Noatak National Preserve
Traditional Use Study:

A Phase 1 Review of Existing Literatures Relating to Traditional Noatak Caribou Hunting

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Table of Contents

Introduction

Caribou (*Rangifer tarandus)*, or *tuttu* in the Iñupiaq language, are fundamental to every aspect of life in Noatak village and in the wider Iñupiat world. The caribou represent a cornerstone of the Iñupiat diet, but the significance does not stop there. The hides and every other part of the animal traditionally serve many purposes—as key sources of food, materials, and medicine, and as materials used for spiritual purposes. Caribou appear prominently in oral traditions and traditional belief—in songs, stories, and ceremonies handed down through generations. Social activities and movements of families have been timed to align with the hunt and the movement of caribou across the landscape. The transmission of knowledge from older to younger community members—about caribou movements and behavior, about the right ways to hunt—are not only key to the physical and cultural survival of Noatak (*Nuataaq*) residents but represent a key part of what it still means to be Iñupiaq in the modern world.

These realities create an urgency to understanding both the current condition of the caribou herds, and the cultural realities related to those herds and their management. In recent decades, caribou numbers have varied and been in decline—while patterns of caribou migration have changed for a variety of reasons ranging from global climate change to localized development pressures and non-resident hunting. Residents of Noatak and other Iñupiaq communities now face the specter of a declining keystone species. They find themselves having to negotiate with land and game managers to access herds that were once freely open for their use. They find themselves needing to be creative and adaptable, mobilizing over vast areas in response to rapidly changing caribou distribution, to monitor the herds and to hunt. All sources, from century-old written literature to the words of living elders, attest that flexibility has been a key part of the traditional hunt—the ability to explore wide areas in search for caribou. Due to the mobility of the herds, hunting areas were vast and changing. In modern times, traditional hunting places still retain their importance, but the hunting range must now expand and adapt to address declines and changes in caribou distribution—at the very same moment that federal and state caribou management have sought to regulate and sometimes limit caribou hunting in hopes of supporting the species' long-term wellbeing.

These relationships come into sharper focus when considering the traditional and ongoing hunt of caribou by Noatak villagers within traditional lands now managed as part of Noatak National Preserve. Descended from two traditional Iñupiaq nations, the

Napaaqtaġmiut and the Nuataaġmiut, the Iñupiaq peoples of Noatak reside a short distance from the preserve, relying significantly on subsistence resources obtained within and near its boundaries—most notably herds of caribou including the Western Arctic Caribou Herd.

In 1978, the U.S. Congress established Noatak National Preserve (NOAT), which encompasses 6.5 million acres of the largest undisturbed watershed in North America—namely, the Noatak River, setting it aside as habitat for a variety of flora and fauna as well as to protect archaeological sites within its boundaries and opportunities for Native subsistence and scientific study. The Baird and DeLong Mountains of the Brooks Range enclose the preserve almost completely. And it is within the preserve that the boreal forest ends, merging into treeless tundra on the valley's southern edge. Hundreds of thousands of caribou typically cross this broad expanse, migrating to and from calving grounds. As one of the world's few remaining vast and untrammeled terrestrial wilderness areas, the Noatak River basin has been named an International Biosphere Reserve; the river itself has been designated a National Wild River for most of its length.

While the preserve is new, the Iñupiaq people and their ancestors intimately understood and utilized the lands within Noatak National Preserve for no fewer than 11,000 years. National Park Service research, such as archaeological research of sites along the major tributaries of the Noatak River, have added to our understanding of these human-environmental interactions. A large and growing written record of the longstanding relationships with the lands and resources in the preserve includes Iñupiaq oral history, as well as documentation produced by archaeologists, geologists, biologists, and other researchers. Indeed, interdisciplinary research efforts—including the present study—have served to gather and organize information to help address problems for the village of Noatak, Noatak National Preserve, and the larger region related to subsistence uses of caribou and other species. Since the creation of the preserve, for example, subsistence studies and tribal consultation records make frequent mention of the negative effects of certain visitors to the preserve on hunting grounds traditionally utilized by Native communities, and on lands critical to caribou migration in the Noatak region. These visitor effects involve, especially, disruptions caused by airplanes and non-local hunters—effects that may be linked in some manner to the very existence of the preserve as a unit of the National Park Service. Past social and anthropological studies of subsistence users and regulatory changes undertaken during this period have brought about minor management changes; yet, they have not fully eliminated local subsistence hunters' concerns.

These and other pressures on caribou herds have increased the need to document the past, present, and likely future significance of caribou to the Iñupiaq peoples of Noatak. The present document, then, serves as a Phase 1 document, meant to assemble information that will aid in future research and resource protection efforts. This is not a "final word" on caribou use at Noatak—in fact, it isn't even close. This is instead a first phase document meant to review certain existing sources on the subject and to organize them thematically as preparation for possible expanded research in the future. The findings presented here are solely meant as a starting point for far more detailed and extensive NPS research, in collaboration with Noatak village—to understand the traditional significance and use of caribou so that the herds and the rich cultural heritage linked to them may be sustained for future generations, in Noatak and beyond.

The findings of this initial investigation confirm the obvious facts of caribou's profound significance to Noatak and other villages associated with the preserve. Certain hunting locations and areas are mentioned, but clearly those presented here are not comprehensive; the full extent of traditional hunting areas will require a more thorough effort involving living tribal members and a range of documentation not included in the present overview. The themes of mobility and adaptability also remain central in all available written accounts—suggesting that traditional hunters had very wide range to pursue caribou, that they have continued to range widely in pursuit of herds, and that the declining scale and changing migrations of caribou require hunters to range as widely now as ever. Writers observing the condition of the Noatak area even decades before preserve creation suggested that changing herd migrations are a central fact of Iñupiaq life. Understanding how Iñupiaq hunters respond to disruption and change is essential to perceiving the wider cultural meaning of the caribou and to comprehending even the most basic and appropriate management needs for the species. Adaptive management, incorporating tribal perspectives and knowledge, is likely to be key to the future of caribou. To this end, we provide not only this Phase 1 summary report, with an annotated bibliography as an appendix, but also a digital archive of approximately 200 pertinent sources for future Noatak village and NPS use, and under separate cover, a short document on the cultural significance of caribou river crossing points. These materials, later to be augmented by future research and expanded NPS consultation with Noatak village, is one small step in the direction of successful future caribou management and the long-term protection of Native subsistence traditions.

Background and Objectives

This document represents the first phase of a Traditional Use Study (TUS), documenting Noatak village use of caribou and possible visitor effects on that use within the Noatak National Preserve (NOAT) unit of the National Park Service. While Phase 1 is complete upon the delivery of this report, additional phases may expand significantly on project themes. This work was part of a multidisciplinary collaboration between the NPS, Portland State University (PSU), and the Noatak IRA (Indian Reorganization Act) Council of Noatak Village. Collaborative research efforts have involved gathering both new and existing documentation by PSU and NPS researchers. This baseline research has been undertaken concurrently with an effort by the NPS to consult and facilitate broader communications between Noatak village subsistence hunters and NPS staff. In this Phase 1 literature review report, we organize research findings with the aim of facilitating later research by NPS and possible PSU researchers—fostering future land and resource-use planning informed significantly by the knowledge, observations, values, and concerns of Noatak caribou hunters. We undertake this effort to foster pro-active and culturally appropriate management on multiple levels.

To achieve the goals of this Phase 1 effort, the NPS determined that a Traditional Use Study or "TUS" is the most appropriate baseline study to provide documentation facilitating subsistence management of resources significant to the community of Noatak. As described in NPS-28, the NPS Cultural Resource Management Guideline, the purpose of a Traditional Use Study is

> "Describing and analyzing traditional resource use…. It fills the data gaps identified by the ethnographic overview and assessment and satisfies requirements of ANILCA… for information on customary uses of cultural and natural resources. Its benefits include the baseline information needed to inform interpretive programs, monitor effects of use on renewable and non-renewable resources, reach culturally informed decisions about appropriate kinds of protection, and assess effects of restricted use on traditional users. Subsistence studies require at least one year of documentary review and intensive fieldwork in collaboration with members of the involved communities, facility with local languages, residence in the community, ethnographic interviewing, and participant observation" (Chapter 10, 3[b]3).

The present document represents the first phase of a Traditional Use Study, assembling basic information that might help to achieve broader aims in later phases.

A TUS assists park managers in planning, programming, and recording treatment and management decisions. These decisions are understood to affect "ethnographic resources" and "ethnographic landscapes" within NPS units, and such landscapes and resources are the focus of the current TUS. Ethnographic landscapes and resources are a category of cultural property, defined by the NPS Ethnography Program as being "important to a people's sense of purpose or way of life."

Phase 1 of the present TUS has involved a literature review generated by Portland State University and augmented by NPS staff, but has also been shaped by the outcomes of meetings and reconnaissance-level ethnographic interviewing of Noatak subsistence users by NPS staff with occasional technical input from PSU researchers. Phase 1 has included NPS organizing a consultation trip to Noatak and making presentations to Cape Krusenstern Subsistence Resource Commission (CAKR SRC) and the Northwest Arctic Regional Advisory Council (NWA RAC). Consultation and presentations were carried out by Superintendent Maija Lukin with assistance from Hannah Atkinson, Cultural Anthropologist, and Hillary Robison, Cultural Resource Manager.

Based on ongoing consultation and research findings, we anticipate that later phases might include a broader research effort to expand and improve significantly upon the contents of this initial literature review. Anticipated future tasks include detailed ethnographic interviewing, site visits as appropriate, and mapping of cultural information (Phase 2); the production of a project report and GIS/map set synthesizing the contents of all available research materials (Phase 3); and a possible fourth phase involving development of some combination of educational, interpretive, and/or map materials for sharing research findings within and beyond the Noatak village community.

The present literature review centers on caribou use and potential visitor effects over a time-span of roughly 80 years. To the extent possible through an initial literature review, this document summarizes several types of information: areas reported for caribou subsistence harvest with the current movements of the herd, areas used for harvest when the herd's migration changes, the location and significance of camps used for caribou hunting and known to be important for caribou herd migration, and the changing nature of visitor effects before and after preserve creation in 1978. While we mention in this document certain sites and areas where caribou hunting has been reported, the list presented here is largely meant to be "representative" and is clearly incomplete—requiring additional investigation and direct engagement with Noatak

hunters and elders who understand the geography of the hunt in intimate detail. Further collaborative mapping efforts, even the use of placename data and other lines of evidence, may help augment more conventional subsistence reports and ethnographic publications.

We hope this work supports NPS creation of an adaptive management plan for caribou hunting in Noatak National Preserve that reflects the natural and cultural realities of caribou, and the mobility and adaptability of the species. In turn, it is our hope that such research efforts and direct Native-NPS engagement will help sustain the long-term viability of the caribou herds of Noatak as well as the communities and cultural traditions that depend on the hunt.

Environment

Situated on the west bank of the Noatak River, Noatak village is approximately 81 miles north of Kotzebue and 102 miles north of the Arctic Circle in Alaska. At a considerable distance from any other major human community, Noatak village is the only settlement along the entire length of the 400-mile Noatak River. The surrounding landscape is characterized by variegated, encompassing wide river valleys, craggy mountain peaks, and vast expanses of treeless tundra.

Weaving this variegated landscape together is Noatak River. Its headwaters begin at Mt. Igikpak, an 8,276-foot tall mountain in the Shwatka Mountains in the central Brooks Range, and run 400 miles west in a semi-circular path through a broad basin, flowing west for the majority of its length before it turns south and empties into the Kotzebue Sound near the mouth of Hotham Inlet. Approximately 100 miles below the Noatak River headwaters is the Noatak Basin, an expansive valley 80 km wide and 130 km long. It extends westward into Kotzebue Sound and is bounded by the DeLong Mountains to the north and the Baird Mountains to the south. The basin is centered along the Noatak River and receives water from three primary tributaries: the Anisak and Aniuk Rivers that enter from the DeLong Mountains from the south, and the Cutler River that flows from the northerly Baird Mountains (Elias et al. 1999). In many places, including the broad Noatak Basin and again at its estuarine outlet, the river becomes a network of braided channels (Northwest Arctic Borough 2016). Except during the three to five weeks following ice break-up and during summers of intensive rain, the river is navigable—in the winters by snowmachine and in warm weather by boat (though the river is shallow) (Foote 1960).

Both arctic and subarctic environments characterize the Noatak region. Winters are long and cold with a mean temperature in February of -25 degrees Celsius and temperatures commonly ranging from -21 to 15 degrees Fahrenheit (NANA n.d.). Annual snowfall averages 48 inches. Summers are short and warm with a mean temperature of 40 to 60 degrees Fahrenheit (11 degrees Celsius) (Martin 2009; NANA n.d.), and annual rainfall is around 12 inches. The wettest month is September, while the driest is June (Brubaker et al. 2011; NANA n.d.).

Stretching along the lower reaches of the Selawik, Kobuk, and Noatak Rivers in an otherwise treeless expanse are narrow strips of spruce (*Picea* spp.) and birch (*Betula* spp.) forest. Moss, lichens, and small flowering plants are widespread both within and beyond these forested areas; and in sheltered places along the rivers and small tributary

streams are low willows (*Salix* spp.), dwarf birch (*Betula* spp.), alder (*Alnus* spp.), blueberry (*Vaccinium* spp.), Labrador tea (*Rhododendron* spp.) and cranberries (*Vaccinium* spp.), among other species (Shirar 2009). In other places, the land is relatively devoid of vegetation, marked instead by rocky steep terrain, or covered in hard-packed snow for large portions of the year (Rainey 1947).

Archaeology of the Noatak Region: A Brief Overview

Native people have called the Noatak region home, and hunted caribou there, since time immemorial. Archaeological surveys document human occupation of the region by hunting people over thousands of years—up to 13,000 years before present according to recent archaeological estimates. Noatak National Preserve contains evidence related to the Paleoindian archaeological tradition, marked by "fluted and tapering-base spear points similar to those of mid-continental North America" (Tremayne 2018:8). The Paleoindian tradition in Northern Alaska dates to ca. 13,000-10,000 cal BP (Tremayne 2018:6). Specifically, sites in the Noatak River region contain artifacts of the Sluiceway Complex, characterized by lanceolate projectile points and similar cutting and scraping tools (Dixon 2013:67). These sites include the Irwin Sluiceway site and MIS-495, radiocarbon dated to 10,200-11,500 years ago. The ecological setting of the sites suggest they were used for caribou or bison hunting. Tuluaq Hill is another Sluiceway complex site, radiocarbon dated even earlier to 13,100-13,000 years ago.

The Noatak Management Plan published by the National Park Service in 1985 provides a general outline of people movements throughout the Noatak region beginning with people referred to as 'Northern Archaic' who moved from the forested areas in the south and east into Northwest Alaska over 6,000 years ago. Even at that time, regional subsistence focused significantly on caribou and other land mammals: "these early people did not depend on sea mammal hunting for their subsistence, but depended on caribou and other land animals" (NPS 1987: 2-39). Archaeological evidence hints that these early inhabitants may have been more "Indian" than "Eskimo" in cultural practice (NPS 1987).

Around 4,200 years ago, artifacts associated with the Arctic Small Tool Tradition begin to appear at interior and coastal sites as far south as Bristol Bay and as far east as Greenland. Researchers have found major settlements representing this tradition along the lower Noatak and Kobuk Rivers. Around 2,500 years ago, people of the Norton and Ipituak traditions shifted to coastal regions and marine subsistence practices. Despite this shift, they still hunted and extensively utilized caribou from the interior regions, including places in and around Noatak National Preserve.

By roughly 1,600 years ago, sites throughout the region show clear evidence of a well-established subsistence tradition by Native peoples who specialized in harvesting both coastal marine mammals on the coast and large mammals—mostly caribou—in the interior. These site compositions are diagnostic of what some archaeologists have termed the Northern Maritime tradition. Around AD 1200, these communities show archaeological signatures diagnostic of Iñupiat culture as it was documented at the time of European contact and as it persists in many ways into present day.

Intensive use of the Noatak River Valley becomes clear in the archaeological record of that time. Sites dating to ca. AD 1200-1400 contain evidence of intensified use and occupation of the Noatak River Valley. By AD 1600, people were clearly living in communities and hunting caribou along the full expanse of the river and its tributaries. Communities along the lower Noatak, including the ancestors of modern Noatak village residents, hunted caribou locally while traveling to the coast seasonally to harvest marine resources at villages such as Sisualik and Cape Krusenstern (NPS 1987). In this way, the dual economy of Iñupiat people, focused on the coast and on caribou hunting in the interior, was centered within these largely interior villages. Even into recent times, Noatak and other interior communities continue to focus significantly on local caribou while relying on maritime resources secondarily, as kin in coastal communities live out a "mirror image" subsistence pattern—relying secondarily on interior resources.

The 1960s were a period of significant archaeological research in and around what would become the preserve. The first researcher to carry out systematic archaeological surveys in the Noatak River drainage was Douglas Anderson, who oversaw surveys in 1961, 1964, 1965, and 1966 (Martin 2009). During this same period, William Irving noted a cairn on Primus Creek near the confluence with Buccaneer Creek, at least 92 late precontact house remains within 20 miles of Itivlik Lake, and 24 house remains near Desperation Lake (Irving 1962). At around that time, using a combination of historical and archaeological data, researchers confirmed that people from Noatak village were descendants of the last people to inhabit the upper Noatak River drainage. Residents of Noatak described former home sites for such places as Okak Bend, Feniak Lake, Desperation Lake, Aniuk, and Kaluachack (Stoney 1900, n.d.; Foote 1965). Alongside this evidence, Foote drew upon unpublished manuscripts. He was able to confirm that Nuataaġmiut formerly lived at several winter villages such as Sutkollauk, Nimyuk, Issygok, and Tooloouk in 1885-86, in "sites which are now deserted" (Foote 1965: 252-253).

The first late precontact site excavated on the Noatak River was at Kangiguksuk—excavated by Edwin S. Hall Jr. between 1963 and 1965 and located at the confluence of Kangiguksuk Creek and the Noatak River (670 57′ N, 1610 50′ W), in the Brooks Range of northern Alaska. Dendrochronological analysis of cultural and faunal remains indicate this was a single house occupied by one Eskimo family for four years around AD 1578 (Hall 1969; Shirar 2007). This research provided additional verification of the centrality of caribou in the subsistence and cultural practices of Noatak Basin residents. As Hall concluded, "the total faunal remains indicate that caribou were plentiful in the area while the site was occupied" (Hall 1969: 77). Another late precontact site excavated during this period was the Sapun Creek Site, consisting of the remains of a single house and generally conforming to this regional pattern.

After the burst of research activity in the 1960s, archaeological research declined. Little archaeological investigation was conducted in the Noatak basin from 1974 through 1992. Then, under the direction of Robert Gal, Chief Archeologist for the Western Arctic Parklands (WEAR), archaeological investigations resumed in the preserve—significantly funded as part of NPS's compliance responsibilities under Section 110 of the National Historic Preservation Act (NHPA). As part of this project, study units were created based on river drainages in all four park units administered by WEAR, including Noatak National Preserve. Over the next two decades, WEAR oversaw archaeological surveys near Primus and Buccaneer Creeks: Irwin Sluiceway Site (49XHP00496), Last Day Site (49XHP00497), Tom's Bench (49XHP00468), Richard's Blade Site (49XHP00727), and Hick's Site (49XHP00583) (see overview in Martin 2009). In 2006, the National Park Service excavated one of eight identified house pits at the Maiyumerak Creek Site (XBM-131), a late precontact site located near the confluence of Maiyumerak Creek and the Noatak River in the Noatak National Preserve (Shirar 2007). Here too, the centrality of caribou in Noatak peoples' subsistence and cultural practices is clearly indicated by the faunal assemblage. This is one of only four late precontact sites in the area that have been formally excavated and dated with radiocarbon methods. Reflecting the preponderance of caribou in the site's faunal remains, some thirteen of fifteen radiocarbon ages were calculated from caribou bone samples. Radiocarbon dates from House Pit 8 at the Maiyumerak Creek Site were found to be in the following ranges: AD 1500 to 1670, AD 1650 to 1950, AD 1490 to 1670, and AD 1780 to 1790 (Shirar 2007: 32). Identified mammal bones from the site's faunal assemblage are dominated by caribou remains, representing 92.58 percent. Based on analysis of caribou mandibles and tooth eruption found at the site, the site is consistent with an occupation

of the house from late summer, fall, and/or winter. Identified caribou remains were highly fragmented, suggesting marrow and grease extraction in addition to other uses of caribou meat, bone, hides, and organs (Shirar 2007).

Two masters' theses summarize these findings from the Noatak region—ranging from the formative 1960s research through the agency and academic studies of the early 21st century. Martin (2009) provided a full archaeological overview of the Noatak region and sites associated with caribou hunting in a thesis submitted to the University of Alaska, Anchorage titled, "The Archeology of a Caribou Drive Complex: The T-Stemmed Hill Sites in the Noatak Basin, Northwest Alaska." In the thesis, Martin summarizes most of the earlier findings of Foote, Anderson, Gal and others, in addition to presenting original archaeological data on caribou hunting. Martin's primary focus is the T-Stemmed Hill Complex, a combination of four sites: 49XHP00491, 49XHP00547, 49XHP00551, and 49XHP00572 (T-Stemmed Hill). Together, these sites exhibit attributes of a communal game drive site where Nuataaġmiut hunters in the late precontact period, most likely from the Desperation Lake area, harvested and processed large numbers of caribou (Martin 2009). The second thesis is Shirar's (2007) "Maiyumerak Creek: Late Prehistoric Subsistence and Seasonality in Northwest Alaska," submitted to the University of Alaska, Fairbanks. Shirar provided a more general review and synthesis of archaeological investigations in the Noatak region as part of their thesis.

Both theses make an unassailable case that caribou has been central to the traditional diet, culture, and economy of Noatak peoples over many centuries of human use and occupation. We recommend both theses as a baseline synthesis of all formal archaeological research in and around Noatak National Preserve preceding the present decade. Additional NPS archaeological surveys have continued since the completion of these theses, and indeed, continue into present day. For example, in 2011 and 2012, archaeologists from the University of Alaska Museum and NPS documented three precontact lakeside village sites in Noatak National Preserve (Shirar et al. 2014). The villages contained house, storage, hunting-related features, petroglyphs, and each contained a large communal dwelling identified as a *qargit*. Subsurface testing of the sites recovered faunal remains and other artifacts. The preliminary results of the faunal analysis indicate that caribou was the most common subsistence resource.

Beyond these works, the NPS has overseen extensive archaeological survey and occasional excavation within the preserve as part of a multi-year research and compliance effort. NPS staff have identified sites, for example, in the Upper Kelly and

Kugururok River Basins where caribou trails are concentrated through mountain passes—accompanied by caribou hunting sites containing caches, lithic scatters, habitation sites and more. Survey and documentation of other places of uniquely concentrated hunting activity, such as at predictable river fords crossed by caribou, have also yielded similar results. Together, these results suggest both the depth and the geographical ubiquity of traditional caribou hunting within what is today the preserve—even as much of the preserve's archaeological record relating to caribou harvests remains as-yet undetected or unrecorded.

Caribou: The Identity and Migrations of a Cultural Keystone Species

Caribou (*Rangifer tarandus)* or *tuttu*, as they are referred to by the Noatak people, are a medium-sized relative of the deer, found in boreal regions across North America and Eurasia (Burch 1972). Caribou have such a singular importance in the traditions of the Nuataaġmiut and other Iñupiat peoples that they are unambiguously categorized as "cultural keystone species." This is a term widely used in modern anthropology to denote those species that "play a unique role in shaping and characterizing the identity of the people who rely on them… that become embedded in a people's cultural traditions and narratives, their ceremonies, dances, songs, and discourse" (Garibaldi and Turner 2004:1). In this respect, caribou hunting has been at the core of what it means to be Nuataaġmiut traditionally. Even today, Nuataaġmiut access to caribou, and the enduring persistence of viable caribou herds in the region, remain key to the preservation of that community's traditional diet, economy, culture, and identity.

Caribou travel widely throughout the Noatak region, largely as part of the Western Arctic Caribou Herd (WACH), grazing on lichens (especially *Cetraria cucullata, Cladonia belliflora*, and *C. sylvatica*), graminoid species—primarily cottongrass (*Eriophorum vaginatum*) and wet prairie sedges (*Carex* spp.), and deciduous shrubs like tealeaf willow (*Salix pulchra*) and dwarf birch (*Betula nana*) (Murie 1935:36-38; Skoog 1968:136-148; White and Trudell 1980). Cottongrass shoots are particularly important during the calving season, and calving areas are often associated with the springtime availability of this plant (Martin 2009). Plant species that are critical in sustaining caribou during the season of migration (cottongrass and lichens) are widespread in the Noatak region, but are also potentially vulnerable to overgrazing and trampling (Inglis 1975; Klein and White 1978:34; Moser et al. 1979; Minc 1985: 52).

Noatak National Preserve sits along the central migration routes of the Western Arctic Caribou Herd, and in or near both the herd's summer and wintering grounds—as well as a short distance south of the herd's core calving grounds. Though its numbers have fluctuated, the Western Arctic Caribou Herd remains the largest caribou herd in Alaska, migrating within a 157,000-mile area in northwestern Alaska (Western Arctic Caribou Working Group 2011). The herd has experienced long-term population fluctuations. During the late nineteenth century, for example, the herd experienced a dramatic

decline, but began to increase once again around 1940 (Foote 1965; Georgette and Loon 1991; Larsen and Rainey 1948). In 2003, the herd reached a peak population of 490,000 (Western Arctic Caribou Working Group 2011). While exact population figures vary, the population trends have been downward since that time, with the herd declining by an average of 4-6% annually, reaching 235,000 only a decade later in 2013 (Mikow et al. 2014). Both the figures and their interpretation vary between agencies, scientists, and local knowledge-holders. According to a Noatak National Preserve "State of the Park" report published by the National Park Service in 2017, the WACH appears to be at the low end of a population cycle, declining well over 50% since 2003 (NPS 2017). While Halas attributes the reduced population to poor calf production, calf survival, range condition, parasites and disease, and harvest (Halas 2015), NPS reports that the health of the herd is stable, attributing the low numbers to natural fluctuations (NPS 2017).

While in recent years a greater proportion of the reduced caribou herd has passed within range of Noatak, hunters have reason to expect a time when caribou will do so no longer. Many Halas respondents remember Elders' warnings that caribou populations will decrease. Noatak resident "Respondent #8" is familiar with this cycle: "'Caribou will go way up and crash. Probably a cycle. The old timers I know they got stories of how hard it used to be to get caribou' (Respondent #8)" (Halas 2015: 39). Based on a long-term analysis of past caribou trends, some writers conclude that: "Given the current state of knowledge, it is not unreasonable to assume that human populations largely dependent upon caribou will be faced with a major resource crisis at least once every 2 or 3 generations" (Burch 1972: 356). This perhaps comes as no surprise to Noatak Elders and hunters who are keenly aware of caribou population fluctuations over generations of accumulated experience.

In more than 40 villages in the Northwest Arctic and Interior regions of Alaska, caribou are still harvested year-round (Mikow et al. 2014; Nedwick and Dau n.d.). During the winter, the animals have a thick layer of fat, and thick fur that is good for warm clothing and bedding; and during the spring, the animal sheds its winter coat, leaving skin soft and supple for summer harvest and the production of clothing and other goods (Larsen and Rainey 1948). In recent decades, commercial operations catering to caribou hunters and even researchers have become part of the local economy. As summarized in one local publication,

> "For indigenous people, the herd is both a vital link to their cultural heritage and a staple source of food. The WAH is also important to visiting hunters and is an important source of income for commercial

> operators who provide hunting and transport services. Given its large size, the biological importance of the WAH to northwest Alaska is significant" (*Caribou Trails* 2014).

