



Yukon North Slope  
Wildlife Conservation and Management  
Plan  
2021

Companion Report 7:  
Grizzly Bear / Akłaq



## Publication Information

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# Companion Report to the Yukon North Slope Wildlife Conservation and Management Plan Number 7: Grizzly Bear / Akłaq

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## About the Companion Report

This report is a companion document to the *Yukon North Slope Wildlife Conservation and Management Plan* (WMAC (NS), 2022). The *Yukon North Slope Wildlife Conservation and Management Plan* (the Plan) is grounded in traditional knowledge and Western science. It addresses traditional use and wildlife conservation and management issues affecting the Yukon North Slope. Strategies in the Plan align with actions underway or planned by a range of agencies and organizations with jurisdiction on the Yukon North Slope.

This companion report summarizes the information that was used to support the objectives and strategies in the Plan, and provides references for the studies used in its development. The companion report draws from authoritative works, reports that synthesize knowledge and issues, and presentations of recent research findings. Sources include traditional knowledge and traditional use, scientific reports and journal articles, and management and conservation reports.

### Companion Report Table of Contents

#### Selected Topics

1. Traditional Use
2. Climate Change Effects
3. Contaminants
4. Aullaviat/Aunguniarvik

#### Featured Species and Species Groups

- |                 |                     |
|-----------------|---------------------|
| 5. Caribou      | 10. Broad Whitefish |
| 6. Moose        | 11. Geese           |
| 7. Grizzly Bear | 12. Furbearers      |
| 8. Polar Bear   | 13. Dall's Sheep    |
| 9. Dolly Varden | 14. Muskox          |

Each chapter is available for download at <https://wmacns.ca/what-we-do/conservation-plan/companion>.

There are fourteen companion reports, addressing four selected topics of key interest as well as ten wildlife species featured in the Plan. The featured species were selected by participants at a workshop held in Aklavik. The wildlife species in the companion reports:

- Have high cultural or economic value or are important as food for Inuvialuit;
- Have similar habitat needs to other wildlife species, so that conserving their habitat is key to conserving habitat for other species; and/or
- Are important for healthy ecosystems, including species that are main food items for top predators.

The Plan identifies key conservation requirements on the Yukon North Slope for each featured wildlife species. The Plan's objectives and strategies are designed to meet these conservation requirements. This companion report summarizes the information that guides the objectives, strategies and conservation requirements in the *Yukon North Slope Wildlife Conservation and Management Plan*.

## Companion Report: Grizzly Bear / Akłaq

This companion report provides information on the conservation requirements for grizzly bear as identified in the *Yukon North Slope Wildlife Conservation and Management Plan*. It summarizes the information that guides the objectives, strategies and conservation requirements in the Plan. It includes information on traditional use, population status and trends, important habitat types and locations, threats to grizzly bear, programs and measures for conservation and management, and selected studies and research relevant to the Yukon North Slope.

### Conservation requirements for grizzly bear on the Yukon North Slope

1. Conservation of multiple ecosystem types grizzly bears depend on, with unimpeded passage for bears throughout the Yukon North Slope.
2. Identification and protection of denning sites from disturbance. Where ongoing or proposed activities are in areas with dens or denning habitat, den sites should be identified and activities relocated away from these sites, particularly through winter until early June.
3. Non-harvest mortality kept to a minimum.

From the *Yukon North Slope Wildlife Conservation and Management Plan* (WMAC (NS), 2022)

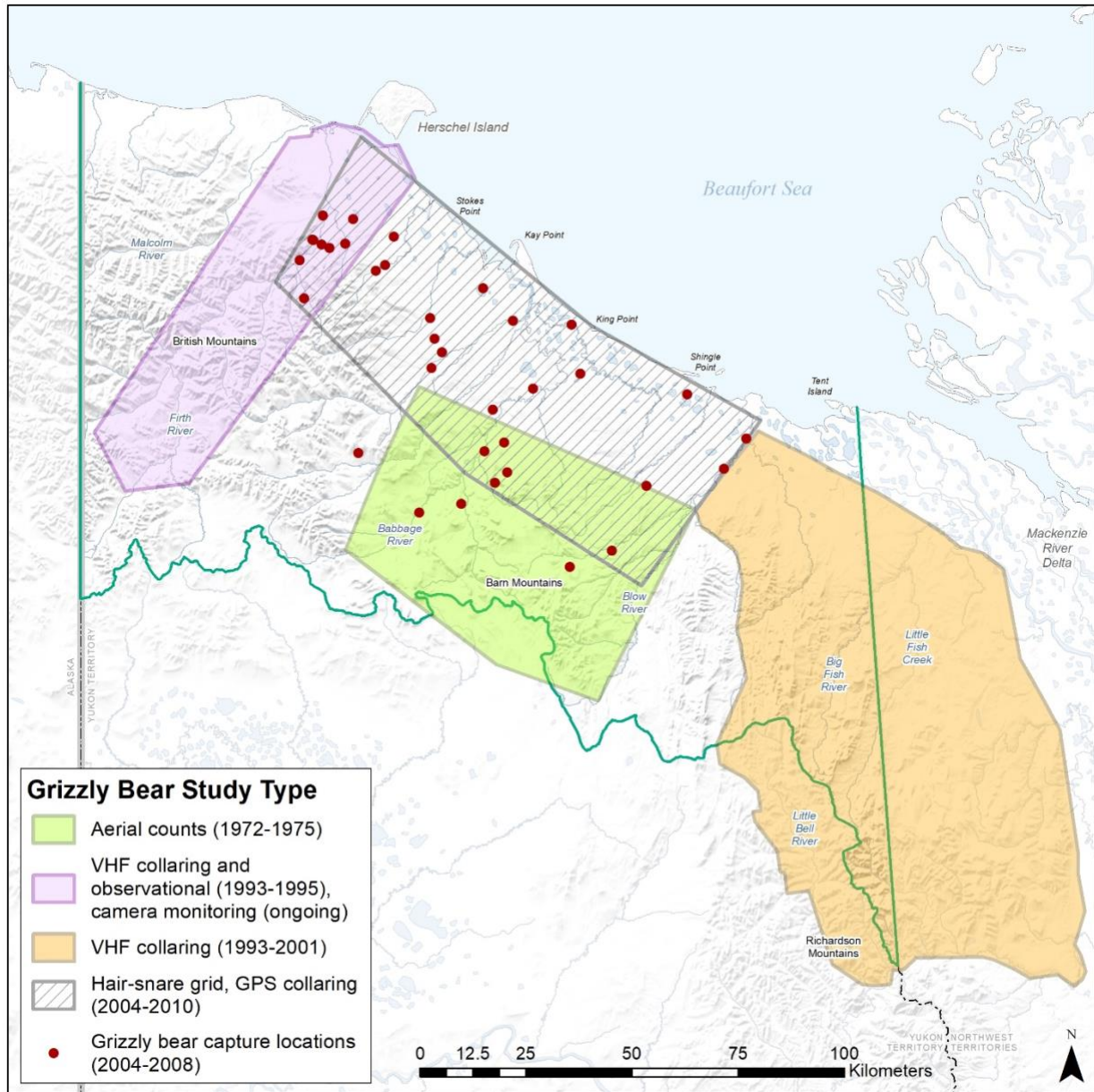
## Grizzly bear on the Yukon North Slope

Grizzly bears (*Akłaq*, *Ursus arctos*) occupy all areas of the Yukon North Slope, but their habitat use varies greatly by season and by sex. Grizzly bears require abundant space. Their annual home ranges cover large areas in the Yukon North Slope: on average 585 km<sup>2</sup> and 3368 km<sup>2</sup> for females and males, respectively (Triska & Heinemeyer, 2020). In all seasons, except when denning, grizzly bears traverse the landscape in search of food, and they require large tracts of relatively undisturbed and connected habitat. Denning habitat is not currently limited in the Yukon North Slope, but the threat of climate change and decreased permafrost may cause future degradation of den sites.

The knowledge base about grizzly bears on the Yukon North Slope includes the collection of traditional knowledge via interviews and mapping, and field studies to monitor and track grizzly bears using camera, hair-snaring and collaring. These studies span from the early 1970s to the present (Map 7- 1). Traditional knowledge and scientific studies have occurred across the Yukon North Slope and document grizzly bear population parameters, denning and seasonal habitat associations, food habits and movements, morphological characteristics, and Inuvialuit uses and harvest techniques. The most recent studies include camera studies on the Firth River (on-going) as well as traditional knowledge studies in 2006-2007 and 2016 that complement a large hair-

snag and GPS collar study (2004-2010) to estimate population status and inform seasonal habitat models.

