Wek'èezhìı
Renewable Resources Board

October 11, 2017

Simon Toogood, Environmental Assessment Officer
Mackenzie Valley Environmental Impact Review Board
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***Via Email***
***stoogood@reviewboard.ca***

**Re: Technical Report – EA1617-01: Tłı̨cho All-Season Road**

Mr. Toogood:

As per the requirements for the Mackenzie Valley Environmental Impact Review Board's EA1617-01: Tłı̨cho All-Season Road (TASR), please find attached the Wek'èezhìı Renewable Resources Board's technical report submission, prior to the November 2017 public hearing. As per the extension agreed to by the Developer, the WRRB's scientific concerns, comments and recommendations related to boreal caribou will be provided by October 23, 2017.

The WRRB is looks forward to continued opportunities to provide meaningful input for the TASR. If you have any questions, please contact our office at (867) 873-5740 or jpellissey@wrrb.ca.

Sincerely,

J. Grant Pryznyk
Chair

Cc Michael Conway, Superintendent, Infrastructure, GNWT
Jessica, A/Manager, Culture and Lands Protection, Tłı̨chǫ Government

# Wek'èezhìı Renewable Resources Board

# Technical Report

## Submission to the Mackenzie Valley Review Board for the Public Hearings on the Tłı̨chǫ All-Season Road Project

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11 October 2017

# Table of Contents

## Technical Report Summary

As per Chapters 12, 13, 14 and 16 of the Tłı̨chǫ Agreement, the Wek'èezhìı Renewable Resources Board (WRRB) has a mandate for wildlife, plant and forest management in Wek'èezhìı, and adheres to the principles and practices of conservation in fulfilling its duties. The Board is an institution of public government, which uses the best available Tłı̨chǫ and local knowledge, scientific information, and expert opinion to make balanced management decisions on an ecosystemic basis.

The WRRB's Technical Report for EA1617-01: Tłı̨chǫ All-Season Road (TASR) is a compilation of work conducted on behalf of the Board by staff and contracted experts. The Technical Report emphasizes the importance of *tǫdzı* (boreal caribou), *ɔekwǫ̀* (barren-ground caribou), *łıwe* (fish) and traditional knowledge. As per the extension agreed to by the Developer, the WRRB's scientific concerns, comments and recommendations related to tǫdzı will be provided by October 23, 2017.

Uncertainties in the evidence for the Base Case, uncertainties about adaptive mitigation, limited information on mitigation effectiveness, and lack of response to increased access and harvesting pressures constrain the WRRB from agreeing with the Developer's assessment of minimal risk to ɔekwǫ̀, tǫdzı and łıwe. The WRRB observes that the TASR assessment's shortcomings can be remedied if the MVEIRB sent the operations phase back to the Parties for (i) further review to collaboratively revise the WMMP, (ii) development of integrated management plans, and (iii) the establishment of an Independent Oversight Committee, to ensure that the road's monitoring and mitigation is highly protective of wildlife, people and the environment, and is based on Tłı̨chǫ elder's knowledge and experience as well as technical information.

## 1. Organization of the Technical Report

The Wek'èezhìı Renewable Resource Board's (WRRB) Technical Report for EA1617-01: Tłı̨chǫ All-Season Road (TASR) is organized following the Mackenzie Valley Environmental Impact Review Board's (MVEIRB) guidance (PR#182) as follows:

1. Executive Summary;
2. Background information on WRRB's involvement in this Environmental Assessment;
3. List of topics raised during this Environmental Assessment to date; and
4. Specific concerns related to *tǫdzı* (boreal caribou), *ɔekwǫ̀* (barren-ground caribou), *łıwe* (fish) and traditional knowledge (TK), and the WRRB's recommendations.

The WRRB may also modify and bring forward additional concerns and recommendations at the public hearing based on the technical reports from the other Parties and the Developer's responses.

The WRRB's emphasis on tǫdzı and ɔekwǫ̀ for the Technical Report recognizes their conservation status listing and assessment as Threatened both nationally and in the Northwest Territories (NWT), respectively. WRRB relies on the traditional and technical knowledge for tǫdzı and ɔekwǫ̀ as shared during this environmental assessment. Where applicable, WRRB has also drawn on other recent environmental assessments, especially the accumulating experience on approaches to assessment and adaptive mitigation. The MVEIRB has provided considerable guidance through its Reasons for Decision Reports as well as supporting material.[1]

The WRRB, during the assessment of the TASR, was mindful of the MVEIRB's Reasons for Decision for Referral of the TASR to Environmental Assessment (PR#2) in July 2017. The MVEIRB identified impacts on caribou and uncertainty about the effectiveness of mitigation measures as two key areas. Concerns for caribou were increased harvesting pressure and predation resulting from new access, increased road-induced mortality, and barrier effects to caribou from linear impediments, dust, noise, and reduced air quality. The MVEIRB specifically wrote (PR#2) that:

> *"Uncertainty in the effectiveness of proposed mitigations can limit the accuracy and confidence in residual impact predictions and leave the Review Board without adequate information to make the legal determinations about significant adverse impacts on the environment that are required under the MVRMA."*

WRRB was also mindful of the MVEIRB's recent decisions for significant effects on the Bathurst ɔekwǫ̀ during recent assessments for mines on the annual range,[2] and that the MVEIRB had specified the need in the TASR review to describe impacts on caribou recovery.

The WRRB's Technical Report places additional emphasis on łıwe as Tłı̨chǫ elders have identified concerns about increased access and harvesting pressure along the TASR and at Lac La Marte. Finally, the WRRB emphasizes the importance of acquiring and using TK about wildlife, including tǫdzı, ɔekwǫ̀, and łıwe, and wildlife habitat, as per Section 12.1.6 of the Tłı̨chǫ Agreement.

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[1] For example; Carthew, R. 2017. Using resilience to offset cumulative impacts. Presentation at IA's Contribution in Addressing Climate Change 37th Annual Conference of the International Association for Impact Assessment 4 - 7 April 2017, Le Centre Sheraton, Montréal, Canada http://www.reviewboard.ca/reference_material/conference_papers_and_articles

[2] MVEIRB. 2016. EA1314-01: Dominion Diamond Ekati Corp., Jay Project Report of Environmental Assessment and Reasons for Decision. http://reviewboard.ca/upload/project_document/EA1314-01_Report_of_Environmental_Assesment_and_Reasons_for_Decision.PDF
MVEIRB. 2013. EA0809-004: Fortune Minerals Ltd., NICO Project. Report of Environmental Assessment and Reasons for Decision http://reviewboard.ca/upload/project_document/EA0809-004_NICO_Report_of_EA_and_Reasons_for_Decision__corrected_.PDF

## 2. Background Information on WRRB

As per Chapters 12, 13, 14 and 16 of the Tłı̨chǫ Agreement, the WRRB has a mandate for wildlife, plant and forest management in Wek'èezhìı, and adheres to the principles and practices of conservation in fulfilling its duties. The Board is an institution of public government, which uses the best available Tłı̨chǫ and local knowledge, scientific information, and expert opinion to make balanced management decisions on an ecosystemic basis.

The WRRB requested participant status in the MVEIRB's EA Public Hearing on December 7, 2016. The WRRB submitted information requests and received responses related to tǫdzı and ɂekwǫ̀ on July 21, 2017. The Board staff attended the August 15-17, 2017 technical sessions and agreed to wording for commitments #3, 10, and 11. The Board submitted additional questions on łıwe and TK on September 8, 2017, which the Developer responded to on October 3, 2017. The Board provided information for Commitment #11 on October 4, 2017. The WRRB plans to attend the MVEIRB's public hearing in Whatì, NT, scheduled for November 15-17, 2017.

## 3. WRRB Technical Issues Raised Prior To This Technical Report

Prior to writing this Technical Report, the WRRB was concerned about the Developer's approach to the environmental assessment (EA), i.e. the Assessment Endpoint and Measurement Indicators, and the temporal and spatial boundaries, as well as uncertainty and missing information in the baseline conditions. The WRRB considered that these uncertainties would hinder its ability to evaluate the evidence for proposed residual effects and so raised these issues as Information Requests (Table 1).

THE MVEIRB was clear in the Terms of Reference that the TASR is within the winter range of the Bathurst herd (PR#2; Section 3.4.3.1 Winter Range). The WRRB had doubts about the Developer's characterization of ɂekwǫ̀ distribution in the Adequacy Statement Report (ASR) (PR#110) and so raised caribou distribution during the Information Requests and, then again, in the Technical Sessions, which led to the Developer's Commitment #3.

The WRRB has identified concerns over the timing and documentation of the Developer's information on mitigation (PR#172). Additional information, such as the Wildlife Management and Monitoring Plan (WMMP), specific to the NWT Wildlife Act, is a requirement typically during licensing. However, for the TASR, Government of the Northwest Territories (GNWT) is also the Developer, which appears to have fragmented the information on mitigation available to assess the residual effects. The Developer provided the ASR (PR#110) in April 2017, which included an assessment of the residual effects. For details on mitigation, the ASR referred to the draft July 2016 WMMP (PR#7), which lacked the most important section. A conceptual Wildlife Effects Monitoring Plan did not become available until August 2017, and the revised second draft WMMP was not available until late September 2017, which left the WRRB with limited opportunity to question mitigation until the Technical Report.

**Table 1.** WRRB's issues raised before the Technical Report for tǫdzı and ʔekwǫ̀

| | **Tǫdzı** | **ʔekwǫ̀** |
|---|---|---|
| Information Requests | 1. Application of Assessment Endpoint and Measurement Indicators | |
| | 2. Measurement Indicators | |
| | 5. Access re: increased potential for harvest | |
| | 7. Habitat Availability (quantification of) | 4. Temporal Boundaries |
| | 9. Habitat Availability (connectivity / fragmentation) | 12. Adaptive Management |
| | 10. Increased Traffic Collisions | |
| | 11. Predation-related Impacts (influence of moose and bison) | |
| | 13. Reclamation | |
| Technical Session | | Distribution barren-ground caribou |
| | | Harvest effects |
| | | Cumulative effects |

The WRRB's issues raised before the Technical Report for łıwe and TK include access, harvesting pressures

**Table 2.** WRRB's issues raised before the Technical Report for łıwe and TK

| | **Łıwe** | **Traditional Knowledge** |
|---|---|---|
| Technical Session | | Culvert Installation |
| | | Furbearers |
| Questions | Fish Yield | Fish & Fish Habitat Monitoring |
| | Harvest Pressure | Fish Management Responsibilities |
| | | Tǫdzı & ʔekwǫ̀ |

## 4. WRRB Issues Raised for This Technical Report

### 4.1 Tǫdzı (Boreal Caribou)

The WRRB was granted an extension to provide its scientific concerns, comments and recommendations related to tǫdzı by October 23, 2017.

## 4.2 ʔekwǫ̀ (Barren-ground Caribou)

### 4.2.1. Assessment endpoint

**1i) WRRB's concern**

Assessment endpoints are the key properties of each Valued Component that should be protected. The WRRB finds that the Developer's defined Assessment Endpoint for ʔekwǫ̀, *Self-sustaining and ecologically effective populations*, is implausible which increases uncertainty for predicting effects of the TASR (PR#110).

**1ii) Developer's conclusion**

The Developer defined the Assessment Endpoint as "Self-sustaining and ecologically effective populations (PR#110) but for ʔekwǫ̀, the Developer stated that *"Due to the current low abundance and harvest restrictions of Bathurst caribou and BNE, barren-ground caribou are considered unlikely to be self-sustaining and ecologically effective at Base Case"* (p.4.53; PR#110).

**1iii) Rationale for WRRB's concern**

The Developer noted that the Base Case[3] does not meet the defined Assessment Endpoint (p. 4-53; PR#110), and in response to the WRRB's information request, the Developer agreed that self-sustaining and ecologically effective needs further definitions for EA, but did not offer a revised definition (PR#110, and PR#142, 149). Instead, the Developer had responded to MVEIRB's question about the applicability of the Assessment Endpoint (PR#133) by stating *"Because barren-ground caribou use of the Project area has tended to be when populations are high and because the potential effects of the Project in the Regional Study Area (RSA) are small, the Project is not predicted to influence the ability of the barren-ground caribou to be self-sustaining and ecologically effective."* The WRRB is concerned about how this rationale is consistent with the TASR's indefinite duration and with the WRRB's recommendations for spatial boundaries (Section 4.2.4 this Technical Report).

