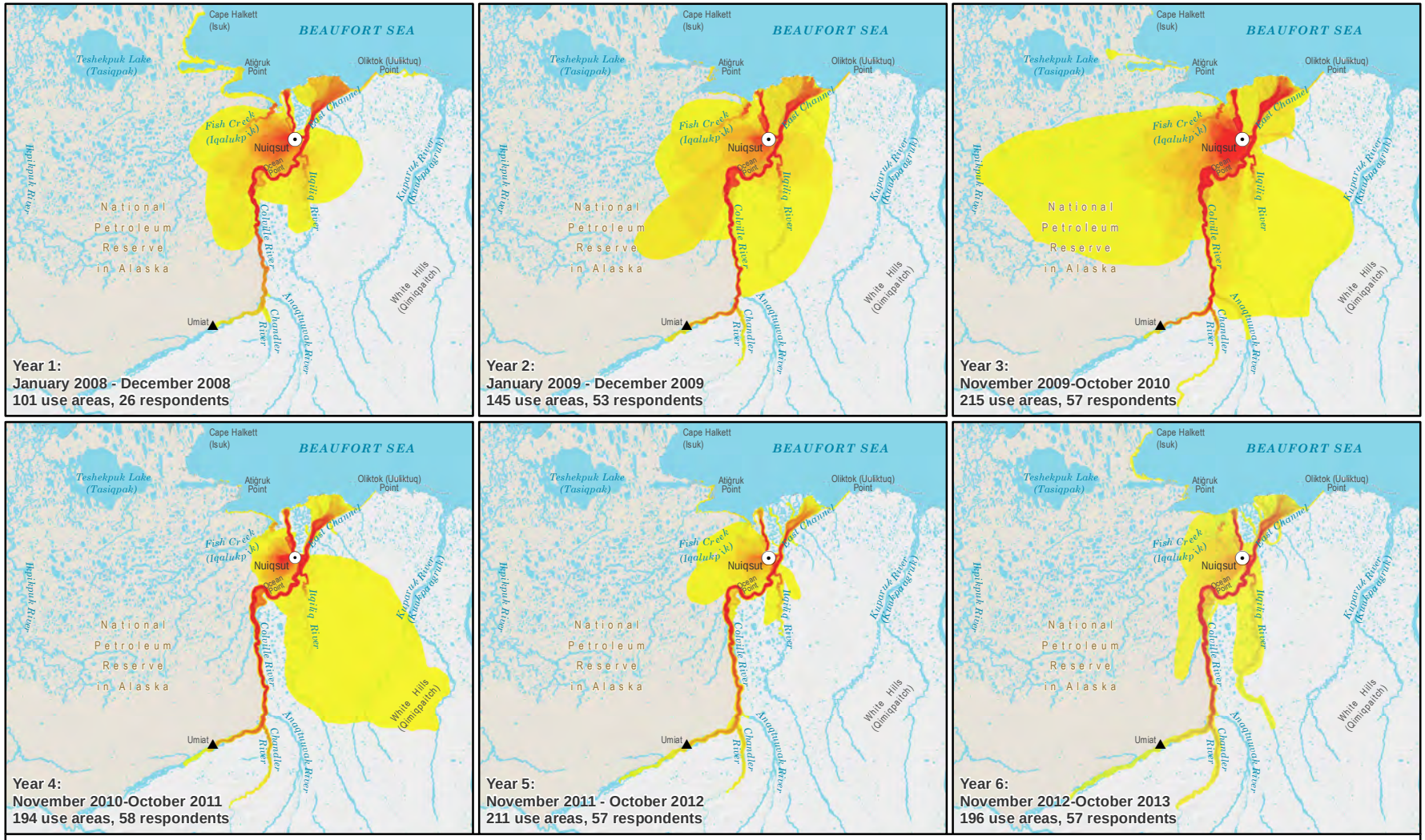
Honoraria
SRB&A will pay honoraria to each participant who completes the entire interview.

Contacts and Questions
If you have questions, please contact Stephen Braund 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: MAPS, INDIVIDUAL STUDY YEARS, 2008-2018



Map C-1 Caribou Subsistence Use Areas: 2008 - 2013 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 161 active harvesters from March of 2009 through February of 2019.

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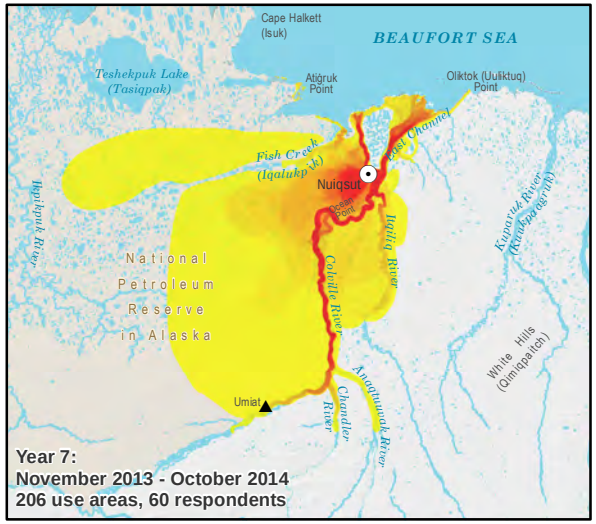
Other areas may have been used for resource harvesting.

National Petroleum Reserve Alaska

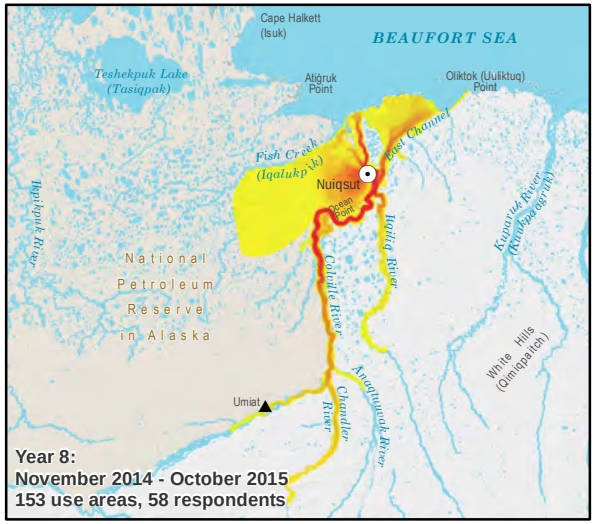
Overlapping Polygons

High

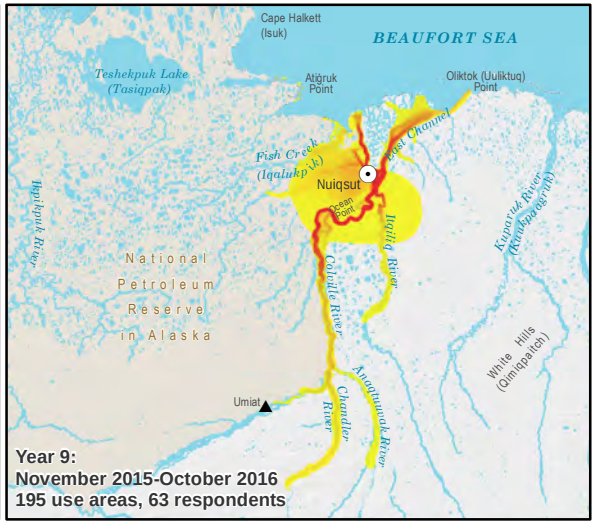
Low



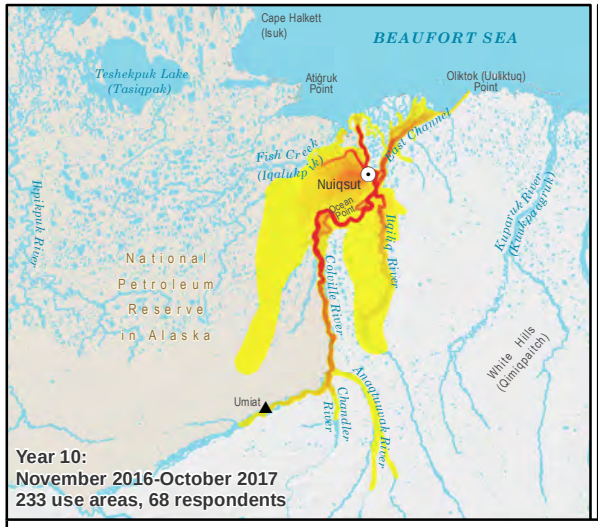
Year 7:
November 2013 - October 2014
206 use areas, 60 respondents



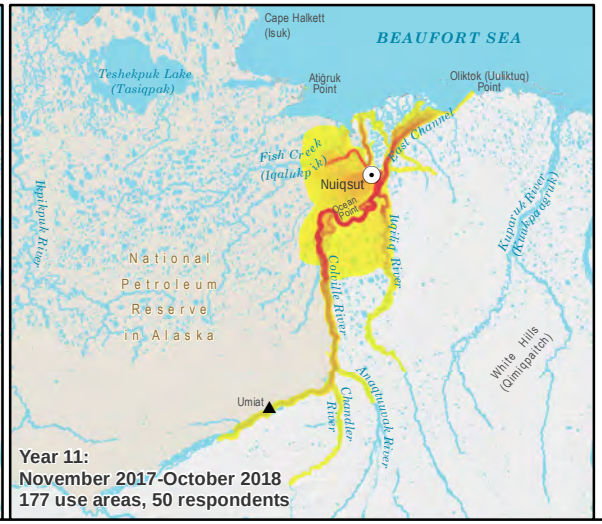
Year 8:
November 2014 - October 2015
153 use areas, 58 respondents



Year 9:
November 2015-October 2016
195 use areas, 63 respondents



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



Year 11:
November 2017-October 2018
177 use areas, 50 respondents

Map C-2 Caribou Subsistence Use Areas: 2014 - 2018 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 161 active harvesters from March of 2009 through February of 2019.

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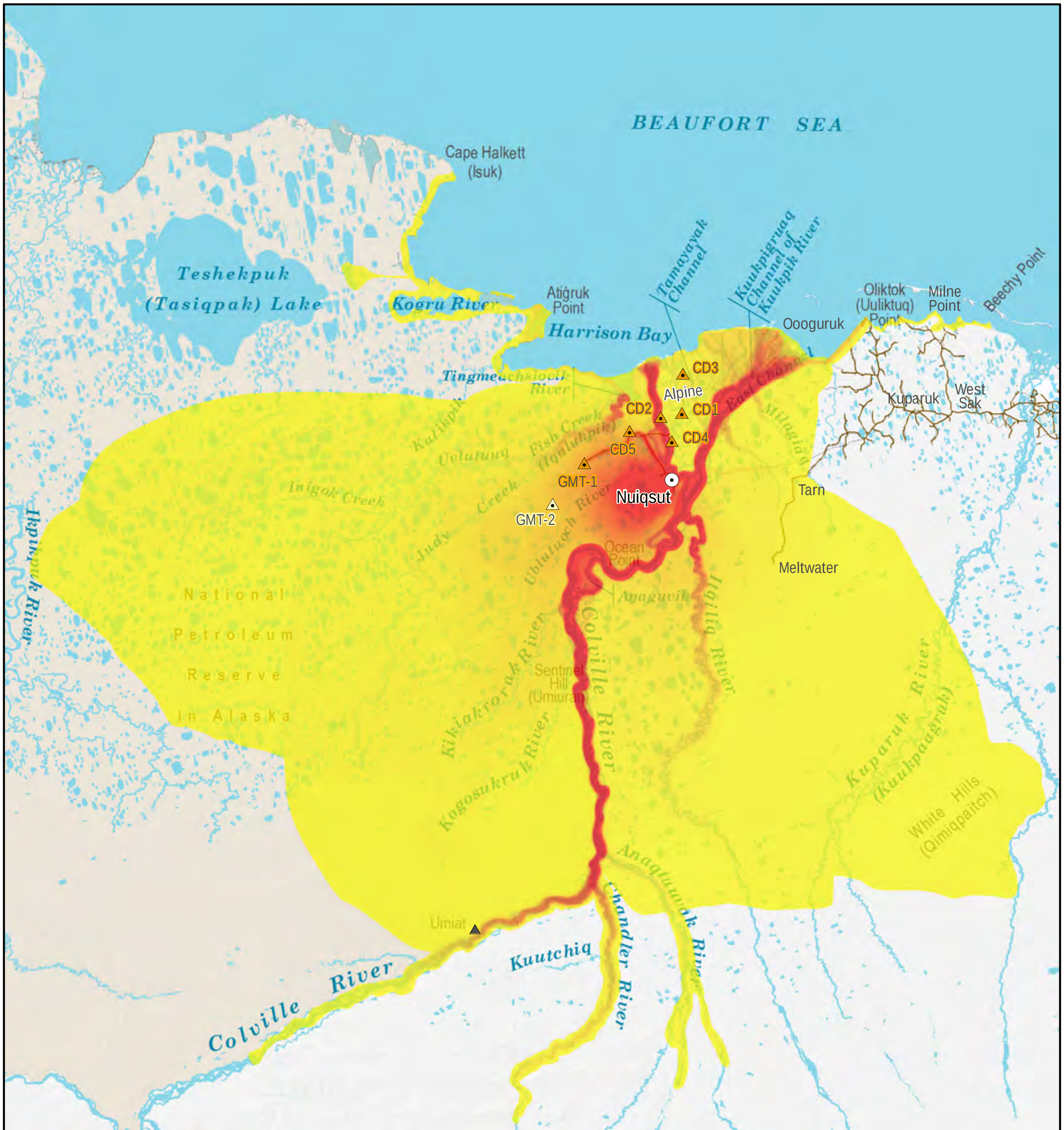
Other areas may have been used for resource harvesting.

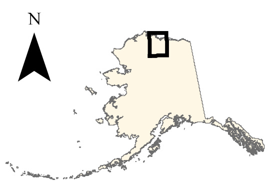
National Petroleum Reserve Alaska

Overlapping Polygons

High

Low





0 5 10 20
Miles

Map C-3 Caribou Subsistence Use Areas, 2008 - 2018 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 161 active harvesters from March 2009 through February of 2019.

Other areas may have been used for resource harvesting.

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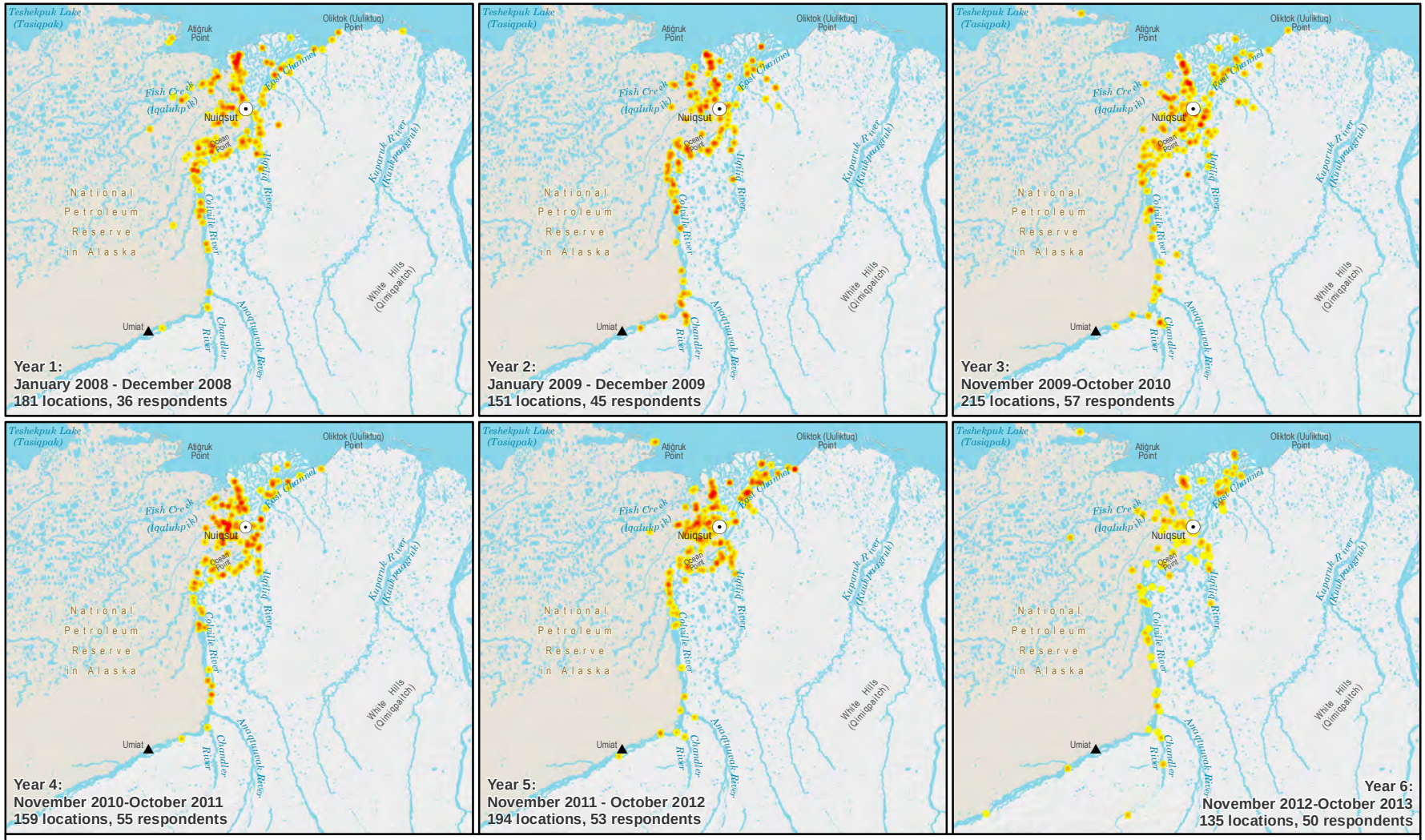
Years 1 - 11: January 2008 - October 2018

High
Low
2102 caribou areas used by 161 respondents

National Petroleum Reserve Alaska



Map C-4 Caribou Harvest Density: 2008 - 2013 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 161 active harvesters from March of 2009 through February of 2019.

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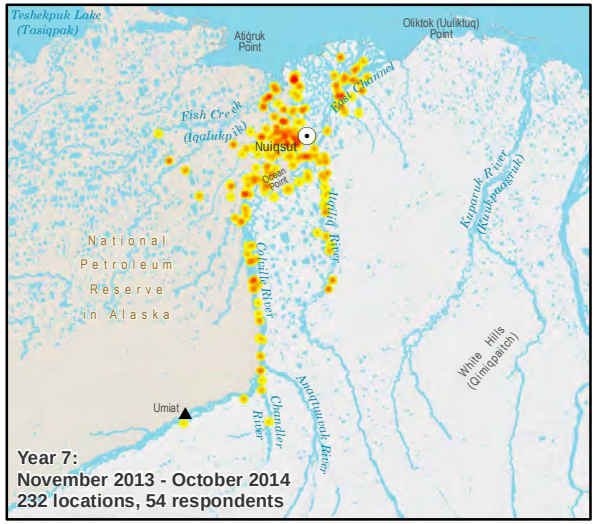
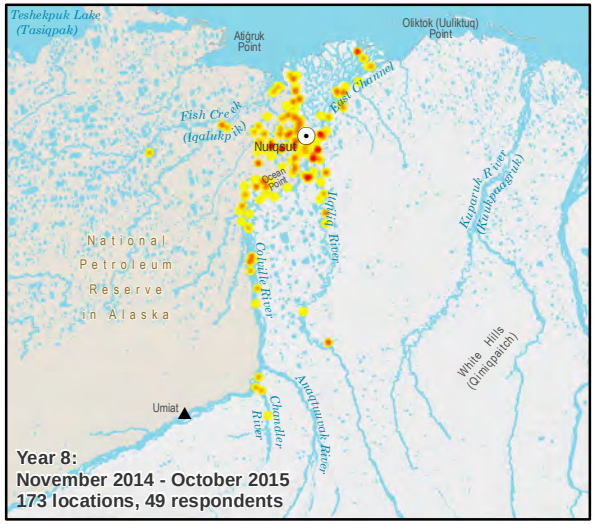
Other areas may have been used for resource harvesting.

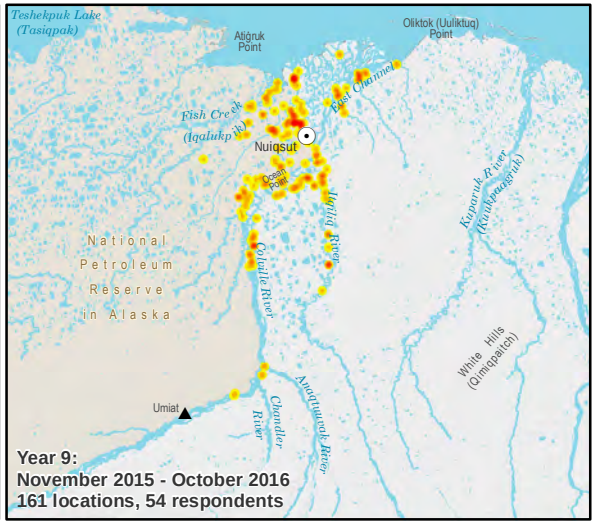
National Petroleum Reserve Alaska

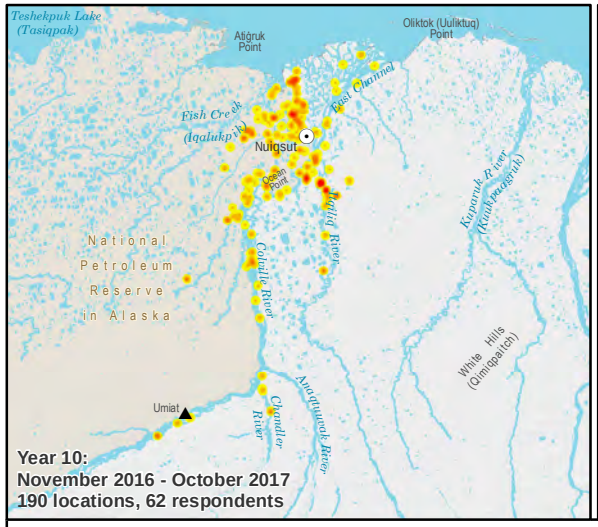
Harvest Density

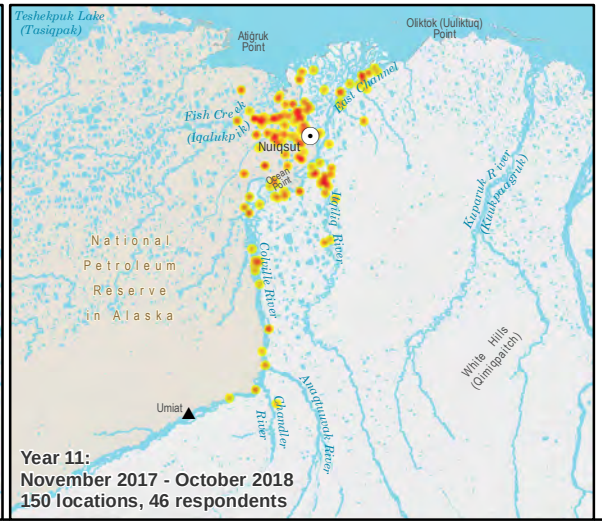
- Fewer caribou harvested
- More caribou harvested

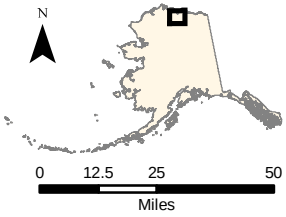












Map C-5 Caribou Harvest Density: 2014 - 2018 Individually

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 161 active harvesters from March of 2009 through February of 2019.

