Government of Northwest Territories
Gouvernement des Territoires du Nord-Ouest

Inuvik-Tuktoyaktuk Highway and Harvest

Analysis as part of the Wildlife Effects Monitoring Program

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ABSTRACT

One way in which highways and roads can impact wildlife populations is through increased rates of wildlife mortality due to increased harvest pressure with expanded access. As part of the Wildlife Effects Monitoring Program, this report examines changes in patterns of harvest of wolves, wolverine and grizzly bears before, during and after the construction of the Inuvik-Tuktoyaktuk Highway (ITH). Harvest data for these species is collected as part of existing mandatory harvest reporting or sample collection programs run by the Department of Environment and Natural Resources in collaboration with Hunters and Trappers Committees and Inuvialuit hunters.

Local harvest rates were highly variable from year to year but have not increased since the opening of the ITH. Longer-term increases in harvest rates in the region pre-date highway construction and are likely related to increases in harvest quotas and changes in sample collection, such as increased incentives and simplified sample collection. Hunter submission forms indicate that hunters are seeing similar amounts of animals in the region over the past decade.

Spatial patterns of harvest have shifted in the region, but neither the average distance of harvest from the ITH nor the proportion of harvests close to the road have changed substantially since the opening of the highway. Overall, the data does not indicate that hunters are extensively using the highway to harvest wildlife, although there may be a slight effect for wolves. There may be indirect effects from the highway such as increased access to further afield locations and decreased harvesting along previously used routes and trails.

A major limitation of this study is that it does not account for hunting effort, and the underlying spatial distributions of these wildlife species and their prey are unknown. While the data do not suggest substantial impacts from the ITH on harvest in the region, there may be delayed effects or unreported hunting. Incorporating future years of data into this analysis may help to verify any impacts from the ITH on harvest.

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INTRODUCTION

The Inuvik-Tuktoyaktuk Highway (ITH), officially Northwest Territories Highway 10, is a 138-kilometre all-season gravel road from Inuvik to Tuktoyaktuk (Figure 1) which replaces a seasonal ice road. Approximately 71 kilometres of the route are on Inuvialuit private lands, with the remainder on Crown lands. Construction of the highway began in 2014, and the highway was officially opened to the public on November 15, 2017.

During the review of the draft Environmental Impact Statement (EIS; Environmental Impact Review Board 2011), a number of concerns were raised on the potential impact of the highway on the distribution and abundance of barren-ground caribou (*Rangifer tarandus groenlandicus*), barren-ground grizzly bears (*Ursus arctos*), wolverine (*Gulo gulo*) and wolves (*Canis lupus*). These species are considered important to harvesters or trappers, and/or they are species at risk or of local concern. Specifically, there were concerns that the highway will lead to the loss and disturbance of wildlife habitat (e.g. den sites) and increased wildlife mortality due to increased harvest pressure and traffic-related mortality along the highway. The Wildlife Effects Monitoring Program (WEMP) was developed in consultation with partners to assess the potential impacts of the ITH (Environment and Natural Resources 2017).

Highways can increase rates of wildlife mortality due to vehicle collisions and intensified harvest pressure with expanded access (Environment and Natural Resources 2017). Harvest rates of grizzly bears, wolves and wolverine in the Inuvialuit Settlement Region (ISR) were already being monitored with existing programs. Baseline harvest data is available from the Inuvialuit Harvest Study, which interviewed hunters and recorded estimated harvest numbers and locations for selected species (including grizzly bears, wolves and wolverine) harvested in the ISR from 1988-1997 (Joint Secretariat 2003). The Department of Environment and Natural Resources (ENR) sample collection programs have been collecting data on sex, age and harvest location of wolves (since 2006/2007) and wolverine (since 2004/2005). There is mandatory reporting of grizzly bear mortalities in the ISR. The area around the ITH is currently closed to barren-ground caribou hunting (barren-ground caribou management area I/BC/07); therefore, caribou harvest rates are not included in this analysis. Caribou movements in relation to the ITH are being assessed in a separate report.

This data can be used to identify changing patterns of harvest relative to the highway during the pre-construction, construction, and post-construction phases. The analysis is targeted to the regional study area (RSA), as described in the EIS, which is a 15 km wide buffer running along either side of the proposed highway corridor (30 km total buffer width). This report focuses on wildlife mortality due to harvest; although it is worth noting that no traffic-related

wildlife mortality of caribou, grizzly bears, wolves or wolverine has been reported during construction or operation of the highway.

Figure 1. Location of the ITH and RSA.

To get feedback from local hunters to aid with interpretations, the results from the analysis of hunter submission data were presented at the Wildlife Management Advisory Council (NWT) and Inuvialuit Game Council meetings in September 2021.

Wolf Harvest

Proposed Monitoring as set out in the 2017 Wildlife Effects Monitoring Program

Wolves are an important furbearer species in the ISR, and traditional knowledge and harvest data confirm that wolves utilize the RSA and proposed highway corridor. Wolves are ranked as Secure in the Northwest Territories (NWT) under the General Status Ranking Program and typically display high resilience to harvest and other pressures (Environment and Natural Resources 2017). However, attraction of wolves to gut piles of other species

harvested near the highway might predispose them to increased levels of mortality due to additional hunting and trapping pressure, or vehicle collisions. This prediction will be tested via ENR's existing regional wolf harvest monitoring program.

Although wolf den surveys were included in an earlier version of the WEMP, preliminary field surveys conducted in June/July 2013 indicated that these components should be dropped from the WEMP because of the difficulty in finding enough dens in the RSA to test impact predictions.

Hypotheses to be tested

- If wolf mortality is higher within the RSA during highway construction and use.
- If mitigations and management actions meant to minimize highway impacts on wolf harvest are effective.

Methods

Patterns of wolf harvest: Existing sources of data were analysed to identify changing patterns of wolf harvest relative to the highway in the RSA during the pre-construction, construction and operation phases. ENR's wolf sample collection program has been collecting data on sex, age, and harvest location since 2006/2007 and is an ongoing program that can be used to track this information into the operations phase of the project. Further baseline is provided by the Inuvialuit Harvest Study which recorded location and numbers of wolves harvested in the ISR from 1988-1997 (Joint Secretariat 2003).

Hunting Regulations and Sample Submissions

The ITH is within wolf management area I/WF/05 (Environment and Natural Resources 2020). Inuvialuit have exclusive rights to harvest wolves in the ISR and there is currently no harvest limit. Non-beneficiaries must receive permission from the local hunters and trappers committee (HTC) before hunting wolves anywhere within the ISR.

Prior to 2014, ENR compensated harvesters $100-200 for submitting a whole wolf carcass. Since 2014, ENR compensates harvesters $200 for a complete set of samples. Harvesters also need to submit a completed harvest submission form and a map showing the harvest location, although harvesters do not always complete every field on their harvest submission and therefore differing amounts of data were available for the following analyses (indicated by the sample size).

Wolf Harvest in Inuvik and Tuktoyaktuk

Annual Harvest

Due to different methodologies, it is difficult to compare data from the Inuvialuit Harvest Study to ENR's current sample collection program (Figure 2). Examining trends suggests that wolf harvest has increased in Inuvik and decreased in Tuktoyaktuk since the Inuvialuit

Harvest Study. It is worth noting that the years of the highest wolf harvest by Tuktoyaktuk corresponds to the peak in abundance of the Cape Bathurst and Bluenose-West caribou herds (ACCWM 2014).

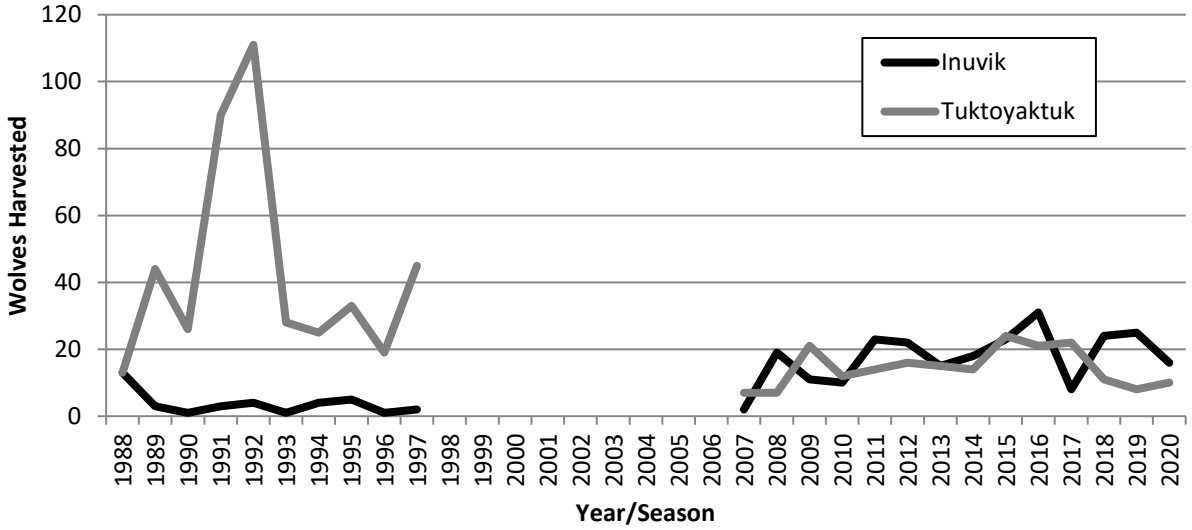

Figure 2. Number of wolves harvested by the communities of Inuvik and Tuktoyaktuk as reported in the Inuvialuit Harvest Study (1988-1997) and through the harvest sample collection program (2007-2020).

Since the beginning of ENR's wolf carcass collection program, Inuvik has shown increasing trends in wolf harvest, while Tuktoyaktuk has remained relatively constant (Figure 3). This could be due to an increase in the wolf harvest incentive, lack of familiarity with the carcass collection program in its early years, wolf availability in the region, or other factors. On average, 28 wolves were harvested annually by the communities of Inuvik and Tuktoyaktuk in the four years prior to road construction (2010-2013), 40 wolves were harvested annually during the construction years (2014-2017) and 31 wolves were harvested annually since the road opened (2018-2020). This does not suggest a recent increase in wolf harvest that could be attributed to the ITH (Figure 3).

