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Introduction

The Yukon North Slope (YNS) has been and remains a core hunting territory of the Inuvialuit of the Western Arctic. From their communities in Aklavik and Inuvik in the Northwest Territories, the Inuvialuit rely on the Yukon North Slope for their subsistence livelihood. They travel by boat, foot, all terrain vehicle or skidoo to hunt, trap and fish along the coast, foothills and mountains of the Yukon North Slope (YNS). The Inuvialuit Final Agreement (IFA) was legislated in 1984 and confirms the management priority for the YNS is the conservation of the land, waters, wildlife and Inuvialuit traditional use. To assist in delivering on this management priority, the IFA established the Wildlife Management Advisory Council (North Slope) – WMAC(NS) - as a co-management body comprised of federal, territorial and Inuvialuit representatives and an independent chair. The mandate of WMAC(NS) is to provide advice on all matters related to wildlife management on the YNS, including to prepare a Wildlife Conservation and Management Plan.

WMAC(NS) is currently in the process of updating the existing Wildlife Conservation and Management Plan (‘Wildlife Plan’) and has worked closely with the Aklavik Hunters and Trappers Committee (Aklavik HTC) in developing the process, approach, and goals for the new plan. The Aklavik HTC also facilitates research and community consultation associated with the revision effort. Round River Conservation Studies (RRCS) is part of the Wildlife Plan team, focused on bringing together ecological and cultural information into a regional assessment for the revised Wildlife Plan.

The revisions to the Wildlife Plan will emphasize greater incorporation of Inuvialuit Traditional Knowledge (TK) and Traditional Use (Armitage and Kilburn, in progress), including TK regarding important YNS fish and wildlife habitats. To focus the habitat assessments, the Wildlife Plan team conducted a two-day workshop in Aklavik in June 2015 to identify a suite of ‘focal species’ to represent the ecological and landscape diversity of the YNS for the regional assessment being completed as part of the plan revisions. Members of the Aklavik HTC discussed and selected seven species based on the species distribution and habitat needs (Heinemeyer and Smith 2015): Barren ground caribou (Rangifer tarandus), polar bear (Ursus maritimus), grizzly bear (Ursus horriblus), moose (Alces alces), geese (represented by yellowlegs or white-fronted geese (Anser albifrons) and snow geese (Chen caerulescens)), Dolly Varden char (Salvelinus malma), and broad whitefish (Coregonus nasus). In addition, the Aklavik HTC identified a diversity of other species or ecosystems of special interest that need to also be considered in the plan, including Dall’s sheep, berry-producing ecosystems, furbearers and several other species (Heinemeyer and Smith 2015). The Wildlife Plan will emphasize the habitat requirements of the seven focal species, and will also incorporate information available for the suite of species and systems of special interest. Inuvialuit TK provides critical information regarding these focal and special interest species including their seasonal habitat use.

The Wildlife Plan team worked on two related projects to ensure Inuvialuit TK of fish and wildlife habitats is available and documented for the Wildlife Plan revisions. The first project focused on Inuvialuit TK of different kinds of habitats and ecosystems of the YNS. A workshop of 15-20 land-users and scientists discussed major ecosystem types across the YNS, grouping them into categories that were recognizable and understood by both parties. An Ecological Land Classification (ELC) recently developed by the Yukon Government to support the Wildlife Plan revisions was used in the workshop to help bridge TK and science habitat interpretations. The ELC uses satellite imagery and environmental data (soils, moisture, plant composition, etc.) to identify and map 40 different ecological communities (ecosystem units) in the eastern YNS (Flynn 2014; MacKenzie et al. 2016) and dovetails to an ELC for
the western portion of the YNS (Fraser et al. 2012). The goal of the TK-ELC workshop was to translate these ‘western science’ ecological classifications into habitat classes recognized by the Inuvialuit who use the YNS. Therefore, the two main objectives of the workshop were to 1) describe the major habitat classes that are recognized by Inuvialuit land-users across the YNS, and 2) group the ELC ecosystem units into these TK-based habitat types. An important outcome of the workshop is the ability to bridge the TK and western science interpretations of ecosystem diversity on the YNS. This work facilitates the discussions between researchers and land-users by providing a shared understanding of YNS ecosystems and habitats, and allows the use of spatial mapping products of the ELC to be integrated with TK-based habitat information. The TK-ELC workshop approach and outcomes are described in Chapter 2.

The second project documented TK about important habitats used seasonally by each of the seven focal species as well as some of the species of special interest. This was achieved through a series of interviews where land-users were asked to describe focal species distribution, movements and habitat use during each season. Prior to undertaking the interviews, a review was completed of the significant amount of Inuvialuit traditional knowledge of wildlife that is already documented, and the interviews built upon these prior research efforts. The objectives of interviews were to record 1) TK of the seasonal distribution, movements, and habitat use of the focal and special interest fish and wildlife species across the YNS, 2) spatial information (mapped by land-users) regarding important habitats for each identified species, and 3) any observed changes to wildlife use of YNS habitats in living memory.

The TK documented through these two efforts and prior TK research will inform and guide the Wildlife Plan revisions including developing maps and models of key fish and wildlife seasonal distributions, movements and important habitats. The results of these two projects are summarized in this report. This report is not intended to provide a full accounting of the TK documented during the efforts as this information is complex; this report is only representative of the large database from which it is derived. It should also be acknowledged that the meaning of some of this information as intended by the interviewees might be partially lost in its removal from the interview context and in its interpretation. The full suite of TK information will continue to be reviewed and relied upon as a foundation for the Wildlife Plan revisions.

**Traditional Knowledge Habitat Classification**

To support the regional ecological and cultural assessment being undertaken as part of the Wildlife Plan revisions, the Yukon Government is developing a new, higher quality and higher resolution Ecological Land Classification (ELC) for the Yukon North Slope. The Wildlife Plan team worked with Inuvialuit land users to develop TK-based habitat classifications and link these with the ELC classifications.

**Workshop Approach and Study Area**

The traditional knowledge habitat classification effort was undertaken through a two-day October 2016 workshop in Aklavik (‘TK-ELC workshop’). There were approximately 20 YNS land-users who participated each day of the workshop, facilitated by the Wildlife Plan team with the Yukon
Government Department of Environment staff providing technical support. The workshop included presentations to provide background information and context for the work, group discussions and small working group sessions over the two days.

The workshop focused on the Yukon North Slope from the western boundary with Alaska to the Northwest Territory in the east (Figure 1). To the south, the YNS area was defined as the southern ISR boundary, while the northern boundary was the coastline, as the ELC does not include marine areas.

After presenting and discussing the background information (Figure 2), the goals of the workshop and an overview of the ELC, workshop participants were divided randomly into four working groups and each working group was asked to identify and describe the different types of habitats they

![Figure 1. Yukon North Slope study area for the October 2016 habitat workshop and November 2016 focal species habitat interviews in Aklavik, NT.](image-url)
encounter on the YNS. A custom 1:250,000 scale map of the YNS study area was used to support these discussions, which showed significantly more terrain, place-name and landmark details than can be included Figure 1. Habitat classes identified by each working group were reported to the full workshop, using a projected map to show patterns of habitat groupings across the working groups (Figure 3). Across the four working groups, there was high overlap in the broad types of habitats identified and described. The descriptors of these habitat classes included a diversity of characteristics (Figure 4) including associations with culturally important species (e.g., geese in wet swamps), features that affect travel such as topography (e.g., flat, steep, or rolling) and moisture (e.g., spongy ground is ground that you sink into when walking), and what the habitat looked like (e.g., tall willow, windswept). Habitat classes that were similar between the different groups were combined through full group discussions, and synthesized to identify and describe a suite of 12 TK-based habitat classes (Table 1).

To place each of the 40 ELC units into a TK habitat class, the land-users again were randomly placed into working groups. Three working groups reviewed and discussed slides, photographs, and descriptions of each ELC unit to decide which TK habitat class it fell into, with Department of Environment staff providing additional ELC unit information as needed to support discussions and classifications. Though working groups again worked independently of each other, there was a high level of consistency when assigning ELC units to TK habitat classes across the three working groups. Of the 40 ELC units, 30 units were placed in the same habitat class by at least two of the three working groups (18 units were placed in the same habitat class by all three working groups and 12 units were placed in the same class by two of the three working groups). If two or more groups placed an ELC unit in a habitat class, it was assigned that class. There were 10 ELC units for which each working group selected a different habitat class. These 10 units were brought back to the full workshop group and reviewed and discussed in more detail. These additional discussions resulted in the designation of the 10 ELC units to TK-based habitat classes by the full group.
Figure 3. Four working groups identified broad habitat classes across the Yukon North Slope working with paper copies of the study area map; these were synthesized on a projected map to facilitate follow-up group discussions during a workshop in October 2016 in Aklavik, NT.

Figure 4. Inuvialuit land users of the YNS identified 12 broad habitat classes, characterized by their physical and ecological attributes as well as cultural characteristics during the October 2016 workshop in Aklavik, NT.

The ‘Grass Willow’ habitat class did not have any ELC units placed within it, and it is assumed that some of the other closely related habitat classes (such as Rivers and Creeks) might have captured the values expressed in this class. Additionally, because the ELC classification is only land-based, the ‘Ice Just Offshore’ habitat class was set aside to focus on the terrestrial ELC classifications which were the primary focus of the workshop. Thus, there were 10 TK-based habitat classes bridging with the ELC units (Table 1).
### Table 1. Broad habitat or landscape classes identified across the Yukon North Slope by land-users in the habitat classification workshop in Aklavik, October 2016; while 12 were initially identified the workshop subsequently focused on 10 of these

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foothills/Rolling Hills</td>
<td>Between mountains and tundra/flats; may start at coast or inland; dry, rocky, low plants</td>
</tr>
<tr>
<td>Rocky mountains/High mountains</td>
<td>Rocky, high, steep, small plants, lichen, windy, snow blows off, little vegetation, trees sometimes;</td>
</tr>
<tr>
<td>Rivers and creeks</td>
<td>Willow and shrubs, could be dry or could have water, erosion on the edge; can have wood; can have small trees on edge</td>
</tr>
<tr>
<td>Timber</td>
<td>Trees, can have tussocks, willows; can be dry, wet or have medium moisture; can be steep; can have rocks, can be near creeks or small rivers</td>
</tr>
<tr>
<td>Hillside Slopes and Valleys</td>
<td>Large, open valleys, below rocky mountains, water run-off, plants can be grass, lichens, moss, low plants, can have steep creeks, may be found at bottom of hillsides</td>
</tr>
<tr>
<td>Tundra/Dry Land</td>
<td>Dry, flat, no tall willow, tussocks; warmer</td>
</tr>
<tr>
<td>Grass Willow&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Creeks; where fat rabbits are; willows used to be along ground but now getting tall closer to Aklavik; near creeks; willows up to a person’s height; wolverine</td>
</tr>
<tr>
<td>Wet Spongy Ground</td>
<td>Feet sink in as you walk; mossy; wet ground but don’t see open water; soft in warm weather and hard when frozen; grassy can have cranberries; willow areas can have blueberries; akpiks; flat; geese, swans, other waterfowl; grizzly bear; caribou; muskox; moose</td>
</tr>
<tr>
<td>Wet Swamp</td>
<td>Low, flat and wet; don’t drive or skidoo through; small willows (knee high and twisted compared to the Delta); flat with lots of water; berries (but nobody picks there); can see water; fish habitat; geese, swans, ducks, cranes</td>
</tr>
<tr>
<td>Erosion/Slumping/Mudslides</td>
<td>Muddy/silt; uneven ground; steep slope; changing water availability; ice/permafrost melting; can have tussocks; clay soil; mossy; wet; can have flat low areas</td>
</tr>
<tr>
<td>Changing Coast</td>
<td></td>
</tr>
<tr>
<td>Beaches</td>
<td>Flat on the coast; pebbles; more stable (than erosion)</td>
</tr>
<tr>
<td>Ice Just Off Shore&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Smooth ice for traveling; polar bear; grizzly; caribou; 30km</td>
</tr>
</tbody>
</table>

---

<sup>1</sup>The ‘Grass Willow’ habitat class was determined to overlap with ‘Rivers and creeks’ class after reviewing and classifying individual ELC units into each habitat description and was therefore removed from further discussion at the October 2016 workshop.

<sup>2</sup>The ‘Ice Just Off Shore’ was set aside during the October 2016 workshop to focus exclusively on the land-based classifications that overlap with the ELC.
The final task of the workshop participants was to identify any finer-resolution TK habitat types nested under the TK habitat classes. Two working groups were established with each reviewing the characteristics of the TK habitat class, and then examining the suite of ELC units that fell within that class. Each working group assessed if the TK habitat class adequately described these ELC units as a single habitat or if habitat subclasses were needed to distinguish important differences between ELC units. If the ELC units within a habitat class were further divided into subclasses, each of these habitat subclasses were named and remained nested under the habitat class. Each working group reviewed the TK habitat classes and associated ELC units, and arrived at a consensus regarding classes and subclasses. The results of each working group were presented and compared for consistency in subclass recommendations. Across the 10 TK-based habitat classes, eight were consistently treated across the two working groups. The remaining two classes were treated differently by each group and these were brought back to the full group for further discussion which resulted in consensus recommendations. The final recommendations resulted in six habitat classes with no subclasses identified and four habitat classes that were further divided into nine subclasses (Table 2).

Workshop Products

Each TK habitat class and subclass has ELC ecosystem units identified, and all ELC units are nested under a TK habitat definition (Appendix I). This will assist the Wildlife Plan team in linking the ELC spatial information to TK of wildlife habitats and other values across the YNS.

The TK-based habitat classifications were used to support the TK wildlife habitat interviews that occurred in November 2016. During these interviews, a poster (Appendix II) along with photos and descriptions of habitat classifications were used to support the identification of habitats important for wildlife species. Interviewees were able to refer to specific photos to describe a particular type of habitat, allowing both researchers and land-users to discuss ecosystem types in greater detail. The next section describes these interviews and the information provided by land-users about fish and wildlife habitat use.

Table 2. Traditional Knowledge-based habitat class and subclass definitions and the number of ELC units linked to each, identified by Inuvialuit land users during the October 2016 workshop in Aklavik, NT.