Without a clear and unambiguous Assessment Endpoint, uncertainty is added to any conclusions about the overall effect of the project. The WRRB also questions the isolated approach to the Assessment Endpoint by not relating it to a wider conservation or management context such as existing herd and range planning. The WRRB notes that using existing management planning as a context is an expectation for ʔekwǫ̀ as they are assessed as Threatened. Even although they are not yet listed under the federal *Species at Risk Act*, the Act is to be considered as a guide during environmental assessments (ECCC letter; PR#105).

**1iv) WRRB's recommendations**

[3] The Base Case is the current environmental conditions given the combined effects of past and present developments and activities.

The WRRB recommends that the Assessment Endpoint should be revised to use a definition that is applicable to the herd's current state and to integrate the Assessment Endpoint within the context of herd and range planning goals and objectives.

### 4.2.2. Measurement Indicators

**2i) WRRB's concern**

The next step in an EA is describing the Measurement Indicators which are measurable and characterize effects to an assessment endpoint. The WRRB suggests that applying the two habitat-based Measurement Indicators to measure how ɔekwǫ̀ habitat changes (vs changes in vegetation classes) is uncertain. The third Measurement Indicator (survival and reproduction) is only partially feasible as it is not explained how it will be measured and attributed to the TASR. This increases uncertainty about the Developer's conclusion.

**2ii) Developer's conclusion**

The Developer described habitat availability, habitat distribution, and survival and reproduction as appropriate measurement endpoints to measure the project effects (PR#110).

**2iii) Rationale for WRRB's concern**

The WRRB did not find the description of the Measurement Indicators or how they could be measured clearly (Section 4.1.2; PR#110). The WRRB had an Information Request about the applicability of the Measurement Indicators to detect changes relative to the effect size of the potential impacts. However, the Developer answered the Information Request with a reference to the draft Wildlife Effects Monitoring Program (PR#142), which does not refer to Measurement Indicators but does refer to the ASR for details (p.9; PR#192).

The Developer's first Measurement Indicator (PR#110) is habitat availability, defined as the changes to the amount of different quality habitats and animal use of available habitat. The WRRB notes that this is not the conventional description of habitat availability (for example, Krausman 1999[4] definition of "habitat availability is the accessibility and procurability of physical and biological components of a habitat by animals". The Developer only used satellite-based measurement of vegetation classes (Landsat SPOT imagery) as the indicator for habitat. The account for ɔekwǫ̀ is more a summary of seasonal ranges rather than explaining how the vegetation classes represent habitat availability, especially given annual variation in snow conditions. Given the apparently low amount (11.7%) of moderate-high quality habitat based on five vegetation classes, and that the accuracy of classification was 85% (Section 4.2.2.; Table 4.2-17; PR#110), it is uncertain how the indicator will be able to measure changes and how changes in this Measurement Indicator relate to ɔekwǫ̀ use or to the Assessment Endpoint. The

[4] Krausman, P. 1999. Some Basic Principles of Habitat Use. Presented in "Grazing Behavior of Livestock and Wildlife." 1999. Idaho Forest, Wildlife & Range Exp. Sta. Bull. #70, Univ. of Idaho, Moscow, ID. Editors: K.L. Launchbaugh, K.D. Sanders, J.C. Mosley.

WRRB is also concerned about how the vegetation classes relate to those used in the GNWT's draft Bathurst Caribou Range Plan and thus are relative to the draft Range Plan thresholds[5].

The second Measurement Indicator is habitat distribution defined as the spatial configuration and connectivity of habitats, and the spatial distribution and movement of animals (PR#110). The Developer used the same Landsat imagery as for habitat availability but for ɔekwǫ̀ does not provide any quantification. Instead, the patchiness is displayed as a map (Figure 4.2-4, PR#110). The text overlaps with the habitat availability section and includes tǫdzı references; one paragraph is identical to tǫdzı section.

The ASR does not explain how habitat distribution as a Measurement Indicator will be applied or the range of effect sizes and their likely detection. It is not clear how the spatial distribution of ɔekwǫ̀ is related to the connectivity and spatial configuration of habitat and how changes will be measured. Measures of habitat fragmentation or connectivity are not provided although from the map 4.4-2 (PR#110), four of seven larger patches of moderate to high quality habitat intersect the TASR.

The third Measurement Indicator is survival and reproduction defined as changes to animal abundance from altering survival and/or reproduction. The Developer does not specify effect size, or how adult or calf survival will be measured relative to natural variation or how reproduction integrates pregnancy and calf survival.

**2iv) WRRB's recommendations and suggested mitigation**
The WRRB suggests that to increase certainty in the predicted effects that the Measurement Indicators be revised to clarify and justify the use of vegetation classes as the only indicator for habitat and the implications of the restriction. The Developer should clarify the likely effect sizes for all three Measurement Indicators and the likelihood of detection through the proposed monitoring.

## 4.2.3. Temporal boundaries

**3i) WRRB's concern**
The WRRB is concerned that monitoring and mitigation will remain in place over the TASR's indefinite life especially during the cycle of ɔekwǫ̀ abundance.

**3ii) Developer's conclusion**
The Developer did not provide firm conclusions about tailoring the timescale of monitoring and mitigation to variations in abundance of ɔekwǫ̀, except to state that mitigation and monitoring would be reviewed five years after construction.

**3iii) Rationale for WRRB's concern**

[5] Bathurst Caribou Range Plan Interim Discussion Document
http://reviewboard.ca/upload/project_document/Bathurst%20Caribou%20Range%20Plan%20Package.pdf

There is a lack of certainty as the Project Description Report (PDR) (p. viii; PR#7) refers to a 40-year temporal boundary while the ASR (PR#110) and the WMMP describes the life of the Project as indefinite. However, the WMMP states that wildlife effects monitoring is proposed for up to five years following construction (p. 8; p. 33; PR#192) and then subject to review. The ASR (PR#110) emphasizes that ɔekwǫ̀ are most likely to overlap the TASR corridor at peak abundance and that ɔekwǫ̀ abundance changes over a 40-60 cycle (PR#110). During the time when ɔekwǫ̀ recover, the timing of their use of the TASR corridor will be uncertain, which leads to questions about ensuring that monitoring and mitigation will remain adequate after likely gaps in ɔekwǫ̀ occurrence change.

The WRRB is also concerned that the WMMP does not allow for changes in monitoring and mitigation as technology, especially techniques for remote surveillance are likely to rapidly change during the project's indefinite life.

**3iv) WRRB's recommendations**
The WRRB recommends that (i) the intensity and methods for monitoring and mitigation be described relative to changes in the cycle of ɔekwǫ̀ abundance, and (ii) the Developer clarify the duration of the monitoring and mitigation for the TASR's operation with criteria for the continuation of monitoring and mitigation.

## 4.2.4. Spatial boundaries (Regional Study Area)

**4i) WRRB's concern**
The WRRB is concerned about how the RSA was rationalized, specifically (i) the size of the RSA and (ii) that the RSA is only a small part of the winter and annual ranges of the Bathurst and Bluenose-East ɔekwǫ̀ herds.

**4ii) Developer's conclusion about the issue**
The Developer states that the rationale for the regional study area for ɔekwǫ̀ is defined *"using Traditional Knowledge and an ecologically relevant scale for wide-ranging mammal VCs that can interact with each other"* (Table 4.1-2; PR#110).

**4iii) Rationale for WRRB's concern**
The WRRB notes the RSA is a 35-km buffer around the Project footprint but the rationale for the 35-km is not explained. Confusingly, Table 4.1-2 (PR#110) lists the area of the ɔekwǫ̀ RSA as the same as for bison (10,105.2 $km^2$), although the bison area is based on the Department of Environment & Natural Resources (ENR), GNWT's regional population management boundaries, TK and potential range expansion due to the Project. Both the bison and tǫdzı RSAs are based on management areas. This raises a question of why the RSA for ɔekwǫ̀ is not the winter or annual range especially given that the Developer (p.4-5; PR#110) identified that:

> *"The RSAs were identified to capture and assess the significance of incremental and cumulative effects from the Project and other previous, existing and RFDs.*

*The VC-specific RSA is the scale at which cumulative effects can be appropriately assessed for each VC."*

The RSA is within the Bathurst ʔekwǫ̀ range planning area and historical range identified by TK (2017 draft Range Plan[6]).

**4iv) WRRB's recommendations**

The WRRB recommends that the 35-km corridor be considered as a local study area while the current RSA be revised to be the same as the Bathurst ʔekwǫ̀ winter range (below the treeline), a total area of 211,821 km$^2$.

## 4.2.5. Base Case Conditions (Distribution)

**5i) WRRB's concerns**

The WRRB has listed distribution as a separate issue for the Base Case because the presented evidence is weak for characterizing the TASR as the edge of the ʔekwǫ̀ winter range and the Base Case fails to deal with the implications of ʔekwǫ̀ recovery. The WRRB is concerned as the Developer uses their characterization of the winter range as a rationale to minimize mitigation and the assessment of residual effects.

The WRRB finds the information on ʔekwǫ̀ exposure to the TASR is still incomplete, despite the useful information provided in Commitment #3; PR#189, which may have led to under-estimating the annual frequency and the number of individual ʔekwǫ̀ exposed to the TASR. The timing of a shift in winter distribution is unclear from the evidence and the possible mechanisms are unexplored, which leads to uncertainty in predicted effects.

**5ii) Developer's conclusion**

Initially (PR#110), the Developer concluded that ʔekwǫ̀ would only overlap with the Project when abundance was at a peak. With additional information (PR#189), the Developer acknowledged between 1925 and 2016, the annual potential likelihood of overlap with the 35-km buffer around the TASR was 7-13%, although uncertainty is high.

**5iii) Rationale for WRRB's concerns**

The rationale for WRRB's concern is focused on (i) the incomplete information for ʔekwǫ̀ distribution, and (ii) the lack of analysis or justification for trends in distribution and their under-lying assumptions.

The Developer characterized the all-weather road as being outside the ʔekwǫ̀ winter range, except during peak abundance (PR#110). However, the primary pathway analysis states that the Project will have strong interactions with ʔekwǫ̀ (Table 4.3-2; PR#110), although this was not explained. There is no summary account for which years there was information and for

[6] http://www.enr.gov.nt.ca/en/services/barren-ground-caribou/bathurst-caribou-range-plan

which years ɔekwǫ̀ were recorded within 35, 70 and 105 km (for example) of the proposed road.

The WRRB found the Base Case as the characterization of ɔekwǫ̀ distribution relied on incomplete evidence and unsupported assumptions (Section 4.2.3.2 PR#110). So, the WRRB raised questions about ɔekwǫ̀ distribution as an Information Request (PR#134) and the Developer reiterated that;

> *"The Tłı̨chǫ All-Season Road Project is completely outside the annual range of the Bluenose-East caribou herd and outside the 99% utilization distribution of the Bathurst caribou herd based on collar data. This indicates that barren-ground caribou herds are unlikely to interact with the Project across a range of abundances."*

However, the WRRB notes that the developer relied on the 99% utilization distribution from a kernel analyses of satellite telemetry to describe seasonal herd distribution but without clarifying the sensitivity of the analysis to the low number of collars. The Developer provided as a response to the WRRB's Information Request #6 (PR#134) that the annual number of collars is 30 collars or more (on cows) in only 3 of 22 years. Kernel analyses depends on an adequate sample size and the analyses are the least accurate for the periphery of the analyzed distribution (Seaman *et al.1999* [7]).

An additional uncertainty for mapping seasonal ranges based on collared ɔekwǫ̀ is that only cows were collared until after 2015. Typically, in winter, bull and juvenile ɔekwǫ̀ are distributed deeper into the boreal forest than the cows and yearlings (Thomas *et al 1998*[8]). The relatively low number of collars and the absence of analyses calibrating the representation of collared individuals suggests that relying on the collars likely will under-estimate the extent of the seasonal range.