Map 7- 1. Focal study areas of previous grizzly bear studies in the Yukon North Slope



The locations of prior grizzly bear studies completed on the Yukon North Slope. Grizzly bear capture locations were from the Babbage River Drainage study area; however, some bears were captured outside of the study area boundary (gray hatched area). Source: Adapted from (Parks Canada and Yukon Government, 2014) and (WMAC (NS), Yukon Environment, Aklavik HTC, & Parks Canada, 2008)

Population estimates and traditional knowledge of grizzly bears in the Yukon North Slope generally suggest a stable grizzly bear population; however, there are likely differences in

population status between the three mountain ranges in the region (British, Barn and Richardson) (Parks Canada and the Yukon Territorial Government, 2014; WMAC (NS) & Aklavik HTC, 2018a).

## Traditional Use

Historically, grizzly bears were harvested by Inuvialuit for their meat, fat, hides, and claws, though they were not associated with daily life as often as other species, such as caribou, muskrat, arctic fox, beluga, or polar bear (WMAC (NS) & Aklavik HTC, 2008). Traditionally grizzly meat was eaten, and the grizzly paws were noted as a particularly good part. Unrendered fat was used in breads and mixed with certain roots to make “moo shoo” [sic]. Fat rendered into oil was used to waterproof skins for use as tarps or tents, burned in lamps, and used in cooking. The grizzly hides were used for shoes or as sleeping pads. Currently, grizzly bears are harvested mainly for income from sales of their hides with only some of the meat being taken home to eat (WMAC (NS) & Aklavik HTC, 2008).

In the past, subsistence hunting occurred throughout the year, including summer. Now, most subsistence hunting primarily occurs in the spring, when hides are worth

the most, or occasionally in the fall (WMAC (NS) & Aklavik HTC, 2008). In the late 1980s, Aklavik Inuvialuit became concerned that the harvest of grizzly bears on parts of their lands was too high, undermining productivity and the long-term abundance of the species. To address this issue, a grizzly bear hunting area was created for the community of Aklavik by the Inuvialuit Game Council (IGC) in 1994 (WMAC (NS) & Aklavik HTC, 2008). This led to the development of a quota system, which is co-managed by the Inuvialuit and the Governments of Canada, NWT and Yukon (J. A. Nagy & Branigan, 1998). Under this quota system, hunters are given a limited number of tags for their yearly harvest. Tags are administered by the Aklavik Hunters and Trappers Committee. The current quota allows 18 grizzly bears, of which 5 can be female, to be harvested within the Yukon North Slope (J. A. Nagy & Branigan, 1998; NWT ENR, 2019).

The locations of grizzly bear harvest activities have not changed much over the past 20 years (Map 7- 2). Most bears are harvested from the Richardson Mountains west of Aklavik and the Barn Mountains behind Tapqaq (Shingle Point) due to their proximity to homes and seasonal camps (WMAC (NS) & Aklavik HTC, 2018b). However, a few harvesters still travel to the British Mountains in Ivvavik National Park to harvest bears (WMAC (NS) & Aklavik HTC, 2018b).

### Traditional Use of Grizzly Bears

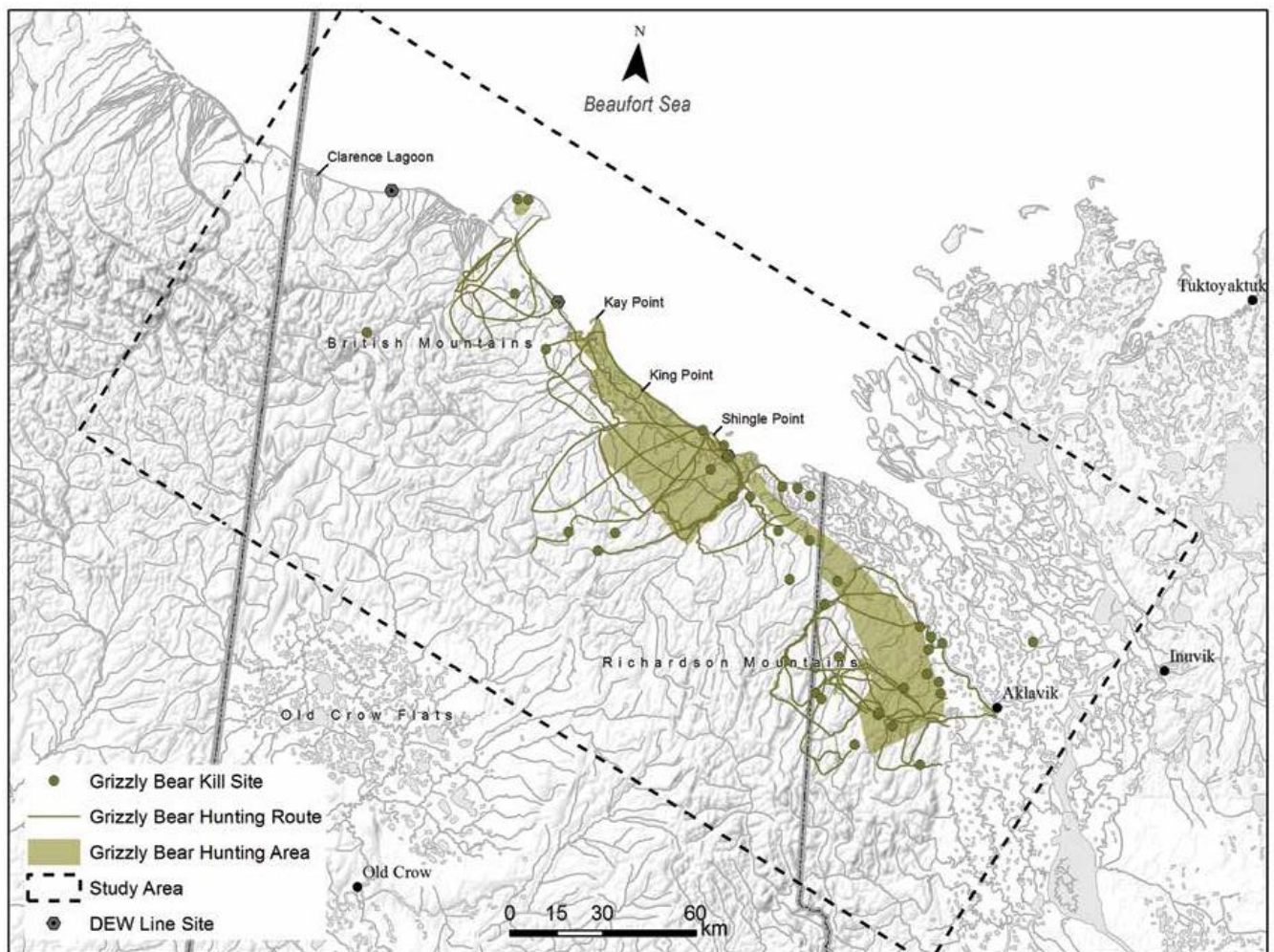
Oil was rendered from bears for consumption and, as we have seen, to waterproof tent covers made of skin. It was also boiled with leaves and applied on dog faces to protect them from mosquitoes.

Lily Lipscombe recalls how her mother rendered oil from grizzly bears, as cited in Yukon North Slope Inuvialuit Oral History (Nagy, 1994, pp. 95).



We'd travel along the beach looking for sign, always looking for sign. And as we're travelling along the coast, we're looking on land and out from the land [onto the ice], because we got both tags. We've got a grizzly bear tag and a polar bear tag, because we're going so far from town. We're doing more than a few days out on the land. All this area here has been covered....over a span of 20 years. We've covered this area here [pointing to map]....a lot. The hunters are finding they're going further and further to find bigger bears because the smaller bears are moving in, and they're not as big as what they used to be. From a 2016 interview. Source: WMAC (NS) and Aklavik HTC, 2018b, p. 65

Map 7- 2. Grizzly bear hunting routes and harvest locations identified in Inuvialuit traditional use interviews



Interviewers asked Inuvialuit land users to identify hunting routes and areas used within living memory. Data from this map were used to develop the composite traditional use map in the Plan. Source: WMAC (NS) and Aklavik HTC, 2018b, Map 8