The timing, length, and direction of WACH migrations vary, but twice a year the migrations become relatively predictable. In the spring, caribou move to a core calving area on the tundra just north of Noatak National Preserve where much of the herd becomes concentrated.

> "Calving occurs in June along the headwaters of North Slope rivers such as the Colville, Ketik, Meade, and Utukok. After calving, the herd generally moves southwest, then eastward, into the high country of the DeLong Mountains. Many animals shift north to their summer range on the Arctic coastal plain" (Georgette and Loon 1988: 11-12).

Various sources depict the northern edge of Noatak National Preserve as overlapping with the southern edge of the herd's summer range. Fly season, occurring soon after calving, is especially bothersome for caribou. In response, they congregate in areas with stiff prevailing winds, or in areas that contain snow that has yet to melt from the previous winter, where flies are less likely to populate (Burch 1972; NPS 2017).

Beginning in late July and August, and continuing into the fall, the caribou begin to disperse and to migrate south across the tundra—many reaching the Noatak River Valley by mid-August (Foote 1960; NPS 1987; Shirar 2007; Nedwick and Dau n.d.). In mid-September the migratory pace quickens, numbers grow, and the herd moves south through mountain passes and across the Noatak River to wintering areas in the Waring Mountains, Baird Mountains, and other areas to the south. In these places, food is easier to access in the fall and in advancing winter months (Georgette and Loon 1988; Burch 1985; NPS 1987; Anderson et al. 1998; *Caribou Trails* 2014; Nedwick and Dau n.d.). Halas defines the wintering area to include Seward Peninsula, the Nulato Hills, the upper Koyukuk River, and areas of the North Slope, with some ranging outside these areas (Halas 2015; Martin 2009). Still, some caribou do also remain on the tundra, in and north of Noatak National Park, during the winter (Burch 1972; Larsen and Rainey 1948; Shirar 2007). In late winter and early spring, around March and April, the herd will return north to again spend late spring and early summer, May and June, on the North Slope (Shirar 2007).

Despite these general trends, the migratory route between summertime calving grounds to the north of Noatak and wintertime grounds to the south varies considerably over time. Indeed, it can even vary widely during a single year or decade (see Figure 1). In the course of their travels, caribou can range over large expanses of land, avoiding predators and other disturbances, or looking for the best grazing opportunities (Georgette and Loon 1988; Burch 1985; NPS 1987; Martin 2009). The variation in caribou migration routes is due, in large part, to availability of optimal food sources, lichen and mosses, though caribou will also follow the undulations of the landscape, taking the path of least resistance. Based in part on ethnographic accounts by Nuataaġmiut consultants, Burch notes,

> "[Caribou] are frequently said to follow the lines of least topographic resistance during the course of their annual migrations. Thus, it is said, they travel through mountain passes rather than at right angles to them, and they will follow ridges rather than cut across them. Unfortunately, this is true only when the lines of least topographic resistance and the intended route of movement happen to coincide. … [T]he caribou herd in northwestern Alaska travels at right angles to the drainage system, both in the spring and in the fall" (Burch 1972: 346).

As a herd animal, caribou are not only attuned to the subtleties of the landscape, but they are carefully attuned to one-another. According to Spiess, caribou have poor eyesight and depend greatly on their sense of smell (Spiess 1979). He and others have suggested that caribou use scent glands on their feet to transmit messages to other members of the herd, and to relay messages that particular trails are safe to follow. Authors such as Burch have noted that hunters are unable to predictably "follow the herd" on open ground because of the rate at which caribou traverse the landscape and the highly variable migratory pathways of the herds (Burch 1972). Instead, waiting at locations where caribou are most likely to cross waterways during their annual migratory path—notably, at fall crossings on the Noatak River—allows hunters to predictably and efficiently reap a substantial harvest. This pattern of hunting river crossings is suggested as an ancient practice by archaeological and oral history evidence, and is still known to modern hunters today.

Caribou crossing sites along the Noatak River are variable from year to year, though caribou generally follow rivers, creeks, and valleys from the north (Burch 1972). Crossing the Noatak River usually begins mid-August (NPS 1987). Researchers have sometimes attempted to graph or model significant caribou crossings in the Noatak

region, with Minc providing in a table a summary of historical information on caribou herd distribution (Minc 1985).[1] In 1987, Georgette and Loon first documented in detail caribou crossing areas noted by Noatak hunters (Georgette and Loon 1988). They note that key hunting areas front the Noatak River both below and above the Nimiuktuk River confluence. Because caribou usually cross in this area, the 32 miles between the head of the Noatak Canyon ('the canyons') and Nakolik River were used intensively for caribou hunting. One knowledgeable Noatak hunter identified 17 caribou crossing areas near the Noatak and Nimiuktuk River confluence, and more crossing sites farther upriver on the Noatak.

[1] For example, Minc notes based on historical sources: "1884, Kobuk and Noatak Rivers, Numerous (Murie 1935); 1898, Kobuk and Noatak Rivers, Empty of caribou (Murie 1935)" (Minc 1985: 53).

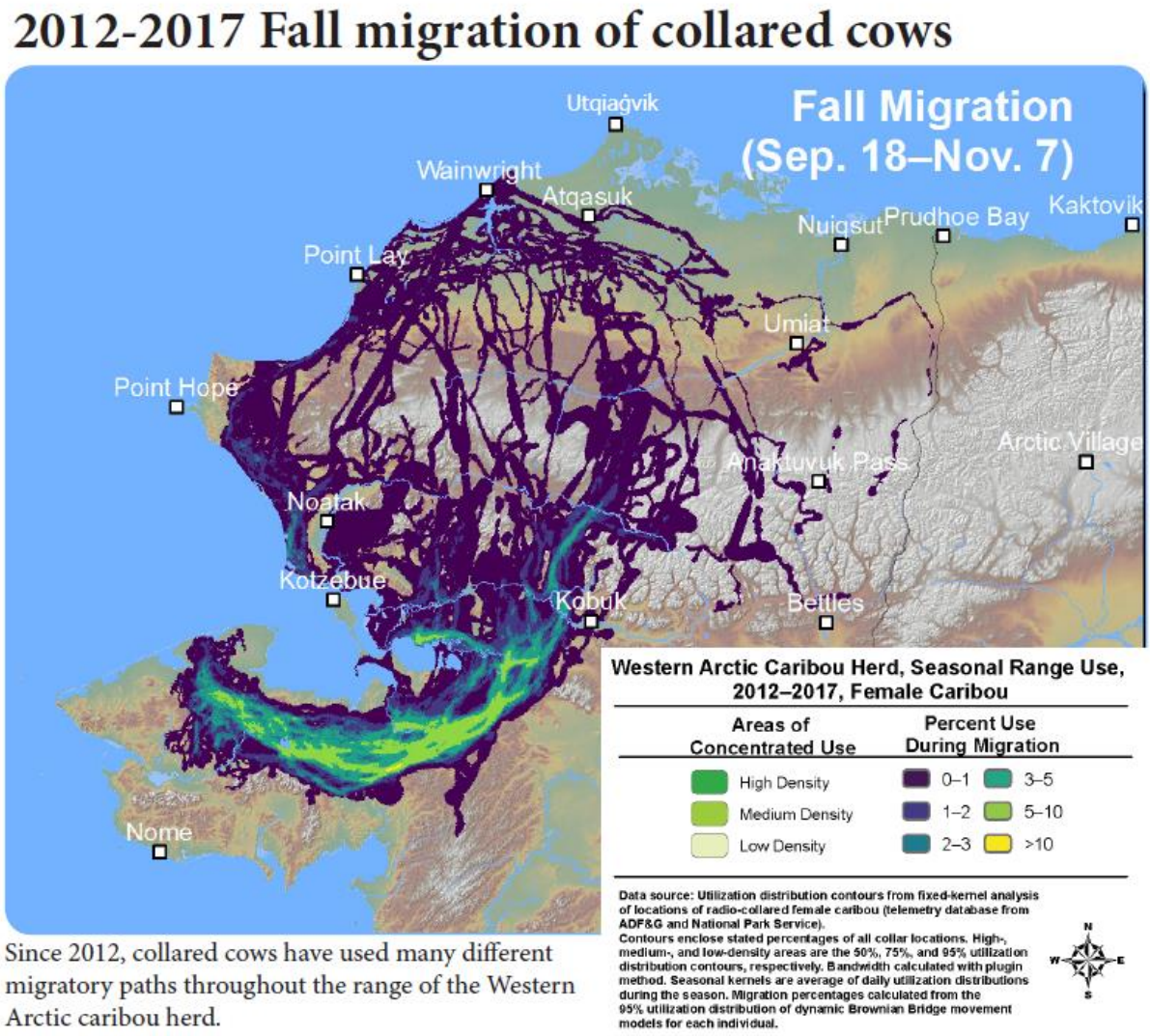

Figure 1: A sample of Western Arctic Caribou Herd movements over a 5-year period (Western Arctic Caribou Herd Working Group 2018:10).

Weather conditions significantly influence the choice of hunting sites and the range of potential river crossings. Georgette and Loon note, for example, that

> "[i]n 1987, when the weather warmed again after a mid-September cold snap, caribou crossed in large numbers near Evaingiknuk Creek, about 20-25 river miles above the village. Several Noatak boats took day trips to hunt caribou there. According to Noatak hunters, caribou frequently cross the river in that area just before freeze-up" (Georgette and Loon 1988: 24).

Under certain conditions, Noatak hunters traveled to the more open areas between the Kelly and Nimiuktuk Rivers. Long-term changes in climate may be affecting caribou migration patterns, with hunting sites moving accordingly. For example, Noatak hunters reported that more caribou have begun to cross lower on the Noatak (and the Kelly, Kugururok, and Poktovik) than they have in the past (Georgette and Loon 1988).

Recent research suggests the extent and dynamism of river-crossing hunting sites. An Environmental Impact Report by Tetra Tech completed as a function of the Red Dog Mine Extension, documents residents who, when interviewed, indicated that

> "caribou traditionally cross the Noatak River from the east near Noatak in the fall; once they have been informed of their crossing, residents in Kivalina expect the arrival of caribou within a couple of weeks. In more recent years, however, hunters observe that once caribou reach the road, they are diverted inland toward the mountains and only a few stragglers cross the road and reach the flats east of Kivalina where hunters have traditionally harvested them" (Tetra Tech 2009: 48).

And in a report by Halas and Kofinas, over half of interviewed Noatak hunters reported Nimiuktut and Ninnuqtuchiaq Creeks as caribou crossing places (Halas and Kofinas 2015). Fifty-eight percent of Noatak hunters interviewed identified caribou crossings at Sapun and Niaqulik Creeks. Halas and Kofinas mapped current and past caribou fall migration movements, as well as key caribou habitat by season (Halas and Kofinas 2015).

In Gabriela Halas' master thesis, "Caribou Migration, Subsistence Hunting, and User Group Conflicts in Northwest Alaska: A Traditional Knowledge Perspective," she includes multiple maps illustrating the movement of caribou across the Noatak region as reported by Noatak interviewees (Halas 2015). Her Map 1 shows current caribou Noatak River crossings as reported by Noatak respondents; Map 2 shows past caribou fall migration routes and locations as reported by Noatak interview respondents, suggesting the dynamism of caribou migration over time; Map 3 shows current caribou fall migratory routes and locations reported by Noatak interview respondents; Map 4 shows current and past caribou fall migration patterns as reported by Noatak respondents; Map 6 shows caribou summer, post-calving, and spring use areas as reported by Noatak interview respondents; May 7 shows caribou winter use areas as reported by Noatak interview respondents; and Map 11 shows important areas for caribou reported by Noatak interview respondents (Halas 2015: 149-59). Also included

in Halas are maps of current and past caribou fall migration movements as reported by Noatak respondents and a map that shows important areas for caribou reported by Noatak interview respondents (Halas 2015). Together, these maps—produced with the involvement and oversight of Noatak hunters—represent a significant contribution to our shared understanding of caribou movement through Noatak National Preserve and the response of human hunters to this highly variable geography.

All studies from recent decades suggest variation in the year-to-year migratory patterns of the WACH, and the degree to which this creates a measure of uncertainty for Noatak hunters. Respondent #62 in Halas has had to change his hunting patterns in the last five years in response to alternate caribou migration patterns: "I'm sure they still cross up the Noatak, but they've been coming down all the way to the mouth even. I've hunted down there in the last five years" (Halas 2015: 40). Noatak resident Robyn Howarth has also perceived a change in caribou migratory patterns: "'There used to be so many big herds of caribou that crossed near us, and they were easy to get. Now we have to go way up river and the last few years we hardly get any'" (in Brubaker et al. 2011: 45). In many cases, some departure from time-honored migration patterns and hunting geographies has been mentioned—suggesting caribou crossing the Noatak River both further upstream and further downstream than before. This is also tentatively reflected in Alaska Department of Fish & Game (ADF&G) reports and other sources; according to reports in *Caribou Trails* (2015), for example, caribou collar tracking data from the last three years has indicated high concentrations of caribou crossing the Noatak River to the east of Sapun Creek in September. These changing patterns also affected the timing and location of caribou arrival at other NPS units in the region, such as Kobuk Valley National Park and Bering Land Bridge National Preserve.[2]

[2] Sitting along the Kobuk River, for example, Onion Portage has been a significant caribou crossing point in the past and has been one caribou river crossing that has remained consistent to the present day, even as numbers have varied following region-wide patterns. According to Jackson: "The Western Arctic herd crosses every fall at their traditional crossing at a place called Onion Portage. This place is special; it is a place where the Inupiaq lived thousands of years ago. The implements found there are made from the bones of the *tuttu*" (Jackson 199: 210). Researchers intent on harnessing caribou with collar tracking devices have had great success at Onion Portage due to the consistent arrival of caribou each fall (*Caribou Trails* 2005-2018).

Caribou Hunting in the Noatak Region: Early 20th Century

Available documentation suggests that Northwest Alaska caribou herds were plentiful during the nineteenth century. Burch describes the Western Brooks caribou herd (now referred to as the Western Arctic Caribou Herd or WACH) in the 1850s and 1860s as "numerous" (Burch 1972), the herd so large that smaller bands of caribou were forced into adjacent, less crowded areas like the Selawik, Kobuk, and Noatak regions to overwinter.

Before 1850, two distinct people groups reportedly hunted along the Noatak River— peoples who later consolidated into the Noatak community. Depictions of traditional territories vary, but certain patterns emerge within available sources. Especially along the lower reaches of the river were the Napaaqtugmiut people (meaning "people of the spruce trees" in Iñupiaq), who also seasonally visited and utilized coastal resources along Kotzebue Sound. The Nautaagmiut people— "inland river people" in Iñupiaq — occupied the interior basins of Noatak River (NPS 1987; Northwest Arctic Borough 2016; Harcharek and Craig 1995; NANA n.d.; Foote 1965). Together, their historical homelands and traditional use areas fully encompass the lands managed today as part of Noatak National Preserve.

Both groups relied heavily on caribou, particularly the Western Arctic Caribou Herd (WACH) as their primary source of sustenance. During the fall and winter, the acquisition and storage of caribou was of upmost importance as they relied on these stores of meat through the winter (Shirar 2007). So dependent upon these herds were the Noatak region peoples that: "[O]ne might plausibly argue that people's lives and their residences were ultimately determined by the routes and numbers of migrating caribou" (Lucier and VanStone 1995:85).

The Napaaqtuġmiut people lived in a constellation of settlements on the lower reaches of the Noatak River. Burch estimates ten Napaaqtuġmiut settlements existed in the area, with 264 to 336 people spread throughout the territory in the early 19th century (Burch 1972). Foote suggests that the population declined and consolidated over the next few decades, so that by the "mid-19th century Napaaqtuġmiut families were living in four general areas, around Akveexrak downstream from modern Noatak and adjacent areas along the lower river, at Naupaktosugruk and the present village of Noatak, from

Noatak village to the Kugrurak River and from here to Kayruxtavik on the middle Noatak River" (Foote 1965: 251). Foote estimates that each of the four areas supported roughly seven households, meaning that in total, the core settlements of Napaaqtugmiut people maintained no fewer than 28 households, or approximately 196 people during that period (Magdanz et al. 2010; Georgette and Loon 1991). Georgette and Loon (1991), referencing Burch (1980), provide a description of how Napaaqtuġmiut people moved toward the coast to hunt seals and beluga in March, returning upriver in summer to fish for salmon and hunt caribou in the DeLong Mountains, relying on a "mixed subsistence economy" (Kelly et al. 1990).

The Nautaaġmiut people, also identified as Noatagmiut or Noatagamut in various sources, occupied the upper territories of the Noatak River. An estimated 536 people lived in 22 settlements in the early nineteenth century (Burch 1972; Magdanz et al. 2010). They too relied on caribou for survival, hunting the animals in their upriver territory much of the year (Georgette and Loon 1988). According to Martin, Nautaagmiut families began the annual hunting treks from summer camps to winter settlement areas in the Noatak Basin the first week in August (Martin 2009), traveling at night and camping along the riverbanks during the day. With the involvement of several family groups, hunting took place communally. According to information in Foote, Nautaagmiut families did not live in permanent large-scale winter villages (Foote 1961), but instead resided in traditional winter settlements strategically placed within the caribou migratory path, at known river-crossing hunting sites at areas like Ohkax Bend, Akingyarax, on the Angaeyu River, and on Nav-var-roak Lake. At these sites, harvesters accessed not only caribou, but also fish and ptarmigan (Larsen and Rainey 1948). Their long-term occupation of these sites ensured that communities could successfully hunt caribou no matter when the caribou might arrive, while relying on abundant riverine resources in the meantime.

Foote included estimates of the annual subsistence take of wildlife by both communities in 1850 (Foote 1965). For the Napaaqtugmiut, he estimated a substantial quantity of caribou: Inland Winter (7501 animals), Inland Summer (562), Sisualik Summer (57), and Nirlik-Barrow Summer (481), resulting in a grand annual total of 8601 animals. For the Nautaagmiut, he estimated caribou harvests of comparable scale: Inland Winter (393 animals), Coast Summer (39), and Inland Summer (224), resulting in a grand annual total of 656 animals. Dividing these numbers of total caribou harvested by estimated household numbers, Foote estimated the annual take of caribou by each Napaaqtugmiut household as follows: Inland Winter (14 caribou per household), Coast

Summer (1.9), and Inland Summer (15.5) (Foote 1965). Using the same metrics, Foote estimated the annual take of caribou by each Nautaagmiut household in 1850 as follows: Inland Winter (55.6 animals per household), Inland Summer (22.4), Sisualik Summer (0.71), and Nirlik-Barrow Summer (16.0) (Foote 1965). These figures confirm what is already well known to Noatak subsistence hunters and cultural specialists: caribou was a foremost subsistence resource in the 19th century, central to all aspects of the traditional diet, economy, culture, and even geographical distribution of human communities in the region at that time.

Martin's master thesis, "The Archeology of a Caribou Drive Complex: The T-Stemmed Hill Sites in the Noatak Basin, Northwest Alaska," includes a historical review of ethnographic research throughout the Noatak region, providing information regarding the annual migration routes for the Nautaagmiut people, tracking caribou as part of their seasonal round, circa 1850 (Martin 2009: 22). The majority of the Nautaagmiut people began their yearly migration to prime summertime resource harvesting areas in June. As soon as ice-breakup allowed, some residents traveled down the Noatak River to their spring and summer camps at Sisualik Spit, located on the northern shore of Kotzebue Sound and near the mouth of the Noatak River. Other Nautaagmiut families traveled far to the north—as far as Nigliq, a trading camp at the mouth of the Colville River—while others remained in the Noatak basin until the return of caribou in the fall, in order to take part in summer harvesting of waterfowl, squirrels, and fish (Shirar 2007; Moerlein 2012).

During the summer, this pattern of travel and resource use meant the Nautaagmiut people traveled extensively throughout the interior lands of the region. In contrast, the Napaaqtugmiut people kept largely to the length of the Noatak River and its reaches, and to the coastal waters downstream. Foote provided a comparison of the Nautaagmiut and Napaaqtugmiut peoples' annual food gathering cycle and associated seasonal movements around 1850 (Foote 1965). The Nautaagmiut people spent the summer (June to August) in the upper Noatak River basin; autumn (September to October) in the Noatak River basin as far north as the middle Colville River; winter (November to April) in the upper Noatak River basin; and spring (May to June) in the Noatak, middle and lower Colville and Ikpikpuk Rivers. By contrast, the Napaaqtugmiut people spent summer (July to August) in the lower and middle Noatak River; autumn (August to October) in the lower and middle Noatak River; winter (November to February) in the lower Noatak River; and spring (February to July) in the lower and middle Noatak River. For the Napaaqtugmiut, travel to the lower river often

included detours to the estuary and adjacent coast for social and subsistence purposes. All of these movements were significantly timed to allow groups to pursue caribou at predictable river-crossing hunting sites, in addition to visiting other communities and harvesting other secondary natural resources.

Beginning in the 1860s, the entire Western Brooks caribou herd began to decline. During this same period, exploration of the Noatak region by outside, largely EuroAmerican peoples increased significantly. Increased trade, settlement, commercial whaling, fur trade, and missionary activity both introduced new diseases and produced new hunting patterns, contributing to a swift transformation of the Noatak Valley and the region as a whole (NPS 1987). These combined influences profoundly affected the mobility and distribution of Indigenous peoples throughout the study area. By 1890, the herd had been reduced to a scattering of small bands and by 1920 had all but disappeared from certain traditional hunting grounds (Larsen and Rainey 1948). Forced to find food in surrounding territories, many Nautaagmiut and Napaaqtugmiut people moved 600 km to the northeast to access the Eastern Brooks (or Porcupine) Herd. Others moved toward the coast, many settling around Point Hope where they relied increasingly upon marine resources. In these places, Nautaagmiut and Napaaqtugmiut peoples often became intermarried and integrated with other Native communities that were residents of, or relocated to, the same settlements (Burch 1972; Morehouse 1981; Burch 1999 et al.; Magdanz et al. 2010; Jackson 1999).

For decades, the caribou population remained low, not only in the Napaaqtugmiut Lowland, but along the upper Noatak River and north of the Brooks Range. Foote documented the extensive distances Noatak hunters were forced to travel to find meat:

> "At the end of January and in February, two Noatak hunting parties traveled up the Noatak and across the mountains to the Arctic drainage. They returned with 9 and 15 caribou respectively, which were shared by the village and were said to have relieved a critical shortage of meat" (Foote 1961: 79).

Yet Nautaagmiut and Napaaqtugmiut families weren't the only people adversely affected by declining numbers of caribou in the Noatak region. For example, Anderson et al. documented Kuuvanmiut subsistence practices in the early 20th century, which were historically centered south of the study area. And due to the effects of starvation and disease at the turn-of-the-century, many deaths were recorded in communities like Kobuk (Anderson et al. 1998). During this time of contracting caribou populations,

hunters from Kotzebue regularly visited the Kobuk valley and Noatak region in search of caribou to sustain their communities. The few caribou remaining were far from the Kobuk Valley, but could still be found in the Noatak or near the headwaters of the Totsenbet (John River). This pattern of outside communities coming to the Noatak River Basin in search of caribou—especially in times of declining resource abundance—has arguably continued into recent times. Incidentally, traveling long distances with dog teams—as was the case in harvest patterns described above—required that a significant proportion of harvested meat be shared with dogs. Fortunately, caribou began returning to the fringes of traditional hunting territories, such as the upper headwaters of the Noatak River, around 1912-1913. Foote cites that "Smith observed that they were 'fairly numerous' in the Aniuk lowland and that Noatak and Kobuk natives hunted them (Smith, 1912, p. 320; 1913, p. 50). Snowdon, a Noatak teacher, wrote in 1913 that caribou were abundant [in that area]" (Foote 1961: 79).

This timing corresponds with the consolidation of the village known today as Noatak (*Nuataaq*). The Noatak village area was always a place of significance to Nautaagmiut and Napaaqtugmiut families. Indeed, in a 1959 study of the culture of the North Alaskan Eskimo, published as a bulletin of the Bureau of American Ethnology, researchers identified this area as one of the more important demographic centers of the region historically. In the larger region, they identified three cornerstone sites where groups came together during the winter season: piŋalu on the Noatak River, tivłu on the Tivłik River, and places above Hotham Inlet and the mouth of the Noatak. Spencer describes the composition of these winter sites in detail:

> "The Nuunamiut settlement—and from the foregoing it is not possible to give any statement as to how many people might be found in it at any one time, population expanding and contracting with the seasons—was thus made up of some temporary houses, of the tent variety, others seasonal, tent posts covered with sod, and still others semipermanent. The actual population of any such settlement at the height of the caribou drive would probably rarely exceed 200 to 300, making up a maximum of 50 to 100 able-bodied hunters. Indeed, this figure seems exceptional and the general pattern was 30 hunters, all of whom could use the same *karigi*" (Spencer 1959: 48).[3]

[3] Spencer also documents information from a man born at the headwaters of the Noatak who remembers a hunting village at piŋalu.

Ruby Ayaqin Foster, an Elder commenting in *Caribou Trails*, remembers that many of these villages consisted of sod houses until the 20th century: "We spent the winter upriver in sod houses" (*Caribou Trails* 2006).

Though long a hunting and fishing camp site near the demographic heart of the larger Noatak River Basin, Noatak village took on a new level of importance in the early 20th century. The California Yearly Meeting Friends Church, a federally supported mission school, was established in 1908 at the present site of Noatak Village. Native families found themselves under growing pressure to relocate to communities with schools—a pressure that would persist and intensify through the 20th century. The displacement of communities in the two decades previous added to the shared willingness of Noatak region families to relocate to a shared village center. Gradually, as caribou continued to return to the Noatak area in more substantial numbers, Nautaagmiut and Napaaqtugmiut families, formerly separated into smaller groups throughout the Noatak and surrounding regions, returned to the Noatak Valley area joined by people from Kivalina and Kotzebue, all congregating at Noatak Village (Foote 1960; NPS 1987; Georgette and Loon 1988; Magdanz et al. 2010). By 1915, families who were once spread throughout the Noatak Basin were represented in the village in whole or in part. In the years that followed, most of these families consolidated and integrated to become a single and significantly integrated community of both Nautaagmiut and Napaaqtugmiut—the people of Noatak River and of lands now situated within Noatak National Preserve (NPS 1987; Northwest Arctic Borough 2016).

This consolidation had its costs. Caribou were still relatively few in the lower Noatak River Basin in the vicinity of Noatak village, requiring families to travel very long distances to hunt during early years of the settlement. As Foote notes, "As late as 1939, Noatak residents who sought caribou meat were forced to travel considerable distances; they went north to the Kukpowruk and to the Utukok Rivers, and they traveled further across the Arctic Slope to Point Lay and to Wainwright" (Foote 1960: 1). Through the 1940s, however, the caribou of the WACH began to return to the south side of the Brooks Range and Noatak River valley in substantial numbers, allowing intensified caribou hunting close to home (Foote 1960; Georgette and Loon 1991). The arrival of a post office and other services, coupled with the rebound in local subsistence hunting opportunities, ensured that the village of Noatak remained a large and permanent community into the present day.

Reasons for the shift in caribou populations during the 19th century are not entirely known. Some authors (i.e. Foote 1960) cite overhunting between 1895 and 1910 as a result of increased non-Native visitors and hunting pressure, due to the Kobuk and Nome gold rushes and the Arctic whaling period. C.H.D Clarke was first to publicly suggest natural cycles of caribou abundance, which he posited occur over a range of 100 years (Clarke 1940; see also Burch 1972). While the length and degree of these distribution cycles has come into question (Minc 1985; Anderson 1998), many biologists have concluded that long-term fluctuations in individual herds occur somewhat independently of human predation and are perhaps reflected in the historic, and continued, rise and fall of caribou in the Noatak region (Burch 1972; Minc 1985; Anderson 1998). Modern interpretations of historical variability in caribou abundance present hot and contentious issues in policy circles and are the focus of significant ongoing biological research; long-term and short-term variability in caribou numbers are now increasingly suggested, in which human pressures can significantly compound (or be offset by) variations caused by natural phenomena and population dynamics (Vors and Boyce 2009).