<table>
<thead>
<tr>
<th>TK-based Habitat Class</th>
<th>TK-based Habitat Subclass</th>
<th>No. of ELC Units Included</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaches</td>
<td>River Beaches</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Coastal Beaches</td>
<td>2</td>
</tr>
<tr>
<td>Slumps</td>
<td>Active Slumps</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Inactive Slumps</td>
<td>1</td>
</tr>
<tr>
<td>Swamps</td>
<td>Lower Swamps</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Upland Ponds and Swamps</td>
<td>1</td>
</tr>
<tr>
<td>Tundra</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Hillside</td>
<td>High Steep Slopes</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Mid Slopes</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Low Slopes</td>
<td>3</td>
</tr>
<tr>
<td>Timber</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Rivers and Creeks</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Rocky Mountain Ridges</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Foothills</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Low Flat Lands</td>
<td>-</td>
<td>3</td>
</tr>
</tbody>
</table>
Traditional Knowledge of Fish and Wildlife Habitats

The primary management purpose of the Yukon North Slope as established in the Inuvialuit Final Agreement (IFA) of 1984 is the conservation of land, water, wildlife and Inuvialuit traditional uses. The Yukon North Slope Wildlife Conservation and Management Plan (Wildlife Plan) is a requirement of the IFA and is an important instrument in providing guidance to accomplish this purpose. The existing Wildlife Plan is being updated and the traditional knowledge of the YNS traditional land-users will provide a foundation for understanding the habitat relations of focal fish and wildlife species. The Wildlife Plan revision team worked with the Aklavik HTC to identify seven focal species: barren ground caribou (specifically, the Porcupine Caribou Herd), polar bear, grizzly bear, moose, white-fronted geese (yellowlegs), snow geese, Dolly Varden char and broad whitefish to represent the ecological diversity of the YNS. In addition, a diversity of species of special interest were identified including Dall’s sheep, muskoxen and grayling.

Review of Traditional Knowledge Research

Existing TK research reports and documents were reviewed to identify TK on the habitat requirements of the focal species and species of special interest. While Inuvialuit land-users have participated in a wide variety of TK research, our literature review targeted studies that reported on our seven focal species and, to a lesser extent on the additional species of special interest. We also primarily searched for TK research focused on the YNS. Because our research was both place-specific and species-specific, we did not review a number of TK studies that include Inuvialuit knowledge but were not directly relevant. The reports that were reviewed (Table 3) provide a wide variety of information on the status, historic and current trends, distribution, movements and ecology of fish and wildlife of the YNS and the broader Inuvialuit Settlement Region.

Many studies refer to the focal species, but do not provide detailed habitat descriptions. For example, yearly harvest totals and human wildlife conflict are the subjects of some TK research (Joint Secretariat 2003; Hegel 2006; WMAC 2008), and are not directly applicable to our study. Multiple reports do describe habitat of some of the focal species, specifically caribou, polar bear, and grizzly bear (WMAC 2003, 2008, 2009; Hegel 2006; Katz 2010; Joint Secretariat 2015). These studies are often broad in scope, and describe habitat characteristics alongside topics such as harvest totals, changing population dynamics, or human-wildlife conflict. For example, Joint Secretariat (2015) reports on polar bear habitat, behavior, Inuvialuit harvest, and climate change impacts. This prior effort focused primarily on ice-based habitat use of polar bears, so the current interviews focused on terrestrial habitat use to avoid redundancy with the Joint Secretariat (2015) TK collection. Limited TK research exist in regards to other focal species, however TK of geese staging areas (Bartzen 2014), descriptions of whitefish spawning habitat (Freeman 1997), Dolly Varden char overwintering sites (Stephenson 2003), and general description of moose habitat (WMAC 2003) were all reviewed prior to beginning the interview process.

To build upon the TK information provided by prior research efforts, a series of interviews were undertaken in Aklavik to specifically collect information on the habitats used by the selected focal species. We designed the research to confirm habitat descriptions that were included in prior reports, clarify topics of confusion, address any topics not previously covered, or update habitat descriptions with more recent observations.
Table 3. Reports reviewed to identify Traditional Knowledge descriptions of habitats used by the focal species and species of special interest for the Yukon North Slope.

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Source</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advisory Committee for the Cooperation on Wildlife Management</td>
<td>Taking Care of Caribou: the Cape Bathurst, Bluernoese-West, and Bluernoese-East barren-ground caribou herds management plan</td>
<td>2014</td>
</tr>
<tr>
<td>Bartzen, Blake</td>
<td>Local Ecological Knowledge of Staging Areas for Geese in the Western Canadian Arctic</td>
<td>2014</td>
</tr>
<tr>
<td>Bennett, T.D and T. C. Lantz</td>
<td>Participatory photomapping: a method for documenting, contextualizing, and sharing indigenous observations of environmental conditions</td>
<td>2014</td>
</tr>
<tr>
<td>Community of Aklavik, Wildlife Management Advisory Council (NWT), and the Joint Secretariat</td>
<td>Aklavik Community Conservation Plan</td>
<td>2008</td>
</tr>
<tr>
<td>Day, Billy</td>
<td>Renewable Resources of the Beaufort Sea for Our Children: Perspectives from an Inuvialuit Elder</td>
<td>2002</td>
</tr>
<tr>
<td>Devon Canada</td>
<td>Devon Beaufort Sea Exploration Drilling Program - Comprehensive Report. Traditional Knowledge and Land Use</td>
<td>2004</td>
</tr>
<tr>
<td>Fisheries and Oceans Canada</td>
<td>DFO Science Stock Status Report D5-60 Big Fish River Dolly Varden</td>
<td>2002</td>
</tr>
<tr>
<td>Friendship, Katelyn and the Community of Aklavik</td>
<td>Climate Change Adaptation Action Plan, community of Aklavik, Northwest Territories</td>
<td>2011</td>
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Interview methods

The interviews followed a rigorous protocol to ensure the robustness, integrity, and confidentiality of the TK information (see Heinemeyer and Tyson 2016 for details). The development of the data collection protocols closely followed the recommendations of Armitage and Kilburn (2015a, 2015b). Interviews followed a questionnaire to guide semi-directed conversations describing the ecosystems and landscape characteristics used by selected fish and wildlife species on a seasonal basis (winter, spring, summer, fall) on the Yukon North Slope. Test interviews with four TK holders were undertaken in October 2016 following the TK-ELC workshop, and the questionnaire and interview protocols were refined based on the feedback from these. The remaining suite of interviews occurred in November 2016.

The Aklavik HTC identified land-users who actively travel on the YNS and recommended them as participants for the interview series. The majority of participants actively hunted and/or fished throughout the YNS, or were active harvesters in their past. Some participants also had experience traveling across the YNS for other purposes, including employment with Parks Canada, participation in scientific research, or trips with the Canadian Rangers. This was particularly true of younger interviewees, many of which drew upon these experiences alongside knowledge gained through fish and wildlife harvesting when describing fish and wildlife distribution and habitat. All interviews occurred in Aklavik, NWT.

Participants were asked a series of questions (Appendix III) regarding each focal species that they had extensive knowledge about. Interviewees were asked to describe habitat characteristics important in different seasons and for specific behaviors (e.g. foraging, migrating, nesting, spawning, etc.) and were encouraged to identify TK-based habitat classes by reviewing photographs of these from the TK-ELC workshop. Additionally, interviewees marked relevant spatial information on a custom 1:250,000-scale paper base map similar in spatial extent as Figure 1, but with significantly more terrain, place-name and landmark details. Interviews typically lasted between one and two hours and individual participants were interviewed between one and three times, depending on the extent of their knowledge. In total, 27 individuals were interviewed, completing 37 separate interviews. Interviewees were compensated using locally established rates, on a per-interview basis. Interviews were treated confidentially. Therefore, attribution for all quotations and descriptions used in this report is by way of Participant Identification Numbers (PIN) to protect anonymity (See Appendix IV for a summary of interviewee biographical data).

Interviews were audio-recorded and an independent professional transcribed these recordings. NVivo software (QSR International Pty Ltd.) was used to assist in summarizing the information. As part
of the interview protocol, transcripts were made available to interviewees for review to ensure accurate documentation of his/her TK. Mapped information was digitized and imported into an ArcGIS geodatabase.

This chapter summarizes the information documented through the TK interviews, and discusses the major habitat requirements of seven focal species throughout the YNS, as well as additional focused information on some of the species of special interest identified by the Aklavik HTC. The TK collected through the interviews is complex and extensive; this report does not represent a full documentation of all the TK collected and is intended to provide a broad summary only. The full suite of TK about fish and wildlife habitats will be used as foundational information for the revisions to the Wildlife Plan.

Caribou

Caribou habitat was the most widely discussed topic among all interviews. Twenty-three participants described caribou habitat, and observations spanned all four seasons. Generally, participants stated that the entire YNS was important for caribou, however focusing interviews on seasonally specific or behaviorally specific topics generated detailed reports about well-defined resource types that are important during each season. Participants referred to different ecosystem types and locations as they referenced different times of year. Participants also described a resident population of caribou on Herschel Island and the nearby mainland. These caribou do not move with the main herd and were generally observed remaining near Herschel Island year-round. All caribou habitat observations were typically discussed on a seasonal basis, and we have summarized results accordingly.

Spring Migration and Calving Habitat

Twenty participants described spring caribou habitat. Generally, interviewees observed caribou migrating out of the mountains and moving towards the coast, before making their way to calving grounds in the late spring. There was no specific migration route described, but respondents identified a broad area along the coast and foothills, where caribou often are seen during their migration (Figure 5). This migration was the major focus of spring habitat descriptions, and interviewees emphasized that caribou will move through a variety of terrain and habitat types on their way to the calving grounds.

Interviewees generally characterized spring habitat as open country, near the coast, which caribou will move through as they migrate to their calving grounds. Ten interviewees described spring caribou habitat as low flat terrain, and ten interviewees described tundra ecosystems. Generally, caribou were described moving through these areas or foraging for lichen, however two respondents described caribou foraging on willows during the spring, and one respondent observed caribou eating any green grass that they could find, pawing snow off of tussocks. Descriptions of habitat use included both bulls and cows, though some interviewees suggested that cows are the first to come down to the coast from the mountains, with bulls following later in the spring.
“Well, in the springtime, the cows like to be in the flats... most of the time the bulls always come last... [They] follow the cows.”

-PIN 110, November 13, 2016

Hillsides were also commonly discussed spring habitat. Six respondents described spring habitat either by selecting pictures of hillside ecosystems or by describing hilly terrain. Some of these participants suggested that caribou are usually near hills or high ground, which they use as escape terrain or a lookout for predators. Other ecosystem classes that were used to describe spring caribou habitat included rivers and streams, swamps, and coastal beaches.
“They always seem to be on a hillside... always seem to be... [at] the top of the hill... ‘cause [they] can see predators coming, I guess.”
-PIN 112, November 20, 2016

Calving grounds were typically discussed separately from spring migration habitat. Twelve interviewees described calving habitat, noting that calving occurs in late spring or early summer. Caribou stay in their calving grounds until early July. This habitat was generally identified as the northwest corner of the study area (Figure 7) and is described as flat, open country that is close to the coast where the herd is able to find relief from insects, forage on lichen and grasses, and avoid predators. Ten of the 12 interviewees discussing calving habitat described the calving grounds either as flat land or tundra, one interviewee described calving grounds as rolling hills and selected a photograph of the lower slope ecosystem type, and one interviewee mapped the location of calving grounds but did not discuss habitat type.

“[Caribou are] mostly kind of close to the hills... the high hills... they can see what’s coming they have a chance to get away from whatever they see.”
-PIN 119, November 21, 2016
“[The calving grounds are] flat, rolling hills... you could see for miles... You [can] see out to the ocean, you can see all the way to Stokes Point, all the way to King Point.”

-PIN 120, November 22, 2016

“This [the calving grounds] is all flats and rivers and lakes. Up here it’s pretty low... [for] up to 10 miles inland...”

-PIN 2, November 17, 2016

“It’s all [tundra], you know, there’s a lot of good eating there, I guess... they’re away from the mosquitoes [when they’re] along the coast there.”

-PIN 107, October 27, 2016

Seven interviewees described changes in calving locations. Five participants described calving occurring farther east than was historically considered normal, including areas east of the Firth River, along the Yukon coast. One participant referred to calving occurring father inland than was historically normal, and one participant referred to calving occurring in non-traditional areas, but did not specify where. These changes were considered a notable shift from historic patterns and were generally observed as increasingly common within the past ten years. One interviewee suggested large, broad-scale shifts in calving location, describing major changes in caribou calving locations over the past 40-50 years. While the location of calving was described as changing, calving habitat was still generally described as low, flat tundra, or rolling hills.

“What my granddad... used to tell us when we were growing up, he said ‘All the caribous used [to]... come from the mountains to have their young ones in the flats. And later on, in the future, they’re going to start having young ones anywhere.’ That’s what [he] used to tell me...and it’s happening now.”

-PIN 110, November 13, 2016

“I’ve never known them to calve too much... on the east side, towards Herschel, but I notice them [these] past couple of years. They have been [calving there] a lot more.”

-PIN 301, November 23, 2016
Interviewees suggested possible reasons for the changes in calving location. Five interviewees thought that this may be due to earlier springs: warmer temperatures and earlier green-up have resulted in caribou calving sooner, before they reach their traditional calving grounds and warmer weather results in increased runoff and higher river flows making river crossings more difficult and therefore blocking access to traditional calving areas. Human disturbance was also suggested as affecting caribou behavior, potentially causing them to seek out more secluded areas.
“Well, 50 years ago, there [were] no snow machines... so people were traveling less. And no noise. I think noise has a lot to do with [it]... there’s a lot more plane traffic around here and that keeps the caribou disturbed all the time.”

-PIN 2, November 17, 2016

“...a lot of the times, these past 10, 15 years, it’s been a hell of a lot warmer, earlier, you know? More land, more grasses and that exposed...”

-PIN 301, November 23, 2016

“...springtime, you know, they [caribou] used to come down here [Alaska and western calving grounds] and calve, but... it’s earlier springs and... then they’re calving right from Barge Lake area... all the way... down the coast now.”

-PIN 121, November 22, 2016

“You know, it’s just a matter of the timing of... things... you know, with everything being early... or later spring... depends on how far they make it before they start [to calve]...”