# Habitat for Grizzly Bear

## Overview

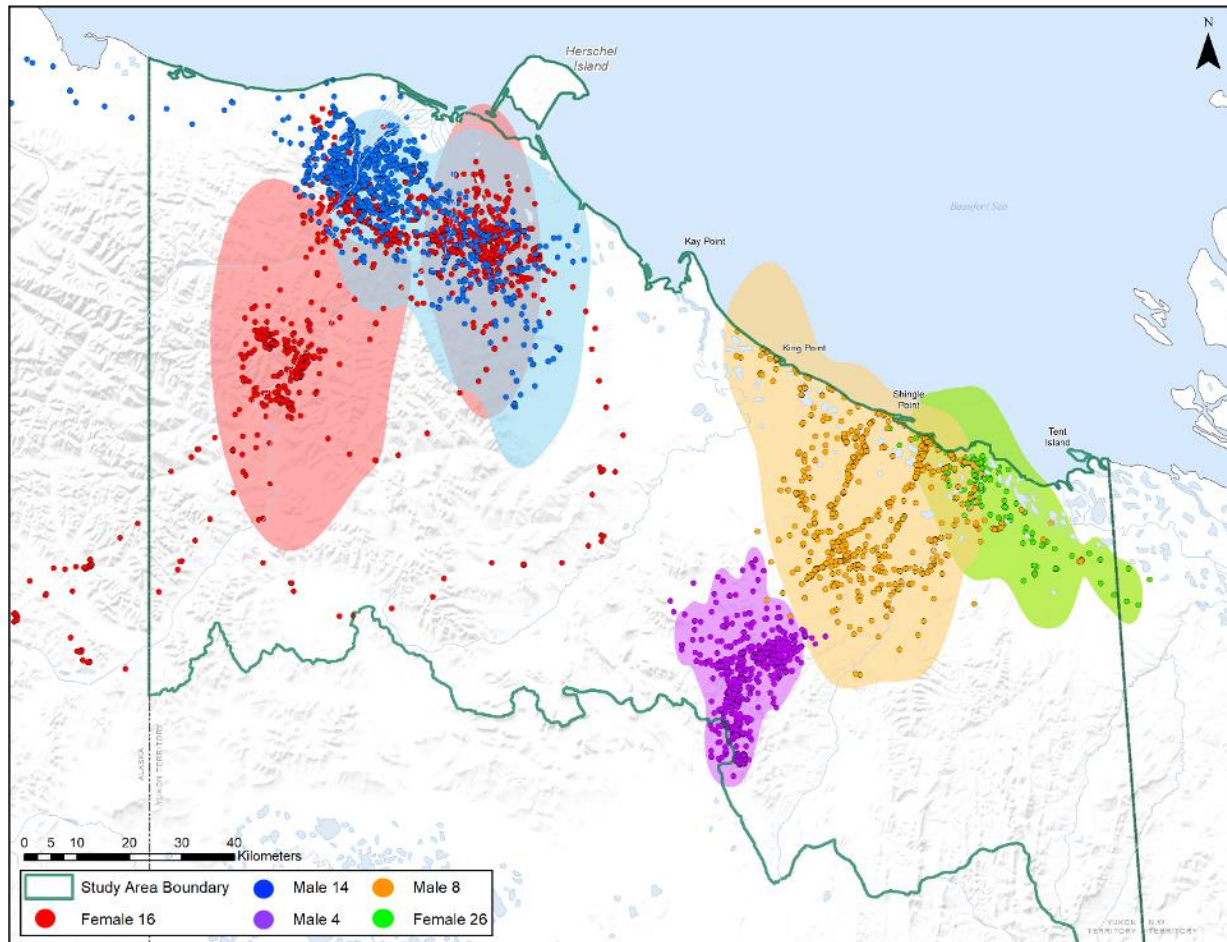
Grizzly bears are widely distributed in western Canada and portions of western United States. Historically, their distribution was even wider. They are found across this distribution in a wide variety of ecosystems, from temperate and boreal forests in the south, to the tundra and sparsely treed landscapes of the Yukon North Slope. Grizzly bears are well-known as a species that requires vast landscapes to thrive. In less-productive northern and arctic landscapes, such as the Yukon North Slope, grizzly bears need even more space, to allow them to move long distances to meet their food needs. Wherever they live, grizzly bears need a range of habitat features:

- Ecosystems with a sufficient amount of seasonally available food;
- Large tracts of undisturbed land; and
- A diversity of landscape features.

Research on the Yukon North Slope shows that while some grizzly bears may move beyond their home ranges over the course of a year, most stay within their large home ranges (Map 7- 3). They feed mainly on vegetation (e.g., crowberry (*Empetrum nigrum*), horsetail (*Equisetum arvense*), bearflower (*Boykinia richardsonii*), bog blueberries (*Vaccinium uliginosum*)), ground squirrels, caribou and large carcasses when they are available (MacHutchon & Wellwood, 2003). Grizzly bear distribution and habitat use on the Yukon North Slope is likely strongly influenced by the distribution and availability of seasonally important foods such as *Hedysarum* (Eskimo potato, bear root), grasses, forbs, berries, ground squirrels, and caribou (Machutchon, 2001; MacHutchon & Wellwood, 2003). A seasonally important prey and carrion source is the Porcupine caribou herd, which migrates through and calves in portions of the Yukon North Slope. Due to natural fluctuations in prey abundance, in arctic ecosystems grizzly bears may benefit from the diversity of ungulates that are present on the Yukon North Slope: caribou, Dall's sheep, muskoxen, and moose. Some studies suggest that increased predation on muskoxen may occur as the availability of other ungulates, such as Dall's sheep, decreases (Arthur & Del Vecchio, 2017; Lambert Koizumi & Derocher, 2019).

To satisfy changing seasonal requirements and widely different seasonal food sources, grizzly bears require large tracts of undisturbed land. Recently, the average annual home ranges for female and male grizzly bears in the Yukon North Slope were calculated as 585 km<sup>2</sup> and 3368 km<sup>2</sup>, respectively (Triska & Heinemeyer, 2020). These calculations accord with previous estimates of expected sizes for northern grizzly bears in YNS and NWT (Collins, Kovach, & Hinkes, 2005; McLoughlin et al., 2003; John A. Nagy & Haroldson, 1990).

Map 7- 3. Movements of five grizzly bears with representative home ranges on the Yukon North Slope



The point locations of five grizzly bears, two females and three males, and their representative home ranges. The map displays two years of data for all bears except Female 26 (one year). Most bears' movements were within established home ranges (95% kernel densities, the shaded shapes); however, two bears (Male 14 and Female 16) displayed long walkabouts. Male 14 traveled into Alaska in September-October. Female 16 completed a loop into Alaska in August-September of one year and did another large loop within the YNS in May-June of the following year, returning to her home range each time (Triska & Heinemeyer, 2020).

## Inuvialuit Traditional Knowledge About Grizzly Bear Habitat on the Yukon North Slope

Traditional knowledge holders emphasize that grizzly bears are always on the move and feed on plants and animals in many habitat types (Table 7- 1). Records of seasonal grizzly bear habitat use are summarized in *Inuvialuit Traditional Knowledge of Wildlife Habitat, Yukon North Slope*; the quotes below are from the same source (WMAC (NS) and Aklavik HTC, 2018a, pp. 30-34).

## Spring

In early spring the bears emerge from their dens and immediately start digging for roots of Alpine *hedysarum* and overwintered berries such as crowberry and bearberries (*Arctostaphylos* spp.), and hunting ground squirrels on hillsides. Then they move from the mountains and their den site locations toward the coast. The grizzly bears travel along river systems and forage in areas of early snow melt, to reach the rolling hills and flat coastal tundra. They follow caribou, hunting them and scavenging wolf kills, and increasingly they are seen near muskoxen. Grizzlies also scavenge whale carcasses and hunt seals out on the ice.

## Summer

During summer bears range widely, traversing the landscape using river drainages in the mountains and coastal plain. They feed on common horsetail and bearflower. Along the coast, they are often searching for whale carcasses and avoiding insects. They also follow caribou in the summer, moving along the coast and into caribou calving grounds as the Porcupine herd travels through the area.

## Fall

In the fall, bears are found in a variety of landscapes; however, food sources determine fall grizzly bear locations and movement. They feed extensively in areas with berries and roots, specifically bog blueberries, crowberries, horsetails, and bearflowers, in preparation for denning. Bears also follow the Dolly Varden as they migrate up the rivers. They hunt and scavenge caribou, moose, muskox and ground squirrels.

## Denning

Den sites generally occur on steep hillsides, near a water source and on south-facing slopes (Table 7- 2). However, some dens occur in flatter, lower lands. Grizzly bear denning areas are being affected by slumping along hillsides, a consequence of climate change.

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.

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 the wintertime... they go for the sea ice where there's seals.

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.

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 upstream... I never, ever seen a bear come down river, they were all moving upriver.

Table 7- 1. Major grizzly bear habitat classes and subclasses and the number of interviewees selecting each class during spring, summer, and fall

Habitat class/subclass	# selecting	Major uses	Season
Mountains and hillsides	16	Hunting ground squirrels, foraging for bear root and berries, denning habitat	spring, fall
Tundra	12	General travel, hunting caribou and muskox, foraging for berries	spring, summer, fall
Rivers, creeks, streams	11	Travel corridor, fishing, hunting caribou and moose	spring, summer, fall
Coast and beaches	11	Scavenging whale and seal carcasses, hunting caribou and muskox, avoiding insects	spring, summer, fall

Traditional knowledge descriptions used to classify habitat classes and subclasses in grizzly bear seasonal models. Source: (WMAC (NS) & Aklavik HTC, 2018a)

Table 7- 2. Major grizzly bear habitat classes and subclasses selected for denning, and the number of interviewees selecting each class

Habitat class/subclass	# selecting	TK description
Hillsides	10	Any hillside steep enough to dig into; small hillsides; hillsides generally
Aspect South	7	Top of hill facing south with good dirt (no permafrost), south facing hillsides
Slope	4	Not necessarily high elevation, but steep bank; steep hillsides
Distance to rivers	4	Above drainage/river; steep riverbanks; hillsides like riverbanks

Traditional knowledge descriptions used to classify habitat classes and subclasses in grizzly bear denning habitat model. Source: (Triska & Heinemeyer, 2020)

## Yukon North Slope Seasonal Habitat Use

Seasonal grizzly bear traditional knowledge and GPS collar data and denning observations were used to model grizzly bear seasonal habitat on the Yukon North Slope. Models were completed for males and females during the spring, summer, fall, and denning periods, and validated by bear GPS collar locations not used in the modeling (Triska & Heinemeyer, 2020).

