

Travel Routes, Harvesting and Climate Change in Ulukhaktok, Canada

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Abstract

This paper presents research that integrates natural and social science data with the knowledge from community members to document the implications of climate change for travel routes, used by community members in Ulukhaktok to access seasonal harvesting grounds, and how policy decisions can enhance capacity to adapt in the future. It outlines steps for engaging arctic communities in climate change research and describes an approach to assessing vulnerability. The approach is applied in a case study for the community of Ulukhaktok, Northwest Territories (NT), Canada. Information was collected from a triangulated set of resources including, community reports, climate records, existing research, and 62 in-depth interviews with community members. Data indicates that climate change together with societal changes have resulted in compromised trail routes to harvesting grounds and increased hazards for travelers. Current adaptive strategies involve traveling via alternative modes of transportation and travel routes, taking extra precautions before and during travel and sharing country foods. Adaptations are not universal among community members and changing trail conditions have resulted in community members spending less time traveling on the land harvesting country foods which has implications for food security, local economy, cultural preservation and health.

Since March, changes go from fog to rain, it is not normal weather. It really affects the people who go out on the land, travel on the land. When people want to travel and weather patterns change like this it affects their emotions, their mentality. They live on country food. It [traveling on the land and harvesting] is good for their soul, a time to spend with family (translated from Inu-inaqtun by Annie Goose, 15 July 2005).

- Jimmy Memogana, Ulukhaktok

Introduction

Evidence of climate change has been widely documented in the Arctic including, changes in temperature, frequency and magnitude of extreme weather, sea-level rise, sea ice dynamics and permafrost thaw (Hinzman et al., 2005; McBean et al., 2005; Gearheard et al., 2006; Laidler 2006). These changes are projected to continue and the effects of future climate change are expected to be felt the earliest and most pronounced in the Arctic (Arzel et al., 2006; Teng et al. 2006). Arctic people have long known about and coped with environmental changes; however, the rapid rate of current climate change together with changing livelihoods is creating significant challenges for Inuit way of life. One of these challenges is the ability for community members to travel on the land and participate in subsistence harvesting activities under changing environmental conditions.

During the past half century, Inuit have experienced rapid social, political and economic changes, including moving into permanent settlements, compulsory education, health care services, the introduction of wage economies, new technologies, and increasing pressure for natural resource development (Oakes and Riewe 1997; Damas 2002; AHDR 2004; ACIA 2005; Ford et al. 2006a; Ford et al. 2006b). Despite undergoing sweeping socio-economic and political changes, Inuvialuit in Ulukhaktok continue to live in close association with the natural environment and travel on the land and subsistence harvesting are important activities in the lives of community members (Usher 2002; IHS 2003). Harvesters use a vast network of travel routes to access seasonal harvesting grounds, most often via mechanized transportation including snow-mobile, all-terrain vehicle (ATV) and motor boat; as a result, people are making shorter duration, more frequent trips on the land.

As described by Condon et al., (1995), Collings et al.