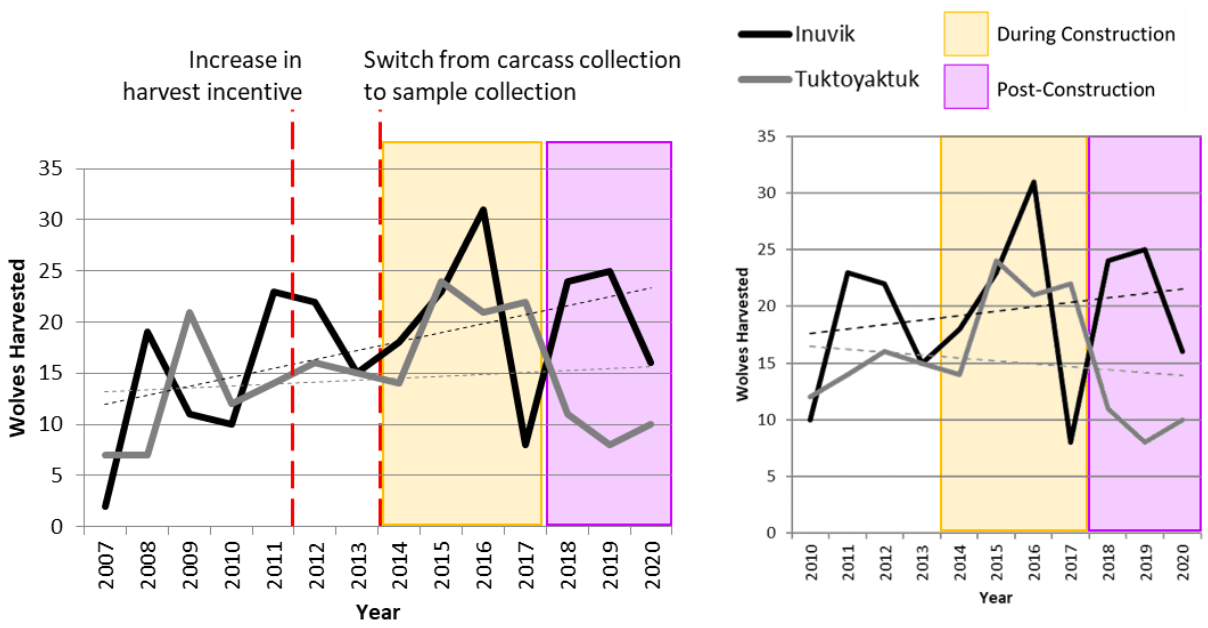

Figure 3. Wolf harvest trends since the beginning of the sample collection program (left) and over the past decade (right), with changes in the sample collection program indicated.

Harvest Season

Current data shows that wolf harvest occurs throughout the winter, peaking slightly in March (Figure 4). With winter harvest, access to hunting and trapping locations is mainly by snowmobile. This pattern is similar to seasonal data from the Inuvialuit Harvest Study, except that wolf harvest peaked in November during the Inuvialuit Harvest Study.

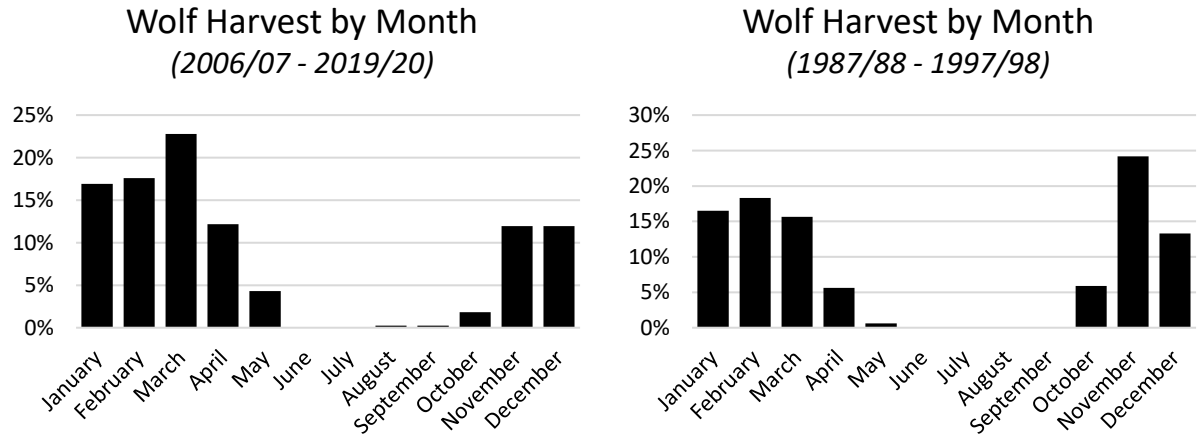

Figure 4. Monthly wolf harvest for Inuvik and Tuktoyaktuk from the current study (left; n=443) and the Inuvialuit Harvest Study (right; n=339).

Harvest Method

Most wolves harvested near Inuvik and Tuktoyaktuk are hunted rather than trapped (91% vs. 9%, Figure 5). The majority of trapping took place below the treeline. The sex ratio of harvested wolves was 55% male and 45% female (n=638). The age structure of harvested wolves was ¾ adults and ¼ juveniles/pups (n=505).

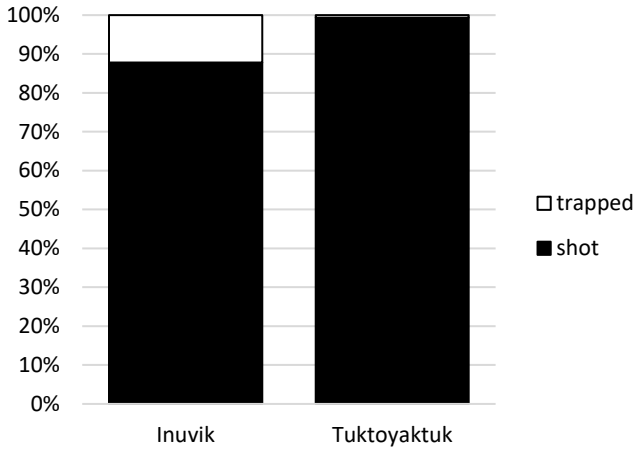

Figure 5. Harvest methods for wolves in Inuvik and Tuktoyaktuk (n=334).

Hunter-observed Wolf Density

ENR's hunter submission forms ask harvesters if they are seeing more, less, or the same number of wolves as usual, although not all hunters complete this field. Since the construction of the ITH, most hunters are reporting that they are seeing the same number of wolves as usual, with no apparent spatial trend in reported changes in wolf density (Figure 6).

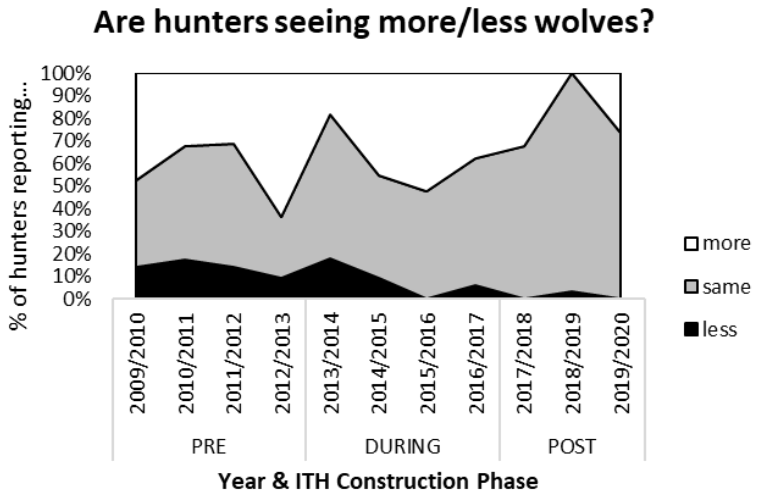

Figure 6. Hunter-reported wolf density within 100 km of the ITH (n=309).

Wolf Packs

One challenge with wolf harvest data is that wolves often travel in packs, and so wolf harvests are non-independent. Hunters report the number of wolves in a pack in their hunter submissions, but it can be difficult to parse out how many wolves they harvested from that pack, especially if they encountered the same pack again over multiple days. To get a general distribution of wolf pack size, wolves were considered to be harvested from the same pack if they were harvested on the same day by the same hunter at approximately the same location, with the same reported pack size.

The previous analyses were re-run using wolf packs rather than wolf kills as the sampling unit, but the results were not substantially affected.

Spatial Distribution of Harvest Relative to the ITH

Examining the spatial distribution of wolf harvest relative to the ITH indicates that wolf harvest may have increased to the west of the highway, between Parsons Lake and Bonnetplume Lake (Figure 7). Wolf harvest appears to have decreased towards the southeast end of the highway, around Jimmy Lake towards Husky Lakes. Overall, wolf harvest appears to have shifted westward since the construction of the ITH. This trend may be influenced by the construction of the ITH, as the area of increased harvest is easy to access through a combination of road access and snowmobile, with most of the harvests in that area occurring about 10 km from the road. Other factors may play a role, however, such as the distribution of wolves in the region, which may have shifted with changes in caribou demographics, reindeer herd location or with the construction of the highway. As wolf abundance and distribution is not being studied in the region, it is difficult to control for this variable.

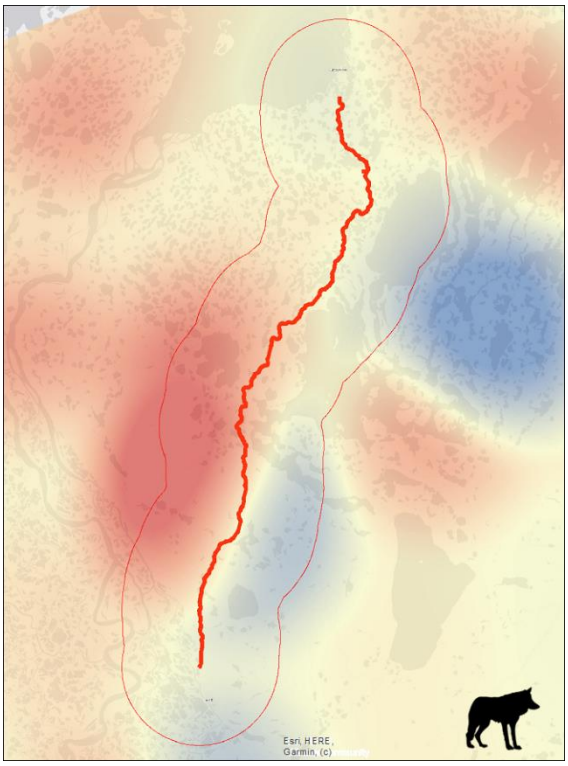

Figure 7. Changes in wolf harvest density from pre-construction (2007-2013) to post-construction (2018-2020): red shading indicates areas where wolf harvest has increased since the ITH was constructed; blue shading indicates areas where wolf harvest has decreased.

If rates of wolf harvest were increasing near the ITH, we would expect the average harvest distance from the ITH to decrease post-highway construction (Figure 8). The average wolf harvest distance from the ITH was 52 km in the four years prior to construction, 61 km during highway construction, and 51 km since the road opened.