The Developer acknowledged, however, based on the Traditional Knowledge Study (PR#28), that ɔekwǫ̀ were harvested in the area surrounding the Project in the mid-1990s. The Developer then concluded in the IR responses (PR# 134) that some individual ɔekwǫ̀ have the potential to interact with the Project intermittently *"when the herds are at high abundance"*. The IR response did not allay the WRRB's concerns, and so the question of distribution was raised during the Technical Session, which led to Commitment #3.

The WRRB appreciates the additional information from aerial surveys provided in Commitment #3, which did identify the shortcomings of the representation of the collars. The information

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[7] Seaman, D. E., J. J. Millspaugh, B. J. Kernohan, G. C. Brundige, K. J. Raedeke, and R. A. Gitzen. 1999. Effects of sample size on kernel home range estimates. Journal of Wildlife Management 63:739-747.

[8] Thomas, D.C., H.P.L. Kiliaan, and T.W.P. Trottier. 1998. Fire-caribou relationships: (III) movement patterns of the Beverly herd in relation to burns and snow. Technical Report Series No. 311. Canadian Wildlife Service, Prairie and Northern Region. Edmonton, Alberta. 176 pp.

also suggested the annual frequency of ɔekwǫ̀ distribution overlapping the 35-km corridor of the TASR is 11% (2006-2016 and 1985-1995) based on sightings during sex and age composition surveys. The GNWT also summarized the overlap between Tłı̨chǫ maps of harvesting and the TASR as a 13% frequency (9 out 110 years). In Commitment #3, the GNWT concluded, and the WRRB concurs, that there is uncertainty about the frequency of overlap between ɔekwǫ̀ distribution and the TASR 35km-wide corridor.

Additionally, the WRRB notes that describing ɔekwǫ̀ distribution only relative to overlapping the 35-km corridor of the TASR is restrictive as it is only a small area. A less restrictive approach to distribution, for example, based on an approximate line dividing the Taiga Shield from the Taiga Plains may be necessary. During 39 of 67 years (1925 to 1991), ɔekwǫ̀ were harvested west and north of Whatì[9] . This does not correlate with years when numbers of ɔekwǫ̀ harvested were few or abundant (Zalatan *et al.* 2006).

The GNWT did not include an unpublished GNWT report which is Urquhart's (1981)[10] compilation of historic ɔekwǫ̀ survey flight lines and areas of ɔekwǫ̀ use in the 1940s to the 1970s. The composite maps for 1933-48 and 1940-50 shows ɔekwǫ̀ distributed as far west as Lac La Martre. Specific years and flight lines also provided which shows ɔekwǫ̀ near Whatì in the early 1950s, especially late winter 1952. Urquhart (1981) recognized the uncertainty in the mapping but suggested there was reason to consider the Bathurst herd's winter range extended west to the Mackenzie River.
More recent information on the winter distribution was also not included. A March 2005 reconnaissance survey prior to collaring (Figure 4; Gunn 2005[11]) showed groups of 100 to 1500 ɔekwǫ̀ in the vicinity of Whatì. This contrasts with the few individual ɔekwǫ̀ identified in reports included in GNWT's Commitment #3.

In summary, the Developer provides incomplete information on the timing or mechanisms for any shift in the location of the winter range or updated information for the most recent information - winter distribution 2013 to 2017. Any trends in distribution are complicated by different analyses and data sets. The Developer did state that as ɔekwǫ̀ abundance has declined, the winter range has shifted but this is not supported by the analysis completed for MVEIRB's assessment for the Jay Pit (Golder Associates 2015; Figure 9.4). Golder Associates (2015) did not find significant trends for the analysis of seasonal ranges 1996-2012, except the fall ranges were significantly further north of the treeline. The treeline is a relatively wide forest-tundra transition zone and Golder's 2016 analysis for ɔekwǫ̀ distribution during fall

[9] Legat, A., Chocolate, G., Gun, B., Zoe, S.A., and Chocolate, M. 2014. Caribou Migration and the State of their Habitat: Tłı̨chǫ Knowledge and Perspectives on ɔwoẁ (Burgenland Caribou). Tłı̨chǫ Traditional Knowledge Reports: Series 2. Tłı̨chǫ Research and Training Institute.

[10] Urquhart, D.R. 1981. The Bathurst herd: a review and analysis of information concerning the Bathurst herd of barren-ground caribou in the N.W.T. for the period 6000 B.C to 1980 A.D. Unpublished report, NWT Wildlife Service, Yellowknife, NWT, 204 pp.

[11] Gunn, A. 2013. Satellite collaring and calf survival In the Bathurst herd of barren-ground caribou 2003 – 2005. Department of Environment and Natural Resources, Manuscript Report No. 228. 68pp.

migration, winter and early spring migration shows a relatively high use of the transition zone although the annual trend is not analyzed.

The distribution of ɔekwǫ̀ on the western winter range does not correlate with abundance, and the information on ɔekwǫ̀ harvested up until 2008 suggested that the change in fall migration did not occur until after 2012. It also suggests that the proximity of ɔekwǫ̀ to the TASR is not restricted to the 1990s peak abundance (Figure 1). If the winter range has recently shifted east onto the barrens since 2013, it is important to know whether the shift correlated with environmental changes such as forest fires and or increased human activity. The Developer did not provide information or analysis to describe possible mechanisms.

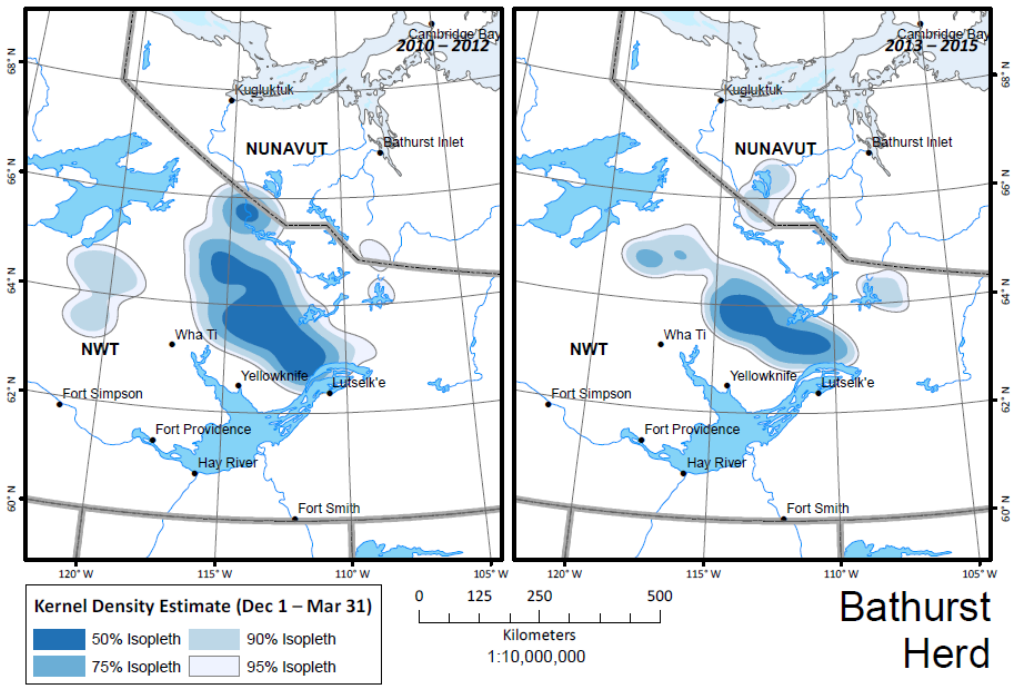


**Figure 1.** Winter (1 December – 31 March) distribution of collared cows from the Bathurst herd 2010-2012 and 2013-2015 (GNWT data analysed by CARMA).

The WRRB notes the uncertainty from incomplete compilation and analysis of information on winter distribution. Consequently, the WRRB does not accept the Developer's characterization of the overlap of the Bathurst herd with the TASR as occurring at the peak of abundance. Instead, the WRRB suggests that historically, the edge of the winter range could be considered as the Mackenzie River. The contraction of the range is recent (since about 2012), and while it may reflect extreme low numbers as the ɔekwǫ̀ retreat to a center of habitation as a refuge (for example, Bergerud *et al.* 2008[12]), the role of landscape changes from climate and human activity cannot be discounted without a review of the evidence.

[12] Bergerud, A.T., S.N. Luttich, L. Camps. 2008. The return of caribou to Ungava. McGill University Press. 586 pp.

**5iv) WRRB's recommendations and suggested mitigation**
The WRRB's recommendations are to increase understanding of the likely exposure of ʔekwǫ̀ to the TASR and the implications for ʔekwǫ̀ recovery. The WRRB recommends a revised and more collaborative approach to reduce uncertainty in describing exposure of the ʔekwǫ̀ to the Project through a more thorough examination of all available evidence and analyses. Specifically, the WRRB recommends (i) an examination of the relationship between indicators for abundance and winter distribution over the cycles of abundance; (ii) analyses to estimate the annual variability in the location and edges of winter ranges, and when and whether trends are measurable; and, (iii) the extent to which trends in environmental conditions correlate with winter distribution.

## 4.2.6. Base Case Conditions (other than ʔekwǫ̀ distribution)

**6i) WRRB's concerns**
The WRRB's concern is that information used to describe the Base Case is incomplete and criteria for the Developer's conclusions are inadequately described.

**6ii) Developer's conclusion**
The Developer concluded that the Base Case conditions are such that ʔekwǫ̀ *"are expected to adapt and be resilient to existing natural and human-related disturbances, and associated variations in habitat availability, and habitat distribution which at Base Case are not limiting."* (Section 4.2.3.2; PR#110).

**6iii) Rationale for WRRB's concerns**
The rationale for the WRRB's concern is focused on (i) a lack of criteria for adaption and resilience, and (ii) missing information.

**<u>Criteria for adaptation and resilience</u>**
The Developer concluded that habitat availability and distribution is not limiting (PR#110), but did not support this with an analysis or explanation. The amount of moderate and high quality habitat in the RSA was low (10.7%), and the amount of disturbance was unreported. It is unclear how the ʔekwǫ̀ could adapt or be resilient to any increased habitat loss or change. The WRRB notes that the amount of habitat disturbance in the surrounding area is high (47% based on the draft GNWT-ENR Range Plan), which raises questions about resilience and adaptability. The WRRB also notes that for the Measurement Indicator 'survival and reproduction', the Developer stated that *"Due to the current low abundance and harvest restrictions of Bathurst caribou and BNE, barren-ground caribou are considered unlikely to be self-sustaining and ecologically effective at Base Case"*. This leaves the WRRB uncertain about the applicability of resilience and adaptability for the habitat availability and distribution.

**<u>Missing information</u>**
The section on habitat distribution acknowledges the role of ʔekwǫ̀ behavior, specifically responses to human activity. However, the cited literature refers mostly to tǫdzı rather than

migratory tundra ɔekwǫ̀ responses to traffic and roads. More information on ɔekwǫ̀ behavioral responses to all-season roads and traffic is available for public roads (open to hunting and tourism), such as the behavioral studies along the Dempster Highway, its monitoring and management. Concerns for all-season roads are long-standing. For example, in its evidence in previous environment assessments and in the draft Range Plan for the Bathurst herd of ɔekwǫ̀, the GNWT had recognized the risks from all-season roads.

A gap in the effects assessment is whether and how harvesting, especially disrespectful harvesting, affects ɔekwǫ̀ behavior. Harvesting would increase the distance at which ɔekwǫ̀ would respond to traffic on an all-season road. Elsewhere, for all-season public roads where harvesting occurs along or from an all-season road, effects on ɔekwǫ̀ behavior are indicated by avoidance of the road. The Developer did not describe whether harvesting along winter roads influenced local movements but hinted at an effect as they stated (p.4-127; PR#110): *"this road [to NICO] will overlap with an existing trail north of Whatì, which barren-ground caribou may already avoid."*

The characterization of the Base Case does not include the cumulative effect of human activity. Elsewhere, the responses of ɔekwǫ̀ in terms of avoidance and stress to cumulative activity ("disrespectful" human behavior) has had a measurable effect (Johnson and Russell 2015; Joly *et al.* 2015[13]). The Developer emphasizes that distribution of ɔekwǫ̀ in the 1990s when the abundance was high (PR#28) but not the reasons why ɔekwǫ̀ migration routes have changed, which the elders related to the cumulative effects of developments, use of the winter roads, construction of the Snare River hydro and power lines (p.35; PR#28).