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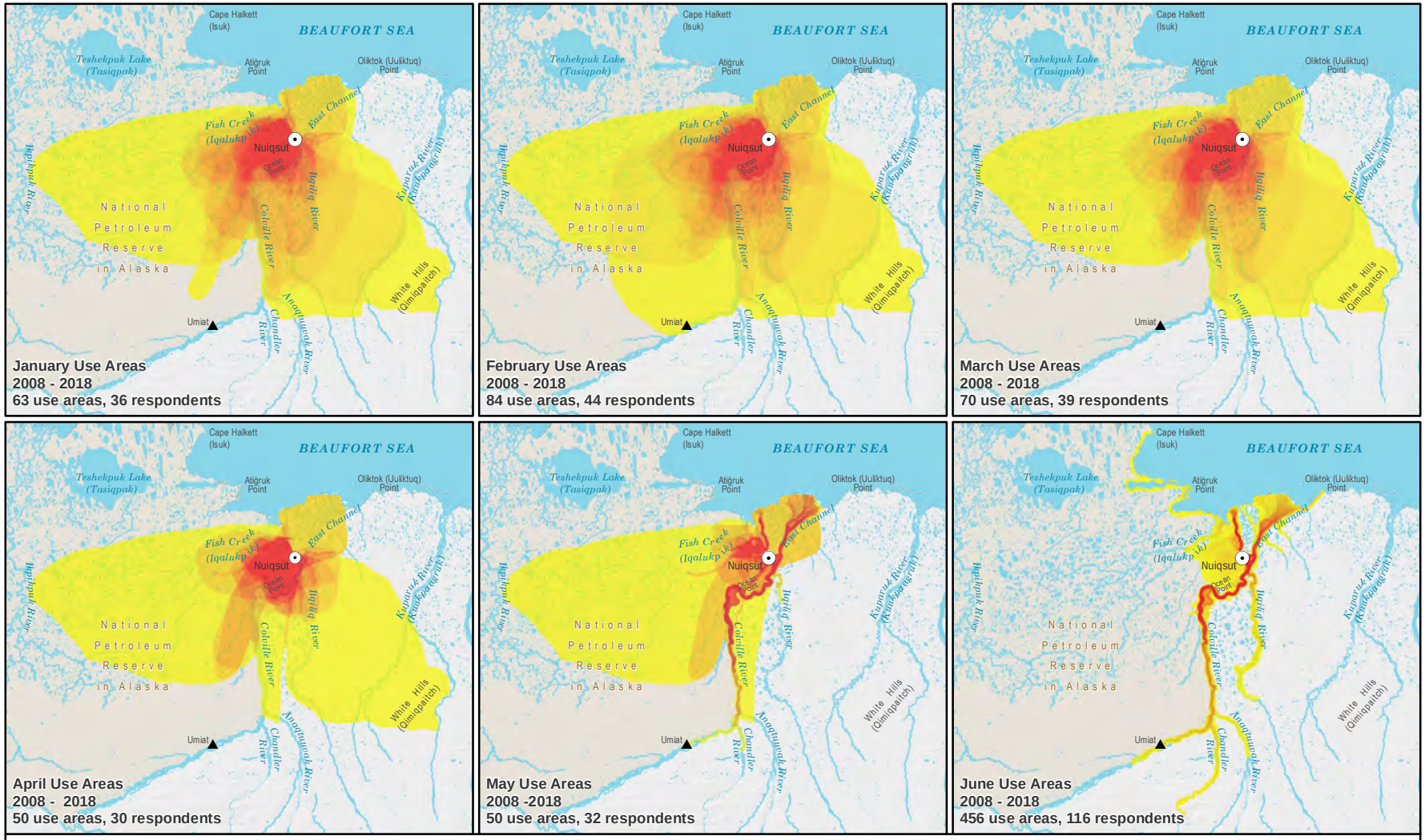
Other areas may have been used for resource harvesting.

National Petroleum Reserve Alaska

Harvest Density

- Fewer caribou harvested
- More caribou harvested



Map C-6 Caribou Subsistence Use Areas: January - June 2008 - 2018

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 161 active harvesters from March of 2009 through February of 2019.

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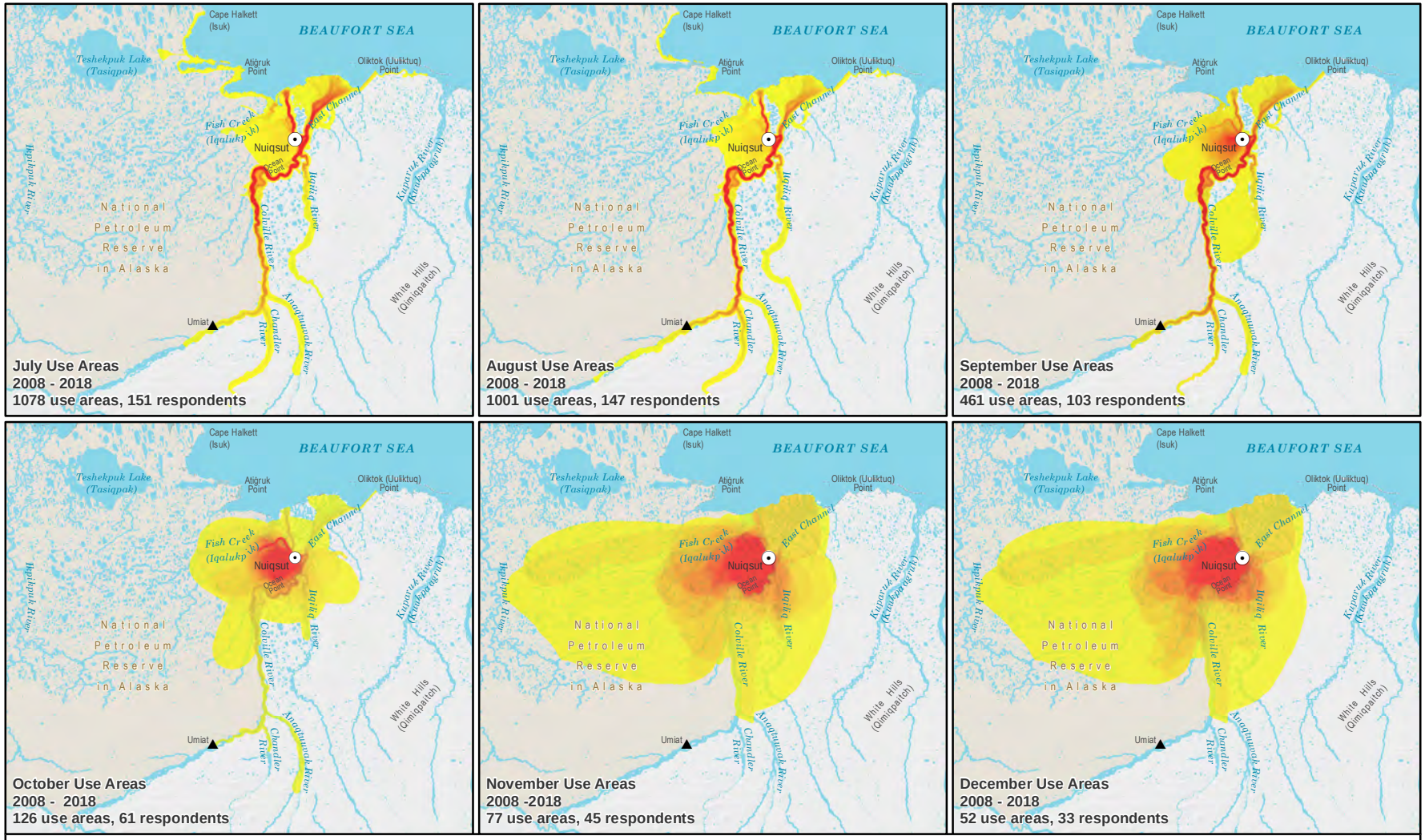
Other areas may have been used for resource harvesting.

National Petroleum Reserve Alaska

Overlapping Polygons

High

Low



N

0 15 30 60

Miles

Map C-7 Caribou Subsistence Use Areas: July - December 2008 - 2018

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 161 active harvesters from March of 2009 through February of 2019.

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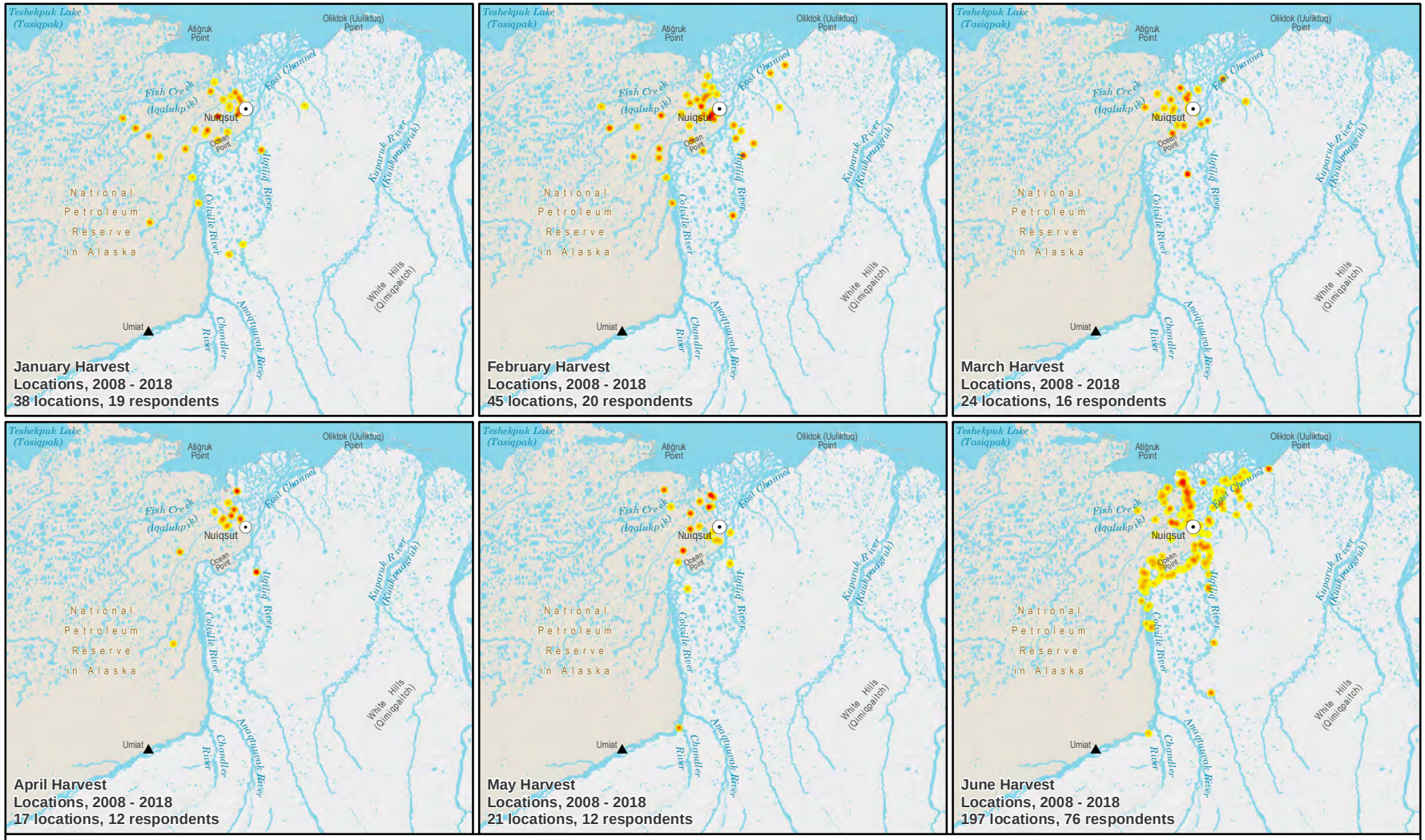
Other areas may have been used for resource harvesting.

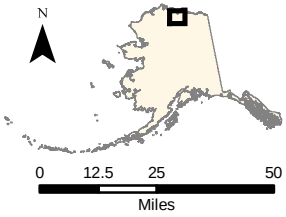
National Petroleum Reserve Alaska

Overlapping Polygons

High

Low





Map C-8 Caribou Harvest Density: January - June, 2008-2018

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 161 active harvesters from March of 2009 through February of 2019.

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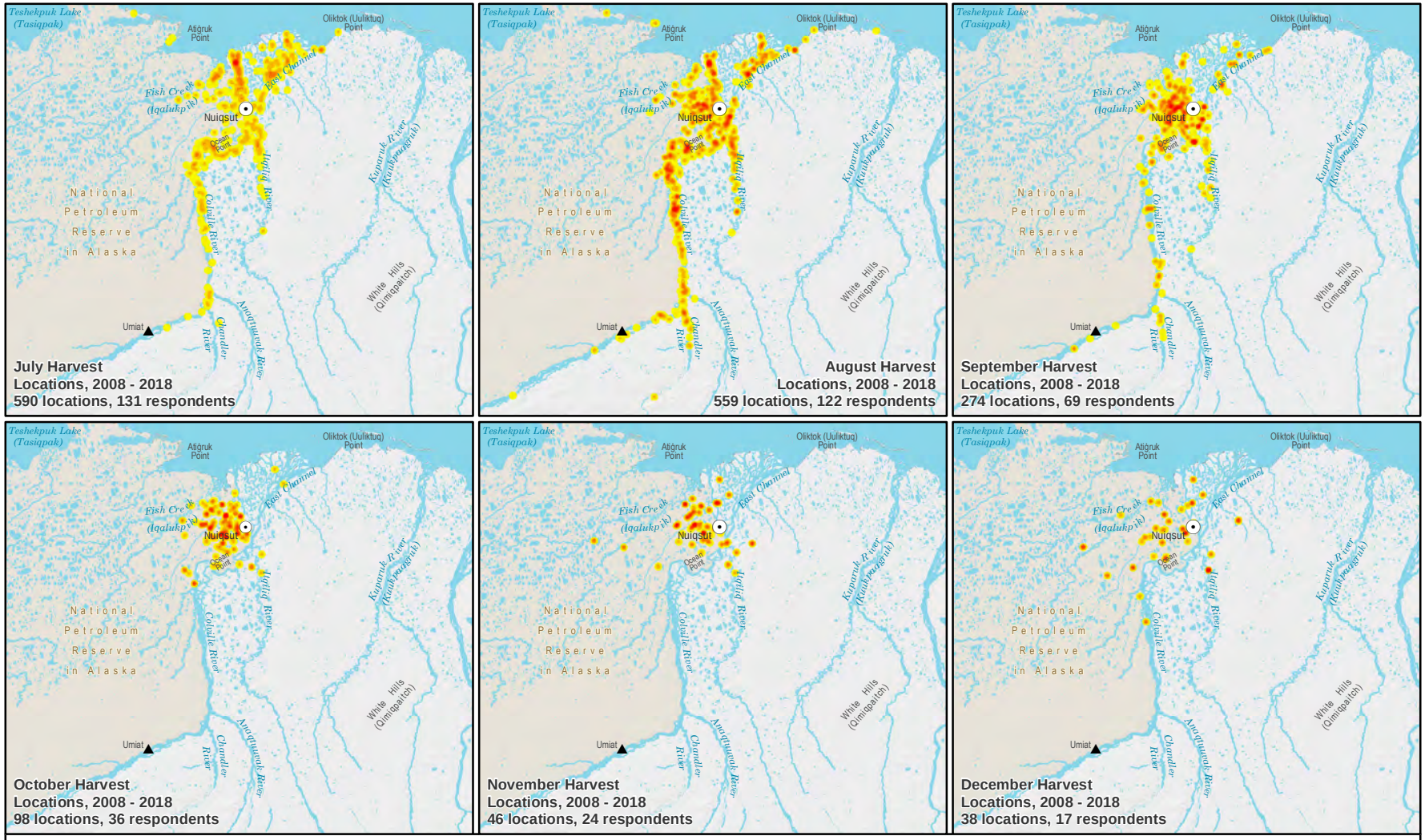
Other areas may have been used for resource harvesting.

National Petroleum Reserve Alaska

Harvest Density

- Fewer caribou harvested
- More caribou harvested



Map C-9 Caribou Harvest Density: July - December, 2008-2018

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 161 active harvesters from March of 2009 through February of 2019.

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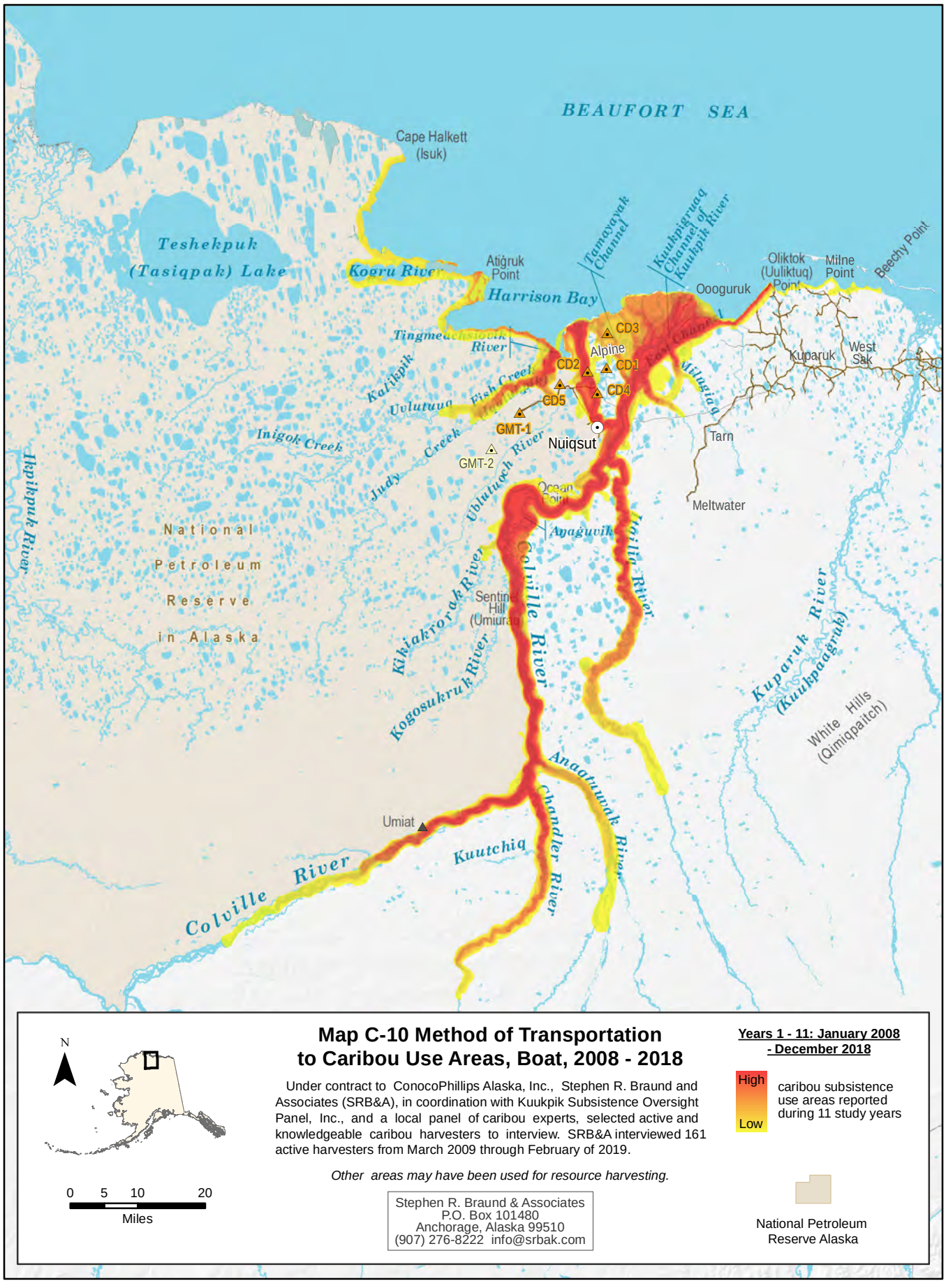
Other areas may have been used for resource harvesting.

National Petroleum Reserve Alaska

Harvest Density

- Fewer caribou harvested
- More caribou harvested



Map C-10 Method of Transportation to Caribou Use Areas, Boat, 2008 - 2018

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 161 active harvesters from March 2009 through February of 2019.

Other areas may have been used for resource harvesting.

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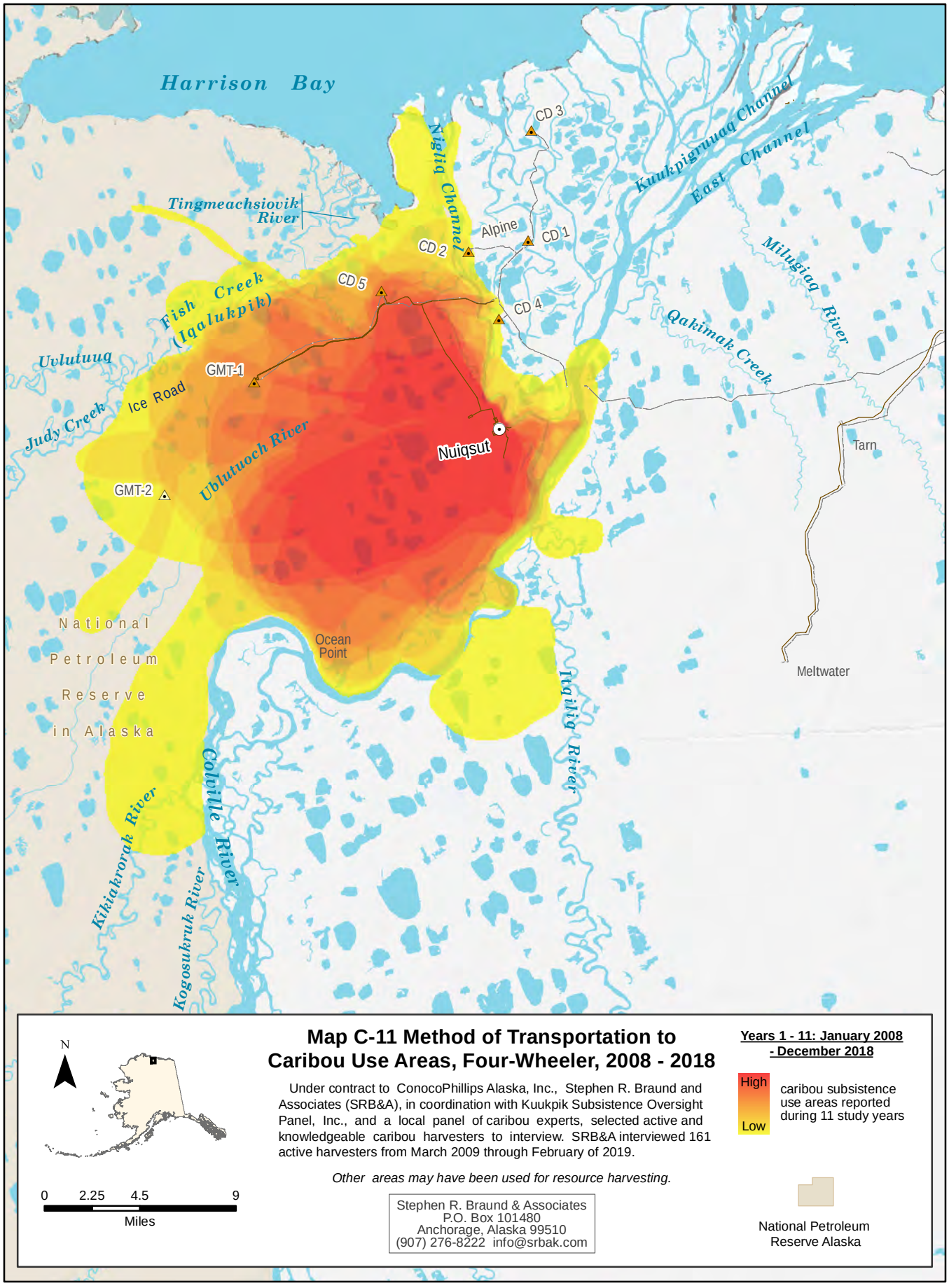
Years 1 - 11: January 2008 - December 2018

High
Low
caribou subsistence use areas reported during 11 study years

National Petroleum Reserve Alaska



Map C-11 Method of Transportation to Caribou Use Areas, Four-Wheeler, 2008 - 2018

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 161 active harvesters from March 2009 through February of 2019.

Other areas may have been used for resource harvesting.