## Spring

In spring, both males and females displayed preferences for areas near the coast, close to rivers and river valleys within the mountains. Females and males significantly selected for lower elevation and increasing slope, while males additionally selected for rounded ridgetops near the coast.

## Summer

In the summer, males and females tended to prefer mountains over areas near the coast, and both were linked to presence of willows and areas close to rivers. There was broad use of the Yukon North Slope during the summer, with the major river drainages having the highest concentrations of high value habitats for both females and males. Additionally, males selected areas within the summer distribution of caribou.

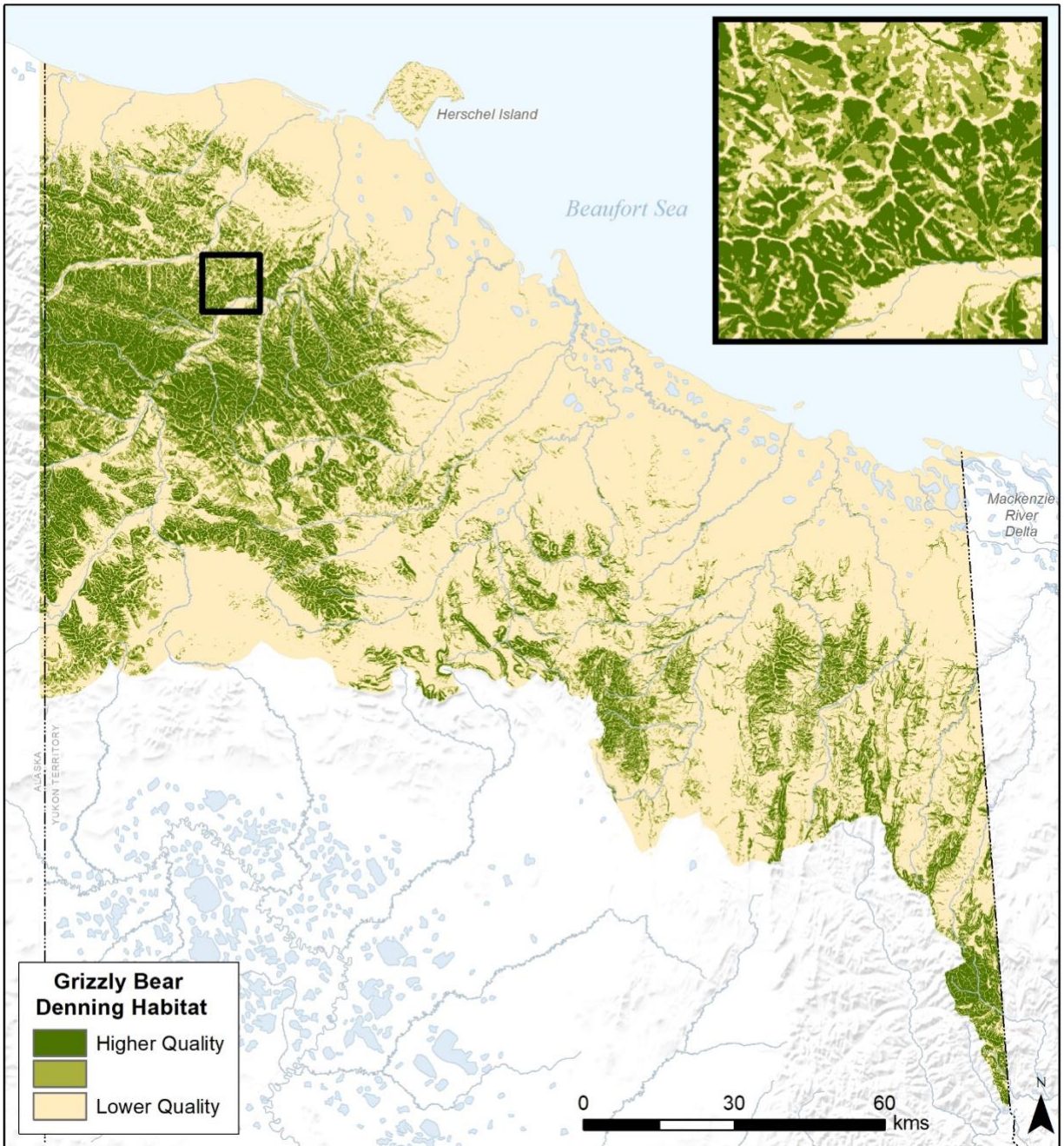
## Fall

During the fall, male and female grizzly bears preferred mountains, with females selecting for shallow and moderate slopes and males selecting for increasingly steep slopes. Areas that encompass good berry habitats were used by both sexes, including areas close to wetlands and vegetation classes that have higher berry-producing species. The highest concentration of high-quality habitats was in the mountainous portions of the Yukon North Slope, with Ivavik National Park having most high-quality fall habitats.

## Denning

A model for grizzly bear dens (Map 7- 4), incorporating both male and female bears, showed use of slopes and southern aspects. This model also incorporated hillsides, and a preference for rivers, but showed that bears avoided tundra. Den selection includes a narrow suite of moderate and high value habitats, covering 13% and 14% of the study area, respectively. These areas are found in the mountains, and were most available in Ivavik National Park and in the southern mountains of eastern Yukon North Slope.

Map 7- 4. Predictive relative importance of habitat for grizzly bear den sites in the Yukon North Slope.



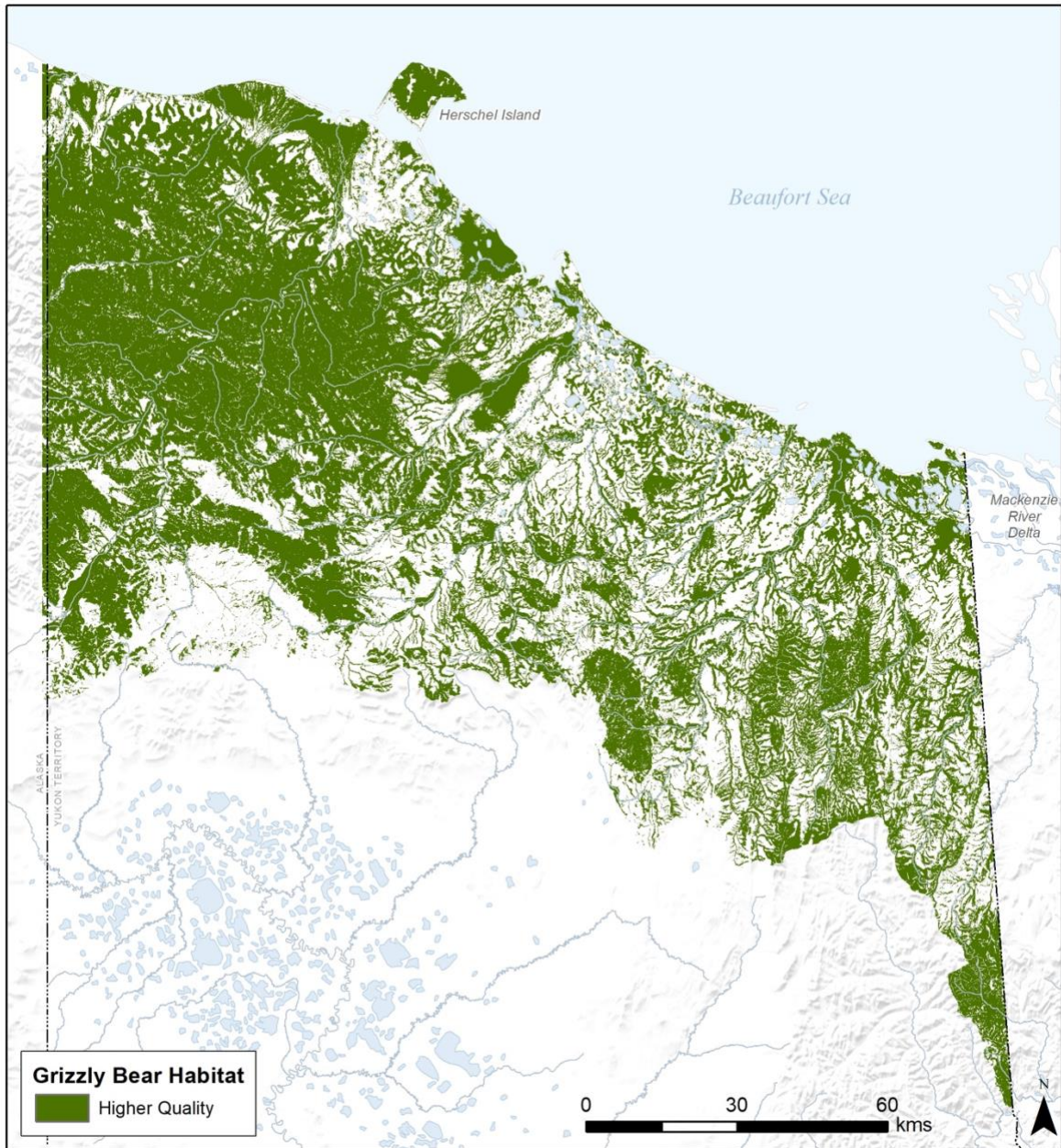
Model results were classified into three equal-area bins. Source: (Triska & Heinemeyer, 2020)

### Combined Seasonal Model

The high value habitats from each seasonal habitat model (spring, summer, fall and denning) for males and females were used to provide a compilation of habitats that are important to grizzly bears during one or more seasons (Map 7- 5). This highlights that grizzly bears use habitat

throughout the Yukon North Slope, including river valleys and drainages, mountains (Barns, British and Richardson) and the coastal plain, during the year.