The Base Case does not address the likelihood that the road and right-of-way may act to deflect or change local movements and migratory movements while acknowledging that how behaviour is measured may affect the results. For example, at the Ekati open pit mine in the NWT on a 21-km all-weather ore haul road, 55-60% of the ɔekwǫ̀ tracks deflected from the road based on snow tracking (2002-2011). However, based on remote cameras, the deflection rate was 1-2% (ERM Rescan 2014[14]).

The Base Case lacks information on ɔekwǫ̀ ecology. There is no description of the theoretical and practical implications of the TASR possibly being the periphery of the annual range and what that may mean for recovery of ɔekwǫ̀ numbers and future exposure to the TASR. The western edge of the range has an increase in high quality winter habitat in Taiga Plains (Barrier 2011[15]) and is half the distance from the calving grounds. Both factors may play a role in the timing of an increase in the western winter ranges. However, despite the conclusion of Barrier

[13] Johnson, C.J., and Russell, D.E. 2014. Long-term distribution responses of a migratory caribou herd to human disturbance. Biological Conservation 177:52-63, and Joly K, Wasser SK, Booth R. 2015. Non- Invasive Assessment of the Interrelationships of Diet, Pregnancy Rate, Group Composition, and Physiological and Nutritional Stress of Barren-Ground Caribou in Late Winter. PLoS ONE 10(6): e0127586. doi:10.1371/journal.pone.0127586

[14] ERM Rescan. 2014b. Ekati Diamond Mine: 2013 WEMP Addendum — Wildlife Camera Monitoring Summary Report Prepared for Dominion Diamond Ekati Corporation by ERM Rescan: Yellowknife, Northwest Territories.

[15] Barrier, T.A. 2011. Factors influencing the distribution of Bathurst Barren-ground Caribou (*Rangifer tarandus groenlandicus*) during winter. Thesis (MSc), University of Northern British Columbia. Prince George, British Columbia. 108 pp.

(2011) about high quality winter range habitat in the Taiga Plains, the Developer only reports a low availability of high quality habitat.

Habitat availability includes the impact of climate and although trends in weather are available they not included in the ASR (PR#110). The importance of the information is in its explanatory power and projections for habitat availability. The climate trends are not just winter snow conditions but also the relationship between hotter and drier summers with increased risk of forest fires. Including the trends would have been useful to understand why climate change is mentioned for cumulative effects but without any supporting information.
The section on survival and reproduction lacks a complete account of the GNWT's available information for calf productivity and adult survival (Cluff *et al.* 2017[16]). Presumably, the inclusion of calf ratios for the Beverly and Qamanirjuaq herds is a mistake. The Developer describes current harvest regulations but not the level of hunting or sources of information subsequent to the Dogrib harvest study and prior to the beginning of restrictions in 2010. In particular, information is not provided on the levels of harvesting along the winter roads. For example, the Tłı̨chǫ check station reports for February to April 2008 and 2009 harvested 613 caribou in 2008 and 1149 caribou in 2009[17]. The harvesters included people from the southern NWT' communities which reflect the increased access.

**6iv) WRRB's recommendations and suggest mitigations**
The WRRB recommends that the Base Case be revised to include updated and additional information, including but not limited to (i) behavioral responses described for other all-season gravel roads with and without harvesting, and (ii) a complete account of the range of natural variation in the survival and reproduction information as well as a more complete account of harvest levels and locations.

## 4.2.7. Mitigation

**7i) WRRB's concern**
The WRRB identified that an adaptive mitigation framework is lacking; and evidence for the effectiveness of mitigation is weak. The WMMP's emphasis for mitigation is for during construction rather than operation, despite the indefinite timeframe for effects to accumulate. The GNWT's WMMP (PR#192) relies on monitoring limited to site and road surveys with a heavy emphasis on collaring for ɔekwǫ̀, and other techniques are not included. Monitoring and mitigation, except collaring, are subject to review for their continuation only five years after the end of construction although the operation phase of the TASR is indefinite. The WRRB is troubled that there are no criteria for the continuation of monitoring and mitigation.

**7ii) Developer's conclusion**

[16] Cluff, H.D., Croft, B., and Boulanger, J. 2017. Calf Production and Adult Sex Ratio in the Bathurst and Bluenose East Herds of Barren-Ground Caribou 2006-2016. Unpublished draft Manuscript Report. Department of Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, NT.
[17] http://www.wrrb.ca/sites/default/files/Tłı̨chǫ%20ENR%20Checkstation%20report.pdf

The Developer characterizes the residual effects as minimal partly as a result of mitigation, and partly as the exposure of ɔekwǫ̀ will be low until ɔekwǫ̀ numbers recover.

**7iii) Rationale for WRRB's concern**

The WRRB is concerned that the Developer is relying on their characterization of ɔekwǫ̀ distribution overlapping the RSA as being restricted to periods of high abundance, thus implying that mitigation is mostly not needed. Even although the rate of recovery and return to historic ranges are uncertain in timing, and that the road has an indefinite life, monitoring and mitigation should be clearly listed relative to the phases of ɔekwǫ̀ abundance.

The spatial boundaries in the WMMP relative to the ASR are unclear how they relate to each other. Four of the six monitoring methods are restricted to the road and associated structures (Tables 4 and 5; PR#192) and only relate to a single effects pathway. The monitoring for the other nine pathways is limited to collaring; access and harvest will be monitored although the methods are not detailed. The WRRB is concerned about the reliance on the collars without more detail on what scale of effect size is detectable.

The WMMP (Table 4; PR#192) lists monitoring of indirect habitat loss from dustfall through the collared caribou although how this would work is not revealed. Given the Developer's reported absence of collared ɔekwǫ̀ from the RSA, it is not clear what will be monitored. During operation of the road, the WMMP (PR#192) mentions unspecified dust suppression techniques to be used as required. But there is no mention of how this will be determined and whether the effects of fugitive dust will be directly measured. The Developer does not use information from other developments to project the possible levels of fugitive dust for the Base Case (and suitable methods).

A gap exists in monitoring techniques for ɔekwǫ̀ as there are no reference to statistically designed ground-based surveys that will allow effects and effectiveness of mitigation to be estimated. Techniques are available such as snow track surveys (with back-tracking to estimate changes in behavior); fecal pellet surveys (local abundance and behavior); and stress measurement (hair snagging and fecal pellet sampling).

The ASR (Table 4.3-1; PR#110) lists mitigation for construction and some mitigation for operation is included in the text. The WMMP lists mitigation by direct and indirect habitat loss, including sensory disturbance, collision and harvesting access for construction and operation (PR#192). The listed mitigation actions in the WMMP are not described as a mitigation hierarchy, which hinders seeing how mitigation can be intensified or reduced relative to monitoring results. The mitigation hierarchy includes restitution or offsetting, e.g. replacement, restoration or compensation, which the WRRB expected that the WMMP would use as direction is available from the MVEIRB's previous environmental assessments[18]. However, the WMMP's absence of restitution or offsetting is not explained.

[18] Hubert, C.2017. A case study on the use of on-site offsets to mitigate impacts to caribou from diamond mining in Canada's north. Paper presented at the 2017 IAIA Conference in Montreal.

The WMMP classifies monitoring as mitigation or effects monitoring. Mitigation monitoring (Section 5.1; PR#192) may refer to monitoring effectiveness. It is identified as verifying how mitigation is working and how to improve it but the relatively detailed methods do not explain the criteria (thresholds) needed to trigger changes in mitigation and how mitigation can be intensified or reduced. Effects monitoring (Section 5.2; PR#192) lists objectives for measuring the effects on ɔekwǫ̀ but the objectives do not specify the acceptable limits or how they would trigger a change in mitigation. The effects monitoring does not specify the application to the Measurement Indicators.

The WRRB is puzzled that one set of thresholds is [wildlife] management thresholds, and action is deferred to co-management partners. But it is unclear how this relates to the ASR, which identified survival and reproduction as one of the three Measurement Indicators to measure effects. Additionally, the WMMP methods on habitat loss do not refer to monitoring, from satellite imagery, any changes in vegetation or forest fires which relate to the two other Measurement Indicators. For habitat, the WMMP acknowledges the need to use Tłı̨chǫ knowledge although not clearly in the context of the EA's Measurement Indicator. The WRRB does not agree that working with TK on habitat will "complement" the collar program once the funds are identified for the TK. Instead, the WRRB recommends that the Tłı̨chǫ knowledge should have equal access to funding as the collar-based information.

Although a threshold of 200 vehicles/day, the design limit for the road, is suggested for adaptive management, it is not explained how monitoring and mitigation will change relative to this threshold. The GNWT does note that ɔekwǫ̀ distribution may be impacted at traffic activity levels as low as 10 to 60 vehicles per day (Appendix G; PR#192), which suggests the 200 vehicles/day threshold is high and more than one incremental threshold is necessary. The threshold for ɔekwǫ̀ for intensified monitoring (road observations) and mitigation is based on the collared ɔekwǫ̀ within 10-km and intensified mitigation depends on intra-departmental GNWT discussion. The WRRB identifies this as weak for reducing risk of ɔekwǫ̀ deflecting from the road or collisions with traffic, and wonders how the 10-km distance was selected relative to for example, the variability in the annual rate of winter movement?

Specific mitigation to avoid or minimize the effects of harvesting on ɔekwǫ̀ behavior relative to the road and traffic is missing from the WMMP. Effective mitigation would reduce the extent to which ɔekwǫ̀ learn to modify their behaviour relative to traffic and the TASR. The WMMP acknowledges that GNWT is limited as to how it can regulate harvesting along a public road except for conservation issues. However, there are approaches other than regulation, such as community-based approaches and education with interactive signage, and a key is community support (see TK report (Section 5.2; PR#28). More use of the GNWT's literature search (Appendix G; PR#192) would also help in examining effectiveness of mitigation for harvesting and public access.

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file:///C:/Users/Owner/Downloads/604_Hubert_Onsite_Offsets_in_Canada's._final_15-May-2017%20(1).pdf

Neither the Adequacy Report nor the WMMP clearly relate the type of mitigation to barren-ground caribou behavior especially the differences during migration vs. foraging movements and the effect of gregarious behavior such as the role of leadership. Memory and experience likely plays a role in caribou leadership. Caribou are typically in social groups, which influence their responses to disturbance as their behaviour affects each other. The Adequacy report (PR #110) has information gaps both in how group size influences crossing success, and how group size or individuals are used to measure crossings and determine thresholds.

The Developer only proposed speed limits and driver awareness as mitigation for access and harvesting (Section 4.6; PR#192) even though the MVEIRB identified the road access created for ɔekwǫ̀ harvesting as a key concern (which was also the case during the MVEIRB's environmental assessment for Fortune NICO in 2012). Although the Developer included a brief literature review, its search terms were more related to collisions and mitigation rather than access management (Appendix G; PR#192). Mitigation for access management is a relatively well-researched question – for example, British Columbia has extensive literature reviews (Wilson and Hamilton 2001; Havlick 1999). The WMMP did include a limited approach to monitor changes in harvest access (Section 5.2.2; PR#192) using patrols, a check station and aerial surveys *"until harvest restrictions are lifted at a minimum"*. However, the monitoring will still be needed to detect changes in harvesting during the entire period of road operation.

The Developer did not include the experience on access mitigation for ɔekwǫ̀ relative to all-season roads, such as the Dempster Highway and the Trans-Taiga road across the fall and winter range for the Leaf River herd in Quebec. Both roads are associated with hunting and ɔekwǫ̀ avoidance (Johnson and Russell 2015; Plante *et al.* 2016). Mitigation included "no-hunting" corridors and "letting the leaders pass" policies (Padilla 2010). The all-season gravel road between Baker Lake and Meadowbank mine in Nunavut has a no-hunting corridor, whose effectiveness is described through a harvest monitoring study[19] to measure changes in harvest levels and locations relative to hunting along the road.

The WRRB considers that the mitigation recommendations in the TK report (Section 5.2; PR#28) are applicable for the WMMP. The elders listed hunting and trapping regulations to minimize outsiders' access and harvesting; a no hunting and trapping zone in the immediate area along the TASR; and development of strategies to mitigate impacts from increased exploration and prospecting in the region for minerals and oil and gas deposits.