Caribou Hunting in the Noatak Region: Mid-20th Century to the Present

Located approximately 75 miles from the mouth of the Noatak River, Noatak Village is a four or five-hour boat ride from Kotzebue (Northwest Arctic Borough 2016) and a few miles west of the Noatak National Preserve (NANA n.d.). By the middle of the 20th century, the rebound in Noatak Basin caribou populations allowed Noatak residents to maintain a robust subsistence tradition despite an increasingly settled life. Residents resumed traditional seasonal migration patterns from the newly consolidated Noatak Village very similar to those of ancestors a generation or more before. Hunting for caribou in the fall provided food resources year-round (Georgette and Loon 1988).

When ice on the Noatak River broke up between May and late July, many residents from Noatak continued the Napaaqtugmiut tradition of harvesting resources on the coast. Families traveled downriver to Sisualik on the coast, harvesting marine resources during the spring and summer months before returning upriver in August, when caribou were hunted as they cross the Noatak River on their southward migration (Foote 1960; Georgette and Loon). Not all Noatak residents of the mid-20th century made these treks, however. Some residents chose instead to stay in the Noatak area, or moved away from the river toward the many lakes, subsisting on waterfowl, squirrels, and fish in a manner reminiscent of the Nautaagmiut seasonal round. Caribou hides were thought to be in prime condition during the summer, and at times men traveled north in search of caribou in lieu of coastal resource harvests (Foote 1960; Shirar 2007; Burch et al. 1999). In many ways, emerging mid-century subsistence cycles were a synthesis of longstanding Nautaagmiut and Napaaqtugmiut practices. Moreover, the growing availability of outboard boat motors and snowmachines in the mid-20th century, soon followed by small airplanes and ATVs, supported this integrated subsistence tradition, allowing long-distance treks from Noatak to the fringes of traditional Nautaagmiut and Napaaqtugmiut territories in every direction.

Certain written accounts of the period prove helpful in parsing out the changing nature of Noatak life and the caribou hunt during this pivotal period—when elders born in the 19th century were still advising young people on the hunt, but from a newly consolidated village and with a steady influx of new technologies and outside pressures. For example, Lucier and VanStone were in Kotzebue Sound in the late summer of 1951 when the Nuataagmiut people from Noatak made their annual visit to Kotzebue village to obtain supplies and visit friends and relatives (Lucier and VanStone

1995). Among these Nuataagmiut were several Elders born in the 1860s and 1870s whom Lucier and VanStone interviewed. In a field journal entry by Lucier in 1952, he relates the following:

> "June 13—Strong west wind. Late last night or in early morning today one boatload of Noatak people arrived and set up their tent near the center of the Sisualik camp. A middle-aged man said that he and his family left Noatak village and started down the Noatak River in their boat two days before. On the way, ducks were scarce and their food was scarce. When they emerged from the river mouth they worked their boat westward along the mainland shore to a camp site where they were stopped by solid ice. They camped there until the ice opened enough to let them boat over to Sisualik. Concerning their journey, the family head remarked, they had gone hungry: 'Seven people, one duck. The dogs got feathers'" (Lucier and VanStone 1995: 27).

The theme of resource scarcity also permeates other accounts of this period. However, the sources offer scant Native perspectives or reporting; thus, readers are unable to assess whether these scarcity narratives represent short-term events or long-term challenges.

The paucity of "insiders' data" was partially addressed by work undertaken a decade later. In 1959, the Human Geographical Studies, a part of the Environmental Studies Program motivated by a federal program to study the industrial applications of nuclear explosives, began field studies in the Kotzebue-Noatak region of Alaska. Cultural geographer, Don Charles Foote, was contracted to conduct personal interviews and document firsthand activities of "Eskimo activity patterns" during a period lasting three years, from 1959 through 1961. During his time in Noatak, Foote documented caribou hunting practices by Noatak residents for a total of three caribou hunting seasons. The 1958-1959 hunting season data appeared in Foote 1959; the 1959-1960 hunting season data appeared in Foote 1960; and the 1960-1961 data appeared in Foote 1961.

Over the course of his fieldwork, Foote observed a gradual shift of caribou migratory patterns that brought the herds increasingly into the vicinity of Noatak Village. When he arrived in Noatak, hunters were required to travel over a hundred miles to find caribou, but by the end of his studies, these hunters were shifting the hunt closer to Noatak Village. In his first report, Foote observed caribou hunters traveling 130 miles up the Noatak River to the Kelly (Kug-gruroak) River or farther to the Nimiuktuk River

(Foote 1959; Georgette and Loon 1988). Project surveys administered by Foote revealed that during the winter of 1958-1959, there was a total of 130 hunting trips (32% of all hunting trips made during that season) northward past the Wuluk River to the areas around Kelly Mountain and Eevangyaek for the purpose of hunting caribou (Foote 1959). Early spring caribou hunting was done in Kivalina. In this publication, Foote provides maps of summer (late June through August), winter (mid-November to March), and spring (mid-March to June) hunting areas from 1957-59—including caribou hunting areas—that further substantiate these long hunting treks.

On the basis of ongoing analysis, Foote attempted to fully describe the geographical range of Noatak, providing clear data that the potential hunting range of the Noatak people encompasses a vast swath of northwest Alaska, including:

> "the waters of Kotzebue Sound around the delta of the Noatak River, the basins of the Noatak and upper Colville Rivers, the Mulgrave and Igichuk Hills, the stretch of coast between Imik and Cape Krusenstern, the Delong Mountains, and the north slopes of the Baird and Schwatka Mountains. The territory actually covered depends primarily on where caribou can be found and may vary greatly from year to year" (Foote 1960: 12).

Foote's documentation also revealed fine-grained details of the traditional caribou hunt as it existed at the time. For example, fall hunting on the Noatak River began in August in 1959. (Two caribou had wandered away from the larger herd and been harvested in July, but Noatak hunters considered these outliers—spatially and temporally.) From area pilots, Noatak caribou hunters confirmed that caribou were migrating from the Cape Lisburne area in a southwesterly direction. Hunters from Noatak prepared to meet the herd at pre-established campsites on traditional caribou fording areas on the Noatak River. A total of 36 hunters made 16 boat trips along the river to intersect with the migrating herd, but only one trip went as far as Nakolik River. All others went to campsites between five and twenty miles above Ipnoarot. After taking part in the hunt and recording many details from the camp he visited, Foote wrote:

> "My wife and I took part in a typical hunting expedition. The party consisted of three men, two women, and one child from Kotzebue; three men and one woman from Noatak; and one man from Ambler. The Noatak group joined the party as it passed the village. We traveled in one large, one medium sized and one small boat and were gone twelve days, from August 19th through August 30th.

> "We went as far as Aakeetkucheyk, a creek joining the Noatak about 120 miles above the village. The party got 45 caribou and one brown bear. Nearly all the caribou were shot in a small meadow about one mile behind our beach camp at Aakeetkucheyk. Bands of caribou came down from the ridges into the meadow to cross the Noatak. Many of the deer killed came within shooting distance while the carcasses of caribou shot earlier were being skinned, butchered, and packed into camp" (Foote 1960: 49).

This hunt continued well into the fall at crossing points along the Noatak. Between October 1 to October 5, 1959, eleven parties killed 135 caribou 30 to 50 miles upriver from Noatak (Foote 1960). Between November 1959 and February 1960, Noatak caribou hunters utilized the Akulugruk River drainage and the upper Hulik River extensively. In April 1960, when spring arrived, caribou hunting efforts shifted back to the Noatak River drainage.

During the winter of 1959-60, Noatak caribou hunters traveled to the valleys of the Kugrurak and Kugroak Rivers, the middle end of the upper Wulik River, and the lowlands of the Noatak River valley. As winter lengthened, so did trips north and northeast in search of caribou. Based on the accounts of Noatak hunters, he explained,

> "When spring thaws hinder travel, caribou hunting will progressively contain itself to the Noatak River valley and to the adjacent and more easily accessible highlands north and west of the village. In the 1959-1960 season, this pattern of hunting activity was evident" (Foote 1960: 2).

In his 1960 report, Foote summarizes the 1959 caribou hunting locations (and the number of animals taken) in an extensive table. The following areas were identified as hunting sites: Kugrurak River (24), Akulugruk River (225), Seevookat Mountain (49), Kappumannik Creek (11), Mamallyrax Creek (17), Pingalurax River (7), Wulik River (86), Kivalina River (19), Katauwak Creek (10), Keegmeesout Hills (5), Ivaengyekyet Mountain (51), Noatak River (98), Mukulogroak (15), and Kaniaxrak Creek (16).

Each year provided a slightly different range of opportunities to Noatak hunters, resulting in a dynamic geography of hunting within lands now within Noatak National Preserve. During the 1960-1961 caribou hunting season, Foote reports that hunters obtained caribou as far upriver as Ningnoktoko (Foote 1961). A total of 111 caribou were harvested. Foote reported that between September 30 and October 5, 1960, eleven hunting parties killed 75 caribou on the Noatak River in the vicinity of

Aakallukseeyueech, 20 miles above the village (Foote 1961), as well as upriver as far as Ningnoktok (Nimiktuk) (Georgette and Loon 1988). After winter freeze-up, hunters traveled as many as thirty miles away from the village using dog teams. On October 8, five hunting teams began to travel northwest toward Pingalurax in search of caribou (Foote 1961).

Throughout this work, Foote and his contemporaries noted the gradual year-to-year movement of major caribou migration corridors closer to the lands surrounding Noatak Village. Migrating a long distance toward the Noatak area over the course of a generation, caribou became not only plentiful near the village, but increasingly easy to access. Therefore, hunters, not having to range as far from home, made shorter trips lasting weeks or days rather than months (Foote 1961; Hippler 1970). During the prior fifteen years, Noatak hunting parties had traveled northwest of the village to search for caribou in the winter months, to an area bounded on the north by the Akulugruk River, the Kappumannik Hills, and the Kugruiak River; and on the south by Keegmeasout and Seevookat. During the 1960-1961 hunting season, a significant amount of caribou (138) were harvested within a triangular area between Killeegraxyat, Talax, and Seevookat. In mid-October, the caribou had become scattered across the flats east of Noatak on the Napaaqtaġmiut Lowland (Foote 1961).

Specifically, within the first week of November of the 1960-61 hunting season, thousands of caribou migrated from the Squirrel River along the Eli River, ten miles from Noatak. Noatak hunters killed 147 caribou from this herd during the first half of November; and 63 were harvested between Kuchaek Creek and Savaksayrax, north of Noatak (Foote 1961). In January, February, and March of 1961, Noatak hunters found caribou on the flats east of Noatak Village. During the last week of January and the first week of February, a herd of at least five thousand caribou was observed along the western flanks of the Baird Mountains where they were hunted from four main camps at the southwestern base of the Myumerott, at Kiloolik, at Koolukutoruk, and at Aaliktonenak (Foote 1961). During the months of April and May, Noatak hunters found caribou on the east and west flanks of the Keegmeasout and in the Kappumannik Hills (Foote 1961). Hunters reported a vast constellation of sites where they had successfully hunted caribou, and seem to have expressed appreciation for the abundance and close proximity of the hunt.[4] Prior to his untimely death in 1969, Foote had compiled a vast quantity of data that continues to be mined for caribou hunting facts.

[4] Foote (1961) summarizes Noatak caribou hunting locations in the autumn of 1960 as the following: Aakallukseeyueech, SW of Savaksayrak, Eevaengyekyak Cr., Pingalurax-

Additional, publicly-funded research provided further detail on these hunting patterns. In 1968, the United State Atomic Energy Commission, Division of Technical Information published a report aimed at identifying potential hydroelectric power sites in Alaska. Within this report is a small amount of new data, a synthesis of prior studies, and a significant amount of material derived from a 1966 publication by D.C. Foote and H.A. Williamson entitled "A Human Geographical Study, Environment of the Cape Thompson Region, Alaska." On the basis of these sources, Arnold produced four maps of land use in the Noatak region (Arnold 1968). These include one of autumn land-use areas (September to mid-October 1950-1960), one of winter (mid-November to March 1950-1960), one of spring (mid-March to June 1950-1960), and one of summer land-use areas (late June to August 1950). While representative of recent caribou harvests, these maps arguably painted a deceptively "static" picture of what was truly a dynamic and rapidly evolving pattern of hunting—influenced by short- and long-term changes in caribou migration patterns. Within this report is documentation of "Present Day Food Quest Activities of Selected Bering Straits Villages," which identifies caribou as a dietary staple and a keystone fall, winter, and summer food source (Arnold 1968: 264).

In the 1980s, both academic and ADF&G subsistence studies began to add new details and depth to the available documentation of the caribou harvest. For example, Schroeder et al. conducted interviews with Noatak hunters in order to gather subsistence information and map caribou harvest areas (Schroeder et al. 1987). Noatak residents were asked to mark harvest locations on quadrangle maps,[5] and data from

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Seevookat, Keegmeesout, Flats E of Noatak, Killeegraxyat-Talax, Flats-Reindeer Corral, Samarurux-Keeaek Cr., Seevoorax Cr., Flats-Oloowik R.; from autumn of 1960 to the winter of 1961: Flats-Oloowik R., Flats E of Noatak, Flats-Asinglaganik, Pingalurax R., Savaksayrax, Kuchaek Cr., Flats-Myumerott, Seevoo-Wulik, Flats-Killoolik, Napaktulik Mt., Seesauk-Kugroak, S of Myumerott, Flats-Kooluktoruk, SE side of Myumerott, Flats-Reindeer Corral.; in the winter of 1961: Flats-Myumerott, Aaliktonenak, Flats-Koolukutoruk, Flats-Oloowik R., Oloowik R.-Myumerott, E of Naupaktusugruk, Flats E of Noatak, Flats-Seeveesuk R., Flats-Reindeer Corral, Flats-Killoolik, Kivalina R., Keeaek Cr., Kochuruk-Samarurux, Aakallukseeyueech, Kaniax W of Noatak, Keegmeasout, Seevoorax Cr., Keeaek Cr.–Keegmeasout; and the from the winter of 1960 to the spring of 1961: Napaktulik Mt., Eevaengyekyak Cr., Mamailyrax, Keeaek Cro-Keegmeasout, Akulugruk R., Akkutuktouk, Keegmeasout, Kappumannik Cr.–Kamanik.

[5] The study area included the following maps: Ambler River, Baird Mts. #1, Baird Mts. #2, Delong Mts, Howard Pass, Killik River, Kotzebue #1, Kotzebue #2, Misheguk Mt. #1, Misheguk Mt. #2, Noatak #1, Noatak #2, Point Hope, Point Lay, Shungnak, Survey

this study was compiled into a set of maps called, "The Subsistence Use Area Map Atlas for ten Kotzebue Sound Communities," currently on file at the Juneau, Fairbanks, and Kotzebue offices of the Alaska Department of Fish and Game, Division of Subsistence (Schroeder et al. 1987). In 1987, Susan Georgette and Hannah Loon conducted field work in Noatak village (Georgette and Loon 1988). Their study area was defined as an area from the Eli River to the mouth of the Nimiuktuk River. Twenty-one households in Noatak were interviewed during the hunting season in 1987, August through September. Hunters were asked to describe their caribou hunting areas, methods, camp locations, costs in dollars and time harvest groups, hunter success, caribou movements, aircraft incidents, and changes over time, to determine the effect of increased air traffic within the study area. Concurrently, the Alaska Division of Game and Department staff at Kotzebue completed three aerial surveys of the Noatak River.

Through this work, Georgette and Loon documented that Noatak residents begin to take day or weekend trips upriver looking for evidence of the start of the caribou migration in mid- to late-August (Georgette and Loon 1988). In late August or early September, hunters start taking longer trips of more than 150 miles, lasting three days to two weeks, traveling past the Kelly River. Many accounts suggest the flexibility of traditional hunting strategies involving visiting a number of alternative locations looking for caribou—usually with motor vehicles that allow widespread searches for herds. For example, one hunter reported that during the fall of 1987 he had "traveled for a day from a camp near Kelly River to the Kaluktavik River without finding caribou, but this hunter later caught some not far above the village" (Georgette and Loon 1988: 32). Most of the hunting in 1987 by Noatak residents took place in the Poktovik area, about five or six hours away from Noatak by boat (Georgette and Loon 1988).

In the fall of 1987, Georgette and Loon identified an area between Noatak Canyon and the Nakolik River used by Noatak caribou hunters (Georgette and Loon 1988). Twenty-seven boats made at least one trip over a 36-mile stretch between the Kelly and Nimiuktuk Rivers, along with some areas farther upriver and downriver. Hunters usually only took one boat trip beyond Noatak Canyon each fall, but may take multiple

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Pass, and the Utukok River (Schroeder et al. 1987: 31). For each quadrangle map, there were multiple communities providing caribou harvest data: Ambler River (8 individuals), Baird Mts. (9), Delong Mts (5), Howard Pass (8), Killik River (6), Kotzebue (2), Misheguk Mt. (7), Noatak (7), Point Hope (2), Point Lay (1), Shungnak(8), Survey Pass (5), and Utukok River (2).

trips if caribou are present below the canyons, in areas like the Kelly River. If it remains successful, hunting continues until freeze-up (Georgette and Loon 1988; cf. Foote 1961).

Georgette and Loon also suggest that the age and experience of hunters has affected their level of mobility. Younger hunters, they observed, rarely traveled beyond the Nakolik River in search of caribou. More experienced hunters, however, consistently traveled as far as the Nimiuktuk River. The rapids above the Nimiuktuk test all travelers' skills. At the time of the study, many elders had traveled as far as the Anisak or Cutler Rivers, having camped in the area during their youth. One Noatak man reported that he traveled 50 miles above the Cutler River in his boat. Another traveled past the Anisak River to Okak Bend. Seeking out caribou, one Noatak Elder traveled by boat to Midas Creek at the headwaters of the Noatak River. During this period, in the 1980s, caribou wintered close to Noatak, and hunters were able to harvest caribou during short trips on snowmachines. But Noatak hunters did not expect caribou pathways to always range so close to the village. Thus, while focusing on these short hunting trips over land, hunters remained prepared to travel longer distances or to hunt by boat on the Noatak River to riparian places considered predictable caribou crossing sites during the southern migration (Georgette and Loon 1988).

Their work also suggested the degree to which caribou absence resulted in Noatak hunters targeting alternative species. Georgette and Loon followed up on this theme in a later report on Dall sheep harvests, which intensify when caribou are scarce. They mention briefly in their report that the upper Noatak River canyon (*Ipnagruat*) and an area near the Poktovik Mountains (*Pauktugvik*) are frequently traveled in the fall for caribou hunting (Georgette and Loon 1991).

Importantly, Noatak Elders have experienced and heard about periods of past food scarcity, and these memories play a central role in interviews with the Elders in multiple publications (Foote 1960; Foote 1961; Georgette and Loon 1988; Anderson et al. 1998; Georgette and Shiedt 2005; *Caribou Trails* 2006; Halas 2015; Halas and Kofinas 2015). Returning to Foote on this point:

> "…at the time Noatak was established, the disappearance of caribou in the area caused wide-spread hunger among the Eskimos. Napaaqtaġmiut and Noatagmiut alive today tell vivid stories which recall the reality of starvation at that time. Kate Burns, a Napaaqtaġmiut, lived at Akveerax with her family. When she was about 12 years old (ca. 1902), food became scarce. In the spring, when the other families journeyed to the coast in

> search of food, she was left alone with her sick mother. Her mother finally died and Kate walked alone without eating or sleeping over to the coast…. Kate recalls that starvation forced some Noatagmiut families to descend the river to join the Napaaqtaġmiut in search of food, even accompanying them to the coast to hunt seal in early spring" (Foote 1961: 79).

When caribou have been scarce, birds, fish, seal, and plant foods become alternate food sources (Foote 1960; Hall 1969; Georgette 2000). One Noatak Elder offered this example: "One year I remember, maybe 1955, everyone was hungry. We never get fish. There was high water, and we couldn't dry fish because of rain. No caribou at that time. We only had ptarmigan to eat" (Georgette and Shiedt 2005: 66). In this way, the very ancient "mixed" subsistence economy of Noatak, providing access to both interior and coastal resources, has helped foster long-term resilience in the community (see Figure 2). Burch identifies how Noatak-region communities who rely on resources that experience regular scarcity have built-in responses to compensate (Burch 1972). And Anthony examines how periods of food scarcity translate into a sense of insecurity that defines overall cultural and subsistence patterns. He recommends a closer look at the 'ecosophy' of Alaska Native peoples (Anthony 2013). Minc has also explored how ancient Iñupiat oral traditions reference times of hunger and environmental stress, and in turn offer prescriptions for how to survive in such times (Minc 1984).

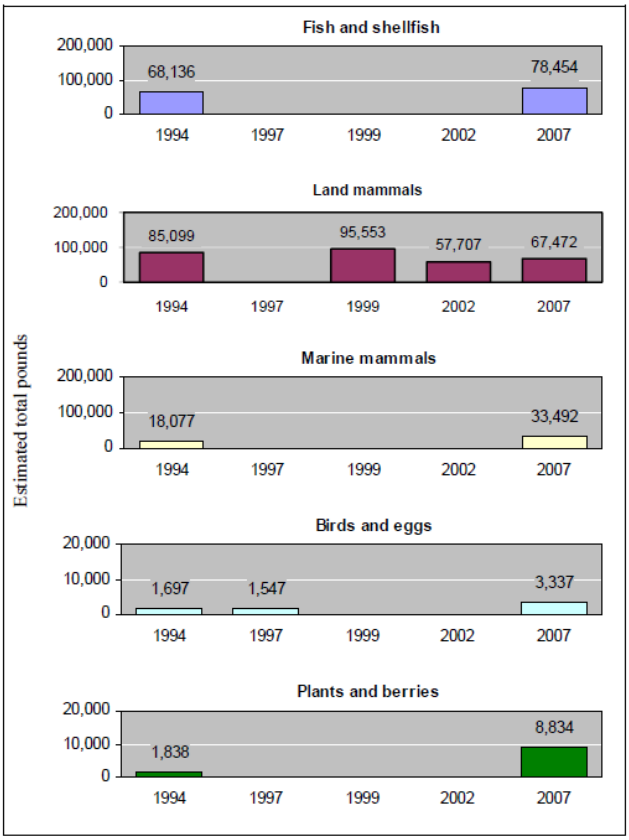

Figure 33.–Estimated total subsistence harvests by category, Noatak, 1994–2007.

Figure 2: Types of subsistence resources harvested by year, Magdanz et al. (2010:60)

Georgette, now the USWFS Selawik Refuge Manager, has continued to work closely with the Noatak people to document caribou harvests and other resource practices—expanding much on the picture of subsistence presented in earlier literatures (Georgette 2016). In her 2016 publication, she provides a cumulative data table of the number of caribou harvested in Noatak in the fall and spring between the years of 1984 and 1992. Georgette et al. includes a short description of caribou hunting statistics from surveys conducted between November 2001 and October 2002 (Georgette et al. 2004). In this document is a written summary of the data, as well as 40-50 pages of tabular and graphical data showing the survey results.

Both the USFWS and ADF&G continue to assemble data on caribou harvests in the area, in datasheets and gray literatures available from both agencies. A 2010 study by Magdanz et al. documented the 2007 Noatak caribou hunting season, primarily between

the months of August and September when residents were actively following the southward migration of the WAH. In Noatak, ninety of 119 households completed comprehensive household surveys—an impressive response rate. Included in this report is general information regarding Noatak Demographics, Wild Food Use and Harvests, Harvest Areas and Harvest Assessments, Food Security, and Comparisons with Prior Results. Appendix D includes Noatak Maps, 2007. Noatak residents utilized the entire Noatak River Basin from the delta to the mouth of the Anisak River, an expanse of over 20,272 km^2. Not only did residents harvest along the river, they also ranged more than 150 km to the east, south, and west, and 75 km north into the Brooks Range, including the Kivalina River (Magdanz et al. 2010).

In 2007, Noatak residents reported using areas in the immediate vicinity of Sisualik and Anigaaq, while lands draining into Kotzebue Sound and the Chukchi Sea from Cape Krusenstern west and north to Kivalina were not used by Noatak hunters. Magdanz et al. note that these subsistence patterns are similar to traditional hunting territories used aboriginally by the Napaaqtugmiut (Magdanz et al. 2010). Based on data provided by Magdanz (2010), Brubaker et al. calculate that in 2007 Noatak residents used an area of 12,596 square miles, including the northern half of Kotzebue Sound, inland as far north as the Kivalina River, and the entire Noatak River from the delta to the mouth of Anisak Creek for subsistence caribou harvesting (Brubaker et al. 2011).

Mikow et al. provide a limited scope survey of the communities located in ADF&G Game Management Unit (GMU) 22 and 23 (Mikow et al. 2014). In this study, researchers documented the number and sex of the caribou, and the timing of the harvest. Noatak residents harvested 360 caribou, 90 pounds per person, between May 2011 and April 2012. More than half of these caribou were taken in the immediate vicinity of the community. The other significant hunting areas identified were in the vicinity of the Noatak River and its tributaries (Kelly River, Kugururok River, Poktovik Creek, Noalik Creek, and Aklummayuak Creek). Additional locations of caribou hunting occurred in the area near the Maiyumerak Mountains, Eli River, the Lake Narvakrak region, Squirrel River, an area north of Noatak near Wrench Creek, an area east of Noatak near Grand Canyon, and along the coast near Imik Lagoon.

A report by Braem and Kostick provides documentation of Noatak caribou hunting areas during the 2009-2010 and 2010-2011 caribou hunting seasons (Braem and Kostick 2014). The report includes the results of big-game subsistence-harvest surveys from communities harvesting caribou from the WACH. Researchers documented the number

and sex of these caribou, and the timing of the harvest. Between May 2010 and April 2011, Noatak hunters harvested 66 caribou, 16 pounds per person. More than half of the caribou harvested by Noatak residents were in the Noatak River drainage above Kelly River, a hunting area extending from the mouth of the Kelly River to the Kaluktavik River that includes the Poktovik Creek area. Fewer caribou were harvested south of the Noatak River in a hilly area that includes Akikuchiak Creek on the eastern boundary. Other areas utilized include an area southeast in the Nakolik River drainage and an area near Buckland in the Kauk River drainage. One resident traveled to the confluence of the Noatak and Cutler Rivers, an area located north of the mountains above Ambler. Another traveled to the Selawik Hills near Buckland. At this time, it was found that hunters were required to travel farther than in past years—attributed in part to declining herd numbers and changing patterns of movement. When caribou is scarce, they note, hunters must increasingly rely on traditional sharing networks with relatives in other communities, involving both the sharing of meat and the sharing of information between kin (Braem and Kostick 2014).

As part of the Environmental Impact Statement completed for the Red Dog Mine Extension, Tetra Tech also attempted to depict the full scale of Noatak caribou hunting areas used in the lifetimes of respondents (ca. 1925-1986) (Tetra Tech 2009). According to their data, the traditional hunting territories of Noatak extends,

> "west to east from the Chukchi Sea coast near Kivalina into the headwaters of the Noatak River, and north to south from the Amatusuk Hills to Cape Krusenstern (Map 19). Other caribou areas occurred east of Selawik Lake. During the period of 1977-1982, in addition to other undocumented areas, Noatak residents hunted caribou in the Mulgrave Hills as well as along the Wulik River and Ikalukrok Creek areas" (Tetra Tech 2009: 17).