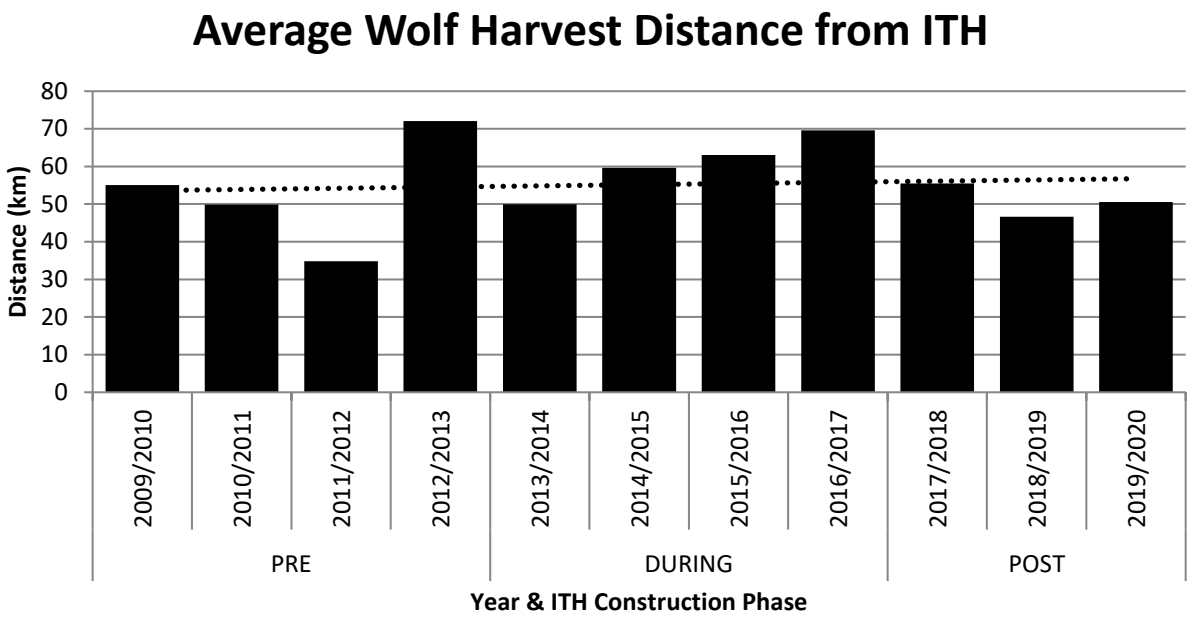

Figure 8. Average distance between reported subsistence harvest locations and the ITH for the communities of Inuvik and Tuktoyaktuk (n=386).

If rates of wolf harvest were increasing near the ITH, we would expect the number of wolves harvested within the RSA to increase relative to the number of wolves harvested outside the RSA. Currently, the trend in wolf harvest within this buffer is proportional to the trend in wolf harvest outside this buffer (Figure 9). In the four years prior to construction of the highway, 22% of wolves were harvested within the RSA. This dropped to 10% during highway construction, then increased back to 26% post-highway construction.

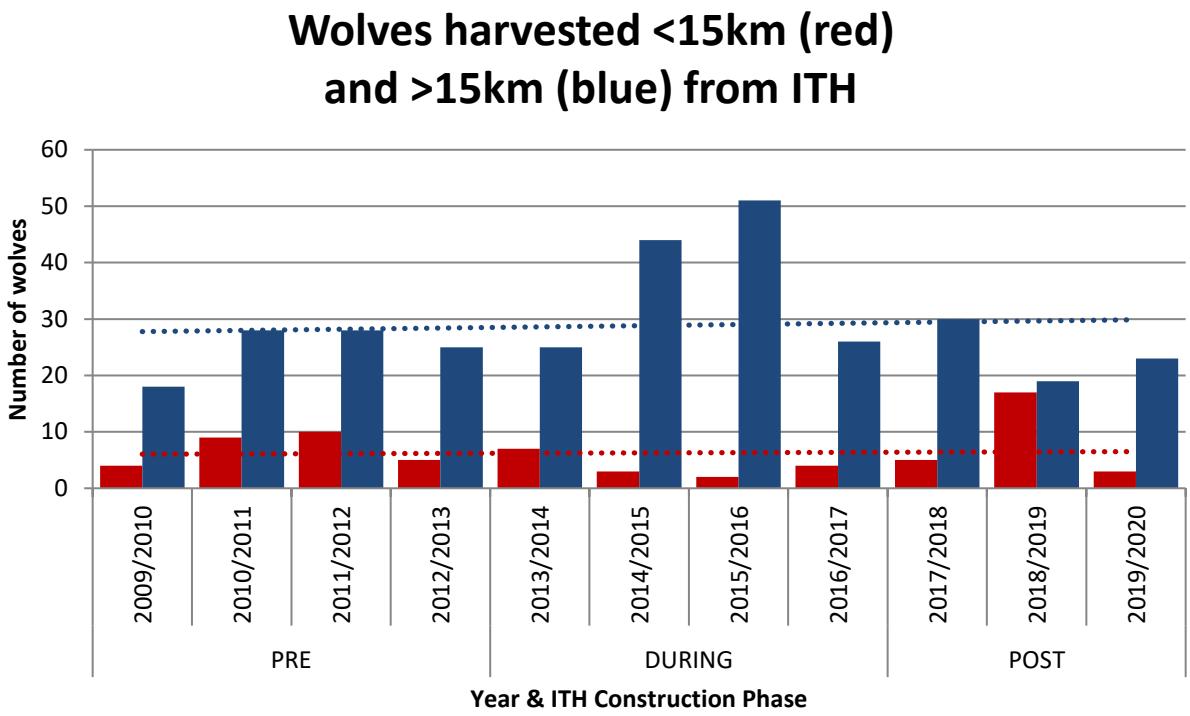

Figure 9. Number of wolves harvested by the communities of Inuvik and Tuktoyaktuk within (red) and outside (blue) of the RSA (n=386).

If rates of wolf harvest were increasing near the ITH, we would expect to see an increase in the proportion of wolves harvested near the road relative to the proportion of wolves harvested further away from the road – a 15 km buffer was used in the preceding graph (Figure 9), but the effect distance could be greater or smaller than that. Looking at the proportion of wolves harvested within different distances of the ITH, we should see an increase in harvest near the road in the post-construction period relative to the pre-construction period (Figure 10). There is an increase in the proportion of wolves harvested around 10 km from the ITH during the post-construction period. The data indicates that this is driven by increased wolf harvest around Parsons Lake and Bonnetplume Lake, which may be related to increased access to these locations due to the ITH.

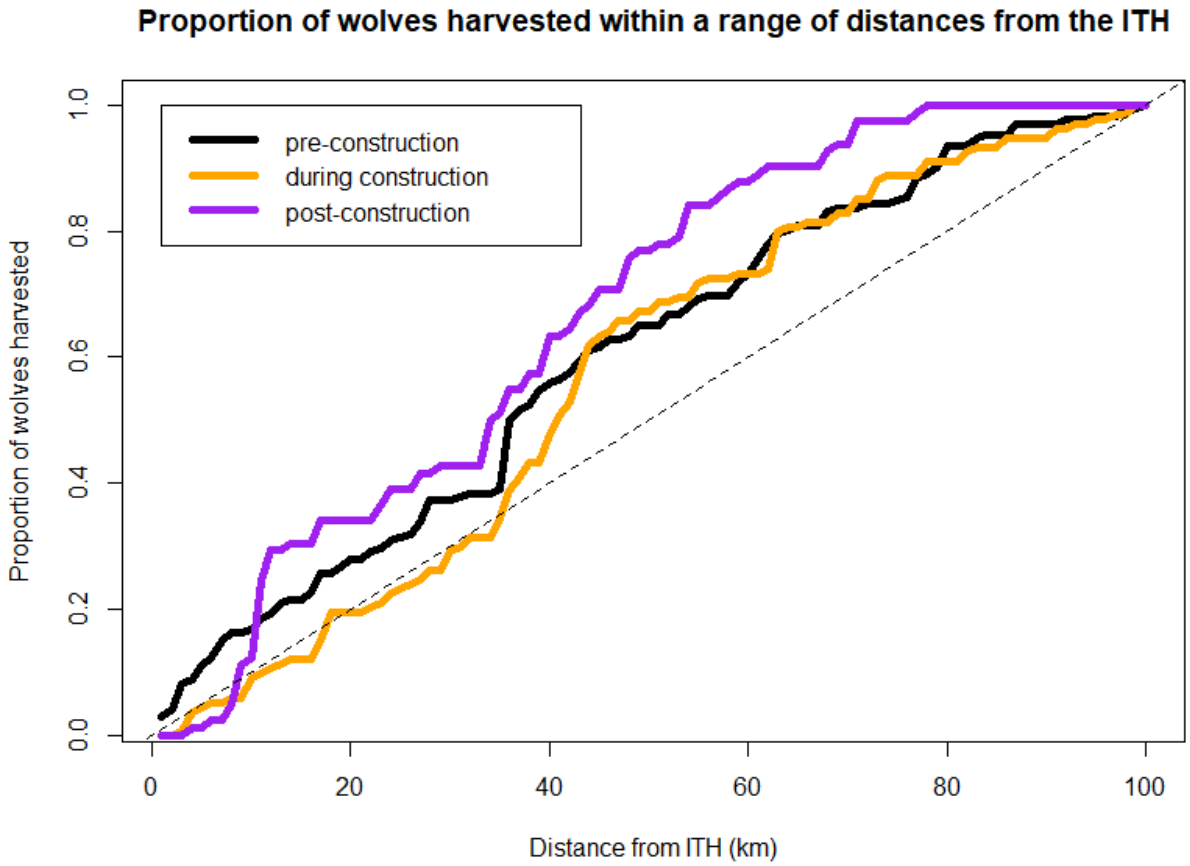

Figure 10. Proportion of wolves harvested between 0-100 km from the ITH.

Prior to the ITH, a seasonal ice road ran between Inuvik and Tuktoyaktuk between January and April every year on the Mackenzie River (Figure 1). Comparing wolf harvest that occurred during these months while the ice road was operational with the same months while the ITH was operational did not reveal any major differences in trends.

Hunter Feedback

Hunters observed that the area of decreased wolf harvest around Noell and Jimmy Lakes corresponds to the location of a snowmobile access trail from Inuvik to Husky Lakes, which was used more before the construction of the ITH.

Wolverine Harvest

Proposed Monitoring as set out in the 2017 Wildlife Effects Monitoring Program

Wolverines are an important furbearer species in the ISR. Harvest and traditional knowledge data confirm that wolverines utilize the RSA. Wolverine are listed as Special Concern under the federal *Species at Risk Act* (COSEWIC 2014, Species at Risk Public Registry 2018b). In the NWT, wolverines are ranked as Sensitive by the NWT General Status Ranking Program but were assessed as Not at Risk by the NWT Species at Risk Committee (SARC 2014). The inclusion of wolverine in the WEMP is based on this status, their low tolerance to human disturbance, and concern over how the proposed highway may result in increased mortality of the species.