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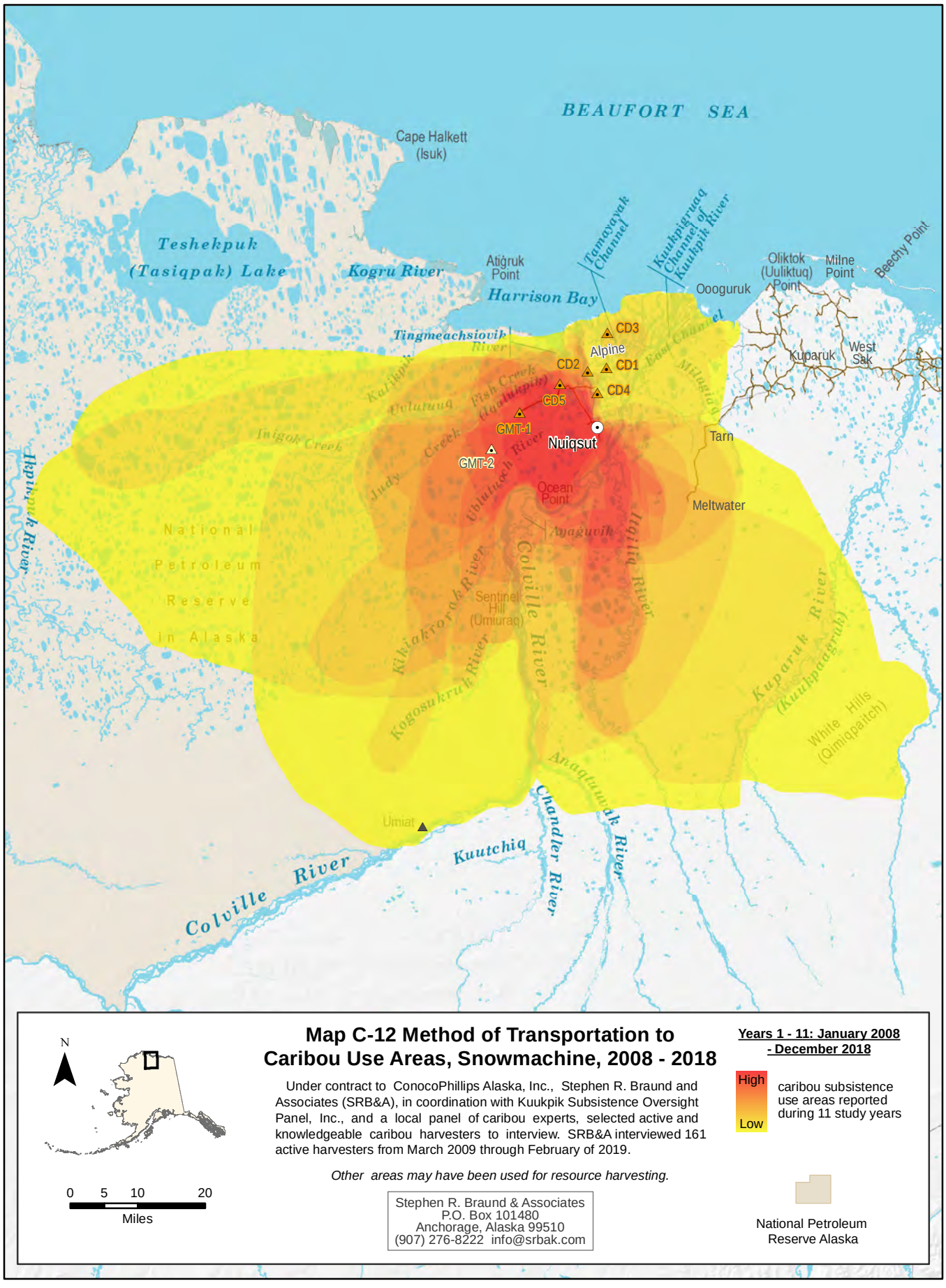
Years 1 - 11: January 2008 - December 2018

High
Low

caribou subsistence use areas reported during 11 study years

National Petroleum Reserve Alaska



Map C-12 Method of Transportation to Caribou Use Areas, Snowmachine, 2008 - 2018

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 161 active harvesters from March 2009 through February of 2019.

Other areas may have been used for resource harvesting.

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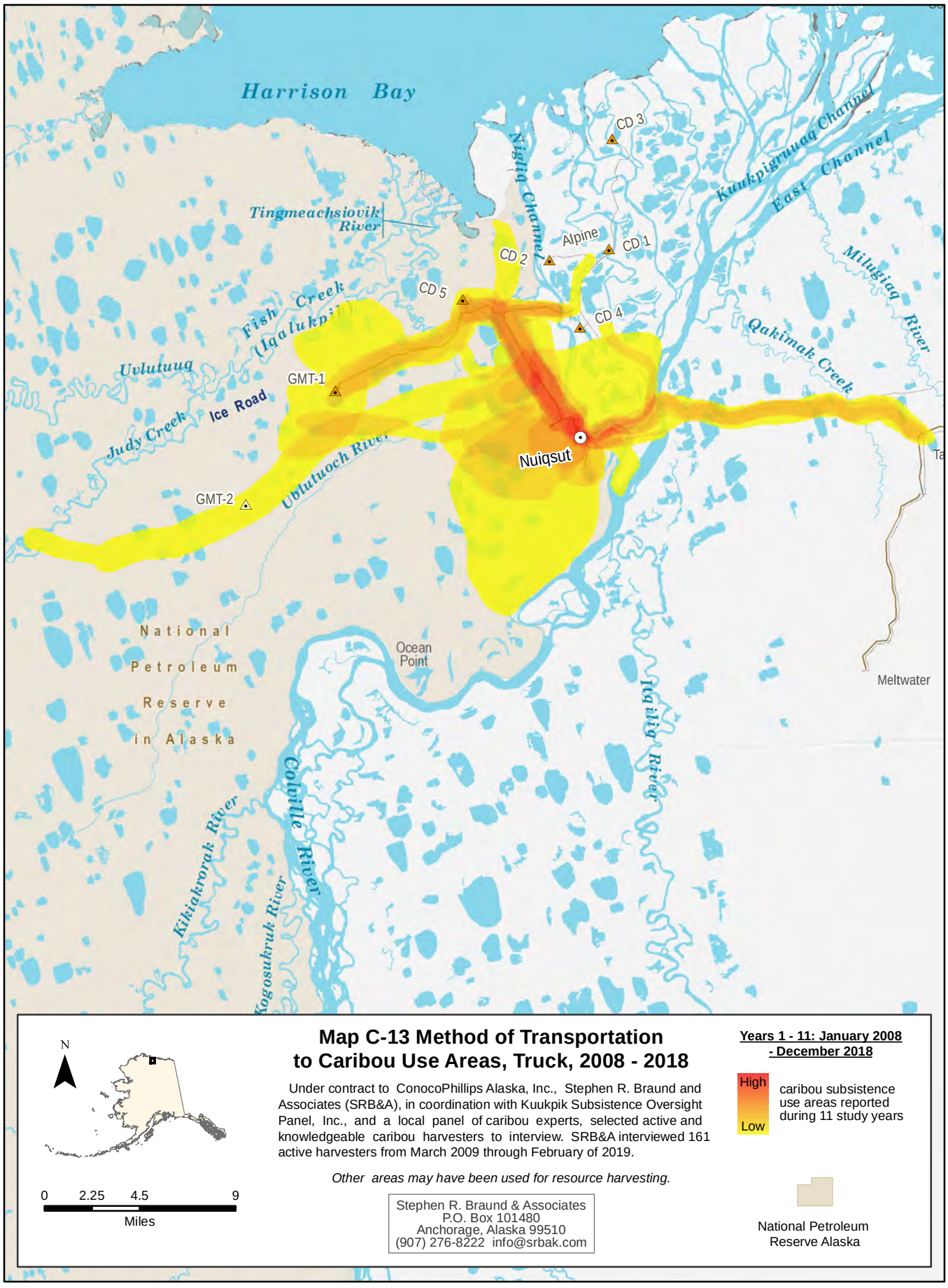
Years 1 - 11: January 2008 - December 2018

High
Low

caribou subsistence use areas reported during 11 study years

National Petroleum Reserve Alaska



Map C-13 Method of Transportation to Caribou Use Areas, Truck, 2008 - 2018

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 161 active harvesters from March 2009 through February of 2019.

Other areas may have been used for resource harvesting.

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Years 1 - 11: January 2008 - December 2018

High
Low

caribou subsistence use areas reported during 11 study years

National Petroleum Reserve Alaska

APPENDIX D: YEARS 1-11 TABLES AND FIGURES – REMOVED ANALYSES

Table D-1: Percentage of Subsistence Use Areas by Pre-Defined Hunting Areas

Pre-Defined Hunting Area	Percentage of Caribou Subsistence Use Areas											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Nigliq Channel	20%	22%	18%	23%	19%	21%	16%	16%	18%	16%	11%	18%
East Channel Colville	12%	14%	16%	14%	16%	16%	16%	12%	15%	10%	15%	14%
Other Colville Delta	1%	2%	2%	1%	1%	2%	0%	0%	0%	0%	3%	1%
Fish Creek	11%	10%	7%	6%	2%	10%	6%	5%	4%	3%	4%	6%
Coastal West	4%	3%	3%	3%	2%	2%	3%	0%	1%	0%	1%	2%
Coastal East	3%	3%	2%	1%	1%	1%	1%	1%	4%	1%	1%	2%
Itqiliq River	11%	12%	13%	11%	12%	9%	10%	12%	14%	14%	15%	12%
Ocean Point	18%	25%	24%	27%	27%	27%	29%	31%	27%	28%	27%	26%
Sentinel Hill	15%	21%	20%	14%	20%	20%	17%	19%	15%	15%	17%	18%
Colville River South	7%	13%	14%	11%	13%	17%	12%	10%	6%	7%	8%	11%
West of Nuiqsut	23%	17%	21%	18%	22%	21%	27%	35%	28%	26%	32%	24%
Other	1%	5%	6%	2%	1%	3%	6%	1%	1%	3%	6%	3%
Number of Use Areas	137	187	215	194	211	196	206	153	195	233	177	

Stephen R. Braund & Associates, 2021.

Table D-2: Percentage of Subsistence Use Areas by Roads

Hunting Area	Percentage of Caribou Subsistence Use Areas											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Roads								13%	17%	15%	20%	16%
Number of Subsistence Use Areas								153	195	233	177	

Stephen R. Braund & Associates, 2021.

Table D-3: Nuiqsut Travel Method by Percentage of Trips

Travel Method	Percentage of Trips											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Boat	85%	84%	74%	78%	78%	85%	70%	65%	58%	59%	59%	72%
Snowmachine	10%	7%	18%	18%	10%	6%	18%	6%	12%	10%	7%	11%
Four-wheeler	3%	6%	13%	9%	14%	8%	11%	14%	18%	16%	11%	11%
Truck	3%	2%	0%	0%	0%	0%	0%	16%	28%	25%	24%	9%
Foot	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	1%	1%
Total Trips	1,008	1,005	1,211	1,139	1,019	1,014	1,190	970	1,049	1,439	961	

Stephen R. Braund & Associates, 2021.

Table D-4: Percentage of Successful Subsistence Use Areas by Pre-Defined Hunting Area

Pre-Defined Hunting Area	Percentage of Caribou Subsistence Use Areas											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Nigliq Channel	89%	38%	55%	53%	61%	54%	45%	52%	40%	53%	35%	52%
East Channel Colville	76%	70%	59%	54%	74%	53%	59%	79%	47%	38%	50%	60%
Other Colville Delta	0%	50%	100%	100%	100%	100%	0%	-	-	0%	60%	57%
Fish Creek	60%	61%	27%	27%	50%	35%	58%	63%	75%	50%	71%	52%
Coastal West	50%	-	14%	-	60%	25%	-	-	-	-	-	37%
Coastal East	50%	100%	40%	50%	100%	-	33%	50%	29%	-	-	56%
Itqiliq River	80%	43%	34%	55%	35%	50%	55%	74%	61%	64%	52%	55%
Ocean Point	96%	85%	76%	65%	68%	60%	71%	66%	62%	56%	58%	69%
Sentinel Hill	95%	88%	81%	64%	70%	58%	79%	72%	66%	68%	70%	74%
Colville River South	90%	88%	84%	52%	71%	52%	83%	75%	73%	59%	73%	73%
West of Nuiqsut	74%	77%	70%	71%	70%	69%	76%	70%	63%	69%	59%	70%
Other	100%	56%	83%	33%	0%	80%	83%	100%	100%	100%	40%	71%
Any Area	78%	61%	58%	55%	64%	54%	61%	65%	53%	57%	52%	60%

Stephen R. Braund & Associates, 2021.

Table D-5: Percentage of Successful Subsistence Use Areas, Roads

Hunting Area	Percentage of Caribou Subsistence Use Areas											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Roads								55%	67%	65%	56%	60%
Total Road Subsistence Use Areas								20	33	34	36	

Stephen R. Braund & Associates, 2021.

Table D-6: Caribou Hunting Typical Duration

Typical Duration	Percentage of Caribou Subsistence Use Areas											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
More than 2 weeks	0%	1%	0%	0%	0%	2%	1%	0%	0%	0%	0%	0%
1-2 Weeks	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
2-6 Nights	7%	15%	7%	8%	9%	10%	6%	6%	2%	6%	2%	7%
1 Night	5%	2%	2%	1%	2%	4%	3%	1%	2%	2%	1%	2%
Same Day	87%	81%	90%	90%	88%	84%	91%	93%	96%	91%	95%	90%
Number of Subsistence Use Areas	135	176	212	193	209	196	190	153	190	233	176	

Stephen R. Braund & Associates, 2021.

Table D-7: Caribou Hunting Longest Trip Duration

Typical Duration	Percentage of Caribou Subsistence Use Areas											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
More than 2 weeks	1%	2%	0%	0%	1%	2%	1%	0%	0%	0%	0%	1%
1-2 Weeks	3%	6%	4%	3%	2%	2%	2%	2%	1%	1%	1%	2%
2-6 Nights	20%	24%	12%	12%	11%	14%	9%	10%	7%	6%	4%	12%
1 Night	6%	5%	4%	4%	2%	8%	4%	3%	4%	5%	2%	4%
Same Day	70%	63%	80%	81%	85%	74%	85%	86%	88%	88%	93%	81%
Number of Subsistence Use Areas	97	163	211	193	208	196	188	153	190	233	177	

Stephen R. Braund & Associates, 2021.

Table D-8: Caribou Hunting Number of Trips

Number of Trips	Percentage of Caribou Subsistence Use Areas											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
20+ trips	8%	5%	9%	7%	4%	7%	7%	8%	5%	8%	5%	7%
6-20 trips	27%	27%	21%	28%	16%	19%	21%	20%	23%	19%	22%	22%
4-5 trips	21%	20%	19%	15%	15%	13%	17%	15%	21%	12%	13%	16%
2-3 trips	25%	26%	27%	29%	34%	28%	27%	28%	29%	31%	29%	28%
1 trip	18%	23%	24%	21%	32%	33%	28%	29%	21%	30%	31%	26%
Number of Subsistence Use Areas	132	183	212	193	210	196	204	153	192	230	170	

Stephen R. Braund & Associates, 2021.

Table D-9: Percentage of Respondents Reporting Changes in Harvest Activities

Type of Change	Percentage of Respondents											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Hunting Area Changed	31%	28%	39%	34%	36%	40%	28%	38%	38%	42%	37%	36%
Frequency Changed	50%	77%	65%	60%	63%	67%	70%	67%	73%	71%	63%	66%
Duration Changed	39%	32%	21%	21%	23%	26%	39%	28%	40%	47%	45%	33%
Months Changed	19%	15%	12%	21%	21%	18%	11%	20%	22%	16%	17%	17%
Harvest Amount Changed	75%	85%	68%	72%	54%	63%	82%	57%	81%	76%	78%	72%
Note: Denominators are the number of respondents for which responses were ascertained, and vary by type of change. Denominators for each study year and type of change are provided in subsequent tables.												

Stephen R. Braund & Associates, 2021.

Table D-10: Percentage of Respondents Reporting Not Harvesting Enough Caribou

	Percentage of Respondents											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Reported Did Not Harvest Enough	47 %	53 %	21 %	16 %	41 %	54 %	32 %	22 %	40 %	41 %	43 %	37%

Stephen R. Braund & Associates, 2021.

Table D-11: Type of Change in Harvest Amount

Type of Harvest Amount Change	Percentage of Respondents											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Harvest More	11%	15%	21%	17%	9%	9%	30%	16%	23%	15%	16%	17%
Harvest Less	64%	70%	47%	55%	45%	54%	53%	41%	58%	61%	61%	55%
Harvest the same	25%	15%	32%	28%	46%	37%	18%	43%	19%	24%	22%	28%
Number of Respondents	36	53	57	58	56	57	57	51	52	62	49	

Stephen R. Braund & Associates, 2021.

Table D-12: Reasons for Decrease in Harvest Amount

Type of Harvest Amount Change	Percentage of Respondents											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Harvest More	11%	15%	21%	17%	9%	9%	30%	16%	23%	15%	16%	17%
Harvest Less	64%	70%	47%	55%	45%	54%	53%	41%	58%	61%	61%	55%
Harvest the same	25%	15%	32%	28%	46%	37%	18%	43%	19%	24%	22%	28%
Number of Respondents	36	53	57	58	56	57	57	51	52	62	49	

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Table D-13: Reasons for Increase in Harvest Amount

Causes	Number and Percentage of Observations											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Personal Factors Total	**4**	**6**	**6**	**7**	**2**	**1**	**10**	**3**	**6**	**5**	**6**	**56**
	80 %	**75 %**	**50 %**	**58 %**	**50 %**	**33 %**	**59 %**	**38 %**	**55 %**	**56 %**	**86 %**	**58%**
Take More Trips	1	3	2				4	2	1	2	3	18
Personal Reasons	2	2	1	5			2		3	1	1	17
Better Transportation/Equipment			1			1	2	1	2		1	8
Change in Subsistence Dependents	1		1	1	1					1	1	6

Causes	Number and Percentage of Observations											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
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**	**1**	**27**
	20 %	**25 %**	**42 %**	**33 %**	**50 %**	**67 %**	**18 %**	**38 %**	**27 %**	**11 %**	**14 %**	**28%**
Resource Availability		2	2	4	2	1	2	1	3		1	18
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
Hunting Success - General Total	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**2**	**0**	**3**	**0**	**7**
	0%	**0%**	**8%**	**0%**	**0%**	**0%**	**6%**	**25 %**	**0%**	**33 %**	**0%**	**7%**
Better Success			1				1	2		3		7
Don't Know Total	**0**	**0**	**0**	**1**	**0**	**0**	**2**	**0**	**1**	**0**	**0**	**4**
	0%	**0%**	**0%**	**8%**	**0%**	**0%**	**12 %**	**0%**	**9%**	**0%**	**0%**	**4%**
I Do Not Know				1			2		1			4
Environmental Factors Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**9%**	**0%**	**0%**	**1%**
Decrease in Predators									1			1
Resource Health Total	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**6%**	**0%**	**0%**	**0%**	**0%**	**1%**
Increase in Resource Size							1					1
Grand Total	**5**	**8**	**12**	**12**	**4**	**3**	**17**	**8**	**11**	**9**	**7**	**96**

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Table D-14: Type of Change in Trip Frequency

Type of Trip Frequency Change	Percentage of Respondents											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Take More Trips	25%	36%	32%	24%	27%	25%	30%	25%	37%	26%	29%	29%
Take Fewer Trips	25%	42%	33%	34%	36%	42%	40%	42%	37%	45%	33%	37%
Take Same # of Trips	50%	23%	35%	41%	38%	33%	30%	33%	27%	29%	38%	34%
Number of Respondents	36	53	57	58	56	57	57	52	52	62	48	

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Table D-15: Reasons for Decrease in Trip Frequency

Type of Trip Frequency Change	Percentage of Respondents											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Take More Trips	25%	36%	32%	24%	27%	25%	30%	25%	37%	26%	29%	29%
Take Fewer Trips	25%	42%	33%	34%	36%	42%	40%	42%	37%	45%	33%	37%
Take Same # of Trips	50%	23%	35%	41%	38%	33%	30%	33%	27%	29%	38%	34%
Number of Respondents	36	53	57	58	56	57	57	52	52	62	48	

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Table D-16: Reasons for Increase in Trip Frequency

Causes	Number and Percentage of Observations											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Personal Factors Total	**1**	**6**	**16**	**9**	**10**	**8**	**13**	**5**	**10**	**6**	**11**	**95**
	8%	**35%**	**80%**	**60%**	**63%**	**47%**	**76%**	**50%**	**56%**	**43%**	**85%**	**56%**
Personal Reasons		6	7	7	5	3	6	3	6	4	6	53
Better Transportation/Equipment			7	2	1	2	5	1	2		4	24
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	2
Use Area Changed					1							1
Resource Distribution or Migration Total	**6**	**7**	**4**	**4**	**4**	**7**	**2**	**3**	**5**	**7**	**2**	**51**
	50%	**41%**	**20%**	**27%**	**25%**	**41%**	**12%**	**30%**	**28%**	**50%**	**15%**	**30%**
Resource Availability	4	7	2	4	3	6	2	2	5	6	2	43
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**	**0**	**9**
	25%	**12%**	**0%**	**0%**	**13%**	**6%**	**6%**	**0%**	**0%**	**0%**	**0%**	**5%**
Traffic Disturbance	1	1				1						3
Development	2	1										3
Helicopter Traffic Disturbance					1		1					2
Airplane Traffic Disturbance					1							1
Environmental Factors Total	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**3**
	0%	**0%**	**0%**	**7%**	**0%**	**6%**	**0%**	**0%**	**6%**	**0%**	**0%**	**2%**
Increase in predators						1			1			2

Causes	Number and Percentage of Observations											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Weather				1								1
Don't Know Total	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
	0%	**6%**	**0%**	**7%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**1%**
I Do Not Know		1		1								2
Development	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**2**
Infrastructure Total	**8%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**6%**	**0%**	**0%**	**1%**
Roads/Ice Roads									1			1
Pipeline	1											1
Economic Factors Total	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**2**
	8%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**10%**	**0%**	**0%**	**0%**	**1%**
Mitigation Funds	1							1				2
Resource Behavior Total	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**6%**	**0%**	**0%**	**0%**	**0%**	**1%**
Skittish Behavior in Species							1					1
Hunting Success - General	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**2**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**10%**	**6%**	**0%**	**0%**	**1%**
Worse Success									1			1
Reduced Harvest Opportunities								1				1
Competition or Hunting	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
Pressure Total	**0%**	**6%**	**0%**	**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**	**0**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**7%**	**0%**	**1%**
Miscellaneous										1		1
Grand Total	**12**	**17**	**20**	**15**	**16**	**17**	**17**	**10**	**18**	**14**	**13**	**169**

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Table D-17: Type of Change in Trip Duration

Type of Trip Duration Change	Percentage of Respondents											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Take Longer Trips	33%	25%	9%	12%	13%	16%	19%	8%	29%	35%	29%	21%
Take Shorter Trips	6%	8%	12%	7%	11%	11%	19%	20%	12%	11%	16%	12%
Take Same Duration Trips	61%	68%	79%	81%	77%	74%	61%	72%	60%	53%	55%	67%
Number of Respondents	36	53	57	58	56	57	57	50	52	62	49	

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Table D-18: Reasons for Taking Longer Trips

Causes	Number and Percentage of Observations											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Resource Distribution or Migration Total	**10**	**5**	**1**	**4**	**5**	**8**	**8**	**1**	**2**	**19**	**4**	**67**
	63 %	**56 %**	**20 %**	**57 %**	**63 %**	**73 %**	**73 %**	**25 %**	**17 %**	**68 %**	**36 %**	**55%**
Resource Availability	4	3		3	2	6	4		2	7	3	34
Farther from Riversides/Farther Inland		1			1	2	4			2		10
Travel Farther to Harvest Resource	1	1	1	1	1			1		5	1	12
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**	**6**	**39**
	0%	**33 %**	**60 %**	**43 %**	**38 %**	**27 %**	**27 %**	**50 %**	**67 %**	**18 %**	**55 %**	**32%**
Personal Reasons		3	3	3	1	1	3	2	7	3	4	30
Better Transportation/Equipment					1	1					2	4
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**	**0**	**6**
	31 %	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**4%**	**0%**	**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**	**0**	**2**
	6%	**0%**	**20 %**	**0%**	**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**	**0**	**4**
	0%	**11 %**	**0%**	**0%**	**0%**	**0%**	**0%**	**25 %**	**0%**	**7%**	**0%**	**3%**
Increased Cost of Living/Expenses		1						1		2		4
Development Infrastructure Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**3**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**8%**	**4%**	**9%**	**2%**
Roads/Ice Roads									1	1	1	3
Environmental Factors Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**8%**	**0%**	**0%**	**1%**
Weather									1			1
Grand Total	**16**	**9**	**5**	**7**	**8**	**11**	**11**	**4**	**12**	**28**	**11**	**122**

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Table D-19: Reasons for Taking Shorter Trips

Causes	Number and Percentage of Observations											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Personal Factors Total	**2**	**2**	**6**	**3**	**5**	**3**	**2**	**2**	**6**	**4**	**2**	**37**
	100 %	**100 %**	**86 %**	**60 %**	**56 %**	**50 %**	**22 %**	**20 %**	**86 %**	**50 %**	**29 %**	**51%**
Personal Reasons	1		5	2	4	1		1	3	2	1	20
Employment/Lack of Time	1	1			1	1	1		2		1	8
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**	**2**	**17**
	0%	**0%**	**14 %**	**20 %**	**22 %**	**17 %**	**33 %**	**50 %**	**0%**	**25 %**	**29 %**	**24%**
Resource Availability			1	1	2	1	2	3		1	2	13
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**	**0**	**8**
	0%	**0%**	**0%**	**0%**	**11 %**	**33 %**	**22 %**	**20 %**	**0%**	**13 %**	**0%**	**11%**
Increased Cost of Living/Expenses					1	2	2	2		1		8
Environmental Factors Total	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	**0**	**0**	**2**	**5**
	0%	**0%**	**0%**	**0%**	**11 %**	**0%**	**11 %**	**10 %**	**0%**	**0%**	**29 %**	**7%**
Weather							1				2	3
More Rain					1							1
Rain								1				1
Hunting Success - General	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**2**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**11 %**	**0%**	**0%**	**13 %**	**0%**	**3%**
Better Success							1			1		2
Development Infrastructure Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**2**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**14 %**	**0%**	**14 %**	**3%**
Roads/Ice Roads									1		1	2
Don't Know Total	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
	0%	**0%**	**0%**	**20 %**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**1%**
I Do Not Know				1								1
Grand Total	**2**	**2**	**7**	**5**	**9**	**6**	**9**	**10**	**7**	**8**	**7**	**72**

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Table D-20: Type of Change in Use Areas