In this same document, caribou use areas utilized between 1998 and 2007 are identified as areas extending along the Noatak River from the mouth to beyond the Nimiuktuk River. The most frequently used river-based hunting areas during this period were between Nimiuktuk and Agashoshok Rivers. Winter hunting areas are identified as extending overland to the east and west of the Noatak. In the last ten years, Noatak residents also reported hunting caribou near Kotzebue, Buckland, and along the Kobuk River (Tetra Tech 2009: 17).

The 2016, the Northwest Arctic Borough publication, "Iñuuniaŀiqput Iļiļugu Nunaŋŋuanun: Documenting Our Way of Life through Maps," published a study with the intention of translating local and traditional subsistence knowledge into map form (Northwest Arctic Borough 2016). The study was conducted over three years, between 2011 and 2014, in the Northwest Arctic Borough communities of Buckland, Deering, Kivalina, Kotzebue, Noatak, Noorvik, and Selawik. Researchers provided maps on which interviewees from each community identified hunting, fishing, and gathering activities. Then the project produced multiple maps showing areas of intense harvesting of birds, fish, eggs, plants, and small animals. However, remarkably, they produced no maps regarding caribou hunting in the Noatak region (Northwest Arctic Borough 2016).

As part of a thesis submission to the University of Alaska Fairbanks, Halas completed some of the most recent focused research on both current and traditional caribou hunting locations, undertaking surveys of Noatak caribou hunters between 2012 and 2014 (Halas 2015). During this time, she interviewed 113 active hunters in the Noatak community. In addition, she identified 20 Noatak residents as "Knowledgeable Hunter," meaning they are no longer considered "active" hunters, but rather, valued knowledge holders. From her data, Halas produced multiple maps, including one that shows caribou hunting areas for Noatak respondents over a five-year period, one showing caribou hunting areas over a lifetime, and another a composite map illustrating both of these five-year and lifetime caribou hunting areas. On these maps, Noatak residents identified especially concentrated hunting at significant caribou crossings at Sapun, Niaquilik, Nimiuktut, and Ninnuqtuchiaq Creeks. Fall hunting is reported as generally done on the surrounding rivers, including the Noatak, as far east as the Cutler River and as far southwest as the mouth of the Noatak at Hotham Inlet. Some hunters travel into the surrounding hills in search of caribou and "pack" it down to the river. Respondent #62 in Halas reported finding caribou all the way at the mouth of the Noatak, and reported hunting there in the five prior years (Halas 2015). During the wintertime, Halas' Noatak interviewees report that caribou hunting is primarily done using snowmobiles, north and northwest of the village in the Kivalina Flats area and near the Red Dog Mine (Halas 2015). Similarly, Braund estimates that most caribou hunting activity out of Noatak occurs within a 60-mile circumference of the village during the winter (Braund 2009).

In recent years, Noatak residents have reported they are again having to travel over extensive terrain to find caribou. The Northwest Arctic Borough documented a decrease in caribou harvesting in Noatak between 1999 and 2010 (Northwest Arctic Borough

2016). During the 2009-2010 fall migrations, the WACH were relatively late moving south through the Noatak drainage and were confined to a narrow east-west corridor along the Anisak River drainage (Mikow et al. 2014). Very few Noatak caribou hunters were especially successful in their hunting efforts during this season. The 2010-2011 migration patterns were similar in that they resulted in few caribou being harvested by Noatak hunters (Braum and Kostick 2014). Halas notes that residents have become acutely aware of these changes in caribou routes:

> "More respondents indicated having a knowledge of caribou migration change, than a knowledge of caribou population. A majority of respondents, 57%, reported that caribou migration has changed considerably ('a lot') in the last ten years. Thirty-four percent stated that caribou migration had changed 'a little,' with only 7% reporting that they either did not know (7%), or believed there has been no change (3%)" (Halas 2015: 43).

On this topic, Halas' "Respondent #16" observed that caribou, until recent times, migrated across the Noatak River, across from the village site. Now, their migration pattern has changed: "They're not coming through the flats [across the village] like they used to. These were like 20 years ago, they were close" (Halas 2015: 41). In a separate study, interviewee Robyn Howarth made similar observations: "'There used to be so many big herds of caribou that crossed near us, and they were easy to get. Now we have to go way up river and the last few years we hardly get any'" (in Brubaker et al. 2011: 45). The State of the Park report for Noatak National Preserve, published in 2017 by the National Park Service, confirms this pattern, providing a stark account of what the Noatak residents already know: a gradual shift in caribou migratory patterns has occurred, confirmed by data received from collared caribou tracked throughout their migratory cycle (Nu 2016). Migratory river crossings during the fall have occurred later and later in the season, affecting the timing and location of subsistence harvests.

Traditional Caribou Hunting Sites and Camps

As caribou have highly dynamic migratory patterns, the tracking and hunting of caribou requires considerable geographical knowledge, passed down generation after generation. Hunting caribou in any season requires extensive and temporally "deep" knowledge of caribou movement and of viable strategies of tracking and herding. This understanding includes an appreciation of how caribou behavior can be affected by interruptions such as noise or the presence of other predators. This knowledge also requires an understanding of how caribou behave in different terrain, such as open tundra, riparian areas, or when crossing water (Burch 1972, Nakashima 1992).

This wealth of knowledge manifests in the methods of caribou hunting practiced by Noatak families (Burch 1972). On open ground, for example, a motivated caribou can run at up to 50 miles per hour; thus, especially prior to the advent of motorized vehicles, hunting caribou by foot on open terrain was challenging. Noatak hunters widely understood that caribou are most vulnerable during water crossings: they arrive at predictable river crossing points, for example, and become relatively awkward compared to when moving on land—unable to move quickly or to escape if they detect hunters. Minc describes in detail how caribou have traditionally been hunted while crossing rivers during fall migrations or herded into lakes during the summer where hunters in kayaks wait to spear them. They are otherwise driven into carefully constructed stone or sod corrals where they are speared (Minc 1985). According to Foote, the Napaaqtaġmiut traditionally drove caribou herds into Nalvaruk Lake where hunters would spear them from kayaks (Foote 1961).[6] This method of caribou hunting is called *kangalanniaq*, meaning "to drive the caribou into the lake and spear them" (Sun 1985: 71, Larsen and Rainey 1948). Ralph Ayyatungaq Raymoth, Sr. remembers when this method was used in summer months:

[6] Foote additionally notes that

> "caribou hunters proceeded up river past the Kougarok River and sometimes as far as the Ningnoktok River. There were good hunting grounds around Nalvaruk Lake, Kanixrax Creek, and Aakeetkuchaek, near Kaniax Creek; the principal autumn and early winter caribou drives took place in these areas" (Foote 1961: 33).

> "There was a ridge the caribou followed. The people piled up the rocks to make them look like humans. Some people were behind the caribou and drove them down that ridge to the lake. The people would be waiting there with their canoes. They killed the caribou with spears while they were crossing the lake. These are true stories that I heard about the caribou" (in *Caribou Trails* 2006).

Caribou hunting methods vary throughout the year. After lakes and rivers freeze over, water hunting becomes impossible. Thus, hunters traditionally employed corrals and other ambush techniques—often in locations near the summertime riverine or lacustrine hunting sites. Especially rich accounts of Napaaqtaġmiut hunters describe the use of corrals or fence-like rows of sticks or other materials to channel caribou into good ambush sites. Authors Larsen and Rainey (1948) and Foote (1961) provide detailed descriptions of this method of caribou hunting:

> "Before they began to prepare the corral, which had to be done before the soil froze, they hunted caribou from kayaks in the rivers or lakes, killing them with flint-bladed lances. Another hunting method used at this time of the year was to build rows of *inuksut,* which led to the entrance of a narrow mountain pass. The caribou were driven in between the *inuksut* towards the pass where they were killed from ambush with arrows" (Foote 1961: 33).

Interviewees such as Johnny Mikiana Norton described caribou corrals being used, and how these traditional forms of hunting fostered teamwork between generations and communities. Working as a team, one group of caribou hunters would drive the animals into a manufactured corral where they were dispatched by other hunters hiding in wait. As he recalled,

> "You had to use somebody else to go move the herd, and someone would hide while the other person drove them to them. The people hiding would shoot them That was how they hunted a long time ago. Today, our young people don't do that now. It is first come, first served. The Elders worked together in the past. When we followed the Elder men; that was how they made us hunt. Together, they worked as a team" (in *Caribou Trails* 2006).

These methods of flushing prey toward other hunters is widespread in Iñupiat tradition, and is even applied to marine mammals. Noting these similarities between caribou and marine mammal hunting, Lucier and VanStone hypothesized that Noatak region caribou corralling techniques inspired the methods applied in early beluga

whale hunts (Lucier and VanStone 1995). They suggest that these caribou hunting traditions were widely known on the coastline in the mid-19th century, a time when Napaaqtaġmiut families often moved to the coast and transposed caribou knowledge to beluga hunts during periods of caribou scarcity.

Long ago, caribou hunting camps were widespread throughout the Noatak River Basin; and that ancestral geography of camps is still reflected in modern resource practices, though harvest patterns and camp locations have changed subtly in the intervening generations.[7] Changes in transportation technology and the increasingly "settled" status of the Noatak community were just some of the factors subtly changing the pace and location of traditional hunting through the 20th century. By the late 1950s and 1960s, caribou hunting had largely become a fall activity, with hunting methods focused especially on camps where hunters could wait at traditional caribou crossing areas on or near the Noatak River, taking caribou from boats or from the shore (Foote 1960, Georgette and Loon 1988, Halas 2015). By early August, mid-century Noatak hunters travelled upriver from summer camps on the coast to caribou camps in the Noatak Basin. They cached maritime hunting gear and assembled caribou hunting gear cached during the previous year, preparing for the fall and winter hunting seasons. They returned to camps that their ancestors had used since long before EuroAmerican contact. Shirar describes these ancestral camps as "semi-subterranean houses along the banks of the river, oftentimes in specific spots they would return to year after year and many times reusing houses from previous years" (Shirar 2007: 12). From these camps, families continued on to winter settlements like Noatak Village while hunters among them remained at camp and watched for caribou at river crossings along their migration routes (Martin 2009).

Noatak hunters selected these hunting campsites based on their knowledge of caribou crossings and other landscape characteristics. In general, caribou hunting camps are positioned near well-established caribou river crossings, where riverine topography and conditions frequently funnel caribou into known fords. Camps are often situated at

[7] In Foote (1965) is a map that includes "Eskimo Settlements Known and Thought to be Occupied About 1850," featuring summer camps and winter houses. It shows the major winter villages of Noatak, Sukkuk, Napaktosugruk, Akveexrak, and one unlabeled winter village along the Noatak River. In his 1961 publication, Foote recorded consistent use of winter caribou hunting campsites along the Kukpuk River and in Augutorux Creek valley and its hinterland from the 1880's until the first decade of the 20th Century.

locations above the tree line with a clear view across the tundra, allowing hunters to watch for approaching caribou that begin to cross the river in mid-August—allowing hunters to assemble and prepare before the next pulse of migrating caribou meet the water. Access to an abundant supply of willows and other woody or brushy vegetation also played a role in determining camp locations. According to Noatak interviewees who spoke to Shirar (2007) and Burch (1998), willow can be used not only for firewood, but to provide protection from the elements and visual cover while ambushing game. Areas with shoreline vegetation also offer opportunities for plant harvesting for food, medicine, or materials concurrent with the caribou hunt. If caribou continue to arrive and remain close to the river, hunting parties continue to occupy the camps until freeze-up (Foote 1961, Georgette and Loon 1988). But once the Noatak freezes over, caribou hunters generally move to join family members at winter settlements. These camps persist into present day.

At times, hunters try to shoot caribou on beaches or riverbanks where they can be harvested easily. Yet interviews undertaken by the current authors indicate hunters traditionally allow caribou to cross the river before hunting begins, so the entire herd is not diverted to another crossing point. This means reducing noise and even removing obstructions from these areas. Within the larger northwest Alaska region, the practice is reported widely:

> "Alaska Native hunting traditions have evolved to allow for harvest of caribou without displacing their historic migration routes. Following these local practices is good for the caribou and good for hunter relations. Allow the first groups of caribou to pass undisturbed. There will be more following these leaders. If hunting along the Kobuk River, hunt only on the south side to allow the caribou to cross undisturbed. Do not place hunting camps so that they block the caribou trails or redirect the migration route" (*Caribou Trails* 2006).

Bulls are targeted during the fall when they are especially fat, and cows later in the year and only in smaller numbers (Georgette and Loon 1988). These traditional practices continue today; Mikow et al., for example, confirmed these patterns, noting that the vast majority of the Noatak caribou harvest during the 2011-2012 season were bulls (308 caribou) (Mikow et al. 2014), with very few cows taken (16 caribou) and more of unknown sex (35 caribou) (Georgette et al. 2005).

From these campsites, Noatak hunters also travel up and down the river in boats, two or three men in one small boat or three to ten in a larger boat, each day scanning the landscape for caribou approaching the river. Once caribou are spotted, the hunters wait in their boats at a point where they expect caribou to cross—being careful not to spook the herd which can divert the entire herd from its migratory path (Halas 2015). According to Noatak interviewees and observations made by Foote:

> "While hunting caribou, the men signal to one another by imitating a raven's call. Because the ravens follow the caribou's summer wanderings, their cry is not alarming to the deer. It is not difficult to get fairly close to the caribou at this season, for they are not very shy when large numbers of them are together" (Foote 1960: 49).

The arrival of outboard motors allowed for these traditions to continue, often with a much expanded geographical range. In Georgette and Loon, a Noatak resident reported that in the 1950s, using some of the first outboard motors, eight to ten hours were required to reach the Kelly River (Georgette and Loon 1988). Hunters would camp there overnight then continue up the river another eight to ten hours to reach caribou hunting areas.

During past studies, Noatak hunting parties reportedly used one boat and traveled on the river from the village to hunting areas over the course of a day. The parties of two or more boats could band together, but this was relatively uncommon. In the mid-20th century, hunters used smaller (14-18 feet) open skiffs to navigate the Noatak River. These were more desirable than larger boats (20-22 feet) used by residents participating in the summer commercial fishing season in Kotzebue Sound, as they could be maneuvered through the shallow water of the Noatak. Georgette and Loon also reported the advantages of small, individual boats, observing that only residents with smaller skiffs were able to access caribou crossing the river in the late fall of 1987, 20 miles above Noatak, when water levels were low (Georgette and Loon 1988). In order to decrease fuel costs, Noatak hunters travel downriver when carrying heavy loads, floating with the current using low or no power rather than traveling upriver against the current. For this reason, hunters often choose not to hunt caribou downriver from the village in fall unless opportunities arise during a trip to Kotzebue (Georgette and Loon 1988).

Much as major winter villages have been consolidated in the region, hunting camps have sometimes consolidated along the rivers; nonetheless, a number of camps are of

enduring importance. During winter of 1960-61, for example, Foote observed a herd of at least five thousand caribou on the western flanks of the Baird Mountains (Foote 1961). Noatak hunters harvested these caribou from four main campsites: at the southwestern base of the Myumerott, at Kiloolik, at Koolukutoruk, and at Aaliktonenak. By 1987, some caribou hunting was done from camps along the stretch of the Noatak River between the village and 'the canyons' in late summer, in conjunction with other harvest activities like berry picking and fishing (Georgette and Loon 1988). Some camped in the Kelly River area, though it is heavily wooded with limited visibility, making caribou hunting difficult. During the 1987 caribou hunting season, Georgette and Loon documented twelve hunting camps, nine of which were located between 'the canyons' and the Nakolik River, a distance of 32 miles along the Noatak River that not only offers unobstructed views of approaching caribou but is unbraided and relatively easy to navigate in a skiff (Georgette and Loon 1988). They write: "There are other areas with similar features and good for caribou hunting, but these are farther upriver and take more time and gasoline to reach. Noatak hunters do not usually travel farther than necessary to reach caribou" (Georgette and Loon 1988: 22).

Publishing in 1979 before park boundaries were finalized, Bob and Carrie Uhl identified key subsistence areas for Noatak residents. The area between the Iggisisauq River and the village site were accessible from town, a popular place for Noatak and Kotzebue camps, and important for harvest of caribou. They write:

> "Most early fall boat hunts for big game whether by Noatak people or Kotzebue Sound people, seldom yield a boat load of meat without reaching the more open area between Kelly (Kugruraq) River and Nimiuktuk (Ninnguqtuuq). This area has many caribou crossing areas and generally offers much more opportunity than lower heavily timbered sections for boat oriented big game harvesters."

The Uhl's also note the importance of this area for caribou hunting by snowmachine in wide open spaces in the mid to upper Noatak. The Nakolik River, by way of the Squirrel River, was an important corridor for Noorvik and Kiana hunters traveling by dog team to the Noatak River Valley when caribou were not found in the Selawik Valley.

Throughout the caribou season, fall caribou camps are occupied continuously by multiple hunting parties. Hunting parties in 1987 were mostly adults with some school-age boys (Georgette and Loon 1988); women with small children generally stayed in the

village, while others chose to participate in the hunt. In 1987, multiple permanent camps existed along the river below Noatak, most near the mouth of the Noatak River belonging to Kotzebue residents. Very few permanent camps were upriver from Noatak (Georgette and Loon 1988). While most fall caribou hunting camps are temporary, varying location each year in accordance with the migratory route of the caribou, hunting camps located in the Kelly and Nimiuktuk River areas are reportedly more permanent (Georgette and Loon 1988). In addition to being reported in various parts of the Noatak River Basin, hunting camps are widely reported throughout the region, with more distant camps sometimes utilized by families from Noatak depending on a range of subsistence and social opportunities.[8]

Some of these camps have also been occupied or utilized by people visiting from elsewhere, or as commercial guides. Georgette and Loon found that a pilot who used the residence in the fall and winter maintained one permanent camp along the Noatak River a few miles above the Kelly River, and another Kotzebue pilot maintained a permanent camp along the Noatak River, several miles above the mouth of the Nimiuktuk (Georgette and Loon 1988). Additionally, they found that of the five guides operating in the Noatak area, one maintained a camp along the Noatak River, a bit more than halfway between Noatak village and the Kelly River. The other guides maintained camps in the Kelly, Kuguroruk, and Nimiuktuk tributaries, and did not utilize the Noatak River to hunt.

Today, as in the past, caribou are hunted continuously throughout fall and into winter; and as before, hunting traditions reflect a combined inland/coast focus. Robert Kirk of Noatak, for example, has two camps: "one upriver and one on the coast" (in Northwest Arctic Borough 2016:164). Due to changes in the settlement patterns and available transportation technologies of Noatak hunters, winter hunting has arguably changed

[8] For example, Arnold (1968) provides a short list of known settlements and seasonal campsites in the Bering Strait Regionm including many that are used by Noatak families. He lists the following seasonal campsites of the Noatagmiut people: Aniyuk on the Arctic coast north of Kotzebue, Mauyoaruk as a campsite on the lower Noatak, and Tikizat at the north end of Krusenstern Lagoon. Noatak is listed as a permanent settlement on the lower course of the Noatak River. Arnold also lists the following seasonal campsites of the Nuataagmiut, but identifies them as "location unknown": Aneyuk (or Aniuk) reported in 1866, Issheyuk (15 homes) reported in 1885, Myoggagallok reported in 1885, and Miayuk, a hunting camp reported in 1885 (Arnold 1968: 244).

more than fall hunting. Unlike fall caribou hunting, Noatak hunters travel either by sled or snowmachine into areas surrounding the village, sometimes around Kivalina Flats, referred to as "the flats" (Halas 2015). Hunting on the flats is a difficult undertaking. During the winter months, caribou are widely scattered throughout the landscape and are much more sensitive to the movement and activities of hunters. This is also the leanest time of year, when the amount of game is particularly low (Shirar 2007). Hunters find little cover, and the intense cold and calm weather of late winter make it easy for caribou to detect sounds and to scatter if spooked. Snowmachines allow hunters to close these vast distances. Noatak hunters try to get within 300 yards of the animals before shooting, aiming to puncture the heart or spine through an area behind the shoulder and slightly lower than the mid-line of the body, crippling the caribou so that it will not run. They must then pursue the caribou either on foot, by snowmobile, or occasionally with a dog team. By March, caribou hunting becomes very inefficient, at which time most hunting is done for the season (Foote 1960, 1961).

In 1959, Foote observed that winter caribou hunting trips from Noatak were at least four or five days long, usually one or two weeks longer depending on the location of caribou, the need for food, and traveling conditions (Foote 1960). Harvested caribou were carried back to the village on sleds. When caribou were plentiful and the harvest too large to bring back to the village, meat would be wrapped in hides and caches in snow caves or high in the willow trees (Foote 1959).

Today, depending on the season, Noatak residents travel on ATVs, motorcycles, snowmachines, or dog sleds over an extensive network of both historic and more recent blazed trails that parallel the Noatak River (NANA n.d.). Georgette and Loon argue that despite changes in technology, the significance of caribou hunting has remained paramount.

> "As technology has changed, Noatak hunters have gone from skin boats pulled upriver by hand and by dogs to wood and aluminum boats propelled by outboard motors. This has shortened the time needed to reach hunting areas which in turn has allowed hunters to travel farther more easily, but it has not otherwise significantly changed the basic pattern and importance of the fall caribou hunt to Noatak residents" (Georgette and Loon 1988: 54).

In many cases, a combination of transportation technologies is used, such as a combination of ATVs and motorized boats in the fall hunt. Hunters have the option of hunting from ATVs, for example, then packing game down to boats for the long journey home (Halas 2015).

Hunters from Other Communities

Kotzebue hunters have traditionally used caribou hunting territories in the Noatak region, especially in autumn and winter. The basic geography of their practices echoes that of Noatak hunters (Foote 1960, NPS 1987, Georgette and Loon 1988, Anderson et al. 1998). Some Kobuk hunters also traveled into the Noatak River drainage via the Omar River in summer to hunt caribou, though less often (Anderson et al. 1998). Indeed, other communities reportedly maintain some of the hunting areas and hunting camps. For example, the Eli River area downriver from Noatak village is reportedly part of the hunting territory of Kotzebue hunters, who maintain camps there (Georgette and Loon 1988).

The subsistence economy in Kotzebue and on the Kobuk is based on fish, including salmon, and caribou—and historically, harvests had to support both human communities and dog teams. The local abundance of those species in places such as the Kobuk River Basin influences decisions regarding whether to travel so far as Noatak River to hunt (Kelly et al. 1990). Hunters from Kotzebue have been able to find caribou in the Buckland and Selawik areas, for example, though according to Elders from Selawik, no caribou were found in these areas between 1930 and 1947 and residents traveled into the Noatak region to find caribou (*Caribou Trails* 2005). So too, times of caribou scarcity or unusual caribou migration patterns have seemed to draw Noatak hunters into areas well beyond the Noatak River Basin.[9] Overlap of caribou hunting territories by Kobuk and Noatak hunters has been documented in various publications (Foote 1960, Hippler 1970, Burch 1985, Georgette and Loon 1988, Anderson et al. 1998).

Scarcity in certain subsistence resources locally, including changes in caribou migration patterns, can prompt hunters from these communities to the south to visit the Noatak River Basin. Many do so based on longstanding kinship with Noatak families, though this is not uniformly the case. This picture is complicated not only by intermarriage between communities, but by the movement of some families from Noatak to other settlements such as Kotzebue for employment or other reasons.

[9] In a focused study on the subsistence practices of Kivalina residents, Burch (1985) made observations of Noatak residents passing through Kivalina while hunting caribou: "Week 148 (April 25—May 1, 1965) Subsistence: 'Seven men from Noatak passed through [Kivalina] on a caribou hunting expedition. They managed to take 39 animals a few miles inland, about 30 miles northwest of Kivalina'" (Burch 1985: 184).

Available written sources make various references to these overlapping hunting areas, with hunters from one village encountering those of another more distant village during the caribou hunt. During the late summer and early fall of 1960 when caribou were actively crossing the river above Ipnarot, for example, Noatak hunters met Kotzebue hunters on the river while hunting. Analyzing this pattern and recording the accounts of elders, Foote reported that Kotzebue hunters sought caribou within a one- to two-hundred mile radius of Noatak (Foote 1960). Similarly, during the fall of 1987, three Kotzebue boats were present above Noatak hunting caribou, with two belonging to former Noatak residents. Kotzebue residents will occasionally accompany Noatak hunting groups (Georgette and Loon 1988).

Anderson et al. also extensively documented the subsistence practices of Kuuvaŋmiut families from the Kobuk region in the twentieth century (Anderson et al. 1988). They describe Kobuk caribou hunting occurring in the Noatak region. During the fall and winter, Kobuk hunters have accessed the upper Noatak River Basin by following the major valleys linking the two basins. Elders from Kobuk also have memories of snowshoeing to camps on the upper Noatak, a 200-mile round trip:

> "Before caribou came to Selawik the people walked and backpacked over to the Noatak area, to the head waters. They would leave in the early fall while the hides are thin and could be used for clothing. The term used was 'qakirut' meaning that they went up and over to the upper land. The hunters also took dogs to help pack. They traveled one day at a time, and relayed their possessions to and fro. They also went up towards Kuugruak area and also close to Rabbit Mountain. The caribou never came here but they would go near Ambler, about 40 miles out. Sometimes, when my husband wanted me to follow, I would go. I sure enjoyed it when we set up camp out in the country and the hunters came back with their caribou harvest" (Laura Iguaqpak Smith in *Caribou Trails* 2006).

Another Selawik resident also mentioned the term *qaqi* in reference to the travel required to reach the Noatak area in search of caribou during lean times in the first half of the 20th century:

> "Generations ago, [during the 1920s through the 1950s] the Iñupiat endured starvation. The quest to find food was difficult, especially during the winter. The men and their pack dogs would *qaqi* or travel north towards Noatak and the North Slope to find caribou. The women and the

> young remained home, fishing and berry picking. Food gathering kept them busy most of the day and night" (Jackson 2000: 27; cf. Jackson 1999: 110).

From the upper Kobuk area, hunters followed Ambler River to the Noatak. From the lower Kobuk River Basin, two routes accessed the Noatak River. The first involved following the Squirrel River and then the Omar. The second, less-favored route, traversed the high ground west of the Salmon River (Anderson et al. 1998). These trails into the Noatak regions were well known to Kobuk caribou hunters, who traveled them in good times but especially in bad. Cyrus Harris also has recently described them, writing, "There's other trails. This one that we were on is the Sisualik trail, the one next to it is the old dog team trail that's heading out to the Noatak, which we call the Jones Trail. … From there it heads up beyond this mountain pass and to the Noatak River. It's an old winter staked trail" (Harris 2016). Foote documented what he was told was a common practice—for hunters from Kotzebue to use dog teams to travel to caribou hunting areas northwest and north of Noatak (Foote 1959). He also reports that men from Deering and Noorvik would hunt northwards from Noatak. Caribou were usually located between the Cutler River and Howard Pass, and hunters went as far east as the headwaters of the Killik River. During the winter caribou hunting season (1959-1960), both Noatak and Kotzebue residents heavily used the Akulugruk-Hulik River basins. Kotzebue hunters brought home approximately 30,000 pounds of meat during this season. Kotzebue resident John Goodwin comments:

> "Pretty much a half of the village would go out all together and go north over to Noatak, way up and hunt caribou. While the other half stay in here in town trying to help each other, you know, like make sure the families don't run out of wood. … But the caribou was way out. … About three weeks to a month hunt" (Kotzebue Resident John Goodwin 2017).