-PIN 302, November 18, 2016

Summer Habitat

Fifteen interviewees discussed summer caribou habitat. These observations generally described caribou traveling from calving grounds, southeast along the YNS, and frequenting locations that allow for insect avoidance and good foraging. Participants commonly described summer caribou habitat by referencing the coast. Caribou were widely thought to use areas close to the coast because the ocean breeze provides relief from mosquitoes and there is a large amount of quality foraging. These areas were generally described as open tundra, with scattered willows, and a large amount of lichen and green vegetation. Six participants selected pictures of tundra ecosystems to describe summer habitat, and four participants described summer foraging areas as flat lands. Interviewees also frequently selected areas close to the coast when mapping summer caribou habitat (Figure 8).

Summer observations of caribou foraging emphasized the importance of green vegetation. Four respondents referred to summer food sources as green vegetation, while participants also referred to flowers, grass, and willows as summer forage. Two respondents also described lichen as an important summer food source.
“...when they [caribou] come by the coast, I’m pretty sure they’re staying away from the bugs... We used to walk up here to look around and... as soon as we get [out of the] wind... that’s when the bugs start... That’s why I think they’re down here [on the coast] because they’re staying away from the... bugs.”
-PIN 109, November 20, 2016

“...when we get caribou... we eat parts of the guts and all that kind of stuff... You see it [green vegetation] in their stomachs... The stomach is really green.”
-PIN 302, November 18, 2016

While open tundra was consistently identified as important summer habitat, caribou were also observed in higher terrain. Six interviewees either selected pictures of hillside or mountain ecosystems to indicate summer caribou habitat, or described caribou traveling through hilly or mountainous regions. These areas were described as providing insect relief, as well as predator avoidance. Additionally, two interviewees noted that these areas often have remaining snow patches, which are important for summer heat and insect escape.

“...in the summertime, where we get the temperatures [that] are 20, 25... degrees Celsius, you get... 40, 50, 60 caribou that are just sitting on these... snow covered valleys... to get away from the... heat and the bugs.”
-PIN 101, October 26, 2016

“...they [caribou] hang out there [on snow patches] ‘cause it’s hot and, you know, it’s warming up, June, July, and the mosquitoes are coming out... they go to the snow... ‘cause its’ cool and the mosquitoes won’t bother [them] as much.”
-PIN 107, October 27, 2016
Fall Habitat

Sixteen interviewees described habitat during the fall migration, as caribou are leaving more coastal areas and heading into the mountains. Throughout the fall, caribou are scattered across the YNS, and habitat descriptions were typically broad and wide-ranging.

Thirteen individuals mapped general locations or migration routes of caribou throughout the fall (Figure 9), and specific habitat descriptions varied. Five participants described caribou moving through mountainous terrain, while six participants either selected photos of hillside ecosystem classes or specifically mentioned hillsides when referring to fall caribou habitat. These areas were listed as important for general travel, foraging, and insect relief, as caribou migrate through the area. When fall snowstorms arrive, three interviewees indicated that mountain ridges are also important foraging areas, as they are generally blown free from snow. Interviewees predominately described caribou
foraging on lichen in the fall (eight respondents), while one participant also described caribou foraging on grass. One participant also suggested that caribou get salt from eating lichen that grows in rocky areas along mountain ridges.

“‘Well, if they’re [caribou] higher on the mountain… you see those little [lichen]… They’re all real salty, if they’re up that way, they’ll be [eating] food on top of the mountain.’”
-PIN 110, November 13, 2016

While mountains and hillsides were widely used to describe fall habitat, participants emphasized that caribou travel through a number of habitat types along their migration. At least three participants described fall habitat as occurring along the coast, and three participants described fall habitat by selecting pictures of tundra ecosystem classes.

“‘[Caribou are] just all the way down the coast… they’re all over. They could be grazing all over...’”
-PIN 118, November 14, 2016

“‘[Caribou are] right on top of the foothills... where it’s flat... they’re feeding all the time...’cause this is an area where there’s a lot of lichen, even on the rocky beach you can see the lichen.”
-PIN 103, November 25, 2016

“‘...I go hiking [from the coast] and you notice a lot of them [caribou] are farther back out of hiking distance... and I notice they’re traveling... I always see them facing to the left... in the fall... I’m looking south, so they’re traveling east.”
-PIN 120, November 22, 2016
Winter Habitat

Twelve participants described winter caribou habitat. These descriptions focused primarily on the caribou that reside on or near Herschel Island, but also included areas on the mainland coast, used by smaller groups caribou periodically throughout the winter. While the main Porcupine Caribou Herd is generally south of the YNS during the winter, interviewees emphasized that small groups of caribou will occasionally pass through the study region. For example, at the time of these interviews (November, 2016), interviewees were reporting a herd of 300-400 caribou near Qutaichuraq, in the eastern portion of the study area. These caribou were observed in addition to the resident population on or near Herschel Island. When describing winter habitat characteristics, interviewees frequently referred to both Herschel Island and areas along the mainland coast (Figure 10).
Interviewees described the characteristics that are important for winter caribou habitat selection consistently across the study area. Participants emphasized that caribou habitat selection focuses on areas where the wind will blow snow off of vegetation, making foraging easier, and that they will be found on different aspects based on wind direction. Nine interviewees described winter caribou habitat on the YNS as the coast or hills, often describing access to snow-free vegetation as an important factor in caribou use of these areas. Five participants described caribou eating lichen in these locations and two described caribou eating grass. At least two participants also described caribou eating muskrat pushups in order to obtain important nutrients during the winter. While these participants described this behavior as largely occurring in the Mackenzie Delta, it has also been observed on the North Slope in areas with higher muskrat densities. Additional descriptions of winter caribou habitat either described flatlands or were limited to spatial information with no associated description. Two participants also referenced caribou traveling on the sea ice.

Figure 10. Areas of the Yukon North Slope used by caribou during winter, as identified by multiple Inuvialuit land-users during TK interviews. Darker shades indicate overlap in areas drawn by multiple land users.
“...they’re eating along where they can easily access [vegetation], like a little high on the mountain and the sides [of hills].”

-PIN 111, November 11, 2016

“...Sometimes there will be west wind and they’ll be on the west side, and sometimes, it will be east wind and they’ll be on the east side.... The wind always blows the snow off the top of the tundra... and they’ll always be around... feeding around that area.”

-PIN 6, November 17, 2016

Migration Changes, Climate Change, and Concerns

Interviewees frequently discussed changes to caribou habitat and behavior. Some responses were unclear regarding the specific nature of change, however at least 15 participants observed changes to the caribou migration patterns in both spring and fall. While observations varied widely, two common themes emerged across the interviews. One was that the migrating animals are changing their routes, generally spending less time along the coast, particularly in the fall. Ten participants observed this trend in recent years. These interviewees described caribou leaving the study area sooner, and traveling through the mountains towards Old Crow, instead of moving along the coast. Another common theme across interviewee comments was that both spring and fall migrations are less predictable. This largely referred to the timing of migration and the abundance of animals. Three participants observed smaller herd sizes, describing encounters with groups of caribou in the tens or hundreds, rather than the full herd. Five participants described a change in both spring and fall migration timing, with four participants describing caribou arriving earlier in the spring and leaving earlier in the fall, and one participant describing caribou remaining in the study area longer during years with warmer weather.

“They [caribou] don’t hang around very long, they’re just bee-lining straight up towards Old Crow and Alaska.”

-PIN 121, November 22, 2016

“[When I was a kid] you’d see hillsides moving [with caribou]!
...Nowadays, it’s rare to see that.”

-PIN 120, November 22, 2016
Explanations for changing migration patterns also varied among respondents. Seven participants suggested that changes in caribou migration are a natural occurrence, as the herd occasionally changes its migration route to allow the vegetation in previously used areas to recover. Three participants suggested that increased human disturbance or potential over-hunting might cause the herd to change its migration routes in both spring and fall. General habitat changes that were associated with a warming climate, such as slumping or increasing wildfires, were cited by at least four participants as a potential reason for the change in migration patterns.

Interview participants, also discussed climate change generally, noting impacts to caribou habitat beyond altered migration patterns. Thirteen interviewees specifically described climate change impacts to caribou habitat. These observations covered a wide range of changes to habitat across all four seasons. Slumping and coastal erosion were discussed by six participants, who listed concern over the loss of foraging and general travel areas. One participant described increasing precipitation and faster snowmelt due to climate change is making river crossings more difficult. Increasing willow growth was observed to make access to lichen more difficult in the summer and fall, and freeze/thaw
events during the winter were observed to make lichen less accessible due to ice coverage. One participant commented on increased insect harassment throughout the summer. Increasing fires and the possibility of heavy snowstorms were also listed as concerns.

“...it gets pretty hot some summers...and we’ll have a lot of bugs... we know we’re not going to have good shape [healthy] caribou because... they’re mostly running all the time.”

-PIN 6, November 17, 2016

“...along the North Slope, it’s all eroding, so... it’s going to hurt them [caribou] in the long run.”

-PIN 111, November 11, 2016

“I remember a few years back... we had a really warm spell and we had some rain [in January], and you notice a lot of dead caribou... it got cold and the caribou couldn’t break through the crust on the snow.”

-PIN 302, November 18, 2016

In addition to climate change, interviewees also cited increasing muskox populations when discussing changes to caribou habitat. Eight participants noted concern that increasing muskox populations are affecting caribou habitat. These observations focused on changes to the vegetation in areas with large muskox populations and general caribou avoidance muskox. Respondents noted that habitat in areas with large muskox populations has decreased in quality, particularly on Herschel Island. Interviewees also stated that caribou avoid muskox, either the animals themselves, or the smell of areas with large muskox populations. Three participants suggested that the increased muskox population is contributing to the changing migration routes of caribou.

“...they [caribou] stay away from the muskox, they don’t go near them too much.”

-PIN 301, November 23, 2016

“We have a lot of muskox on the island [Herschel]... 10 years ago, there used to be a lot of tundra and then after the... muskox started going on the island... there’s starting to be more and more mud.”

-PIN 6, November 17, 2016
Moose

Moose were observed throughout the YNS, and 18 participants described moose habitat across a variety of locations in the study area. Most interviewees tended to describe moose habitat generally and did not necessarily link observations to a specific season. Participants did not typically indicate any major seasonal moose migrations, nor identify specific calving grounds, or seasonally specific resources. Instead, interviewees tended to focus on common habitat requirements for moose, year-round, providing a detailed summary of moose habitat across the YNS.

Several interviewees emphasized specific habitat characteristics when discussing moose. All respondents mentioned the presence of willows at some point when discussing moose habitat, and seven participants stated that moose are always within close proximity to willows. Fourteen interviewees stated that moose are always nearby or in water, whether in the form of a river, lake, or swamp. While interviewees emphasized that moose could be found in a variety of terrain types, typically they observed moose in lower elevations and flatter terrain. Twelve respondents described moose habitat as flat or low terrain. Even when moose were observed in more mountainous terrain, respondents typically emphasized that they were seen at the bottom of hillsides or in drainages and river valleys.

These habitat characteristics were reflected in selection of ecosystem class photos. Sixteen participants selected photos of rivers and streams (such as is shown in Figure 11) to describe moose habitat, often noting that the willows, low ground, or water in the photos indicated good moose habitat. Similarly, eight participants selected photos of swamps (such as is shown in Figure 12) to indicate moose habitat, specifying that the presence of water and green vegetation are important for moose. Some participants also selected tundra ecosystem classes (six participants), low flatlands (three participants), or hillsides (two participants).
Figure 11. An example of a photo of rivers and streams selected to represent moose habitat.

Figure 12. Example of a photo of lower swamps ecosystems, selected to represent moose habitat.

“[Moose are] mostly down low. Like, near the river and willows. My guess would be like a protected area from the wind.”

-PIN 120, November 21, 2016
“I’ve never seen any [moose], or just very few, away from the willows... They seem to stay around the willows in draws... That’s where you see them most of the time.”

-PIN 2, November 15, 2016

“[Moose] always seem to be close to the water, because they seem to be feeding in the lakes. I’ve seen them... feeding in the lakes all the time... I think they’re eating grass roots all the time... Sometimes you see them eating tips of the willows.”

-PIN 112, November 20, 2016

“They [moose] wouldn’t go into the higher terrains...they... like to stay in the flat area where it’s open...”

-PIN 9, October 26, 2016

Coastal versus Inland Moose Habitat

While many interviewees described moose habitat in general terms, some participants observed a distinct difference between inland moose habitat and habitat closer to the coast. Eight participants described coastal habitat as flatter, wetter, and more open than inland habitat. While some of these habitat descriptions included willows, they were often described as less prevalent or shorter than willows that are found inland or in the Mackenzie Delta. Three participants specifically noted that coastal moose habitat is more likely to consist of swamp ecosystem classes than areas inland, which are typically composed of river valleys and creeks.

Land users indicated that the difference between these habitats is reflected in moose foraging behavior. Participants describing foraging on the coast often referred to moose eating grasses and sedges, in place of or alongside willows. To participants that harvest moose, this difference plays a major role in the quality of meat. Some participants noted that moose harvested on the coast taste different than inland moose, noting a higher fat content and better flavor in coastal moose compared to those found inland.

“[Moose eat] willow in the Delta, and...down the coast [they] eat sedges. It’s two different stories, it’s two different foods they’re eating.”

-PIN 9, October 26, 2016

“In the Delta, or even out here [in the mountains], [moose] taste like willow, because that’s what they’ve been eating. And they get skinny and tough. They’re like eating a rubber boot!”

-PIN 2, November 15, 2016
“Out on the coast there’s different habitat. They’re [moose] feeding in lakes, grasses, whatnot… the meat is really different from the ones… up in the Mackenzie.”

-PIN 101, November 18, 2016

“[Moose are eating] sedges [on] the coast. That’s why I … get my moose down… past Anderson River… I don’t really get my moose up here [inland mountains]… but if I do… they taste like willow. If I get mine down at the Anderson River or Barge Lake…it eats those sedges there, so it tastes like salt.”

-PIN 9, October 26, 2016

Generally, interviewees that described coastal moose habitat shared observations that were made in the summer, while observations of inland moose were made year-round. In some instances, this was a function of land-user travel patterns: most of the participants interviewed for this project tend to travel by boat in the summer, making coastal moose sightings more likely. However, at least four interviewees suggested a seasonal movement of moose between inland and coastal habitats. These observations suggest that moose move farther back into the mountains and river valleys in months where snow covers much of the shorter vegetation, and travel to the coast in the summer, when green, fresh vegetation is exposed. One respondent suggested that moose move into the mountains for protection from predators in the winter.