Type of Use Area Change	Percentage of Respondents											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Use Area Changed	6%	19%	14%	29%	29%	28%	16%	15%	7%	2%	9%	16%
Smaller Hunting Area	11%	0%	11%	0%	4%	0%	4%	8%	5%	5%	2%	4%
Expanded Use Area	0%	0%	7%	0%	4%	11%	7%	2%	7%	0%	0%	3%
Travel Farther to Harvest Resource	14%	4%	5%	2%	0%	0%	0%	6%	0%	6%	2%	4%
Utilizing New or Different Areas	0%	0%	2%	0%	0%	0%	2%	6%	19%	29%	13%	6%
Changing of Timing of Hunt	0%	2%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
Personal Reasons	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Take Fewer Trips	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Change in Harvest Methods	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%
Move to Different Areas	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
No Change in Use Area	69%	70%	61%	67%	64%	60%	72%	63%	62%	58%	63%	65%
Number of Respondents	36	53	57	58	56	57	57	52	42	62	46	

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Table D-21: Reasons for a Change in Use Area

Causes	Number and Percentage of Observations											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Personal Factors Total	**4**	**4**	**19**	**15**	**13**	**12**	**8**	**7**	**8**	**3**	**8**	**101**
	24 %	**25 %**	**83 %**	**68 %**	**46 %**	**44 %**	**40 %**	**37 %**	**47 %**	**11 %**	**40 %**	**43%**
Personal Reasons	1	1	10	11	6	3	2	4	1	3	3	45
Lack of Transportation/Equipment	2	2	5	4	3	4	2	2	2		2	28
Better Transportation/Equipment			4		1	3	1	1	3		2	15
Employment/Lack of Time	1	1				2			1			5
Change in Transportation Method					1		3				1	5
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**	**2**	**58**
	35 %	**44 %**	**9%**	**9%**	**43 %**	**30 %**	**20 %**	**21 %**	**12 %**	**32 %**	**10 %**	**24%**
Resource Availability	1	2		1	4	8	3	3	2	6	2	32
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
Harvest Resource Closer to Community					1							1

Causes	Number and Percentage of Observations											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
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**	**2**	**33**
	6%	**19 %**	**9%**	**18 %**	**7%**	**7%**	**15 %**	**21 %**	**24 %**	**21 %**	**10 %**	**14%**
Shallower Rivers/Lakes			1	3		1	2	1	1	2		11
River Channel Changed						1		3	3	4	2	13
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**	**1**	**18**
	24 %	**6%**	**0%**	**5%**	**4%**	**19 %**	**15 %**	**11 %**	**0%**	**0%**	**5%**	**8%**
Development	1	1		1	1	1	2				1	8
Helicopter Traffic Disturbance	1					1	1					3
Traffic Disturbance	1					2						3
Disturbance								2				2
Airplane Traffic Disturbance	1											1
Air Traffic						1						1
Development Infrastructure Total	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**8**	**4**	**17**
	12 %	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**18 %**	**29 %**	**20 %**	**7%**
Roads/Ice Roads	1								3	8	4	16
Pipeline	1											1
Don't Know	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**2**	**0**	**0**	**3**	**6**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**5%**	**11 %**	**0%**	**0%**	**15 %**	**3%**
I Do Not Know							1	2			3	6
Economic Factors Total	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**3**
	0%	**6%**	**0%**	**0%**	**0%**	**0%**	**5%**	**0%**	**0%**	**4%**	**0%**	**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**	**0**	**1**
	0%	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**4%**	**0%**	**0%**
Sport Hunting and Fishing										1		1
Grand Total	**17**	**16**	**23**	**22**	**28**	**27**	**20**	**19**	**17**	**28**	**20**	**237**

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Table D-22: Type of Change in Months of Harvest by Type of Change

Type of Hunting Month Change	Percentage of Respondents											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Later Hunting Season	11%	0%	5%	0%	0%	0%	2%	2%	2%	0%	0%	2%
Earlier Hunting Season	0%	0%	0%	0%	2%	2%	2%	2%	0%	0%	0%	1%
Harvest Season Changed	8%	15%	7%	21%	20%	16%	7%	14%	20%	16%	17%	15%
Harvest Season Same	81%	85%	88%	79%	79%	82%	89%	82%	78%	84%	83%	83%
Number of Respondents	36	53	57	58	56	57	57	50	51	61	48	

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Table D-23: Reasons Given for a Change in Harvest Season

Causes	Number and Percentage of Observations											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
Personal Factors Total	**4**	**5**	**5**	**12**	**8**	**7**	**4**	**7**	**3**	**5**	**6**	**66**
	57 %	**63 %**	**71 %**	**86 %**	**67 %**	**70 %**	**67 %**	**88 %**	**38 %**	**50 %**	**75 %**	**67%**
Lack of Transportation/Equipment	2	2	2	3	6	3	1			1	2	22
Personal Reasons		2		7	1	1	2	4	2	1	3	23
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	2
Change in transportation method									1			1
Resource Distribution or Migration Total	**3**	**2**	**2**	**1**	**2**	**1**	**1**	**0**	**2**	**3**	**1**	**18**
	43 %	**25 %**	**29 %**	**7%**	**17 %**	**10 %**	**17 %**	**0%**	**25 %**	**30 %**	**13 %**	**18%**
Resource Availability		2	1		2	1	1		2			9
Later Migration/Arrival	3										1	4
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**	**0**	**5**
	0%	**0%**	**0%**	**0%**	**17 %**	**10 %**	**0%**	**0%**	**25 %**	**0%**	**0%**	**5%**
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**	**0**	**1**
	0%	**13 %**	**0%**	**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**

Causes	Number and Percentage of Observations											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	All Years
	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	0	1
	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%	1%
Better Success						1						1
Development Infrastructure	0	0	0	0	0	0	0	1	0	2	1	4
	0%	0%	0%	0%	0%	0%	0%	13%	0%	20%	13%	4%
Roads/Ice Roads								1		2	1	4
Economic Factors	0	0	0	0	0	0	0	0	1	0	0	1
	0%	0%	0%	0%	0%	0%	0%	0%	13%	0%	0%	1%
Increased cost of living/expenses									1			1
Grand Total	7	8	7	14	12	10	6	8	8	10	8	98

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APPENDIX E: TABLES AND FIGURES, INDIVIDUAL STUDY YEARS 2008-2019

Table E-1: Respondents' Residence at Time of Birth

Study Year	Percentage of Respondents				Total
	Nuiqsut	Other North Slope Community	Elsewhere in Alaska	Outside Alaska	
2008	25%	64%	8%	3%	36
2009	40%	46%	10%	4%	52
2010	32%	51%	14%	4%	57
2011	41%	48%	9%	2%	58
2012	44%	42%	11%	4%	57
2013	47%	42%	11%	0%	55
2014	44%	44%	12%	0%	59
2015	40%	48%	10%	2%	58
2016	52%	34%	13%	0%	61
2017	43%	37%	19%	0%	67
2018	40%	42%	18%	0%	50
2019	59%	27%	14%	0%	22
All Years	42%	44%	12%	1%	158

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Table E-2: Respondents' Decade of Birth

Study Year	Percentage of Respondents							Total
	1940s	1950s	1960s	1970s	1980s	1990s	2000s	
2008	6%	17%	33%	19%	22%	3%	0%	36
2009	10%	12%	19%	15%	31%	13%	0%	52
2010	0%	16%	26%	16%	25%	18%	0%	57
2011	2%	10%	19%	16%	33%	21%	0%	58
2012	2%	16%	19%	11%	32%	19%	2%	57
2013	4%	11%	22%	9%	35%	18%	2%	55
2014	2%	14%	24%	8%	24%	25%	3%	59
2015	2%	14%	26%	12%	31%	16%	0%	58
2016	3%	15%	19%	5%	37%	21%	0%	62
2017	1%	13%	25%	6%	29%	25%	0%	68
2018	0%	12%	28%	8%	30%	22%	0%	50
2019	0%	9%	18%	14%	41%	18%	0%	22
All Years	3%	13%	23%	12%	31%	18%	1%	159

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Table E-3: Respondents' Gender

Study Year	Percentage of Respondents		Total
	Male	Female	
2008	97%	3%	36
2009	91%	9%	53
2010	96%	4%	57
2011	95%	5%	58
2012	95%	5%	57
2013	86%	14%	57

Study Year	Percentage of Respondents		Total
	Male	Female	
2014	90%	10%	60
2015	88%	12%	58
2016	71%	29%	63
2017	69%	31%	68
2018	70%	30%	50
2019	86%	14%	22
All Years	86%	14%	163

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Table E-4: Percentage of Respondents by Pre-Defined Hunting Area

Study Year	Percentage of Respondents												
	Nigliq Channel	East Channel Colville	Other Colville Delta	Fish Creek	Coastal West	Coastal East	Itqiliq River	Ocean Point	Sentinel Hill	Colville River South	West of Nuiqsut	Other	Number of Harvesters
2008	75%	47%	3%	42%	14%	11%	42%	67%	58%	28%	69%	6%	36
2009	72%	47%	8%	34%	6%	9%	40%	85%	74%	45%	53%	17%	53
2010	63%	53%	7%	23%	5%	9%	42%	79%	67%	54%	65%	19%	57
2011	74%	47%	2%	19%	3%	3%	38%	90%	48%	36%	53%	3%	58
2012	68%	54%	4%	7%	9%	4%	42%	79%	60%	42%	60%	5%	57
2013	65%	51%	5%	32%	7%	4%	30%	75%	63%	53%	53%	7%	57
2014	53%	48%	2%	18%	8%	5%	30%	82%	53%	38%	60%	20%	60
2015	41%	31%	0%	14%	0%	3%	33%	76%	47%	28%	64%	2%	58
2016	52%	46%	0%	13%	2%	11%	43%	75%	44%	17%	57%	2%	63
2017	54%	34%	1%	9%	0%	4%	43%	85%	46%	25%	62%	6%	68
2018	40%	48%	8%	14%	2%	4%	48%	72%	48%	24%	74%	14%	50
2019	50%	36%	0%	9%	0%	0%	27%	50%	27%	5%	68%	0%	22
All Years	59%	45%	3%	19%	5%	6%	38%	76%	53%	33%	61%	8%	

Notes: Pre-Defined Hunting areas used by respondents identified post-interview based on reported subsistence use areas for 2008-2018 and by respondents in the interview starting in 2019.

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Table E-5: Percentage of Respondents Using Roads

Study Year	Percentage/Number of Respondents	
	Roads	Number of Harvesters
2008		
2009		
2010		
2011		
2012		
2013		
2014		

Study Year	Percentage/Number of Respondents	
	Roads	Number of Harvesters
2015	33%	58
2016	46%	63
2017	43%	68
2018	62%	50
2019	59%	22
All Years	49%	-
Notes: Road use by respondents identified post-interview based on reported use areas for 2015-2018 and by respondents in the interview starting in 2019.		

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Table E-6: Percentage of Caribou Subsistence Use Areas Reported by Month

Study Year	Percentage of Subsistence Use Areas												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2008	4%	7%	7%	4%	4%	16%	58%	52%	15%	14%	8%	7%	137
2009	3%	3%	2%	2%	2%	33%	56%	41%	17%	3%	2%	2%	187
2010	5%	9%	7%	3%	3%	24%	52%	51%	28%	4%	6%	4%	215
2011	3%	4%	3%	2%	2%	25%	46%	53%	21%	5%	4%	3%	194
2012	1%	2%	2%	0%	1%	15%	42%	51%	24%	5%	1%	1%	211
2013	1%	1%	1%	2%	2%	21%	51%	44%	16%	4%	1%	1%	196
2014	4%	2%	3%	0%	1%	18%	50%	48%	27%	6%	7%	4%	206
2015	2%	2%	1%	3%	3%	20%	53%	51%	25%	6%	1%	1%	153
2016	5%	8%	7%	6%	4%	20%	55%	49%	19%	8%	6%	4%	195
2017	2%	4%	3%	3%	3%	21%	53%	45%	26%	7%	2%	2%	233
2018	3%	3%	1%	1%	2%	24%	53%	41%	19%	6%	3%	1%	177
2019	0%	2%	4%	0%	2%	19%	46%	65%	30%	7%	5%	4%	22
All Years	3%	4%	3%	2%	2%	21%	51%	49%	22%	6%	4%	3%	

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Table E-7: Percentage of Hunting Trips by Month

Study Year	Percentage of Trips												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2019	0.0%	0.3%	1%	0.0%	0.0%	10%	27%	39%	16%	3%	1%	0.3%	309

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Table E-8: Percentage of Caribou Harvested by Month

Study Year	Percentage of Caribou Harvested												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2008	1%	2%	2%	2%	0%	8%	33%	36%	8%	4%	3%	2%	397
2009	0%	1%	1%	1%	0%	12%	37%	26%	15%	1%	4%	1%	277
2010	2%	3%	3%	1%	0%	10%	25%	32%	18%	4%	3%	2%	394
2011	0%	3%	0%	0%	1%	13%	24%	24%	23%	10%	2%	0%	358
2012	0%	1%	1%	0%	1%	15%	27%	30%	16%	7%	1%	0%	408
2013	3%	1%	1%	0%	0%	10%	35%	32%	14%	2%	1%	0%	272
2014	5%	5%	1%	0%	0%	10%	24%	23%	13%	5%	8%	5%	705

2015	6%	1%	0%	1%	1%	9%	22%	21%	29%	9%	1%	1%	463
2016	5%	2%	5%	3%	0%	10%	27%	28%	12%	5%	3%	1%	263
2017	1%	5%	0%	1%	1%	9%	29%	25%	17%	6%	0%	4%	281
2018	1%	1%	0%	0%	9%	9%	31%	28%	14%	2%	5%	0%	262
2019	0%	1%	8%	0%	1%	9%	29%	29%	17%	1%	4%	0%	109
All Years	2%	2%	2%	1%	1%	10%	29%	28%	16%	5%	3%	1%	
Notes: While one active harvester reported harvesting caribou during a timeframe from June to December, they were unable to identify the number of caribou harvested during each individual month. Therefore, these data are not shown on this figure even though the harvest polygon is shown on maps depicting harvest by month.													

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Table E-9: Travel Search Method

Study Year	Percentage of Subsistence Use Areas				Total
	Boat	Snowmachine	Four-wheeler	Truck	
2008	74%	22%	4%	2%	137
2009	80%	9%	9%	2%	187
2010	74%	16%	9%	0.5%	215
2011	80%	12%	9%	0%	194
2012	74%	8%	17%	1%	211
2013	77%	10%	11%	1%	196
2014	70%	15%	14%	1%	206
2015	65%	8%	18%	8%	153
2016	69%	6%	13%	14%	195
2017	70%	6%	16%	11%	233
2018	66%	9%	13%	14%	177
2019	60%	4%	26%	12%	57
All Years	72%	10%	13%	6%	

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Table E-10: Travel Access Method

Study Year	Percentage of Subsistence Use Areas					Total
	No Access	Boat	Snowmachine	Four-wheeler	Truck	
2019	93%	0%	0%	2%	4%	57

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Table E-11: Boat Use by Month

Study Year	Percentage of Subsistence Use Areas												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2008					2%	16%	56%	50%	10%	3%			137
2009					2%	32%	53%	38%	11%	0%			187
2010					2%	22%	49%	46%	21%	1%			215
2011					2%	23%	44%	47%	13%	0%			194
2012					1%	13%	39%	43%	16%	1%			211
2013					1%	19%	48%	39%	10%	0%			196
2014					0.5%	17%	47%	42%	19%	0.5%			206
2015					1%	17%	44%	39%	12%	1%			153
2016					1%	15%	45%	41%	12%	2%			195
2017					2%	18%	47%	35%	12%	1%			233
2018					0%	19%	42%	30%	8%	1%			177
2019					0%	11%	32%	35%	7%	0%			57
All Years					1%	18%	45%	40%	13%	1%			

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Table E-12: Snowmachine Use by Month

Study Year	Percentage of Subsistence Use Areas												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2008	2%	5%	5%	2%	1%			0%	4%	11%	8%	5%	137
2009	2%	3%	1%	1%	0%			0%	1%	3%	2%	2%	187
2010	5%	8%	7%	3%	1%			0%	1%	2%	5%	4%	215
2011	3%	4%	3%	2%	0%			0%	4%	4%	4%	3%	194
2012	1%	1%	1%	0.5%	0%			0.5%	1%	2%	1%	1%	211
2013	1%	1%	1%	2%	1%			0%	2%	3%	1%	1%	196
2014	3%	2%	3%	0%	0.5%			0%	2%	2%	6%	4%	206
2015	2%	2%	1%	2%	0%			1%	3%	1%	1%	1%	153
2016	2%	2%	2%	2%	0%			%	2%	1%	1%	1%	195
2017	1%	3%	2%	1%	0.4%			0.4%	1%	1%	0%	1%	233
2018	2%	2%	1%	1%	1%			0%	2%	1%	2%	0%	177
2019	0%	0%	2%	0%	0%			0%	0%	0%	2%	0%	57
All Years	2%	3%	2%	1%	0%			0%	2%	3%	3%	2%	

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Table E-13: Four-wheeler Use by Month

Study Year	Percentage of Subsistence Use Areas												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2008	0%	0%	0%	0%	0%	0%	1%	1%	1%	0%	0%	0%	137
2009	0%	0%	0%	0%	0%	1%	2%	3%	5%	1%	0%	0%	187
2010	0%	0%	0%	0%	0%	2%	2%	5%	6%	1%	1%	0%	215
2011	0%	0%	0%	0%	1%	2%	1%	6%	4%	1%	0%	0%	194
2012	0%	0.5%	0%	0%	0.5%	1%	3%	8%	6%	2%	0%	0%	211
2013	0%	0%	0%	1%	0%	3%	4%	5%	4%	1%	0%	0%	196
2014	0%	0%	0%	0.5%	0%	1%	3%	5%	6%	4%	1%	0%	206

Study Year	Percentage of Subsistence Use Areas												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2015	0%	0%	0%	1%	1%	3%	7%	9%	7%	2%	0%	0%	153
2016	2%	2%	1%	2%	2%	2%	3%	4%	5%	3%	4%	2%	195
2017	0%	0%	0%	0%	0%	1%	3%	5%	8%	3%	0%	0%	233
2018	0%	0%	0%	0%	1%	2%	4%	5%	5%	1%	0%	0%	177
2019	0%	0%	0%	0%	0%	4%	9%	25%	18%	4%	2%	2%	57
All Years	0.2%	0.2%	0.1%	0.3%	0.4%	1.7%	3.5%	6.6%	6.1%	1.7%	0.6%	0.3%	

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Table E-14: Truck Use by Month

Study Year	Percentage of Subsistence Use Areas												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2008	1%	2%	2%	1%	1%	0%	0%	0%	0%	0%	0%	1%	137
2009	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	187
2010	0%	0.5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	215
2011	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	194
2012	0%	0%	0.5%	0%	0%	0%	0.5%	0%	0%	0%	0%	0%	211
2013	0%	1%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	196
2014	0.5%	0%	0%	0%	0%	0%	0%	0.5%	0%	0%	0%	0%	206
2015	0%	0%	0%	1%	0%	1%	3%	3%	2%	2%	0%	0%	153
2016	3%	5%	4%	4%	2%	4%	7%	5%	2%	2%	3%	2%	195
2017	1%	2%	2%	2%	2%	3%	3%	6%	6%	4%	1%	1%	233
2018	2%	2%	1%	1%	1%	4%	6%	6%	5%	4%	1%	1%	177
2019	0%	2%	2%	0%	2%	5%	7%	7%	7%	4%	2%	2%	57
All Years	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%	

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Table E-15: Percentage of Caribou Use Areas in Which Respondents Reported Successful Harvests

Study Year	Subsistence Use Areas		
	Yes (Successful)	No (Unsuccessful)	Number of Use Areas
2008	78%	22%	137
2009	61%	39%	187
2010	58%	42%	215
2011	55%	45%	194
2012	64%	36%	211
2013	54%	46%	196
2014	61%	39%	206
2015	65%	35%	153
2016	53%	47%	195
2017	57%	43%	233
2018	52%	48%	177
2019	72%	28%	57
All Years	61%	39%	

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Table E-16: Mean Number of Caribou Harvested Per Harvest Location and Subsistence Use Area

Study Year	Mean # Caribou Harvested Per Harvest Location	Number of Harvest Locations	Mean # Caribou Harvested by Subsistence Use Area	Number of Subsistence Use Areas
2008	2	182	2.7	137
2009	1.8	152	1.5	187
2010	1.9	196	1.7	215
2011	2	162	1.7	194
2012	1.8	195	1.6	211
2013	1.9	143	1.4	196
2014	2.2	248	2.7	206
2015	2.3	173	2.6	153
2016	1.9	163	1.6	195
2017	1.6	190	1.3	233
2018	1.7	149	1.4	177
2019	2.8	60	2.9	57
All Years	1.99	2013	1.93	2161

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Table E-17: Percentage of Caribou Harvest Locations by Caribou Pre-Defined Hunting Area

Study Year	Percentage of Caribou Harvest Locations												
	Nigliq Channel	East Channel	Other Colville	Fish Creek	Coastal West	Coastal East	Itqiliq River	Ocean Point	Sentinel Hill	Colville River	West of Nuiqsut	Other	Total Harvest Locations
2008	19%	8%	2%	8%	1%	3%	7%	22%	9%	4%	14%	3%	182
2009	18%	7%	1%	5%	0%	0%	3%	19%	8%	9%	15%	1%	152
2010	16%	8%	2%	1%	1%	1%	4%	21%	8%	10%	22%	6%	196
2011	17%	10%	1%	2%	0%	1%	7%	19%	8%	4%	30%	1%	162
2012	15%	17%	1%	1%	2%	1%	5%	16%	6%	6%	31%	1%	195
2013	22%	13%	1%	3%	1%	0%	6%	6%	8%	10%	26%	3%	143
2014	8%	9%	0%	4%	0%	0%	8%	13%	6%	8%	37%	8%	248
2015	9%	8%	1%	3%	0%	0%	6%	17%	6%	4%	43%	2%	173
2016	12%	9%	1%	7%	0%	1%	11%	17%	9%	2%	30%	2%	163
2017	18%	5%	0%	2%	0%	0%	12%	15%	7%	7%	28%	6%	190
2018	9%	10%	2%	3%	0%	0%	11%	10%	5%	7%	41%	3%	150
2019	13%	8%	0%	5%	0%	0%	2%	13%	7%	0%	48%	3%	60
All Years	15%	9%	1%	4%	0%	1%	7%	16%	7%	6%	30%	3%	

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Table E-18: Percentage of Caribou Harvests by Caribou Pre-Defined Hunting Area, 2008-2019

Study Year	Percentage of Total Caribou Harvests												
	Nigliq Channel	East Channel	Other Colville	Fish Creek	Coastal West	Coastal East	Itqiliq River	Ocean Point	Sentinel Hill	Colville River South	West of Nuiqsut	Other	Total Harvest Locations
2008	23%	8%	2%	7%	1%	3%	6%	17%	9%	3%	18%	3%	368
2009	21%	8%	1%	6%	0%	0%	4%	20%	9%	11%	17%	1%	277
2010	19%	7%	2%	1%	1%	1%	3%	17%	7%	7%	30%	6%	365

Study Year	Percentage of Total Caribou Harvests												
	Nigliq Channel	East Channel	Other Colville	Fish Creek	Coastal West	Coastal East	Itqiliq River	Ocean Point	Sentinel Hill	Colville River South	West of Nuiqsut	Other	Total Harvest Locations
2011	15%	10%	1%	2%	0%	1%	4%	17%	5%	4%	40%	1%	331
2012	15%	20%	2%	1%	1%	4%	4%	12%	3%	3%	35%	0%	348
2013	25%	17%	1%	3%	1%	0%	6%	4%	5%	8%	27%	4%	272
2014	9%	11%	0%	5%	0%	0%	7%	7%	4%	10%	39%	8%	552
2015	10%	9%	0%	3%	0%	0%	5%	21%	4%	3%	43%	3%	398
2016	12%	10%	0%	5%	0%	1%	11%	12%	8%	2%	36%	3%	309
2017	17%	4%	0%	2%	0%	0%	15%	12%	5%	6%	30%	9%	310
2018	10%	8%	2%	3%	0%	0%	10%	9%	5%	5%	45%	3%	256
2019	5%	7%	0%	3%	0%	0%	1%	7%	4%	0%	65%	7%	165
All Years	15%	10%	1%	3%	0%	1%	6%	13%	6%	5%	35%	4%	

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Table E-19: Average Number of Trips per Caribou Harvested by Pre-Defined Hunting Area, 2008-2018

Study Year	Average Number of Trips per Caribou Harvested												
	Nigliq Channel	East Channel	Other Colville	Fish Creek	Coastal West	Coastal East	Itqiliq River	Ocean Point	Sentinel Hill	Colville River South	West of Nuiqsut	Other	Any Area
2008	3.3	2.8	0.1	2.5	6.7	0.8	2.0	5.6	9.1	6.0	2.2	1.8	2.7
2009	5.1	6.0	5.0	3.3	-	-	8.8	5.9	10.7	6.5	2.7	32.5	3.6
2010	5.3	6.0	5.2	12.3	15.0	3.8	10.5	5.5	13.0	9.6	2.5	2.7	3.3
2011	7.2	3.2	3.0	10.5	-	2.0	5.4	6.2	13.2	13.2	1.7	22.5	3.4
2012	6.0	1.5	1.0	4.0	2.7	0.2	5.1	6.5	19.6	13.0	1.7	14.0	2.9
2013	4.3	2.9	2.0	11.4	2.0	-	2.9	30.6	18.6	8.8	1.9	1.9	3.7
2014	4.4	3.2	0.5	2.3	-	-	2.3	9.4	11.3	4.4	1.5	2.8	2.2
2015	5.9	2.1	0.0	0.9	-	-	3.1	3.7	12.5	11.4	2.0	0.6	2.4
2016	3.2	4.1	0.0	0.9	-	21.5	3.8	8.5	7.6	15.2	3.8	2.0	3.4
2017	5.4	6.0	-	1.2	-	-	4.0	8.8	11.7	4.6	5.7	1.7	4.6
2018	2.4	6.7	2.5	3.4	-	-	5.0	13.2	20.5	10.7	3.2	7.6	3.8

Notes: For the Years 2008-2018, these data were analyzed by retroactively categorizing use areas under the 12 pre-defined hunting areas. Starting in 2019, the study team asks respondents to report the number of trips by each of the 12 hunting areas. Because of the difference in data collection methods, the 2008-2018 data are shown in a separate table from the 2019 data.