This practice was significantly due to cycles of caribou abundance close to home. During the span of 1940 to 1964, large numbers of caribou returned to the Kobukmiut area, reducing the need for Kobuk hunters to travel into Noatak territory (Hippler 1970). Multiple Selawik residents comment in *Caribou Trails* (2005-2018), the newsletter of the Western Caribou Working Group, about the return of caribou to these areas south of Noatak. For example, Ralph Ayyatungaq Raymoth, Sr. describes the transition this way:

> "It was in the 1950s when I first started going out to hunt caribou, about 80-100 miles from here—from Selawik to the headwaters of Selawik River and around Ambler area. Later on in the years, the caribou start going south—more and more south until they start grazing around the upper Selawik area. That's when a lot of people started to caribou hunt around there" (in *Caribou Trails* 2006).

This pulled Kotzebue and Kobuk hunters away from the Noatak, and toward places south of that basin.

In the decades that followed, the proximity of caribou to the villages of Kobuk and Selawik further decreased the need for hunters to travel long distances into the Noatak basin. Hunters also cited an increase in airplane traffic on the Noatak River, with the location of gravel bars for landing aircraft, influencing some airplane-based hunters' choice of locations (Georgette and Loon 1988). Indeed, recent changes in caribou distribution continue to affect long-distance hunting treks, as localized scarcity sends hunters from one basin into another—sometimes amplifying pressure on caribou populations remaining in areas still being hunted.

Understanding the Significance of Noatak Caribou Hunting

The cultural, social, economic, dietary, even religious significance of subsistence hunting is tremendous within rural Alaska—and this is certainly true of caribou hunters in the Noatak region. Authors such as Fall have attempted to define and describe subsistence, characterizing the importance of "wild food harvests" to Alaska residents. In recent writings, he has made it clear that people of the Arctic region—including Noatak—stand apart, harvesting the most wild foods of all Alaskan regions (averaging 405 pounds of useable weight per person in 2014 alone) (Fall 2016). The caribou hunt continues to be a very important traditional activity and a leading source of food for not only the approximately 510 current Noatak Village residents, but for all Alaskan Native hunters with traditional ties to the Noatak region (Georgette and Loon 1988, NANA n.d.).

The nutritional value of caribou to the people who live in the region has been an enduring topic of study in academic, state, and federal literatures (Foote 1959, 1960, 1961, 1965, Arnold 1968, Magdanz et al.). Burch was also significantly focused on the caloric and nutritional value of caribou to the community (Burch 1972). He proposed that a family of four needed to harvest 250 caribou each year to meet the nutritional and domestic requirements for the family and their dogs. Foote (1959, 1960, 1961, 1965) also devoted considerable attention to the dietary significance of caribou. In his 1965 publication, he calculated harvested pounds of caribou meat compared to the caloric requirements of Napaaqtaġmiut and Nuataaġmiut peoples in 1850—suggesting the considerable scale of the caribou harvest historically. Morehouse addressed the nutritional value of different parts of the caribou that are traditionally consumed, assessing the minerals and vitamins they provide (Morehouse 1981). Fall conducted an analysis comparing the nutritional and replacement values of wild foods for the Arctic rural region (Fall 2016), estimating that at $8.00/pound, wild food harvests equate to a monetary equivalent of $82,138,858 a year for the region. These documents, plus the straight-forward statements of Noatak hunters and families, make it clear that caribou are fundamental to meeting the caloric and nutritional requirements of the Noatak people while also having underappreciated economic value (Northwest Arctic Borough 2016). Without caribou, life as it is known in Noatak may not be possible or enduring.

Of course, caribou not only provide necessary nourishment to the Noatak community, but are deeply embedded within the cultural traditions, social customs, and oral history

of Noatak people (NPS 2017). They are in so many ways, as one Noatak resident put it, the "life blood of the people" (in Halas and Kofinas 2015: 1). This deep cultural association between people and caribou begins with childhood—when most residents first learn of caribou and take part in caribou hunting and processing (Georgette and Loon 1988). Indeed, most Noatak children are reported to begin accompanying caribou hunting parties before the age of ten (Halas 2010). Ongtooguk describes the method by which young Iñupiat hunters receive their traditional education in subsistence caribou hunting:

> "The apprenticeship begins on the day that the uncle chooses to take the future hunter out. … The age at which this happens depends upon the maturity of the youngster. The uncle has been watching the young hunter and one day, with almost a casual air, the uncle and his hunting partner agree to take the youngster out. … Apprentice hunters might not actually hunt the first time they go out to a hunting camp. The youngest person sets up the tent, hauls water, perhaps prepares sleeping bags, collects firewood, cooks and certainly cleans. … While out at camp, the young boy learns about good locations for certain animals, fish or materials during certain seasons. The boy also learns about how to select the location for the hunting camp, what equipment to bring for certain areas and for different kinds of hunting, fishing or trapping. … He learns how to pack and store and how to move from one place to another, efficiently and intelligently" (Ongtooguk 2000: 60-61).

The traditional ecological knowledge of Noatak caribou hunters is thus rooted in lifetimes of experience and training passed down through many generations (NPS 2017). Principally, Noatak caribou hunters, trained in proper protocol and hunting practices, embody core traditional values: showing respect for all life (animals, but also plants, the lands, and waters), taking only what is needed to subsist, and sharing harvests with others in the community.

Among many communities in Northwest Alaska, sharing subsistence resources is a deeply valued traditional practice and has been widely documented in the Noatak region—including within subsistence studies that otherwise provide little other cultural context. The high value placed on sharing manifests in many ways. For example, hunters often form hunting parties when searching for caribou. Ralph Ayyatungak Ramoth, an Elder, explains that caribou harvested by the hunting party are shared equally within the group: "The hunter shares the caribou he got with others. He shares with the hunting partner. Upon arriving at home, share with those having no meat. The

more you share; it will always come back to you. You have to learn these skills in order to be a good hunter'" (*Caribou Trails* 2005). Another Elder writing in *Caribou Trails* also commented on expectations that caribou harvested by a hunting party be divided between all participants: "The innards and delicacies including the head were brought home. The hunting group shared everything in the camp. All the animals caught during the day's hunt were divided equally among all the hunters" (*Caribou Trails* 2005).

Hunters who harvest more caribou than needed for their households commonly share meat with family members who don't have access to the resource or who are no longer able to actively hunt due to age or other barriers. Mikow et al. documents the number of households who harvested caribou in relation to the number of households who utilized caribou in the Noatak community (Mikow et al. 2014). They found that 62% of households in Noatak harvested caribou, while 95% used the resource during the study year. This difference suggests the extent to which caribou meat is shared throughout the community. Ruby Ayaqin Foster, an Elder and widow, explains how she benefits from these traditional sharing networks: "We had to share when we get anything like moose, caribou or rabbit. The ones who had hunters share with the widows like me. It wasn't easy—*qaganangitchuq*—to hunt for caribou then" (in *Caribou Trails* 2006).

As all families are sustained by the harvest, each of the households, whether they consist of active hunters or not, carefully track the health and stability of the herd. Some residents who do not participate in the caribou hunt report monitoring conversations between hunters on the radio (*Caribou Trails* 2005). Others are prepared to assist with the processing of the meat once hunters return home—skinning and butchering the animals, drying or otherwise processing and storing the meat. The harvest and processing of caribou brings families together, in shared activities of common interest; these events are in many ways central social events for families and entire communities, important well beyond the caloric and nutritional value of the caribou.[10]

[10] Sally Custer, for example, though not a resident of Noatak, is a recent member of the Caribou Working Group representing the Upper Kobuk villages of Shungnak, Ambler, and Kobuk—and has made valuable comments on this point. She expresses that she is deeply concerned that her people always be able to hunt and eat caribou: "Caribou is one of the main foods of our diet. We need to make sure that they are healthy and their numbers are high. Although I am not a hunter, I skin and butcher the caribou, dry it, and store it. It is something that has always been close to my heart" (*Caribou Trails* 2005).

The sharing of *nikipiaq* ("real foods")—subsistence foods like fish, seal oil, and caribou meat—holds special cultural, social, and personal value in food distribution networks (Magdanz et al. 2010). As reported in a news article by Leins, when May Watson, an 80-year old from Noatak whose diet consisted of whale blubber, seal oil, and caribou, moved to Kotzebue into a long-term care facility, she suffered stomachaches and general distaste for what she called "white man's food" (Leins 2018). Family who bring Elders like May traditional foods perform a critical service, as it turns out. In this way, caribou harvested by Noatak residents finds its way to family and friends living beyond Noatak. May's experience is not unique for many Native residents in the Noatak region who find processed foods unpalatable (Halas 2015, *Caribou Trails* 2005, 2006); for a host of reasons, some residents find store bought foods to be expensive, "not fulfilling," and generally less desirable (Halas 2015). An individual identified as "Respondent #7" in Halas prefers not only the taste of caribou, but points out that when caribou harvests are not available, the entire community falters:

> "We hurt a lot. No meat. Now we gotta go to the store and buy it. Most of the people around here don't have steady jobs…. We work and have to get what we can get. We like the fat from the caribou. That's the prime, you know. It tastes good. So we hurt a lot when we don't have that. We live with it and we raise up with it. We share it with the Elders and everybody. When we don't have it, it hurt a lot of people around here" (Halas 2015: 66).

The practice of sharing subsistence foods, particularly caribou, strengthens familial and communal social bonds. It also provides an element of food security and a sense of "contentedness" within the community (Magdanz et al. 2010, Jackson 2000, ANKN n.d.).

The importance of sharing resources such as caribou is a traditional belief deeply embedded in ancient oral traditions. In a publication that explores the role of oral tradition and "myth" in subsistence practices, Minc touches briefly on the role of the *umealiq* in folktales (Minc 1985). The *umealiq* is a wealthy man of high standing who holds a social responsibility to provide for those in need within the community, especially looking after the subsistence needs of the less fortunate in lean times. These ancient oral traditions prescribe:

> "appropriate responses to seasonal food shortages [and] reflect the use of local obligations for economic support. In three cases, the situation is alleviated through reliance on kinship ties. In two cases each, shortages

> are mediated through either the sharing of stored surpluses between families, the role of the *umealiq* in providing for less well-supplied members of the community, or magical assistance" (Minc 1985: 91).

Encoded and reinforced by their central role in ancient Iñupiat oral tradition, resource sharing has sustained the community socially and spiritually, and provided food safety within a highly dynamic environment (Jackson 2000).

In the past, young hunters learned some of their caribou-hunting knowledge through shared oral history. Young and old hunters alike gathered in the *qarigi,* or 'men's house'—a tent constructed during the winter months primarily for the ceremonial preparations for hunting by the men (Spencer 1959). The *qariqi* also functioned as a communal space for villagers to hold church, have meetings, work, and find entertainment— joined by women and children at certain times (NPS 2017). In this setting, hunters have shared the oral traditions that impart core traditional values through storytelling and other means (Ongtookguk 2000). Such oral traditions involving caribou hunts have been documented, somewhat briefly, by Spencer (1959) and Sun (1985).

Oral traditions describe the origins of the caribou, and of many interactions between the humans of the past and this cultural keystone species.[11] Burch also provides an in-depth look at the way oral traditions influence traditional caribou hunting patterns. In his publication, Burch describes:

> "Lakes which ostensibly offered superior locations for caribou hunting operations were shunned because they were inhabited by monstrous fish; excellent campsites were abandoned and later avoided because of the activities of hostile ghosts; good fishing and hunting areas could be visited only during daylight hours because of the dangerous nighttime activities of wild babies [*iraaq* or *naaluqriq*]; and so it went" (Burch 1971: 149).

[11] In her (1985) publication, Minc relates a creation narrative that tells of the origin of people and specific animals, including caribou:

> "…Aiyagomahala told his people to hunt as much as they could and collect all kinds of inland animal skins. Caribou, mountain sheep, wolf, wolverine, lynx, grizzly bear, black bear, beaver, marmot, and otter were always around the camp, and the people collected a large number of summer skins" (Minc 1985: 86).

Oral traditions describe Noatak hunters interacting with the world of spirits and ancestors; and these oral traditions show how respectful behavior must be exhibited by caribou hunters if they will be rewarded with a successful hunt. Minc explores these rituals and values in great depth, describing the proper treatment of hunting implements and animals based on the perception that all animals possess sentient spirits (Minc 1984). With proper respectful treatment, these spirited animals will recognize the respect of the hunter and reward it. Ongtooguk describes the exchange as an animal giving itself to the hunter (Ongtooguk 2000). If protocol is broken, the animal spirit will take offense and avoid the hunter—even warning other animals to stay away (see also Spencer 1959, Morehouse 1981, and Lucier and VanStone 1995). This is reflected in modern instruction provided to Native youth:

> "When asked about other comments or advice they would like to leave the younger generation… Laura Iguaqpak Smith ended with, 'Have respect for all the animals. When you don't have respect for the animals, they will not come back to you. Have respect for the animals God made for us to be healthy and happy'" (*Caribou Trails* 2005).

Waste is regarded as a paramount form of disrespect, as is overharvesting (Foote 1960, 1965, Burch 1972). Elders often assert this through statements in the *Caribou Trails* newsletters series (2005-2018). To cite one of many examples, Minnie Gray wrote:

> "Our Elders told us not to waste. Not to throw anything out. When you get caribou in the fall, then you dry it for winter. When it is spring you take the bones and smash and boil them. The fat on the surface is collected and you dry caribou stomach inside out and then clean it and dry it. Then you put the bone fat in there and eat it with dried meat and dried fish. Yoi… good meat!! The caribou fur is used in many ways. It is used for sleeping bags, mattresses, winter fur is better because it doesn't shed as much as spring fur. It is better for waterproof mukluks. That is how we lived way back in my days. Our Elders always advised us to not be wasteful" (in *Caribou Trails* 2015).

Today, Elders fear the younger generations are not participating in caribou hunts and are not properly taught the cultural values and etiquette so foundational to Native identity. They express concern that the use of store-bought foods has increased

significantly, as has the proportion of these foods in the diets of young Noatak villagers (Moerlien 2012). Profound generational shifts in activity and diet seem to be underway.[12] Elders speaking with Moerlien told of an increased rate of diabetes and cancer within the community, which they understand to be a result of increased reliance on processed, store-bought foods (Moerlien 2012).

Conversely, Georgette and Loon found that Noatak hunters expressed both "delight" and "satisfaction," associated with caribou hunting and related activities (Georgette and Loon 1988: 19). Positive effects of caribou hunting are evident not only in physical health, but also in mental health within many communities (NPS 2017). Such comments come from Elders, but also from media accounts in the region. For example, a news story by Leins reported how nursing home administrators found the introduction of a new traditional foods program called "The Maniilaq Association" in nursing homes in the Noatak region, helped Native Elders to "eat better, they sleep much better…they eat much healthier" (Leins 2018). These broad indicators of "health" linked to the caribou hunt are also woven into technical reports and theses. When asked to define a "successful hunt," Noatak residents describe variables including time spent with family and friends; seeing locals on the land; lack of disruption by non-locals; teaching young people; getting meat for Elders; sharing meat; and performing other activities while hunting, such as fishing, spiritual connection, seeking peace, getting closer to God, camping, going to a favorite spot, safety, and harvesting more than one caribou (Halas 2015: 59). On the other hand, detrimental effects seem to be attributed to caribou hunting when danger or environmental stressors are perceived—effects like "spooked" caribou being diverted from river crossings due to non-local activity, aircraft noise, or other activities (Halas 2015).

As Noatak hunters continue to invest themselves in the hunt and the community, traveling the landscape in search of herds that remain intricately woven into subsistence practices, cultural traditions and community identity—definitions of what it means to be "a good hunter"—integrate notions of being an active, informed guardian and steward. As one hunter noted:

[12] Moerlien commented that: "During our visits to Noatak and Selawik, it was not uncommon to sit at a meal where the Elders ate fish or caribou and the children and younger family members ate a prepared frozen meal of pizza or fried chicken" (Moerlein 2012: 53).

> "Being a good hunter now also means reading, listening and talking about things we never used to have to think about. Sometimes it means going to meetings instead of hunting, and speaking before a group of people even when it feels uncomfortable. … Being a good hunter is no longer just about keeping your rifle, boat and snowmachine in good working order, and watching the weather and signs of wildlife. If there is to be game to hunt in the future we also have to pay attention to developments planned for the land our wildlife depends on" (*Caribou Trails* 2005).

Today, multiple venues exist for younger people to learn about caribou and proper protocol while subsistence hunting. Even young people not raised close to the hunt or under the instruction of hunting elders have options. For example, the Alaska Native Knowledge Network (ANKN) has published instructional materials to assist Native youth, Elders, teachers, and guides in teaching the logistics and cultural values associated with caribou hunting (ANKN n.d.). Embedded in this training are the values and traditions of the Noatak people. Other sources include *Sharing our Pathways*, a newsletter published by the Alaska Rural Systemic Initiative (AKRSI) for the purpose of promoting educational programs based on Alaska Native world view, culture, and philosophy. Elmer Jackson, the Iñupiaq Regional Coordinator and a regular contributor to the publication contributes his knowledge of caribou hunting by the Iñupiaq people. As he explains:

> "An Iñupiaq value that is alive is sharing. When a young hunter catches his first game it is given to an Elder. A person who lives the subsistence way of life must learn the skill of skinning and dissecting game animals such as bear, moose and caribou. A hunter is a person who when subsistence hunting, treats them with respect" (Jackson 1999: 110).

Elders are respected as repositories of knowledge. Each passing year marks "the loss of knowledge bearers and Elders who can contribute to the documentation process" (NPS 2017:36). Thus, *Caribou* Trails, a newsletter published by the Western Arctic Caribou Herd Working Group, has made it a point to document traditional values associated with caribou harvesting in a section of the newsletter called 'Listening to our Elders' (*Caribou Trails* 2005-2018). Here, Elders from Noatak, Kobuk, Selawik, and other communities share their experiences hunting caribou and explain the importance of caribou within the context of traditional social and cultural values and practices.

The Context of Caribou Management

In 2017, the federal subsistence program grappled with impacts to subsistence opportunity for the community of Noatak. Caribou hunting trips were getting longer, cost more money and were less successful (Halas, 2015). Caribou were not returning to the Noatak Valley as they had in the past, and a community member requested a closure of the hunt to non-federally qualified subsistence users. Through the regulatory proposal process, attention turned to what areas needed to be closed. Debate ensued over where the issue was located and what areas are most important to the Noatak harvest. Noatak National Preserve is often at the center of the debate; recommendations on further research and management of that resource in the region can improve caribou management and help protect subsistence opportunities.

Encompassing most of the Noatak River Basin, Noatak National Preserve is a relatively young unit of the National Park Service. A 1978 presidential proclamation first established the preserve, which was then formally designated as a unit of the National Park Service under the 1980 Alaska National Interest Lands Conservation Act (ANILCA).

This designation was the outcome of a nationwide effort, through the 1970s, that resulted in a dramatic expansion of the NPS presence within Alaska. In December 1971, the National Park Service managed less than seven million acres in the state. Yet, the passage of the Alaska Native Claims Settlement Act (ANCSA), passed in that month, allowed the Secretary of the Interior to withdraw up to 80 million acres of land to be managed as national parks, wildlife refuges, wild and scenic rivers, or as national forests—provisions known as the ANCSA and the 'd-2' provision (Section 17 (d)(2)). These land withdrawals prompted an assessment of many lands, including those within Noatak River Basin, for their potential as additions to the National Park Service system. The same legislation also codified the existence of the village and regional Native corporations, including the NANA and many other corporations within the larger west Alaska region.

By 1979, as part of the land review process, a subsistence study had been completed and published for Noatak as a part of Alaska's Cooperative Park Studies Unit (CPSU)—established in 1972 to administer and undertake scientific research regarding national parks (Norris 2002:65). (The CPSU is a predecessor to the Cooperative Ecosystem Studies Unit [CESU] that has produced the present report.) In the course of these

assessments, both Noatak and Kobuk lands had been identified as areas where the persistence of subsistence activities were considered as nominating factors for inclusion within the NPS. The CPSU subsistence study gathered data demonstrating the deep and enduring relationship between Noatak people and the caribou, fish, and other subsistence resources in the Noatak Basin. This report informed decisions to make the Noatak Basin a United States National Monument in December of 1978. On December 2, 1980, this monument was converted into a National Preserve as a result of the passage of the Alaska National Interest Land Conservation Act (ANILCA). While contributing to the decision to nominate the preserve for NPS status, the importance of subsistence and other cultural activities at Noatak was not specifically referenced in the enabling legislation. Instead, Section 201(8) of ANILCA specifies that:

> "The preserve shall be managed for the following purposes, among others: To maintain the environmental integrity of the Noatak River and adjacent uplands within the preserve in such a manner as to assure the continuation of geological and biological processes unimpaired by adverse human activity; to protect habitat for, and populations of, fish and wildlife, including but not limited to caribou, grizzly bears, Dall sheep, moose, wolves, and for waterfowl, raptors, and other species of birds; to protect archeological resources; and in a manner consistent with the foregoing, to provide opportunities for scientific research."

Still, the role of Native communities was reflected in the official record surrounding ANILCA and the original creation of the preserve. The U.S. Senate report that accompanied the Senate committee bill creating Noatak National Preserve stated that "'the Noatak Valley represents the largest undeveloped and pristine river valley in the United States ... best characterized as a vast primitive expanse by virtue of low human numbers, scant development, outstanding scenery, and concentrations of wildlife'" (in Norris 2002:56). Norris notes that the legislation that allocated lands to the Noatak National Preserve unit was unique in that local residents were included in conceptions of its "pristine state," and the legislation concluded that activities permitted in the park must be compatible with, and not interfere with, subsistence uses of the local people. Final legislation outlined expectations that NPS "work closely with Native village inhabitants of the region to assure that Native cultural values are enhanced by establishment of the Noatak National Preserve" (in Norris 2002: 74).

From the earliest years of the preserve, NPS managers grappled with the relatively uncommon challenge of how to maintain natural landscapes and resources in a "pristine" manner according to their mandate, while also accommodating an ancient

and evolving subsistence tradition on these lands. Initial responses to the challenge—the need to strike a balance between natural resource preservation and the preservation of a way of life—set the path for the decades ahead. Much hinged on the agency's capacity to regulate "adverse human activity" in order to preserve natural resources, including those utilized by human harvesters. Indeed, the regulation of human activity represented one of the few natural resource management tools recognized in early planning efforts. The Noatak National Preserve Management Plan, published by the National Park Service in 1987, says:

> "These natural systems have remained virtually unaltered by man because of the vast, rugged, and remote nature of the area. Because natural systems within the preserve are considered to be largely undisturbed, no forms of manipulative management will be undertaken during the life of this plan. Rather, management of natural resources will be achieved primarily by the management of human actions that affect resources. The emphasis will be on monitoring the resources and conditions, human uses, and the study of these natural systems to establish baseline data" (NPS 1987: 76).

Yet, the regulation of human activity was no simple task. Subsistence hunting was to have priority in the preserve—not only protected by the terms of ANILCA, but by a host of federal laws, policies, and regulations established both before and after the preserve's creation. Furthermore, as a preserve, the NPS allows subsistence and sport hunting by non-locals within Noatak National Preserve's boundaries.

In the process of preserve management, the NPS has been compelled to address the special ecological and subsistence significance of caribou. The sharing of ideas and information contributed much to this effort. Park managers increasingly recognized that, by virtue of their close association since time immemorial, Noatak hunters have important insights into the behavior and biology of these animals within the preserve (Halas 2015, Halas and Kostinas 2015; NPS 2016). Noatak peoples' ancient relationship with caribou has contributed to their intimate familiarity with the geography of the Noatak region, particularly the Noatak River. This in turn contributes to Noatak residents' understanding of the ecological patterns and processes that influence long-term population fluctuations and the migration of caribou across the landscape. The growing appreciation by NPS has been clear in a mounting number of publications that assert, "[the] Noatak National Preserve isn't just one of the last fully functional, intact ecosystems—it's the grocery store. For thousands of years, people have relied on the Noatak River and the surrounding woods and tundra to provide the means for

survival" (NPS 2015). The robust and healthy presence of subsistence activities in the preserve was essential to striking the right "balance" between the complex preservation mandates of the NPS, as a growing number of NPS documents attest. In this view, Noatak National Preserve,

> "preserves both the traditional way of life and generations of accumulated knowledge in Northwest Alaska. Noatak National Preserve does more than protect the land Iñupiat people have lived on for generations; it also protects their traditional way of life for future generations" (NPS 2016).

Still, the status of the caribou population and potential adverse effects on that population by any number of outside forces makes this balance elusive. Many recent reports suggest the Western Arctic caribou herd population has been in general decline since 1960, at a rate often reported as 4-6% annually (Andersen et al. 1998, Mikow et al. 2014, *Caribou Trails* 2014, Halas 2015). This declining trend has been noted by many Noatak residents, within many publications (NPS 2017). In their 2015 publication "The Noatak Caribou Traditional Knowledge Project," Halas and Kofinas interviewed multiple Noatak residents concerning their caribou hunting practices. Many expressed concerns that caribou populations are in decline once again, in and around the preserve. One Noatak resident made this comment:

> "It's not the same like it used to be…when [caribou] bunches [would] come or when you [would] talk about a bunch, you're talking about 500 to 1,000 and when you go into the herd, they don't stop…. Nowadays the herds are smaller, maybe 50 to 100. Long ago, we used to take our pick…. It's not the same as it used to be" (in Halas and Kofinas 2015: 1).

The NPS and other agencies have been assessing the causes and effects of this trend, in light of each agency's specific mandates. This has prompted an intensification of caribou monitoring and management efforts, led significantly by ADF&G and the USFWS, with significant involvement from the NPS. The land area over which the WACH moves each season is immense and crosses many jurisdictions. According to a Noatak National Preserve study presented at the Western Arctic Caribou Herd Unit 23 Working Group Meeting in 2014, Ackerman reported the WACH migratory range was 34,329 square miles; 36% of this area being inside Noatak National Preserve (NOAT), Cape Krusenstern National Monument (CAKR), and Kobuk Valley National Park (KOVA); 74% of this area being in Game Management Unit (GMU) 23; and 49% of this

area being managed by Western Arctic Parklands (WEAR). For this reason, management of these animals requires the involvement and cooperation of many groups.

Federal agencies work with each other and subsistence users within the framework laid out in Title IIIV of ANILCA. As it is mandated in Section 805, the Northwest Arctic Regional Advisory Council (NWARAC) is made up of local residents from the region. The NWARAC reviews proposals for regulations, policies, and management plans for all federal lands. The National Park Service, also mandated by ANILCA, has established Subsistence Resource Commissions (SRC) that develop hunting program recommendations for the Secretary of the Interior and the Governor of Alaska to address hunting issues within National Parks and Monuments. Because of the wide range of the herd, involving management from multiple agencies and affecting multiple communities, the commission will often consider subsistence management issues regionally, commenting on policies and plans as they affect Noatak National Preserve and lands adjacent to the park units. While the NWARAC plays a key role in management of federal subsistence hunting and the SRCs in park subsistence management, they are advisory to the decision makers. The Kobuk Valley SRC, Cape Krusenstern SRC, and NWARAC all have a representative from Noatak currently, but appointment processes do present barriers to equitable community participation in management.

The NPS participates in both state and federal regulatory processes. Both regulatory systems can be used to hunt in Noatak National Preserve. The other way that park Service management attempts to address hunting in the preserve is through management of contracts with hunt guides and Commercial Use Authorizations (CUA). CUAs allow for-profit businesses to operate visitor services on parklands. The most common commercial use authorization in Noatak National Preserve is transportation for non-subsistence hunters. CUA management must be consistent with the park purposes, management plan, policies, and regulations. In addition, CUAs must have a minimal impact on other park resources. Given that local subsistence users are being impacted by non-subsistence hunters and aircraft activity, WEAR management has responded with multiple actions.