The Developer did not provide examples or information on the effectiveness of mitigation even though the MVEIRB specified it as an important topic. Although relatively few, there are studies, such as Braund *et al.* 2013, [20] that analyzed the effectiveness of the identified

[19] Gebauer, M., A. Crampton, J. Shaw, and I. Laing. 2016. *Meadowbank Mine: 2015 Wildlife Monitoring Summary Report.* Prepared for Agnico Eagle Mines Ltd. NIRB Public Registry

[20] Braund, Stephen R. Braund & Associates. 2013. Aggregate Effects Research and Environmental Mitigation Monitoring of Oil Industry Operation in the Vicinity of Nuiqsut: History and Analysis of

mitigation measures and monitoring plans for oil development on the Alaskan coast. Additionally, the Developer could have made use of the annual monitoring reports for operational mines in both the NWT and Nunavut, which include information on the effectiveness of mitigation.

The approach to adaptive management and thresholds is available from elsewhere[21] and the WMMP could have used that experience. The WMMP's section on Adaptive Management is separate from thresholds and the section is mostly scheduling for reports.

The WMMP acknowledges the need for a collaborative approach although without details or timelines. The WRRB notes that as many issues remain unresolved for a WMMP and uncertainties about effects and their mitigation, a collaborative Independent Oversight Committee to provide advice on adaptive mitigation could reduce the risks and build trust. Oversight bodies in environmental assessment are becoming more accepted and Affolder *et al*. (2011) reviews different models.

The WRRB also recommends five-year independent audits of the monitoring and mitigation to ensure that it is effective and that as new technologies become available, their applicability is considered. One aspect that the WRRB notes is related to an Oversight Committee is that the Developer has not outlined archiving for monitoring data and what will be the role of the GNWT's Wildlife Management Information System and the Cumulative Impact Monitoring Program's disturbance registry. The WRRB also sees merit in an Access and Harvest Monitoring and Mitigation Plan to manage access, control mitigations, and traffic.

**7iv) WRRB's recommendations**

The WRRB recommends the following:

i. The WMMP needs to be revised to clarify the relationship with the ASR's Measurement Indicators (PR#110).
ii. The WMMP needs to be revised to address likely effect size, range of natural variation and the monitoring effort likely needed to detect an effect size.
iii. Revisions to the WMMP should specify the development of criteria to measure effectiveness of mitigation and how thresholds are specifically applied to changes in mitigation and monitoring (adaptive mitigation).
iv. The range of monitoring techniques and mitigation actions should be expanded (see preceding text) to use the experience gained from elsewhere and especially for the operational phase.
v. A collaboratively developed oversight committee and an access management plan for wildlife harvesting with recommendations based on community-based monitoring and adaptive mitigation to manage access and harvest monitoring. The plan should describe criteria for temporary closure related to wildlife or weather.

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Mitigation Measures, Final Report. Prepared for the U.S. Department of the Interior, Alaska OCS Region, Anchorage, AK. Technical Report No. BOEM 2013-212.

[21] For example, http://www.wildlifeandroads.org/decisionguide/

vi. Monitoring and mitigating cumulative effects be addressed with specific criteria, thresholds and timeframes consistent with herd management planning and the draft Bathurst Caribou Range Plan.

## 4.2.8. Residual Effects Analysis

**8i) WRRB's concern**

The WRRB is concerned about how the Developer assessed the residual, incremental, and cumulative effects, and whether the Developers under-estimated effects, which reduces certainty about the risks to ɔekwǫ̀. Given that ɔekwǫ̀ are assessed as Threatened and are at low numbers, the WRRB is concerned that the Developer did not clearly examine implications of what the Developer characterized as 'small' effects. The WRRB also notes that reconsideration of mitigation may lead to revisions to the residual effects.

**8ii) Developer's conclusion**

The Developer describes the three primary pathways with strong interactions for ɔekwǫ̀ (Table 4.3.2; PR#110), and the effect of dust on forage and vehicle collisions were considered secondary pathways.

The Developer predicted that residual effects will be small changes in habitat availability (p. 4-175; PR#110), and habitat distribution during road operation if ɔekwǫ̀ interact with the Project when more abundant and burned habitat becomes suitable over time through vegetation succession (p. 4-176; PR#110).

For the incremental effects on the third Measurement Indicator, the Developer concluded *"the Project could affect barren-ground caribou survival and reproduction through winter habitat loss (vegetation clearing), sensory disturbances, and increased harvest pressure and injuries and mortalities from vehicle strikes due to improved access, (p.4-176; PR#110) but effects to survival and reproduction for barren-ground caribou are predicted to be small relative to the Base Case"*.

For cumulative effects, the Developer concluded *"Cumulative effects to survival and reproduction of barren-ground caribou from RFDs (including the Project) are predicted to be small"*; and, *"Although there is uncertainty in the magnitude of changes to survival and reproduction, effects are not expected to exceed the resilience or adaptability limits of barren-ground caribou in the RFD Case"* (p. 4-201; PR#110).

**8iii) Rationale for WRRB's concerns**

The Developer states that residual effects (incremental or cumulative) are based on calculating and predicting changes to measurement indicators after mitigation (p. 4-169; PR#110). However, the residual effect analysis for ɔekwǫ̀ is more a narrative, and the WRRB is unsure how the residual effects analysis was completed through calculating and predicting changes to all three measurement indicators.

The residual effects for indirect loss of habitat availability (Section 4.4.2.2; PR#110) are based on a selective approach. The Developer suggests only a few ɔekwǫ̀ are likely exposed to the road, they will adapt to sensory disturbance (Johnson and Russell 2014) and cites the Tłı̨chǫ Knowledge report (PR#28) that any ɔekwǫ̀ already have previous experience with human activity along the existing network of trails surrounding the Project route at Base Case (PR#28).

Citing Johnson and Russell (2014) as support for ɔekwǫ̀ habituation, i.e. the learnt reduction in behavioural responses such as to traffic and roads or off-road vehicles, is questionable. Johnson and Russell (2014) stated that for the Porcupine herd, it was difficult to describe habituation as the time period was long (27 years) and the levels of industrial and hunting disturbance varied during that time. Habituation is complex and difficult to demonstrate (Blumstein 2016)[22].

Johnson and Russell's (2014) account of the distributional responses of the Porcupine herd to a public gravel road is useful as they reported avoidance distances, which declined from 30km in 1985–1998 to 18.5 km during 1999–2012. Johnson and Russell (2014) noted that the level of industrial exploration had slowed by 1985 and then remained low on the winter range. The hunting level declined during 2000-2012 possibly because hunting access changed through different "no-hunting" corridors and "letting the leaders pass" policies (Padilla 2010).

An illustrative example of the likely interaction between hunting and roads is that hunters from Baker Lake can use all-terrain vehicles on an all-weather gravel road linking a gold mine and community for hunting. A recent (August 2017 and preliminary) analysis suggests an increase in road avoidance during the fall migration (Kite et al. 2017[23]), and as ɔekwǫ̀ moved closer to the road, they showed greater milling behaviour (clustered movement) and avoidance movements (deflections to the north and south) by ɔekwǫ̀ within 36 km of the road. However, it is fair to note that the mine's developer has questioned the findings (Golder Associates 2017).

The WRRB suggests that the Dempster and Meadowbank all-season gravel roads with both traffic and harvesting raise doubt about the applicability of rating of the residual level of indirect habitat loss for the TASR. If the zone of influence was assessed on a precautionary basis at 30-35 km, then the indirect habitat loss would be most of the RSA. The Developer used the same rate of habitat direct loss (the road's footprint) for the Measurement Indicator habitat distribution as for habitat availability. The Developer did not quantify that the TASR could change survival and reproduction through winter habitat loss, sensory disturbances, and increased harvest pressure and mortalities from vehicle strikes. The Developer argued that the

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[22] Blumstein, D. 2016. Habituation and sensitization: new thoughts about old ideas. Animal Behaviour 120: 255-262.

[23] Kite, R. J. Boulanger, M. Campbell, G. Harvey, J. Shaw, and D. Lee. 2017. Seasonal caribou distributions and movement patterns in relation to a road in the Kivalliq region of Nunavut. Unpublished report to Government of Nunavut.

Golder (Golder Associates Ltd.) 2017. Meadowbank Mine and All-weather Access Road Caribou Zone of Influence Assessment; Whale Tail Commitment 8. Prepared for Agnico Eagle Mining by Golder Associates Ltd. Edmonton, AB. - Both reports available Public Registry NIRB

changes would be less than those caused by, for example, weather. However, the WRRB found this to be misleading because the road-related effects would be additive to natural variation.

For cumulative effects, the ASR limited the Reasonably Foreseeable Developments to Fortune Minerals Ltd. NICO Mine; Nailed Hydroelectric Project and Tłı̨chǫ Park/Whatì Park. However, the PDR (PR#69) mentioned DEMCo's Bugow, Nighthawk Gold's Colomac sites and BFR Copper & Gold's Mazenod property as the three most likely future projects but each would be more likely if there were all-season roads to Gamètì and Wekweètì. It is uncertain to the WRRB why an extension of the all-season gravel road to Gamètì is not included as it was shown on maps during consultations for the TASR during the NICO environmental assessment. The TK study (PR#28) noted that a potential road may increase the harvester's use of the existing trail network. However, the geographic extent of cumulative effects was considered from local to beyond regional which was identified as the incremental and cumulative changes to sensory disturbance and access from Project-related traffic on the Gamètì and Wekweètì winter roads. (p. 4.214; PR#110). The Developer also included climate change as a cumulative effect although did not provide enough details to estimate the additional risks to ɔekwǫ̀.

The WRRB is uncertain why the effect of dust on forage was a secondary pathway given that the TASR has an indefinite life over which dust could accumulate even although travel frequency (initially) is relatively low. Dust is a strong concern raised by elders (PR#28), which is similar for most developments on the ɔekwǫ̀ ranges. The WRRB's concern is the indefinite life of the project as elsewhere, such as Prudhoe Bay oilfield where gravel roads have been used since the late 1960s, and deep dust layers alongside roads have been measured (Raynolds *et al.* 2014[24]).

**8iv) WRRB's recommendations**

The WRRB recommends that the Residual Effects analysis be revised to more comprehensively assess incremental and cumulative effects to reduce the current uncertainty. Specifically, the WRRB recommends that (i) the relationship between responses to harvesting and roads be re-considered, and (ii) the Developer review the implications of what is meant by 'small' effects relative to the current state of ɔekwǫ̀.

## 4.2.9. Conclusion

The WRRB does not find enough evidence that the TASR would avoid a risk to the Bathurst herd of ɔekwǫ̀. The WRRB is especially concerned given the severe decline of ɔekwǫ̀, which are now nationally and territoriality assessed as Threatened. Uncertainties in the evidence for the Base Case, uncertainties about adaptive mitigation and limited information on mitigation effectiveness constrain the WRRB from agreeing with the Developer's assessment of minimal risk to ɔekwǫ̀ and ɔekwǫ̀ recovery.

[24] Raynolds, M. K., et al. 2014. Cumulative geoecological effects of 62 years of infrastructure and climate change in ice-rich permafrost landscapes, Prudhoe Bay Oilfield, Alaska. Global Change Biology, 20(4), 1211–1224.

The WRRB identified two worrisome shortcomings in the Base Case: (i) the exposure of ɔekwǫ̀ to the TASR; and (ii) minimal consideration of harvesting, especially disrespectful harvesting relative to ɔekwǫ̀ responses to roads and traffic. These two shortcomings in the Base Case follow through as weaknesses in the mitigation, and then in the assessment of residual effects for operation of the TASR. The Developer does not clearly explain how monitoring and mitigation will be adjusted if ɔekwǫ̀ numbers and distribution change as ɔekwǫ̀ recover from the current decline. The risk is that as ɔekwǫ̀ return to the western ranges, the effect of any deflection from the TASR relative to ɔekwǫ̀ recovery and re-occupation of their historic ranges is uncertain.