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Table E-20: Average Number of Trips per Caribou Harvested by Pre-Defined Hunting Area, 2019

Pre-Defined Hunting Area	Average Number of Trips Per Caribou Harvested
	2019
Nigliq Channel	4.3
East Channel Colville	1.2
Other Colville Delta	-
Fish Creek	0.2
Coastal West	-
Coastal East	-
Itqiliq River	7.0
Ocean Point	7.3
Sentinel Hill	4.4
Colville River South	-
West of Nuiqsut	1.4
Other	0.0
Any Area	1.9

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Table E-21: Average Number of Trips per Respondent by Pre-Defined Hunting Area, 2008-2018

Study Year	Average Number of Trips per Respondent													Number of Harvesters
	Nigliq Channel	East Channel	Other Colville	Fish Creek	Coastal West	Coastal East	Itqiliq River	Ocean Point	Sentinel Hill	Colville River South	West of Nuiqsut	Other	Roads*	Any Area	
2008	7.9	2.2	0	1.8	0.6	0.2	1.2	9.8	8.3	2	4.1	0.6		28	36
2009	5.6	2.6	0.4	1.1	0.3	1.1	2	6.1	5.2	3.7	2.4	1.2		19	53
2010	6.4	2.5	0.5	0.6	0.5	0.3	2	6.1	5.7	4.5	4.7	1.1		21.2	57
2011	6.3	1.9	0.1	1.1	0.5	0.1	1.3	5.9	4.1	2.9	3.8	0.8		19.6	58
2012	5.5	1.9	0.1	0.1	0.1	0.1	1.3	4.8	4.1	2.5	3.7	0.2		17.9	57
2013	5.2	2.3	0.1	1.4	0.1	0.2	0.8	5.9	4.6	3.6	2.5	0.3		17.8	57
2014	3.7	3.1	0	1.1	0.2	0.3	1.4	6.5	4.5	3.9	5.3	2		19.8	60
2015	3.9	1.3	0	0.2	0	0.2	1.1	5.3	3.7	2	5.8	0.1	2.7	16.7	58
2016	1.9	2	0	0.2	0.1	0.7	2	5	3	1.4	6.7	0.3	5.0	16.7	63
2017	4.1	1.1	0	0.1	0	0.3	2.6	4.8	2.9	1.3	7.9	0.7	5.8	21.2	68
2018	1.2	2.7	0.2	0.5	0	0.2	2.6	6.3	4.9	2.6	7.5	1.2	5.3	19.2	50

Notes: For the Years 2008-2018, these data were analyzed by retroactively categorizing use areas under the 12 pre-defined hunting areas. Starting in 2019, the study team asks respondents to report the number of trips by each of the 12 hunting areas. Because of the difference in data collection methods, the 2008-2018 data are shown in a separate table from the 2019 data.

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Table E-22: Average Number of Trips per Respondent by Pre-Defined Hunting Area, 2019

Pre-Defined Hunting Area	Average Number of Trips Per Harvester 2019
Nigliq Channel	1.8
East Channel Colville	0.6
Other Colville Delta	0.0
Fish Creek	0.0
Coastal West	0.0
Coastal East	0.0
Itqiliq River	0.6
Ocean Point	3.6
Sentinel Hill	1.4
Colville River South	0.0
West of Nuiqsut	6.6
Other	0.0
Roads*	5.2
Any Area **	14.0
Number of Harvesters	22

Notes:
*While roads, including ice roads, occur in the highest frequency in the area West of Nuiqsut, they are not unique to that area and can occur within any of the eleven pre-defined areas or other areas.
**Totals for pre-defined use areas do not include roads, which is a separate but comparable dataset.

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Table E-23: Percentage of Trips by Pre-Defined Hunting Area, 2008-2018

Study Year	Percentage of Trips													
	Nigliq Channel	East Channel Colville	Other Colville Delta	Fish Creek	Coastal West	Coastal East	Itqiliq River	Ocean Point	Sentinel Hill	Colville River South	West of Nuiqsut	Other	Roads*	Total Trips
2008	28%	8%	0%	6%	2%	1%	4%	35%	30%	7%	14%	2%		1,008
2009	30%	14%	2%	6%	2%	6%	10%	32%	28%	19%	13%	6%		1,005
2010	30%	12%	3%	3%	2%	1%	9%	29%	27%	21%	22%	5%		1,211
2011	32%	9%	1%	6%	2%	0%	7%	30%	21%	15%	19%	4%		1,139
2012	31%	10%	1%	1%	1%	0%	7%	27%	23%	14%	21%	1%		1,019
2013	29%	13%	0%	8%	0%	1%	4%	33%	26%	20%	14%	2%		1,014
2014	19%	16%	0%	6%	1%	2%	7%	33%	23%	19%	27%	10%		1,190
2015	23%	8%	0%	1%	0%	1%	6%	32%	22%	12%	35%	1%	16%	970
2016	11%	12%	0%	1%	0%	4%	12%	30%	18%	9%	41%	2%	30%	1,049
2017	19%	5%	0%	0%	0%	2%	13%	23%	14%	6%	37%	3%	28%	1,439
2018	6%	14%	1%	3%	0%	1%	13%	33%	26%	13%	39%	6%	28%	961

Study Year	Percentage of Trips													
	Nigliq Channel	East Channel Colville	Other Colville Delta	Fish Creek	Coastal West	Coastal East	Itqiliq River	Ocean Point	Sentinel Hill	Colville River South	West of Nuiqsut	Other	Roads*	Total Trips
All Years	24%	11%	1%	4%	1%	2%	9%	30%	23%	14%	26%	4%	25%	
*While roads, including ice roads, occur in the highest frequency in the area West of Nuiqsut, they are not unique to that area and can occur within any of the eleven pre-defined areas or other areas. **Totals for pre-defined use areas do not include roads, which is a separate but comparable dataset.														

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Table E-24: Percentage of Trips by Pre-Defined Hunting Area, 2019

Pre-Defined Hunting Area	Percentage of Trips 2019
Nigliq Channel	13%
East Channel Colville	5%
Other Colville Delta	0%
Fish Creek	0%
Coastal West	0%
Coastal East	0%
Itqiliq River	5%
Ocean Point	26%
Sentinel Hill	10%
Colville River South	0%
West of Nuiqsut	47%
Other	0%
Roads*	37%
Total Trips**	309

Notes:
*While roads, including ice roads, occur in the highest frequency in the area West of Nuiqsut, they are not unique to that area and can occur within any of the eleven pre-defined areas or other areas.
**Totals for pre-defined use areas do not include roads, which is a separate but comparable dataset.

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Table E-25: Percentage of Respondents Taking Overnight Trips

Study Year	Percentage of Respondents		Number of Respondents
	Day Trips Only	Overnight	
2019	86%	14%	22

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Table E-26: Percentage of Overnight Trips

Study Year	Percentage of Trips		Total Trips
	Day Trips	Overnight Trips	
2019	99%	1%	309

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Table E-27: Average Trip Duration (Hours) by Pre-Defined Hunting Area

Pre-Defined Hunting Area	Average Duration (Hours)
	2019
Nigliq Channel	10
East Channel Colville	8
Other Colville Delta	0
Fish Creek	53
Coastal West	0
Coastal East	0
Itqiliq River	4
Ocean Point	15
Sentinel Hill	22
Colville River South	0
West of Nuiqsut	10
Other	0
Roads*	5
Total Trips**	309

Notes:
*While roads, including ice roads, occur in the highest frequency in the area West of Nuiqsut, they are not unique to that area and can occur within any of the eleven pre-defined hunting areas or other areas.
**Totals for pre-defined use areas do not include roads, which is a separate but comparable dataset.

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Table E-28: Average Number of Trips by Month

Study Year	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2019	0.0	0.0	0.1	0.0	0.0	1.4	3.8	5.5	2.3	0.5	0.1	0.0

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Table E-29: Number of Trips Taken by Respondents

Study Year	Number of Trips										
	1-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100+
2019	50%	18%	23%	5%	0%	5%	0%	0%	0%	0%	0%

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Table E-30: Caribou Group Size Noted at Caribou Harvest Locations, 2012-2019

Estimated Herd Size	Percentage of Harvest Locations								
	2012	2013	2014	2015	2016	2017	2018	2019	All Years
1000-2000	2%	1%	1%	1%	3%	0%	0%	3%	1%
500-999	1%	3%	1%	4%	0%	0%	0%	0%	1%
100-499	3%	10%	9%	9%	8%	4%	4%	7%	7%
81-99	0%	0%	0.4%	0%	0%	0%	0%	0%	0%
71-80	1%	0%	1%	1%	0%	1%	1%	0%	1%
61-70	1%	0%	0.4%	0%	0%	0%	0%	0%	0%
51-60	2%	1%	2%	2%	1%	0%	1%	2%	1%
41-50	2%	2%	3%	1%	1%	1%	2%	5%	2%
31-40	1%	2%	2%	3%	1%	1%	1%	3%	2%
21-30	1%	3%	4%	4%	5%	3%	2%	2%	3%
11-20	13%	11%	14%	11%	15%	13%	7%	14%	12%
2-10	41%	38%	42%	44%	36%	46%	51%	40%	42%
1	34%	29%	20%	20%	31%	33%	31%	24%	28%
Total Number	176	138	234	160	156	166	142	58	

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Table E-31: Respondents Observing Abnormalities in Harvested Caribou, 2008-2019

Study Year	Percentage of Respondents						Number of Harvesters
	Health	Other	Parasites	Quality	Size	One or More Abnormalities	
2008	47%	3%	22%	8%	28%	64%	36
2009	26%	4%	2%	4%	11%	38%	53
2010	18%	0%	5%	4%	18%	40%	57
2011	26%	0%	3%	10%	16%	29%	58
2012	33%	4%	4%	14%	26%	44%	57
2013	16%	4%	0%	4%	12%	25%	57
2014	15%	5%	2%	0%	8%	22%	60
2015	16%	2%	0%	10%	5%	21%	58
2016	14%	2%	0%	2%	5%	19%	63
2017	22%	3%	1%	3%	10%	29%	68
2018	14%	0%	2%	0%	8%	20%	50
2019	23%	5%	0%	5%	9%	32%	22
All Years	22%	2%	3%	5%	13%	32%	

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Table E-32: Percentage of Abnormal Caribou by Type of Abnormality, 2008-2019

Study Year	Percentage of Abnormal Caribou					
	Health	Other	Parasites	Quality	Size	One or More Abnormalities
2008	32%	1%	18%	4%	58%	74
2009	47%	6%	15%	6%	26%	34
2010	35%	0%	22%	5%	43%	37
2011	85%	0%	11%	22%	44%	27
2012	60%	4%	4%	22%	66%	50
2013	64%	14%	0%	14%	50%	14
2014	83%	13%	4%	0%	43%	23
2015	51%	11%	0%	23%	40%	35
2016	69%	6%	0%	6%	25%	16
2017	68%	7%	4%	7%	39%	28
2018	47%	0%	12%	0%	53%	17
2019	75%	13%	0%	25%	25%	8
All Years	60%	6%	7%	11%	43%	30

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Table E-33: Percentage of Abnormal Caribou Used by Type of Abnormality, 2008-2019

Study Year	Percentage of Abnormal Caribou					
	Health	Other	Parasites	Quality	Size	One or More Abnormalities
2008	17%	0%	85%	67%	88%	70%
2009	25%	100%	100%	50%	89%	59%
2010	15%	-	88%	100%	88%	68%
2011	43%	-	0%	17%	8%	41%
2012	23%	0%	0%	9%	61%	50%
2013	67%	50%	-	50%	43%	64%
2014	11%	67%	0%	-	20%	26%
2015	11%	100%	-	0%	86%	51%
2016	18%	100%	-	100%	100%	44%
2017	11%	0%	0%	0%	64%	32%
2018	13%	-	0%	-	67%	41%
2019	17%	100%	-	0%	50%	38%
All Years	23%	57%	34%	39%	64%	49%

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Table E-34: Type of Observed Abnormalities, 2008-2019

Observed Abnormality	Percentage of Observations												
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	All Years
Disease/Infection	29%	35%	33%	45%	36%	33%	57%	38%	33%	45%	30%	43%	37%
Decrease in Resource Size	43%	26%	31%	27%	41%	29%	33%	33%	22%	35%	45%	14%	35%
Change in Texture of Meat	0%	9%	0%	9%	10%	5%	0%	7%	33%	8%	15%	29%	8%
Change in Smell of Meat	2%	3%	0%	11%	8%	5%	0%	12%	6%	5%	0%	0%	5%

Observed Abnormality	Percentage of Observations												
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	All Years
Fewer Parasites	12%	0%	18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
Physical Abnormalities	0%	9%	0%	0%	1%	0%	0%	10%	0%	3%	0%	7%	2%
Increase in Resource Size	6%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
More Parasites	4%	0%	3%	7%	1%	0%	0%	0%	0%	3%	0%	0%	2%
Parasites	0%	15%	0%	0%	0%	0%	0%	0%	0%	0%	10%	0%	2%
Injured Resource	0%	0%	0%	0%	0%	19%	0%	0%	6%	0%	0%	0%	1%
Fur less thick	0%	0%	0%	0%	0%	0%	3%	0%	0%	3%	0%	7%	1%
Taste	1%	0%	0%	0%	1%	5%	0%	0%	0%	0%	0%	0%	1%
Resource Injury	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%
Change in resource quality	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Resource appears unhealthy	0%	0%	0%	0%	1%	5%	0%	0%	0%	0%	0%	0%	0%
New Species in Region	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Abnormal Resource Death	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Less Fat	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total	83	34	39	44	80	21	30	42	18	40	20	14	

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Table E-35: Percentage of Respondents Reporting Impacts

Study Year	Percentage of Respondents			Number of Harvesters
	Any Impact	Development Impact	CPAI Impact	
2008	83%	83%	72%	36
2009	70%	68%	51%	53
2010	60%	60%	39%	57
2011	41%	41%	21%	58
2012	70%	70%	32%	57
2013	65%	65%	40%	57
2014	58%	53%	32%	60
2015	55%	50%	33%	58
2016	40%	38%	21%	63
2017	56%	54%	44%	68
2018	72%	68%	58%	50
2019	41%	36%	23%	22
All Years	59%	57%	39%	

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Table E-36: Percentage of Observations by Associated Developers

Study Year	CPAI	Hilcorp	Oil Search/Repsol	Other Industry	Unspecified	Total Observations
2008	62%	0%	0%	16%	32%	102
2009	54%	0%	0%	5%	43%	91
2010	53%	0%	0%	2%	47%	58
2011	44%	0%	0%	11%	44%	36
2012	33%	0%	5%	22%	42%	79

Study Year	CPAI	Hilcorp	Oil Search/Repsol	Other Industry	Unspecified	Total Observations
2013	50%	0%	5%	9%	39%	80
2014	54%	0%	2%	0%	44%	54
2015	51%	0%	15%	11%	32%	47
2016	39%	0%	0%	18%	45%	44
2017	67%	0%	0%	1%	31%	70
2018	65%	1%	1%	1%	33%	85
2019	56%	0%	0%	0%	44%	9

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Table E-37: Household Harvest Survey Observations of Impacts on Caribou Hunting

Study Year	Percentage of Households				Number of Households
	Any Impact	Development Impact	CPAI Impact	Avoided Development Areas	
2010	40%	40%	10%	8%	78
2011	27%	27%	4%	9%	77
2012	45%	39%	13%	4%	82
2013	39%	38%	11%	10%	84
2015	44%	43%	23%	2%	82
2016	41%	41%	13%	3%	79
2017	32%	29%	16%	11%	82
2018	50%	49%	24%	16%	86
2019	33%	33%	15%	2%	46
All Years	39%	38%	14%	7%	

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Table E-38: Percentage of Respondents Reporting Development-Related Impacts on Caribou Hunting, by Impact Type

Study Year	Percentage of Respondents									Number of Respondents
	Helicopter traffic	Plane traffic	Other traffic	Oil company personnel	Man-made structures	Regulations	Seismic lines or activity	Other	Any Impact	
2008	69%	47%	25%	6%	67%	17%	0%	11%	83%	36
2009	45%	38%	19%	2%	34%	11%	13%	6%	68%	53
2010	49%	19%	2%	4%	9%	0%	18%	2%	60%	57
2011	29%	12%	3%	0%	5%	0%	2%	7%	41%	58
2012	53%	33%	2%	5%	14%	4%	0%	5%	70%	57
2013	60%	22%	13%	9%	24%	0%	5%	5%	67%	55
2014	43%	15%	2%	2%	20%	0%	0%	2%	53%	60
2015	33%	12%	7%	0%	16%	0%	0%	3%	50%	58
2016	16%	17%	8%	0%	14%	3%	2%	5%	38%	63
2017	22%	18%	15%	3%	26%	1%	1%	10%	54%	68
2018	42%	28%	8%	12%	40%	0%	0%	14%	68%	50

Study Year	Percentage of Respondents									Number of Respondents
	Helicopter traffic	Plane traffic	Other traffic	Oil company personnel	Man-made structures	Regulations	Seismic lines or activity	Other	Any Impact	
2019	14%	14%	5%	5%	9%	0%	0%	5%	36%	22
All Years	40%	23%	9%	4%	23%	3%	3%	6%	57%	-
At Least One Year	67%	42%	23%	11%	45%	9%	20%	12%	82%	163

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Table E-39: Percentage of Development-Related Impact Observations, by Impact Type

Study Year	Percentage of Observations								Average Impacts Per Respondent	Number of Observations
	Helicopter traffic	Plane traffic	Other traffic	Oil company	Man-made structures	Regulations	Seismic lines or	Other		
2008	28%	24%	9%	2%	28%	6%	0%	4%	2.8	101
2009	26%	22%	11%	1%	22%	7%	8%	3%	1.7	91
2010	48%	19%	2%	3%	9%	0%	17%	2%	1.0	58
2011	53%	19%	6%	0%	8%	0%	3%	11%	0.6	36
2012	52%	27%	1%	4%	10%	3%	0%	4%	1.4	79
2013	45%	16%	9%	6%	17%	0%	4%	4%	1.5	82
2014	53%	16%	2%	2%	25%	0%	0%	2%	0.9	55
2015	53%	15%	9%	0%	19%	0%	0%	4%	0.8	47
2016	26%	28%	12%	0%	21%	5%	2%	7%	0.7	43
2017	25%	17%	14%	3%	26%	1%	1%	12%	1.0	69
2018	31%	16%	6%	7%	31%	0%	0%	9%	1.7	87
2019	33%	25%	8%	8%	17%	0%	0%	8%	0.5	12
All Years	39%	20%	7%	3%	19%	2%	3%	6%	1.2	-

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Table E-40: Household Harvest Survey Observations of Development-Related Impacts by Impact Type

Study Year	Percentage of Households									Number of Households
	Helicopter traffic	Plane traffic	Other traffic	Oil company personnel	Man-made structures	Regulations	Seismic lines or activity	Other	Any Development Impact	
2010	19%	10%	4%	0%	6%	0%	3%	10%	40%	78
2011	18%	10%	0%	0%	0%	0%	0%	4%	27%	77
2012	18%	11%	0%	0%	5%	0%	0%	20%	39%	82
2013	19%	12%	4%	0%	7%	2%	0%	8%	38%	84
2015	21%	10%	5%	0%	10%	1%	0%	13%	43%	82
2016	19%	6%	10%	0%	8%	3%	4%	14%	41%	79
2017	9%	5%	7%	0%	12%	1%	0%	9%	29%	82

Study Year	Percentage of Households									Number of Households
	Helicopter traffic	Plane traffic	Other traffic	Oil company personnel	Man-made structures	Regulations	Seismic lines or activity	Other	Any Development Impact	
2018	15%	5%	8%	2%	15%	1%	2%	24%	49%	86
2019	13%	7%	4%	2%	9%	0%	0%	13%	33%	46
All Years	17%	8%	5%	0%	8%	1%	1%	13%	38%	-
At Least One Year	42%	26%	17%	2%	27%	5%	5%	38%	65%	151

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Table E-41: Percentage of Reported Impacts by Month

Study Year	Percentage of Reported Impacts												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2008	7%	7%	7%	6%	4%	33%	55%	33%	9%	4%	3%	7%	101
2009	1%	1%	0%	1%	2%	29%	40%	23%	11%	1%	1%	1%	91
2010	17%	17%	10%	7%	10%	19%	52%	33%	19%	9%	14%	17%	58
2011	0%	0%	0%	0%	0%	8%	14%	44%	0%	3%	3%	3%	36
2012	3%	3%	3%	1%	1%	8%	35%	39%	14%	3%	3%	3%	79
2013	6%	6%	7%	4%	4%	32%	44%	28%	11%	5%	5%	6%	82
2014	4%	4%	4%	4%	2%	20%	35%	45%	18%	4%	2%	4%	55
2015	2%	2%	2%	2%	2%	30%	32%	38%	15%	6%	2%	2%	47
2016	2%	7%	2%	2%	2%	35%	51%	35%	21%	19%	5%	2%	43
2017	10%	10%	10%	7%	14%	25%	28%	22%	26%	12%	7%	9%	69
2018	14%	14%	14%	15%	16%	41%	45%	28%	21%	15%	14%	14%	87
2019	8%	8%	8%	8%	8%	8%	42%	50%	8%	8%	8%	8%	12
All Years	6%	7%	6%	5%	6%	24%	39%	35%	14%	7%	6%	6%	

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Table E-42: Respondent Descriptions of Helicopters Associated with Impact

Helicopter Descriptions	Percentage of Observations										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	All Years
Blue and White Helicopter	29%	32%	34%	30%	21%	4%	18%	6%	4%	0%	18%
Alpine Helicopter	14%	0%	12%	16%	17%	24%	0%	6%	0%	0%	9%
Air Logistics Helicopter	14%	0%	7%	8%	0%	4%	0%	0%	0%	0%	3%
Umiat Area Helicopter	0%	5%	7%	5%	0%	12%	0%	0%	0%	0%	3%
Conoco Phillips Helicopter	4%	0%	0%	0%	3%	8%	0%	6%	22%	0%	4%
Helicopter For Scientific Studies	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	1%
BLM Helicopter	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%
Other Agencies Helicopter	0%	0%	2%	0%	0%	4%	0%	12%	4%	0%	2%
Black Helicopter	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%
Red Helicopter	4%	0%	5%	0%	3%	0%	9%	0%	11%	0%	3%
Helicopters - Unknown Owner	36%	53%	29%	27%	31%	20%	73%	53%	37%	100%	46%
Helicopter, Blue	0%	5%	0%	0%	10%	8%	0%	0%	4%	0%	3%
Helicopter, Blue and Orange	0%	5%	0%	3%	0%	0%	0%	0%	0%	0%	1%
Orange Helicopter	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%
Red and Black Helicopter	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%

Helicopter Descriptions	Percentage of Observations										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	All Years
Yellow Helicopter	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
Blue and Red Helicopter	0%	0%	0%	0%	0%	0%	0%	12%	0%	0%	1%
Other Oil Company Helicopter	0%	0%	0%	5%	3%	16%	0%	0%	4%	0%	3%
Airplane - Unknown Owner	0%	0%	0%	3%	3%	0%	0%	0%	0%	0%	1%
Green and White Helicopter	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
Green and Yellow Helicopter	0%	0%	0%	0%	0%	0%	0%	6%	0%	0%	1%
Total	28	19	41	37	29	25	11	17	27	4	

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Table E-43: Respondent Descriptions of Airplanes Associated with Airplane Traffic Impacts

