

Title: “Challenges and Implications of using ATK for Species Conservation: a Case Study of Northern Canada Wolverines”

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1. Introduction

As society has changed and evolved and as our ways of studying the world around us have evolved, we have begun to realize a few things:

1. humans are having a significant impact on the world around us: a burgeoning human population, human-induced climate change, and the exploitation and loss of natural resources.
2. current methods of assessing such problems are insufficient. It often seems the more we know, the more complex the issues get, and the less we seem to know about them. Better tools are needed to help understand and solve the problem. ‘Tools’ mean not only technological fixes, but also changes in thinking, such as the incorporation of uncertainty and adaptive management.

While these general realizations have been progressing, there has been a worldwide rise in the recognition of Indigenous Peoples. Article 8(j) of the Convention on Biological Diversity (CBD) states that “each contracting Party shall, as far as possible and appropriate... subject to national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous knowledge and communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application”. Aside from some of the obvious caveats, the statement is a general recognition of the importance of Indigenous Peoples. The CBD has been ratified by over 180 countries.

It is in light of these recognitions and realizations that we have begun to search out other ways of knowing. And it is in this context that traditional knowledge (TK) has risen to the level of preeminence that it appreciates today. TK has always been there, a ‘sleeping chameleon’ – now being promoted by the scientific and Indigenous communities

1.1. The sleeping chameleon

Like reptiles, TK has been around for a very long time, the term itself is relatively new. Primitive hunting strategies and tools all reveal that early societies had gleaned information from their surroundings in order to allow for successful hunts. Early work done by anthropologists researching folk taxonomies and ethnoscience are the predecessors to the present TK studies (Berkes, 1999). However, as Kuhn and Dearden (1996) note, while anthropologists recognized the value of alternative knowledge systems, to many scientists Indigenous knowledge about the environment was new information. Early work done by people like Descartes, Bacon, and Kant largely put the chameleon to sleep; science became the dominant mode of thinking, and the subsequent systematic subjugation of Indigenous Peoples made the academic world largely downplay knowledge of more “primitive cultures”. But now

this chameleon is starting to wake up. The value of Indigenous peoples and their environmental knowledge has been recognized internationally in Our Common Future (WCED, 1987), and has been applied to fields such as environmental impact assessment (Sallenave, 1994; MVEIRB, 2003), climate change (Riedlinger and Berkes, 2001; Berkes and Jolly, 2003), and fisheries management (Huntington et al, 1999; NWMB, 2000).

Similar to a chameleon, TK is slippery and changes colour. There is heated debate around what traditional knowledge actually is, and what terms should be used to define it. Words such as ‘tradition’, ‘aboriginal’, and even ‘knowledge’ are hotly contested. As a result, a number of different, slightly varying shades of the term have been developed. Examples taken from literature show a number of applicable terms in use, ranging from ATK to community knowledge (see table 1). Aboriginal traditional knowledge (ATK) is the term used by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and hence is the term used throughout this article.

Table 1: Terms and definitions to describe TK

Term	Source	Definition
Aboriginal traditional knowledge	Bill C-5, <i>Species at Risk Act</i> S.15(2) ¹	None given
Traditional Ecological Knowledge	Huntington, 2000, p.1270	“the knowledge and insights acquired through extensive observation of an area or species. This may include knowledge passed down in an oral tradition, or shared among users of a resource. The holders of TEK need not be indigenous”
	Berkes, Colding, and Folke, 2000, p.1252	“a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment”
Traditional knowledge	GNWT, 1993, p.2	“Knowledge and values which have been acquired through experience, observation, from the land or spiritual teachings, and handed down from one generation to another”; Applies mainly to Aboriginal people
Indigenous Knowledge	Gadgil et al., 1993, p.151	“a cumulative body of knowledge and beliefs handed down through generations by cultural transmission about the relationship of living beings (including humans) with one another and with their environment”. <i>Indigenous</i> implies to pre-scientific societies.
Local Knowledge	Feit, 1998, p.3	“systematic, based on observation and analysis, very extensive, imminently practical, and relevant to the management of resources”; “used by local resource users, and communities of resource users, to enhance sustainable resource use”. Implies both Indigenous and non-Indigenous
Native Knowledge	Nakashima, 1990	“the traditional knowledge of native subsistence hunters”; “a broad and refined nature of the natural environment” leading to “hunting success and social recognition”
Community Knowledge	Mallory et al., 2001	Knowledge of eight species in Baffin Island referred also as “traditional or community aboriginal knowledge”, and “traditional ecological knowledge”
Inuit Quajimajatuqanginnut (IQ)	Bell, 2003	“The Inuit way of doing things: the past, present, and future knowledge of Inuit Society”; “a set of values passed from generation to generation through oral tradition and found in the hearts and minds of people”

¹ *The Species at Risk Act*, 1st Sess., 37 Parl., 2001-2002, s15(2).