The Developer's proposed monitoring is not systematically scaled to the likely exposure of ɔekwǫ̀ and how it will change over time. The WRRB is concerned about the reliance on collars for monitoring, which is the same technique that led to uncertainties in the Base Case on distribution (collars under-estimate the extent of distribution and were insufficiently analyzed). The WRRB does not find evidence to regard the collars, even with increased number, as a rigorous tool for monitoring without calibrating how collars represent the herd as a whole.

The WRRB found plausible the proposed mitigation for TASR construction to minimize and avoid direct loss of vegetation, a component of ɔekwǫ̀ habitat. However, evidence for the effectiveness of mitigation for indirect habitat loss was weak, especially during TASR operation. The mitigation for avoiding and minimizing ɔekwǫ̀ avoiding and deflecting from the TASR is limited to speed restriction and recommendations for overflights.

The draft WMMP is weak in describing the adaptive management framework. The MVEIRB has characterized the framework[25] as a systematic approach to when monitoring indicates that an Action Level [threshold] has been reached. The WRRB is puzzled by the lack of details, such as decision trees which now are a standard part of recent WMMP. The need for an adaptive management framework ensures that mitigation can deal with unforeseen circumstances which are especially likely when ɔekwǫ̀ recover into a changing landscape through a warming climate and increasing human footprint.

The TASR has an indefinite life and the WRRB is concerned that the WMMP suggests that the GNWT audit the WMMP five years after construction but does not specify criteria to sustain adaptive management. The WRRB is concerned that the GNWT may consider that TASR is to be managed the same as, for example, Highway 3, even though the adaptive management for the TASR will be established through the Mackenzie Valley Resource Management Act.

The WRRB worries that the Developer has characterized the residual effects to be only 'small' changes to ɔekwǫ̀. But after a 97% decline in the size of the Bathurst herd and the current

[25] MVEIRB. EA1415-01: Canadian Zinc Corp., Prairie Creek All Season Road Project Report of Environmental Assessment and Reasons for Decision http://www.reviewboard.ca/upload/project_document/Report%20of%20Environmental%20Assessment%20-%20Sept%2012%202017.pdf

curtailment of harvesting, the Developer did not describe how small changes may have disproportionate effects on survival and reproduction given that those indicators are already low. The Developer also did not acknowledge that small effect sizes are difficult to detect which imposes uncertainties on the proposed monitoring and adaptive management. The Developer's approach to Reasonable Foreseeable Projects is minimized by taking such a restrictive approach to the RSA (35 km buffer of the TASR). The WRRB believes that this is inadequate to assess cumulative effects, especially over the indefinite timeframe.

Thus, the WRRB considers that as the Developer has not reasonably predicted all the effects, and the levels of uncertainty are high for the proposed monitoring and mitigation, there is risk to ɔekwǫ̀. The WRRB also notes that the societal values of ɔekwǫ̀ are so important in northern communities and that ɔekwǫ̀ are in trouble – a point repeatedly articulated in environmental assessments and consultations for ɔekwǫ̀ management and range planning consultations.

The WRRB suggests its recommendations for ɔekwǫ̀ in the Technical Report can be implemented as a MVEIRB Measure. The WRRB also observes that the TASR assessment's shortcomings can be remedied if the MVEIRB sent the operations phase back to the Parties for (i) further review to collaboratively revise the WMMP, (ii) development of specific management plans such as for access and traffic management, and (iii) the establishment of an Independent Oversight Committee, to ensure that the road's monitoring and mitigation is highly protective of Threatened ɔekwǫ̀, people and the environment, and is based on Tłı̨chǫ elder's knowledge and experience as well as technical information.

## 4.3 Łıwe (Fish)

### 4.3.1 Summary of Direct Effects to Łıwe & Łıwe Habitat

As part of the PDR, the Developer conducted a Fisheries Protection Self-Assessment[26], a structured and risk-based method designed by the Department of Fisheries and Oceans (DFO) to assess harm and impacts to łıwe and łıwe habitat. The WRRB's review of the self-assessment conducted by the Developer was found to be reasonable, with no substantial gaps.

The Developer's Fish and Fish Habitat Protection Plan[27] was also reviewed; this document highlights watercourse crossing locations and methods. Most of the document uses current best management practices, construction standards, and mitigation measures. Section 8 (Highway Maintenance) focuses on roadbed safety as well as emergency maintenance (culvert blocking), while section 9 (Monitoring), focuses on erosion and sediment control and inspection for structural integrity of bridges and culverts. However, the Developer does not show a comprehensive understanding nor a commitment to preventative maintenance to structures in

[26] http://www.reviewboard.ca/upload/project_document/EA-1617-01_Appendix_T_-_Fisheries_Protection_Self-Assessment_Serious_Harm_Impacts_Determination_Record_February_2016.PDF

[27] http://www.reviewboard.ca/upload/project_document/EA-1617-01_Appendix_X_-_draft_Fish_and_Fish_Habitat_Protection_Plan.PDF

order to prevent impacts to łıwe habitat, i.e. łıwe passage. The Developer also lacks a surveillance schedule or process to monitor detection of emerging impacts to łıwe habitat in and around stream crossings.

One of the Developer's consulting firm, SRK, produced a Hydrotechnical Progress Report,[28] which summarized field investigation at fifteen watercourse crossings along the road alignment. The progress report showed pictures of stream crossings, helping reviewers appreciate the land and waterscapes encountered along the TASR. The photographic evidence of crossing provides reviewers with excellent opportunities to understand the nature of the łıwe habitat present. Unfortunately, SRK conducted the aerial and ground survey after spring melt in early July 2014, and would have likely missed viewing high-water flow scenarios. In addition, SRK was only able to obtain field measurements (stream width, depth, etc.) at six of the fifteen sites.

The Developer, along with the Tłı̨chǫ Government (TG), prepared a PowerPoint presentation[29] of road conditions along the TASR. Though well intentioned as a ground-based exploration of the road alignment, the photographic evidence shows a surprising disregard for best practices associated with fording rivers with all-terrain vehicles (crossing 15, picture 2), and damage to bogs and wetlands (Km 72, several pictures) from travelling with off-road vehicles. It is common practice in virtually all jurisdictions in Canada to avoid all-terrain vehicle travel[30] through water bodies, including wetlands. This Developer report casts doubt on the Developer's appreciation for working in and around water, despite the management plans outlined in the PDR.

**WRRB Recommendation 1 (Łıwe): To prevent impacts to waterbodies and wetlands during surveying, construction, maintenance, and monitoring of the TASR, WRRB recommends the Developer devise and implement best practices for operating all-terrain vehicles in and around water.**

**WRRB Recommendation 2 (Łıwe): To prevent impacts to waterbodies and wetlands from members of the public operating all-terrain vehicles, the WRRB recommends the GNWT and the Tłı̨chǫ Tłı̨chǫ Government devise and publish best practices for operating all-terrain vehicles on public lands in and around water.**

The WRRB provides in the following footnotes, examples of such policies, outreach and education tools for the jurisdiction of Alberta[31], and by DFO and Government of Newfoundland & Labrador[32].

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[28] http://www.reviewboard.ca/upload/project_document/EA-1617-01_Appendix_S_-_Stantec_Hydrotechnical_Progress_Report_August_2014.PDF

[29] http://www.reviewboard.ca/upload/project_document/EA-1617-01_Appendix_H_-_TASR_Photo_Presentation_-_Conditions_along_route_in_June_2014.PDF

[30] https://www.youtube.com/watch?v=P5yfTgPSrTg

[31] http://aep.alberta.ca/recreation-public-use/recreation-on-public-land/motorized.aspx

[32] http://publications.gc.ca/collections/collection_2010/mpo-dfo/Fs49-1-2010-eng.pdf

On March 17, 2017, the Developer submitted an updated meeting report. This report highlights a December 15, 2016 meeting between the Developer and DFO where water course crossings and effects to łıwe and their habitat were discussed. The report highlights a DFO conclusion that many watercourse crossings can be self-assessed, while the remaining watercourse crossings are considered low-risk to łıwe and łıwe habitat. The conclusion by DFO was that the road is not likely to cause significant adverse effects[33].

The WRRB concurs with this DFO assessment that construction of the TASR is not likely to cause significant adverse effects to łıwe habitat. The Developer sufficiently describes construction and mitigation methods, that, once implemented, would meet industry standards and mitigate impacts to łıwe habitat.

However, the WRRB finds there remain sufficient questions with respect to a likely impact on łıwe habitat during operation of the road. Specifically, the WRRB's concerns center on the surveillance and maintenance aspects of monitoring.

In the ASR[34], section 3.6 Monitoring and Follow-up (p.3-64), a consultant to the Developer, Golder & Associates (Golder), describes two-years of post-construction monitoring of watercourse crossings to verify erosion and sediment control measures. Golder states that integrity of crossing structures will be inspected regularly and during high runoff; however, frequency is not reflected in the GNWT commitment below.

The Developer supplied two commitment tables in response to MVEIRB IR#21, one table for construction, and another for operation[35]. More specifically, the WRRB highlights Table MVEIRB-IR21-2: A Operation Commitments, commitment #6 which says "*Watercourses will be inspected upstream and downstream of the crossings for erosion, scour, and flow blockages during the spring freshet and through the open water season, as required. Impacts will be minimized by culvert maintenance, including removal activities of debris (e.g., ice, beaver dams), following DFO guidance (i.e., gradual removal such that flooding downstream, extreme flows downstream, release of suspended sediment, and fish stranding can be avoided).*"

**WRRB Recommendation 3 (Łıwe): The WRRB recommends that Developer commitment #6 in Table MVEIRB-IR21-2 also include łıwe passage and regular annual inspection. The new commitment would read as follows: *"Watercourses will be inspected at least annually upstream and downstream of the crossings for erosion, scour, flow blockages, and łıwe passage during the spring freshet and through the open water season, as required. Adverse***

[33] http://www.reviewboard.ca/upload/project_document/EA-1617-01_DFO-GNWT_meeting_summary_report_.PDF

[34] http://www.reviewboard.ca/upload/project_document/EA-1617-01_Developer_s_Adequacy_Statement_Response.PDF

[35] http://www.reviewboard.ca/upload/project_document/EA-1617-01_Developer_responses_to_MVEIRB_IRs_10__11__12__15__21.PDF

***effects to łıwe habitat will be minimized by culvert maintenance, including removal activities of debris (e.g., ice, beaver dams), following DFO guidance (i.e., gradual removal such that flooding downstream, extreme flows downstream, release of suspended sediment, and łıwe stranding can be avoided)".***

### 4.3.2 Summary of Indirect Eff0ects to Łıwe

In the main PDR, the Developer did not examine indirect impacts to fisheries associated with increased fishing pressure. Rather, the Developer focused on preventing impacts to łıwe habitat, such as at watercourse crossings.

With an impact assessment to fisheries missing, information requests from various users began to uncover an underestimated assessment, and a disjointed response from responsible authorities comprised of three levels of government: federal, territorial, and indigenous government.

On December 19, 2016, the WRRB responded to an October 2016 information request from the MVEIRB regarding łıwe harvesting[36]. The WRRB requested more time to answer the IR but provided a commissioned report by D.B. Stewart (1997) entitled "A review of the status and harvests of fish stocks in the North Slave area".[37]

In a response to an information request from the MVEIRB on December 21, 2016, DFO indicated that it "*...does expect increased sport and subsistence fishing pressure on some fish stocks along the proposed road route, particularly at the major river crossings such as the James River, Dupont River and La Martre River, due to improved access to these sites.*"[38].

In response to MVEIRB IR#8, the GNWT responded[39] that the three levels of government, DFO, the Tłı̨chǫ Government, and the GNWT, would work together to administer and manage fisheries resources. However, the GNWT indicated they are planning for no additional resources, nor any additional inspections or enforcement capacity, explaining that DFO is the management authority for łıwe and łıwe habitat in the NWT. The GNWT included federal Order in Council P.C. 1976-535 as an attachment to this information request response to demonstrate this point in terms of management responsibility. However, this Order in Council clearly shows that if the GNWT desires to assume administration of freshwater sport fishery in the NWT, that responsibility for enforcement of regulations with respect to sport fishing will rest with the GNWT. The GNWT's response to this question remains unsatisfactory.