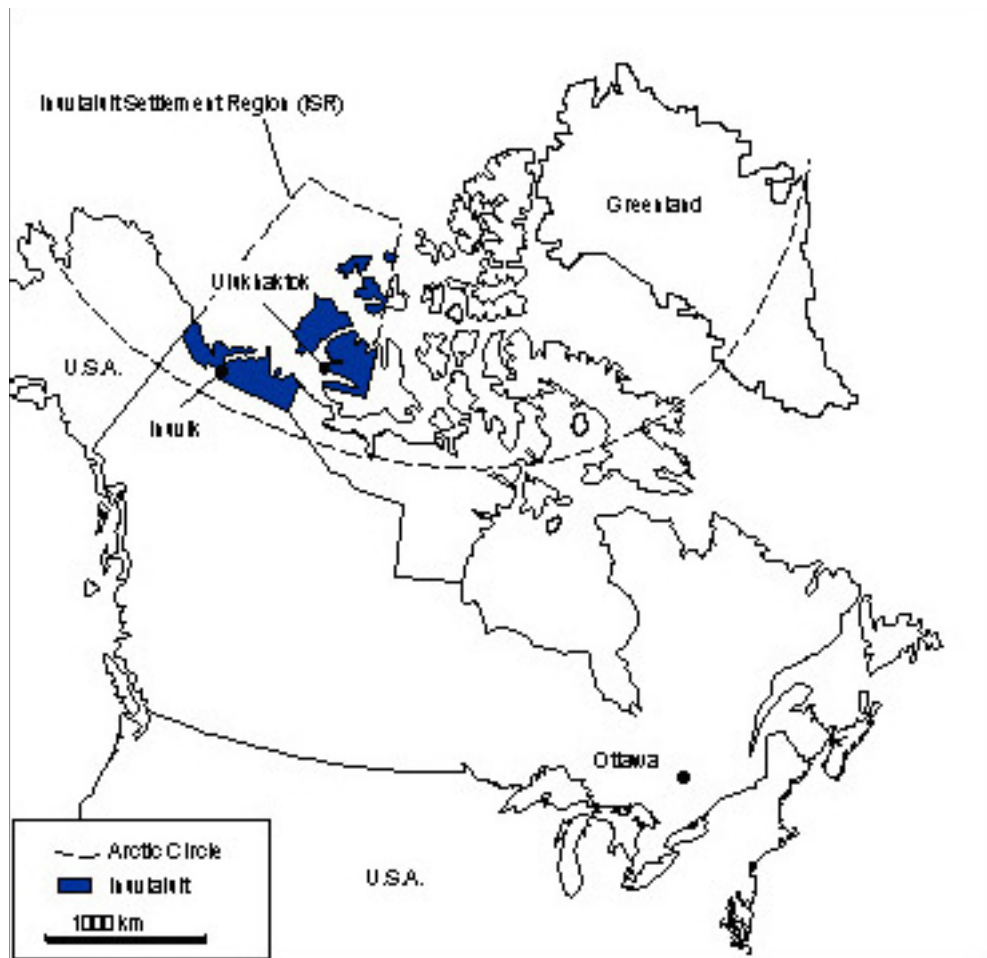


Figure. 1: Location of Ulukhaktok in the ISR, NT, Canada.

(1998) and substantiated in interviews, in the opinion of most community members, country foods (fish and wildlife that are harvested from the land) are preferred because they are healthier, fresher, and therefore better tasting, more satisfying, and less expensive to obtain. Furthermore, the acquisition and consumption of country foods is essential to cultural identity. The importance lies in the activity of harvesting, spending time with family members, the fulfillment and pride associated with the harvest and also in the distribution of country foods in the community. In addition, over half of the community earns some cash income from methods other than wage employment (Stern 2001). Subsistence harvesting offsets the financial cost of purchasing store-food and provides an important source of income for some community members (guiding and helping on sport hunts for polar bear, musk-ox and caribou, the sale of furs, pelts, and/or clothing and gifts made from wildlife products) (Usher 2000; 2002).

This paper reports on research conducted with the community of Ulukhaktok, Northwest Territories (NT) documenting the livelihood implications of climate change impacts on travel routes used by community members to access harvesting grounds, and associated adaptation policy options.

Case Study: Ulukhaktok, NT

Ulukhaktok, formerly known as Holman, is a community of 434 people (NWT Bureau of Statistics 2006), 95% Inuvialuit, located in the Inuvialuit Settlement Region (ISR), Northwest Territories (NT), Canada (Fig. 1). Beginning in the 1920s, Inuvialuit of Ulukhaktok made a rapid transition from a lifestyle entirely based on subsistence to one that now depends on a mixed economy in a permanent settlement, where wage income and subsistence earnings both play important roles.

During spring and summer 2005, information was collected in the community from multiple sources: secondary sources of information including, community reports, community meeting minutes, harvesting data, and climate records; participating in community activities and experiential trips on the land; and 62 semi-structured interviews with a cross-section of adult community members. The purpose of the interviews was to document and characterize what risks interviewees have, and are currently dealing with, gain insights on adaptation strategies being employed to deal with current risks, and identify those factors which influence the ability of the community to adapt.

Vulnerability Approach

The research employed an approach for assessing vulnerability described by Ford and Smit, (2004) and Smit and Wandel, (2006). This approach builds on research in natural hazards and risk management and conceptualizes *vulnerability* as a function of both the *exposure-sensitivity* of a community to climate risks and the ability of the community to cope with, recover from or *adapt* to exposures-sensitivities (Smit and Pilifosova, 2001; Turner et al., 2003). Vulnerability does not exist in isolation, but is considered within the scope of other social and ecological factors and processes.