Currently, caribou management by each agency is based significantly on estimates of herd size, which is based on aerial photography conducted at regular intervals. In June, during calving time, composition surveys are conducted to determine how many new

calves are born into the herd each year. In spring, composition surveys help determine the survival rate of these new calves, as well as adult mortality. Movement of the herd is monitored through satellite telemetry, based on data received from tracking collars placed on animals as they migrate through river crossings each fall. ADF&G also gathers information on calf weight and body composition, and collects blood samples to determine the general health of the herd and exposure to disease (Nedwick and Dau n.d.).

The Western Alaska Caribou Herd Working Group has been established in an attempt to mediate the interests of these many management agencies and Native villages and corporations, to "ensure conservation of the Western Arctic Caribou Herd, safeguard the spiritual and cultural well-being of Alaska Natives and the interests of all users of the herd, and integrate indigenous knowledge with Western Science" (NPS 2017). This group receives financial and technical assistance from Noatak National Preserve and from the Western Arctic Parklands staff in support of that goal. The group meets annually and determines the status of the herd from a management plan devised from the biological health of the herd. The plan then recommends that different regulatory and management actions be taken at three levels: preservative, conservative, and liberal.

The results of these surveys correlate with the observations of Noatak hunters. The Noatak National Preserve "State of the Park," published by the National Park Service in 2017, reported that the "opportunity to pursue key subsistence activities is decreasing" (NPS 2017: viii), identifying caribou as one of the key species of concern. The report predicts that subsistence harvesters will "face increasing hardship" as a result of the decline of caribou population (NPS 2017: x).

Throughout their report on Nuataaġmiut subsistence, Uhl and Uhl emphasize that subsistence is opportunistic and adaptive. The Upper Noatak is all of critical importance to caribou hunting, and the specific location varies year to year depending on where caribou herds are present. They also call for monitoring and management of use as it impacts the natural world. An adaptive plan of management for subsistence uses and commercial uses has yet to be generated by the National Park Service, but for a successful plan to be developed, frequent communication between the agency and hunters would be required.

The NPS, Noatak residents, and many other parties are involved in opportunities to positively affect caribou numbers and sustain subsistence practices for the benefit of present and future generations. Multiple writers have proposed the need for cooperative management of the WACH, more fully involving Native values and knowledge within resource management planning at multiple levels. These writers suggest that caribou hunters not only possess intimate geographical knowledge of hunting areas within the Noatak River Basin, but also valuable ecological knowledge about caribou behavior that is not available by other means. Some suggest that traditional Noatak values—particularly of respect between species and across generations, may also benefit non-Native hunters and institutions (Halas 2015, Halas and Kofinas 2015, *Caribou Trails* 2005-2018, Nedwick and Dau n.d.).

Adverse effects on caribou numbers and movements by outside influences range from climate change to outside hunters and vehicles. Hunting pressure often described as "non-local," has been cited as the cause for some caribou population declines—an assessment with considerable time-depth. Foote, for example, hypothesized that overhunting between 1895 and 1910 by hunters brought to the area as a result of the Kobuk and Nome gold rushes and during the Arctic whaling period were to blame for caribou population declines in the early 1800s (Foote 1960). When Georgette and Loon conducted their research in Noatak territory, caribou numbers had rebounded to an estimated 230,000 animals, the largest it had been in the last 20 years (Georgette and Loon 1988). At the time of that study, the concern was not a lack of caribou numbers to support Noatak hunters, but rather how to reduce or maintain the interference of non-local hunters, vehicles, and other activities in traditional Noatak River caribou hunting locations. Yet by the time Magdanz et al. studied caribou in the Noatak region, residents were seeing clear declines in caribou abundance, so that the range of management concerns expanded (Magdanz et al. 2010).

Through interviews with hunters from Noatak and other area villages, Magdanz et al. documented that these hunters were especially concerned about excessive noises and disturbances produced by ATV, boat, and airplane traffic in caribou migratory areas, causing animals to divert from their usual migratory patterns:

> "Households that said they did not get enough caribou in 2007 most frequently said the caribou were too far away, were scarce, or the migration had changed, reasons that were categorized as relating to abundance. A significant number of households said they lacked the equipment, the money to buy equipment or fuel, or a hunter to get

> caribou, which were categorized as lacking the 'means' to harvest. Residents also cited reasons categorized as competition: too much airplane and boat traffic, too many sport hunters, and caribou being spooked by the noise from ATV, boat, or plane traffic. Several respondents said that the noise from planes and boats (competition) had changed migration routes (abundance) or pushed caribou farther away (abundance) (Magdanz et al. 2010: 52).

A few reports have commented on the impact of aircraft on the migratory path of the WACH, some focusing on the Noatak Controlled Use Area (CUA) that closes the area to aircraft traffic from May through October in order to decrease disruption of caribou migrations and the subsistence hunters who depend on them (Magdanz et al. 2010; Georgette and Loon 1988).

In 2003, the ADF&G Game Management Unit 23 Working Group, operating under the umbrella of the Alaska Department of Fish and Game, worked to protect subsistence uses, and to identify and minimize user conflicts resulting from the influx of fall hunters to that unit (Northwest Arctic Borough 2016, NPS 2017). Ackerman presented the results of a Noatak National Park study at the Unit 23 Working Group Meeting in 2014 that consisted of compiled data (2009-2013) on commercial hunting and transporter activity within the Noatak National Preserve into a GIS database along with the results of mail surveys of non-local hunters (2010-2013); structured interviews with non-local hunters, guides, and pilots; and the results of acoustic conditions within the park during peak hunting season (2013-2014) (Ackerman 2014). These data provided a background for management steps and additional documentation, undertaken by multiple agencies since that time.

Some researchers, like Carothers et al. (2014) have published observations of caribou decline as part of a wider study of climate change seen as unpredictable ice conditions (changes in freezing and break-up periods), changing measures of annual rainfall, lower river levels during open water season, and a decrease in food (moss and lichen) availability for caribou herds that has precipitated herds ranging into alternate routes (Jackson 1999, Brubaker et al. 2011, Moerlin and Carothers 2012, Carothers et al. 2014, Halas 2015, Halas and Kofinas 2015, NPS 2017, Nedwick and Dau n.d.). Researchers such as Halas have recorded multiple comments by Noatak residents who observed changes in caribou behavior in response to environmental change. Respondent #20 reports seeing the migratory route of caribou change dramatically in the last few years:

> "The weather patterns, like no other. Its snow freeze up and then melt all over. Rain. The weather patterns been…it's not like cooling off and stay cold and then freeze. It's like, do that real fast and then comes a heat wave. Caribou knows when to move. They know what the weathers gonna do. They just stay till it cools off but there's too many bugs when it's warm…mosquitoes" (Halas 2015: 51).

Or, for example, Noatak Elder Evelyn Shy reported in a publication by the Northwest Arctic Borough that "traditional hunting, fishing, and gathering is changing because of changes in the weather. People have to be more careful because the ice could be too thin. It rains when it used to be snowing and the permafrost has been melting along the river" (Northwest Arctic Borough 2016: 165). Environmental variability is suggested to not only have impacts on caribou numbers and behavior, but also to affect hunter access to caribou. For example, in 1986, high water prevented some Noatak households from participating in the caribou hunting season (Georgette and Loon 1988). Authors such as Moerlein have also documented Noatak subsistence users' responses to environmental change in the use of resources other than caribou, but note that caribou hunting is also affected by such phenomena as changing seasonal hydrology patterns that, in turn, block hunter access to hunting sites (Moerlein 2012).[13]

While Noatak residents indicated that predators were on the rise, data from Park Service wildlife management does not point to a wide-scale population increase. The issue may be localized predator-population increases, or an increase in the likelihood of observing predator populations close to prey. Survey respondents did note an increase in predators (predominantly bears and wolves) in the Noatak River area blamed for 'scaring' caribou into the hills and mountains (away from the river) and reducing caribou population (NPS 2017). NPS biologists, however, have determined that predator populations are not on the rise overall within the area—suggesting that these may be largely localized population effects. Respondents working with Halas mapped

[13] Morelein (2012) spent time camping with a Noatak family at Sisualik, the traditional spring fishing and marine mammal hunting grounds for Noatak and others from nearby communities. During that time, she participated in an 'opportunistic caribou hunt,' while on the Noatak River during the spring. Her primary concern was the documentation of environmental changes by Noatak residents that affect fishing subsistence practices in Noatak and Selawik, such as changing water levels and temperatures and the timing of the annual freeze-up and melt. She notes that these changes that may not only affect fish populations, but also caribou hunting practices, as most caribou hunting is done on the Noatak River and the surrounding waterways.

predator use areas in the Noatak, which included wolves, bears, and others, such as fox and wolverine (Halas 2015: 49, Fig. 5.5). Respondent #16 commented: "It's [the caribou population] been declining every year. Mostly [because of] hunting and predators. That's what causes decline. That's more hunting and more predators today than twenty years ago. They don't give the caribou enough time to multiply" (in Halas 2015: 40). More research is needed to understand how wolves and bears are impacting caribou population. Additional reasons for caribou hunting declines have been offered by researchers such as Martin, who reports Noatak residents' concerns about a disconnect between generations in the transmission and prioritization of hunting knowledge to Native youth (Martin 2009).

Attempting to document the range of factors identified by Noatak residents, Halas and others completed broad questionnaire surveys. The statistical analysis by Halas and Kofinas (2015) suggests that 42% of all respondents in Halas (2015) reported that the WACH population had decreased in the last ten years, 36% were unsure if the population had changed, 15% reported no change, and 8% thought the population had increased. Reported reasons for fewer caribou were weather and climate impacts, disruptive sport hunter planes, caribou moving in smaller groups, caribou declines resulting from natural cycles, and excessive numbers of predators. Those citing no change thought the numbers were steady and that caribou were just traveling in smaller groups. Those few who reported a larger caribou population over time cited statistics from management agencies as a principal source of that information. One respondent thought declines were significantly due to caribou interactions with non-native reindeer. Halas and Kofinas offer tabular data analyzing these impacts to caribou hunting by non-local activity (Halas and Kofinas 2015: 3); and Halas provides tabular data identifying the extent by which Noatak respondents perceived predatory and non-local activities to be negative (Halas 2015: 138).

Understandably, Native communities in Northwest Alaska, including Noatak peoples, are intent on being included in all aspects of the caribou resource management process. Magdanz et al. documents these desires, including direct comments from Noatak residents to this effect (Magdanz et al. 2010). This sentiment is also shared in many contributors to the *Caribou Trails* newsletter (2005-18), from many villages in the region. One example from Selawik states,

> "The life experiences of Selawik's Elders and their customary caribou hunting practices reveal valuable ecological knowledge about caribou not available from conventional means. It is our hope that when their

> knowledge and insights are combined with data collected by biologists studying the herd we will gain a more complete picture of this valuable resource. …Hannah Paniyavluk Loon, from her report, 'A Historical Perspective on Caribou Movements and Abundance in the Selawik Drainage, 2004'" (*Caribou Trails* 2005).

The most recent research studies published by Halas (2015) and Halas and Kofinas (2015) are products of collaboration between the Native Village of Noatak, the Noatak National Preserve, and researchers at the University of Alaska, Fairbanks. The focus of this research is the documentation of traditional knowledge of caribou hunting by Noatak hunters during the 2012 to 2015 hunting seasons for the purpose of informing resource management in northwestern Alaska. In 2015, Alagaaq Luther, age 16, was one young hunter of a total of eight from Noatak who wrote to the Board of Fish and Game explaining how he had been unable to get his first caribou, and how integral it is for the people of Noatak to harvest caribou, to sustain physical health and cultural identity. The shared voice of Noatak hunters who participated in this study and who wrote to the Board of Fish and Game has been heard in interagency staff meetings and federal review boards. In 2016, the Federal Subsistence Board voted to close GMU 23 on July 1, to all non-federally qualified subsistence hunters for the 2016/2017 regulatory year (Nu 2016).

Phase 1 Conclusions and Recommendations for Future Planning and Research

The written record regarding caribou hunting in and around Noatak National Preserve is rich and of remarkable time depth. Moreover, all studies seem to confirm that caribou is a "cultural keystone species" central to every aspect of traditional subsistence, culture, and economy: as that technical term implies, caribou "play a unique role in shaping and characterizing the identity of the people who rely on them [and are] embedded in a people's cultural traditions and narratives, their ceremonies, dances, songs, and discourse" (Garibaldi and Turner 2004:1). Caribou, *tuttu* in Iñupiaq, have long been central to traditional subsistence, but also to a wide range of traditional cultural practices, economic activities, even family organization and travel. And this significance persists into the present day, with caribou hunting being a cornerstone element of both Iñupiat subsistence practices and of Iñupiat cultural persistence. Even the location of Native allotments and cabins used by Noatak residents today align with the locations of predictable caribou harvests—at places such as caribou river crossings. With this level of significance in the Noatak community, well-documented in the available written literature presented in this report, the practices of caribou hunting clearly require consideration as a part of Noatak National Preserve management and federal subsistence and natural resource policy related to lands and resources on NPS-managed lands. Moreover, Noatak village caribou hunting traditions, as well as access to caribou, may be protected by a number of federal laws, policies, and regulations related to Native cultural practices and civil rights.

Archaeological documentation, though not fully summarized in this document, provides verification of both the great time depth of these practices, and their ubiquity across the landscapes of what is today Noatak National Preserve (Hall 1969, Shirar 2007, Foote 1965). Focusing on the ethnographic and historical sources available to us, the present Phase 1 report provides a detailed view of caribou hunting and its significance over the last century. In the mid-20th century, Foote (1959, 1960, 1961) provided some of the first detailed written documentation of the locations and mobility of traditional Noatak caribou hunting, as well as other aspects of hunting tradition, based on the personal accounts of Noatak hunters. Subsequent research in Noatak and other nearby villages increasingly focused on the priorities of ADF&G subsistence program: the nutritional importance of caribou (Burch 1972, Morehouse 1981, Fall 2016) as well as

hunting locations and hunting success throughout the Noatak region, measured primarily by household surveys (Arnold 1968, Foote 1965, Georgette and Loon 1988, Mikow et al. 2014, Braem and Kostick 2014, ADFG 2017; ADFG 2010, Georgette et al. 2004, Georgette 2016). A growing recent literature focuses on the causes of caribou herd decline and other obstacles to Noatak caribou hunting such as outside hunters and engine noise, climate change, and a range of other factors (Magdanz et al. 2010, Halas 2015, Halas and Kofinas 2015). For three generations, research on caribou harvests in this area has been substantial and ongoing. In fact, researchers and resource planners should appreciate that Noatak residents sometimes express a sense of "research fatigue."

When reviewing all of these sources, key themes become apparent. All of the major writers who documented traditional Iñupiat life in the Noatak region prior to the foundation of the preserve—writers such as Foote, VanStone, and Uhl—provided clear documentation of certain recurring themes that have a bearing on modern caribou management. They describe the high level of caribou mobility and the high level of variability in caribou locations throughout the region. They also describe ways that Iñupiat hunters and their families adapt to the uncertainty of caribou locations over such vast scales. Traditional hunters must monitor vast areas, share and receive information on herd size and locations, and understand the varying geographical distribution and scale of the herd. This aspect of traditional hunting has persisted into the present day as hunters continue to monitor and adapt to rapidly changing caribou herd size and distribution. The task was made easier by such factors of modern motorized transportation, data sharing with federal and state agencies, and even satellite and caribou tracking technologies. Yet, the traditional adaptive capacities of Native hunters have also been challenged by such factors as new land jurisdictions and boundaries, and the increasingly disrupted scale and distribution of caribou populations due to disturbances on local, regional, and global scales.

Thus, while Iñupiat hunters' traditional responsiveness to dynamic caribou population size and location has remained a cornerstone of the hunting tradition, the focus on adaptation and mobility has arguably intensified in modern times. Indeed, recent researchers such as Halas (2015) have concluded that modern Noatak hunters report a shared knowledge that is sharply focused on recent changes in caribou migration ranges, and on finding adaptive strategies to sustain the hunt in times of such dramatic change.

The literature also makes it clear that Noatak residents report a range of disturbances, from global warming to airplane noise to the pressure of hunters from outside communities—all contributing to the unpredictability of caribou locations and undermining the success of the hunt. This is not only a subsistence challenge, but a challenge to the very culture and identity of Native subsistence hunters. Some may even perceive it as an existential threat to Noatak village as they presently know it.

Meanwhile, the NPS and other agencies must carry out natural resource and subsistence planning in this same rapidly changing context. The NPS Subsistence Program must contend with challenges such as limited data and questions related to the applicability of *historical* data on caribou presence and hunting activity in predicting future needs. Certainly, Noatak village hunters and those from nearby villages have hunted across wide areas—many named in this document or known to the NPS through existing maps and data. Furthermore, certain places are of very longstanding and elevated significance, especially caribou crossing points on rivers and certain crossing points through mountain passes. Yet, to know the identity of these places is not sufficient in understanding the caribou hunting needs of the present and the future.

Beyond this, some sources suggest that accurate biological indicators of caribou status are elusive. For example, the participation of many residents in northern and western Alaska in the harvesting reporting system for the WACH appears to be uneven. To an unknown extent, caribou harvesting is underreported to ADF&G (Georgette 2016). The limitations of this data have only recently been recognized by researchers who acknowledge that modern hunting locations may be vastly different than areas reflected in harvest maps from the past—reflecting the dynamism of the WACH and a range of other influences (Mikow et al. 2014).

Moreover, information on the deeper cultural significance of caribou, beyond its caloric value and geographical point of origin, remains regrettably thin in the written record. While many sources suggest a desire by non-Native scientists and agency managers to integrate Native knowledge and values into management, efforts have been limited and to date, results have been mixed. The detailed Iñupiat knowledge of caribou is not only intrinsically important and worthy of documentation, but has vast implications for the National Park Service as the agency seeks to meet its mandates under a wide range of laws, policies, and regulations supporting Native cultural practices. Beyond seeking data on harvest quantities and locations, the cultural dimensions of the caribou harvest and highly detailed local knowledge of Noatak hunters deserve broader attention. Such

information seems invaluable in helping shape future efforts to develop meaningful management plans and to help ensure the future of this species and the physical and cultural survival of the people who know it well.

With these facts in mind, the NPS may wish to consider a range of possible alternatives for collaborating with Noatak village and other Native communities associated with Noatak National Preserve. On the basis of this Phase 1 literature review, we advance the following concepts:

1. Planning for caribou management must involve frequent and direct engagement with Noatak village hunters, rather than reliance on existing writings, maps, and other materials of the sort summarized in this Phase 1 assessment. Existing information is of limited applicability to modern management challenges due to a) the sharp focus on past documentation on only a portion of the traditional practice of caribou harvest, and b) the rapidly changing range of natural and human disturbances affecting caribou distribution and, in turn, caribou hunting locations. Regular consultation and meetings are clearly indicated.

2. Meaningful planning for future caribou management and harvest must take an "adaptive management" approach or similar. This will allow management guidelines to be, to the extent possible, up-to-date and rapidly responsive to changing caribou numbers and distribution and will allow for the changing patterns of subsistence hunting resulting from this dynamism. An adaptive approach will also allow new data on management successes or failures to inform management without a significant time lag.

3. To truly understand the distribution of caribou hunting, or any other dimension of the hunt, the existing written literature is insufficient. Therefore, by extension, this Phase 1 literature review is also a grossly insufficient depiction of the true nature and significance of caribou hunting in Noatak village. Additional documentation will be required to address specific topics of pressing concern overlooked in the existing literature, or on topics where the existing literature is outdated.

4. We therefore recommend that, if the village of Noatak is supportive, the NPS proceed with a Phase 2 Traditional Use Study that will involve systematically documenting a number of pressing topics. This would include but not be limited to documenting places actively hunted in the living memory and oral traditions of Noatak hunters; adaptive strategies employed by hunters for caribou tracking and hunting mobilization; observed habitat changes and human disturbances that affect caribou presence and distribution; the roles of transportation, tracking

and other technologies in the modern hunt; enduring cultural and culturally-significant practices related to the hunt; and Traditional Ecological Knowledge (TEK) related to caribou and caribou hunting within lands now managed within the preserve. As part of this effort, researchers are advised to collaborate with Noatak hunters in the detailed mapping of caribou hunting areas—not as isolated points, but as linear pathways and landscape-scale polygons all linked as part of a larger whole. Placename data referencing caribou hunting and other cultural map data can also be integrated into such an effort. In a Phase 3, the accumulated data can be assembled into a full thematic report in language that speaks to modern management and policy concerns and is useful to Noatak village residents wishing to engage the management process or simply document their cultural and historical practices. Complete GIS/map layers representing the full range of geographical data gathered as part of the effort can also be included as a project deliverable. An optional fourth phase would involve developing some combination of educational, interpretive, or map materials for sharing of research findings within and beyond the Noatak village community, at the discretion of village residents and council.

We advance these recommendations on the basis of a simple Phase 1 review of existing documentation, resulting in our production of this report, as well as the annotated bibliography appendix, the project archive of approximately 200 written sources on the topic delivered to the NPS and Noatak village, and an article on caribou river crossing sites under separate cover. We hope that these tools and this background information may be of use for the planning process ahead. We recognize that the recommendations offered here will scarcely overcome hurdles to incorporating Native knowledge into caribou management planning in such rapidly changing environmental and regulatory contexts. However, we offer these recommendations with the sincere hope that they will facilitate certain necessary and meaningful collaborative efforts ahead—so that *tuttu*, and the Native communities connected to them, will survive and thrive into the imaginable future.

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n.d. The Western Arctic Caribou Herd: The Largest Herd in Alaska. Case Study. http://www.adfg.alaska.gov/static/education/educators/curricula/alaskawildlifecurriculum/pdfs/case_study_western_arctic_caribou_herd.pdf, accessed 14 January 2019.

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http://www.adfg.alaska.gov/static/home/library/pdfs/wildlife/caribou_trails/caribou_trails_2010.pdf, accessed 14 January 2019.

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White, R. G., and J. Trudell
1980 Habitat preference and forage consumption by reindeer and caribou near Atkasook, Alaska. *Arctic and Alpine Research* 12(51):1-529.

Wolfe, Robert J.
2013. Sensitive Tribal Areas on the Arctic Slope: An Update of Areas, Issues, and Actions in Four Communities. Iñupiat Community of the Arctic Slope. https://www.Iñupiatgov.com/files/North%20Slope%20Sensitive%20Tribal%20Areas%20Final%20Report.pdf , accessed 8 November 2018.

Appendix A:
Annotated Bibliography

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1979. Alaska Area Native Health Service: Description of the Program. Department of Health & Welfare Public Health Service, Health Services Administration, Indian Health Service, Alaska Area Native Health Service. https://ia800409.us.archive.org/18/items/alaskaareanative00alas/alaskaareanative00alas.pdf, accessed 8 November 2018.

General description on caribou use by Athabaskan people: "Others on the Seward Peninsula depended largely upon caribou, as did the people of the upper Noatak and Kobuk rivers, and of the Brooks Range" (6).

Alaska Department of Fish and Game (ADF&G)

2010. Excel File: ADFG_Noatak Community Harvest Data_2010. Alaska Department of Fish & Game.

Data in Excel table form from the Western Arctic Caribou (Big Game) 2010-2011 Project (Project ID 181), from Noatak, (Community Code 250) for multiple animal resources including caribou (resource code 211000000). Headings include the following: percent attempting to harvest, percent harvesting, percent using, percent giving away, percent receiving, units, reported harvest, conversion factor, reported pounds harvested, average lbs harvested per household, estimated harvest, lower harvest amount estimate, upper harvest amount estimate, estimated pounds harvested, lower harvest lbs estimate, upper harvest lbs estimate, per capita lbs harvested, percent 95 CIP, percent of total harvest, mean per capita used, mean per capita grams per day, ninety fifth confident limit of mean use in pounds, ninety fifth confidence limit of mean use in grams per day, ninety fifth confidence limit of mean use grams per day, fiftieth percentile use median user grams per day, ninety fifth percentile use high end user grams per day, and one hundredth percentile use top user grams per day. (File: ADFG Noatak Community Harvest Data_2010).

Alaska Department of Fish and Game (ADF&G), Division of Subsistence

2017. Estimated harvests of fish, wildlife, and wild plant resources by Alaska region and census areas, 2014, Alaska.

Seven-page document. Describes how ADF&G has calculated harvest estimates based on the information provided by household surveys. Provides equations. Table 3- Estimated harvests of wild resources for home use in Alaska by census area, region, and category, 2014: identifies Arctic Region land mammals as 107.1 pounds useable weight, per capita harvest.

Alaska Fisheries Science Center

n.d. Noatak. Community Profiles for the North Pacific Fisheries—Alaska. NOAA-TM-AFSC-259—Volume 4, NOAA Fisheries, Alaska Fisheries Science Center. https://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/communityprofiles/Noatak_Profile_2000_2010.pdf, accessed 8 November 2018.

Provides basic demographic information for the village of Noatak, 2000-2010.

Alaska Native Knowledge Network (ANKN)

n.d. Four Units on Tuttu. Alaska Native Knowledge Network, University of Alaska Fairbanks. http://www.ankn.uaf.edu/curriculum/units/tuttu/, accessed 8 November 2018.

Learning materials for students to learn about the caribou and the importance of keeping the environment free from pollution. There are four, unit lessons for students in grades four through twelve. Unit one focuses on the importance of caribou for the Iñupiat. Unit two provides caribou anatomy and specifies that students spend a week participating in the fall migration subsistence hunting practices. Unit three describes products made from caribou. Unit four outlines a symposium of students, teachers, scientists and elders.

Anderson, Douglas B., Wanni W. Anderson. Ray Bane, Richard K. Nelson, and Nita Sheldon Towarak

1998. Kuuvanmiut Subsistence: Traditional Eskimo Life in the Latter Twentieth Century. National Park Service. https://ia600307.us.archive.org/2/items/kuuvanmiutsubsis00ande/kuuvanmiutsubsis00ande.pdf, accessed 7 November 2018.

Provides substantial information regarding the hunting practices of hunters from Kotzebue and the territory they visit in the Noatak region in search of caribou.—A commissioned report giving a detailed description of the lifestyle of the Kobuk River area people in northwestern Alaska as observed in 1974 and 1975. The study was undertaken as a part of the National Park Service's interest in learning about the Alaska d-2 proposals (proposed Alaska additions to the national park system) and the natural and human resources, which are integral parts of the land. Recognizing the value of Kuuvanmiut Subsistence to the people of northwestern Alaska, the National Park Service prepared an edited, unpublished version of the original manuscript in 1986. In 1992 the Northwest Arctic Borough School District requested a re-publication of Kuuvanmiut Subsistence for classroom use in its bilingual curriculum. This volume, prepared in cooperation with the Bilingual Program, is based on the 1986 edited version.—Provides background/historic information regarding caribou hunting practices of the Kobuk people. Some reference to caribou hunting territories in Noatak region.

Anthony, Raymond

2013. Animistic pragmatism and native ways of knowing: adaptive strategies for overcoming the struggle for food in the subarctic. International Journal of Circumpolar Health, Vol. 72. https://archive.org/details/pubmed-PMC3754613, accessed 6 November 2018.

Shows how narrative in relationship to the ''ecosophy'' of Alaska Native peoples can help to promote a more ecological orientation to address food insecurity in rural communities in Alaska. Native elders have been the embodiment of trans-generational distributed cognition, for example, collective memory, norms, information, knowledge, technical skills and experimental adaptive strategies. They are human ''supercomputers,'' historical epistemologists and moral philosophers of a sort who use narrative, a form of moral testimony, to help their communities face challenges and seize opportunities in the wake of an ever-changing landscape. Focuses mainly on Iñupiaq of Seward Island, but entire article can be applied to communities in Alaska where subsistence practices continue.

Arnold, Robert D.

1968. Alaska Natives & the Land. Federal Field Committee for Development Planning in Alaska, Anchorage. https://ia801303.us.archive.org/29/items/ERIC_ED055719/ERIC_ED055719.pdf, accessed 8 November 2018.