“In wintertime, they tend to go… farther inland. You see more draws and more willows growing…. They come inland a bit and are close to the rivers…”

-PIN 2, November 15, 2016

“I think they’re [moose] just migrating back towards the Delta after a long winter… because I think they do move up to the mountains before freeze up… I think they go up to the mountains for winter.”

-PIN 117, November 15, 2016

**Herding**

Eight interviewees described instances of large groups of moose herding together. Multiple participants described groups of moose between 10 and 20 individuals, and on at least two occasions, participants witnessed a herd of moose numbering over 150 individuals. This behavior was uniformly described in the winter and spring, and was witnessed inland, typically in river valleys surrounded by
more mountainous terrain. Interviewees suggested that this was surprising but increasingly common behavior, and they were unsure of its cause. Areas where land-users witnessed large groups of moose were marked on a map.

“Springtime, they all bunch up together…like caribou. That’s a new one [to me], first time I see that...”
-PIN 106, November 12, 2016

“...we went traveling up here [in the mountains] and usually this whole area [is] just covered in moose, right where all the willow habitat is... two or three years in a row we saw about 150.”
-PIN 117, November 15, 2016

“...for about...10 years, we see exactly 60 moose in one herd. That’s the most moose we [have] ever seen in one herd…”
-PIN 6, November 12, 2016

“...most of the time when they’re in the hills, they always bunch up together...we never really saw that much long ago...2006, I think I started seeing those bunches.”
-PIN 118, November 14, 2016

Climate Change and Population Trends
Eight interviewees suggested that climate change is altering moose habitat in the study area. Five participants observed climate change positively impacting moose habitat, noting longer growing seasons, earlier snow melt, and more willow growth throughout the study area. Three interviewees suggested that climate change might negatively affect moose populations, listing concerns of drying lakes, increased insect harassment, or more common wildfires. While concerns regarding climate change were mixed, nine participants observed higher moose populations through the region than were historically considered normal, while one participant observed a decrease in moose numbers. Explanations for the growth in moose numbers ranged from a decrease in hunting to better habitat and warmer weather.

“Well, when I was a little girl, I never used to... see hardly any moose. And today, it’s totally different. It’s because... we’re having earlier [growing] seasons.”
-PIN 1, November 12, 2016
Grizzly Bear

Interviewees emphasized that grizzly bears travel throughout the entire study area, but have seasonally specific habitat preferences. Eighteen participants provided interview data on grizzly bear habitat, focusing on the season(s) in which they most frequently encounter bears. Spring habitat and denning habitat were most commonly discussed topics with 16 and 14 participant responses, respectively. This was largely due to participants’ experience hunting grizzlies in the spring, often when they have recently emerged from den sites. In addition, 11 participants discussed summer habitat and eight interviewees provided information about grizzly bear habitat use in the fall.

“Up here, the grizzly bear basically roams. You know, it doesn’t have its own area... he’s always constantly moving...you might see him over here and...you know, couple of weeks later he’ll be way off track somewhere else.”

-PIN 301, November 23, 2016

Spring Habitat

Generally, respondents emphasized that grizzly bears spend the spring moving out of the mountains and traveling down river valleys, towards the coast. Depending on the time and location that participants encounter grizzly bears, responses focused either on mountainous regions and river valleys, or open tundra and the coast.

Ten respondents identified hillside or mountainous ecosystems as spring grizzly bear habitat either verbally or through photo selection. These areas are important for grizzly bears as they emerge from their dens, and are used for foraging and general travel. Typically, respondents see grizzly bears digging for roots or hunting ground squirrels along hillsides early in the spring (Table 4). These hillsides are often the first places to become snow free, and grizzly bears can be found in patches of bare ground where the snow has either melted or been blown away.

“[Grizzly bears] are...mostly on the high ground. They stick close to the high rocks where there’s no snow.... You can see lots of ground squirrels running around and ... you can see those little holes and they’re starting to come out [of the ground] and run back and forth. And you can see bear tracks from digging them up...”

-PIN 119, November 18, 2016
“I was taught to use ground squirrels as an alarm clock for [grizzly bears].... You know if you see a ground squirrel up and about, running around...there’s going to be grizzly bears moving.”

-PIN 301, November 23, 2016

Rivers and streams are used by grizzly bears for travel routes as they move out of the mountains and towards the coast. Nine respondents either selected photos of river and stream ecosystems (such as in Figure 11) or specifically described spring grizzly bear habitat by referring to rivers, creeks, or streams. In areas where creeks are narrow and surrounded by dense vegetation or steep banks, bears travel on higher ground, above the water. As the rivers widen, and the topography is less steep, respondents note seeing bears traveling in and alongside waterways.

“Most of the time, in the springtime, you see them [grizzly bears] going down into the bigger creeks, bigger rivers that [are} running out...estuaries.”

-PIN 301, November 23, 2016

Eleven respondents noted that grizzly bears move to the coast in the spring. In doing so, they travel onto flatter land, which is typically described as tundra (such as in Figure 13. Interviewees generally observe bears traveling or scavenging carcasses as they move throughout the tundra. Along the coast, grizzly bears have been observed scavenging whale carcasses and hunting for seals. Six respondents have seen grizzly bears traveling onto the sea ice, hunting for seals along pressure ridges and at breathing holes.

“When they come out of the den, they’re always running towards the ocean... They can smell the seals. That’s where they mostly go [the coast] when they’re coming down the mountains... because there’s no animals up here [in the mountains] in wintertime... they go for the sea ice where there’s seals.”

-PIN 103, November 25, 2016

“[I] see them [grizzly bears] out on the ice... You see them following the cracks, like the polar bears do.

-PIN 117, November 15, 2016
Often, interviewees indicated that food availability is the more important reason grizzly bears are found in a certain area, rather than specific ecosystem types. This is particularly notable in regards to caribou. Ten interviewees noted that grizzly bear follow the caribou herd, and eight respondents specifically discussed grizzlies following caribou in the spring, either to directly prey upon animals or scavenge wolf kills.

[Grizzly bear] follow them [caribou] wherever they go...I’ve seen, right at Shingle Point, along the shore, we seen these caribou really running and right behind them was a bear!”

-PIN 1, November 11, 2016

“...what I notice in springtime is that when the wolves are hunting between the caribou...as soon as the bears come out, some...follow the wolf trail until they find a wolf kill and then take the caribou away...from the wolf.”

-PIN 6, November 17, 2016

“...what I notice is that... even when I’m traveling, sometimes I’ll see a bear and then I’ll see a wolf, if not I’ll see a wolf then I’ll see a bear...bear and wolf always keep close together.”

-PIN 6, November 17, 2016
Responses also suggest that grizzly bears increasingly follow muskox herds. Four interviewees gave detailed accounts of grizzly bears traveling to areas with large muskox populations, particularly in the spring when access to and from the Herschel Island muskox population is easier and muskox are having their young. These interviewees suggested that muskox has become an important food source for bears and one person suggested that this might be becoming more common, as the muskox population increases.

“The past... six, seven years...we notice that... with the muskox numbers getting bigger on Herschel, that they’re [grizzly bears] eating muskox. No one knew that before, from what I know.”
- PIN 120, November 21, 2016

“What the bears will do is they’ll always head down towards where the muskox are ...they always have young ones with them in the springtime, and then the bears will always start hunting the young muskox.”
- PIN 6, November 17, 2016

“Grizzly bears [are] always...there on Herschel Island. There’s always muskox on the island, so they always head to the island because they know the muskox can have young ones with them.”
- PIN 6, November 17, 2016

**Summer**

Participant knowledge of summer grizzly bear habitat tended to be based on sightings made while traveling by boat or air and occasional encounters at summer camps, rather than a concerted effort to hunt or track bears. Still, 11 participants discussed summer grizzly bear habitat and tended to stress that bears are wide ranging and constantly moving throughout the region, not confining themselves to a specific habitat type.

“If they’re [grizzly bears] near a creek bottom, river bed, they will be on willows in the area...if they’re up on the hillside, it’s more tussocks, tundra-like country...they’re moving through all types of vegetation.”
- PIN 101, November 11, 2016

Interviewees who did discuss specific grizzly bear habitat in the summer tended to describe tundra or coastal ecosystems. Six participants noted that grizzly bears are on or around the coast in the summer, often looking for whale carcasses or avoiding insects. Four participants described this area by
referencing pictures of tundra ecosystems and noted that grizzly bears can be found throughout the rolling hills and flat tundra that is immediately inland from the coast.

Interviewees continued to emphasize that grizzly bears will follow caribou in the summer. As a result, bears will move along the coast and into caribou calving grounds, as the herd travels through the area.

“They’re [grizzly bears] following the caribou...June, July...in August...You wonder where they’ve gone and then figure it out...they’re way over on [the] side with the caribou. You know, along the beach and over into Alaska.”

-PIN 107, October 27, 2016

Fall Habitat

Eight participants discussed fall grizzly bear habitat, and continued to emphasize that grizzly bears can be found in a variety of landscapes and vegetation classes throughout the region. Participants’ descriptions of fall grizzly bear habitat ranged widely, and included muskeg, tundra, coastal beaches, river valleys, and mountains. Interviewees stated that the food sources determined fall grizzly bear locations, and observations of grizzly bear foraging and hunting in the fall included eating berries, hunting and scavenging caribou, moose and muskox; eating ground squirrels; digging for bear root; and following the Dolly Varden char migration upstream.

“...in the early fall time, you still have the cranberries that are just finally ripe, you know. They’ll [grizzly bears] be eating those, they’ll be eating some of the blueberries that are still starting to grow, and roots...”

-PIN 301, November 23, 2016

A general theme across participants describing fall grizzly bear habitat was the preparation for denning and the movement towards winter and denning habitat. Three participants specifically noted that this entailed moving back to the mountains from the coast. Some interview responses suggest that this is associated with the Dolly Varden char migration. Three interviewees said they witnessed grizzly bear either following a Dolly Varden char migration upstream or fishing at spawning and overwintering sites.

“Most times... they are moving into [the mountains]. I’ve seen myself, in the fall, I’m working [the] lower Firth...counting the Arctic char ... in one day there were 14 grizzly bears walk by us, going up stream... I never, ever seen a bear come down river, they were all moving upriver”

-PIN 301, November 23, 2016
“...where that fish hole is, there will...probably be bear in the fall time.”
PIN 6, November 17, 2016

Table 4. Major grizzly bear habitat types used across all seasons, and number of participants identifying each habitat type.

<table>
<thead>
<tr>
<th>Habitat Type</th>
<th>No. Selecting</th>
<th>Major Uses</th>
<th>Season(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mountains and hillsides</td>
<td>16</td>
<td>Hunting ground squirrels, foraging for</td>
<td>Spring, fall</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bear root and berries, denning habitat</td>
<td></td>
</tr>
<tr>
<td>Tundra</td>
<td>12</td>
<td>General travel, hunting caribou and</td>
<td>Spring, Summer, Fall</td>
</tr>
<tr>
<td></td>
<td></td>
<td>muskox, foraging berries</td>
<td></td>
</tr>
<tr>
<td>Rivers, creeks, and</td>
<td>11</td>
<td>Travel corridor, fishing, hunting</td>
<td>Spring, summer, fall</td>
</tr>
<tr>
<td>streams</td>
<td></td>
<td>caribou and moose</td>
<td></td>
</tr>
<tr>
<td>Coast and beaches</td>
<td>11</td>
<td>Scavenging whale and seal carcasses,</td>
<td>Spring, summer, fall</td>
</tr>
<tr>
<td></td>
<td></td>
<td>hunting caribou and muskox, insect</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>avoidance</td>
<td></td>
</tr>
</tbody>
</table>

Denning Habitat

Fourteen participants described grizzly bear denning habitat, mapping or describing over 20 unique den sites. The majority of interviewees (12) observed that dens are found on a hillside. Eight participants observed dens above or close to a river, lake, or some source of water. Descriptions of denning areas were highly detailed and vegetation descriptions ranged from thick willows to open tundra or bare ground.

Interviewees were not always able to recall the aspect of a den site, but when this information was given, participants generally referred to south facing hillsides. Seven participants described denning habitat as south facing, and nine individual den sites were observed on a south aspect.

“I could see the bear... It was like straight rocks, way up... like halfway up the mountain and then there was a patch of grass, like a big patch, and that’s where he just disappeared right into...It was facing...south.”

- PIN 117, November 15, 2016

While south facing hillsides were the most frequently described denning areas, this was not uniform across all descriptions. Three den sites were described as west facing, and one was observed...
on a northwest aspect. A suggested reason for these den locations was avoidance of a cold south wind that prevails in the region throughout the winter.

“...in the winter, when they hibernate...the south wind is always the coldest and it’s blowing this way.”
-PIN 103, November 25, 2016

In some instances, dens were observed in flat locations. Five respondents described den sites as occurring in low, flat locations, typically near a river or creek. Three respondents either suggested a change in denning locations over time or cited other land-users and elders who have witnessed grizzly bears increasingly denning in lower and flatter habitats.

“I notice there are grizzly bears denning lower, in the lowland. Just like on the slope hills.”
-PIN 301, November 23, 2016

Climate Change and Concerns
There was no consensus regarding the overall health or status of the grizzly bear population, with some respondents noticing an increase in bear population, others suggesting a decrease, and some noticing no change in population. However, six individuals observed that it is increasingly difficult to find large bears, especially closer to Aklavik. Some participants explained that this was due to local harvesting, and suggested that hunters are taking bears when they are too young or small, not allowing them to reach their full size.

“...sometimes they [hunters] come back with small bears and that kind of frustrates me... they should focus way over in the park... they’re big over there.”
-PIN 7, November 13, 2016

Six individuals suggested that climate change is affecting grizzly bear habitat or behavior. Generally, participants observed grizzly bears entering dens later in the fall and emerging earlier in the spring. Some participants were also concerned that an increase in slumping along hillsides is altering grizzly bear habitat, making old dens unusable and the establishment of new dens more difficult.
Polar Bear

In-depth polar bear Inuvialuit traditional knowledge research was recently completed (Joint Secretariat 2015). This work included significant amounts of information about polar bear movements and ecology including offshore ice use, and we did not attempt to replicate the collection of this information. We focused our TK collection on terrestrial and near-shore polar bear habitats, with the goal of collecting land-based habitat descriptions. Eleven participants described terrestrial or near shore polar bear habitat. These descriptions largely focused on den sites, however five participants described hunting or foraging areas that exist along the coast or on the near-shore ice. These descriptions add to a body of existing TK literature, and further refine TK descriptions of polar habitat.