The first stage of the methodology is to assess *current vulnerability*. This involves the integration of natural and social science data with the knowledge of community members to identify risks (climate related and other) that are relevant to the community (e.g. nature of the spring melt), or exposures-sensitivities, and the capacity of the community to adapt to these risks (e.g. ability of harvesters to travel via alternative modes of transportation if spring conditions are not suitable for travel by snow machine). The second stage of the vulnerability approach incorporates future climate probabilities and future social probabilities to assess *future vulnerability*. This involves looking at those climate change risks currently affecting the community (e.g. compromised travel routes) and the adaptive strategies being employed, in light of future climate change projections and future social probabilities to characterize vulnerability in the future.

Community Involvement

Stakeholders – community members, local leaders and decision-makers – are an integral part of every stage of the research process. In order to facilitate the active engagement of community members, key steps for community research collaboration were developed and applied. These steps draw on the experiences of researchers, Inuit and northern organizations, arctic communities and other community-based research projects (Condon et al. 1995; Berkes and Jolly 2002; Ford et al. 2006a; Ford et al. 2006b; Laidler 2006). The outlined steps taken for effective engagement of the community in this research also respond to, and complement the discussions that took place during the project session, ‘Community-Based Research’ at the Northern Research Forum, 2006.

Early and ongoing communication with community partners was central to the research process from its early conception (e.g. pre-research visit) to final project results (e.g. dissemination of research findings in the

community). It ensured that local ideas and concerns were integrated into the research design and process. Early and ongoing communication also provided an opportunity for community members to identify risks that are important to them and adaptations that are realistic beyond those selected a priori by researchers. **The research proposal** was developed collaboratively by researchers and community representatives. Researchers worked with community members to refine research questions; select the most suitable methods for data collection; choose the most appropriate time to conduct research in the community; and identify training opportunities for community members. **Training opportunities** as research assistants were identified for two high school graduates, Fred Kataoyak and Robby Inuktalik. Fred and Robby were responsible for assisting in all stages of the research process including, data collection, analysis and dissemination. Annie Goose worked as the research project’s Inuinnaqtun interpreter. Annie’s role went far beyond interpreting and also included, facilitating research activities requiring translation (setting-up interviews), providing guidance to ensure that data collection was conducted in a respectful and culturally acceptable manner, and back-checking interview translations. **Research findings** were communicated back to the community using multiple dissemination techniques including, a plain-language summary booklet, presentations to the school and community groups, and individual household visits. Dissemination materials were available in Inuinnaqtun and English. Ample time (two months), as determined together with local partners, was given so that community members had the opportunity to discuss the research findings with the lead author, ask questions and provide feedback.

Current Vulnerability

Current Exposures-Sensitivities

Current changes in the climate together with changing livelihoods are affecting the ability of community members to perform harvesting activities. Travelers are being *exposed* to increased risks and compromised travel routes to harvesting grounds making travel on the land more hazardous and sometimes preventing travel altogether. Environmental changes that are identified by community members as problematic include, (1) earlier and more rapid spring melt, and (2) variable timing of sea ice freeze-up and break-up.

It is often the interaction between multiple stressors, climate and non-climate driven, which have changed, and in many cases increased, the exposure-sensitivity of the community to these climate risks. Changes in harvesting behaviour including dependence on mechanized

transportation, the speed and timing at which traveling now occurs, and the erosion of land-based skills in youth have increased the *sensitivity* of community members to climate risks. As a result, some community members are spending less time on the land and are harvesting less country foods with implications for food security, local economy, cultural preservation and health.

Spring melt and inland trails

Community members report that weather patterns have become increasingly unpredictable and it is now more difficult to forecast when conditions will be optimal for traveling. Weather conditions are described as occurring in extremes; it is either too hot or too cold, nothing is steady anymore.

...weather patterns have really changed, it can be nice and then suddenly a storm can hit. It's like we don't have time to say the weather is going to change. The change is so rapid (translated from Inuinnaqtun by Annie Goose, 14 July 2005).