Map 7- 5. Grizzly bear habitat overview: high value habitats from seasonal habitat models



This map displays habitat rated as high value by males or females during a minimum of one season or denning. It combines the results from seasonal habitat models in Triska and Heinemeyer (2020) and displays the highest ranked equal-area bin from each model. Note that white areas in the Yukon North Slope do not equate to non-habitat, but indicate lower quality habitat.



## Grizzly Bear Population

The Canadian western population of grizzly bear is designated as Special Concern under the Species at Risk Act due to naturally low reproductive rates, increasing pressures from resource extraction, high mortality risk in areas of human activity, cumulative impacts, and a high sensitivity to human disturbance (COSEWIC, 2012). Yukon North Slope grizzly bears have limited or no exposure to human activities, road infrastructure, and industry. These are likely one of the few remaining grizzly bear populations, even in the North, that may be naturally regulated and at carrying capacity, meaning the population size is around the highest that the ecosystems can support (Government of Yukon, 2016; Parks Canada and the Yukon Territorial Government, 2014).

### Species Conservation Status

Information on the conservation status of the western population of grizzly bear is in Table 7- 3.

Table 7- 3. Grizzly bear conservation status: Canada, Yukon, and global

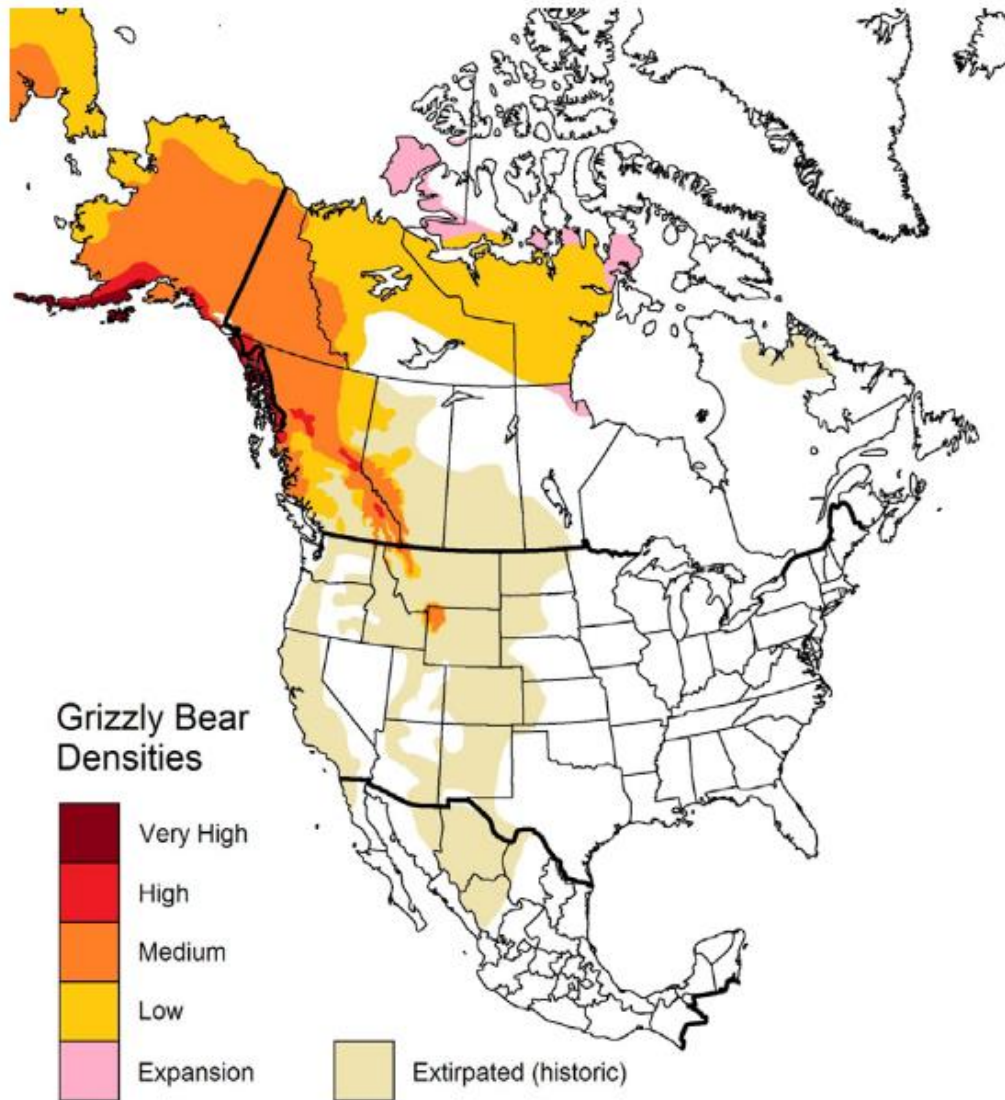
Status assigned by	Applies to	Status	References
Species at Risk Act (SARA)	Canada	Listed as Special Concern on Schedule 1 in 2018	(Canada, n.d.)
Committee on the Status of Endangered Wildlife in Canada (COSEWIC)	Canada	Special Concern; last assessed 2012	(Canada, n.d.)
Canadian Endangered Species Conservation Council (General Status of Species in Canada)	Canada	N3: Vulnerable*	(Canadian Endangered Species Conservation Council, 2016)
Yukon	Yukon	S3: Vulnerable*	(Yukon, 2020)
NatureServe	Global	TNR: No Status Assigned (not assessed)*	(NatureServe, n.d.)

\*Following the ranking system developed by NatureServe, an international network of conservation data centres (NatureServe, n.d.). N=National; S=Subnational; T=subspecies or population

Historically, grizzly bears ranged from Alaska to Mexico, and east to the western shores of the Hudson Bay. However, their range has been drastically reduced – by over 50% – since the 1800s, due to persecution and habitat loss as North America was settled (COSEWIC, 2012). Currently, populations persist predominantly in Alaska and western Canada, with small populations remaining in Idaho, Wyoming and Montana Map 7- 6. Conditions for grizzly bears are worsening in the southern part of their range and populations are declining. Grizzly bears are sensitive to human disturbance and vulnerable to high rates of mortality (COSEWIC, 2012).

Therefore, western, and particularly northern, Canada represents a significant core of grizzly bear range. The highest bear densities are associated with seasonally rich food sources, specifically salmon. The Yukon North Slope provides habitats that support low to moderate densities of bears, given the low productivity of the arctic ecosystems. Still, the undisturbed and connected landscapes of the Yukon North Slope make it a rare and extremely important region for maintaining this species.

Map 7- 6. Grizzly bear historic distribution and current relative densities in North America



Current and historic (19<sup>th</sup> century) grizzly bear distribution in North America. Source: McLoughlin, from multiple sources (COSEWIC, 2012)

## Population Trends on the Yukon North Slope

Traditional knowledge collected in 2016 (WMAC (NS) & Aklavik HTC, 2018a) revealed there was no consensus regarding population trends. Some respondents noted an increase in bear population, while others suggested a decrease and some noticed no change in the population. However, there was consensus that smaller bears are generally occurring closer to Aklavik with larger bears occurring in Ivavik National Park.

...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.

2016 interview from WMAC (NS) and Aklavik HTC, 2018a, p. 41

A capture-recapture study completed from 2004-2010 suggested that the grizzly bear population in the Yukon North Slope may have been slightly declining over this time period; however, the study determined this reflected natural population fluctuations and that the population is stable (Parks Canada and the Yukon Territorial Government, 2014). The study estimated a population of 431 grizzly bears (95% confidence interval: 349-532) with a 60:40 Male/Female sex ratio within the Yukon North Slope.