Wolverines may use the area within the RSA less than expected during and after construction as a result of noise from construction activity, camps, and vehicle traffic. Alternatively, wolverines may be attracted to camps, cabins, or construction activities associated with the highway if waste and odours are not properly managed. Destruction of nuisance or problem carnivores during highway construction is a concern, although the implementation of the ITH Wildlife and Wildlife Habitat Protection Plan should reduce the potential for defense of life and property (DLP) kills.

Hypotheses to be tested

- If wolverine mortality is higher within the RSA during highway construction and use.
- If mitigations and management actions meant to minimize highway impacts on wolverine harvest are effective.

Methods

Patterns of wolverine harvest: Existing sources of data were analysed to identify changing patterns of wolverine harvest relative to the highway during the pre-construction, construction and operation phase. ENR's wolverine carcass collection program has been collecting data on sex, age, and harvest location since 2004/2005 and is an ongoing program that can be used to track this information into the operations phase of the project. Further baseline information can be provided by the Inuvialuit Harvest Study which recorded location and numbers of wolverine harvested in the ISR from 1988-1997 (Joint Secretariat 2003).

Hunting Regulations and Sample Submissions

The ITH is within wildlife management zone I (Environment and Natural Resources 2020). Inuvialuit have exclusive rights to harvest wolverine in the ISR and there is currently no harvest limit. Non-beneficiaries must receive permission from the local HTC before hunting wolverine anywhere within the ISR.

Prior to 2015, harvesters were compensated $75 for submitting a whole wolverine carcass. Since 2015, harvesters have been compensated $50 for submitting a wolverine head. Harvesters also need to submit a completed harvest submission form and a map showing the harvest location, although harvesters do not always complete every field on the harvest submission and therefore differing amounts of data were available for the following analyses (indicated by the sample size).

Wolverine Harvest in Inuvik and Tuktoyaktuk

Annual Harvest

Due to different methodologies, it is difficult to compare data from the Inuvialuit Harvest Study to ENR's current sample collection program. Examining trends suggests that wolverine harvest in Inuvik has increased since the Inuvialuit Harvest Study, while wolverine harvest in Tuktoyaktuk has remained relatively constant (Figure 11).

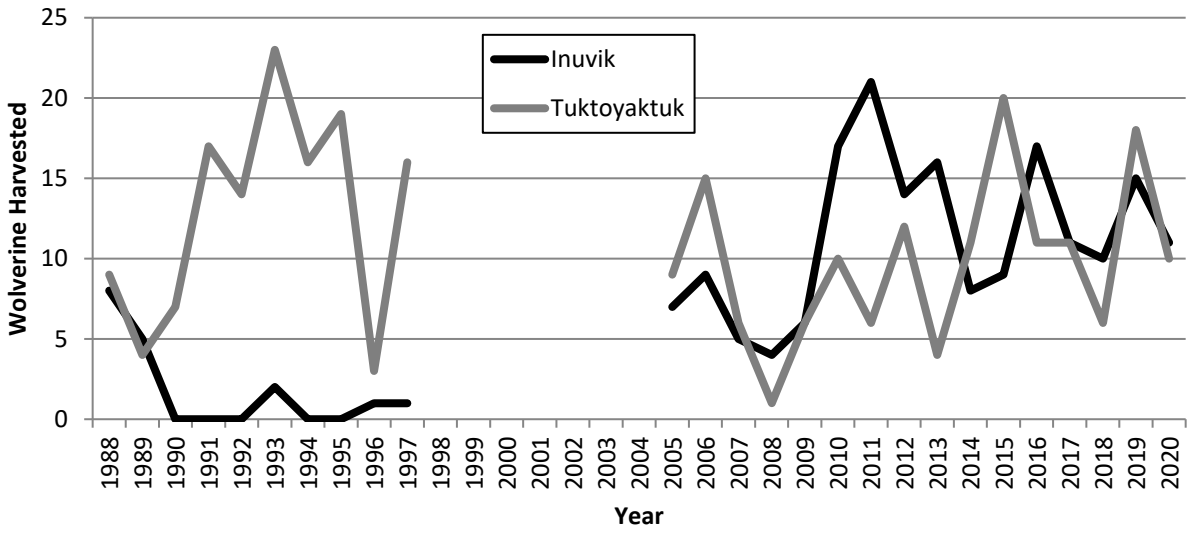

Figure 11. Number of wolverine harvested by the communities of Inuvik and Tuktoyaktuk as reported in the Inuvialuit Harvest Study (1988-1997) and through ENR's harvest sample collection program (2005-2020).

Since the beginning of the hunter-submitted wolverine sample collection program, both Inuvik and Tuktoyaktuk have shown increasing trends in wolverine harvest (Figure 12). This could be due to a lack of familiarity with the carcass collection program in its early years, wolverine availability in the region or other factors. On average, 25 wolverine were harvested annually by the communities of Inuvik and Tuktoyaktuk in the four years prior to road construction (2010-2013), 24.5 wolverine were harvested annually during the construction years (2014-2017) and 23 wolverine were harvested annually since the road opened (2018-2020). This does not suggest an increase in wolverine harvest that could be attributed to the ITH (Figure 12).

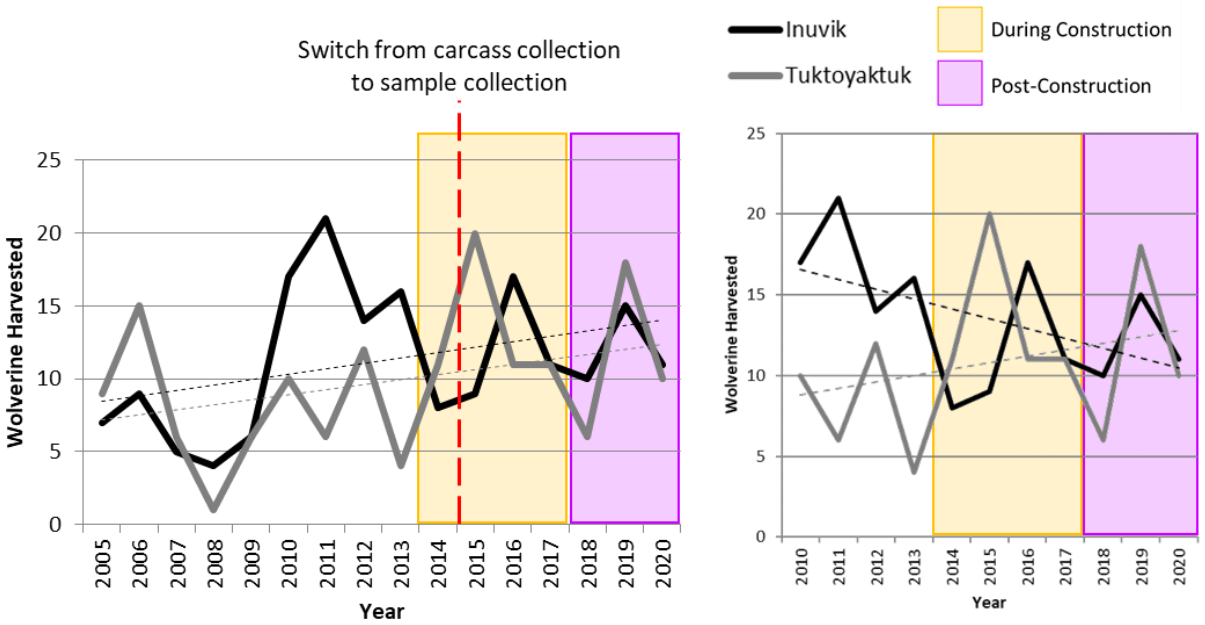

Figure 12. Wolverine harvest trends since the beginning of ENR's carcass collection program (left) and over the past decade (right), with changes in the sample collection program indicated.

Harvest Season

Data submitted to ENR shows that the majority of wolverine are harvested during the winter, which is consistent with seasonal data from the Inuvialuit Harvest Study (Figure 13). With winter harvest, access to hunting and trapping locations is mainly by snowmobile.

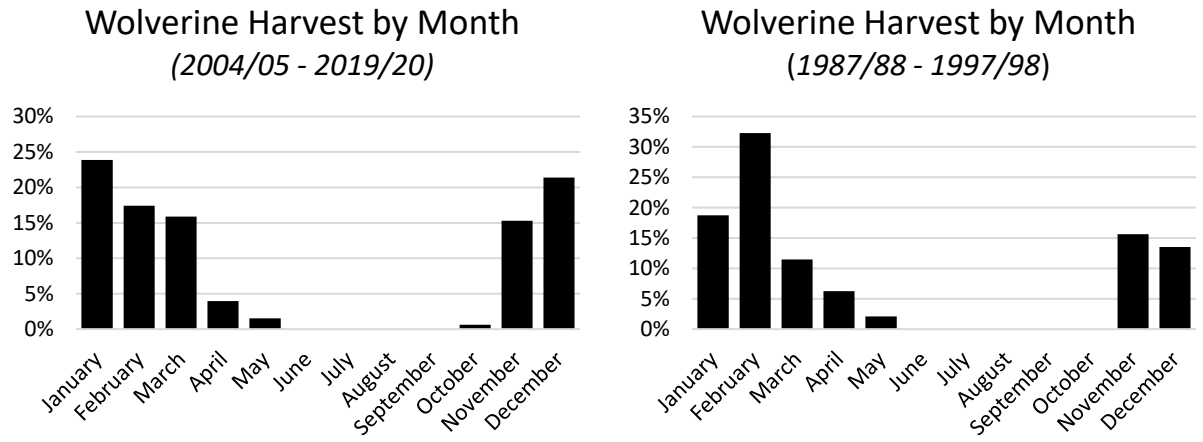

Figure 13. Monthly wolverine harvest for Inuvik and Tuktoyaktuk from the current study (left; n=327) and the Inuvialuit Harvest Study (right; n=96).

Harvest Method

Hunters used a mix of hunting and trapping to harvest wolverines (Figure 14). Overall, slightly more wolverine were shot than trapped (57% vs. 43%) but the harvesting method varied by community. Most trapping took place below the treeline. Harvested wolverine were 2/3 male and 1/3 female (n=401). Adults made up the majority of harvest wolverine (70%) with 10% juveniles and 20% yearlings (n=408).