A fundamental question to ask is why wake up the chameleon? What are the benefits that are derived from the use of ATK? Reasoning can be split into three categories: biological, cultural, and political. ATK and community knowledge has tremendous potential to various biological fields (see Feit, 1998; NWMB, 2000; Mallory et al., 2001) for a number of reasons. Significant amounts of knowledge on the environment held by local people – Conklin (1957) documented a folk taxonomy for the Hannunoo of the Philippines which recognized roughly 1,600 plant species. Another reason is the inherent characteristics of the knowledge. Often based on empirical observations of the surrounding environment (Pierotti and Wildcat, 2000), ATK is often described as diachronic, providing long-term data over specific areas (Usher, 2000). It can also provide annual information in places where scientific studies are limited, such as in northern Canada, where geography and climate make studies expensive and field seasons brief. While such knowledge will not exist for all species or to the same extent, and the information derived from such knowledge will not always be correct (as with information from any knowledge source), ATK can contribute important and relevant biological information.

ATK is promoted politically to reaffirm the importance of Aboriginal Peoples. Canada is working to improve relationships with the Aboriginal Peoples they originally displaced and tried to assimilate, and recognizing the importance of ATK is one step in that process. Pre-European contact places the Aboriginal population in Canada at a conservative 500,000 (RCAP, 1991). Current estimates place the Aboriginal population in Canada over 1,000,000 and growing, with over 50 distinct linguistic groupings largely divided into three distinct groups: First Nation (“Indian”), Inuit (“Eskimo”), and Metis. But, increased recognition of ATK by governments such as Canada’s “must not necessarily be taken as evidence of increased empowerment or legitimacy. Rather, its recognition and use by non-aboriginals represents a stage in the on-going evolution of social relations between Indigenous populations and the dominant groups” (Kuhn and Duerden, 1996, p.72). However, the recognition of ATK and community knowledge in Canada’s Species at Risk legislation is an important step forward in helping to recognize the political and cultural importance of Aboriginal Peoples in Canada.

1.2. COSEWIC, ATK, and wolverine

The Government of Canada is investigating how ATK and community knowledge can be used to help conserve species at risk. While such knowledge has been promoted and used for EIA, and for resource management, it has rarely been used explicitly in species conservation (Ellis, 2001). There are few active attempts by other governments to incorporate ATK and community knowledge into species at risk legislation. The Government of Canada recently passed the Species at Risk Act (SARA), which requires the use of the best available knowledge for decision-making, including “scientific knowledge, community knowledge, and aboriginal traditional knowledge”². The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) is responsible for evaluating the status of species in Canada. COSEWIC is a body that functions at arms-length from the federal government, consisting of eight species specialists subcommittees, a fledgling ATK subcommittee and the general COSEWIC Committee. Members are appointed based on their expertise, and provide independent, impartial scientific advice and recommendations on species. Their species assessments are based on “science and traditional or local knowledge” (COSEWIC, 2002a). However, the majority of COSEWIC members have been appointed according to the scientific expertise; only recently has a member been appointed because of his Aboriginal background. The ATK committee, which, when fully functional, will facilitate the incorporation of Aboriginal traditional knowledge into the COSEWIC status assessment process.

² *Supra* note 1

Although currently rarely used, ATK can contribute pertinent knowledge for determining the status (i.e. endangered, threatened and special concern) of some species. The wolverine (*Gulo gulo*) is one species for which there is limited scientific information regarding populations in northern Canada.

The wolverine is a member of the weasel (Mustelidae) family, and resembles a small bear with a bushy tail. It is an aggressive carnivore that grows to an average of 1m in length, and weighs between 15 to 25kg (CWS, 2002). Wolverines have large home ranges (390-920 km²) and low reproductive potential, are solitary except in breeding season, and are highly mobile (Weaver, Paquet, and Ruggiero, 1996; Banci and Harestad, 1990). Wolverines are considered extremely sensitive to human intrusion, and prefer isolated areas (Landa et al., 1998). Some biologists argue that the absence of human activity is the critical habitat component for wolverines (CWS, 2002). Due to their natural rarity and preference for isolated locations, it is considered the least studied of the large carnivores (Weaver, Paquet, and Ruggiero, 1996).

Prior to European settlement in North America, wolverines were once distributed throughout Canada and Alaska, and through the montane regions as far south as New Mexico and Arizona (Kyle and Strobeck, 2001) (see figure 1). With the advancement of European settlement, wolverine distribution has contracted to mainly northern and western Canada and Alaska. The wolverine in Canada was split into two populations in 1989: the western population (Yukon, NWT, Nunavut, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario), and the eastern population (Quebec, Newfoundland) (COSEWIC 2002b). The eastern Canada population of the wolverine is considered endangered by COSEWIC, as there have been no official sightings of individuals in this population since the early 1980's (CWS, 2002) (see figure 2). The western population is listed by

COSEWIC as special concern. Internationally, the wolverine is listed as vulnerable (VU A2c), meaning it faces a high risk of extinction in the wild in the medium-term future.