Denning

Most interviewees who described terrestrial polar bear habitat referenced observations of polar bear dens. Den sites were typically observed along the coast or on Herschel Island, however on two occasions, participants described den sites in inland areas. Interviewees universally described dens on hillsides, banks, or in river draws, where snow accumulates through the winter. Snow accumulation was the most emphasized habitat characteristic in den sites, rather than aspect or surrounding vegetation.

“...it [polar bear den] was on a huge snow bank, on the east [side of Herschel Island]... snow accumulates on the east side of... this big valley that it was in... And the den itself was in the snow, which was... two, three feet in diameter and it went down like six feet straight... and you see all these claw marks... on the entrance of the polar bear den.”

-PIN 101, November 11, 2016

“In the... deeper creek... during the storm, the snow will build up over time... and get like up to 20, 30 feet deep.”

-PIN 120, November 21, 2016

“Usually, they [polar bears] go into snowbanks. This one [den] was in a snowbank... [a] 30-foot snowdrift.”

-PIN 2, November 15, 2016

Coastal Habitat and Near-shore Ice

Most descriptions of land-based polar bear activity, aside from denning, referred to Herschel Island or the nearby mainland. Four individuals specifically described the coastline or near-shore ice as
important polar bear habitat. Polar bears travel through this area hunting seals or scavenging carcasses along the shoreline. Two interviewees described a break between near shore, or land-fast, ice and the open ocean sea ice that occurs near the coastline. This area was frequently selected as an important hunting area for polar bears (Figure 14) due to the large number of seals that use the break in the ice for breathing holes. Generally, participants did not specify a single season where polar bears are more likely to be found on land, however at least one participant suggested that on-land activity is more likely to occur in months with no nearby sea ice.

“... they’ll [polar bears] hunt seals close to shore because there’s cracks that happen in those areas and so the seals will go there for breathing holes...”

-PIN 120, November 21, 2016

“I’ve seen polar bears in that coastal area...just right off the shore...just traveling along, hunting... places where they’ve caught seals...”

-PIN 120, November 21, 2016

“... most times, you often run into them [polar bears]... from Kay Point all along... to... the [Alaska] border, here... in this area, there’s a lot of seals.”

-PIN 301, November 23, 2016

“[In the] fall time... there’s no ice, right? So, he’s [polar bear] going to be on the land. I don’t know where else he’s going to be.”

-PIN 301, November 23, 2016

Interviewees described no major overland migration or travel route. One participant described a seasonal movement pattern, stating that polar bears are seen moving westward each spring. Generally, if polar bears were seen on land, it was suggested that they were crossing to and from sea ice, or hunting along the shore. Most participants still referred to on-land sightings of polar bears as a rare event, and tended to focus their descriptions of terrestrial polar bear activity on the area from Kay Point to Herschel Island (Figure 14).
Figure 14. Areas of the Yukon North Slope used by polar bear for overland or near shore movement and foraging, as identified by multiple Inuvialuit land-users during TK interviews. Darker shades indicate overlap in areas drawn by multiple land users.

Dolly Varden Char

Dolly Varden char interviews focused specifically on near shore habitat, rivers, spawning sites, and overwintering areas. Twenty-three participants discussed Dolly Varden char habitat, and interview responses ranged from descriptions of general fishing areas, to identification of spawning and overwintering sites. Respondents described summer ocean habitat, river migrations, and spawning and overwintering areas separately. Some interviewees refer to Dolly Varden char as Arctic char, others using the species names interchangeably, and others explained that certain fish stocks are considered Dolly Varden char and others are considered Arctic char. For the purposes of the habitat descriptions
sought in these interviews, we used the names interchangeably, based on the preference of the interviewee.

**Near-shore Ocean Habitat**

Dolly Varden char were described in near-shore marine habitat throughout the summer. Seventeen participants described summer Dolly Varden char habitat, mostly focusing on fishing areas just off shore, particularly near Shingle Point. Typically, interviewees described fishing for Dolly Varden char in mid-summer when fish stocks are present all along the coast.

Three interviewees described a correlation between sea ice and Dolly Varden char populations. Dolly Varden char are thought to move with sea ice, feeding off of small invertebrates that are concentrated around floating ice. Interviewees describing this relationship tended to suggest that the presence of sea ice typically indicated large stocks of Dolly Varden char nearby.

> “something about Arctic char... in July, there’ll be no fish... And then all of the sudden, the ice comes in... And the fish come in with it. Where there is ice there’s always fish.”
> PIN 2, November 17, 2016

> “…when the ice first opens up and we can set the fish nets at Herschel Island, we get a good number of fish [Dolly Varden char]... and then once the ice goes out...[it] kind of slows down ‘cause they go... in and out with the ice.”
> PIN 120, November 22, 2016

> “…long ago, when the ice used to come and it used to be really good for char fishing, ‘cause the char... hang around the ice to feed off the little bugs... [that are] there.”
> PIN 302, November 18, 2016

**Migration Upstream and River Habitat**

Dolly Varden char were observed migrating from the ocean into rivers towards the end of summer and beginning of fall. Thirteen individuals described Dolly Varden char-bearing rivers, noting that migration typically began at the end of August, with Dolly Varden char reaching their spawning grounds later in the fall. These rivers included the Babbage, Big Fish, Little Fish, Firth, Malcolm, Komakuk, and Running River as well as major tributaries, such as Spruce Creek, Joe Creek, and Sheep Creek. River habitat was discussed generally, and interviewees did not indicate certain areas as supporting larger runs than others.
Spawning Sites and Overwintering Areas

A major focus of interviews was discussing spawning and overwintering sites. Fourteen participants discussed Dolly Varden char spawning habitat, and marked spawning sites on the map (Figure 15). These areas were typically described as shallower parts of the river, with deeper pools and clear water. Four participants described these areas as staying ice-free year-round; usually because of ground water that entered the river at a warmer temperature in these locations or a high sulfur or salt content that prevented water from freezing.

Figure 15. Areas of the Yukon North Slope used by Dolly Varden char for spawning, as identified by Inuvialuit land-users during TK interviews.
Overwintering sites were described similarly to spawning areas, and in most instances participants described Dolly Varden char using the same area to spawn and overwinter. Five participants described overwintering areas remaining ice-free throughout the year, while at least two interviewees observed Dolly Varden char overwintering in areas that freeze. The remaining interviewees only described the location of overwinter sites. Overwintering sites were marked on the map, with a high degree of consistency across participants (Figure 16).

Climate Change Concerns

Interviewees largely described the Dolly Varden char population as stable, however many participants listed concerns over climate change impacting habitat and three participants observed a decrease in Dolly Varden char populations. Ten participants described population levels as normal, and ten participants did not discuss population changes. Interviewees that observed decreasing populations cited smaller seasonal runs and lower yearly catches as evidence of changing Dolly Varden char numbers. No specific habitat change was listed as the cause for potential decreases in Dolly Varden char populations, however interviewees often shared concern over climate change impacting important Dolly Varden char habitat.

Nine participants observed impacts to Dolly Varden char habitat as a result of climate change. Three interviewees described erosion along riverbanks and coastlines, which was observed to deposit sediment in rivers, making them shallower and less clear. Four interviewees described a change in migration timing, largely referring to Dolly Varden char stocks moving through summer fishing locations earlier in the year. Three participants described incidents of salmon moving into the region, attributing this to warmer temperatures, and two participants observed that the decrease in summer ice is impacting marine Dolly Varden char habitat. One participant described lower snowpack, which is resulting in lower water levels in important creeks and spawning areas.
Figure 16. Areas of the Yukon North Slope used by Dolly Varden char for over-wintering, as identified by Inuvialuit land-users during TK interviews.

“...erosion is the one that’s going to do a lot of damage to our rivers.”
-PIN 1, November 11, 2016

“...you know, we’ve never had salmon in the area before, an now they’re starting to... pop up in places where we’re getting the Arctic char.”
-PIN 101, November 18, 2016
“...the erosion on the hills...make the creek shallow... Probably harder [for Dolly Varden char] to get up to where they’re supposed to spawn.”

-PIN 111, November 11, 2016

“Probably about 10 years [ago] was a really thick ice... And it was really good fishing... you could see the char coming, you could see their little ripples... along the edge of the water... That’s what the normal used to be back then.”

-PIN 302, November 18, 2016

Broad Whitefish

Broad whitefish is considered a “Delta fish” by many of the participants rather than a species they associated closely with the YNS. Still, 11 interviewees shared observations of whitefish habitat along the YNS and many of these participants used the species as an example of habitat change along the YNS, citing the occurrence of whitefish in new locations.

Most reports of whitefish habitat referred to lakes, or near shore coastal waters. Nine participants indicated general whitefish habitat, referring to summer fishing locations. These areas included lakes close to the shore, Roland Bay, and near-shore coastal waters, such as those around Shingle Point. Interviewees described catching whitefish alongside Dolly Varden char when fishing in the ocean during the summer months.

Seven interviewees referred to the occurrence of whitefish in marine waters as a recent trend, emphasizing that whitefish were not traditionally thought of as an ocean species. These participants described seeing more whitefish in the ocean than was historically considered normal, describing coastal flooding and storm surges that allow for whitefish escapement from coastal lakes into near-shore marine waters. Many whitefish-bearing lakes are close to the ocean, and a general lack of high ground between freshwater lakes and the coast allows for mixing between the two when the area floods. Two respondents also commented that coastal waters have become less salty than they were historically, suggesting that this may be associated with the increased occurrence of whitefish in marine waters. One participant suggested that this was caused by increased freshwater runoff and changes to river flow as a result of climate change.

“Well, whitefish never used to be at Shingle Point long ago, when I was a little girl... Now the fish from the Delta are starting to come into that area... Because our water is not as salty as before.”

-PIN 1, November 11, 2016
Geese

Many species of geese seasonally travel through the YNS. We focused these interviews on two species: yellowlegs (also known as greater white-fronted goose) and snow geese, but interviewees mentioned other species, such as Canada goose, brant, and swans when describing goose habitat. Sixteen interviewees described habitat specifically for yellowlegs and snow geese, with information spanning the length of the YNS and observations occurring in spring, summer, and fall. Most participants linked their descriptions of habitat to specific behaviors such as nesting, foraging, staging, and spring or fall migration. Interviewees described important habitat characteristics and emphasized specific locations that are used for each of these seasonal activities. In some cases, the references to ‘geese’ in the interview conversations make it somewhat unclear which species is being described or if multiple species exhibit the described behavior or habitat use. Where possible, we have differentiated between yellowlegs and snow geese, but in some instances, collected information only refers to general geese habitat.

General Migration Patterns

Most interviewees shared similar observations of snow geese and yellowlegs migration patterns. Generally, participants described yellowlegs flying from inland areas and arriving on the YNS between late April and June. Yellowlegs were typically observed in the area through the summer, while they nest or forage. Snow geese were observed flying through the area during the spring, but were less frequently observed nesting or stopping over for long periods of time. Interviewees suggested that
snow geese will occasionally use nesting sites along the YNS, but primarily nest outside of the study area on Banks Island, using the YNS during their fall migration.

Land-users find both yellowlegs and snow geese foraging along the YNS in the fall until they migrate south for the winter. Interviewees observed both species of geese foraging in similar areas throughout the study area, and consistently described the southward migration occurring in September or October. Yellowlegs were observed departing approximately two weeks earlier than snow geese, which wait until the first snow to move south.

In the time period between the arrival of geese on the YNS and their migration southwards, interviewees frequently observe nesting, foraging, staging, and stopover locations along the coast. These areas are typically returned to each year and were described consistently amongst interviewees.

Nesting Areas

Thirteen participants described nesting habitat along the YNS. Generally, nesting geese were observed to be primarily yellowlegs. In three cases, participants suggested that nesting areas contain similar amounts of yellowlegs and snow geese, however the majority of respondents observed largely yellowlegs throughout the nesting season. Snow geese were generally observed nesting out of the study area, on Banks Island.

“The yellowlegs usually nest around Qutaitchuraq... we don’t usually get snow geese until we get... snow on the ground...”
-PIN 131, November 15, 2016

“...first week in May, we see a whole bunch [of geese] at Blow River... during the summer they use that [area] for nesting... [It’s] yellowlegs, 95%, maybe mixed 5% with snow geese.”
-PIN 2, November 15, 2016

“[It’s] mostly yellowlegs in this area... you’re seeing a lot of snow geese, too... but they’re... crossing over to Banks Island... that’s where the snow geese nest.”
-PIN 121, November 22, 2016

Many of the nesting descriptions were linked to specific areas (Figure 17), and habitat observations were largely consistent. Nine respondents described nesting areas as flat terrain, and eight participants observed that nests are always near water. Common ecosystem classes used to describe nesting habitat included lower swamps (seven participants), upland ponds and swamps (eight participants), and low flatlands (five participants). Within these areas, participants often described nesting sites as grassy locations, with available cover or camouflage.
Twelve out of the 13 participants that described nesting habitat also mapped specific locations as important nesting grounds for geese. Geese return to these areas on a yearly basis, and mapped areas show a large degree of continuity across interviews (Figure 17).

“[Geese] like an area where they’re hard to see, and... they have to live close to the river or the lake where the young ones always...go feeding.”

-PIN 112, October 27, 2016
Foraging Habitat

Participant descriptions of foraging habitat spanned spring, summer, and fall. These descriptions referenced geese habitat generally, and did not usually differentiate between species, however, participants often observed yellowlegs earlier in the season and snow geese in the later summer or fall. Spring foraging areas were largely described as similar to nesting areas. Participants described low, wet, grassy areas, in the same manner that they described nesting locations. Spatially, many of the same polygons indicating nesting areas were also used to mark early season foraging locations (Figure 18). Often, participants observed yellowlegs staying in these general areas through the summer, eating grass and roots. Five participants described geese foraging on grasses or sedges, and while these descriptions were primarily applied to spring habitat, some participants emphasized that this food source is used through the summer and fall, as well.

Participants also described geese foraging for berries such as cloudberries, cranberries, and blueberries as they ripen. In the summer, geese were observed flying back and forth between nesting areas and foraging habitat. Five interviewees described summer foraging habitat either by selecting pictures of hillside ecosystem classes or by specifically describing hillside terrain. These locations were generally described as open terrain, with scattered short willows and low shrubs and grass. Six interviewees described fall foraging habitat in the same manner, with foraging primarily described as occurring wherever large quantities of ripe berries are found. Four participants described fall foraging habitat by selecting pictures of tundra ecosystems.