- Margarit Egotak, Ulukhaktok

Increased variability in weather patterns has been observed in the late winter and early spring (March-June); the timing of the spring melt is described as being unpredictable, occurring earlier in the season and taking place over a shorter period of time. Local observations are supported by climate data which show that the average length of the melt season in the Arctic has increased by approximately 5.3 days per decade between 1979 and 1996 (Smith 1998). This is consistent with a documented pattern of increasing air temperatures in the Arctic, notably in the winter and spring; the average trend in temperature increases in the Arctic between 1966 and 2003 was 0.40C, approximately 4 times greater than the average for the century (McBean 2005). Earlier spring melt dates have disrupted inland trail conditions and consequently access to spring harvesting grounds. Travelers have been stranded on the land when their snow machines and *kamotiks*¹ have become stuck in melting conditions, or have had difficulty reaching harvesting grounds and/or traveling back to the community during an early melt.

Wind patterns and travel routes on the sea ice and water

A striking feature of the tidal waters in the area around Ulukhaktok is the long period of seasonal ice cover due to relatively shallow water. Freeze-up generally occurs in the community bays near the end of October and ice thickness increases over the winter until the ice reaches a thickness of around two meters (six to seven feet) in early spring (Condon 1987). During this time the sea ice

is usually stable to travel on, supporting travel routes to harvesting grounds (e.g. ringed and bearded seal, polar bear, and King Eider ducks). The sea ice would historically break-up in late June, exposing open water which provides access to summer harvesting grounds via boat (e.g. Perry caribou, ringed and bearded seal, Arctic char). In recent years, however, community members and scientists have observed changes in sea ice conditions.

Satellite observations and historical records show that sea ice cover in the Arctic during the summer has significantly decreased over the last thirty-years and multi-year ice has declined at an even greater rate (Cavaliere et al. 1997). This reduction in sea ice cover is associated with increasing temperatures and length of the melt season in the Arctic (Loeng 2005). Community members in Ulukhaktok have also observed significant change in local sea ice conditions; specifically, community members identified changes in the timing of sea ice freeze-up and break-up to be important variables affecting travel routes to harvesting grounds.

Sea ice freeze-up and break-up in Ulukhaktok is influenced by the speed and direction of the wind. Queen's Bay, where the community is located, faces south-west, and an easterly wind is necessary to initiate break-up and clear the bay of broken ice before people can travel on the water by boat. In the past, the community would receive strong east winds in the spring at a similar time each year; however, community members report that the wind no longer follows a regular pattern, and the timing, and nature of break-up has become unpredictable. In recent years, east winds have come on suddenly without warning, they are stronger than they used to be and are experienced more often in winter months. Strong east winds can cause an unpredictable, rapid break-up of the sea ice which creates risks for travelers, prevents access to harvesting grounds and blocks travel routes back to the community. There have been incidents when large open water leads have formed between the ice that harvesters are traveling on and the land-fast ice making it impossible to follow the same travel route back to the community.

Westerly winds are reported to now be more common in the spring. In spring 2005, shortly after east winds broke-up the ice, the direction of the wind changed to westerly winds which pushed the broken ice back into the community bays. Consequently, people were unable to travel on the sea ice by snow-machine or on the water by boat because the bay was choked with broken ice. These conditions prevented access to summer caribou harvesting grounds in Prince Albert Sound (Prince Albert Sound is located north of Ulukhaktok and ex-

tends East into Victoria Island. Transportation via the land between Ulukhaktok and Prince Albert Sound is difficult due to steep cliffs and rocky terrain).

...it all depends on the ice conditions, like the caribou was probably right close to the shore in July and August. Now it's finally break-up but by the time there is a road (ice free passage on the water) to go get your caribou, they're all gone...ice conditions, late break-up, it can affect your hunting.

– *Susie Malgokak, Ulukhaktok*

A third observed change in wind conditions is the occurrence of more south winds in the summer and increased frequency and magnitude of storms. Rough ocean conditions create additional dangers for travelers on the water and sometimes prevent travel by boat altogether.

Adaptive Strategies

Despite climate change impacts on travel routes, community members in Ulukhaktok continue to participate in harvesting activities by employing adaptive strategies to cope with changing conditions. Adaptations include: traveling via alternative travel routes and modes of transportation, taking extra precautions before and during travel, sharing country foods and supplementing their diet with store-bought foods. Adaptations, however, are not without costs and community members have varying abilities to employ adaptive strategies, with some people better equipped to deal with change than others.