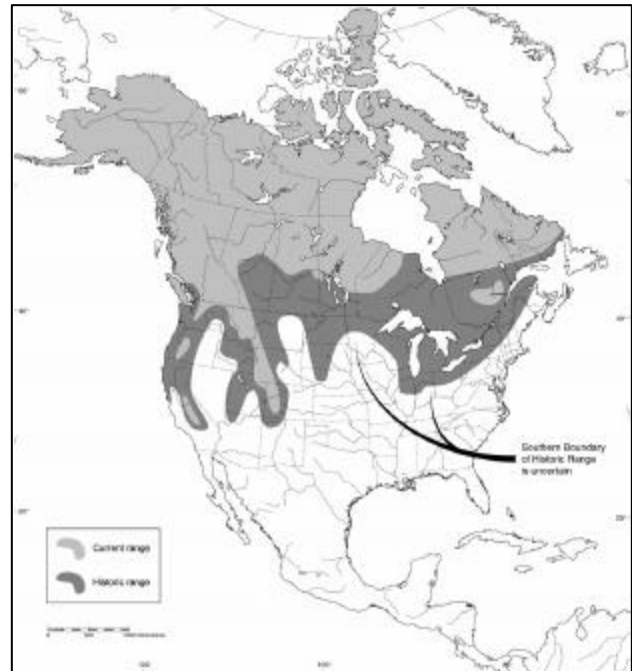


Figure 1: North American distribution of wolverines

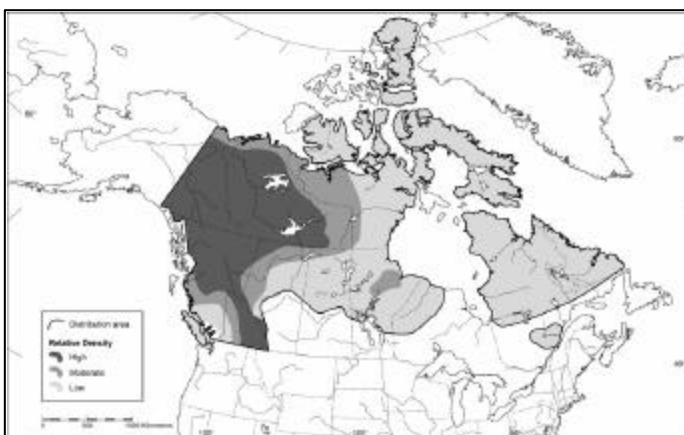


Figure 2: Canadian distribution of wolverines

However, much of the current available knowledge of wolverine populations comes from furbearer data, yet much of the wolverine trapped in northern Canada is used within communities and often goes unreported. Critical information regarding population estimates, habitat use, and distribution is often lacking. Therefore, to adequately capture the available knowledge regarding wolverines, and hence improve the assessment of their current status, wolverine ATK is required. Northern biologists and Aboriginal People indicate that those Aboriginals who have lived in close proximity to the species for many years have accumulated a large body of knowledge regarding the wolverine populations in their respective areas.

The goal of the project was to develop a process on how to incorporate ATK into COSEWIC's species assessment process, using the wolverine as an initial case study. The end results would be a status report of wolverines based on ATK, and a report that would gather information on logistics and feasibility, and provide recommendations on designing a structured process on how to involve ATK into the species assessment process.

2. Project description

2.1. Study area

Interviews were conducted across northern Canada, in the Yukon Territory (YT), Northwest Territories (NWT), and Nunavut (NU) in order to collect a valid regional representation of available wolverine knowledge in northern Canada. Eleven arctic communities were proposed as knowledge collection sites, including Yellowknife, Inuvik, Kulguktuk, and Whitehorse. These eleven sites were chosen based on advice from local hunter and trapper committees (HTCs), regional wildlife management organizations, and local biologists, and response and interest generated from the local communities. As the majority of these communities lack any sort of road access, most were accessed by air.

Interviews took place over 5 weeks during the winter months of January and February, when the majority of people were close to major communities, and were not currently taking long hunting trips. This provided a good opportunity to talk to those people who are knowledgeable but are often out on the land throughout the rest of the year.

2.2 Study Design

“Wolverine experts”, those people who have intimate experience with wolverines in the north, were interviewed to gather knowledge about wolverines in their specific areas. Since “ATK research is neither an opinion poll nor a behavioural survey, random selection of respondents is neither required nor appropriate” (Usher, 2003, p.74). Such experts were chosen with the help and the cooperation community HTCs, regional biologists, and wildlife officers in NWT and NU, and Aboriginal Organizations and regional biologists in YT. Dialogue was initiated with the concerned wildlife management boards, HTCs, regional governments, and Aboriginal organizations (AO) early (10-12 months before the field study) to ensure their involvement in the project and that they are well informed. An initial list of possible experts was developed, and then they were contacted to determine if they would like to participate in the study. Participants were given a description of the project, its intentions, possible implications, and the reasons for their requested participation. Timelines were fashioned according to people's availability and the most feasible contact route.