Along with the yellowlegs that are abundant in the area spring and summer, snow geese will fly to these areas and forage in the fall before heading south for the winter. Berries were usually discussed in a general sense, however when interviewees did provide information on specific berry preferences among geese, seven interviewees described geese foraging on blueberries, while seven described foraging on cloudberries. One participant referred to geese also foraging on cranberries, and
at least one participant suggested that snow geese are more likely to eat blueberries than other berries.

Figure 18. Areas of the Yukon North Slope used by geese for foraging, as identified by multiple Inuvialuit land-users during TK interviews. Darker shades indicate overlap in areas drawn by multiple land users.

“...when we stay at Shingle Point, we see them [geese] come from the ocean, then they’re flying up to the high hills, up to the tundra... and eating a lot of aqpik [yellow berries]...”

-PIN 6 November 12, 2016
"We know they’re eating berries in late fall... They always come from the ocean and they’re always heading to the foothills."
- PIN 6, November 12, 2016

"...soon as you see cloudberry... whoosh... that’s where they [geese] go."
- PIN 112, October 27, 2016

"I don’t know [everything] they [geese] eat, but ... when you look in their guts, you can find blueberries."
- PIN 1, November 12, 2016

Staging Habitat

Interviewees also discussed important stopover or staging areas that geese use during the spring and fall migrations. These locations often overlapped with areas identified for other uses, but were notable because of the high number of geese that were consistently observed. Fourteen interviewees discussed staging locations and eleven participants marked these areas on a map. Participants often reported sightings of hundreds or thousands of geese in a single area, typically in the spring or fall, and described both snow geese and yellowlegs using these locations, alongside Canadian geese and other waterfowl.

"...when they’re [geese] flying over here [in the fall], they’ll ... maybe jump a mile or two and then they stop, ‘til somebody scares them up. Then they take off, always going south..."
- PIN 2, November 15, 2016

"... they usually bunch up... thousands and thousands of geese... every spring and fall."
- PIN 5, November 14, 2016

Staging areas were generally described as flatter locations, often containing mud bars, near water. Eight participants either selected low flatlands ecosystem photos or described flat landscapes when discussing staging locations. Two participants suggested that geese use these areas in the spring because they are the first to melt. Other ecosystem classes used to define staging locations also included river beaches and coastal beaches. Commonly selected stopover areas included Ptarmigan Bay, the Blow River Delta, and the Babbage River (Figure 19).
“...on this big mud plain... there’s always... at least 1,000 geese... during the first part of the spring, they come... they stop in there where all the water is... rushing through the Babbage.”

-PIN 120, November 22, 2016

Changes and concerns

Participants observed a number of changes in geese populations and habitat use. Nine interviewees suggested an increase in goose populations throughout the YNS. These observations were typically in regard to all geese in the area, but yellowlegs, in particular, were thought to be increasing.
One interviewee suggested that snow geese, specifically, are increasing in the Shingle Point area, while at least two participants noticed a decline in the number of snow geese using the YNS during migration.

“One thing about yellowlegs, they’re really multiplying, which is really good.... Twenty years ago, you could see very few... [but, now] around this area, I could easily say there were at least... 4,000 geese.”
-PIN 2, November 15, 2016

“... over the past 10 years... it’s a good, healthy [population]... both snow geese and yellowlegs.”
-PIN 121, November 22, 2016

“...there’s a lot of geese now... I see there’s more than there used to be.”
-PIN 5, November 14, 2016

It is possible that the observed changes in snow geese abundance are related to a change in migration pattern, which four participants discussed. These participants observed that geese still fly over the region, but either do not stop as frequently or move farther inland during their migration, flying closer to the mountains than was historically considered normal. Three of the participants discussing changes to geese migration suggested that these changes in migration pattern have resulted in fewer snow geese using historically important stopover locations.

“...as far as we hear, they’re [snow geese] increasing in Sachs Harbour. There’s a lot more there... they usually come out from Sachs Harbour and they go through...here. They don’t do that anymore. They used to land in here by the thousands...”
-PIN 2, November 15, 2016

“...they should do a study on why [it] is these geese [are] not landing here anymore. What’s happening to this?”
-PIN 2, November 14, 2016

“I hardly see snow [geese]. They go inland. I think they go inland...That’s a change.”
-PIN 8, November 20, 2016
Seven individuals suggested that climate change may also be altering goose habitat, however responses varied regarding specific impacts. Two participants noticed geese arriving to the study area earlier, and one participant stated concern that increasingly erratic weather may result in geese arriving to the region too soon, exposing themselves to late spring cold spells. Other concerns included drying out of nesting habitat or flooding and salt kill from coastal storms. One participant suggested warmer weather might benefit geese, especially during the nesting period.

Species of Special Interest

While the focus of this interview series was obtaining detailed information regarding seven focal species, specific information on special interest species was sought on an opportunistic basis. If an interviewee had knowledge regarding a special interest species and there was time left in an interview, a limited set of questions were asked about this special interest species (Appendix III). The questions were primarily asking for location-specific information, such as dens for wolverines, wolves, or arctic foxes, nesting sites for raptors, or seal haul-out zones. These areas were mapped on the occasion that an interviewee shared relevant spatial data. More broad topics that were included in special interest questions included Dall’s sheep habitat, muskox habitat, and general berry habitat. While these topics were not discussed as frequently as focal species habitat, some interviewees shared detailed habitat descriptions that strengthen our knowledge of habitat characteristics throughout the study area.

Muskox

Muskox was the most widely discussed special interest species. Nineteen participants referred to muskox, either in direct response to a special interest interview question or in discussing grizzly bear or caribou habitat. Interviewees commonly described muskox in similar habitats as caribou and emphasized that muskox could be found “all over.” Seven interviewees observed muskox in tundra ecosystems and three participants observed muskox along the coast. Two participants observed muskox in each hillside or mountain ecosystems or in rivers and valleys. Muskox were generally observed eating similar vegetation as caribou, with some respondents describing either lichen or grass forage.

The largest concern regarding muskox was their observed increase and the resulting impact on caribou populations. Interviewees commonly described an increase in muskox populations, and ten participants noted that muskox have a negative impact on caribou habitat, stating that caribou typically avoid muskox. These participants listed notable concern regarding the impact that a growing muskox population is having on caribou habitat use. Four interviewees noted that muskox are becoming a favored prey source for grizzly bear, particularly on Herschel Island, where there has been a large muskox population in recent years.
Dall’s Sheep

Sheep were also widely discussed by interview participants. Thirteen interviewees discussed sheep, largely focusing on mountainous areas near the eastern and western extents of the study area. Eleven participants described sheep habitat as mountainous either by selecting photos of the mountain ecosystem class or specifically describing seeing sheep in mountainous terrain (such as in Figure 20). These observations were typically made in the summer and fall, when land users are traveling through sheep habitat, however no participants suggested seasonal specific habitat selection or migration of sheep during the year.

Figure 20. Example of a photo of rocky mountain ridges, selected to represent sheep habitat

Additional Species and Information

When possible, interviewees were asked to describe other special interest species. These questions were largely focused on place-specific habitat uses (e.g., identifying den sites) or discussing species that were not a primary focus of the of the regional assessment (e.g., describing ptarmigan habitat). These remaining special interest topics included: arctic fox, wolf, and wolverine den sites; seal haul-out zones; general berry habitat; raptor nest point locations; beaver population changes; and ptarmigan and shorebird habitat descriptions. Interviewees gave many detailed descriptions and provided important spatial information regarding these topics, however too few participants provided information on these to summarize habitat characteristics at this point. Data on special interest topics has been cataloged and digitized and will contribute to the updating of the Wildlife Plan.
Discussion and Conclusion

The TK-ELC workshop and the focal species interviews have resulted in the documentation of TK regarding wildlife habitat across the YNS. This information will play an important role in the updating of the Wildlife Plan and development of the regional ecological and cultural assessment for the Yukon North Slope.

The TK-ELC workshop provided an important foundation for interviews by creating a bridge between TK and western science descriptions of habitat. The importance of this cannot be understated, as efforts to share across knowledge systems have faced technical and social challenges in the many regions where it is pursued. This effort is a collaboration that bridges knowledge systems to provide a shared understanding and terminology to achieve mutually-agreed upon goals and products. In addition, there were important lessons learned that have improved the ability of researchers and land-users to share information effectively. The workshop highlighted that some of the terminology used in western science land classification is unrecognized by many land-users. For example, the terms ‘meadow’, ‘bog’, ‘fen’, ‘fellfield’ were commonly referenced in the ELC documents but were unfamiliar to many workshop participants, or not commonly used. As expected, Inuvialuit land-users did not use western science common names of several plant species, and it was challenging to bridge species names despite having an Inuvialuit traditional plant guide and a room of knowledgeable land users. Additionally, some words have different meanings when used by traditional land users than when used in western science. For example, traditional land users often used the term ‘willow’ to refer to any woody plant above knee height that is not a tree, including willow, alder and birch, and used ‘shrub’ to describe any woody plants below knee height, many of which may be classified as ‘willows’ by western scientists. Thus, common western science phrases such as ‘tall shrub’ were contradictory as interpreted by Inuvialuit land-users and therefore initially caused confusion. The workshop created the opportunity to identify a common language when discussing ecosystems and habitats.

The habitat classes and photos that emerged from the TK-ELC workshop played a large role in TK interviews focused on fish and wildlife habitats. In some instances, habitat classes and photos were directly translatable to the land-user descriptions of wildlife habitat. For example, 16 out of 18 interviewees who described moose habitat selected photos of the “Rivers and Streams” habitat class, immediately associating the photos with observed moose locations. Similarly, photos of the swamp classes were commonly used to describe goose habitat across many interviews.

Despite the overall success of the habitat classes and associated photos, we recommend that this method be used in addition to, not as a replacement for, detailed verbal descriptions of habitat characteristics in TK interviews. We found that the most useful descriptor of habitat was the observations of the land-user, which often revealed more detail or nuance than photo selection. In some instances, photo selection had the potential to be misleading. For example, some respondents selected photos of ecosystem classes based on landscape features in the foreground or background, not the intended focal point of the photo. This problem was often encountered if there were mountains or shoreline in a photo, when the intended focal point was a different habitat feature. In these instances, it was important that the interviewee described why he or she selected a photo and what characteristics were important in the photo, and that the interviewer recognized if these characteristics matched the TK habitat class linked to the specific photograph.
While using a combination of photo-based and narrative-based descriptions of habitat allowed for a high level of detail across interviews, knowledge of particular species or seasonal habitat uses was largely related to individual travel and land-use patterns. Focal species habitat was often described in most detail as it related to specific hunting seasons or locations. For example, most interviewees that discussed grizzly bear habitat focused on describing locations where bears are found during the spring hunting season. As grizzly bear hunting largely occurs on snowmobiles, the perspective and location of land-users describing spring bear habitat was different than those describing summer habitat, which typically is accessed via boat.

This variation in land-user travel throughout the year made it difficult to discern patterns in seasonality for some species. For example, participants described a difference between “coastal” moose habitat and “inland” habitat, suggesting that inland moose feed largely on willow, while coastal moose eat sedges and grasses with a higher salt content improving the flavor of the meat. Some participants suggested that the difference in these habitats was seasonal: moose are more likely to be found towards the coast in the summer and move inland during the winter. Other participants acknowledged that it was difficult to know if moose are moving between these habitats or if their own patterns of seasonal travel influence the location of sightings: land-users are more likely to travel inland by snowmobile in the winter, while traveling by boat in the summer makes near-coast sightings more likely.

Similarly, participants’ reasons for traveling across the YNS largely influenced their knowledge regarding certain habitats. For example, many participants that described wildlife habitat in the western part of the study area, particularly polar bear habitat, have been employed by Parks Canada or have worked as research assistants in the region at some point in their history. These participants used observations made while flying to and from field sites, fieldwork, and other duties related to employment, as well as traditional wildlife harvesting, to gain knowledge of wildlife habitat.

The range in experiences across interviewees is reflected in the TK data. For some species, such as moose, grizzly bear, caribou, and geese, combinations of land-user observations and photo selections generated consensus descriptions of important vegetation, terrain types, and spatial locations for important habitat types. Other species habitats were described in less detail; either because many of the terrestrial habitat descriptors used in the interviews were not relevant (e.g. polar bears, which are largely observed on sea ice) or because land-users do not frequently interact with certain species across the YNS (e.g. broad whitefish, which were often referred to as a “Delta fish”).

This interview series adds important TK habitat information to previously documented TK across the YNS. This information is of stand-alone benefit (as summarized in this report) and will assist in management and conservation efforts for wildlife habitats across the YNS. By focusing on detailed habitat descriptions, the knowledge collected in this research can inform wildlife habitat mapping and modeling efforts across the YNS. Additionally, the bridging of science-based ecosystem classification (e.g. the ELC) and TK descriptions provides an important and novel approach to improving the ability to leverage both knowledge systems in conservation and land management efforts. This will enable researchers and land managers to use all available information in planning efforts. Specifically, the information documented through the work presented in this report will directly support the revised Wildlife Plan and other management efforts of WMAC(NS).
Bibliography

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Appendix I: TK-ELC Bridging
Interim bridging of TK habitat classes and subclasses with the eastern YNS ELC ecosystem units. This bridging may be updated as the ELC is finalized and some ELC unit classifications or names are revised.