Basic information regarding the Nuunamiut movement across the landscape in response to caribou behavior and migration. Contains multiple maps of various divisions including a map of "Major Subsistence Patterns of Alaska Eskimos" that includes caribou hunters. Arnold produced four maps of land use in the Noatak region. These include one of Autumn land use areas (September to mid-October 1950-1960), one of winter land use areas (mid-November to March 1950-1960), one of spring (mid-March to June 1950-1960), and on of summer land use areas (late June to August 1950). Within this report is documentation of 'Present Day Food Quest Activities of Selected Bering Straits Villages,' of which caribou is identified as a fall, winter and summer food source. Of note is a table that lists 'historic places' associated with the Noatagmiut and the Nunatagmiut and defines them as 'seasonal campsites,' or 'status unknown' (244).

Bernard, D. R. and A. L. DeCicco

1987. Stock assessment of the Dolly Varden char of Kotzebue Sound. Fishery Data Series No. 19, Alaska Department of Fish and Game, Juneau, Alaska, USA. http://www.adfg.alaska.gov/FedAidPDFs/fds-019.pdf, accessed 7 November 2018.

Map of the Noatak watershed. No mention of caribou.

Bland, Laurel L.

1972. The Northern Eskimos of Alaska. A Source Book. Alaska State Department of Education, Juneau. https://ia800509.us.archive.org/8/items/ERIC_ED075144/ERIC_ED075144.pdf, accessed 8 November 2018.

Prepared as a resource for Alaskan educators, thisbook is designed for any grade level or learning setting. It providesthe basis for teachers to develop their own appropriate units.Basic information on "The Northern Alaskan Eskimos (Iñupiat s)" and dependence on caribou for subsistence as part of a hunting pattern referred to as the "Caribou Hunting Pattern (caribou, fish, seal and beluga – a small white whale)." Touches on trade and economy and changes brought about by Western influences. Identifies changes in caribou migratory patterns and effects on hunting patterns.

Bradley, Claudette

2000. *AISES (American Indian Science and Engineering Society) Corner* in Sharing Our Pathways: A Newsletter of the Alaskan Rural Systemic Initiative 5(1-5): 56. https://archive.org/details/ERIC_ED453984, accessed 6 November 2018.

The AISES Initiative concluded its fifth year with eight summer science-culture camps held on Afognak Island, Haines (vicinity of), St. Paul, Kwethluk, Kisaralik river, St. Mary's, Chevak and Fairbanks. Each camp had Elders teaching activities specific to the culture of the region and engaged students in science projects. … These students arose at 7:00 a.m. each morning to work with Elders and teachers. They cleaned and tanned caribou skins and carved and polished caribou bone and wood to make an Athabascan "toss and catch the hole" game piece.

1999. *AISES (American Indian Science and Engineering Society) Corner* in Sharing Our Pathways: A Newsletter of the Alaska Rural Systemic Initiative, Volumes 1-4 (1996-1999): 245. Alaska Federation of Natives; University of Alaska Fairbanks; National Science Foundation. https://ia800206.us.archive.org/23/items/ERIC_ED450981/ERIC_ED450981.pdf, accessed 8 November 2018.

Through the AISES program of the Alaska Rural Systemic Initiative, village students are learning that Elders' knowledge is relevant to science and makes valuable contributions to scientific research.

Braem, Nicole M., and Marylynne Kostick

2014. Subsistence Wildlife Harvests in Elim, Golovin, Kivalina, Koyuk, Noatak, and Wales, Alaska, 2010-2011. Special Publication No. SP2012-04. Alaska Department of Fish and Game, Division of Subsistence. http://www.adfg.alaska.gov/specialpubs/SP2_SP2012-004.pdf, accessed 7 November 2018.

Provides documentation of Noatak caribou hunting areas during the 2009-2010 and 2010-2011 caribou hunting seasons. The report includes the results of limited scope, big game subsistence harvest surveys from communities that harvest caribou from the WAH. Researchers documented the number, sex, and harvest timing for these caribou. Conducted Noatak hunters harvested 66 caribou, 16 pounds per person, between May 2010 and April 2011.

Brubaker, Michael, Jake Bell, James Berner, Mike Black, Raj Chavan, Jeff Smith, and John Warren

2011. Climate Change in Noatak, Alaska. Alaska Native Tribal Health Consortium (ANTHC). https://anthc.org/wp-content/uploads/2016/01/CCH_AR_062011_Climate-Change-in-Noatak.pdf, accessed 7 November 2018.

Rural Arctic communities are vulnerable to climate change and residents seek adaptive strategies that will protect health and health infrastructure. In the Iñupiat community of Noatak, climate change is impacting the weather, land, river, wildlife, plants, and the lives of the people who live there. Examples of potential health effects from climate change include injuries from falling through ice, heat stroke from extreme summer temperatures, respiratory ailments from wildfire

smoke, gastrointestinal infections from waterborne pathogens, chronic diseases in the absence of food security, and damage to critical infrastructure. This report documents climate change impacts as described by the local people and interpreted through the lens of public health. Of note are comments made by Noatak residents regarding changes in caribou migratory paths.

Burch, Ernest S., Jr.
1971. The Nonempirical Environment of the Arctic Alaskan Eskimos. Southwestern Journal of Anthropology 27(2):148-165. https://www.jstor.org/stable/3629237, accessed 13 November 2018.

The research reported on here was carried out in 1969-1970 in a number of communities in northern and northwestern Alaska, including Anaktuvuk Pass, Barrow, Deering, Kivalina, Kotzebue, Noorvik, Point Hope, Selawik, and Shungnak. Although data relevant to this topic were obtained for all areas, most de rived from the coastal district between Point Hope and Deering and from the drainages of the Noatak, Kobuk, and Selawik Rivers. Data was derived through interviews using topographic maps and soliciting information about traditional settlements, annual cycles, and travel. Of note: References the nonempirical environment in the form of 'creatures' that effect location of hunting and subsistence practices.

1972. The Caribou/Wild Reindeer as a Human Resource. American Antiquity 37(3):339–368. https://www.jstor.org/stable/278435, accessed 13 November 2018.

The purpose of the present paper is to initiate a reconsideration of what human life is like when the caribou/wild reindeer is a major resource. The data on the prey derive primarily from biological studies of caribou conducted in Alaska (summarized by Skoog 1968) and Canada (summarized by Kelsall 1968) over the past 2 decades, the bulk of this information thus being extracted from existing sources. The data on the (human) predator populations come primarily from research conducted since 1968 by Thomas C. Correll and myself among several groups of Eskimos in both Alaska and Canada some of whom were highly dependent on caribou for their subsistence. Of note: Extensive information regarding caribou migratory patterns and other biological processes that effect human practices of subsistence and mobility on the landscape.

1985. Subsistence Production in Kivalina, Alaska: A Twenty-Year Perspective. Technical Paper 128.Division of Subsistence, Alaska Department of Fish and Game. http://www.subsistence.adfg.state.ak.us/techpap/tp128.pdf, accessed 8 November 2018.

A focused study on the subsistence practices of Kivalina residents. Of note: Burch also made observations of Noatak residents passing through Kivalina while hunting caribou.

Burch, Ernest S., Jr., Eliza Jones, Hannah P. Loon, and Lawrence D, Kaplan
1999. "The Ethnogenensis of the Kuuvaum Kanjiagmiut." *Ethnohistory* 46(2):291-327. http://www.jstor.org/stable/482963

The Native inhabitants of the upper Kobuk River, Alaska, are identified in the ethnographic record as Iñupiaq Eskimos. This article presents evidence showing that they were actually Koyukon-speaking Athapaskans in the early nineteenth century. Between about 1860 and 1880 they were rapidly and peacefully assimilated, and they are Iñupiaq Eskimos today. The article

summarizes what is known or can be reasonably inferred about the upper Kobuk Koyukon way of life prior to the change. Discusses cladism and ethnogenesis as producers of new ethnic units. Of note are descriptions of seasonal migratory patterns.

Bureau of Land Management (BLM)

1983. Final Environmental Impact Statement on Oil and Gas Leasing in the National Petroleum Reserve in Alaska. Bureau of Land Management, U.S. Bureau of the Interior. https://ia800403.us.archive.org/10/items/FEISonOilandGasLeasingintheNPRinAlaska/FEISonOilandGasLeasingintheNPRinAlaska_041.pdf, accessed 8 November 2018.

Caribou are identified as a key resource and issue of the final EIS. Any petroleum developments in NPR-A following leasing are likely to result in some degree of behavioral changes of caribou populations in NPR-A and adjacent areas. Under the conservation measures adopted in the Preferred Alternative, these behavioral changes are not expected to result in any catastrophic influences on the natural cycling of caribou population levels. However, it is likely that site-specific behavioral changes in response to development, especially to construction and use of a pipeline and haulroad corridor from NPR-A to a point of access to market, may alter present regional caribou distribution, at least in the short term, and may influence subsistence availability. Contains a map of the ranges of the Arctic caribou herds and 'Hypothetical Caribou Use 'Zones'' and a section that addresses the Western Arctic Herd specifically.

1973a. A Proposal: Noatak National Conservation Area. Alaska State Office, Bureau of Land Management. Washington, D.C.: U.S. Department of the Interior, Bureau of Land Management. https://archive.org/details/NoatakNationalConservationAreaaProposal, accessed 6 November 2018.

Legislation that provides for the Noatak Conservation Area. Contains a section of 'Human Use' that briefly addresses caribou use.

1973b. Land Use Capacity and Management Philosophies for Alaska: A Study. . Alaska State Office, Bureau of Land Management. Anchorage, Alaska: U.S. Department of the Interior, Bureau of Land Management. https://archive.org/details/landusecapacitym00unit/page/n1?q=noatak, accessed 6 November 2018.

Outlines land use capacities and management philosophies of the BLM. Breaks down the proposed Noatak Conservation Area into "Management Units" and attempts to define 'resource management opportunities' within each unit. Each unit is defined by its 'salient features' and known 'resource values' like caribou habitat are defined.

Burwell, Michael

2006. The 1976 Decline of the Western Arctic Caribou Herd: Contested Constructions of Ecological Knowledge. Anthropology Research Paper, University of Alaska Anchorage. https://www.uaa.alaska.edu/academics/institutional-effectiveness/departments/center-for-advancing-faculty-excellence/_documents/burell-decline-of-the-western-6-21-2008.pdf, accessed 8 November 2018.

A student research paper that explores problematic ADFG caribou management practices and the effects of distrust between agencies and harvesters when communication breaks down. Outlines the sequence of events that led to harvest restrictions during the 1976-77 season by the Alaska Board of Game as a result of an unpredicted population drop. Describes the continuing distrust between subsistence users and ADFG management system and the difficulties of co-management without changing current state and federal legal and administrative mandates. Of note are interview quotes from ADFG biologists regarding caribou management.

Carothers, Courtney, Caroline Brown, Katie J. Moerlein, J. Andres Lopez, David B. Andersen, and Brittany Retherford

2014. Measuring Perceptions of Climate Change in Northern Alaska Pairing Ethnography with Cultural Consensus Analysis. Ecology and Society 19(4). https://www.jstor.org/stable/26269670, accessed 12 November 2018.

Provides observations of TEK gathered regarding subsistence fishing practices in Arctic communities including Noatak: "In addition to changing climatic conditions, we found that changing living conditions, decreasing interest by younger generations in pursuing subsistence lifestyles, and economic challenges in rural Alaska were also understood to be pressing drivers of change that have the potential to dramatically reshape subsistence patterns and practices in the study communities" (Carothers et al 2014).

Cordova Daily Times

1919. Noataks are called Arabs of the North. *Cordova Daily Times,* 4 December 1919. https://chroniclingamerica.loc.gov/lccn/sn86072239/1919-12-04/ed-1/seq-7.pdf, accessed 8 November 2018.

A news article from 19191 by James H. Maguire, a teacher in Noatak, regarding the migratory nature of Noatak residents.

Dayo, Dixie. Ed.

2000. Sharing Our Pathways: A Newsletter of the Alaskan Rural Systemic Initiative 5(1-5). https://archive.org/details/ERIC_ED453984, accessed 6 November 2018.

A collection of newsletters edited by Dixie Dayo. Some articles possess relevant information. Individual authors have been cited when information has been found pertinent. See Bradley, Claudette, Jackson, Elmer, and Mulluk, Jr., Robert.

Ducker, James H.

1985. Alaska's Northwest Region: A History. Bureau of Land Management, Anchorage, Alaska. https://ia601009.us.archive.org/24/items/AlaskasNorthwestRegionaHistory/AlaskasNorthwestRegionaHistory_035.pdf, accessed 8 November 2018.

The report is designed to facilitate the BLM's endeavors to make navigability determinations in Alaska. Provides physical description of the Noatak River system. Basic information regarding dependence of Noatak and Kotzebue peoples on caribou and caribou hunting practices from boats

on the Noatak and Kelly rivers. Of note is a table of 'Native Allotments of Northwest Alaska,' that provides location, means of access, use and other remarks.

Engelhard, Michael, Linda J. Ellana, and George K. Sherrod

1993. Ethnohistoric Insights into Indigenous Contact and Land Use on the Upper Kobuk and Koyuyuk Rivers. Unpublished Report. Department of Anthropology, University of Alaska Fairbanks. https://irma.nps.gov/DataStore/DownloadFile/546728, accessed 12 November 2018.

Provides evidence that at least two neighboring populations of Athabaskans – Koyukon and Gwich'in – as well as some North Slope Iñupiat groups had made extensive use of land and resources on the upper to middle Noatak and Kobuk rivers. Some of the most relevant evidence suggesting joint, seasonally alternating, and/or consecutive land and natural resource use by both Iñupiat and Athabaskans was found in the form of coexisting Iñupiaq , Gwich'in, and Koyukon place names on the upper Kobuk, Noatak, Koyukuk, and Alatna rivers.

Fall, James A.

2016. Subsistence in Alaska: A Year 2014 Update. Alaska Department of Fish and Game, Division of Subsistence. Anchorage.

Four-page document defining and describing subsistence and the importance of 'wild food harvest' to Alaska residents. Graphs of Alaska's population in 2014, table of percentage of households participating in subsistence activities in rural areas, a pie graph of what wild foods are harvested, and a pie graph of who harvests fish and game. Of note: a bar graph of wild food harvests in Alaska by area (pounds useable weight per person per year) – Arctic is shown as highest at 405 lbs – and a table that shows Wild food harvests in Alaska: Nutritional and replacement values.

Foote, Don Charles

1959. The Economic Base and Seasonal Activities of Some Northwest Alaskan Villages: A Preliminary Study. Submitted to the United States Atomic Energy Commission in compliance with Contract No. AT (04-3)-315. https://www.osti.gov/servlets/purl/4626508, accessed 13 November 2018.

In 1959, the Human Geographical Studies, a part of the Environmental Studies Program initiated by the desire to study the industrial applications of nuclear explosives, began a field study in the Kotzebue-Noatak region of Alaska. Mr. Don Charles Foote was contracted to conduct personal interviews and document firsthand activities of 'Eskimo activity patterns' during a period that lasted three years: 1959-1961. This is his preliminary study.

1960. The Eskimo hunter at Noatak, Alaska, Winter 1960. Submitted to the United States Atomic Energy Commission in compliance with Contract No. AT (04-3)-315. https://www.osti.gov/servlets/purl/4626506, accessed 13 November 2018.

In 1959, the Human Geographical Studies, a part of the Environmental Studies Program initiated by the desire to study the industrial applications of nuclear explosives, began a field study in the Kotzebue-Noatak region of Alaska. Mr. Don Charles Foote was contracted to conduct personal interviews and document firsthand activities of 'Eskimo activity patterns'

during a period that lasted three years: 1959-1961. This is the results of his observations during his first year of study.

1961. A Human Geographical Study in Northwest Alaska. Final Report of the Human Geographical Studies Program, United States Atomic Energy Commission, Project Chariot. (with contributions from H. Anthony Williamson). https://www.osti.gov/servlets/purl/4649596/, accessed 13 November 2018.

In 1959, the Human Geographical Studies, a part of the Environmental Studies Program initiated by the desire to study the industrial applications of nuclear explosives, began a field study in the Kotzebue-Noatak region of Alaska. Mr. Don Charles Foote was contracted to conduct personal interviews and document firsthand activities of 'Eskimo activity patterns' during a period that lasted three years: 1959-1961. These are the results of his second year of study.

1965. Exploration and resource utilization in northwestern arctic Alaska before 1855. PhD Dissertation, Department of Geography, McGill University. http://digitool.library.mcgill.ca/webclient/StreamGate?folder_id=0&dvs=1542137355644~847, accessed 13 November 2018.

Foote performs an extrapolation of caribou numbers and hunting effort based on caloric needs in 1850 for the Napaaqtaġmiut and Naotagmiut along the Noatak River. Identifies the following winter settlements: Noatak, Sukkuk, Napaktosugruk, and Akveexrak.

Gal, Robert

1999. Northern Exposure: Young Alaskans, Face to Face with their Heritage. The Federal Archeology Program: Secretary of the Interior's Report to Congress, 1996-1997. National Park Service, Department of the Interior. https://ia800206.us.archive.org/33/items/ERIC_ED428916/ERIC_ED428916.pdf, accessed 8 November 2018.

Very briefly describes how the senior class of the Napaaqtugmiut School located in Noatak village were invited to a 'former Iñupiaq village site" within the boundaries of the Noatak National Preserve as some of their ancestors had once inhabited the site. There is a grainy picture of caribou crossing a river and one of 'Caribou crossing Lake Kaiyak.'

Georgette, Susan

2000. Subsistence use of birds in the Northwest Arctic Region, Alaska. Technical Paper No. 260. ADF&G Division of Subsistence. http://www.adfg.alaska.gov/techpap/tp260.pdf, accessed 7 November 2018.

Brief, oblique references to caribou in relation to bird harvesting. Of note: Some respondents mention caribou when commenting on bird hunting practices.

2016. Summary of Western Arctic Caribou Herd Overlays (1984–92) and Comparison with Harvest Data from Other Sources. Special Publication No. 2016-06. Alaska Department of Fish and Game Division of Subsistence.

http://www.adfg.alaska.gov/specialpubs/SP2_SP2016-006.pdf, accessed 7 November 2018.

For a variety of reasons, many residents of northern and western Alaska participate sporadically, if at all, in the harvesting reporting system for the WAH. Caribou harvests are thus underreported to ADF&G to a substantial but unknown extent. This report examines the data from one reporting system, summarizes hunter participation and harvest quantities by community by year, 1984-92. Of note: Table of Noatak number of caribou harvested in fall and spring 1984-92.

Georgette, Susan and Hannah Loon

1988. The Noatak River: fall caribou hunting and airplane use. Technical Paper No. 162. ADF&G Division of Subsistence. http://www.adfg.alaska.gov/techpap/tp162.pdf, accessed 7 November 2018.

Describes the fall caribou hunting patterns of the Noatak residents; characterizes the nature and extent of fall airplane use of the Noatak River between the Eli and Nimiuktuk Rivers; documents changes in Noatak hunting patterns and airplane use of the Noatak River in the past several years; examines the relationship between aircraft traffic and Noatak hunters; and describes the movement of caribou in the Noatak valley in fall. Project area is from the mouth of the Eli River to the mouth of the Nimiuktuk River, August through September, space and time specified by the controlled use area proposal. Information gathered from hunters: hunting areas, methods, camp locations, costs in dollars and time harvest groups, hunter success, caribou movements, aircraft incidents, and changes in these over time. Twenty-one households in Noatak were interviewed during the hunting season in 1987. Local pilots were also interviewed regarding: number, timing and purpose of trips made to the Noatak valley, observed caribou movements, extent of non-local aircraft traffic, interactions with boats and other aircraft, and changes in use patterns over the past ten years. Three aerial surveys of the Noatak River were completed by the Division of Game and Department staff at Kotzebue.

1991. Subsistence hunting of Dall sheep in Northwest Alaska. Technical Paper No. 208. ADF&G Division of Subsistence. http://www.adfg.alaska.gov/techpap/tp208.pdf, accessed 7 November 2018.

Describes the practice of hunting sheep when caribou are scarce. Caribou are mentioned only in contrast to sheep hunting methods and practices.

Georgette, Susan and Attamuk Shiedt

2005. Whitefish: traditional ecological knowledge and subsistence fishing in the Kotzebue Sound Region, Alaska. Technical Paper No. 290. ADF&G Division of Subsistence & Maniilaq Association. http://www.adfg.alaska.gov/techpap/tp290.pdf, accessed 7 November 2018.

Caribou are mentioned in reference to balance of food availability/scarcity.

Georgette, Susan, Kate Persons, Enoch Shiedt, and Sandra Tahbone

2004. Subsistence Wildlife Harvests in Five Northwest Alaska Communities, 2001-2003. Results of a household survey of Kawerak, Inc. Maniilaq Association, and the Alaska Department of Fish and Game.

https://library.alaska.gov/asp/edocs/2007/04/ocn123495361.pdf, accessed 6 November 2018.

Short description of caribou hunting statistics from surveys done between Nov. 2001 and Oct 2002. 10 pages of written summary and approximately 40-50 pages of tabular and graphical data showing the results of these surveys.

Halas, Gabriela

2015. Caribou Migration, Subsistence Hunting, and User Group Conflicts in Northwest Alaska: A Traditional Knowledge Perspective. MS Thesis, University of Alaska Fairbanks. https://scholarworks.alaska.edu/handle/11122/6090, accessed 8 November 2018.

Very rich/dense data source. Multiple maps of WAH migratory routes, wintering areas, calving grounds as well as maps showing fall hunting locations as identified in approximately 62 interviews with Noatak caribou hunters. Address integration of TEK and management. Identifies sources of disruption and displacement of caribou hunters. Of note: Direct quotes from active hunters and other Noatak residents who are considered knowledgeable about hunting in the past.

Halas, Gabriela and Gary Kofinas

2015. Community Report: Caribou Migration, Subsistence Hunting, and User Group Conflicts in Northwest Alaska. AFES Miscellaneous Report 2015-06. UAF School of Natural Resources & Extension. https://www.uaf.edu/files/snre/publications/misc/MP-15-06.pdf, accessed 8 November 2018.

Data from The Noatak Caribou Traditional Knowledge Project: The study was completed from 2012 to 2015 and documented Noatak residents' traditional knowledge of caribou ecology and caribou hunting as a way of informing caribou science and wildlife management in northwestern Alaska. Two research questionnaires were developed. "The Active Hunter Survey," was used to document all active Noatak hunters' knowledge about their caribou hunting practices, changes to caribou and caribou hunting, impacts to caribou, interactions with non-local hunters and commercial operators; 62 participants. "The Knowledgeable Hunter Interview," included both active and non-active hunters and incorporated mapping the traditional knowledge of select Noatak hunters; 19 participants. Includes photographs of interviewees marking caribou locations on a map and caribou hides laid out to dry as part of processing.

Hall, Edwin S., Jr.

1969. Avian Remains from the Kangiguksuk Site, Northern Alaska. The Condor 71(1):76-77. https://www.jstor.org/stable/1366058, accessed 13 November 2018.

The site is Kangiguksuk, located at the confluence of Kangiguksuk Creek and the Noatak River (670 57' N, 1610 50' W), in the Brooks Range of northern Alaska. This site was excavated between 1963 and 1965. An analysis of the cultural and faunal remains recovered by completely excavating the site indicates that the single house was inhabited by an Eskimo family for about four years around A.D 1578. Of note: Mention of caribou remains at site, meaning caribou were plentiful at the time of inhabitation.

Hippler, Arthur F.

1970. From Village to Town: An Intermediate Step in the Acculturation of Alaskan Eskimos. Training Center for Community Programs in coordination with Office of Community Programs Center for Urban and Regional Affairs. University of Minnesota, Minneapolis. https://archive.org/details/ERIC_ED045247/page/n13?q=noatak, accessed 6 November 2018.

Discusses the movement and settlement of the Kobuk River group over time. Addresses the changes in both in response to disappearance and reappearance of caribou in the area. Of note: comments on the changes in caribou hunting as a result of the introduction of the snowmachine.

Impact Assessment, Inc.

1989. Point Lay Biographies. Social and Economic Studies Program Technical Report No. 140. Anchorage, AK: USDOI/MMS, Alaska OCS Region. https://www.boem.gov/BOEM-Newsroom/Library/Publications/1989/89_0094.aspx, accessed 8 November 2018.

Within this document are biographies of different people.

Jackson, Elmer

2000. *Iñupiaq Region: Natural Products made from the Tuttu, Part III* in Sharing Our Pathways: A Newsletter of the Alaskan Rural Systemic Initiative 5(1-5). https://archive.org/details/ERIC_ED453984, accessed 6 November 2018.

In addition to providing information regarding products made from caribou (tents, warm winter clothing: boots, mittens, socks, pants, etc), Jackson identifies caribou hunting locations during periods of famine. Addresses traditional low of showing respect to the animals and the environment and sharing. Indigenous people passed, from generation to generation, the practice of having respect for the animals and the environment. They took only what was needed, subsisting from season to season

1999a. *Caribou – Tuttu – Rangifer Tarandus* in Sharing Our Pathways: A Newsletter of the Alaska Rural Systemic Initiative, Volumes 1-4 (1996-1999): 210. Alaska Federation of Natives; University of Alaska Fairbanks; National Science Foundation. https://ia800206.us.archive.org/23/items/ERIC_ED450981/ERIC_ED450981.pdf, accessed 8 November 2018.

Provides basic information on caribou behavior, migratory routes, including river crossings, environmental impacts (acid rain) on food for caribou.

1999b. *Iñupiaq Region: Integrating Native Values* in Sharing Our Pathways: A Newsletter of the Alaska Rural Systemic Initiative, Volumes 1-4 (1996-1999): 195. Alaska Federation of Natives; University of Alaska Fairbanks; National Science Foundation. https://ia800206.us.archive.org/23/items/ERIC_ED450981/ERIC_ED450981.pdf, accessed 8 November 2018.

Elders, native educators, Iñupiaq language teachers and certified teachers at the Northwest Arctic Borough School District (NWABSD) began the process of curriculum development. At their December 10-12, 1997 subsistence curriculum development workshop, they gathered

information on whitefish, caribou, fall camping, spring camping and medicinal plants. Of note: Jackson provides caribou hunting dates and locations.

1999c. *Iñupiaq Region: Integrating Indigenous Knowledge into Education* in Sharing Our Pathways: A Newsletter of the Alaska Rural Systemic Initiative, Volumes 1-4 (1996-1999): 110. Alaska Federation of Natives; University of Alaska Fairbanks; National Science Foundation. https://ia800206.us.archive.org/23/items/ERIC_ED450981/ERIC_ED450981.pdf, accessed 8 November 2018.

An Iñupiaq value that is alive is sharing. When a young hunter catches his first game it is given to an elder. A person who lives the subsistence way of life must learn the skill of skinning and dissecting game animals such as bear, moose and caribou. A hunter is a person who when subsistence hunting, treats them with respect.

Kelly, Michael D., Patricia O. McMillan, and William J. Wilson

1990. North Pacific Salmonid Enhancement Programs and Genetic Resources: Issues and Concerns. Technical Report NPS/NRARO.NRTR-90/03. National Park Service, United States Department of the Interior. https://archive.org/details/northpacificsalm00kell?q=noatak, accessed 6 November 2018.

Oblique mention of caribou; general mention as important subsistence food source for those in Kotzebue.

Langdon, Steve and Rosita Worl

1981. Distribution and Exchange of Subsistence Resources in Alaska. Technical Paper No. 55. Prepared for the U.S. Department of Fish and Game. University of Alaska, Arctic Environmental Information and Data Center, Anchorage Alaska. http://www.subsistence.adfg.state.ak.us/techpap/tp055.pdf, accessed 14 November 2018.