Interviews were conducted mainly on an individual basis and in familiar settings using a semi-directive approach. The semi-directive approach was the method recommended by the elders in the bowhead study conducted by the Nunavut Wildlife Management Board (NWMB, 2000) and was also the preferred method for a number ATK collection studies in Northern Canada and Alaska (Huntington, 1998; Huntington et al., 1999; NWMB, 2000; Usher, 2003). Open-ended questions intended to collect the participants' information regarding wolverines were used. A map was also used to note key areas (e.g. distribution, areas of high/low population density) as well as propel conversations. Interpreter's were used in some situations to translate Inuktitut when required. With participant's approval,

interviews were recorded with a minidisc recorder. In some situations, where in-person interviews could not be done, interviews were done over the phone. Although not preferred, in some situations, it was the only option available. Participants were compensated for their information with a \$50 cheque.

Questions were developed with the assistance of COSEWIC members, relevant literature, members of WMBs and HTCs, and other participants. Participants were asked a series of questions on the following topics: species information; local use; past distribution, population levels, and status; wolverine habitat; behaviour; food; threats, and; final comments. Questions were designed to access content relevant for COSEWIC species assessment, namely species information, habitat and population information.

2.3 Ethics approval and Prior Informed Consent

Due to location and design of the study, ethics and research approval was needed from a number of different sources. Initially, ethics approval was granted from Dalhousie University’s Social Sciences and Humanities Human Research Ethics Board, which complies with the 1998 TriCouncil Policy Statement on *Ethical Conduct for Research Involving Humans*. Approval for the study to take place was also required from each of the territories: the Nunavut Research Institute (NU), the Aurora Research Institute (NWT), and the Yukon Scientists and Explorers Permit (YT). Communication with each potential study community in NWT, and NU was required before approval would be granted from those two territories. Approval and comments from potential First Nations organizations within whose territory the study would take place was required for the Scientists and Explorers Permit. Therefore, discussions with each potential community and AO were initiated 5-10 months prior to the actual study.

Informed consent was obtained from each participant prior to each interview for the use of his or her knowledge. Prior informed consent (PIC) forms were used, and were available in both in English and Inuktitut. Consent was also obtained to record the interview and use direct quotes used, if agreed to by the participant. If desired by the participant, their identities remained confidential in the report by assigning a number to each interview participant so that their name will not appear in the report

3. Preliminary results

In Total, 30 interviews in 10 different communities were conducted with recognized wolverine experts. One community was excluded after lack of support from the local HTC. Of those 30, 2 were conducted as phone interviews (1 in Old Crow, and 1 in Tuktoyaktuk), and the other 28 were in-person interviews (see table 2). An interpreter was required to translate English and Inuktitut for 1 interview in Arviat and all 5 interviews in Baker Lake. The questions developed were used as a framework to guide the conversation with participants about their knowledge and experiences with wolverines.

However, it was determined early on in the study that some of the questions were too specialized for the level of knowledge of some participants, and were subsequently not asked. Due to the style of wolverine harvesting, the seasons of hunting, and the rarity of wolverines, some participants did not have information about wolverines in non-hunting seasons (i.e. late spring and summer) and consequently generally lacked knowledge about interannual variation in wolverine dispersal, habitat use, and feeding. However, in order not to overlook those who

Study site	# of interviews conducted
Arviat, NU	4
Baker Lake, NU	5
Kugluktuk, NU	4
Yellowknife, NWT	2
Inuvik, NWT	3
Tuktoyaktuk, NWT	6
Old Crow, YT	1
Dawson City, YT	2
Haines Junction, YT	2
Teslin, YT	1
Total	30

Table 2: communities visited and interviews conducted

had knowledge on such subjects, participants were prompted to determine their level of knowledge. Some of the more knowledgeable participants did have such knowledge on the subjects. The following results are preliminary and are subject to review and comment by the participants themselves and community organizations.

Duration and cost of study

Planning for the study was underway approximately 14 months before the field season. The initial two months were to develop a process and proposal acceptable by environment Canada. The majority of regional and community organizations were contacted 8-12 months prior to the field season. The field season itself lasted 5 weeks. Information obtained from interviews is now being verified by the participants and the supporting community organizations. This is estimated to take 2-3 months. After this stage, a draft wolverine status report based on ATK will be produced, and will undergo a COSEWIC review process which is scheduled to take 7 months before a final report will be produced. In total, the project will take approximately 25 months from initiation to completion. Due to the amount of travel required, the expenses incurred were in the form of airfare, since many of these communities are only accessible by air (see table 3). Total cost of the project to date is 13,904.36. It is estimated that another 1,000.00 CAD will be spent on further administration expenses (e.g. reproducing reports, postage, copying data tapes). This price does not include phone calls, faxes, mailing expenses, or any contractor's fee.