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[36] http://www.reviewboard.ca/upload/project_document/EA-1617-01_WRRB_response_to_Oct__28_Review_Board_Information_Request.PDF

[37] http://www.reviewboard.ca/upload/project_document/EA-1617-01_WRRB_DFO_Report_on_North_Slave_fish_harvests_and_stocks_Stewart_1997.PDF

[38] http://www.reviewboard.ca/upload/project_document/EA-1617-01_Federal_letter_to_MVEIRB_-_information_request_response.PDF

[39] http://www.reviewboard.ca/upload/project_document/EA-1617-01_The_developer_s_response_to_Review_Board_IRs__8_and_14.PDF

DFO's response to a similar question also cites co-management with the WRRB, and ultimately answers that it "*has yet developed an enforcement plan to deal with new access into the area*[40]". DFO appeared to commit to work closely with WRRB and Tłı̨chǫ communities to develop an appropriate plan to address increased fishing access should the project proceed to the regulatory phase.

In response to a series of questions on all aspects of the environmental assessment, on April 12, 2017, the Developer submitted the ASR.[41] Section 3 of this report focuses on the assessment of effects to łıwe and łıwe habitat. More specifically, the report estimates effects on the fishery from harvesting pressure between a "Base Case" and a "TASR Case" after application of mitigation. The Developer's conclusions (page 3-58) are that effects to the fishery are negligible to low for four reasons, namely:

- Small population of people (and fishers) in the NWT;
- The distance between the TASR and population centre (fishing effort attenuation);
- Other fisheries nearby and in the NWT (dilution of fishing effort); and,
- No growth in recreational fishing industry.

The Developer's analysis of effects on specific watercourses directly accessed from TASR are as follows: Lac La Martre (Table 3.3-2 Negligible), Upper La Martre River (Table 3.3-3 Negligible to Low), James River (Table 3.3-8 Negligible to Low), as well as other smaller stream crossings (Table 3.3-9 Negligible to Low). The Developer also identifies mitigation measures available, such as Tłı̨chǫ Government's ability to control access and fishing.

In the Tłı̨chǫ Government response to NSMA IR2, the Tłı̨chǫ Government refused to directly address the IR as it was deemed to be outside the jurisdiction of the MVEIRB. However, the Tłı̨chǫ Government cited "in *PR#97, IR1, the Tłı̨chǫ Government provides a detailed response pertaining to fish harvesting concerns as a direct or indirect result of the construction and operation of the TASR, including our ability to enact legislative authority to control and effectively manage fish harvesting on Tłı̨chǫ Lands.*"[42]

In the GNWT's response to MVEIRB IR#6, the Developer says it "*does not plan to conduct monitoring associated with fisheries harvest in the Project area*[43].

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[40] http://www.reviewboard.ca/upload/project_document/EA-1617-01_Government_of_Canada_response_to_first_round_IRs.PDF

[41] http://www.reviewboard.ca/upload/project_document/EA-1617-01_Developer_s_Adequacy_Statement_Response.PDF

[42] http://www.reviewboard.ca/upload/project_document/EA-1617-01_The_Tli_cho_Government_s_response_to_information_requests.PDF Page 39

[43] http://www.reviewboard.ca/upload/project_document/EA-1617-01_Developer_s_respones_to_MVEIRB_IRs_1__2__4__6.PDF, Page 3 of 4

In the GNWT's response to NSMA IR#3, the Developer highlights that in one water body, several authorities (Tłı̨chǫ Government and DFO) have overlapping responsibilities[44]. However, GNWT reiterates that it does not have authority to manage fisheries in the NWT.

In the GNWT's response to MVEIRB IR#19, the Developer summarized effects of the project on łıwe habitat and łıwe abundance[45]. The main conclusions of the Developer are that with implementation of mitigation, namely enforcement of fishing regulations to prevent overfishing, no residual effects from Project construction and operation are anticipated.

### 4.3.3. Analysis

Roads have long been known to cause effects on terrestrial and aquatic ecosystems (Trombulak & Frissell, 1999)[46]. Specifically, increased exploitation effects (sport fishing) on northern łıwe species (lake trout) on isolated lakes are already well documented using experimental manipulations (Gunn & Sein, 2000[47]).

Fisheries are notoriously challenging to manage, requiring an understanding of both fishing effort (harvest) and the reaction of the łıwe resource to fishing pressure.

The WRRB believes that the Developer's assessment of fishing impact in water bodies directly connected to the TASR is underestimated, and is based on a limited appreciation of fisher behaviour in the North Slave region of the NWT.

Most drive-up fishing location in the NWT offer very low or zero fishing catch rates. Stream crossings along highways in the NWT are typically locally depleted from łıwe, with seasonal exceptions for streams such at the Kakisa or Redknife River where grayling and sucker migrate in the spring. Lake shorelines exposed to drive-up fishing opportunities, such as those along Hhighway 4 (the Ingraham Trail) offer notoriously poor to non-existent łıwe catches, unless fishers can relocate their fishing effort with boats to more favorable locations away from the highway shoreline. It is WRRB's opinion that łıwe presence close to the TASR such as in Upper La Martre River (Table 3.3-3), James River (Table 3.3-8), as well as other smaller stream crossings (Table 3.3-9) will likely experience moderate to high localized effects, absent active management by government.

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[44] http://reviewboard.ca/upload/project_document/EA-1617-01_Developer_response_to_NSMA_IRs__1_and_3.PDF

[45] http://www.reviewboard.ca/upload/project_document/EA-1617-01_Developer_response_to_Review_Board_IRs_3__16__17__and_19.PDF

[46] Trombulak, S.C., and Frissell, C.A. (1999) Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology 14(1): 18-30.

[47] Gunn, J.M., and Sein, R. (2000) Effects of forestry roads on reproductive habitat and exploitation of lake trout (Salvelinus namaycush) in three experimental lakes. Can. J. Fish. Aquat. Sci. 57(suppl. 2): 97-104.

With respect to fishing effects on Lac La Martre, the Developer used a reasonable model developed by Evans et al (1991)[48] that described the relationship between lake surface area and observed annual yields of lake trout in Ontario. Using this model, the Developer estimated that "sustainable annual harvest" of lake trout in Lac La Martre could be 23,108 kg. Harvest levels from the community of Whatì were estimated by Golder to be 13,696 kg of lake trout, indicating that *"only 58% of the current sustainable harvest is being utilized be residents of Whatì".*[49] During the technical sessions of August 16, 2017,[50] the Developer provided a different estimate of yield "*of about 63,000 kilograms of lake trout*", but the listener was left to guess that the estimate was derived from a different model, likely that of Payne et al (1990)[51]. There are a few problems with this analysis. Firstly, the model by Evans et al (1991) does not estimate sustainable harvest, rather it estimates yield. Yield is the estimate of how much łıwe could be produced by a lake, whereas harvest is the amount of łıwe that could be taken by fishing *after* accounting for other sources of łıwe mortality (ageing, predation by other animals, etc.). Second, Evans et al (1991) and other authors caution there is inherent variability in yield potential from the lake area model, and as such, estimates should be taken as educated guesses. Second, the Developer does not explain the significance of, reasoning for, or limitations of using the Payne versus Evans model. The take home message is yield estimate are best guesses, vary wildly (by up to 272%), and have uncertainties. Third, the Developer does not estimate what the additional harvest pressure would be from Aboriginal Non-Tłı̨chǫ, Non-Aboriginal NWT residents, and non-NWT residents. This makes it nearly impossible to conclude that only 58% of the Lac la Martre lake trout yield is being harvested. The WRRB does not fault the Developer for not estimating harvest pressure, as it is very difficult to estimate when there is little to no harvest rate estimates for non-commercial fishery in the NWT.

By the technical sessions of August 16, 2017,[52] the Developer provided an estimate that an additional 14,000 recreational anglers could be supported on Lac La Martre. It is left to the reader to guess how this harvest pressure was estimated, and if this estimate could be 272% smaller if one uses the Evans model instead of the Payne model, or whether this harvest estimate applies to lake trout only or to other species. Given the lack of empirical yield estimates on Lac La Martre, the variability in obtaining yield estimates from models, and

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[48] Evans, D.O, Casselman, J.M., Wilcox C.C. (1991) Effects of Exploitation, Loss of Nursery Habitat, and Stocking on the Dynamics and Productivity of Lake Trout Populations in Ontario Lakes. Lake Trout Synthesis. Ontario Ministry of Natural Resources, Toronto.

[49] Page 3-58, 3rd paragraph http://www.reviewboard.ca/upload/project_document/EA-1617-01_Developer_s_Adequacy_Statement_Response.PDF

[50] http://www.reviewboard.ca/upload/project_document/MVEIRB%20re%20TLICHO%20ALL%20SEASON%20RD%20%2008-16-2017.pdf, page 133 of day 2 transcript.

[51] Payne, N.R., Korver, R.M., MacLennan, D.S., Newsy, S.J., Shouter, B.J., Stewart, T.J., and Thomas, E.R. (1990) The harvest potential and dynamics of lake trout populations in Ontario. Lake Trout Synthesis Population Dynamics Working Group Report. Ontario Ministry of Natural Resources, Toronto, Ont.

[52] http://www.reviewboard.ca/upload/project_document/MVEIRB%20re%20TLICHO%20ALL%20SEASON%20RD%20%2008-16-2017.pdf, page 133 of day 2 transcript.

unknown additional fishing pressure from outside Whatì, the WRRB finds that the TASR effect to the fishery in Lac La Martre is unknown but could possibly be low to moderate. However, mitigation could be applied to keep track of both yield and harvest pressure and ensure that management actions are deployed by government to reduce or eliminate effects to fishery from TASR.

On October 3, 2017, the Developer provided clarification (PR #211) on the following:

- The Lake Trout biomass estimate of 23,108 kg provided in the ASR (Section 3.3.2) is the calculated sustainable harvest for the Lac La Martre fishery as per the fishing yield model by Evans et al. (1991); whereas the biomass estimate of 63,000 kg provided during the technical session in Behchokǫ̀ is the maximum equilibrium yield for the fishery as per the life history-based model by Shuter et al. (1998);
- As noted in the ASR, Lake Trout may be the most vulnerable species to overharvest in the region due to relatively slow growth and late maturity characteristics, and therefore, it is expected that the estimated angling effort potential for the Lake Trout fishery will maintain the productivity of other species in the lake, and estimate the capacity of the lake to support recreational and subsistence fishing pressure; and,
- The model in Shuter et al. (1998) (instead of Payne et al 1990) may prove more reliable and useful to resource managers upon further analysis of existing catch data for Lac La Martre (e.g., Bond 1973) and verification of model assumptions. The reliability of fishing yield estimation would also be expected to improve as new data on the fishery are collected and analyzed in the future.

Further, the Developer noted that *"there is a reasonable level of certainty that the access created by the all-season road will not pose a risk to the ongoing productivity of local fisheries"*. The Developer does suggest that additional information on harvesting statistics may be useful for the management of local fisheries, with a creel survey listed as the survey method that fisheries managers could consider in the future. The WRRB does not feel that a creel survey is adequate to properly management the fisheries along the TASR.

**WRRB Recommendation 4 (Łıwe)**: **The WRRB recommends that DFO, GNWT, and the Tłı̨chǫ Government work together to scope out, and, as appropriate, design and implement a Fisheries Management Plan (FMP) for the TASR corridor. The FMP would establish fishery objectives, assess yield and harvest, identify management issues and measures, clarify management and stewardship arrangements, design and implement a regulatory and compliance plan, and design an adaptive management plan. Scoping out of a FMP should be complete within 12 months of TASR receiving regulatory approval.**

### 4.3.4. Conclusion on Indirect Effects on Łıwe

Though the assumptions and conclusions on fisheries-related impact mediated by the TASR are reasonable, it is unreasonable to conclude that no additional management or monitoring is required along the TASR and associated watersheds. Fisheries, both commercial and sport, are

no longer managed using coarse assumptions and blind faith. Rather, fisheries important to people are managed using Fisheries Management Plans (FMP). In Canada, DFO manages commercial fisheries using Integrated Fisheries Management Plans (IFMP)[53], while provincial governments manage fisheries using similar tools (BC[54], SK[55], ON[56]). Some FMP apply across broad waterscapes and include the whole province while others focus on a specific body of water or fishery. It would be irresponsible to expose a fishery to additional fishing pressure along the TASR and all the way to Lac La Martre without an FMP.