Alternative transportation

Access to mechanized transportation largely determines if, and when community members are able to travel to harvesting grounds. Specialized equipment is relied on for each harvesting season and not having the necessary equipment limits what harvesting grounds harvesters are able to access. Current climate impacts on travel routes have increased the variability of trail conditions requiring harvesters to often adjust their travel routes, which sometimes requires traveling via an alternative mode of transportation. For example, in the event of an early spring melt, when the snow and sea ice become unstable to travel on by snow machine, harvesters must wait for the land to dry before accessing inland harvesting grounds by ATV, or the sea ice to disperse before traveling by boat. In these cases, having access to an ATV and/or boat potentially enables a harvester to continue to participate in spring harvesting activities despite compromised trail conditions. This

adaptive option, however, is not available to everyone as transportation equipment is expensive to purchase, operate and maintain, and employment and income are not equally distributed in the community.

Extra precautions

Harvesters who are able to adapt to changing conditions and continue to travel on the land are exposed to increased risks. Travelers are adapting to increased risks by taking extra precautions before and during travel including, leaving a travel itinerary with people in the community, using trails and harvesting grounds that are closer to the community when possible, taking extra supplies (e.g. food, fuel, tents, stove, etc.), traveling in groups, and in some cases avoiding potential risks by not traveling at certain times of the year such as in late spring.

Food sharing and change in diet

Despite adaptation efforts, community members are spending less time on the land participating in harvesting activities. Community members are coping with having reduced access to harvesting resources by relying on the strength of traditional food sharing networks to receive country foods. Food sharing relationships have a long history in Inuvialuit culture and modern sharing networks continue to be an important social practice in Ulukhaktok (Condon et al. 1995; Collings et al. 1998). When the demand for country foods surpasses supply, community members supplement their diet with store bought foods. For some community members, who have the economic ability to purchase food from the stores, this is a viable adaptation option. However, community members indicate that store bought foods are less satisfying and not as desirable as country foods. The success of adaptive strategies such as buying store bought foods appears to be a matter of perspective, and whereas this adaptation may seem reasonable to a southern perspective, it is not consistent with local culture.

Determinants of Adaptation

In Ulukhaktok, some factors which determine the ability to adapt to changing trail conditions and reduced access to harvesting include, (1) access to income, (2) knowledge of land-based skills, and (3) community wellness. Determinants of adaptation provide strategic policy entry points for enhancing adaptive capacity; addressing conditions which are already problematic in the community inadvertently builds individual and household capacity to deal with exposures-sensitivities affecting access to harvesting grounds.

Access to Income

In order to purchase mechanized modes of transportation, extra supplies and store bought foods, community members need access to a regular source of income. Community members identify significant challenges to obtaining regular income including, a limited number of job opportunities in the community, lack of necessary education and training qualifications, and nepotism. Only a quarter of Inuvialuit adults in the community between the ages of 18 and 64 years have full-time wage employment, another 25% have regular part-time jobs, and the remaining 50% are either dependent on another wage earner or derive their income from subsistence earnings, seasonal employment, casual work or social transfer payments (Stern 2001). The inability to gain employment limits access to personal income and thus to harvesting equipment which is key for adapting to changing trail conditions.

Youth

The erosion of land-based skills in youth has made younger generation harvesters more sensitive to increased traveling risks. Unlike most of their parents, youth have much less experience participating in traditional land-based activities beyond weekend outings and summer camps, but considerably more experience with southern education, cultures and technologies. Adult community members are concerned that youth are not taking the time to learn from their parents how to travel safely to harvesting grounds and be successful in harvesting activities. Younger generation harvesters are accustomed to traveling long distances in short periods of time; they plan their travels assuming that they will have access back to the community after only a short time on the land; and they often travel with minimal supplies. As a result, some young harvesters are not well prepared if they encounter changing conditions on the land.

Community Wellness

Adaptive strategies including, the ability to acquire income and the strength of social networks (e.g. food sharing, knowledge sharing) are often autonomous to the individual or household unit. The health and wellbeing of individuals and households is therefore paramount in facilitating adaptation. An issue which community members identified as problematic, and was previously documented in the 1998 Community Wellness Plan, is drug and alcohol abuse (Kulbisky 1999). Drug and alcohol abuse is identified as a catalyst to other social problems including family violence, criminal activity and elder abuse. Subsistence abuse and lack of necessary

support services have left some community members with a diminished capacity to deal with risks associated with changing conditions.