Table 3: expenses

Type of Expense	Amount (CAD)
Air travel	\$4,842.80
Accommodation	\$4,820.51
Meals	\$2,239.15
Administration expenses & miscellaneous	\$2,001.90
Total	\$13,904.36
Projected	\$2,000.00
Grand Total	\$15,904.36

4. Conclusions

4.1. Wolverine status

Species Information

Wolverine have a number of names, depending on the language and dialect of the people hunting wolverine. It is called *kalvik* in the Kitikmeot (Kugluktuk) region of Nunavut, and *qavvik* in the Kivalliq (Baker Lake and Arviat) region of Nunavut as well as the Inuvialuit Settlement Region (ISR) (Inuvik and Tuktoyaktuk). Called *nehtryooh* in the Gwitchin of Old Crow and *nehtryuh* in the North Slave region (Yellowknife) of NWT, people described the as looking like a big weasel or little bear, with a strong tail and thick forehead. They have a wide gait, and “look like a turtle” to some. Having a keen sense of smell and hearing, wolverine are never resting, and look like a blowing or rolling ball of fur because of their characteristic gait. Males were described as being larger than females, weighing 15-40 pounds, with an average weight of 25 pounds, with females being 7-10 pounds lighter. One participant reported catching a large male that was 60 pounds. A wolverine's fur will also become faded with the sun, making them less desirable as pelts during the spring and summer months. In addition, wolverine fur will become faded and more grizzled with age. Participants in Arviat thought there were two types of wolverine: a smaller, darker type found more towards Yellowknife, and a larger, lighter type found around Arviat.

Mating and Reproduction

Participants thought wolverine to be shy and solitary, often being seen alone except for a few weeks around breeding season. Breeding season in all parts of the north was thought to be between February and April. During this time, participants reported that males were moving around quite a bit, and that

they would begin to track females. One reported finding an area where males were fighting, likely over a breeding opportunity with a female. Male home ranges are larger and overlap a number of female home ranges to increase chances of breeding success. In the Kitikmeot region, thick bushes of willows in creeks or banks were described as habitat where females will go to give birth. In the Kivalliq region, it was thought to be large rocky areas. In the more mountainous Yukon region, females were thought to give birth higher up in the mountains. All these areas feature safety, warmth, and isolation. Females were thought to give birth early in the spring, having litters from 2-4 young. One participant in Baker Lake stated that wolverine would give birth to a maximum of two young. Females raise the young on their own during the spring and summer months, being intolerant of the male. In the winter, one participant reported seeing the male with the young, after they had reached a larger size.

Outside of the breeding season, wolverine were also observed in all regions feeding in groups. This most often occurred in winter, and always around large animal carcasses, such as muskox, caribou, and moose. People reported seeing groups of between 2 and 4 wolverine feeding at one site. It is likely that wolverine will be more tolerant of each other during the winter months when less fresh food is available and there are more large carcasses around.

Movement/dispersal

Most participants believed that wolverine had home ranges, but that they would also travel and migrate according to food availability. Wolverine were described as always on the move and far ranging, indicating either that some were transients, and also that wolverines may have a very large home range. Some participants stated that wolverines do have an extremely large home range, and they would see the same wolverine moving across their trapline every 2-3 weeks, moving in opposite directions. One participant recognized that the majority of younger wolverines do not have an established home range, and are more transient than older wolverines. They will migrate with the food, in some cases following the wolves and caribou, until they would come across an area where they could establish a home range. This would support the fact that wolverines are transitory, and that they are moving in from refugia to fill those ranges where wolverine had been killed. Participants noted that wolverine will use urine to mark their territories.

Males were thought to travel more than females. This is supported by the fact that the majority of hunters caught mostly males. A hunter would be more likely to come across a male's track than a female's, since the males are covering greater distances, and are moving more often than females are.

Competition

Wolverine were thought to have few true competitors, being an aggressive animal as well as one with good survival skills. Wolverine were known to take food away from much larger animals, such as grizzly bears, polar bears, and foxes. However, some people noted that wolverine would occasionally be killed by wolves. One participant noted that the wolverine he saw killed by wolves was not eaten by the wolves. Participants noted that wolverine would often climb trees to avoid being hunted, and one participant noted that the tracks of the wolverine he found had been killed by wolves were leading to the closest large tree.

Nutrition

Wolverine were reported to have a large and varied diet. Participants reported that wolverine would always be looking for food, and would often leave areas where food availability was poor. Participants thought that wolverines were mainly scavengers, and would often follow wolves during the winter months to feed on their carrion. Often the carrion was caribou, but also moose, bison, and dall sheep, in those areas where those animals are available. People would commonly associate good areas and habitat for wolverine as being areas "where the food is", and wherever wolves would be found. Participants

reported that wolverines would also on occasion kill their own large animal, with people reporting them killing bison, caribou, and sheep. Participants reported wolverine caching food in various locations so that they could feed on it later. One participant reported they preferred to cache food on northerly slopes, which were exposed to less sun, allowing the food to last longer. Wolverine were also thought to eat more ptarmigan in the winter months by sneaking up on them as they lay hiding in the snow.