The study found that that females within the region did not to give birth until they were approximately 9 years old (Parks Canada and the Yukon Territorial Government, 2014). Similarly, Nagy et al. (1983) found the first litter to be at 6-8 years of age. This is older than average; in Canada, the first age of reproduction is estimated at 6 years (COSEWIC, 2012). Grizzly bears in the Yukon North Slope had a mean litter size of 2.05 (SE  $\pm$  0.20) which is consistent with average litter sizes in Canada of 1-3 cubs (COSEWIC, 2012). Survival of adult bears was high. However, cub survival was low, making the survival of adult females particularly important for the population stability of Yukon North Slope grizzly bears. Cub survival on the Yukon North Slope was estimated as 0.40 (SE  $\pm$  0.13); for comparison, cub survival is generally expected to range from 0.60-0.70 (Bunnell & Tait, 1985).

## Population Trends on Yukon North Slope by Ecodistrict

Grizzly bear population trends and estimates were projected within the Yukon North Slope by ecodistrict. Population trends from a Parks Canada and Yukon Territorial Government (2014) study indicate that the grizzly bears in the British Mountain ecodistrict are increasing, whereas grizzly bears in the Barn Mountains and the Coastal Plains ecodistricts are at carrying capacity or in slight decline. Additionally, population density estimates (bears/1000km<sup>2</sup>) for these regions were generated by Nagy (1990) and reassessed by Parks Canada and the Yukon Territorial Government (2014) (Table 7- 4). The trends identified in 2014 were based on the estimated population growth rate from data collected, using survival and reproductive rates estimated over the six years of field study.

Table 7- 4. Grizzly bear population density estimates by Yukon North Slope ecodistrict

Location	Density estimate (bears/1000 km <sup>2</sup> )
Barn Mountains	13.0
British Mountains	43.1
Coastal Plains	10.8

Source: (Parks Canada and the Yukon Territorial Government, 2014)

## Population Management

The adaptive management of grizzly bears in the Yukon and Northwest Territories integrates scientific and traditional knowledge to set and maintain harvest (Clark & Slocombe, 2011). In addition, population management decisions incorporate feedback from the communities. Grizzly bear research on the Yukon North Slope has included traditional knowledge studies and scientific studies, which inform management for the species on the Yukon North Slope. These studies document traditional uses and harvest techniques, and identify morphological characteristics, population parameters, denning and seasonal habitat associations, food habits and movements. Since 2014, Parks Canada has worked within Ivvavik National Park along the Firth River using camera traps to capture variations in occupancy (M. Suitor and D. Tavares, personal communication, November 16, 2020).

Under the terms of the IFA, the Inuvialuit have the exclusive right to harvest grizzly bear in Ivvavik National Park and anywhere in the NWT portion of the Inuvialuit Settlement Region, including the Mackenzie Delta to the west and northwest of Aklavik. They hold a preferential right to harvest grizzly bear on the eastern Yukon North Slope between Ivvavik National Park and the NWT-Yukon border. Since 1994, grizzly bear hunting has been co-managed by the Inuvialuit and the Governments of Canada, NWT and Yukon using a quota system whereby hunters are given a limited number of tags for their yearly harvest (J. A. Nagy & Branigan, 1998). The tags are assigned to specific harvest zones in the Aklavik Grizzly Bear Hunting Area. Quotas affect where bears are harvested and how the harvest effort is distributed across the YNS. However, harvest zones that are further away (e.g., Ivvavik National Park) often have unfilled quotas, reflecting the increased travel required. Each harvested bear must have a tag applied. Samples, such as a tooth, are collected for each harvested bear. The samples help determine the age of the bear, which allows for further insight into the population structure of YNS grizzly bears and harvest patterns over time. All human-caused bear deaths (including Defense of Life and Property kills) are accounted for under the quota.

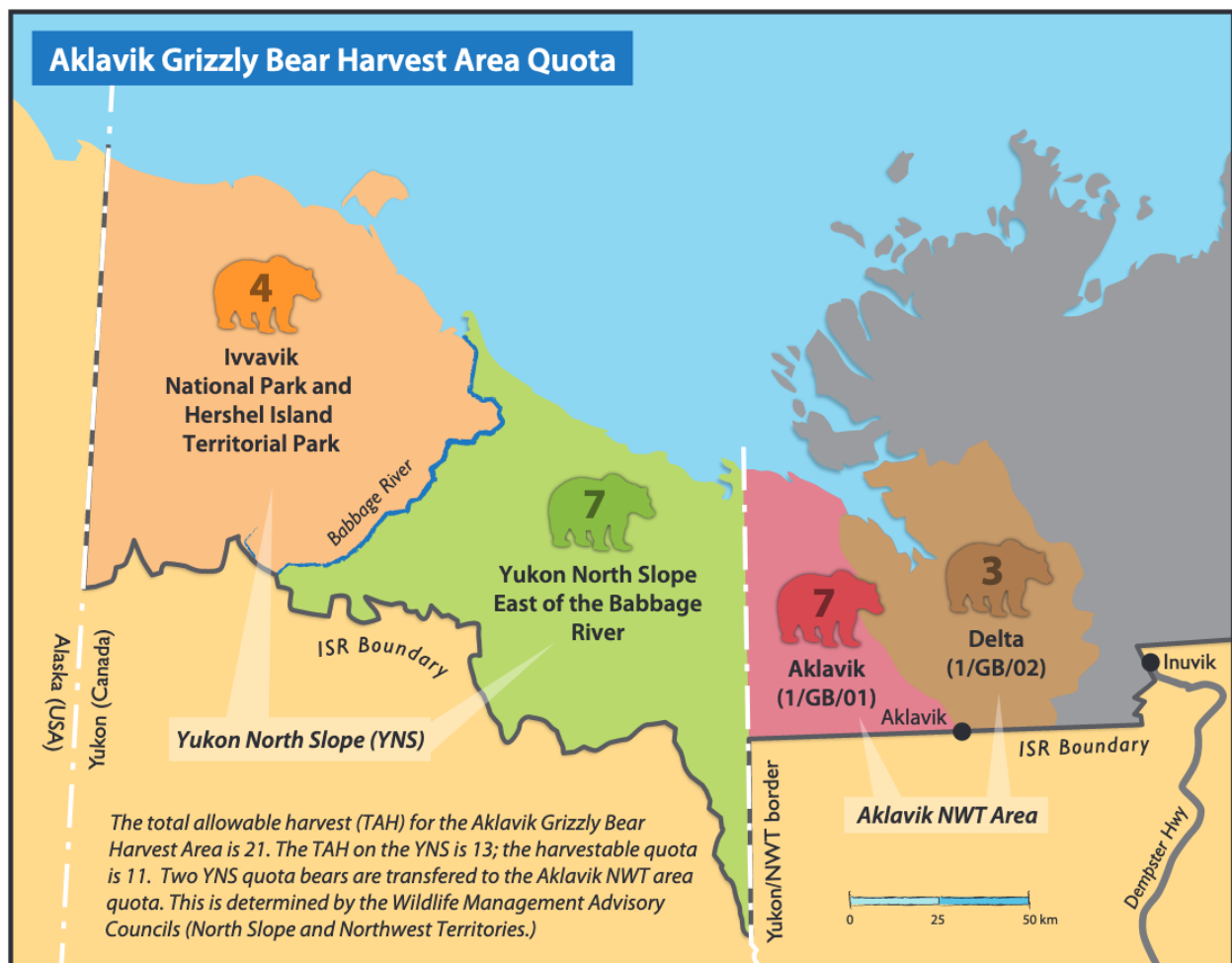
Lower harvest rates than the allotted quota are typical across the Yukon North Slope, and over the last 5 years the cumulative quotas within each harvest zone were not reached. For example, between July 2015 and June 2020, 3 bears were harvested of 20 allotted for Ivvavik National Park and Herschel Island, 15 of 35 were harvested for Eastern Yukon North Slope, and 20 of 35 for Aklavik-NWT. However, in some years the maximum number of female bears allotted were

harvested (NWT ENR, 2019). It is important to note that the reasons for low harvest rates are complex (for further information, see the Traditional Use companion report).

In addition to traditional uses, grizzly bears are also killed in Defense of Life or Property (DLP). DLP kills are the result of human-bear conflict. As such these kills are centred around sites of human use, such as camps, cabins, and communities. These are included in the quota and used to inform management decisions.

The population evaluation completed by Parks Canada and the Yukon Territorial Government (2014) resulted in a management recommendation to maintain the existing quota of a ~4% harvest rate adjusted for the updated point population estimate (M. Suitor, personal communication, November 16, 2020). The 2014 report indicates that this option requires concurrent monitoring.