Airplane Descriptions	Percentage of Observations										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	All Years
Alpine Airplane	0%	29%	10%	15%	44%	0%	17%	17%	14%	33%	18%
Cessna	9%	0%	5%	0%	0%	0%	0%	8%	7%	0%	3%
Twin Otter	9%	0%	14%	0%	0%	0%	0%	25%	7%	0%	6%
Supercub	18%	0%	5%	8%	11%	0%	8%	0%	0%	0%	5%
Beechcraft	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	1%
Shared Services Airplane	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	1%
Sport Hunting Airplane	0%	0%	5%	0%	0%	14%	0%	0%	7%	0%	3%
Cargo Airplane	36%	14%	5%	23%	0%	14%	0%	0%	0%	0%	9%
Red and White Airplane	0%	0%	0%	0%	0%	0%	17%	0%	0%	0%	2%
White Airplane	0%	0%	0%	0%	0%	0%	17%	8%	7%	0%	3%
Airplane - Unknown Owner	18%	57%	43%	54%	44%	43%	42%	33%	57%	67%	46%
Yellow Airplane	9%	0%	5%	0%	0%	14%	0%	0%	0%	0%	3%
DC6	0%	0%	0%	0%	0%	0%	0%	8%	0%	0%	1%
Total	11	7	21	13	9	7	12	12	14	3	

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Table E-44: Respondent Descriptions of Man-Made Structures Associated with Impacts

Man-Made Structure Descriptions	Percentage of Observations										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	All Years
Trucks	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	1%
Pipeline	40%	33%	75%	57%	21%	11%	56%	22%	19%	50%	38%
Ice Roads and Bridges	40%	0%	0%	0%	36%	0%	0%	0%	7%	0%	8%
Infrastructure	20%	33%	13%	43%	7%	22%	0%	22%	30%	0%	19%
Seismic Lines	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	1%
Roads and Bridges	0%	0%	0%	0%	21%	67%	44%	56%	41%	50%	28%
Waste	0%	33%	13%	0%	0%	0%	0%	0%	0%	0%	5%
Safety Risks	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%
Total	5	3	7	13	14	9	8	18	27	2	

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Table E-45: Household Harvest Survey Road Use by Road Area, 2018-2019

Study Year	Percentage of Households Using						Total Households
	Any roads	Spur Road (Area 1)	East of Spur Road toward Alpine (Area 2)	West of Spur Road to CD5 (Area 3)	Between CD5 and GMT-1 (Area 4)	Between GMT-1 and GMT-2 (Area 5)	
2018	54%	51%	9%	39%	34%	NA	70
2019	64%	53%	11%	29%	44%	31%	45
Note: CD5 (Colville Delta 5); GMT-1 (Greater Mooses Tooth 1); GMT-2 (Greater Mooses Tooth 2)							

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Table E-46: Household Harvest Survey Reasons for Using or Not Using Roads for Caribou Hunting, 2018-2019

Reason	2018		2019	
	Percentage of Households Using Roads	Percentage of Households Not Using Roads	Percentage of Households Using Roads	Percentage of Households Not Using Roads
Ease of use	50%	0%	31%	0%
Transportation method	26%	38%	28%	44%
Avoid industry	0%	25%	0%	0%
Resource availability	18%	9%	21%	0%
Personal preference	0%	13%	0%	19%
Security restrictions	0%	3%	0%	0%
Funds	3%	0%	0%	0%
No reason specified	16%	16%	7%	0%
Not ascertained	0%	0%	24%	44%
Total Households	38	32	29	16

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Table E-47: Respondents Reporting Avoidance of Previously Used Hunting Areas, 2013-2019

Study Year	Percentage of Respondents Avoiding		Total Respondents
	No	Yes	
2013	39%	61%	57
2014	42%	58%	57
2015	42%	58%	52
2016	49%	51%	61
2017	25%	75%	64
2018	24%	76%	49
2019	41%	59%	22
All Years	38%	62%	

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Table E-48: Places of Avoidance by Percentage of Observations, 2013-2019

Place	Percentage of Observations							
	2013	2014	2015	2016	2017	2018	2019	All Years
Alpine/Alpine Satellites	29%	30%	21%	11%	13%	13%	0%	16%
Fish Creek	9%	8%	3%	14%	13%	13%	29%	12%
Nigliq Channel	9%	3%	8%	3%	8%	21%	0%	7%
East Channel	7%	0%	8%	6%	14%	8%	7%	7%
Itqiliq River	2%	8%	0%	6%	2%	2%	14%	5%
Kuupaqullurak	0%	8%	8%	11%	5%	2%	0%	5%
Colville Delta	4%	5%	8%	11%	3%	0%	0%	5%
Nanuq	0%	0%	10%	11%	3%	6%	0%	4%
Upper Colville River	2%	5%	8%	3%	3%	8%	0%	4%
West of Nuiqsut	4%	5%	3%	3%	3%	2%	7%	4%
Tamayayak Channel	7%	8%	3%	0%	3%	0%	0%	3%
Various Areas	0%	5%	0%	0%	0%	6%	7%	3%
Spur Road	0%	3%	5%	3%	3%	0%	0%	2%
Pisiktagvik	0%	0%	3%	3%	5%	0%	0%	1%
Nigliq	0%	0%	0%	6%	0%	4%	0%	1%
Judy Creek	0%	0%	0%	0%	0%	2%	7%	1%
Nuiqsut	0%	0%	0%	0%	2%	0%	7%	1%
Puviqsuk	4%	0%	0%	0%	2%	2%	0%	1%
Freshwater Lake	0%	0%	0%	0%	0%	0%	7%	1%
Qitik	0%	0%	0%	0%	0%	0%	7%	1%
Colville River	0%	0%	0%	0%	0%	0%	7%	1%
Teshekpuk Lake	2%	0%	0%	3%	0%	2%	0%	1%
East of Nigliq Channel	2%	0%	3%	0%	0%	2%	0%	1%
East of Colville Delta	0%	3%	3%	0%	2%	0%	0%	1%
Shallow Areas	7%	0%	0%	0%	0%	0%	0%	1%
Qakimak River	2%	0%	0%	3%	2%	0%	0%	1%
Anaktuvuk River	0%	5%	0%	0%	0%	0%	0%	1%
East of Colville River	2%	0%	0%	3%	0%	0%	0%	1%
Atiġruk Point	2%	0%	0%	0%	0%	2%	0%	1%
Oliktok Point	0%	0%	3%	0%	2%	0%	0%	1%
Nuiqsupiaq	0%	0%	3%	0%	2%	0%	0%	1%
West of Colville River	0%	0%	0%	0%	2%	2%	0%	1%
Umiuraq	0%	0%	0%	0%	3%	0%	0%	0%

Place	Percentage of Observations							
	2013	2014	2015	2016	2017	2018	2019	All Years
Ikpikpuk River	0%	0%	0%	3%	0%	0%	0%	0%
Chandler River	0%	3%	0%	0%	0%	0%	0%	0%
Tingmeachsiovik	0%	0%	3%	0%	0%	0%	0%	0%
Eskimo Island	0%	0%	3%	0%	0%	0%	0%	0%
Kuparuk River	2%	0%	0%	0%	0%	0%	0%	0%
Lake near Kachemak	2%	0%	0%	0%	0%	0%	0%	0%
Lake 17	0%	0%	0%	0%	0%	2%	0%	0%
Niġlivik	0%	0%	0%	0%	2%	0%	0%	0%
Kayuqtisiḷik	0%	0%	0%	0%	2%	0%	0%	0%
Ulusrak	0%	0%	0%	0%	2%	0%	0%	0%
Milugiaq River	0%	0%	0%	0%	2%	0%	0%	0%
Location not captured	0%	0%	0%	0%	2%	0%	0%	0%
Total	45	37	40	37	63	48	14	282

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Table E-49: Places of Avoidance by Percentage of Respondents, 2013-2019

Places	Percentage of Respondents								
	2013	2014	2015	2016	2017	2018	2019	All Years	At Least One Year
Alpine/Alpine Satellites	23%	19%	15%	7%	13%	12%	0%	13%	28%
Fish Creek	7%	5%	2%	8%	13%	12%	18%	9%	17%
East channel	5%	0%	6%	3%	14%	8%	5%	6%	15%
Nigliq channel	7%	2%	6%	2%	8%	20%	0%	6%	15%
Upper Colville River	2%	4%	6%	2%	3%	8%	0%	3%	9%
Kuupaqullurak	0%	5%	6%	7%	5%	2%	0%	3%	8%
Colville Delta	4%	4%	6%	7%	3%	0%	0%	3%	6%
Nanuq	0%	0%	8%	7%	3%	6%	0%	3%	6%
West of Nuiqsut	4%	4%	2%	2%	3%	2%	5%	3%	6%
Itqiliq River	2%	5%	0%	3%	2%	2%	9%	3%	6%
Various Areas	0%	4%	0%	0%	0%	6%	5%	2%	5%
Spur Road	0%	2%	4%	2%	3%	0%	0%	1%	4%
Tamayayak Channel	5%	5%	2%	0%	3%	0%	0%	2%	4%
Puviksuk	4%	0%	0%	0%	2%	2%	0%	1%	3%
Pisiktagvik	0%	0%	2%	2%	5%	0%	0%	1%	3%
East of Colville Delta	0%	2%	2%	0%	2%	0%	0%	1%	2%

Places	Percentage of Respondents								
	2013	2014	2015	2016	2017	2018	2019	All Years	At Least One Year
East of Nigliq channel	2%	0%	2%	0%	0%	2%	0%	1%	2%
Qakimak River	2%	0%	0%	2%	2%	0%	0%	1%	2%
Shallow areas	5%	0%	0%	0%	0%	0%	0%	1%	2%
Anaktuvuk River	0%	4%	0%	0%	0%	0%	0%	1%	2%
Oliktok Point	0%	0%	2%	0%	2%	0%	0%	0%	2%
East of Colville River	2%	0%	0%	2%	0%	0%	0%	0%	2%
Nuiqsupiaq	0%	0%	2%	0%	2%	0%	0%	0%	2%
Teshekpuk Lake	2%	0%	0%	2%	0%	2%	0%	1%	2%
Nigliq	0%	0%	0%	3%	0%	4%	0%	1%	2%
Umiraq	0%	0%	0%	0%	3%	0%	0%	0%	2%
Atiġruk Point	2%	0%	0%	0%	0%	2%	0%	1%	2%
West of Colville River	0%	0%	0%	0%	2%	2%	0%	1%	2%
Nuiqsut	0%	0%	0%	0%	2%	0%	5%	1%	2%
Judy Creek	0%	0%	0%	0%	0%	2%	5%	1%	2%
Chandler River	0%	2%	0%	0%	0%	0%	0%	0%	1%
Kuparuk River	2%	0%	0%	0%	0%	0%	0%	0%	1%
Lake near Kachemak	2%	0%	0%	0%	0%	0%	0%	0%	1%
Tingmeachsiovik	0%	0%	2%	0%	0%	0%	0%	0%	1%
Eskimo Island	0%	0%	2%	0%	0%	0%	0%	0%	1%
Ikpikpuk River	0%	0%	0%	2%	0%	0%	0%	0%	1%
Niġlivik	0%	0%	0%	0%	2%	0%	0%	0%	1%
Kayuqtusiḷik	0%	0%	0%	0%	2%	0%	0%	0%	1%
Ulusrak	0%	0%	0%	0%	2%	0%	0%	0%	1%
Milugiaq River	0%	0%	0%	0%	2%	0%	0%	0%	1%
Lake 17	0%	0%	0%	0%	0%	2%	0%	0%	1%
Freshwater Lake	0%	0%	0%	0%	0%	0%	5%	1%	1%
Qitik	0%	0%	0%	0%	0%	0%	5%	1%	1%
Colville River	0%	0%	0%	0%	0%	0%	5%	1%	1%
Location not captured	0%	0%	0%	0%	2%	0%	0%	0%	1%
Total Number of Respondents	57	57	52	61	64	49	22		131

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Table E-50: Causes of Avoidance, Percentage of Observations, 2013-2019

Causes	Percentage of Observations							
	2013	2014	2015	2016	2017	2018	2019	All Years
Development Causes	**60%**	**60%**	**72%**	**53%**	**48%**	**56%**	**50%**	**57%**
Development Activities	15%	11%	28%	27%	23%	17%	25%	20%
Development Infrastructure	13%	26%	24%	8%	18%	24%	13%	19%
Development-General	8%	0%	12%	10%	4%	2%	0%	5%
Security Restrictions	8%	6%	6%	6%	3%	6%	0%	5%
Contamination Concerns	11%	9%	0%	0%	0%	0%	13%	3%
Safety Concerns	6%	9%	2%	2%	0%	8%	0%	4%
Environmental Causes	**34%**	**19%**	**24%**	**29%**	**32%**	**27%**	**25%**	**27%**
Resource Availability	11%	13%	18%	27%	24%	17%	0%	18%
Environmental Factors	23%	6%	6%	2%	8%	11%	25%	10%
Personal Reasons	**4%**	**21%**	**4%**	**16%**	**14%**	**15%**	**25%**	**14%**
Don't Know	**2%**	**0%**	**0%**	**0%**	**1%**	**2%**	**0%**	**1%**
Cause Not Captured	**0%**	**0%**	**0%**	**2%**	**4%**	**0%**	**0%**	**1%**
Total Observations	**53**	**47**	**50**	**49**	**71**	**66**	**16**	**352**

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Table E-51: Causes of Avoidance, Percentage of Respondents, 2013-2019

Causes	Percentage of Respondents								
	2013	2014	2015	2016	2017	2018	2019	All Years	At Least One Year
Development Causes	**37%**	**35%**	**46%**	**31%**	**36%**	**47%**	**23%**	**36%**	**47%**
Development Activities	14%	9%	27%	21%	25%	22%	18%	20%	26%
Development Infrastructure	12%	21%	23%	7%	20%	33%	9%	18%	28%
Contamination Concerns	11%	7%	0%	0%	0%	0%	9%	4%	7%
Security Restrictions	7%	5%	6%	5%	3%	8%	0%	5%	9%
Safety Concerns	5%	7%	2%	2%	0%	10%	0%	4%	7%
Development-General	7%	0%	12%	8%	5%	2%	0%	5%	12%
Environmental Causes	**26%**	**16%**	**15%**	**21%**	**30%**	**29%**	**18%**	**22%**	**40%**
Resource Availability	11%	11%	17%	21%	27%	22%	0%	16%	30%
Environmental Factors	21%	5%	6%	2%	9%	14%	18%	11%	16%
Personal Reasons	**4%**	**18%**	**4%**	**13%**	**16%**	**20%**	**18%**	**13%**	**24%**
Do not know	**2%**	**0%**	**0%**	**0%**	**2%**	**2%**	**0%**	**1%**	**2%**
Cause not captured	**0%**	**0%**	**0%**	**2%**	**5%**	**0%**	**0%**	**1%**	**2%**
Total Respondents	**57**	**57**	**52**	**61**	**64**	**49**	**22**		**131**

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Table E-52: Causes of Avoidance by Place, 2013-2019

Place	Environmental Causes	Development Causes			Personal Reasons	Total
	Environmental Factors	Development Activities	Development Infrastructure	Contamination Concerns		
East Channel		1				1
Fish Creek	2	2	1	1		6
Itqiliq river	2					2
Various Areas					1	1
West of Nuiqsut			1			1
Nuiqsut					1	1
Freshwater Lake				1		1
Qitik					1	1
Colville River					1	1
Judy Creek		1				1

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APPENDIX F: HARVESTED RESOURCE ASSESSMENT CODES

Table F-1: Harvested Resource Assessment Codes

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

Numeric Code	Code Name	Notes
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 G: RESPONDENT QUOTES BY TOPIC, 2019

Active Harvester Interview Quotes, 2019

This appendix contains quotes from active harvest respondents during interviews for the 2019 study year, by topic. This appendix includes quotes that provide description and context regarding 2019 harvesting activities, beyond stating the information already reported in report figures and tables (e.g., month of harvest, number of hunting trips, duration of hunting trips without additional context or information). The quotes are organized under the associated headings in the main body of this report. In the case of the first section (Caribou Subsistence Use Areas and Harvest Locations), this appendix provides geographic subheadings not provided in the main body of the report, to aid in navigation of quotes.

CARIBOU SUBSISTENCE USE AREAS AND HARVEST LOCATIONS

Road Hunting Areas

Along the Spur Road from Nuiqsut, past CD5 and about six miles from this flat area [off road past GMT 1] there was a bunch of caribou. That was in July and August. I [also] went out there [on the] first and second week of September. I got like how many of them in between these lakes there was a herd coming this way. (SRB&A Nuiqsut Interview March 2020)

They [the caribou] were all along the Spur Road. Yes, [between GMT1 and CD5]. Yes, [I went out by these lakes too] right around that way. That's where I got a caribou last summer. I could have gotten more but was busy last summer for work. July and August. (SRB&A Nuiqsut Interview March 2020)

I went on the Spur Road. I tried to go with a buddy about halfway. I got a caribou pretty close to town. [I shot it my] self. Both [were] male. Young male. [There was] nine [caribou]. Got one in August and early in September… They seem to come from the east, sometimes west. [I went by] four-wheeler. (SRB&A Nuiqsut Interview March 2020)

Between GMT1 and GMT2 [I got] one caribou. I had to walk about a mile from the road. [It was] closer to GMT 2 [on the] south side. Yeah, about a mile. [It was in] February. [It was a] Female. [There were] four or five [caribou in the herd]. (SRB&A Nuiqsut Interview March 2020)

[I went] about halfway to GMT1. (SRB&A Nuiqsut Interview March 2020)

[I] went with a Honda to [past GMT1]. (SRB&A Nuiqsut Interview March 2020)

[I hunted caribou to] GMT1 [in] August and September [by] four-wheeler. A quarter mile before the first bridge, there was four of them right there. I shot them, they were all male. After we got those four, we chased them [farther off the road]. There was about 20 of them. Then we went about three miles off the end of the [GMT1] road. (SRB&A Nuiqsut Interview March 2020)

Along the Spur Road from Nuiqsut, past CD5 and about six miles from this flat area [off road past GMT 1] there was a bunch of caribou. That was in July and August. I [also] went out there [on the] first and second week of September. I got like how many of them in between these lakes there was a herd coming this way. (SRB&A Nuiqsut Interview March 2020)

[I used the roads because I can] get out there faster. (SRB&A Nuiqsut Interview March 2020)

It's a lot easier, especially with wet summers it can be too cold on a boat. (SRB&A Nuiqsut Interview March 2020)

Easier to go out to catch caribou and haul back home. (SRB&A Nuiqsut Interview March 2020)

[The roads] are more smooth [and] I'm getting old. [The caribou] are less scared from all the development. [The] ramps on GMT1 are good. (SRB&A Nuiqsut Interview March 2020)

[I] don't have [a] Honda or snogo, so [I] can just use [my] truck. (SRB&A Nuiqsut Interview March 2020)

I only had a truck, and the road was useful. (SRB&A Nuiqsut Interview March 2020)

We went past that one rig and past that one at the end. We got the one [caribou] on the way back from there. We went in a car…. (SRB&A Nuiqsut Interview March 2020)

[I went] four-wheeler hunting right after that. [I went out to] CD5, we went off trail, right there. (SRB&A Nuiqsut Interview March 2020)

We drove out towards GMT, because we don't have a boat or an ATV. (SRB&A Nuiqsut Interview March 2020)

Not having a boat [is why I used the roads], [there are] no caribou on the river. (SRB&A Nuiqsut Interview March 2020)

[I had] no access to boat or honda, so I use a car and walk and hunt. [The road is] more accessible, but still [there is] lots of traffic and dust, lots of dust. (SRB&A Nuiqsut Interview March 2020)

That's where the caribou were. (SRB&A Nuiqsut Interview March 2020)

[I] have to [use the roads], [I'm not] going to find them [caribou] anywhere else. (SRB&A Nuiqsut Interview March 2020)

Because the caribou [are] too far from town. (SRB&A Nuiqsut Interview March 2020)

[I went caribou hunting] on the Spur Road... towards GMT. Yeah, [past K Pad]. Between GMT and CD5… Yes [around March]. Yes, [in a truck]. (SRB&A Nuiqsut Interview March 2020)

At the beginning of June, I got like eight of them. That was for my blanket toss. That was there—close to GMT1/GMT2. Yes, [the ramps along the roads have improved] quite a bit. Yes, [that was in June]. [I used a] truck and four-wheeler. Truck to GMT1 and ATV to [GMT]2. Yes, [I use a four-wheeler to get out past GMT1]. [That is during] August [through] October along the road. (SRB&A Nuiqsut Interview March 2020)

I couldn't go hunting anywhere on the river. All of my hunting was on GMT [road]. [I was looking on the Spur Road], all the way to GMT 2. [In] like August and late July. I think early September was the last time I went. No, [I don't go off the road]. (SRB&A Nuiqsut Interview March 2020)

[I harvested two caribou] closer to CD5. Just two. [It was a] small herd, I'd say not even a dozen. That was in August. [They were] males. I shot them myself. (SRB&A Nuiqsut Interview March 2020)

[On] GMT2, [I shot] maybe 10 here, eight here, here eight to 10. [I shot them on] both sides [of the road], all along the road. [In] August, September, November and December I probably got—I know I got five of them up here [northeast of Nuiqsut] in July… [I have] quite a few [hides]. I probably have 40 caribou hides from this last fall. [I got a total of] 40-50. We will say 45. And then November and December I got four each for November and December. Maybe more—I am trying to remember for each for the feasts. And then people would ask to, I was just about then giving away the four caribou, [I] kept behind the hearts and one body. I dropped most of it off with elders. Most of the fall they were maybe groups of 10-50; some were loners. [There were] very few up [in northwest NPRA]. (SRB&A Nuiqsut Interview March 2020)

I think I got one caribou on the road. Just one bull, right by this big lake [oil lake]. End of June, male. Just a small herd of maybe 30 or 40. I went to GMT1, but the caribous were right by the pipeline, so I didn't [get the caribou]. (SRB&A Nuiqsut Interview March 2020)

We got it [caribou] on the land side [of the road, not ocean side]. I don't know if they make it to the ocean or not. Second K-pad. There was three of them, the fourth one we didn't take because it was too sick or something, they were too skinny. There was a female I think, and many males. (SRB&A Nuiqsut Interview March 2020)

GMT1 [Road in] August and September. Four-wheeler. Yes [successful]. A quarter mile before the first bridge, there was four of them right there. I shot them, they were all male. In August. (SRB&A Nuiqsut Interview March 2020)

Then we went about three miles off the end of the road. [There was] about four right there and that was September. By four-wheeler. Yes [I shot them]. Males. There was maybe 10 [total]. (SRB&A Nuiqsut Interview March 2020)

I went on the Spur Road. I tried to go with a buddy about halfway. I got a caribou pretty close to town. [I shot them myself]. [They were] both male. Young male. [There were] nine [caribou]. [I] got one in August…[and] early in September. Self. September. [It was a] loner. They seem to come from the east, sometimes west. [I went by] four-wheeler. (SRB&A Nuiqsut Interview March 2020)

One was in July.[I took the] Road. I got one right here at this corner. About halfway to GMT1. [It was in] July. (SRB&A Nuiqsut Interview March 2020)

And then one here in October… There was two of them [in October]. [It was] male. I only got one of them. There was two herds that went through the roads, one went this way [east], one went this way [west]. (SRB&A Nuiqsut Interview March 2020)

Between GMT1 and GMT2 [I got] one caribou. I had to walk about a mile from the road. [It was] closer to GMT 2 [on the] south side. Yeah about a mile. [It was in] February. [It was a] Female. [There were] four or five [caribou in the herd]. (SRB&A Nuiqsut Interview March 2020)

[I went out to] CD5, we went off trail, [I got the caribou] right there. [I got] three bulls [in] August 16th. August and September is the only time I hunted. (SRB&A Nuiqsut Interview March 2020)

Yes [I went on the Spur Road] towards GMT. Yeah, [past K Pad]… Between GMT and CD5. When we got to it, we realized it was reindeer… [It was in] March. Someone else [shot them]. I have no idea [what sex they were]--he didn't tell me. Yes, four [caribous were in the herd]. Yeah. And the one in summertime was a caribou. In the same area... [It was in] May. I'd say 10 to 15 [caribou were in the herd]. (SRB&A Nuiqsut Interview March 2020)

[I shot a caribou] right after the bridge on the south side [of Spur Road]. [It was Male]. That was August also. [It was] alone. Me and my brother caught five of them together, around the bridge, this side. I shot three of them and kept two. It was one male and four females. That was late September, it was cold. Yeah, just the five [together in a herd]. Yeah, there is another one around here, around on of these lakes. I have one of them--that one was really fat. That was late July. Yes, [I shot it]. Yes, [it was male]. It was with another one. (SRB&A Nuiqsut Interview March 2020)

Overland Areas West of Nuiqsut

I travel several miles out of Nuiqsut [by four-wheeler]. Some of them [trips] I go straight from Nuiqsut, but most of the caribou I got along the road… [I traveled by four-wheeler] down to Ocean Point. (SRB&A Nuiqsut Interview March 2020)