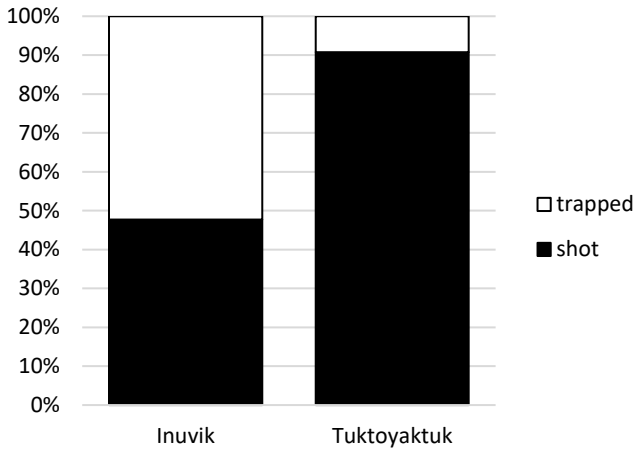

Figure 14. Harvest methods for wolverine in Inuvik and Tuktoyaktuk (from 407 wolverine sample submissions).

Hunter-observed Wolverine Density

Hunter submission forms ask harvesters if they are seeing more, less or the same number of wolverines as usual, although not all hunters complete this field. Since the construction of the ITH, most hunters are reporting that they are seeing the same number or more wolverine than usual (Figure 15), with no apparent obvious spatial trend in reported changes in wolverine density.

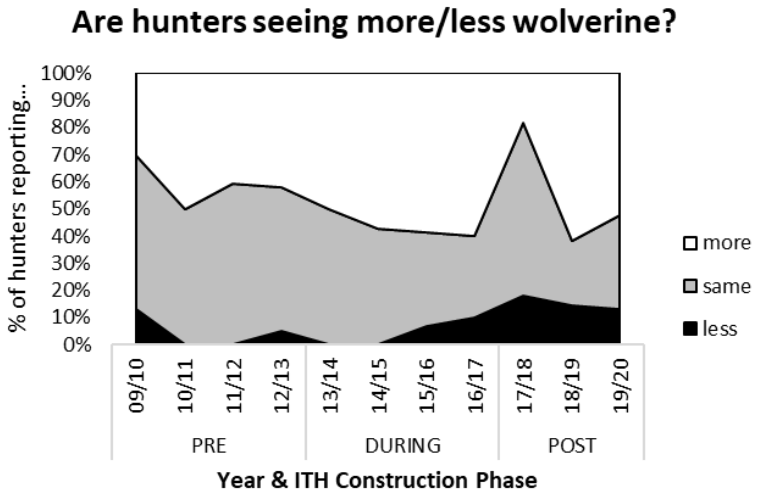

Figure 15. Hunter-reported wolverine density within 100 km of the ITH (n=243).

Spatial Distribution of Harvest Relative to the ITH

Examining the spatial distribution of wolverine harvest relative to the ITH indicates that wolverine harvest may have increased near the community of Tuktoyaktuk at the north end of the highway and decreased at the south end of the highway, around Jimmy Lake (Figure 16). Both these areas can be easily accessed from communities by snowmobile with or without the use of the ITH, therefore this shift does not suggest that more harvesters are using the road to access wolverine hunting locations. The harvest increase near Tuktoyaktuk may be partly driven by hunters not reporting exact harvest locations. However, other factors may play a role, such as the distribution of wolverine in the region, which may have shifted with the construction of the highway. As wolverine abundance and distribution is not being studied in the region, it is hard to control for this variable.

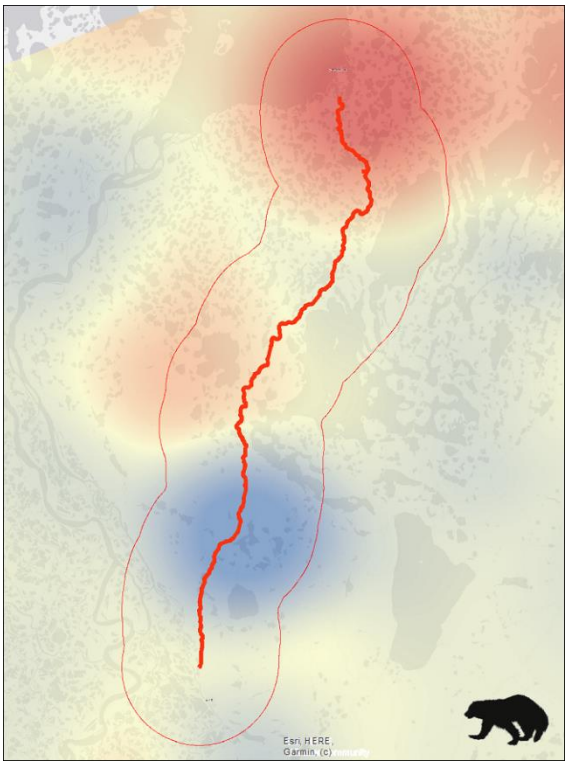

Figure 16. Changes in wolverine harvest density from pre-construction (2005-2013) to post-construction (2018-2020): red shading indicates areas where wolverine harvest has increased since the ITH was constructed, blue shading indicates areas where wolverine harvest has decreased.

If rates of wolverine harvest were increasing near the ITH, we would expect the average harvest distance from the ITH to decrease post-highway construction (Figure 17). The average wolverine harvest distance from the ITH remained constant between 44-48 km prior to, during and post-highway construction.

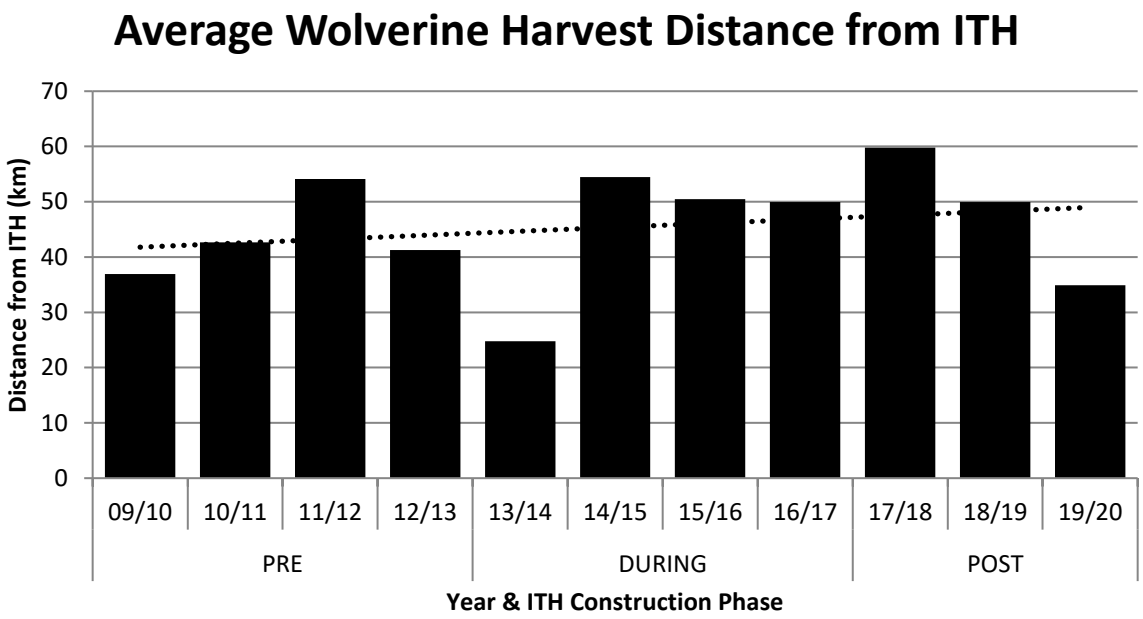

Figure 17. Average distance between reported subsistence harvest locations and the ITH for the communities of Inuvik and Tuktoyaktuk (n=268).

If rates of wolverine harvest were increasing near the ITH, we would expect the number of wolverines harvested within the RSA to increase relative to the number of wolverines harvested outside the RSA. Currently, the trend in wolverine harvest within this buffer is proportional to the trend in wolverine harvest outside this buffer (Figure 18). Twenty-four percent of wolverine were harvested within the RSA in the four years before the highway was constructed. This dropped to 15% during highway construction, then increased back to 21% post-highway construction.

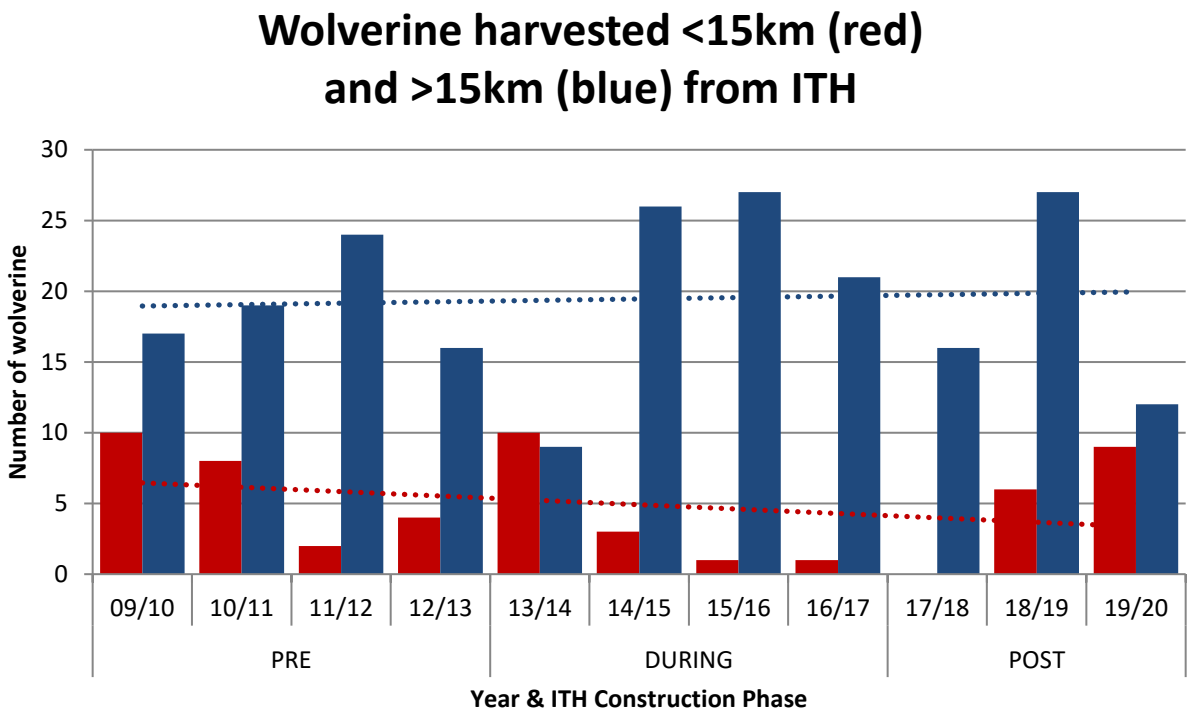

Figure 18. Number of wolverine subsistence harvested by the communities of Inuvik and Tuktoyaktuk within (red) and outside (blue) of the RSA (n=268).