Map 7- 7. Grizzly bear harvesting zones and quotas on the Yukon North Slope and adjoining N.W.T. harvesting zone



This image reflects current quotas in 2021. Source: WMAC(NS)

## Transboundary Considerations

Grizzly bears move beyond the boundaries of the Yukon North Slope to the NWT, Alaska, and south within the Yukon. This movement was observed in collared bears (2004-2010 study by YG and Parks Canada) used to assess seasonal habitat use (Triska & Heinemeyer, 2020). Prior studies in the Alaskan Brooks Range (Harry Reynolds, 1976; H. V. Reynolds & Hechtel, 1987) have been used to supplement data in the Yukon North Slope and inform management decisions (Parks Canada and the Yukon Territorial Government, 2014). Alaska's North Slope grizzly bear population is believed to be stable and harvested lower than the allowed maximum sustainable yields (Lenart, 2015). There is no formal transboundary management between Canada and Alaska, but it is important that Yukon North Slope managers remain aware of changes in the population size, structure, and harvest rates/methods in Alaska.

## Observations, Concerns, and Threats

### Impacts of Climate Change

Traditional knowledge collected in 2016 suggests that climate change may be affecting grizzly bear habitat and behaviour. Interviewees reported that grizzly bears enter dens later in the fall and emerge earlier in the spring, and also that slumping along hillsides associated with permafrost melt may be altering habitat and making old dens unusable and the establishment of new dens more difficult (WMAC (NS) & Aklavik HTC, 2018a).

Increased temperatures will likely lead to grizzly bear expansion north where this is possible. The Yukon North Slope is bounded by the Beaufort Sea but, east of the Yukon North Slope, grizzly bears have been expanding north into the Canadian Arctic Archipelago (Aklavik HTC, Aklavik Community Corporation, WMAC (NWT), FJMC, & Joint Secretariat, 2016; Pongracz, Paetkau, Branigan, & Richardson, 2019). Where grizzly bears overlap with polar bears, this could result in increased hybridization and competition with polar bears (*U. maritimus*) becoming more common (COSEWIC, 2012; Pongracz et al., 2019). Grizzly bears and polar bears have overlapped on the Yukon North Slope since the 19<sup>th</sup> century (COSEWIC, 2012); hybridization in the region has not been reported in any available sources. However, competition for whale carcasses in the autumn has been documented along the Beaufort Sea in the Arctic National Wildlife Refuge of Alaska (Miller, Wilder, & Wilson, 2015). Although interspecific interactions were not typically aggressive, grizzly bears predominantly displaced polar bears when present at the same time (Miller et al., 2015).

Few research studies related to climate change on grizzlies have been completed, but COSEWIC (2012) suggests that following (additional) issues may arise for grizzly bears:

- Potential decreases in food sources as seasonal foods fail, which may reduce survival
- Changes in caribou, moose, and muskox populations (either positive or negative) may reduce or promote survival
- Increased competition from black bears expanding north and to higher altitudes
- Loss of permafrost loss may decrease den stability
- Increased human development as the North becomes more amenable to agriculture or other activities may displace bears or increase bear/human interactions

## Impacts from Human Activities

Disturbance by humans greatly influences grizzly bears and they are at high mortality risk in areas with human activities and where roads generate access points (COSEWIC, 2012). Human activities can alter the habitat in which bears live, displace bears, disrupt the bear's social system, causing high energetic responses compared to normal behavior, and increase mortality (McLellan, 1990). Additionally, availability of human food sources or trash may lead to further disruptions for grizzly bears, increased conflict with humans, and increased mortality (Clark & Slocombe, 2011; Mattson, 1990).

Elsewhere in their Canadian range, where grizzly bears overlap areas with high human use, non-harvest-related mortality is a significant cause of declines and a key reason for listing western Canadian grizzly bears as a species at risk (COSEWIC (2012). While human-bear conflict has not precipitated population decline in the ISR, the effect of Defense of Life or Property (DLP) kills is an important consideration in management. DLP grizzly bear kills on the Yukon North Slope are most likely to occur at seasonal camps (e.g., Tapqaq), where there is the potential for increased attractants. DLP kills are more common in the vicinity of the community of Aklavik, though, where the unfenced landfill is a significant attractant. While not on the Yukon North Slope, these kills are important to consider in Yukon North Slope management as the community is adjacent to the region.

COSEWIC (2012) recommends that ongoing or proposed activities or developments with the potential to lead to grizzly bear mortality should be carefully scrutinized and measures put in place to minimize this risk. Within the Yukon North Slope, non-harvest kills (e.g., in defense of life and property) count towards the harvest quota to best maintain a sustainable harvest level (Clark & Slocombe, 2011; WMAC (NS) & Aklavik HTC, 2008).

Table 7- 5. Mean annual recorded human-caused grizzly bear mortalities in Canada 1990 - 1999

Jurisdiction	Hunting kills			Non-hunting kills			Total
	Males	Females	Unknown	Illegal	DLP	Other	
Alberta	9.1	4.7	0.0	3.7	4.2	3.1	24.8

British Columbia	187.3	101.6	0.0	5.9	40.2	n/a	335.0
Yukon	51.0	27.5	0.0	n/a	13.2	1.5	93.2
NWT and Nunavut	8.1	1.7	1.0	n/a	9.4	n/a	20.2
ISR and GSA	21.1	5.2	4.1	Included in hunter kills			30.4
<b>Total</b>	<b>276.6</b>	<b>140.7</b>	<b>5.1</b>	<b>9.6</b>	<b>67.0</b>	<b>4.6</b>	<b>503.6</b>

Note: DLP refers to Defense of Life or Property. The number of bears killed combined (hunter and non-hunting kills) is highlighted in the final column. Redrawn from Source: (Yukon Grizzly Bear Conservation and Management Plan Working Group, 2019)

Table 7- 6. Mean annual harvest of Yukon North Slope grizzly bears, June 2009 - July 2020

Harvest Zone	Males	Females	Total	DLP
Ivvavik National Park	0.7	0.2	0.9	0
Yukon North Slope	2.9	0.6	3.6	0
Aklavik-NWT	3.2	1.5	4.5	1.3

Note: DLP refers to Defense of Life and Property. DLP harvests are counted against the annual harvest quota and therefore are included in the total harvest count. Bears of unverified sex are counted as females. Source: Government of the Northwest Territories unpublished data, 2020. Quotas as of 2021 can be seen in Map 7-7.

## Links to Plans and Programs

This section lists plans and programs that link to the objectives and strategies of the *Yukon North Slope Wildlife Conservation and Management Plan*. These plans and programs informed the development of the Yukon North Slope Plan and are an integral part of its implementation.

### Grizzly Bear Conservation and Management

Multiple plans, guidelines and agreements relate to the harvest management of grizzly bears on the Yukon North Slope.

Table 7- 7. Information used to inform grizzly bear harvest management measures in 2019

Species	Management Plans, Guidelines, and Agreements	Harvest Management Measures (2019) for the Yukon North Slope
Multiple	<ul style="list-style-type: none"> <li>– Inuvialuit Harvest Study (1988-1996)</li> <li>– Community Based Monitoring Program, including the updated Harvest Study (2016-present)</li> <li>– Arctic Borderlands Ecological Knowledge Co-op</li> </ul>	Both current programs collect information relating to the harvest of species and conditions on the land during harvest activities. These results of these programs have been used in adaptive harvest management for Yukon North Slope species.



Species	Management Plans, Guidelines, and Agreements	Harvest Management Measures (2019) for the Yukon North Slope
Grizzly bear	<ul style="list-style-type: none"> <li>– Plan for ISR (J. A. Nagy &amp; Branigan, 1998)</li> <li>– Yukon plan (Yukon Environment, 2018)</li> <li>– SARA plan for the Western Population in Canada (to be developed)</li> </ul>	<ul style="list-style-type: none"> <li>– Harvest limited by an annual quota for the Yukon North Slope harvest area, based on bear density estimates</li> <li>– Non-Inuvialuit resident harvest may be permitted with quota allocation</li> <li>– The Yukon plan does not apply to the Yukon North Slope but affects the management of neighbouring grizzly bear populations in Yukon</li> </ul>

- *Aklavik Inuvialuit Community Conservation Plan (Aklavik HTC et al., 2016)*  
Identifies the Richardson Mountains, Richard’s Island, Mackenzie River Delta, major river drainages, eskers, and southerly slopes (for denning) as important grizzly bear habitat. It also notes that there has been an increase of grizzly bear sightings on Arctic Islands in recent years and identifies a need to set sustainable harvest quotas and to assess potential impacts of human disturbance.
- *Ivvavik National Park of Canada Management Plan (Parks Canada, 2018)*  
Conservation and management of grizzly bear is part of the plan’s strategy “to protect and conserve natural ecosystems, habitat, wildlife, cultural resources and Inuvialuit practices, based on the best available scientific and traditional knowledge” (Parks Canada, 2018).
- *North Yukon Regional Land Use Plan (Vuntut Gwitchin Government & Yukon Government, 2009)*  
Lists the grizzly bear as a species of national conservation concern. Identifies land management units that are high priority grizzly bear habitat in the region.