I was riding my ATV four-wheeler. I just got only one, had no room for [anymore]. I shot it, cut it, skin it, and put in on four-wheeler. [I went in] August. Then I went close to this lake; there was [a] lot [of] caribou out there. On the other side of Fish Creek. [I went in the] middle of August, [I didn't catch any] they were running, they were scared. They must [have] got into a fight with a wolf or wolverine. (SRB&A Nuiqsut Interview March 2020)

Yes [I went for caribou] west to of Nuiqsut. Say June. At least June. June to August. Yes, [on an ATV]… [There is] just the one spot [where you can cross the Ublutuoch] and the rest [of the Ublutuoch] you can't get across. (SRB&A Nuiqsut Interview March 2020)

The last spot [I hunted] was seven miles west of [the] lakes. (SRB&A Nuiqsut Interview March 2020)

August 23rd right behind the airport. We went straight though the shortcut [west of Nuiqsut]. (SRB&A Nuiqsut Interview March 2020)

[I used a] truck and four-wheeler. Truck to GMT1…. (SRB&A Nuiqsut Interview March 2020)

I travel several miles out of Nuiqsut… Some of them I go straight from Nuiqsut but most of them I got along the road… down to Ocean Point. (SRB&A Nuiqsut Interview March 2020)

I just went straight out to the cabin and circled back [on the road]. No, I wasn't [successful]. I saw some. Yes, [I was searching by ATV]. August and September. (SRB&A Nuiqsut Interview March 2020)

I was riding my ATV four-wheeler. I just got only one, had no room for [anymore]. I shot it, cut it, skin it, and put in on four-wheeler. [I went in] August. (SRB&A Nuiqsut Interview March 2020)

Then I went close to this lake; there was [a] lot [of] caribou out there. On the other side of Fish Creek. [I went in the] middle of August, [I didn't catch any] they were running, they were scared. They must [have] got into a fight with a wolf or wolverine. (SRB&A Nuiqsut Interview March 2020)

The last spot was seven miles west of [the] lakes [I] got two caribou. Yeah, male. [They were] by themselves. ATV. September. That was all the caribou I caught. (SRB&A Nuiqsut Interview March 2020)

August 23rd right behind the airport. We went straight though the shortcut [west of Nuiqsut]. Two of them [caribou]. [I was using an] ATV. [I shot them myself] No, there was only two that I found out there. Those were the only places I went. Spur Road, GMT1, and upriver. (SRB&A Nuiqsut Interview March 2020)

Yes. I got two caribou west of Nuiqsut [in] different spots. Just those two. Both in June. [It was] me [who harvested them]. It was alone. There were seven [in the other herd]. (SRB&A Nuiqsut Interview March 2020)

Out here [west of Nuiqsut] Maybe further out in this area. [Local resident] had to bring us gas. We were burning too much fuel for our caribou. Yes. I only start going for females in November and December and maybe October because the bulls were rutted. No, no, no just November and December I am certain about that. [There were] 10 to 15 per herd. (SRB&A Nuiqsut Interview March 2020)

Nigliq Channel

I went out to [the] cabin [on Nigliq] but I didn't see no caribou. That was in the first week of August. [I was in a] boat. (SRB&A Nuiqsut Interview March 2020)

I went down Nigliq Channel, I just went to Nigliq. I did get one caribou, it was right by this lake. One. I tried to get more but they all ran away…. [There was] probably 50 or 60 [caribou], there was a lot of them. [That was in] July. (SRB&A Nuiqsut Interview March 2020)

I don't think I got any caribou on the Nigliq last summer… I went down Nigliq Channel, all the way to the ocean. [I] didn't catch any caribou that summer. [I went there in] July. (SRB&A Nuiqsut Interview March 2020)

That [caribou hunting] was the only hunting we did. We scouted on Nigliq, on this side, but no luck. They [hunters] were all up here on the coast, waiting for them. (SRB&A Nuiqsut Interview March 2020)

Just [went to] Nigliq. Cause that's my grandma's fish camp. No, [I didn't harvest], but my family did. A very small caribou. It was a small antler and a large antler. [It was] June or July. When it comes to my family, we go as a group. All of us have to help. Hunting, fishing, taking fish out of t

We did try to get off the boat [and go] towards the spur road. We walked. [There were] caribou that way, people were shooting them left and right, so we stayed underneath on the river and ducked down in our boats until they stopped shooting then we went out looking for our own, They are normally on the east side of the river.he net. It's fun that way, as a family. (SRB&A Nuiqsut Interview March 2020)

And on Nigliq channel. Yes [all the way to the ocean] in June. We tried to [shoot some caribou] but they were at the shallow spots. (SRB&A Nuiqsut Interview March 2020)

Yeah, I went up Nigliq. In July and August. (SRB&A Nuiqsut Interview March 2020)

[I went] all the way up to Nigliq. Same months [June, July, and August]. (SRB&A Nuiqsut Interview March 2020)

I went down Niġliq Channel, I just went to Niġliq. I did get one caribou it was right by this lake. [I got] one [caribou]. I tried to get more but they all ran away. I shot it. Male. [There was] probably 50 or 60 [caribou], there was a lot of them. [I went in] July. (SRB&A Nuiqsut Interview March 2020)

It is also by my great uncle's cabin is on the other side of the river [at Nigliq Channel]. My cousin got it. I have no idea [if it was male or female]. It was June or July. I can't remember. Yeah, it was the end of the herd. I'd say 15 [were in the herd]. (SRB&A Nuiqsut Interview March 2020)

East Channel

They'll [caribou] be all around the coast. They let us know through VHF there's caribou coming your way. I went all the way out to Pisiktaġvik [in] August through September. No [I did not get caribou]. (SRB&A Nuiqsut Interview March 2020)

We scouted here [on the East Channel] too. All the way up here [northeast] until it became too shallow. All the way in that area. Going short cut after short cut. We saw lights up here. There is a place. Lot of lights on this side. That is where we saw them. But we stayed on this side [west side] of Helmericks… [We went in] August. (SRB&A Nuiqsut Interview March 2020)

Me and my buddy went to Pisiktaġvik area on the east side. There was [a] herd on this side [east]. There were people doing survey, they had camera and backpacks. So I didn't want to shoot caribou when people were out there so we decided to leave them alone. That was in July. No, [I did not get any caribou]. They must be doing geology. They pick eggs, flowers, leaves all that. (SRB&A Nuiqsut Interview March 2020)

I went inside here [East Channel], I went all the way up to the cabin. [I went in the] middle of July. That's my usual route right on the Colville. (SRB&A Nuiqsut Interview March 2020)

Last year… I was on the north side of Pisiktaġvik. [In] July, yeah July. (SRB&A Nuiqsut Interview March 2020)

[I went hunting near] one of these little islands across from Helmericks. (SRB&A Nuiqsut Interview March 2020)

And the other one was right around here [Pisiktaġvik]. Just one. Male. It was the same day [in July]. [It was] alone. Someone I was with [got the caribou]. (SRB&A Nuiqsut Interview March 2020)

Fish Creek

I went to Fish Creek, Judy Creek. I got one big bull. There was a caribou on this side [east of Nigliq]. There were herd. [I went] in August. I shot one big bull. Half [of the] herd [was] on this side [east], [and the other] half [of the] herd [was] on this side [west]. There was more on this side [east of Nigliq]. [There was] maybe over more [than] 1,000 [caribou], maybe over 2,000. There were tons of them, and all the trucks went out and shoot at them. (SRB&A Nuiqsut Interview March 2020)

[I] went down to the ocean, all the way to Fish Creek. [It's] quite a bit of ways to the cabins. There's several cabins there. [I went in] August and September. (SRB&A Nuiqsut Interview March 2020)

Itqiliq River

Yeah, Itqiliq. We got two on the way back. Right about where the Y is, in June. [We took a] boat. (SRB&A Nuiqsut Interview March 2020)

[I went] In the Itkillik toward the cabin. Yes, [in August]. [I didn't get any] which is strange. (SRB&A Nuiqsut Interview March 2020)

November last year with my snowmachine I got four females. I just remembered yeah. Right up around here [near Kayuqtusiḷik]. November. Snowmachine. I did [shoot the caribou]. Just seven or eight caribou [total]. I went through Itqiliq and followed the creek and went through the top and back the same way. When I got these four caribous, I hurt my back while I was cutting them up.

I think I got eight in Itqiliq in March. On the east side of the river, all in the same spot. Yes, me [I shot them]. [They were] maybe males, maybe both. (SRB&A Nuiqsut Interview March 2020)

Upriver Colville

I went down [the] Colville. Yeah [Napasulu]. I saw some caribou [by Qitik], but they were too far. [I went in] July and August. No [harvest]. (SRB&A Nuiqsut Interview March 2020)

[I go] upper River. I'm lucky--I catch them pretty close to the village and just go home. [I] go past Ocean Point. Sentinel Hill [Umiuraq] is usually the farthest. I got a tank that takes me to Aŋaġuvik and back. I go [to the short cut by Puviqsuq] in August when the bugs are gone, in July there's too much mosquitoes and bees. (SRB&A Nuiqsut Interview March 2020)

[I went caribou hunting] on the Colville... right at Kikiakrorak [River]. I don't catch caribou around the summer... We went right up to Kogosukruk [River]. I went in the shortcut. There was a lot of fish around there. I couldn't believe it. (SRB&A Nuiqsut Interview March 2020)

Last summer, basically [hunted caribou] on the Colville, upriver. Furthest was around Qitik. Yes [I used the shortcut through Puviksuk]. I think that nowadays that's the way to go, it's pretty much the main way. [I went in] June. Middle of June… that's pretty much the only place [I went hunting last year]. (SRB&A Nuiqsut Interview March 2020)

Yea I think it was like summertime. [I went by] boat. Basically, right around here Pisiktaġvik. (SRB&A Nuiqsut Interview March 2020)

I know we went to Ocean Point and then we turned back around. It's one of these shortcuts [on the other side of Puviqsuq]. We went on the regular channel [in August]. (SRB&A Nuiqsut Interview March 2020)

I just know that we passed the big ridge past Ocean Point, until there was no more hills. They said, 'Soon as we pass those hills, we'll be at Ocean Point.' It started getting foggy, so we turned around, and it was raining. We got one caribou on our way down, we had to leave it because we weren't done with our ride, but we went back and picked it up. [That was at the] end of July or August, before it got ice on the river, when it starts freezing. (SRB&A Nuiqsut Interview March 2020)

We went to the bluffs and stayed there for like two hours. When we got upriver there was nothing but fox, grasses, bear tracks. We went straight from Nuiqsut with my brother, he knew where to go. Yes, [we were searching the whole time]. No, [we didn't catch any], we just saw herds. [It was] towards the end of summar--I'd say August. Yeah, [we took a boat]. We did some walking too. We walked around a lot. When we first get there, they send two or three of us to make sure we aren't hunted by bears. (SRB&A Nuiqsut Interview March 2020)

Last year I only went so far [upriver]. Just for caribou. Yes, [just a little past Umiraq]. July. All of it was July. [By boat]. (SRB&A Nuiqsut Interview March 2020)

To Umiraq [through Anagavik and the main channel]. July through September, by boat. (SRB&A Nuiqsut Interview March 2020)

Last summer I went to check out aunt and uncle's property. Their landmarks were all still up. I end up seeing muskox by Puviqsuq. That's in July. [I was] boating. (SRB&A Nuiqsut Interview March 2020)

Me and my buddy went to Umiuraq. We camped there for about a week. We got two there [at Umiuraq]. [We went] in August… We started running out of gas and headed home. I don't like going up Aŋaġuvik. There was no water, we almost got stuck. We barely made it out, we almost got stuck. (SRB&A Nuiqsut Interview March 2020)

Actually, [partner's] daughters got the caribous. Right there--two there [near Kikiakrorak]. [It was in] August. We spent four days right there waiting for the caribou to come around. [They were] the only one[s] we saw. One male, one female. There was four of them [in the herd]. (SRB&A Nuiqsut Interview March 2020)

Yeah I got one caribou last year. They're usually too far. You don't want to get them too far, just leave them alone. But I got one bull just past Ocean Point [in] August. [There was] only two, I just took one. [I shot it] myself. (SRB&A Nuiqsut Interview March 2020)

Yeah got one caribou last year. They're usually too far. You don't want to get them too far, just leave them alone. But I got one bull just passed Ocean Point [in] August. [There was] only two, I just took one. [I shot it] myself. (SRB&A Nuiqsut Interview March 2020)

[I shot a caribou on the] other side [of Kayuqtusiḷik].It was on the first week of August. Before we went to Cross Island for whaling. Yes, [it was male]. Yes, I think so [it was alone]. (SRB&A Nuiqsut Interview March 2020)

[We got] one caribou right near Qitik. [We] spent the night. [We got] one. Yes, [it was alone]. [There were other bulls, but] they were too far. Someone else shot it. (SRB&A Nuiqsut Interview March 2020)

Just by Ocean Point. [We shot three and] I shot one. [They were males,] yes. [It was] July. I think there were five [in the herd]. (SRB&A Nuiqsut Interview March 2020)

We got two there [Umiuraq]. [We went] in August. My brother did, I didn't shoot the caribou. They were male caribou. There was one female and one little calf. There was maybe like 50 [caribou]. (SRB&A Nuiqsut Interview March 2020)

Me and my buddy got two more [at] Kikiakrorak. [We shot] two. They were laying on the sand. [My] brother did [shoot the caribou]. They were male. [There were] 100 [caribou]. They were just starting to get brown color. Pretty and had fat on them. (SRB&A Nuiqsut Interview March 2020)

Unspecified Harvest Locations

I got like how many of them in between these lakes? There was a herd coming this way [and I] shot two.[They were] both male. I usually go for both [male and female]. [It was in] July. They were scattered I'd say there was 50 [caribou in the herd]. (SRB&A Nuiqsut Interview March 2020)

That was before freeze-up in September. I got three. They were all bulls. I try to get them; they were male. [There was a] little over 50 [caribou]. (SRB&A Nuiqsut Interview March 2020)

After we got those four, we chased them. They ran south by the lakes. I didn't catch them, my buddy got those four [by the lakes]. Males. August. Same herd. (SRB&A Nuiqsut Interview March 2020)

We got two around this area. Just the one. [It was a] female. Probably in July. No [herd] Someone I was with [shot the caribou]. (SRB&A Nuiqsut Interview March 2020)

We did the boating trip on the 9th and we got the one [caribou]. It was just right close to the end right on that shortcut on the sand bar. I did [shoot it]. Male. [It was] alone. There was some nearby, but it wasn't with them. (SRB&A Nuiqsut Interview March 2020)

I got three more in the same area. I got three more in the same area. [I shot them myself]. August. A heard, there was 15. There was three of them. Males. My dad shot one, I shot three. (SRB&A Nuiqsut Interview March 2020)

We got one caribou on our way down, we had to leave it because we weren't done with our ride, but we went back and picked it up. [That was at the] end of July or August, before it got ice on the river, when it starts freezing. [Brother] did [shoot the caribou]. It was a good size one compared to the [road] one and it was skinny as heck!... No, it was by itself. In fact, there was one on the other side of the river. The other people were trying to get it, but they didn't get it. (SRB&A Nuiqsut Interview March 2020)

Right on this side of these lakes. The first two were here and the other two were on this side. Yes, [I shot them]. Yes, [they were males]. July was the first one… [It was] alone. August was the second two… They were by themselves too. (SRB&A Nuiqsut Interview March 2020)

Yes [we got one] on south side on gravel bar. [We shot] one. Someone I was with [shot it]. Yes, [it was male]. In July. Yes, [it was alone]. (SRB&A Nuiqsut Interview March 2020)

Yes, [I shot] two. Almost right at my mom's camp. Yes, [they were males]. In July. Yes, [they were in a herd of] about 300. (SRB&A Nuiqsut Interview March 2020)

Once I know where the caribou are at just go straight up to them. [I shot] five [here]. Me and my family [shot them]. [I have] three girls, they got them with their .22 lever action. Yeah, those are bulls. I'd say a majority of the herd had already passed, [there were] maybe a few hundred. (SRB&A Nuiqsut Interview March 2020)

[There was] just one [caribou] in the little channel. [There was] one on both sides. I shot them. [They were] both male. [I went] almost [towards the] end of July, in the summertime. There was like 30, 40 [caribou]. (SRB&A Nuiqsut Interview March 2020)

I just got only one, had no room for [anymore]. I shot it, cut it, skin it, and put in on [the] four-wheeler. [I went in] August. [It was a] male. There was maybe 10 of them. There was little small calves too. (SRB&A Nuiqsut Interview March 2020)

TIMING OF ACTIVITIES

September is when we like to get our caribou because they're nice and fat. It was weird to put away meat with no fat on it. (SRB&A Nuiqsut Interview March 2020)

September is the best time we get them. Because they're fat; fat and they're mated already. (SRB&A Nuiqsut Interview March 2020)

Yeah, I go [to the short cut by Puviqsuq] in August when the bugs are gone, in July there's too much mosquitoes and bees. (SRB&A Nuiqsut Interview March 2020)

When the water goes low, I don't go out. But when its high, I go out. There's [a] lot [of] water. In [the] first week of July there lots [of] mosquitoes I don't like to go then. I like to go at the end of the month. [I went hunting] seven days in July. Maybe 15 times [in August], when the water goes low, I don't go out, but when its high I go out. (SRB&A Nuiqsut Interview March 2020)

It was towards end of July where they're a little fat, but September is the best time we get them. Because they're fat; fat and they're mated already. All summer we we're going out there. (SRB&A Nuiqsut Interview March 2020)

In [the] first week of July there lots [of] mosquitoes I don't like to go then. I like to go at the end of the month. [I went hunting] seven days in July. Maybe 15 times [in August], when the water goes low, I don't go out, but when its high I go out. There's [a] lot [of] water. (SRB&A Nuiqsut Interview March 2020)

TRAVEL METHOD

We just look around to see anything [is how we how we decide how far we go on the roads]. As long as we can see it [caribou] if it's not too far from the road. (SRB&A Nuiqsut Interview March 2020)

Nowadays most of our hunting is on the road because most of the caribou are by the road [west side] and they don't cross. Last summer it was mostly on the road. (SRB&A Nuiqsut Interview March 2020)

They don't really allow [road hunting], even us members of the community. They complain about us hunting on the Spur Road. Nothing really comes close to town anymore so if you took a walk to the Freshwater Lakes you will see nothing but birds. (SRB&A Nuiqsut Interview March 2020)

We've mostly been hunting on the road, it's easier and you save gas. I think it's a waste [of gas] to go by boat. (SRB&A Nuiqsut Interview March 2020)

[I went hunting on the roads] just only one time, cause there's workers over there going back and forth. I don't hunt there no more. I don't like to go where there's traffic, rigs, and I just don't like to bother [the people working]. (SRB&A Nuiqsut Interview March 2020)

FREQUENCY OF TRIPS

[I went on road trips] quite a few times. In the fall time I tried to go as much as I could, about five to six times, maybe more. Most times, I'd just go home with nothing. You see some, but not a whole lot. They're skittish. (SRB&A Nuiqsut Interview March 2020)

Almost every day, we're riding out there [on the road]. As long as we have gas we're out there. If we see [caribou] we'll tell people, or we'll get them ourselves. (SRB&A Nuiqsut Interview March 2020).

I don't know I had my net right by the bridge. [I went to Nigliq a] couple times maybe 5 or 6 times. I talked to couple people over there and they didn't see any [caribou]. They spend time over there. [It is] usually about an hour round trip [to Nigliq]. (SRB&A Nuiqsut Interview March 2020)

[I was] scouting, stopping, looking around [for] about four to five hours [at Pisiktaġvik]. [I went] just three times. Because when you don't see nothing out there you just don't go out there. (SRB&A Nuiqsut Interview March 2020)

Maybe three or four times [to Fish Creek area west of Nuiqsut]. [I drive from] Nuiqsut to K-Pad and then I'll stop at GMT1 with my truck. (SRB&A Nuiqsut Interview March 2020)

[I went four-wheeler hunting] 15 times, maybe 20 times. At least 20 times [using the roads]. About 6 to 8 hours [on the roads]. (SRB&A Nuiqsut Interview March 2020)

Maybe like three or four times [in July] on the road, that was the only time on the river we took our whole family [out by Ocean Point]. (SRB&A Nuiqsut Interview March 2020)

[I took] probably more than 20 [trips total], just a couple hours—two to three hours. [I took] four to five [trips in June]. Less [caribou hunting] in July and August because I was moose

hunting. A couple [trips in August]. Five [trips in September]. Two to three [trips in October]. (SRB&A Nuiqsut Interview March 2020)

[I went hunting on the roads] just only one time, cause there's workers over there going back and forth. I don't hunt there no more. I don't like to go where there's traffic, rigs, and I just don't like to bother [the people working]. (SRB&A Nuiqsut Interview March 2020)

DURATION OF TRIPS

The trip upriver [Umiraq] was about four or five hours to where we stopped. We couldn't go fast because it was foggy. [It was] like ten hours there and back. (SRB&A Nuiqsut Interview March 2020)

We try to make it a whole day just to make a trip because I really want to get berries [too]. [It's] about six to eight hours [per trip]. (SRB&A Nuiqsut Interview March 2020)

[I went to Nigliq] a lot of times… I went only twice last year. [I'd] spend a day. Day trips. About eight hours, sometimes 10. I like to take advantage of the day light. (SRB&A Nuiqsut Interview March 2020)

That GMT road seems short on a truck but on an ATV is longer. (SRB&A Nuiqsut Interview March 2020)

It's rough by four-wheeler, [you're] most likely [to] break your Honda. [I'd] spend a day. Day trips. About eight hours, sometimes ten. I like to take advantage of the day light. (SRB&A Nuiqsut Interview March 2020)

I went out there [Nigliq] when [resident] said there was caribou out there. It took me two hours to cut up the caribou about a half hour to pack [the caribou] on [the] sled. About four hours [total for the Nigliq trip]. I came home in the dark and I ran into [resident] out there and I got a cigarette from him. (SRB&A Nuiqsut Interview March 2020)

Fish Creek, I went over there just one time. I didn't take very long. We got caught from the wind, it was blowing wind and there were white caps. We stayed there about four days, that was [the] second week of August. (SRB&A Nuiqsut Interview March 2020)

[It took] about half a day [when I went upriver]. Because we had to wait for the last ones [caribous] to get across. (SRB&A Nuiqsut Interview March 2020)

[I] went twice to Itqiliq [River]. [It was] 16 hours each time. [I] left at 10 in the morning and didn't get back until four in the morning. (SRB&A Nuiqsut Interview March 2020)

[I went to Umiraq] about five to six times. Sometimes I go with my cousin with his boat. It takes about an hour to get there. We get off at Ocean Point and look around. (SRB&A Nuiqsut Interview March 2020)

Yes, [we camped]. Just one night, we heard there was a moose out there but we couldn't find it. (SRB&A Nuiqsut Interview March 2020)

HERD CHARACTERISTICS

Last year… I was on the north side of Pisiktagivik…. There were a lot of them [in the herd]: maybe 3 or 4,000 of them. There were some lingering out here. There were a lot of mosquitoes and those caribou flies. (SRB&A Nuiqsut Interview March 2020)

From the beginning of the mouth [of Itqiliq] to Fortymile, [I saw] several hundred at least. Here [in the NPR-A] they split into three herds. They were all bunched up, thousands and thousands. They started walking when the bears start coming around for them [in March]. (SRB&A Nuiqsut Interview March 2020)

There was a caribou on [east] this side [of Nigliq]. They were [a] herd. [I went] in August. I shot one big bull. Half [of the] herd [was] on this side [east], [and the other] half [of the] herd [was] on this side [west]. There was more on this side [east of Nigliq]. [There was] maybe over more [than] 1,000 [caribou], maybe over 2,000. There were tons of them, and all the trucks went out and shoot at them. (SRB&A Nuiqsut Interview March 2020)

I got like how many of them in between these lakes? There was a herd coming this way [and I] shot two. [They were] both male. I usually go for both [male and female]. [It was in] July. They were scattered; I'd say there was 50 [caribou in the herd]. (SRB&A Nuiqsut Interview March 2020)

[I harvested two caribou] closer to CD5. Just two. [It was a] small herd, I'd say not even a dozen. That was in August. [They were] males. [I shot them myself. (SRB&A Nuiqsut Interview March 2020)

And then one here in October… There was two of them [in October]. [It was] male. I only got one of them. There was two herds that went through the roads, one went this way [east], one went this way [west]. (SRB&A Nuiqsut Interview March 2020)

OBSERVATIONS OF HARVESTED CARIBOU HEALTH AND CONDITION

No, they were good. (SRB&A Nuiqsut Interview March 2020)

They were all thick healthy bulls. Yum! (SRB&A Nuiqsut Interview March 2020)

Yep, [they were healthy]. No sick ones this time. (SRB&A Nuiqsut Interview March 2020)

The one I caught… was really skinny. It was really skinny. Yeah, we still ate it. (SRB&A Nuiqsut Interview March 2020)

All were good, all had fat and were healthy. (SRB&A Nuiqsut Interview March 2020)