If rates of wolverine harvest were increasing near the ITH, we would expect to see an increase in the proportion of wolverine harvested near the road relative to the proportion of wolverine harvested further away from the road – a 15 km buffer was used in the preceding graph (Figure 18), but the effect distance could be greater or smaller than that. Looking at the proportion of wolverine harvested within different distances of the ITH (Figure 19), we should see an increase in harvest near the road in the post-construction period relative to the pre-construction period. For wolverine, the post-construction harvest distance curve follows a similar pattern to pre-construction and during construction. This does not suggest a substantial uptick in harvesting near the ITH.

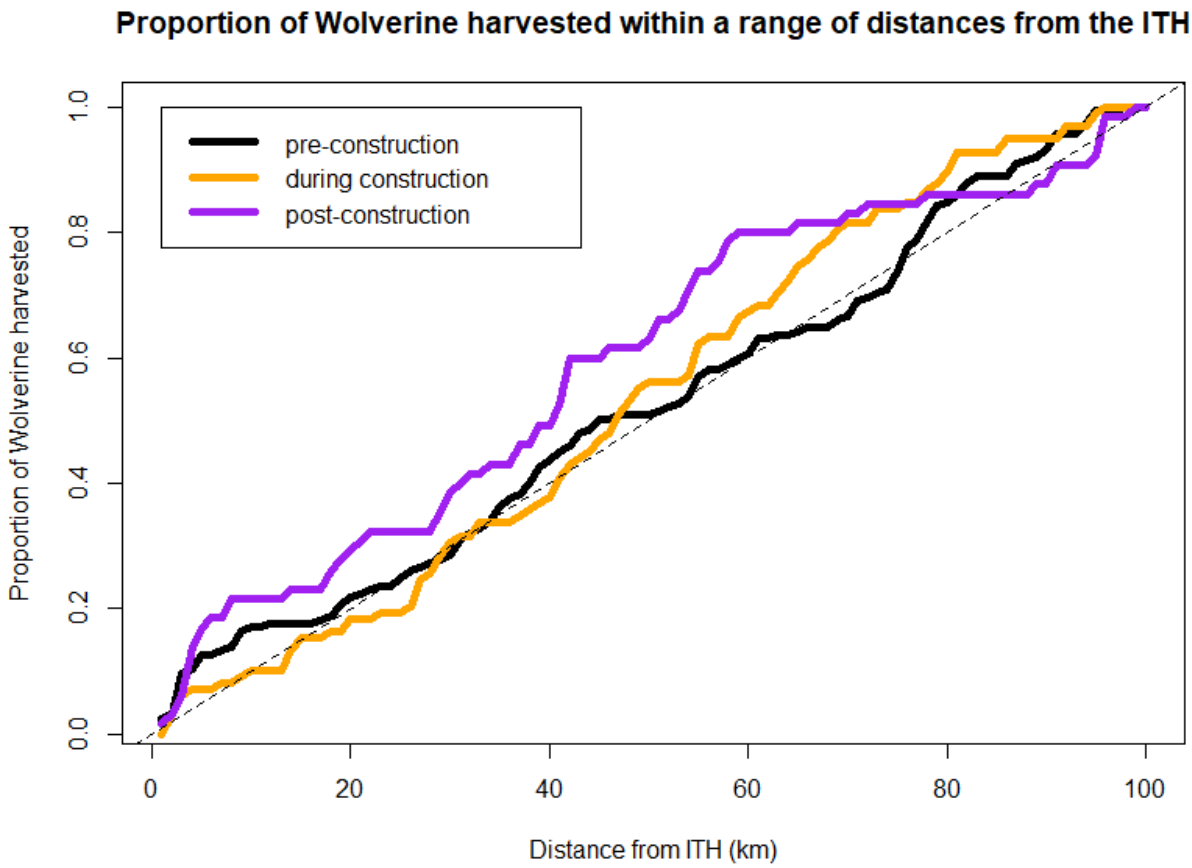

Figure 19. Proportion of wolverine harvested between 0-100 km from the ITH.

Prior to the ITH, a seasonal ice road ran between Inuvik and Tuktoyaktuk between January and April every year (Figure 1). Comparing wolverine harvest that occurred during these months while the ice road was operational with the same months while the ITH was operational did not reveal any major differences in trends.

Hunter Feedback

Hunters observed that the area of decreased wolverine harvest around Noell and Jimmy Lakes corresponds to the location of a snowmobile access trail from Inuvik to Husky Lakes, which was used more before the construction of the ITH.

Grizzly Bear Harvest

Proposed Monitoring as set out in the 2017 Wildlife Effects Monitoring Program

Grizzly bears are listed as Special Concern under the federal *Species at Risk Act* (COSEWIC 2012, Species at Risk Public Registry 2018a). In the NWT, grizzly bears are ranked as Sensitive by the General Status Ranking Program and by the NWT Species at Risk Committee, although they are not listed on the NWT List of Species at Risk (SARC 2017). The inclusion of grizzly bears in the WEMP for the construction of the ITH was based on this status, their low tolerance to human disturbance and concern over how the proposed highway may result in changes in distribution and increased mortality of the species.

Industrial development presents several threats to bear populations including the potential for increased destruction of bears involved in human-bear conflicts, potential for collisions with vehicles and the alteration and fragmentation of habitat. The highway may increase ease of access and possibly increased mortality resulting from hunting. However, hunting is managed under a quota system and all human-caused mortalities are counted under the quota. Any increases in mortalities due to human-bear conflicts or collisions will cause a decrease in tags available to harvesters.

Grizzly bears in the Arctic are at the northern extent of their range, where they have naturally low densities. Because they live in areas of low productivity, they have large area requirements. During and after construction, grizzly bears may use areas along the highway less than expected as a result of noise from construction activity, camps and vehicle traffic. Alternatively, grizzly bears may be attracted to camps, cabins or construction activity if waste and odours are not properly managed; these individuals may be removed from the local population as problem wildlife. After the highway is opened, additional mortalities may occur if grizzly bears are attracted to kill sites near roads and are subsequently hunted. Direct grizzly bear mortality associated with vehicle collisions is expected to be a rare event.

Hypotheses to be tested

Grizzly bear harvest mortality was assessed before construction of the highway. This information will form the baseline conditions from which it will be determined if rates of grizzly bear mortality within the RSA are higher during and after highway construction (i.e., because of vehicular mortality, increased harvest pressure, or removal of problem bears).

Methods

To get a better understanding of the impact of the highway on direct mortality in the RSA, DLP kills, harvest data and other incidental mortality data (vehicle collisions, etc.) was tracked before, during and after highway construction. This information will be used to determine if any actions, such as harvest management along the highway, are necessary.

As ENR records for grizzly bear harvest in the study area go back to the late 1980s, harvest locations post construction were compared to historic grizzly bear harvest data to look at changes in the distribution of the harvest. Levels of DLP kills and other types of mortality pre-, during and post construction were monitored. There is mandatory reporting of grizzly bear mortalities in the ISR.

Hunting Regulations and Sample Submissions

Inuvialuit have exclusive rights to hunt grizzly bears in the ISR and can allow the transfer of that right to other hunters. Grizzly bear hunting in the area adjacent to the ITH is conducted under quota (Figure 20), which was first introduced in 1994. The highway traverses two management areas: Inuvik area I/GB/03 and Tuktoyaktuk area I/GB/04 (Environment and Natural Resources 2020). All human-caused mortalities of grizzly bears are counted under the quota. Therefore, if there are DLP or highway collision mortalities, this will impact hunting opportunities in the communities.

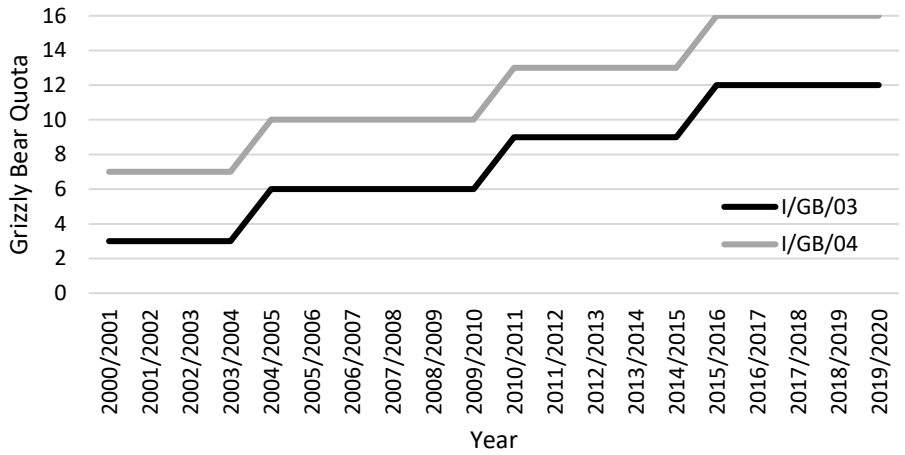

Figure 20. Grizzly bear quotas near the ITH from 2000-2020.

Non-beneficiaries must receive permission from the local HTC and a tag before hunting grizzly bears anywhere within the ISR. Under the HTC by-laws and the *Wildlife Act*, it is mandatory to report grizzly bear kills and provide certain samples to ENR. Harvesters are compensated between $35-130, depending on which samples are submitted. Harvesters are also required to complete a Hunter Kill Return Form and provide a harvest location.

Grizzly Bear Harvest in Inuvik and Tuktoyaktuk

Annual Harvest

A study by Nagy et al. (1983) found that between 1974-1977 an average of eight grizzly bears were harvested annually (range of 6-11) in the area encompassing Tuktoyaktuk Peninsula and Richard's Island. Most of the bears were harvested near Husky Lakes and males were almost twice as susceptible to being harvested as females. Grizzly bear harvest areas and harvest limits have since been implemented through HTC by-laws.

The Inuvialuit Harvest Study collected data on grizzly bear harvest from 1988-1997, however, harvests were underreported in this study, with between 0-4 bears harvests reported annually for the communities of Inuvik and Tuktoyaktuk. The ENR grizzly bear harvest database has been collecting data since 1986. This database may have underreported harvest data during its early years, but in general it shows increasing grizzly bear harvest trends in Inuvik and fairly consistent harvest in Tuktoyaktuk (Figure 21).