<table>
<thead>
<tr>
<th>TK Class</th>
<th>Sub Class Habitat</th>
<th>ELC Class</th>
<th>ELC Unit Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaches</td>
<td>Coastal Beaches</td>
<td>Beachland</td>
<td>6I - Dune-Arctic dunegrass (Dn)</td>
</tr>
<tr>
<td>Beaches</td>
<td>River Beaches</td>
<td>Beachland</td>
<td>6H - Sandbeach sandwort (BchSw)</td>
</tr>
<tr>
<td>Beaches</td>
<td>Coastal Beaches</td>
<td>Estuarine - Saltwater marsh</td>
<td>6K - Em-Saline-Beach Sedg (EmSg)</td>
</tr>
<tr>
<td>Slumps</td>
<td>Active Slumps</td>
<td>Thaw Slump</td>
<td>7A - Coastal slump-recent (SIR)</td>
</tr>
<tr>
<td>Slumps</td>
<td>Inactive Slumps</td>
<td>Thaw Slump</td>
<td>7B - Coastal slump-stable (SIS)</td>
</tr>
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<td>Lower Swamps</td>
<td>Marsh</td>
<td>6G - Wm-Graminoid (WmGr)</td>
</tr>
<tr>
<td>Swamps</td>
<td>Upland Ponds and Swamps</td>
<td>Fen</td>
<td>6E - Wf-Water sedge (Wfs)</td>
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<tr>
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<td>-</td>
<td>Arctic Tundra</td>
<td>3C - Mountain-avens - Alluvial Terrace (MAT)</td>
</tr>
<tr>
<td>Tundra</td>
<td>-</td>
<td>Shrub Tundra</td>
<td>3F - Sedge tussock (ST)</td>
</tr>
<tr>
<td>Tundra</td>
<td>-</td>
<td>Shrub Tundra</td>
<td>5C - Birch-Sedge tussock toeslope (BS)</td>
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<td>Hillside</td>
<td>High Steep Slopes</td>
<td>Arctic meadow</td>
<td>2A - Coltsfoot mountain sorrel drainage area (CMS)</td>
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<tr>
<td>Hillside</td>
<td>Mid-Slopes</td>
<td>Arctic Tundra</td>
<td>3D - Mountain-avens – Horsetail-wet (toe slope) (MHV)</td>
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<td>Mid-Slopes</td>
<td>Shrub Tundra</td>
<td>5B - Birch-crowberry mesic slope (Bcr)</td>
</tr>
<tr>
<td>Hillside</td>
<td>Mid-Slopes</td>
<td>Bog</td>
<td>6C - Willow/Birch-moist(cool) slope (WBC)</td>
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<tr>
<td>Hillside</td>
<td>Mid-Slopes</td>
<td>Fen</td>
<td>6D - Cottongrass tussock - fen (CTf)</td>
</tr>
<tr>
<td>Hillside</td>
<td>Low Slopes</td>
<td>Bog</td>
<td>6B - Alder-cottongrass tussock (Act)</td>
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<tr>
<td>Hillside</td>
<td>Low Slopes</td>
<td>Arctic meadow</td>
<td>2B - Graminoid wet slope (GrW)</td>
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<tr>
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<td>Low Slopes</td>
<td>Arctic meadow</td>
<td>2C - Chamisso's willow alpine snowbed (SBc)</td>
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<td>Woodland</td>
<td>8B - Spruce-birch mesic slope (SBM)</td>
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<td>-</td>
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<td>8C - Spruce-birch mesic slope Tussocked (SBMT)</td>
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<td>-</td>
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<td>8F - Spruce-horsetail wet slope (SH)</td>
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<td>-</td>
<td>Woodland</td>
<td>8G - Spruce-kinnikinnick dry slope (SK)</td>
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<td>Floodplain</td>
<td>4A - Alder-grass drainage channel (AGRD)</td>
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<td>Rivers and Creeks</td>
<td>Floodplain</td>
<td>4B - Willow-coltsfoot drainage channel (WC)</td>
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<tr>
<td>Rivers and Creeks</td>
<td>Floodplain</td>
<td>4C - Willow floodplain (WFl)</td>
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<tr>
<td>Rivers and Creeks</td>
<td>Floodplain</td>
<td>4D - Willow Floodplain - Inactive (WFil)</td>
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<td>-</td>
<td>Arctic fellfield</td>
<td>1A - Rock Liohen (RM)</td>
</tr>
<tr>
<td>Rocky Mountain</td>
<td>-</td>
<td>Arctic heather snowbeds</td>
<td>3A - Heather-bearflower nivation slope (HB)</td>
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<td>-</td>
<td>Arctic Tundra</td>
<td>3E - Mountain avens tundra herb (MT)</td>
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<td>5D - Birch-crowberry submesic slope (WBA)</td>
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<td>6J - Em-Saline-Graminoid (EmGr)</td>
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</table>
Appendix II: Poster of TK-based Habitat Class Photos

This poster shows the 10 habitat classes identified in the TK-ELC workshop and used in the TK interviews.
Appendix III: Species-Specific Interview Questionnaires

The species-specific questionnaire used to guide semi-directed interviews of YNS traditional land-users in Aklavik, NWT in November 2016.

Part 1: Describing Interviewee Use of the YNS

These questions are asked at the initiation of each interview.

1) What year were you born in?
2) How long have you been traveling to the Yukon North Slope?
3) In what seasons do you go to the Yukon North Slope? What are the primary reasons you go to the North Slope during each season? How often through the years do you go to the Yukon North Slope during each season?

Clarify species and seasons to be covered in first series of questions by filling in the species name here and indicating which season(s). “First, we are talking about the habitats of ____ (species) ____ during the spring, summer, fall, winter season(s)”

Porcupine Caribou Habitat Interview Questionnaire

Part 2: Describing habitats used by the species in each season

1) What seasons have you seen caribou on the Yukon North Slope? Are these bulls, cows, or both?
2) Do caribou stay in certain places when you see them on the Yukon North Slope or are they moving through the area when you see them in X season?
   a. If they stay: Can you show me where they like to be during the X season? Are these bulls, cows, or both? Map this
   b. If they are migrating: Can you show me where they move through the area during the X season? Map this
3) Can you describe the habitat where you see caribou in the X season?
   a. What does the vegetation look like?
   b. Can you pick out the photos(s) of habitats that best represents the most important habitat for caribou?
   c. What is the terrain like in these areas? (Flat, sloping, steep?)
   d. Are they often found on certain aspects?
   e. Are they often found down low or up the hillsides or someplace different?
   f. Are caribou often near some kinds of habitats? Describe sheep example, if needed.
      i. How close are they to these near-by places?
      ii. Why do they do this?
4) What are the caribou doing when you see them in this habitat?
   a. If feeding, do you know what are they eating?
b. Do you know why they like this habitat for doing X activity?

5) Are there other habitats that you also believe are also important for caribou in the X season?
   a. Can you describe these habitats?

6) Are there any other places on the Yukon North Slope that are important for caribou in the X season? For bulls, cows, or both? Why?  
   Mapped and verbal response.

7) Can you point to areas where you have seen caribou calving? Mapped response.
   a. Do you know if these areas used every year?
      i. *If not used every year, Do you know why the caribou choose these areas in the years they do calve here?*
   b. Do caribou choose kinds of lands or habitats to have their calves in?
      i. Can you describe what it looks like where caribou calve?
   c. Are caribou calving in the same kinds of habitats that you have always seen them calve in?
      i. Can you describe how these habitats have changed?
   d. Have you noticed changes to the timing of caribou calving?

**THE PART 2 QUESTION SET FOR WILDLIFE IS REPEATED FOR EACH SEASON (SPRING, SUMMER, FALL, WINTER) THE INTERVIEWEE HAS EXPERIENCE WITH THE SPECIES. QUESTION 7 ASKED ONLY ONCE**

**PART 3: Documenting Changes in Distribution, Numbers and Habitats**

1) Are caribou more or less common than they used to be, or about the same?
   a. Is this change (if there is one) occurring everywhere caribou live in the YNS?
   b. When did you first notice this change? Ask time frame- try to get as specific as possible
   c. Do you think that these are natural changes?

2) Are you seeing caribou in new places that you did not used to see them? Are these bulls, cows, or both?
   a. Do you still see caribou in all the places that you used to see it?
   b. Which seasons have you noticed these changes?
   
   Map, clearly indicating loss or addition of species

3) Do you know of any important movement routes that caribou use; such as between seasonal habitats or for annual migrations? *Skip if this has been covered in the seasonal questions*

4) Are you noticing changes in caribou migration patterns?
   a. Are caribou traveling through different areas or at different times?
5) Do you have ideas about why these changes (in abundance, distribution, movements) are happening?

6) Have you noticed changes to the habitat in places where caribou are no longer found or changes in the habitat in areas where caribou have recently started using?
   a. Do you have any ideas as to why the habitats are changing?

7) Has climate change caused changes in caribou habitat?
   a. Are these changes affecting caribou?
      i. How have these changes affected caribou?

**Part 4: Additional Information**

1) Is there anything else you would like to share about the important habitats that caribou require on the Yukon North Slope that will help us better identify and conserve these habitats?

**Dolly Varden char (Arctic char) and Broad Whitefish Habitat Questionnaire**

**PART 2: Describing Distribution and key habitats of Dolly Varden char (Arctic char) and/or broad whitefish in each season**

1) Can you show me the rivers, streams or lakes, or areas along the coast have you found Dolly Varden char or broad whitefish in on the Yukon North Slope? *Map these*
   a. Do you know what months they are in this area, or if they are there year-round?

2) Do you know how far up-stream each species is found?

3) Do you know some places where Dolly Varden char or broad whitefish spawn in this waterway? *Mapped response*
   a. Can you describe what the waterways look like where they spawn?
   b. When does spawning occur?

4) Do you know some places where Dolly Varden char or broad whitefish overwinter? *Mapped response*
   a. Can you describe what the waterway looks like where they overwinter?

5) Are there other critical areas for either of these species along this waterway? *Mapped and verbal response*

Repeat the above questions 2-4 for each waterway indicated including any coastal areas as appropriate
After completing the waterway specific questions, confirm the overall seasonal patterns that may have emerged about when each species is found along the coastline, in rivers and/or in lakes:

6) Can you confirm what seasons or months do you see Dolly Varden char or broad whitefish in:
   a. Rivers?
   b. Lakes?
   c. Along the Coast?
   d. And, when they spawn?

PART 3: Documenting Changes in Distribution, Numbers and Habitats

1) Are either species more or less common than they used to be or about the same?
   a. Is this change (if there is one) occurring everywhere it lives in the YNS?
   b. When did you first notice this change?
   c. Do you think it is a natural cycle?
   d. Are you concerned about it?

2) Are you seeing Dolly Varden char or broad whitefish in new places that you did not used to see them?
   a. Do you still see both species in all the places that you used to see them?
   b. Which seasons have you noticed these changes?

Map, clearly indicating loss or addition of species

3) Are you noticing changes in Dolly Varden char or broad whitefish migration patterns?
   a. Are they traveling through different areas or at different times?
   b. When did you first start seeing these changes?

4) Have you noticed changes to the timing or location of spawning for either species?
   a. When did you first start seeing these changes?

5) Do you have ideas about why these changes (in abundance or distribution) are happening?
   a. Have you noticed changes in the habitats where Dolly Varden char or broad whitefish are no longer found or changes in the habitat where they have recently started occurring?

6) Is climate change affecting Dolly Varden char or broad whitefish habitat?
   a. Are these changes impacting these species?
   b. How are these changes affecting each species?

Part 4: Additional Information
1) Is there anything else you would like to share about the important habitats this species requires on the Yukon North Slope that will help us better identify and conserve these habitats?

Geese Habitats Questionnaire

**PART 2: Describing nesting, foraging and stopover habitats used by geese**

This interview is focused on snow geese and white fronted geese (yellow legs).

1) Do you see both snow geese and yellow legs commonly on the North Slope?

Based on this answer, decide to focus on just one species, to cover each species separately or to ask questions clarifying between the species.

2) When do you first see geese on the North Slope each year?
   a. Is this the same for both species?
   b. How long do they stay for? Is this the same for both species?

3) Have you seen geese that are nesting on the North Slope?
   a. Which species have you seen nesting on the North Slope?
   b. Can you show me on the map where you have seen geese nesting? *Map for each species*
   c. Can you describe what the habitat looks like where they are nesting? Is this the same for each species?
   d. Can you identify any photos that best describe nesting habitat?
   e. How much time do geese spend in this habitat each year?
   f. Do geese return to the same nesting spots each year? Is this the same for each species?

4) Are there other habitats that are also important to the geese during the nesting season, such as feeding areas? Is this the same for each species?
   a. Can you describe what these habitats look like? Do both species use similar habitat for foraging?
   b. Can you identify the photos that best describe these areas?
   c. How far from the nest will geese go to get to these other habitats? Is this the same for both species?
   d. Can you show me some feeding areas on the map? *Map these for each species*
   e. Do you see them feeding in new places or new habitats as the season passes or do they always stay in the same areas through the season?
   f. Do they return to the same spots each year? Is this the same for each species?

5) We know that some geese nest outside the YNS but may stop to rest and feed on the YNS during their migration. Have you seen geese that you think are just stopping over?
Traditional Knowledge of Wildlife Habitats on the Yukon North Slope

July 12, 2017

Tyson and Heinemeyer, prepared for the Wildlife Management Advisory Council (NS)

1. a. Which species does this stopping over?
   b. What were they doing when you saw them?
   c. What time of year did you see them? Is this the same for both species?
   d. Can you describe what the habitat looks like where you see them? Is this the same for both species?
   e. Can you identify the photos that best describe this habitat?
   f. Can you identify some of these areas on the map for each species? Map these
   g. Are they often near other habitat like open water? If so, about how far away would you say they will go from open water? Is this the same for each species?
   h. How much time do geese spend stopping over each year? Is this the same for each species?
   i. Do they return to the same spots each year? Is this the same for each species?

6) Are there any other areas that are important for geese? What do these areas look like? Can you identify any on the map? Verbal description, photo selection, and/or mapped responses

**PART 3: Documenting Changes in Distribution, Numbers and Habitats**

1) Are geese more or less common than they used to be, or about the same? Is this change (if there is one) occurring everywhere that geese live in the YNS? Do you think this change a natural cycle? Are you concerned about this change? Is this the same for each species? Verbal and potentially mapped response

2) Are you seeing geese in new places that you did not used to see them?
   a. Do you still see geese in all the places that you used to see them?
   b. Which seasons have you noticed these changes? Which species?
   Map, clearly indicating loss or addition of species

3) Are geese migrating through different areas or at different times? Is this the same for each species?

4) Do you have ideas about why these changes (in abundance, distribution, timing) are happening?

5) Have you noticed changes to the habitat in places where geese are no longer found or changes to the habitat in areas where geese have recently started using?

6) Has climate change resulted in changes in geese habitat?
   a. Have these habitat changes affect geese?
   i. Has this affected geese? Same for each species?

**Part 4: Additional Information**
1) Is there anything else you would like to share about the important habitats that geese require on the Yukon North Slope that will help us better identify and conserve these habitats?

Grizzly Bear Habitat Questionnaire

PART 2: Describing habitats used by the species in each season

1) What seasons have you seen grizzly bear on the Yukon North Slope?
   a. Can you identify a few spots on the map where you have seen this species in the X season?