Discusses the pattern of distribution of big game, including caribou, among the Athabaskan peoples. Brief mention of Sisualik as a trading center. Items would be exported from Siberia (metal goods and Chukchi reindeer skins) from East Cape to the Diomede Islands, to Wales and later Sisualik where Noatak people would carry them to the Upper Noatak to the inland Iñupiat who would take goods to Negalik.

Larsen, Helge and Froelich Rainey

1948. Ipiutak and the Arctic Whale Hunting Culture. Anthropological Papers of the American Museum of Natural History, Vol. 42. New York: Order of the Trustees. http://digitallibrary.amnh.org/handle/2246/65, accessed 13 November 2018.

This summary is based on information obtained in 1942 by Larsen from the Utorqarmiut now living at Wainwright and Point Lay,5 and supplemented by information on the Noatarmiut obtained by Rainey in 1941 at Kivalina, and from various other sources. Main discussion is the results of an excavation of an Inupiak village. Authors argue that the presence of caribou remains is evidence of a fall/winter dependence on caribou hunting, similarities are drawn between

Inupiak and Nunatarmiut cultural practices and remains. Of note: Some direct references to the Noatarmiut along the Noatak River. General references to caribou behavior and movement across the landscape.

Leins, Casey
2018. The Push for Traditional Foods in Alaska. U.S. News. 19 January 2018. https://www.usnews.com/news/best-states/articles/2018-01-19/now-on-the-menu-at-some-alaska-public-facilities-caribou-and-seal, accessed 8 November 2018.

News story about integrating traditional foods, including caribou, into a nursing home in Kotzebue. Interview conducted with May Watson, an elder who lives who moved into the nursing home from Noatak and who sees traditional foods as integral to the health of Native people in the region.

Lucier, Charles V. and James W. VanStone
1995. Traditional Beluga Drives of the Iñupiat of Kotzebue Sound, Alaska. Fieldiana, Anthropology, New Series No. 25. October 31, 1995 Publication 1468. Chicago: Field Museum of Natural History. https://archive.org/details/traditionalbelug25luci, accessed 6 November 2018.

The authors of this study were in Kotzebue Sound in the late summer of 1951 when Nuataagmiut from the Noatak were making their annual visit to Kotzebue village to obtain supplies and visit friends and relatives. Among these Nuataagmiut were several elders who were born in the 1860s and 1870s … Taking advantage of the presence of these elderly Nuataagmiut visitors, Lucier, with assistance from VanStone, tape-recorded information on, among other subjects, traditional beluga drives. Of note: Draws connections between caribou hunting and the development of beluga whale 'herd-style' hunting. Main discussion revolves around summer camp, Sisualik.

Magdanz, James S., Susan Georgette, Caleb Pungowiyi, Hazel Smith, and Enoch Shiedt
2010. Exploring approaches to sustainable fisheries harvest assessment in Northwest Alaska. Technical Paper No. 341. ADF&G Division of Subsistence. http://www.adfg.alaska.gov/techpap/TP%20341.pdf, accessed 7 November 2018.

Provides data from communities in Northwest Alaska that desire household surveys regarding subsistence. Of note: Direct comments from Noatak residents included.

Magdanz, James S., Nicole S. Braem, Brad C. Robbins, and David S. Koster
2010. Subsistence harvests in Northwest Alaska, Kivalina and Noatak, 2007. Technical Paper No. 354. ADF&G Division of Subsistence. http://www.adfg.alaska.gov/techpap/TP354.pdf, accessed 7 November 2018.

Data from comprehensive household surveys meant to monitor subsistence harvests: 90 of 119 households surveyed. Of main interest is the chapter entitled 'Comprehensive Survey Results – Noatak 2007.' Included under this heading are general information regarding Noatak, Demographics, Wild Food Use and Harvests, Harvest Areas, and Harvest Assessments, Food Security and Comparisons with Prior Results. Appendix D includes Noatak Maps, 2007.

Martin, Richard Lee

2009. The Archeology of a Caribou Drive Complex: The T-Stemmed Hill Sites in the Noatak Basin, Northwest Alaska. MA Thesis, University of Alaska Anchorage. https://www.academia.edu/4750398/The_Archaeology_Of_A_Caribou_Drive-Complex_The_T-Stemmed_Hill_Sites_In_The_Noatak_Basin_Northwest_Alaska_A_Thesis, accessed 8 November 2018.

From 1974 to 1992, remarkably few additional archeological investigations were conducted in the Noatak basin. In 1992 the National Park Service, under the direction of Robert Gal, Chief Archeologist for the Western Arctic Parklands (WEAR), began investigations of the Noatak National Preserve under Section 110 of the National Historic Preservation Act of 1966 (NHPA). As part of this project, study units were created based on river drainages in all four of the park units administered by WEAR. The Anisak study unit (figure 3.3), based on the Anisak River Drainage in the Noatak basin, is one such unit" (Martin 2009: 44). Sites identified: Irwin Sluiceway Site (49XHP00496), Last Day Site (49XHP00497), Tom's Bench (49XHP00468), Richard's Blade Site (49XHP00727), Hick's Site (49XHP00583). Of note: T-Stemmed Hill Complex. The four sites discovered were designated: 49XHP00491, 49XHP00547, 49XHP00551, and 49XHP00572 (T-Stemmed Hill). "These four sites, together with associated cultural and geological features, document a landscape used for mass caribou harvesting and processing (50).

Nedwick, Meghan and Jim Dau

n.d. The Western Arctic Caribou Herd: The Largest Herd in Alaska. Case Study. http://www.adfg.alaska.gov/static/education/educators/curricula/alaskawildlifecurriculum/pdfs/case_study_western_arctic_caribou_herd.pdf, accessed 14 January 2019.

Overview of caribou management techniques. Currently, caribou management is largely based on estimates of herd size based on aerial photography conducted every two to three years. In June, during calving time, composition surveys are conducted to determine how many new calves are born into the herd each year. In spring, composition surveys are completed to determine the survival rate of these new calves. Adult mortality is estimated each year. Movement of the heard is monitored through satellite telemetry based on data received from tracking collars placed on animals as they migrate through river crossings each fall. ADF&G also gathers information on calf weight, body composition and collects blood samples to determine the general health of the herd and exposure to disease.

Mikow, Elizabeth, Nicole M. Braem, and Marylynne Kostick

2014. Subsistence Wildlife Harvests in Brevig Misssion, Deering, Noatak, and Teller, Alaska, 2011-2012. Special Publication No. 2014-02. Alaska Department of Fish and Game, Division of Subsistence. http://www.adfg.alaska.gov/specialpubs/SP2_SP2014-002.pdf, accessed 7 November 2018.

A limited scope harvest survey of communities in GMU's 22 and 23 that harvest from the Western Arctic caribou herd. Researchers documented the number, sex, and harvest timing for these caribou. Noatak harvested 360 caribou, 90 pounds per person, between May 2011 and April 2012.

Minc, Leah D.
1985. Scarcity and Survival: The Role of Oral Tradition in Mediating Subsistence Crises. Journal of Anthropological Archaeology 5(1986):39-113. https://deepblue.lib.umich.edu/bitstream/handle/2027.42/26239/0000319.pdf;sequence=1, accessed 8 November 2018.

Data rich resource regarding folklore and myth, ceremony and ritual associated with caribou hunting.

Moerlein, Katie J. and Courtney Carothers
2012. Total Environment of Change: Impacts of Climate Change and Social Transitions on Subsistence Fisheries in Northwest Alaska. *Ecology and Society* 17(1). https://www.ecologyandsociety.org/vol17/iss1/art10/, accessed 8 November 2018.

Ethnographic research exploring local observations of climate changes and related impacts on subsistence fisheries in three Iñupiat communities in northwest Alaska and six Athabascan communities in the Yukon River drainage. Of note: Provides comments from residents regarding the impact of climate change on subsistence practices that would appear to be applicable to caribou hunting.

Moerlein, Katie J.
2012. A Total Environment of Change: Exploring Social-Ecological Shifts in Subsistence Fisheries in Noatak and Selawik, Alaska. Thesis, MS, University of Alaska Fairbanks. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.383.5579&rep=rep1&type=pdf, accessed 7 November 2018.

Addresses fishing subsistence practices in Noatak and Selawik, Alaska. Of note: Informants from Noatak observe disconnect between generations and are concerned about the continuation of subsistence practices.

Morehouse, Karen Bornfleth
1981. Alaska Native Diet and Nutrition: An Ethnohistorical View. MA Thesis, University of Alaska Fairbanks. https://scholarworks.alaska.edu/bitstream/handle/11122/8369/Morehouse_K_1981.pdf?sequence=1, accessed 13 November 2018.

Some mention of Numamiut, or Interior peoples. Of note: information regarding nutritional value of caribou, changes in technology, socioeconomic and culture change, and some oblique mention of ceremony in relation to hunters and caribou hunting.

Morseth, C. Michele
1997. Twentieth-Century Changes in Beluga Whale Hunting and Butchering by the Kanigmiut of Buckland, Alaska. *Arctic* 50(3):241-255. https://arctic.journalhosting.ucalgary.ca/arctic/index.php/arctic/article/view/1106/1132, accessed 7 November 2018.

No mention of Noatak. One reference to caribou describing the habitat in which they live.

Mulluk, Jr., Robert

1999. NANA Region Update in Sharing Our Pathways: A Newsletter of the Alaska Rural Systemic Initiative, Volumes 1-4 (1996-1999): 40. Alaska Federation of Natives; University of Alaska Fairbanks; National Science Foundation. https://ia800206.us.archive.org/23/items/ERIC_ED450981/ERIC_ED450981.pdf, accessed 8 November 2018.

Poem that describes the experiences of hunting with traditional knowledge of caribou: "A Trained Hunter."

Nakashima, Douglas J.

1991. The Ecological Knowledge of Belcher Island Inuit: A traditional basis for contemporary wildlife co-management. Thesis, McGill University, Department of Geography. http://digitool.library.mcgill.ca/webclient/StreamGate?folder_id=0&dvs=1541638660785~933, accessed 7 November 2018.

Some information on management based on traditional values, generic utility of caribou and changes in technology.

NANA Regional Corporation, Inc.

n.d. Noatak. NANA Regional Corporation, Inc. http://nana.com/regional/about-us/overview-of-region/noatak/, accessed 8 November 2018.

Two-page document: provides basic information (geography, climate and topography, transportation, government) regarding the village of Noatak.

National Park Service (NPS)

1985. Noatak National Preserve: Draft General Management Plan/Environmental Assessment, Land Protection Plan, Wilderness Suitability Review, and River Management Plan. https://archive.org/details/noatakgeneralman00nati?q=noatak, accessed 7 November 2018.

Includes overview (resource description) of caribou within the Noatak National Preserve (migratory routes, behavior, etc). Maps are included of caribou habitat ranges. Gives a cultural sequence overview of people in the region from 12,500 years ago, includes some information about historic and current caribou hunting within the Reserve. Includes information regarding the seasonal trends of caribou hunting within the Reserve. Suggests a need for further research and future management efforts.

1987. General Management Plan, Land Protection Plan, Wilderness Suitability Review: Noatak National Preserve, Alaska. https://archive.org/details/generalmanagemen87noatak, accessed 6 November 2018.

Legislative and management overview of the Noatak National Preserve. Includes overview (resource description) of caribou within the Noatak National Preserve (migratory routes, behavior, etc). Includes maps of migratory movement of the herds and a map of 'external influences': roads, proposed gas lease areas, existing oil and gas leases, potential mine sites, etc.

Gives a cultural sequence overview of people in the region from 12,500 years ago, includes some information about historic and current caribou hunting within the Reserve. Identifies caribou calving and wintering areas and migration routes as 'sensitive habitats.'

2015. Subsistence Practices in Noatak National Preserve. National Park Service. https://www.nps.gov/noat/learn/historyculture/subsistence-in-noatak.htm, accessed 8 November 2018.

Five-page document: brochure. Has some pictures of caribou and brief sentences regarding hunting.

2016. Subsistence: Noatak National Preserve. National Park Service. https://www.nps.gov/noat/learn/historyculture/subsistence.htm, accessed 8 November 2018.

Three-page document: brochure. Includes picture of caribou crossing. Brief sentences discussing subsistence as an 'age-old tradition.'

2017. State of the Park Report for Noatak National Preserve, Alaska. State of the Park Series No. 46. National Park Service, U.S. Department of the Interior. https://irma.nps.gov/DataStore/DownloadFile/578599, accessed 8 November 2018.

Caribou are included in a 'State of the Park Summary Table' as a terrestrial animal that 'warrants moderate concern,' but whose 'condition is deteriorating.' Gives population and health updates. References to interrelationship with wolf population. Viewing caribou is also referenced as a 'recreational opportunity.' Identifies the 'opportunity and continuity for subsistence activities, availability and subsistence resources, as 'warrants moderate concern,' and the 'condition is deteriorating.' Identifies climate challenges. Caribou lichen, as a native plant, is assessed in relation to amount burned throughout the winter range of the WACH. See Terrestrial Animals (Caribou), Cultural Anthropology and Cultural Landscapes sections.

Noatak School Students

2015. Letters to Alaska Board of Game regarding Caribou Population. http://www.adfg.alaska.gov/static/regulations/regprocess/gameboard/pdfs/2014-2015/Southcentral_03_13_15/rcs/rc067_Noatak_School_Students_Prop_202.pdf, accessed 14 January 2019.

In 2015, Alagaaq Luther, age 16, was one young hunter of a total of eight from Noatak who wrote to the Board of Fish and Game, explaining how he had been unable to get his first caribou and how integral it is for the people of Noatak to harvest caribou, to sustain physical health and cultural identity. The collective voice of the Noatak hunters who participated in this study and who wrote to the Board of Fish and Game has already been heard in interagency staff meetings and federal review boards.

Norris, Frank

2002. Alaska Subsistence: A National Park Service Management History. Alaska Support Office, National Park Service, Department of the Interior.

https://ia800607.us.archive.org/7/items/alaskasubsistenc00norr/alaskasubsistenc00norr.pdf, accessed 8 November 2018.

Discusses the progression of legislation that provided for the creation of the National Park system and the progression of events that led to the creation of the Noatak National Preserve.

Nu, Jennifer

2016. With hunting on the rise, researchers tap traditional knowledge of Noatak caribou. Anchorage Daily News. 1 May 2016. https://www.adn.com/wildlife/article/researchers-study-noatak-s-traditional-knowledge-caribou/2016/05/01/, accessed 8 November 2018.

News article that generally discusses Halas and Kofinas' work with Noatak caribou hunters to effect change in caribou management paradigms.

Ongtooguk, Paul

2000. *Aspects of Traditional Iñupiat Education* in Sharing Our Pathways: A Newsletter of the Alaskan Rural Systemic Initiative 5(1-5). https://archive.org/details/ERIC_ED453984, accessed 6 November 2018.

Provides information regarding the training of caribou hunters and worldview regarding the place of hunters in context of the animals that give of themselves: Hunting skills and conditioning were, and are, learned through traditional games and competition such as wrestling, weight lifting and the one- and two-foot high kick. In addition to hunting, traditional education has provided and is continuing to provide a way for children to learn and accept other adult roles that are essential to survival.

Rainey, Froelich G.

1947. The Whale Hunters of Tigara. Anthropological Papers of the American Museum of Natural History, Volume 41, Part 2. http://digitallibrary.amnh.org/handle/2246/125, accessed 13 November 2018.

General discussion of movement and origins of the Eskimo living on the Noatak, Kobuk, and Selawik rivers. Brief mention of Kotzebue as a trade center; where the Tikerarmiut would trade for caribou skins from Noatak hunters.

Pualu, Paul

1989. Paul Pualu: Tazruk in Point Lay Biographies. Social and Economic Studies Program Technical Report No. 140. Anchorage, AK: USDOI/MMS, Alaska OCS Region. https://www.boem.gov/BOEM-Newsroom/Library/Publications/1989/89_0094.aspx, accessed 8 November 2018.

Paul Tazruk is better known by his Iñupiaq name Pualu. He was born in 1905 somewhere near Point Lay to a family of reindeer herders. Pualu followed in that tradition until the 1940s when reindeer herding ended in Wainwright where he was living at the time. Pualu also lived a subsistence life. His training began as a toddler going into the mountains on his father's back. This training enabled him to spend most of his adult life living off the land with hunting and trapping.

Rainey, Froelich G.
1947. The Whale Hunters of Tigara. Anthropological Papers of the American Museum of Natural History, Volume 41, Part 2. http://digitallibrary.amnh.org/handle/2246/125, accessed 13 November 2018.

Noatak residents described as neighbors to the Tigara. Caribou is mentioned briefly as item of trade between these groups.

Restino, Carey
2015. Caribou Migration Runs Through Northwest. *The Arctic Sounder,* 18 September 2015. http://www.thearcticsounder.com/article/1538caribou_migration_runs_through_northwest, accessed 14 January 2019.

Two-page newspaper article describing the decline of caribou herds and a more traditional migratory route in 2015.

Rogers, Jillian
2014. Declining Western Arctic Caribou Herd Worries Hunters, Biologists. *Anchorage Daily News,* 28 December 2014. https://www.adn.com/rural-alaska/article/plummeting-size-arctic-caribou-herd-leaves-subsistence-hunters-biologists-worried/2014/12/28/, accessed 14 January 2019.

News article that covers the declining WAHC population: comments from Dau that 'it's going to get worse before it gets better,' and limiting harvest rates by sport hunters would only account for 5% of total taken, the other 95% are by subsistence users. Touches on conflict of migratory path diversion by outside hunting parties.

Schroeder, Robert, David B. Andersen, and Grant Hildreth
1987. Subsistence Use Area Mapping in Ten Kotzebue Sound Communities. Technical Paper No. 130. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska & Maniilaq Association Kotzebue, Alaska. https://www.commerce.alaska.gov/web/Portals/4/pub/1987_Subsistence_Use_Area_Mapping_Kotzebue_Sound.pdf, accessed 8 November 2018.

Describes how maps of subsistence areas were made for multiple Northwest Alaskan groups including caribou hunting by Noatak residents. Included are a list of maps created using this data. However, there are no maps included in this report, they must be attained from ADFG.

Shirar, Scott
2007. The Maiyumerak Creek Site: Late Prehistoric Subsistence and Seasonality in Northwest Alaska. MA Thesis, University of Alaska Fairbanks. https://scholarworks.alaska.edu/handle/11122/5568, accessed 13 November 2018.

"The Maiyumerak Creek Site (XBM-131) is a late prehistoric site located near the confluence of Maiyumerak Creek and the Noatak River in the Noatak National Preserve, Alaska. Excavations conducted at the site by the National Park Service during the 2006 field season focused on one of eight identified house pits" (Shirar 2007: iii). Of note: General information regarding hunting

strategy, some information regarding the types of camps on the Noatak River used for caribou hunting, good information regarding general subsistence patterns of the Noatak in particular, some information regarding migration of WAH.

2009. Subsistence and Seasonality at a Late Prehistoric House Pit in Northwest Alaska. *Journal of Ecological Anthropology*, 13(1), Article 1. http://scholarcommons.usf.edu/jea/vol13/iss1/1, accessed 8 November 2018.

Similar, more succinct information presented in this publication, as in his 2007 Thesis.

Silook, Paul

n.d. Paul Silook Journals, Volume XII Inserts. Daniel S. Neuman Papers, 1895-1921. ASL-MS-162. Alaska State Library Historical Collections. https://library.alaska.gov/hist/hist_docs/docs/asl_ms162_1_12_web.pdf, accessed 15 January 2019.

Brief mention of Kiyayuktualook, 'the father of the Kivalina people' hunting caribou and marring Nayak from Noatak. While living in Noatak he traveled inland to join a hunting party in search of caribou. Of note is a section called 'The Magic Quiver' where it mentions that 'when the young man hunted he never missed a shot. But when he killed a caribou the arrow always hit the caribou on the other side. That is, when he shot the deer from his right side his arrow would hit it on its left side.'

Spencer, Robert F.

1959. The North Alaskan Eskimo: A Study in Ecology and Society. Smithsonian Institution, Bureau of Ethnology, Bulletin 171. Washington: United States Government Printing Office. https://ia600204.us.archive.org/18/items/bulletin1711959smit2/bulletin1711959smit2.pdf, accessed 14 November 2018

Information regarding hunting a winter camp used for caribou hunting and territories, hunting strategy, general information regarding the WAH, trade, and utility. Mentions a shaman that went to Noatak during a caribou hunting trip who turned into a loon.

Stefansson, Vilhjalmur

1913. Food Taboos in Alaska. *Oceanside Record,* Volume 1, Number 29. 20 November 1913. https://cdnc.ucr.edu/cgi-bin/cdnc?a=d&d=OR19131120.2.61&srpos=8&dliv=none&e=-------en--20--1--txt-txIN-noatak-------1, accessed 7 November 2018.

Trade with Noatak peoples mentioned.

1914. Prehistoric and present commerce among the Arctic coast Eskimo. Ottawa: Government Printing Bureau. https://ia800300.us.archive.org/22/items/prehistoricprese00stefiala/prehistoricprese00stefiala.pdf, accessed 14 November 2018.

Trade with Noatak peoples mentioned.

1914. The Stefansson-Anderson Arctic Expedition of the American Museum: Preliminary Ethnological Report. Anthropological Papers of the American Museum of Natural History, Vol. XIV, Part 1. New York: Order of the Trustees. http://digitallibrary.amnh.org/handle/2246/242, accessed 13 November 2018.

Discusses Colville and Coronation Eskimos. Mention of trade with Noatak people for caribou hides.

Tetra Tech

2009. Red Dog Mine Extension Aqqaluk Project: Final Supplemental Environmental Impact Assessment. Volume 2. http://dnr.alaska.gov/mlw/mining/largemine/reddog/pdf/rdseis2009vol2a.pdf, accessed 8 November 2018.

Contains interviews with Noatak and Kivalina residents regarding changes in caribou behavior/migratory patterns. In Noatak, 25 of 30 individuals reported that the change in migration had begun in 1998 or later, whereas in Kivalina 11 respondents described the start date of the change as 1989 (the year mine operations began). Residents also observed that caribou began crossing the Noatak River farther south and closer to the community within the last 20 years; however, this trend has been reversing in the last few years and caribou have generally been crossing farther from the community. Many informational maps included of subsistence caribou areas.

Uhl, William R. and Carrie Uhl

1979. *Nuatakmiit: A Study of Subsistence Use of Renewable Resources in the Noatak River Valley*. Occasional Paper, Anthropology and Historic Preservation, Cooperative Park Studies, no. 19. Alaska Cooperative Park Studies Unit, University of Alaska.

A detailed treatment of traditional subsistence practices associated with the Preserve on the eve of NPS management.

United Stated Bureau of Education

1914. Report on the Work of the Bureau of Education for the Natives of Alaska, 1912-13. Bulletin, 1914, No. 31. Whole Number 605. Washington: Government Printing Office. https://archive.org/details/ERIC_ED541684, accessed 6 November 2018.

Brief mention of caribou, mostly in reference to attempts of reindeer herding.

1917. Report on the Work of the Bureau of Education for the Natives of Alaska, 1914-15. Bulletin, 1916, No. 47. Washington: Government Printing Office. https://archive.org/details/reportonworkbur00educgoog?q=noatak, accessed 6 November 2018.

Brief mention of caribou, mostly in reference to attempts of reindeer herding.

1919. Report on the Work of the Bureau of Education for the Natives of Alaska, 1917-18. Bulletin, 1919, No. 40. Washington: Government Printing Office.

https://archive.org/details/ERIC_ED541235/page/n1?q=noatak, accessed 6 November 2018.

Brief mention of caribou, mostly in reference to attempts of reindeer herding.

Western Arctic Caribou Herd Working Group

2018. *Caribou Trails: News from the Arctic Caribou Herd Working Group,* Summer 2018, Issue 18.
http://www.adfg.alaska.gov/static/home/library/pdfs/wildlife/caribou_trails/caribou_trails_2018.pdf, accessed 14 January 2019.

2017. *Caribou Trails: News from the Arctic Caribou Herd Working Group,* Summer 2017, Issue 17.
http://www.adfg.alaska.gov/static/home/library/pdfs/wildlife/caribou_trails/caribou_trails_2017.pdf, accessed 14 January 2019.

2016. *Caribou Trails: News from the Arctic Caribou Herd Working Group,* Summer 2016, Issue 16.
http://www.adfg.alaska.gov/static/home/library/pdfs/wildlife/caribou_trails/caribou_trails_2016.pdf, accessed 14 January 2019.

2015. Caribou Trails. News from the Western Arctic Caribou Herd Working Group, Summer 2015, Issue 15.
https://westernarcticcaribounet.files.wordpress.com/2016/09/caribou-trails-2015.pdf, accessed 8 November 2018.

2014. Caribou Trails. News from the Western Arctic Caribou Herd Working Group, Summer 2014, Issue 14.
https://www.adfg.alaska.gov/static/home/library/pdfs/wildlife/caribou_trails/caribou_trails_2014.pdf, accessed 8 November 2018.

2013. *Caribou Trails: News from the Arctic Caribou Herd Working Group,* Issue 13.
https://www.adfg.alaska.gov/static/home/library/pdfs/wildlife/caribou_trails/caribou_trails_2013.pdf, accessed 14 January 2019.

2012. *Caribou Trails: News from the Arctic Caribou Herd Working Group,* Issue 12.
http://www.adfg.alaska.gov/static/home/library/pdfs/wildlife/caribou_trails/caribou_trails_2012.pdf, accessed 14 January 2019.

2011. *Caribou Trails: News from the Arctic Caribou Herd Working Group,* Spring 2011, Issue 11.
http://www.adfg.alaska.gov/static/home/library/pdfs/wildlife/caribou_trails/caribou_trails_2011.pdf, accessed 14 January 2019.

2010. *Caribou Trails: News from the Arctic Caribou Herd Working Group,* Spring 2010, Issue 10.
http://www.adfg.alaska.gov/static/home/library/pdfs/wildlife/caribou_trails/caribou_trails_2010.pdf, accessed 14 January 2019.

2008. *Caribou Trails: News from the Arctic Caribou Herd Working Group,* Spring 2010, Issue 9.

http://www.adfg.alaska.gov/static/home/library/pdfs/wildlife/caribou_trails/caribou_trails_2010.pdf, accessed 14 January 2019.

2006-07. Caribou Trails. News from the Western Arctic Caribou Herd Working Group, Winter 2006-07, Issue 8. https://www.fws.gov/uploadedFiles/Region_7/NWRS/Zone_2/Selawik/PDF/2006-07%20Caribou%20Trails%20low%20res.pdf, accessed 8 November 2018.

2005. Caribou Trails. News from the Western Arctic Caribou Herd Working Group, Spring 2005, Issue 7. https://www.fws.gov/uploadedFiles/Region_7/NWRS/Zone_2/Selawik/PDF/2005%20Caribou%20Trails%20low%20res.pdf, accessed 8 November 2018.

All of these Caribou Trails publications contain valuable interview data regarding caribou hunting, management, and other practices from residents of Kobuk and Noatak.

Wolfe, Robert J.

2013. Sensitive Tribal Areas on the Arctic Slope: An Update of Areas, Issues, and Actions in Four Communities. Iñupiat Community of the Arctic Slope. https://www.Iñupiatgov.com/files/North%20Slope%20Sensitive%20Tribal%20Areas%20Final%20Report.pdf, accessed 8 November 2018.

"'The caribou always arrive the end of June or first week of July. They always come from the mountain. There's a valley with a wind, so they come into the south wind for mosquito relief. This year they were a little late, about July 10th, just last week, thousands of them. Point Hope caught a bunch of caribou. They travel southeast toward and through Noatak and Kobuk and Norvik and Kiana'" (Point Hope Expert in Wolfe 2013: 30).