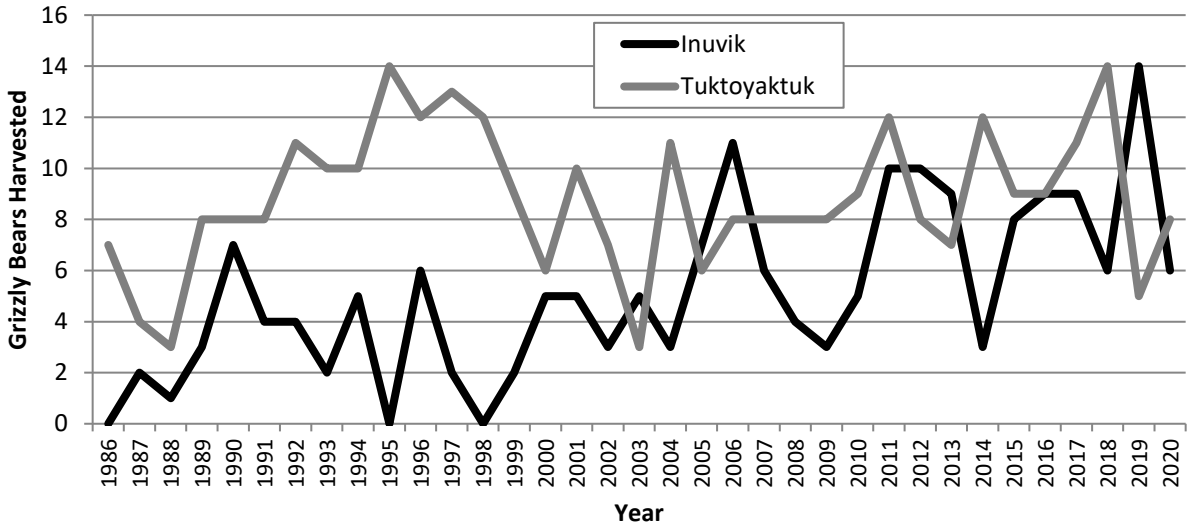

Figure 21. Number of grizzly bears harvested by the communities of Inuvik and Tuktoyaktuk as reported in the ENR's harvest database (1986-2020).

Both Inuvik and Tuktoyaktuk have shown increasing trends in grizzly bear harvest over the past 20 years (Figure 22); however, this is likely due to increasing grizzly bear quotas (Figure 20). On average, 17.5 grizzly bears were harvested annually by the communities of Inuvik and Tuktoyaktuk in the four years prior to road construction (2010-2013), during the construction years (2014-2017), and since the road opened (2018-2020). This does not suggest an increase in grizzly bear harvest that could be attributed to the ITH (Figure 22).

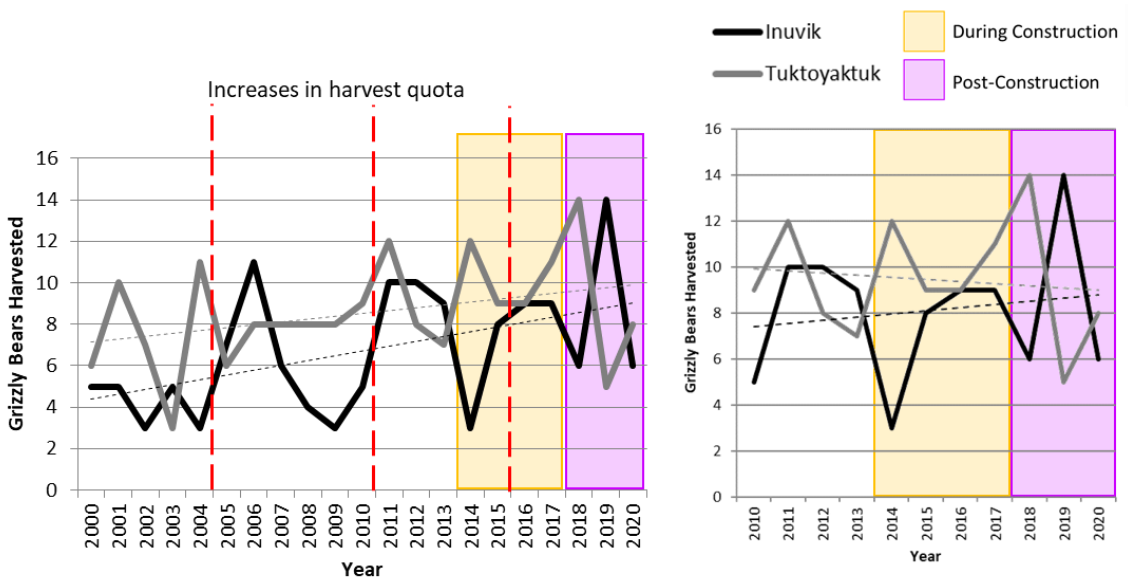

Figure 22. Grizzly bear harvest trends over the past two decades (left) and over the past decade (right), with changes in the sample collection program indicated.

Harvest Season

Grizzly bears hibernate during the winter, so harvest occurs primarily in the spring months: half of all harvests occurred in May (Figure 23). Approximately 75% of bears harvested were male, and approximately 25% were female.

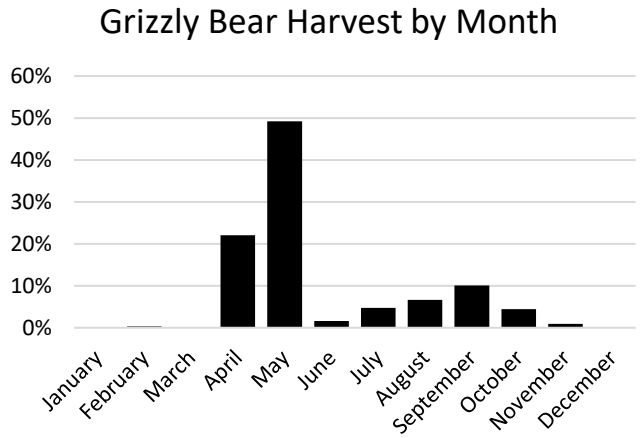

Figure 23. Monthly grizzly bear harvest for Inuvik and Tuktoyaktuk from the current study (n=317).

Defense of Life or Property (DLP) Kills

Bears that were killed in defense of life or property (DLP) were not included in the previous analyses. The low numbers and high variability between years in DLP kills makes it difficult to tell if the ITH is having an impact on the number of these bears in the region (Figure 24).

However, there have been no DLP kills directly related to the construction or operations of the highway.

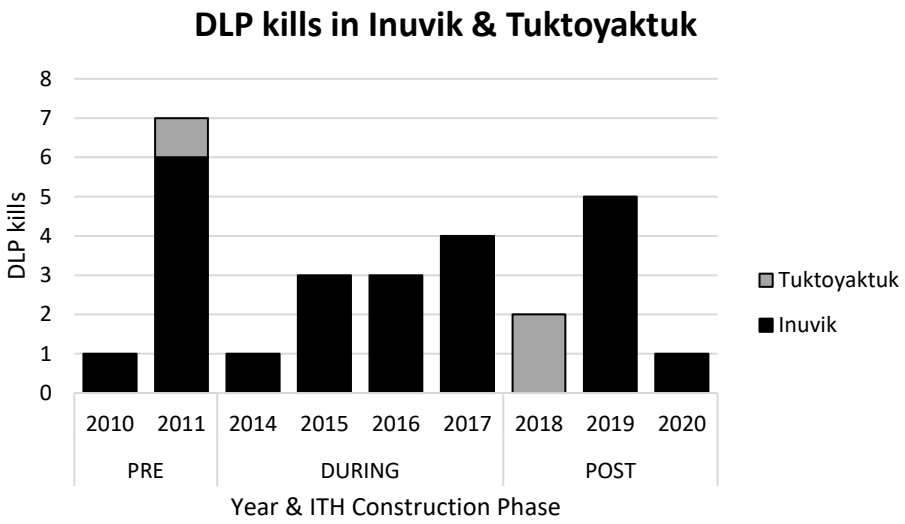

Figure 24. Bears killed in DLP in Inuvik and Tuktoyaktuk (no DLP kills were reported in 2012 and 2013).

Spatial Distribution of Harvest Relative to the ITH

Examining the spatial distribution of grizzly bear harvest relative to the ITH indicates that bear harvest may have increased along the channels of the Mackenzie River and near Noell Lake and decreased along the Husky Lakes (Figure 25). This shift does not suggest that more harvesters are using the road to access grizzly bear hunting locations. Other factors may play a role; however, such as the distribution of grizzly bears in the region, which may have shifted with changes in caribou or reindeer demographics or with the construction of the highway. In another project that is part of the WEMP, grizzly bear abundance and distribution is being measured with a hair-snag genetics survey, which will be able to provide more insight as to whether these factors have changed since the construction of the highway.

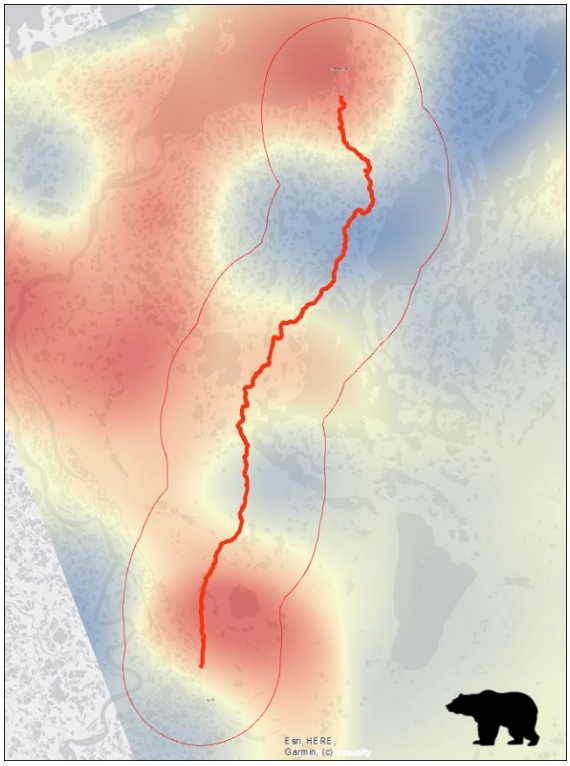

Figure 25. Changes in grizzly bear harvest density from pre-construction (2000-2013) to post-construction (2018-2020): red shading indicates areas where bear harvest has increased since the ITH was constructed, blue shading indicates areas where bear harvest has decreased.

If rates of grizzly bear harvest were increasing near the ITH, we would expect the average harvest distance from the ITH to decrease post-highway construction (Figure 26). The average grizzly bear harvest distance from the ITH was around 55 km prior to and during highway construction. The average distance has decreased post-construction, with the average bear harvested 43 km from the ITH.