In addition to carrion, wolverine would feed on whatever food source is available. Snowshoe hares and ptarmigans were identified as important food sources. Some participants in the Yukon felt that wolverine numbers may be affected by the availability of snowshoe hares. Wolverine were also reported to eat porcupine, mice, beaver, fish, ducks, seals, gulls and gull eggs, and lemmings. Participants reported seeing wolverine feed on berries and vegetation in the summer months. Lemmings were also reported as being an important summer food source. One participant described wolverine as eating more meaty foods in the winter, and fresher foods and vegetation in the summer months. Participants also reported wolverine feeding on antlers, bones, and skulls. The varied diet also supports the fact that wolverine do not cycle to the same affect as other animals. Participants reported that wolverine populations were fairly stable, with some highs and lows, but nothing to the same affect as other furbearers such as lynx.

Local Use

Wolverine were considered important for the majority of participants, and were used mainly for fur trimming because of its frost resistant properties. Participants report people eating wolverine in the past, but rarely do today. In the Kivalliq region, wolverine are often sold for money and do not appear as important to people in the ISR or Kitikmeot region, where wolverine is highly prized by local people. Participants in the Kivalliq region reported selling about $\frac{1}{2}$ to $\frac{3}{4}$ of their wolverine catch to the DSD, and keep $\frac{1}{2}$ to $\frac{1}{4}$, depending on how many wolverine they would catch per year. But, in the Kitikmeot and ISR, wolverine were highly prized, with many people not selling any. Those people that sold wolverine usually caught more than 2 per year, and would sell them to people from the community and neighbouring communities. Participants could obtain a much higher price for their pelt by selling it within the community rather than to fur auction. Therefore, since fur auction data is currently used as the main indicator of wolverine catch and population numbers, both catch and population numbers are likely being tremendously underestimated in NWT and Nunavut, and more so in the Kitikmeot region and the ISR than the Kivalliq region. In the Yukon, all trappers have to report their catch, and the majority of people sold nearly all their wolverine pelts, making the census numbers fairly accurate.

While participants noted that many people are catching wolverines these days, they also acknowledge that they are hunting only in certain areas. While snow machines have provided better access for hunters and trappers, they are still exploiting relatively small, concentrated areas in the north. Participants identified several different areas of refugia, where people do not hunt, and/or where wolverine are always dispersing out. Several of these areas are protected by national parks. Trappers believe that trapping does not threaten the wolverine population since less people are trapping these days, largely because it is no longer economically feasible.

Habitat

Participants noted that wolverine could be found almost anywhere, but did acknowledge that they prefer certain types of habitat. In the Kivalliq region, people reported seeing more wolverine closer to and in the treeline. In areas where there were no trees, wolverine preferred hilly, rocky areas, areas that likely provide more food as well as shelter and protection. Females are thought to den in large cracks in boulders. Participants recognized flat, open areas as being poor terrain. In addition, creeks, banks, and riverbeds are seen as good travel corridors for wolverine, and also areas where they would den and cache food. In the Kitikmeot and ISR, people reported finding more wolverine in the treeline, and in

hillier, rockier terrain, and areas of thick bush and willows. Participants also reported that streams and rivers were good traveling corridors for wolverine, as well as denning sites. Thick bushes of willows are areas where females would have their young. Similarly, flat, open areas were reported as poor habitat, but wolverine would be seen there. In the North Slave region, participants found wolverine also preferred the treed areas compared to the barrenlands. In the Yukon, wolverine are often found higher up in the mountains; areas with good shelter, protection, and food. Females have their young up in the mountains, and one participant reported wolverines making dens in the snow under fallen trees. In all areas, participants found wolverine would prefer areas that provided good protection and shelter, either in the form of trees or boulders, and had a large, often steady food source. Breeding females preferred more isolated areas with high levels of protection and cover.

Population levels and trends

The majority of participants indicated wolverines as having low densities. People rarely see wolverines, and often one has to be lucky to actually catch one. In combination with large home ranges, and long-distance movements, it would seem to make the wolverine vulnerable to hunting and trapping pressures, especially with increased access in the form of roads and better transportation. However, the majority of participants reported that wolverine populations were either stable or increasing. Only in Yellowknife did people report that the population might be decreasing. This is supported by the fact that the majority of participants reported catching older males. Catching fewer females means that people are not catching the breeding population, and thus allowing younger males to migrate from refugia to repopulate trapped areas. In addition, people would voluntarily restrict their own hunting or trapping efforts if they saw fewer wolverines than usual. Participants also preferred not to hunt wolverine during the spring and summer months (mid-March to October) because their fur becomes faded. This would decrease concerns of people catching a female wolverine with young.