Future Vulnerability

Changes which are already affecting trail conditions in Ulukhaktok are projected to continue with further implications for community access to harvesting grounds. The impacts of future climate change cannot be predicted with certainty, but we can gain some insight on the nature of future vulnerabilities by looking at current vulnerabilities in light of future climate change and socio-economic projections.

Future Exposures-Sensitivities

Based on future greenhouse gas emission scenarios, average autumn and winter temperatures are projected to rise by an additional 3 to 5°C over most Arctic land by the end of the 21st Century (Katsov and Kallen 2005). Rising temperatures are expected to cause a dramatic decrease in ice cover, which could result in an ice-free Arctic ocean during summer at the end of the century (Johannessen et al. 2004). These trends are consistent with observations made by community members who report that the sea ice around Ulukhaktok no longer completely freezes-over and sea ice extent and timing of break-up has become increasingly variable. This projected reduction in sea-ice cover would further affect travel routes on the sea ice and limit access to marine harvesting grounds. In addition, there could be an increased occurrence of open-water leads and thinner ice, creating increased hazards for travelers.

Rising temperatures also have implications for inland trails. Climate change scenarios predict that by the late 21st Century, precipitation could increase by as much as 35% in certain high Arctic locations (Kattsov and Kallen 2005). Like temperature, a projected increase in precipitation is expected to be the greatest in the fall and winter and smallest in the summer (Kattsov and Kallen 2005). Increased precipitation in the spring will affect the timing and rate of the spring melt, accelerating the melting of snow and further reducing access to inland harvesting grounds.

Future Adaptive Capacity

The ability of community members to manage risks associated with future climate change will be influenced by the nature of future socio-economic relationships. Concerns which are already present in the community will likely continue to condition adaptation to future climate change if they go unaddressed.

Determinants of current adaptive strategies in Ulukhaktok represent strategic policy entry points for strengthening the community's ability to deal with future climate change. Enhancing a harvester's ability to purchase alternative modes of transportation, fuel and supplies helps that harvester cope with changing trail conditions and continue to access harvesting grounds. Currently, Inuvialuit have a regional program, the Inuvialuit Harvester's Assistance Program (IHAP) which provides financial assistance to Inuvialuit individuals and groups to engage in renewable resource activities (IRC and IGC 2001). IHAP builds individual and household economic capacity to participate in harvesting activities by enabling harvesters to purchase necessary harvesting equipment. IHAP currently works at a very small scale; however, a potential way to strengthen community adaptive capacity to cope with changes in trail conditions is to expand the current IHAP to assist more harvesters in the community.

The health and well-being of individuals and/or household units is an important determinant of the ability to employ these adaptation options. Increasing incidences of alcohol and drug abuse are reported to affect the ability of some community members to participate in harvesting activities and/or obtain employment. Alcohol and drug programs outlined in the Community Wellness Plan are potential policy entry points that if implemented, could help improve the health and well-being of community members and enhance their ability to cope with changing conditions. A needed initiative to address alcohol and drug abuse in the community is to fill vacant community wellness positions (e.g. social worker, mental health worker, and alcohol and drug counselor) to ensure that community members have access to the necessary addiction and mental health support services.

Conclusion

The active engagement of stakeholders – community members, local leaders and decision makers – in the research helped identify risks that are relevant to the community and adaptations that are realistic. Some climate risks which community members identified as being important, wind patterns and timing and nature of the spring melt, are not captured in conventional climate models. Moreover, community members identified many non-climate risks that influence how they are affected by climate change and condition the ability to adapt. Climate change risks cannot be separated from risks, climate and non-climate-related, posed by existing conditions. Multiple drivers of cumulative change need to be acknowledged and addressed. Recognizing that youth will be the generation responsible for ad-

ressing future climate change, it is essential to address problems affecting youth including loss of land-based skills, drug and alcohol abuse and unemployment. This research shows that adaptations to climate change are unlikely to be undertaken for climate change alone but are more likely to be in response to conditions that are already problematic in the community.

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Notes

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i Kamotik: A traditional Inuit sled towed behind a snow machine or dog sled and used to haul harvesting equipment.

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