## Research and Monitoring Programs

- **Species surveys**  
Grizzly bear monitoring
  - Aerial counts of bears in the Barn Mountains from 1972 to 1975, radio-collared bears in the Richardson Mountains from 1993 to 2001 (J. A. Nagy & Branigan, 1998; J. A. Nagy et al., 1983; John A. Nagy & Haroldson, 1990)
  - Radio collar study of 5 bears in the Firth Valley from 1994 to 1995, plus observational monitoring of bears, scats and feeding sites from 1993-1995 to assess grizzly bear diet, activity budget and patterns (Mackenzie & MacHutchon, 1996).
  - GPS collar study of 35 grizzly bears focusing on the Babbage River Drainage from 2004-2010; however, bears traversed the Yukon North Slope and into Alaska and the NWT (Parks Canada and the Yukon Territorial Government, 2014; Yukon Environment, Parks Canada, WMAC (NS), & Aklavik HTC, 2008).
  - Hair snag grid focused on the Babbage River Drainage from 2004-2010 (Parks Canada and the Yukon Territorial Government, 2014).

- **Harvest and population structure monitoring / Tag program and sample collection:**  
Government of Yukon works cooperatively with the Government of the Northwest Territories (GNWT). GNWT and the Aklavik HTC distribute tags (up to the amount of the quota for each zone) for grizzly bear harvest on the Yukon North Slope. Each harvested bear (including DLPs) must have a tag applied. The tag program allows for very accurate harvest monitoring from year to year, and all human-caused mortalities are tracked. For each harvested bear, there is also mandatory sample collection of a tooth and proof of sex. The tooth allows for aging the bear, which provides insight into the population structure.
- **Harvest monitoring: Inuvialuit Harvest Study (IRC, 2017, 2018, 2019)**  
Annual harvest monitoring in the ISR was led by the Inuvialuit Game Council and the Inuvialuit Regional Corporation. This program included grizzly bear harvest monitoring. The ISR Community-Based Monitoring Program was revised after 2014 to focus on harvest. Aklavik Inuvialuit Community Resource Technicians (CRTs) collected harvest information, including harvest locations, through annual interviews with active harvesters. This program built on previous harvest monitoring methods and data (Inuvialuit Harvest Study, 2003).

## Selected Studies and Research Relevant to the Yukon North Slope

This section is an annotated listing of selected reports, scientific papers, and other resources that provide support to the *Yukon North Slope Wildlife Conservation and Management Plan* and highlight issues and research directions that will be important to consider during its implementation.

### Traditional Use and Traditional Knowledge Studies

- **Aklavik Local and Traditional Knowledge about Grizzly Bears of the Yukon North Slope (WMAC (NS) & Aklavik HTC, 2008)**  
Collaborative 6-year study between Yukon Department of the Environment, Parks Canada (Western Arctic Field Unit), Aklavik Hunters and Trappers Committee (AHTC) and the Wildlife Management Advisory Council (North Slope). Beginning in 2004, this project was designed to increase understanding of grizzly bears. From 2006-2007 this included traditional

knowledge interviews in relation to harvest activity and techniques, population trends, habitat use and movement patterns. This document is referenced throughout this chapter.

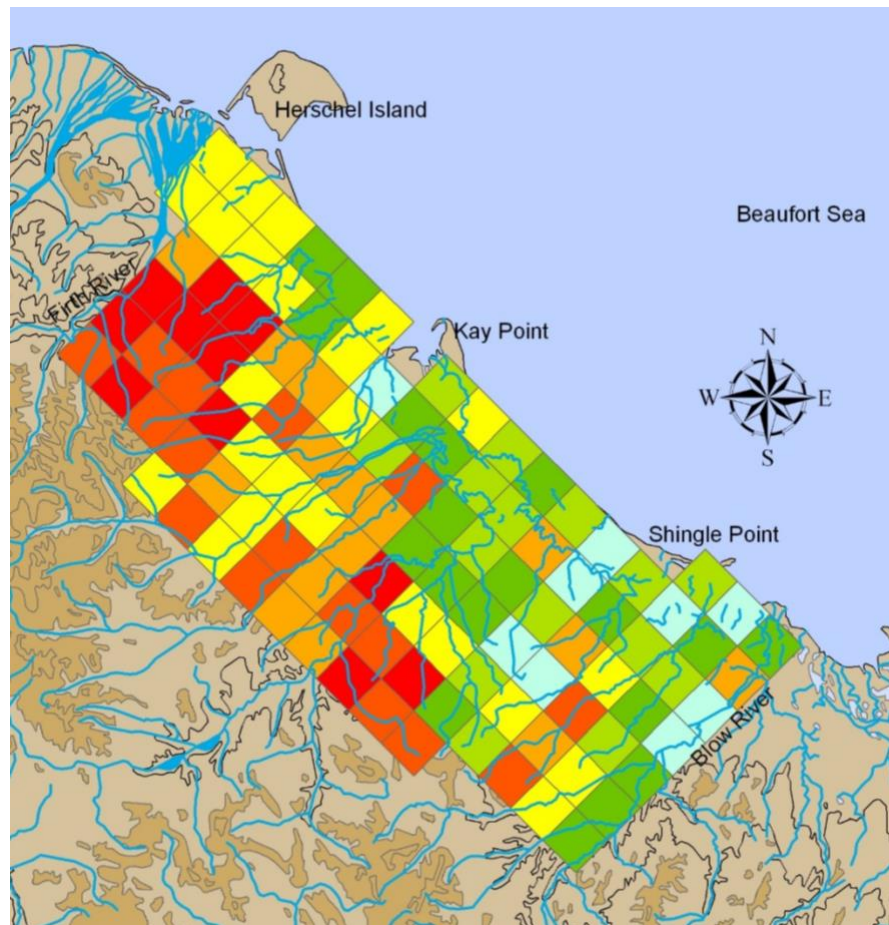
- *Yukon North Slope Inuvialuit Traditional Use Study* (WMAC (NS) & Aklavik HTC, 2018b) and *Inuvialuit Traditional Knowledge of Wildlife Habitat, Yukon North Slope* (WMAC (NS) & Aklavik HTC, 2018a)

These two studies were undertaken by the WMAC (NS) and the Aklavik HTC to document traditional use patterns and knowledge about wildlife habitat on the Yukon North Slope. Both studies were based on interviews with Aklavik Inuvialuit land users. Maps were used in the interviews and all geographically referenced data were digitized and displayed on maps. The results were used in developing the Plan and are described and referenced throughout this chapter.

## Research

- Home range and population parameters (John A. Nagy & Haroldson, 1990)
- Additional home range and population parameters (J. A. Nagy & Branigan, 1998)
- Activity budget and patterns within the Firth River Valley (Machutcheon, 2001)  
Study of activity of 5 radio-collared bears and visual observations of bears from 1994-1995. Grizzly bears were observed feeding on plants and caribou, and spent more time feeding and less traveling or resting if they were eating predominantly plants.
- Food habits in the Yukon, Canada 1993-1995 (MacHutchon & Wellwood, 2003)
- Adaptive co-management and grizzly bear-human conflicts (Clark & Slocombe, 2011)  
Compares co-management plans in two northern Canadian communities and how they are influenced by grizzly bear-human conflicts. In Baker Lake, Nunavut there is evidence that wildlife management would benefit from the inclusion of Traditional Knowledge. The ISR in NWT/YK provides a management framework that incorporates scientific and Traditional Knowledge within a quota system.
- Assessment and status report on the grizzly bear in Canada (COSEWIC, 2012)
- Spatially-explicit capture-recapture population estimates for grizzly bears (Parks Canada and the Yukon Territorial Government, 2014)  
Data from the hair-snag grid (Map 7- 8) completed across the Babbage River Drainage from 2004-2010 were analysed using spatially explicit capture-recapture analysis. They generated overall population trends and point estimates for the Yukon North Slope and population density estimates (bears/1000km<sup>2</sup>) for three ecodistricts within the Yukon North Slope.

Map 7- 8. Location of hair-snag grid – data used for spatially explicit capture-recapture analysis – covering the Babbage River Drainage in the Yukon North Slope



The intensity of hair-snag events with high intensity in red and orange cells, low intensity in light and dark green cells and no events in blue cells. Hair snag events were combined over 2006 and 2007 sampling. Source: (Parks Canada & Yukon Territorial Government, 2014)

- **Research on predation of muskoxen (Arthur & Del Vecchio, 2017)**  
In northeastern Alaska from 2000-2006, grizzly bear predation accounted for 58 and 62% of muskoxen calves and adults, respectively. Predation occurred during the later winter and spring indicating the importance of muskoxen during periods of limited food availability and potentially reduced populations of other ungulates.
- **Bayesian approach to identifying grizzly bear habitat values (Triska & Heinemeyer, 2020)**  
This study develops grizzly bear habitat models for denning, spring, summer, and fall. The Bayesian approach provides a resource selection model for each season that incorporates traditional knowledge and GPS collar locations to identify male and female seasonal habitat preferences. A denning habitat model was also developed using traditional knowledge and

den site locations compiled over many years. Combined output from these models are contained in the 'Habitat' section of this chapter.

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