In the Kivalliq region, people reported that wolverine had dramatically increased over the past 20-30 years. Participants reported that wolf kill programs in the 1950's and 60's likely killed off many of the surrounding wolverines. Consequently, 20-30 years ago, people rarely saw or caught wolverines, and many participants' parents did not catch wolverines. It is likely that populations in these areas are rising again as wolverine move in from surrounding refugia and begin to breed. One participant commented that there are more wolverine today than 20-30 years ago, but not as many as there were before the wolf kill programs, indicating that the population has yet to reach capacity. In the North Slave region, populations were thought to be stable, but also may be decreasing. This may be an indirect result of the high levels of development occurring in the region, potentially causing wolverine to retreat to less-developed areas. In the Kitikmeot region, wolverine populations were reported as being fairly stable or increasing, with small fluctuations in numbers. Populations have always thought to be stable, with good habitat and shelter, plentiful food, and a number of surrounding refugia. The population was also thought to be increasing and/or moving north, as people are seeing wolverine in greater numbers on some of the islands where they rarely were in the past. Similarly, in the ISR, participants commented that wolverine populations were stable. In the northern areas of the Yukon, populations were thought to be increasing do to less people trapping actively trapping in the area. In the central and southern Yukon, populations were described as stable, with small fluctuations in population numbers, likely due to the total availability of food for wolverines. Participants reported that their parents and other elders also caught wolverine at similar to levels to what is being caught today. Again, people reported that fewer people are trapping today than in the past.

Based on participant information, there are high levels of wolverine in the Yukon where mountains are plentiful. Wolverine are also plentiful in the North Slave region, but may be decreasing. In the ISR and Kitikmeot regions, there are very high levels of wolverine, mainly along the northern reaches of the mainland. Wolverine are the least plentiful in the Kivalliq region. Although populations here are likely

increasing, it is unlikely that they will support levels similar to the Kitikmoet region, due to the type of habitat and food availability.

Threats

Participants recognized few threats to wolverine, citing as reasons low development in most areas and low hunting pressure. Some participants believed wolverine to be sensitive to humans and human developments, and some worried that if areas were developed, it may affect wolverine numbers. One participant recognized that global warming may affect wolverine's hunting ability, and would consequently affect their numbers. Trapping was not believed to be a threat to population numbers because fewer people are trapping today than in the past. It is likely that hunting pressure is greater than many participants believe, especially for a species like wolverine with low density and fecundity. However, hunting pressures is likely concentrated to certain areas, allowing for large areas of refugia, where there is little development, to exist. These areas, as long as they are undisturbed, may produce wolverines that will migrate to hunted areas to fill empty home ranges.

4.2. Insights from the case study

Participation & Concerns over confidentiality

Initially, 34 people were approached to take part in the study. 30 participants agreed to take part in the study, and only 4 did not wish to take part. Of those 30, one person did not agree to be tape-recorded. 8 of the 30 participants explicitly wished to remain confidential, while 2 people did not really care either way, but preferred slightly to remain confidential. Therefore, in total 1/3 of the participants were kept confidential. 8 people did not wish to have quotes taken from what they said.

The majority of people who wished to remain confidential did so because they did not want to have their name in the report, and did not want to be bothered by people in the future about the study. Although the study had a good response rate from the original 34 people, such rates should not be expected in more politically hostile areas, or for those species which there is a large level of concern over. Some people in the study expressed concern about the information they shared, hoping the report would not cause their rights and privileges to be restricted. In most areas, people felt comfortable with wolverine, knowing that it is uncommon, but that the population seems to be stable or increasing. In addition, the study took place in northern Canada, where the majority of land claims have been settled. There may be a lower response rate for species that are endangered or whose populations are noticeably decreasing to people, or in areas where land claims are being negotiated.

Who to interview

It is important to interview a wide range of species experts. First, those people who are active on the land, interacting with the species should be interviewed. This provides a present-day source of information. In addition, many of these active people may have already been hunting for at least 15-20 years, and therefore also provide a short-term history of trends and abundances. Second, those elders who were active on the land in the past should also be interviewed. This can provide more historical information on the species, not available from modern people. Their information will often reach back further than scientific study, especially in areas and for those species where there is little or mostly recent scientific research on. These requirements should be made clear to those people and organizations that will identify knowledgeable people.

How to interview

Interviews should be conducted in-person rather than via questionnaire, email, fax, or phone. It is much easier to have a dialogue with a person and it is easier to judge reactions. Phone interviews were conducted for a number of participants when personal visits were impossible, and the amount of

information gathered was less than compared to in-person interviews. In addition, interviews should be conducted in the semi-directive manner, with a loose questionnaire that can be roughly followed, though not in any particular order. This method allows for the interviewer to follow the train of thought of the participant, and build on past points. It allows for a much more relaxed form of interview, both for the interviewer and participant, and allows for better information to be gathered. If interviews cannot be conducted in person, phone interviews would be recommended because they still allow for some interaction between participant and interviewer.

Where to interview

The only major city visited during the wolverine case study was Yellowknife; the rest of the communities were small, and with a significant Aboriginal population. In Yellowknife, only 2 interviews were conducted. This was due in part to lack of support from community organizations where manpower was already stretched, and due to people being more cautious of the study. 2 people declined to be interviewed in Yellowknife alone, with only 1 in all the other communities combined. This may be a typical issue for studies conducted in rural versus urban areas. In smaller communities, it is easier to facilitate contacts due to the familiarity among people and their community organizations. Larger communities generally will have less familiarity with each other, and typically will not be as close as smaller communities. But, not all communities are equal, and in some smaller communities it may also be difficult to establish contacts. In addition, many of the areas visited in the north were already covered by comprehensive land claims, while in the south, land claims are ongoing, and usually has a more politically hostile climate. This may make ATK studies in the south more difficult in some respects than in the north, due to the oftentimes-controversial nature of ATK.