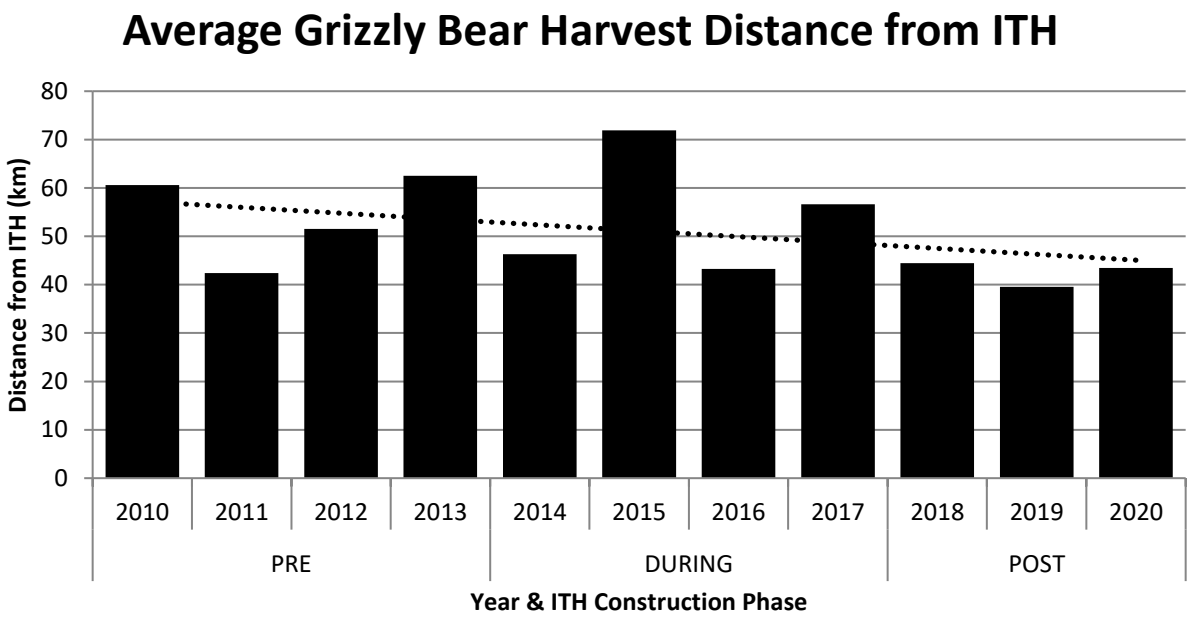

Figure 26. Average distance between reported subsistence harvest locations and the ITH for the communities of Inuvik and Tuktoyaktuk (n=153).

If rates of grizzly bear harvest were increasing near the ITH, we would expect the number of bears harvested within the RSA to increase relative to the number of bears harvested outside the RSA. Currently, the trend in grizzly bear harvest within this buffer is proportional to the trend in grizzly bear harvest outside this buffer (Figure 27). 19% of bears were harvested within the RSA in the four years before the highway was constructed. This dropped to 14% during highway construction, then increased back to 23% post-highway construction.

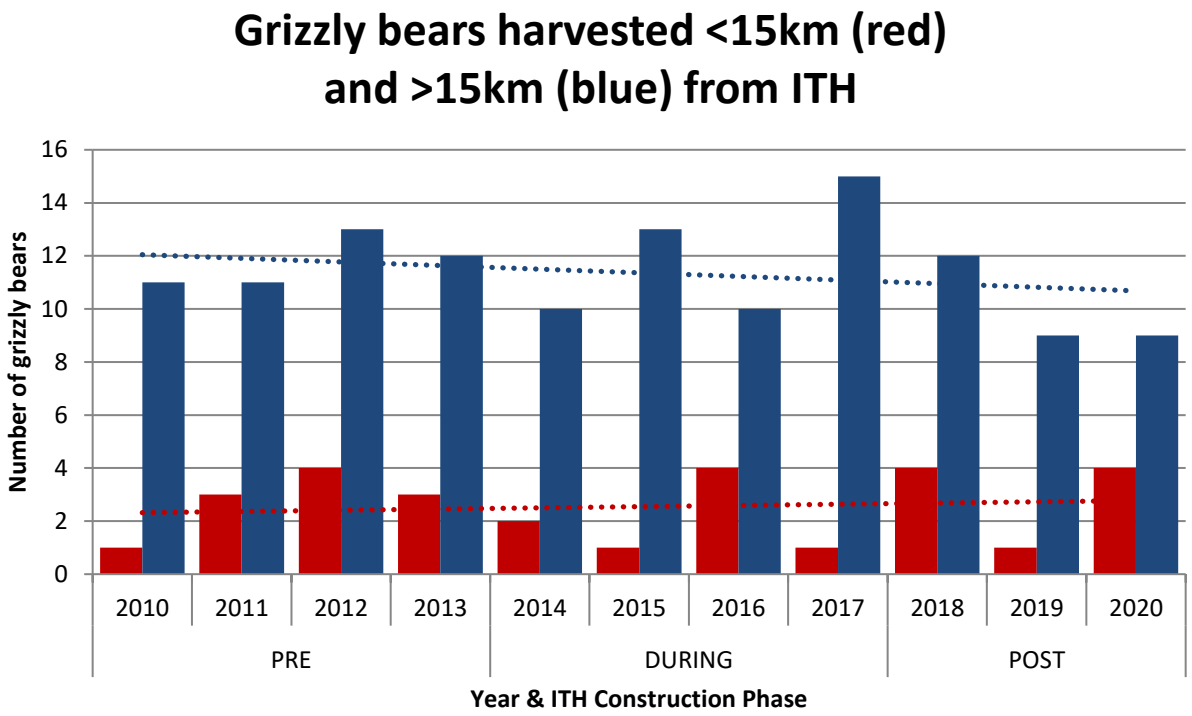

Figure 27. Number of grizzly bears subsistence harvested by the communities of Inuvik and Tuktoyaktuk within (red) and outside (blue) of the RSA (n=153).

If rates of grizzly bear harvest were increasing near the ITH, we would expect to see an increase in the proportion of bears harvested near the road relative to the proportion of bears harvested further away from the road – a 15 km buffer was used in the preceding graph (Figure 27), but the effect distance could be greater or smaller than that. Looking at the proportion of bears harvested within different distances of the ITH, we should see an increase in harvest near the road in the post-construction period relative to the pre-construction period (Figure 28). For grizzly bears, the post-construction harvest distance curve follows a similar pattern to pre-construction and during construction. This does not suggest a substantial increase in harvesting rates near the ITH.

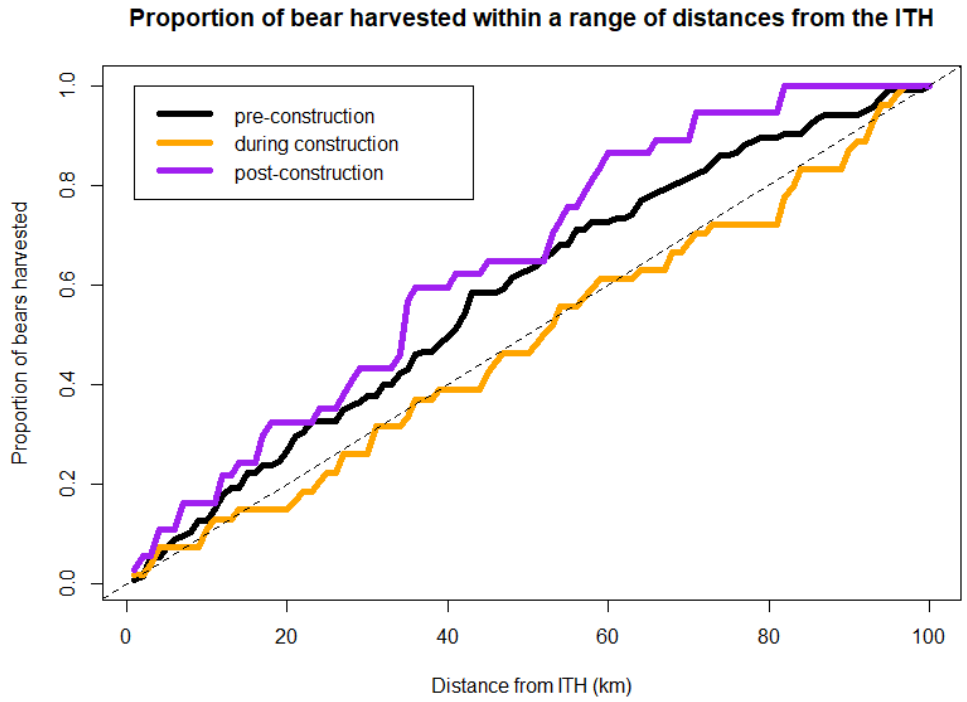

Figure 28. Proportion of grizzly bears harvested between 0-100 km from the ITH.

Hunter Feedback

Grizzly hunters will choose an animal to hunt based on its size, and some areas don't have many big bears. Hunters will pass up small bears in order to get the biggest bear, with one hunter reporting passing 16 bears before selecting one to hunt. Therefore, areas of increased harvest may not be reflective of grizzly bear presence, but could indicate areas of high-quality habitat, which may be dominated by large male bears.

DISCUSSION

Shifts in hunting patterns can be due to a variety of factors other than road access. Changes in climate, habitat or prey species can impact predator abundance and distribution. For example, community members indicated that the reindeer herd used to come closer to Inuvik. The location of the reindeer herd, as well as other prey species such as caribou and moose, will affect where predator species are located, and subsequently harvested. Caribou distribution relative to the ITH is being analyzed in a separate study, but there are no studies looking at the distribution of moose or other prey relative to the ITH. Hunters also often mention fur prices as a factor influencing how many (and which) animals they harvest.

As hunter submission forms are only returned for successful hunts, one major limitation of this analysis is that it does not account for hunting effort. Therefore, we cannot evaluate if the ITH has affected where hunters are looking for animals, only where the animals are harvested. Additionally, harvesters do not always report exact harvest locations, so some harvest locations are estimated from location comments such as "Husky Lakes" or "near Tuk" – this should not have a substantial impact on these results if this reporting has remained consistent over time.

A few hunters indicated that the ITH makes hunting easier; geese and moose were noted as animals that are commonly hunted near the road. Several community members noted that a major impact from the ITH is easier access to Husky Lakes for both boats and snow machines. There has been an increase in the number of people going to Husky Lakes and more cabins being built there since the ITH opened. This is an example of how the ITH could indirectly affect hunting distribution through increasing access to other areas, even if these areas are not within the RSA. However, in this case, the data shows a general decrease in hunting wolves, wolverine, and grizzly bears near Husky Lakes since the opening of the ITH.

Community feedback indicated that people have regular hunting areas that they go to, but that these areas may change gradually over time and new hunting locations may be affected by the ITH. We may not see harvesting effects until years later and it was suggested that this analysis should be re-done in a few years to look for delayed effects.

There were also concerns that despite the area around the ITH being closed to caribou hunting, there may still be people harvesting caribou in the closed zone, and there should be more ENR presence patrolling the road to prevent this.

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