Yes [the caribou was in good health]. The only thing that [was abnormal] to me is that it had a really small antler and a big antler. (SRB&A Nuiqsut Interview March 2020)

I use the skin for sewing, but this year I was only able to make yo-yos because it was too skinny [the caribou hide], and when I cut the meat they had little white spots in the meat near the spine and buttocks that's where I would find the white pus. I wanted to bring them to you, I had them in a jar. They [family] must of thrown them away. The hair was shaved off [in a lotta places]. Yeah [we left it]. As much as we couldn't afford to throw the meat away even though it was skinny. (SRB&A Nuiqsut Interview March 2020)

I got one sick caribou. I shot it and it was sick. It had real purple meat, yellowish. I think it was at Fish Creek at the end of August. I just skinned it and left it. I didn't want [to] take it home. There were six caribou but I only got one but it was sick so I didn't want [to] take it. (SRB&A Nuiqsut Interview March 2020)

Not two of them, they had stuff in the meat. Green. We cut their head off and left them. It was like on their legs [joints]. Pus. (SRB&A Nuiqsut Interview March 2020)

Yes. The meat was green. They had bumps where the bones attach [joints]. They were like tumors. We just took the head off and left it. (SRB&A Nuiqsut Interview March 2020)

I got one. It was a sick one. It had reddish, bubbly, yellow around the butt part. It had a big nose and black lungs, really black lungs. It was a sick one. I left it out there, cut the head off and left it out there. (SRB&A Nuiqsut Interview March 2020)

One of the caribou, on the liver, had white spots on the liver. I think it's from [right near Spur Road] I took the liver and sent a picture of liver to [North Slope Borough Department of Wildlife Management]. Because I cook and eat the liver. Sometimes I ferment the liver to get a strong taste. And according to what [NSB Department of Wildlife staff] told me, was there was some kind of worm. [I] used the caribou but not the liver. And that's the best part, you get a lotta nutrients from the liver. (SRB&A Nuiqsut Interview March 2020)

Those that are green are just fat forming on their bodies to my knowledge. This year there were a lot of frozen ones. I ran into five this year that hasn't been touched by other animals and frozen to the ground. (SRB&A Nuiqsut Interview March 2020)

IMPACTS ON HARVESTING ACTIVITIES

Impacts of Helicopter Traffic

Last year there was so many helicopters. How come they go on the right season? When we go camping, hunting there's helicopters flying everywhere. There was helicopter on Pisiktaġvik area. There was so many caribou on [the] east side of Pisiktaġvik. (SRB&A Nuiqsut Interview March 2020)

Saw a few helicopters. It was between Nuiqsut and Alpine. In July. [I] don't know [who it was]. And I seen another one by Ocean Point. I couldn't see any name on them [helicopter]. (SRB&A Nuiqsut Interview March 2020)

Impacts of Airplane Traffic

And there was a plane. I think they are [scaring the caribou] because I hardly see any caribou there this year. That was in August. (SRB&A Nuiqsut Interview March 2020)

[There was] a plane [at] Kayuqtusilik. I was coming on to a caribou [to shoot it] and a plane came. It circled around and I lost my chance to get it [the caribou]. I don't know who those people are. (SRB&A Nuiqsut Interview March 2020)

Plane. I don't know what they were doing, but they landed and took off. Around here somewhere [Qitik]. We were hunting moose [and] caribou. August. All those mosquitoes will kill you there's so many. (SRB&A Nuiqsut Interview March 2020)

I do here, at my mom's camp, we do experience plane traffic. From Alpine CD3 Airport, [it] isn't too far [from there]. It's not just Alpine, it's Helmerick's personal planes. (SRB&A Nuiqsut Interview March 2020)

Impacts of Other Traffic

Too many trucks driving. They didn't try to slow down. That was [in] August. They didn't slow down or nothing. There was just too many of them. But that was it. (SRB&A Nuiqsut Interview

Impacts of Oil-Company Personnel

There was a lot of people out there doing survey[s] and we just don't bother. No, I don't know them [people working]. But there was people walking out on the tundra, they were doing surveying. Taking pictures of leaves and grass. I said who are you people? And they were walking with backpacks and a guy with shotgun. Taking pictures of all kinds of plants. (SRB&A Nuiqsut Interview March 2020)

Impacts of Man-Made Structures

[The] pipeline [has impacted me] because I've seen a couple caribou that didn't want to cross [the pipeline]. They would turn back northwest. That's probably the only thing I thought of is the pipeline. They didn't want to cross underneath. [This was] probably in August. (SRB&A Nuiqsut Interview March 2020)

No, just the roads that is the only things I noticed with caribou, they never cross the roads. (SRB&A Nuiqsut Interview March 2020)

One time when they first built the ramp to cross the road, they [ramps] were small, narrow, and slippery; two-by-four wood. Now. Right now they change it; they made it [the ramp] wider and bigger. Right now, the road is very high. If you go out right now and look you can see the ramp. (SRB&A Nuiqsut Interview March 2020)

Other Impacts

There are hardly any [caribou], they hardly come around close anymore. Maybe because it was wrong timing [that we searched for them]. I was looking at 17 to 20 caribou and harvesting and sending [them] to my family in Anchorage. This year I didn't send anything at all. Now I'm saying they should have a public meeting because they feed us [at public meetings]. Cause the store [bought food] is expensive. (SRB&A Nuiqsut Interview March 2020)

No Development Impact

No helicopters, no other people on ground being disturbative. It was a good season. (SRB&A Nuiqsut Interview March 2020)

Naw, I hardly do hunting [this year], hardly. (SRB&A Nuiqsut Interview March 2020)

Not from oil. The others were going towards Fish Creek side and that was diverting them from where I usually go. (SRB&A Nuiqsut Interview March 2020)

No [direct impacts], but our surroundings, yeah. You have to go pretty far to catch anything these days. So many things: planes flying, trucks that scare the caribou away. (SRB&A Nuiqsut Interview March 2020)

Well like I said earlier. The first 10 years was pretty hard with the development, [now things are] settling down, they're [caribou] starting to come around. (SRB&A Nuiqsut Interview March 2020)

No [impact]. It's more like a support road to me. I have more access to the land further to the west. I was, the gravel road is a big plus. Big, Big Big PLUS. Big, big, big, big plus. Thanks for the corporation for making a priority for us to have access to the land. (SRB&A Nuiqsut Interview March 2020)

IMPACTS ON OTHER RESOURCE HARVESTING ACTIVITIES

Not really. Things are starting to come back after Alpine settled down. (SRB&A Nuiqsut Interview March 2020)

That rig you can hear at Oooguruk island [development]. Thumping. You can really hear it. Probably [affect the seals]. Even if you're 10 miles away you can hear them. (SRB&A Nuiqsut Interview March 2020)

Moose. We can see [helicopters] circling one spot. They been putting these landmarks in certain spots [Ocean Point Umriaq area, same reasons as caribou]. (SRB&A Nuiqsut Interview March 2020)

Just catching some sick fish on my net, the broad whites. (SRB&A Nuiqsut Interview March 2020)

No, the fish are way fat though, I don't know. It's different than they used to be, like [they're] too fat. Cause you know when we dry them in the summer, and when it [the hanging fish] gets yellow and strong? I couldn't even eat them. [Even] my seal oil was more yellow, it looked like pee to me. Maybe the river seals [are the seals I'm talking about]. (SRB&A Nuiqsut Interview March 2020)

No. We saw a helicopter near Niglivik [but they didn't bother us]. Yeah, there were maybe 8 miles [away], but we heard them. (SRB&A Nuiqsut Interview March 2020)

Fish. We have sick fish. I don't know how many are telling you but we have sick fish. Last year we caught sculpin up here that had a baby in its mouth. It had hairs on the side of its mouth. There were a couple that had green mucus inside of it, it was probably a cisco. (SRB&A Nuiqsut Interview March 2020)

[There was a] lot [of] impact[s] starting from Alpine. The whole thing bother[s] me. There ice roads over 150 miles all around Nuiqsut. They don't bother us, but we have no choice to get caribou. I got riffle to shoot the caribou and I can't shoot it without looking further out, "Oh, I see a truck, I see a snowmachine" I might as well not shoot. They drag GPS and look for oil. They have a light weight snowmachine with a cooler in the back and look for oil. (SRB&A Nuiqsut Interview March 2020)

REPORTED AVOIDANCE OF SUBSISTENCE USE AREAS

[I avoid] Fish Creek. [It's] too developed, too much stuff in the way. I think I'll try to go to our traditional fishing spots to check how the Arctic grayling and broad whitefish are, because the Nigliq is smaller than the Colville. The buffering in Fish Creek, there's not going to be any buffering [at Nigliq], or the buffering [in the water] might kill the fish because there's not enough water to filter the pH [from the buffering]. (SRB&A Nuiqsut Interview March 2020)

[I avoid the] area towards Fish Creek. I used to go out there [in the] springtime, but it's alright, they don't bother us. They fly on the right season, right month [during hunting season]. There's oil companies like ConocoPhillips, and Armstrong, and Nanuq doing oil search[es], flying, flying, flying. (SRB&A Nuiqsut Interview March 2020)

Fish Creek, I haven't been to Fish Creek in a long time. Sometimes it's just bad weather because I have to get out to the ocean. (SRB&A Nuiqsut Interview March 2020)

[It's low] over there [in the creeks west of Fish Creek]. The land and the ocean are almost the same, it gets kind of confusing out here. (SRB&A Nuiqsut Interview March 2020)

[I avoided] Itqiliq River. It's okay in early July, but it's really shallow. The river will go down and you're stuck. Everybody goes up and down [Itqiliq] real quick. (SRB&A Nuiqsut Interview March 2020)

[I no longer go to] Itqiliq [River because it's] too shallow. (SRB&A Nuiqsut Interview March 2020)

Everything is on Colville, everything is starting to come back alive over there (East Channel) there's just been too much activity over there, but now that Alpine is starting to slow down we mostly try to let them [caribou] cross over to Teshekpuk area. (SRB&A Nuiqsut Interview March 2020)

No, out there is where we usually go, or upriver. Or go passed the water lake [Freshwater Lake], or the hills over there. People used to go so close but they … [don't anymore]. I'm blaming all the traffic that's out there. There's too much dust on the caribou's food from the roads. They eat where there's no dust at all and all of a sudden there's all the dust they're eating. I don't know. (SRB&A Nuiqsut Interview March 2020)

Last year, I never went through Aŋaguvik. But I never went upriver anyways. I was by myself and I was [working a lot]. (SRB&A Nuiqsut Interview March 2020)

Yes, Qitik. Not enough gas. But I never went upriver anyways. (SRB&A Nuiqsut Interview March 2020)

We used to go past the village. That's where we used to go hunting too. My uncle illegally killed a muskox so we don't go out that way anymore. I don't go that way. Whenever my grandma goes out hunting, I go with her. There isn't much hunting around town. A little here or there but I usually don't go around town. (SRB&A Nuiqsut Interview March 2020)

On the river. I don't have my own boat; I go with my family. Sometimes they are not successful [I help them]. (SRB&A Nuiqsut Interview March 2020)

No, I always hunt in the same area. More [hunting] on the road though. (SRB&A Nuiqsut Interview March 2020)

Yes [west of Nuiqsut]. Because they get intercepted here [near Nigliq and Spur Road]. You have to use that road to catch caribou in the fall now. I don't even like to go out there [on the road]. It just doesn't feel right. But if you want to catch caribou before freeze-up, you have to use that road. (SRB&A Nuiqsut Interview March 2020)

[There is a] lot [of] larvae. One of the caribou, on the liver, had white spots on the liver. I think it's from [right near Spur Road] I took the liver and sent a picture of liver to [North Slope Borough]. Because I cook and eat the liver. Sometimes I ferment the liver to get a strong taste. And according to what [North Slope Borough] told me, was there was some kind of worm. [I] used the caribou but not the liver. And that's the best part, you get a lotta nutrients from the liver. (SRB&A Nuiqsut Interview March 2020).

The skin. There was not much fur. [It was] like they didn't grow their hair back or something. And when you're skinning the caribou, it plucks off so easily. That's what made me stop skinning that one caribou cause the hair was falling off. And there was one caribou that had the biggest heart for the smallest body. It was fat [the heart]. We ate it, but the body was small [compared to size of the heart]. (SRB&A Nuiqsut Interview March 2020).

We have actually gotten one with bad knees from ... my grandma had noticed, the smell of it. If you let it thaw out and the smell is really bad then the meat is sick. I heard of caribou in Barrow too that was really sick, and it has a really bad smell on it. Oh bubbles. When the meat is bad it bubbles. It has bubbles, bubbling up from the meat. (SRB&A Nuiqsut Interview March 2020).

These caribous were limping, and half of their antlers were gone, limping all the time. I always see some limping. You can tell when they are in the herd, the horns go up and down, [you] can really see them limping. No [idea why they were like that]. (SRB&A Nuiqsut Interview March 2020).

I know some of them. There was few [caribou] that didn't want to go more east. The others stayed on the east side; they didn't want to go west. They would stick around here [east side]. A small herd went through Nigliq, but there weren't a whole bunch. They went back over and stuck around the small river over here [east side]. I forgot what they call it; it starts with a K though. They stuck around the ocean. (SRB&A Nuiqsut Interview March 2020)

Could I say from last year to this year? They are further out. We have to go far. (SRB&A Nuiqsut Interview March 2020)

There used to be migration [of caribou around the coast]. With all the new construction and building. They [caribou] like to go down to the coast. (SRB&A Nuiqsut Interview March 2020)

No, they are all pretty much the same. Unless you are going back 25 years ago. Back in the days they used to be going all the way past your map [in the east], all along the coast, like 10,000 of them. My dad shot one time and boom, dropped four of them. (SRB&A Nuiqsut Interview March 2020)

Last year there was more [caribou]. There was no helicopter flying and there was more caribou and that was good. First week of July and first week of August to [the] end of August. They go off and on, off and on. (SRB&A Nuiqsut Interview March 2020)

They were all spread out. We had to look for them in binoculars and ride on the tundra in a four wheeler. (SRB&A Nuiqsut Interview March 2020)

I don't know how that rig is gonna do [what effect it will have], but it'll be out here this year [Ocean Point]. (SRB&A Nuiqsut Interview March 2020)

They [caribou] were actually the same last year. They went [to] the same places. Pretty normal. (SRB&A Nuiqsut Interview March 2020)

No, I think there just starting to realize what's out there. The pipeline and whatnot. They're starting to stay on south side of the pipeline, but some are on north side too up there. (SRB&A Nuiqsut Interview March 2020)

No. Just hardly seen any [caribou] this year. (SRB&A Nuiqsut Interview March 2020)

APPENDIX H: NUIQSUT TRADITIONAL KNOWLEDGE OF CARIBOU

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 (2010) through SRB&A (2020)), 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, Libbey, and Spearman 1988). While little data on prehistoric use patterns are available, Burch (1980) estimates that there were approximately 500 Kuukpigmiut (people of the lower Colville River) living on the Colville River in the mid-1800s. Nigliq, near the mouth of the Nigliq Channel and a current camping and fishing site for many community residents, was once a trading site where Iñupiat and Athbascans would gather to trade and fish. As one individual described,

> *There are a lot of unmarked trails up there [near Niġliq]. A lot of history actually. A long time ago before development when they were living in sod houses and dancing there was a lot of trade in caribou and muktuk. That is how they would do it. They would do a lot of trading in the winter and do a lot of hunting in the summer time.* (SRB&A 2016)

Many Kuukpigmiut had moved to Utkiaġvik by the early 20th century due to Bureau of Indian Affairs (BIA) schooling requirements, 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, Itqiliq 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.

Elders and other residents have noted the presence of long-term caribou trails and crossings which have informed traditional hunting areas and even, in part, the selection of the current community site (SRB&A 2018). Crossing areas mentioned by elders and hunters include the Colville River delta near Nuiqsut, *Niġliq*, *Pisiktaġvik, Puviksuk* (farther upriver on the Colville River), *Putu, Aanayyuk*, *Qulvi*, and *Qakimak.* According to community residents, crossing and other habitat areas are influenced by factors such as temperature, breezy conditions, and food availability:

> *I was about 13 years old when the porcupine caribou came through town. I don't see tuttu come through town anymore. There are trails that are old caribou trails, they used to run straight through town but that was before Alpine. They go around now and stay away from the community.* (SRB&A 2016)

> *As long as I have been here we used to get the caribou herd run through town. When I was little. IT's been about 10-15 years or something. Since they actually came through town. They actually come into town, the caribou trails. You can see them come into town. And then there is a couple more, and on top of that hill around here, that hill has a caribou trail that has always been there and everything.* (SRB&A 2016)

> *We don't go south in July because all the caribous are out here [indicating an area from Anajuk Point northeastward to Qulvi], all the way, all the coast. … It's cool over here. We start feeling the ocean breeze around [Anajuk Point]. When we turn, right when we turn, you know, there's the breeze, … and that's where the caribous are, from right here [at Anajuk Point], you know, all along—where they should be.* (HDR Alaska 2015)

> *One of the main caribou crossings on the Colville River delta. And then what I had never realized what Sara Koonalin (ph) had said was that during the migrations and when it's very*

hot in the summertime, the caribous like to go along the high banks of the rivers to stay cool when they're in mass amounts. And then I just wanted to point out, and then keep in mind that, you know, that we have to take care of our caribou and stuff like that, and then just wanted to point out that it hasn't been pointed out in a long time, when the caribou start migrating in low areas where there's swamp and stuff and they like to get on high banks when it's really hot and then that they like to travel through there to try to cool off from the Arctic breeze and stuff. (BLM 2003)

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. While the following discussion summarizes observations of changes within the more recent past, many of these observations are presented in the context of traditional knowledge regarding typical or historic caribou migration, distribution, and behavioral patterns.

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) (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) (MMS 1979)

Starting in the 1990s, Nuiqsut residents continued to express concerns about changes to caribou during public hearings related to the National Petroleum Reserve – Alaska (NPR-A). 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)

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) (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. During the hearings, residents noted that the proposed placement of Alpine Satellites infrastructure was in the pathway of traditional caribou migratory routes and habitat areas:

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.) (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) (BLM 2003)

And the caribou migration where we see that, you know, that [CD3] is an area where the Central Arctic Herd comes in during the insect relief season. You know, that's a very sensitive area that I think needs to be protected. (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. One panel member observed that caribou movement patterns had begun changing well before Alpine Development began, due to the various exploratory activities happening in the region.

In more recent years, Nuiqsut elders and hunters have expressed the belief that the Central Herd migration has changed due to interference from pipelines, and they pointed out several areas on the Colville River delta, including *Pisiktaġvik*, where they used to cross more regularly and in greater numbers. Respondents commented that the reflection from the pipelines deflects caribou and suggested that the oil companies should dull or paint the surface of the pipelines to mitigate this impact. Elders have noted that caribou orient themselves during their migration based on certain landmarks, and that because shiny pipelines mimic the sea ice pack, the pipelines often confuse migrating caribou. One noted, "Also the pipeline is so reflective that sometimes the caribou thinks that is the edge of the ocean, the ice pack, so that is why they go and travel further south of us" (SRB&A 2010b). Another 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).

Elders provided the following additional descriptions of caribou migrations and how they have changed from their traditional routes:

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

I never seen a real lot of caribou. Back then we used to have a lot. There'd be a lot more caribou in this area than compared to the west, Teshekpuk Herd. When they'd migrate there'd be more. In the 50s there's lots of caribou used to cross right down there, in the summer time. Never do that anymore, hardly. They start CD3 and Alpine, but that Tamayayak River used to have lots and lots of caribou but hardly any more. CD3, the people told Alpine, there's hardly any here. There used to be a lot of caribou that migrate right here, they don't do that anymore [by the coast]. (SRB&A Nuiqsut Interview March 2009)

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

> *Teshekpuk go up this way. This side of the Colville. The Central Herd go back [along Itqiliq 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.

During a recent interview, a Nuiqsut Caribou Panel member and elder maintained that Porcupine Herd caribou are distinguishable from Central Arctic Herd caribou through differences in their antlers. Porcupine Herd caribou, in addition to what are referred to as "woodland caribou," have larger antlers which are oriented upward (SRB&A Nuiqsut Interview February 2021).

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)

Elders have also commented that the pipelines and roads cause the caribou to stop and scatter, rather than continuing on their migratory route and remaining as one herd. Residents have noted that large amounts of infrastructure can confuse migrating caribou:

> *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)

The Prudhoe Bay spine road is like a gate: the caribou get corralled in the area by roads, traffic, pipeline reflections, and staging. They get confused. They are scared to cross the pipelines, they are as scary as a grizzly bear would be to the animals. Some caribou are driven south, others are driven to the coast. If more roads are built, then there will be more blockage of the caribou. They will get stuck in the oil fields like a corral. The ones stuck south stay south and get little insect relief, while those going north get to the beach and the coast and get relief. DOI, MMS 2007a

In addition to impacts from pipelines, elder respondents and active harvesters 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." Residents note that caribou are sensitive to sounds (e.g., from traffic), smells (e.g., from industrial emissions), and sights (e.g., shiny pipelines).

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)

Yeah, all of the caribou migrated through there. When I was a young man, I would wait for them there [near Fish Creek] with my uncle. Uncle used to say "you go right at that point" meaning at Nigliq. Used to be they migrated… even to Teshekpuk Lake. You know the caribou calving grounds, north of Teshekpuk… caribou kind of roam, up to the Brooks Range, up to Wainwright, this is the western herd…This is something else too. My own personal view is it because of the lights from the structures, the oil field infrastructure, and the smell. The smell from Prudhoe Bay, you notice with the haze that comes in. Those caribou have a good sense of smell. (SRB&A 2016)

The animals are sensitive to the smell of anything and they can go a different route when they smell something. (MMS 1982)

There used to be thousands of caribou in that area in the 70s. [For the] first time we see a little bit of herd this summer come from the east, because the migrations of the caribou has changed a lot. The Porcupine Herd comes from the east, that's along the coast, and the Teshekpuk Herd comes from the west; that's the western herd. The migration of the western herd has diverted southward. We used to see them coming in from the coastline, but now we see them coming from the south. Mainly [because of] too much traffic. (SRB&A 2016)

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

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

Again, the caribou from the east side has been diverted because of tremendous drill sites; a lot of pipelines crisscross. Our caribou from the east don't come directly through Nuiqsut.

> *They're 15, 20 miles south of here, meaning we have to travel that (much) further to harvest our caribou at some point. If the caribou are left alone by the industries, they will migrate right around through their migration path. But if they are being harassed, they're going to go further south, meaning we have to travel further south towards Umiat to subsist. And they say (that this is) the first time that that has happened to this village.* (Marjorie Ahnupukana) (AECOM 2011)

In summary, traditional knowledge of the Nuiqsut people indicates that prior to oil and gas development in the region, caribou movement through the Colville River delta area was relatively predictable, followed similar patterns from year to year, and included large herds measuring in the thousands. Over time, residents have observed that caribou movement into the Colville River delta is generally less frequent, less predictable, and involves smaller or more widely distributed herds. Through traditional knowledge of historic and traditional caribou migratory and behavioral patterns, in combination with 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 2012, 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 compared to the past:

> *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)

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 tuttus *hang around there, where Alpine is. We used to hunt* tuttu *where the Alpine is.* (SRB&A Nuiqsut Interview March 2009)

During a public hearing in Nuiqsut in 1998, an elder noted the traditional importance of the Teshekpuk Lake area when caribou were unavailable closer to Nuiqsut:

When the caribou was in short supply, we would travel to Tasiqpak knowing that we would find caribou and to the area close to Kuuguluk. Before we moved back to Nuiqsut I used to also do my hunting at Umiat. That area is a prime hunting ground… (BLM 1998)

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)

Another elder noted that a majority of caribou were harvested in summer, as fall was spent preparing foods and shelter for the winter:

> *After we come back from the islands we would spend the summer going up the Colville and spend the summer in the cliffs fishing. Our uncles would be packing caribous. In the fall time we would go back down stream towards their home. They would summer not too far from here and gradually move up where the fish were migrating and spend their time further up river and spending their time drying and hunting for caribou before winter comes. In the fall time they would build a sod house. They would cut thick willows and bend them together make a sod house.* (SRB&A 2016)

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 Itqiliq 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 Niġliq 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 Iñupiaq children attend school, most families from the Colville River region moved to Barrow permanently. However, many returned to the Colville River area during the summer and stayed at fish camps or coastal settlements east of the delta, or they would take shorter subsistence hunting trips during the winter months as time allowed. These patterns persisted until the early 1970s when the region was resettled.

A cultural plan entitled *Nuiqsut Paisaŋich* was prepared in cooperation with the community of Nuiqsut in 1979 and provides insight into community use patterns around the time of resettlement (Brown 1979), and an addendum was prepared in 2018 which confirmed these traditional uses and provided a contemporary update (SRB&A 2018). The *Paisaŋich* 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 Teshekpuk Lake to the Colville River, extending upriver along the Colville River to the mouth of the Chandler River, overland in an area between the Itqiliq 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 the annual reports for the Nuiqsut Caribou Subsistence Monitoring Project (SRB&A (2010) through SRB&A (2020)).

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