Compensation

The majority of people were happy to share their information on wolverine, and found the 50-dollar compensation more as a bonus to than a requirement for the study. However, 50 dollars may seem like poor compensation for 15-20 years worth of observations on a species, while the majority of money goes to the report writer who only collects the information, not the actual observations. While the information is being collected for the good of the species, it is still important to compensate someone for sharing important information. The question is how, and how much. Some say that the solution would be to just purchase local reports on a species that has been produce by the community. However, I believe this only sidesteps the issue, since once again you are paying a community or report writer, not the people who own the information. It would depend on the community how the money was spent, and on whom. And you still have to pay a report writer. I believe that 50-100 dollar compensations would suffice, with people being paid 100 dollars per hour, with a 50-dollar minimum fee.

Cost of study

The wolverine ATK study will be one of the most expensive ATK studies to be conducted because wolverines have a very broad distribution, mostly in northern Canada. For many of the communities visited, road access is lacking, makes driving impossible, creating higher traveling costs. In addition, travel in the north is generally more expensive than the south: airplane tickets are usually more expensive, along with accommodation and food. Therefore, overall expenses are quite high. And because of its broad distribution, it requires that many communities be visited. But, for species where there distribution is more concentrated and/or in the South, costs would be expected to be much cheaper.

Value of information collected

The information obtained from the ATK study is extremely descriptive and detailed, especially for such a solitary and wide-ranging species. The information provides for a longer timeline of data than currently available on wolverines in the north, and provides more descriptive, finer scale information than currently available, and which could really only be obtained with comparatively expensive DNA or

satellite tracking studies. Much of the information obtained from participants supports and agrees with previous scientific studies on denning (Magoun and Copeland, 1998), diets (Magoun, 1987) and home ranges (Banci and Harestad, 1990) of wolverines. It also supports more recent studies on dispersal (Morten Vangen et al, 2001), foraging behaviour (Alisauskas et al., 2002), and wolf predation (White et al., 2002). In addition, the information obtained from participants supports other traditional knowledge studies done in Old Crow (Sherry and VGFN, 1999), Aklavik (WMAAC (NS) and Aklavik HTC, 2003), and the Gwich'in Settlement Region (Boles, 1975; GRRB 2001).

The future of ATK studies

It is not likely that COSEWIC will commission such expensive ATK studies for all the species being assessed, nor is it necessary. For many species, ATK may only form a small part of the report, since there will be enough information already to make accurate assessments of species. For some species where there is little information or are of high cultural importance to Aboriginal People, ATK may play a larger role. Methods are described below that are designed to help COSEWIC and the ATK subcommittee determine how they should devote their efforts towards collecting ATK. In addition, future ATK studies may not be done solely by COSEWIC. More and more groups, including Aboriginal and other governments, are interested in performing ATK studies. These provide COSEWIC with forming partnerships to do ATK studies or assisting in other ways. One way may be to help set up regional or local species information collection programs in each region or community. For example, helping to establish an annual or seasonal survey/questionnaire that is administered to all hunters and trappers in a community. This would provide a way for people to input what they have seen and learned about the species on a regular basis. Then, COSEWIC could just purchase that information when necessary, or could purchase a report written by a community member which already summarizes the information. Startup and ongoing costs would be minimal, but its success would depend on the work of local community organizations and the response rate to the survey.

The inclusion of Aboriginal traditional knowledge in species assessment touches on a number of biological, economic, cultural, and political concerns, both for species and Aboriginal Peoples in Canada. From a species perspective, using ATK provides another source of information to better our understanding of species, and consequently improve our decision-making and management for that species. The wolverine ATK report will provide a better description on wolverine in northern Canada and improve how we manage and attempt to recover wolverines. Such lessons can be broadened to include many species in Canada that are used regularly by Aboriginal Peoples. Economically, ATK studies may provide another source of revenue for Aboriginal Peoples, who can act as knowledge experts, or perhaps conduct or be contracted by COSEWIC to write ATK reports. However, information from ATK studies may cause economic opportunities such as fur harvesting to be curtailed. If the wolverine ATK study found them to be critically imperiled, it would likely spell the doom for Aboriginal Harvesting. These experiences are likely inevitable and unavoidable, but the issue is how to resolve the differences such that communication, understanding, and information sharing will not be cut off or restricted, and that management will need to incorporate both scientific and Indigenous perspectives of the world. ATK is an important cultural step forward if its use can be steered by Aboriginal Peoples who own the information, rather than users of the information. ATK can promote, recognize, and celebrate the long history, intimate relationship, and knowledge that Aboriginal People have with certain species and the environment. Politically, ATK can help Aboriginal People become involved in policy-making and management issues, such as through the ATK subcommittee of COSEWIC. ATK can act as a key that Aboriginal People can use to improve our understanding of species, actively promote conservation, and make us all proud of the cultural and biological diversity that exists in Canada today.

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