2) Can you describe the habitat where you see grizzly bear in the X season?
   a. What does the vegetation look like?
   b. Can you pick out the photos(s) of habitats that best represents the most important habitat for grizzly bear?
   c. What is the terrain like in these areas (flat, sloping, steep, etc.)?
   d. Are they often found on certain aspects?
   e. Are they often found down low or up the hillsides or someplace different?
   f. Are grizzly bear often near some kinds of habitats, animals or other features?
      Describe sheep example, if needed. The animal piece is to see if they follow caribou like wolves do
      i. How close are they to these near-by places?
      ii. Why do they do this?

3) What are the grizzly bear doing when you see them in this habitat?
   a. If feeding, do you know what are they eating?

4) Are there other habitats that you also believe are also important for grizzly bear in the X season?
   a. Can you describe these habitats? Repeat the questions 2a-2f above, as appropriate

5) Are there any other places on the Yukon North Slope that are important for grizzly bears in the X season? Why? Mapped and verbal response.

At least once during the interview, be sure to ask:

6) Can you point to some of the places where you have seen denning areas for grizzly bears? Mapped response.
   a. Are these sites returned to over multiple years?
   b. Do bears like to den in certain kinds of lands or habitats?
i. Can you describe what it looks like where grizzly bears den?

c. Are grizzly bears denning in the same kinds of habitats that you have always seen them den in?
   i. Can you describe how these habitats have changed?

**PART 3: Documenting Changes in Distribution, Numbers and Habitats**

1) Are grizzly bears more or less common than they used to be, or about the same?
   a. Is this change (if there is one) occurring everywhere that grizzly bears live in the YNS?
   b. When did you first notice this change?
   c. Do you think it is a natural cycle? If so, what do you think causes it?
   d. Are you concerned about it?

2) Are you seeing grizzly bears in new places that you did not used to see them? *Map these*
   a. Do you still see grizzly bears in all the places that you used to see them?
   b. Which seasons have you noticed these changes?
      *Map any changes in distribution, clearly indicating loss or addition of species*
   c. Have you noticed changes to the habitat in places where grizzly bear are no longer found or changes to the habitat in areas where grizzly bear have recently started using?

3) Are grizzly bears eating the same things that they have always eaten?
   a. Are they eating new things or eating more of some foods that didn’t used to be very important?
   b. Are they no longer eating things that they used to eat or eating less of some things than they used to?
   c. When did you first notice this change?

4) Are grizzly bears traveling through different areas or at different times?

5) Do you have ideas about why these changes (in abundance or distribution) are happening?

6) Is climate change causing changes in grizzly bear habitat?
   a. Do these changes this affect grizzly bears?
      i. How do these habitat changes affect grizzly bears?

**Part 4: Additional Information**
1) Is there anything else you would like to share about the important habitats that grizzly bears require on the Yukon North Slope that will help us better identify and conserve these habitats?

Moose Habitat Questionnaire

PART 2: Describing habitats used in each season

1) Which seasons have you seen moose on the Yukon North Slope? Based on the answer, decide which seasons to discuss habitat for moose in

2) Can you describe the habitat where you see moose in the X season?
   a. What does the vegetation look like?
   b. Can you pick out the photos(s) of habitats that best represent the most important habitat for moose?
   c. What does the terrain look like in these areas (flat, sloping, steep, etc.)?
   d. Are they often found on certain aspects?
   e. Are they often found down low or up the hillsides or someplace different?
   f. Are moose often near some kinds of habitats?
      i. How close are they to these near-by places?
      ii. Why do they do this?

3) What are the moose doing when you see them in this habitat?
   a. If feeding, do you know what are they eating?

4) Are there other habitats that you also believe are also important for moose in the X season?
   a. Can you describe these habitats? Repeat the questions 2a-2f above, as appropriate

5) Are there certain habitats that are used for calving?
   a. Can you describe this habitat?

6) Are there any other places in the Yukon North Slope that are important for moose? Why?
   Mapped and verbal response.

PART 3: Documenting Changes in Distribution, Numbers and Habitats

1) Are moose more or less common than they used to be, or about the same?
   a. Is this change (if there is one) occurring everywhere that moose live in the YNS?
   b. Do you think that this is a natural cycle?
c. Are you concerned about this change?
d. When did you first notice this change? Verbal and potentially mapped response

2) Are you seeing moose in new places that you did not used to see them?
   a. Do you still see moose in all the places that you used to see them?
   b. Which seasons have you noticed these changes?
   c. When did you first notice this change?

Map, clearly indicating loss or addition of species

3) Have you noticed changes to the timing or location of moose calving?
   a. When did you first notice this change?

4) Do you have ideas about why these changes (in abundance or distribution) are happening?

5) Have you noticed changes to the habitat in places where moose are no longer found or changes to the habitat in areas where moose have recently started using?
   Be clear about which is declining or increasing when describing.

6) Is climate change causing changes in moose habitat?
   a. Is this habitat change affecting moose?
      i. How is this affecting moose?

Part 4: Additional Information

1) Is there anything else you would like to share about the important habitats that moose require on the Yukon North Slope that will help us better identify and conserve these habitats?

Polar Bear Habitat Questionnaire

PART 2: Describing and Mapping Denning

Before beginning, acknowledge that a major polar bear TK study has been recently completed. The following questions are following up on this work focused on polar bears use of land.

Denning:
1) We understand that polar bears largely use offshore ice, but for this habitat research, we are focusing on land and near-shore habitat. For example, we know that polar bears den on land. Have you seen any polar bear dens on the Yukon North Slope?
   a. Can you show me where you have seen polar bear dens?
   b. Do you know if the bears come back to these dens over multiple years?
c. What does the land look like in places where polar bears den?
d. Has polar bear denning changed (either timing or location)? When did you first notice this change?

PART 3: Describing On Land Movements and Other Activities

2) Have you seen polar bears on land or the near shore? If yes:
a. What season or month did you see polar bears on the land or near the shore?
b. If near-shore, approximately how far from land? Can use kilometers, snowmobile ride time, etc.
c. Would you identify a where you have seen this species in the X season?

3) When you saw polar bears at these sites in X season, what were they doing?
a. If Feeding: Do you know what they were eating?
b. If Traveling: Do you know if bears move through this area a lot?
   i. Where are they coming from and going to?
   ii. Do you know why they go this way?

   **Map movement routes that interviewee believes are regularly used.**

   iii. Do you know if there certain types of land that they like to travel through?
   iv. Are overland movement routes changing? When did you first notice this change?

4) Have you seen polar bear on the land or near the shore in other seasons?
   **If yes, then repeat Questions 2-3 for each season**

5) Are there any other land features or places that are important for polar bears?

6) Are there any other specific places- on land or near shore- in the Yukon North Slope that are important for polar bears? In what season? Why? If these places are near shore, approximately how far away are they?
   **Mapped and verbal response.**

Part 4: Additional Information

1) Is there anything else you would like to share about the important habitats that polar bear require on the Yukon North Slope that will help us better identify and conserve these habitats?

Species of Special Interest Questionnaire

If there is spare time during the 3 hour interview session and the interviewee agrees to do so, explain that we are looking for information on some additional species that the Inuvialuit have identified as important. These are a couple focused questions to help us understand critical habitats for these species.
species. The questions below are listed in order of priority, so start at the top. Once we have at least 5 responses to a question, consider not asking that question any further in order to be able to get information on species of lower priority.

1) Have you seen polar bear den sites (only asked if the interviewee hasn’t been interviewed on polar bear as a focal species)?
   a. What does the land look like in places where polar bears den?
   b. Can you identify any polar bear den sites on the map? Map these
   c. Are these sites returned to over multiple years?

2) Can you show me the rivers, streams or lakes, or areas along the coast have you found Dolly Varden char or broad whitefish in on the Yukon North Slope (only asked of those interviewees that were not interviewed about these fish as a focal species)? Map these
   a. Do you know of any spawning area along these waterways?
   b. Do you know of any place they spend the winter along these waterways?

3) Have you seen sheep on the Yukon North Slope?
   a. Can you show me where? Map these
   b. Can you describe what their habitat looks like? Does this change in different seasons such as in winter or during lambing?
   c. Have you seen where there are mineral licks that they use? Map these?

4) Have you seen where shorebirds nest on the Yukon North Slope?
   a. Can you describe what the habitat looks like?

5) Have you seen muskox on the Yukon North Slope
   a. Can you describe what their habitat looks like? Diet?
   b. Are their general areas where you see muskox? (what are their typical areas?)
   c. Has this changed over time? (distribution, habitat)

6) Have you seen places where shorebirds gather on their migration in the spring, in the fall?
   a. What does this habitat look like? Map these if site specific/limited

7) Have you seen any places where wolves dens? Map these.
   a. Are there certain kinds of habitats that good for denning for wolves?
   b. Do they use these year after year?

8) Can you describe what good berry habitats look like? Focus on verbal description, can also show photos and identify.
   a. What kinds of berries are found here?
   b. Are there other kinds of berries found in different places? Can you describe what these places look like?

9) Have you seen where seals haul themselves out of the water? Map a few of these.
   a. Are these used year after year?

10) Have you seen any places where arctic foxes den? Are there other places important for arctic fox (use areas)? Map these

11) Are there places where beavers used to not be but they are there now? (Map if specific re: new sites with beaver or sites that no longer have beaver)

12) Have you seen places where wolverines den?
   a. Can you describe the habitat where you most often find wolverine denning?
b. Can you show me some sites on the map (*Map these*)

13) Have you seen places where *raptors* nest?
   a. Do you know which species?
   b. Can you describe the habitat where this species nests?
   c. Can you show some of these places? (*Map*)
   d. Are these used year after year?

14) Can you describe the types of habitats where you see a lot of *ptarmigan*?
   a. Do you see ptarmigan in different habitats in different seasons? Can you describe these?
## Appendix IV: Participant biographical data

<table>
<thead>
<tr>
<th>PIN</th>
<th>Year of Birth</th>
<th>Approx. years using YNS</th>
<th>Primary Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>103</td>
<td>1989</td>
<td>20</td>
<td>Spring grizzly hunting, winter caribou and fur bearers hunting</td>
</tr>
<tr>
<td>109</td>
<td>1955</td>
<td>50</td>
<td>Fishing and whaling in the summer at Shingle Point</td>
</tr>
<tr>
<td>8</td>
<td>1937</td>
<td>Entire life</td>
<td>Spring and summer muskrat and beaver hunting, fishing, polar bear hunting</td>
</tr>
<tr>
<td>7</td>
<td>1962</td>
<td>Entire life</td>
<td>Childhood fur trapping, currently just summers at Shingle Point</td>
</tr>
<tr>
<td>107</td>
<td>1949</td>
<td>Entire Life</td>
<td>Grew up hunting, fishing, and whaling at Shingle Point, worked as a researcher on Herschel Island</td>
</tr>
<tr>
<td>2</td>
<td>1936</td>
<td>70</td>
<td>Year-round hunting of caribou, geese, fur bearers, moose, and rabbits, whaling, and fishing</td>
</tr>
<tr>
<td>111</td>
<td>1971</td>
<td>25</td>
<td>Caribou hunting in the spring and summer, Dolly Varden Char fishing in the summer</td>
</tr>
<tr>
<td>121</td>
<td>1968</td>
<td>Entire life</td>
<td>Whaling and fishing along coast in the summer</td>
</tr>
<tr>
<td>301</td>
<td>1985</td>
<td>Entire Life</td>
<td>Hunting fur bearers in the spring, fishing in the summer</td>
</tr>
<tr>
<td>114</td>
<td>1981</td>
<td>30</td>
<td>Caribou hunting</td>
</tr>
<tr>
<td>120</td>
<td>1988</td>
<td>Entire Life</td>
<td>Year-round hunting of fur bearers and game animals, also works as a ranger at Herschel Island</td>
</tr>
<tr>
<td>112</td>
<td>1951</td>
<td>56</td>
<td>Whaling and fishing in the summer</td>
</tr>
<tr>
<td>104</td>
<td>1942</td>
<td>Entire Life</td>
<td>Whaling in the summer, hunting caribou, sheep, and moose in the fall</td>
</tr>
<tr>
<td>106</td>
<td>1954</td>
<td>Entire Life</td>
<td>Year-round hunting and trapping</td>
</tr>
<tr>
<td>302</td>
<td>1989</td>
<td>Entire Life</td>
<td>Year-round hunting and fishing</td>
</tr>
<tr>
<td>9</td>
<td>1964</td>
<td>Entire Life</td>
<td>Summer hunting and fishing growing up, has also worked with researchers as an adult</td>
</tr>
<tr>
<td>5</td>
<td>1978</td>
<td>Entire Life</td>
<td>Year-round hunting of grizzly bears, geese, and caribou</td>
</tr>
<tr>
<td>101</td>
<td>1956</td>
<td>Entire Life</td>
<td>Spring fur bearers and caribou hunting, summer fishing and hunting at Shingle Point</td>
</tr>
<tr>
<td>110</td>
<td>1942</td>
<td>Entire Life</td>
<td>Grew up on the North slope, hunting and fishing with grandparents year-round</td>
</tr>
<tr>
<td>118</td>
<td>1982</td>
<td>25</td>
<td>Summers as a kid, now travels out in the spring and fall</td>
</tr>
<tr>
<td>119</td>
<td>1976</td>
<td>Entire Life</td>
<td>Year-round harvesting, but mostly spring caribou</td>
</tr>
<tr>
<td>1</td>
<td>1944</td>
<td>Entire Life</td>
<td>Year-round hunting, fishing, and whaling growing up on the land</td>
</tr>
<tr>
<td>106</td>
<td>1975</td>
<td>35</td>
<td>Whaling in the summer and caribou hunting</td>
</tr>
<tr>
<td>117</td>
<td>1989</td>
<td>Entire Life</td>
<td>Spring and summer fishing and hunting of game animals and fur bearers, also works at Herschel Island as a ranger</td>
</tr>
<tr>
<td>115</td>
<td>1965</td>
<td>Entire Life</td>
<td>Year-round game and fur bearer hunting, berry picking, mainly caribou now</td>
</tr>
<tr>
<td>131</td>
<td>1993</td>
<td>Entire Life</td>
<td>Caribou and goose hunting</td>
</tr>
<tr>
<td>3</td>
<td>1948</td>
<td>Entire Life</td>
<td>Born at Shingle Point, harvested across all seasons and species over the years</td>
</tr>
</tbody>
</table>