## 4.4 Traditional Knowledge

As is generally understood among regulatory boards, Indigenous people of Canada pay close attention to relations between all aspects of the environment; they consider the full range that may be impacted or used. In the WRRB's experience, the extent of the Dene perspective is both complex and far reaching. The Tłı̨chǫ, like other Indigenous people, consider human behaviour as an indicator of health of land—including water, fish, and animals.

Information gathered from Tłı̨chǫ elders and harvesters in Whatì and Behchokǫ̀ who know the 'land' strongly and clearly suggests two things:

- Uncertainty associated with the impact of TASR; and,
- The need for an all-species approach to monitoring.

Tłı̨chǫ harvesters, who use the land and know the stories passed to them by their ancestors are the best people to monitor the land past the 35-km buffer zone associated with the TASR.

### 4.4.1. Łıwe (Fish)

Today, as in the past, people in Whatì rely on fish as an important source of healthy food (Appendix A). Whatì elders and harvesters have recently experienced some negative changes to the success of local fish populations: smaller sizes, unusual distribution, fewer numbers, and different species. As harvesters, they constantly monitor conditions and quickly become aware of change.

> *"People really live off fish here in Whatì. So they really respect fish and if there are some changes in the fish they know right away."*
> *(Charlie Jim Nitsiza, July 11, 2017)*

> *"After five years the fish went down. And Jimmy Nitsiza Sr. and Johnny Nitsiza and Louie Beaulieu mentioned they want to shut the plant down for maybe five years to see*

[53] http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/ifmp-gmp/guidance-guide/preparing-ifmp-pgip-elaboration-eng.htm
[54] http://www.env.gov.bc.ca/esd/documents/ff_program_plan.pdf
[55] http://publications.gov.sk.ca/documents/66/76425-44c1e4e5-c717-42d3-bef7-75f0d398b55d.pdf
[56] https://www.ontario.ca/page/fisheries-management-zones

> *if there will be more fish again. But later the building burnt down and the fishing plant was not opened again."*
> *(Benny Jeremick'a, September 7, 2017)*

In their responses to questions from the WRRB (PR #211), the GNWT states that forest fires *"… may cause temporary stress to fish populations, … the recent fires [2014] are unlikely to have a lasting effect on fish populations".*

Evidence from the elders suggests otherwise. As they discussed possible causes for these negative changes to łıwe populations, they most frequently mention the impacts on water quality/fish habitat from the smoke and ash of the unusually intense forest fires of 2014. They also noted that the 2014 forest fires changed wind direction and the surface flow of water during the fire.

> *"Since the 2014 fire, our łıwe are getting smaller. I think it is the smoke and ash. We need to look very close into this." (Joe Champlain)*

> *"All the burned land flows into the lake in the spring when the snow is melting and there were so many large ashes falling to the lake. The łıwe are being harmed." (Jimmy Nitsiza)*

And with the impacts of climate change, we can only expect unusually intense fire events to happen more often.

At the same time, there is some uncertainty about how these negative changes will evolve in the near and distant future, especially given the multiple factors that contribute to change—some known and some as yet unknown.

**WRRB Recommendation 1 (TK): Monitor łıwe and water with a system that coincides with Tłı̨chǫ knowledge—continue to build on the elders' and harvesters' knowledge (See Appendix B).**

**WRRB Recommendation 2 (TK): Allow łıwe populations to recover based on elders' and harvesters' knowledge before introducing any new human activity that could add to the negative cumulative impacts on łıwe and łıwe habitat.**

While interviewing elders and walking habitat-types used by tǫdzı (boreal caribou) Joe Rabesca explained (Sept. 26, 2017) that the area covered with ʔelatì (clay water) eventually flows into Whatawoodıà (Mosquito Creek). Similarly, when Bobby Migwi and Camilla Nitsiza were examining a map (Figure 2) showing the proposed route of TASR he explained:

> *"You see all those lakes? They're ʔelatì and very [muddy and] smelly. We go there during the winter but not in the summer. … Once I was thirsty and dug a hole in the ice. It was good to drink; it's all ʔelatì. You see this river, its goes all the way to*

*Whatawoodià (Mosquito Creek). You see this creek here? We can barely see it. Along that there is this lake here; we don't know if there are fish in the lake, but [we know] fish go up stream at Whatawoodià from Tìcho [the big lake—Great Slave Lake]. Maybe there are fish in the ʔelatì, we don't know because we didn't check it out. … It's very hard [and dangerous] to travel there during the summer and fall time so we don't go there."*

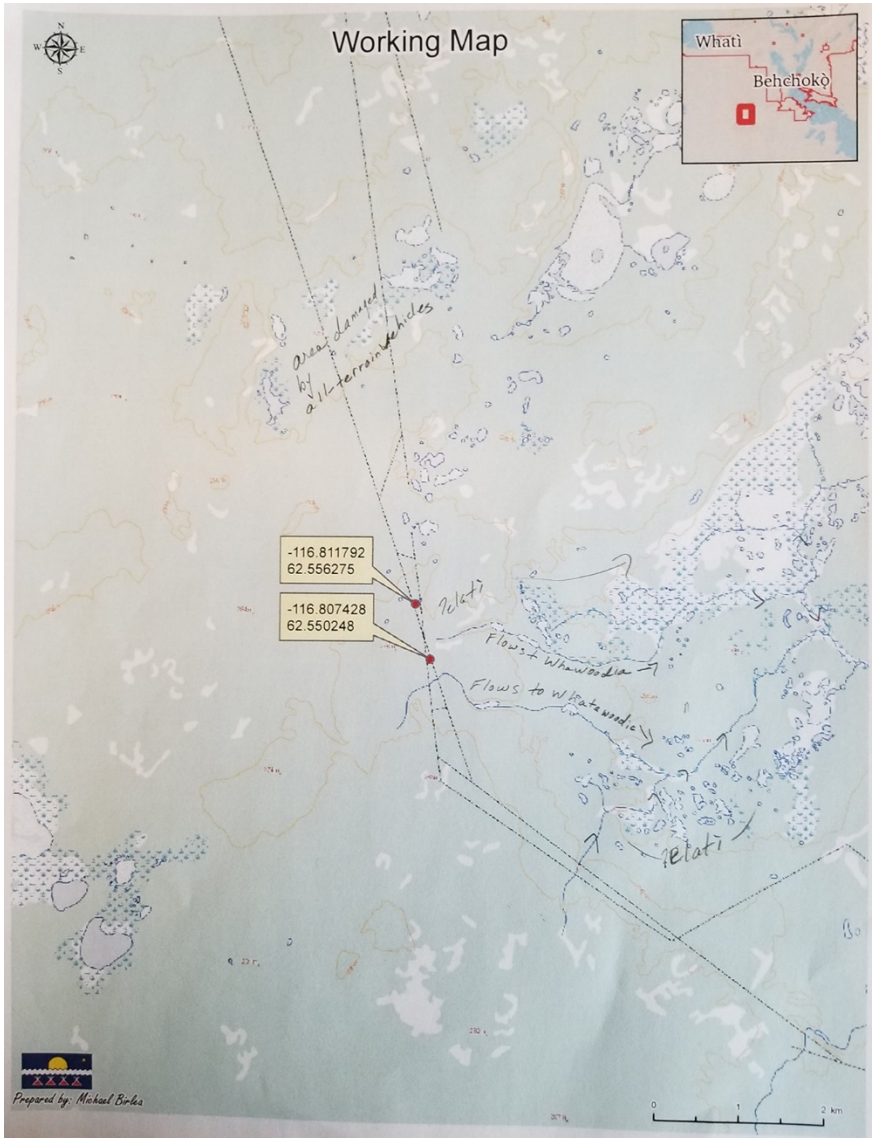



**Figure 2.** Bobby Migwi's information, September 12, 2017.

Although the Developer's review of the impacts to łiwe and water concluded that TASR would probably not cause significant adverse effects to łiwe and łiwe habitat, the evidence from harvesters and elders suggests that it could have an indirect effect.

The areas where creeks and ponds are associated with bogs and wetlands—in association with ɔelatì—need to be watched and protected as the water from these areas often feed the larger rivers and provide habitat for łıwe.

**WRRB Recommendation 3 (TK): To prevent impacts to all waterbodies and wetlands, the WRRB recommends that the GNWT ensure that each bridge and culvert does not disrupt the seasonal flow of water in areas where ʔelatì exist, as they feed larger creeks and rivers—łıwe habitat.**

**WRRB Recommendation 4 (TK): The WRRB recommends monitoring by Tłı̨chǫ harvesters who have Tłı̨chǫ knowledge of the area with extensive ɔelatì.**

### 4.4.2.ʔekwǫ̀ (Barren Ground Caribou)

The Tłı̨chǫ traditional knowledge report states that the harvesters' observed changes to ɔekwǫ̀ migration routes in the 1990s. The Developer emphasized that ɔekwǫ̀ only came to the project area when populations are high.

The Developer used insufficient Tłı̨chǫ knowledge to make the above statement. ʔekwǫ̀ harvesting information between 1925 and 1996 show distribution of ɔekwǫ̀ associated with the taiga plains (DT11C 2001: Appendix II) when there was at times sufficient ɔekwǫ̀ and at other time insufficient ɔekwǫ̀ to feed Tłı̨chǫ camps (DT11C 2001: opposite p. 58). The archived scientific information Gabrielle Mackenzie-Scott found states

> *"In 1948-49, Banfield estimated the herd [between Great Bear and Great Slave Lakes] to be 219,000. In 1950, Kelsall estimated the herd had dropped to 147,000. Kelsall continued to report a further drop in 1952-53 to 51,000 [ɔekwǫ̀]. …An extensive aerial survey was conducted in 1955. Over 38 thousand miles were flown in the sector alone. In a confidential report of July 15, 1955, the results showed a steady decline since 1948.*
> *…*
>
> | | *1949* | *1955* |
> |---|---|---|
> | *Between Great Bear and Great Slave Lakes* | *219,000* | *55,952"* |
>
> (Mackenzie-Scott 1998: 19-20).

During this period, ɔekwǫ̀ were harvested near or on the tiaga plains and between Gamètì and Behchokǫ̀, and in the Project area. Specifically, in 1951 ɔekwǫ̀ were near Whatì and ʔehtł'ètì [James Lake] (ibid).

Wildlife Officers did not think harvesting was the problem (Ibid: 19). It should be noted that during this period of time winter roads and traffic were becoming more numerous.

As Tłı̨chǫ elders and harvesters have expressed, roads especially associated with loud noises, smells and dust cause ɔekwǫ̀ to be stressed and confused, which disrupts their ability to find adequate food on which to survive through the winter (DT11C 2001; Jacobsen 2014).

TASR will provide more access to the area and with that will come additional harvesting which at times will include disrespectful harvesting. As the Tłı̨chǫ knowledge report (Jacobsen 2014: 41) states the people are concerned the road will bring outside hunters, who presumably lack knowledge of respectful harvesting.
Respectful harvesting includes, but is not limited to, taking direction from Tłı̨chǫ leaders about where and when to hunt, knowing how to approach ɔekwǫ̀, which should be done softly, not by chasing animals with fast skidoos (Legat et al 2008).

**WRRB Recommendation 5 (TK): To better understand ɔekwǫ̀ habitat and ensure adequate habitat is available when ɔekwǫ̀ return to the project area, WRRB recommends an in depth Tłı̨chǫ knowledge study on ɔekwǫ̀ habitat with the project area.**

**WRRB Recommendation 6 (TK): Monitoring by Tłı̨chǫ elders and harvesters who have Tłı̨chǫ knowledge of ɔekwǫ̀ throughout Wekèezhı̀ı (See Appendix B).**

### 4.4.3. Tǫdzı (Boreal Caribou)

The WRRB has been documenting information on habitat types used by tǫdzı within their range associated with Wek'èezhìı. As the document, entitled *Habitat Types: Tǫdzı and Proposed Tłı̨chǫ All Season Road* shows, many of these habitat types have been found in association with TASR in September 2017 (Appendix C).

TASR will provide more access to the area and with that will come additional harvesting which at times will include disrespectful harvesting. As the Tłı̨chǫ knowledge report (Jacobsen 2014: 41) states, the people are concerned the road will bring outside hunters, who presumably lack knowledge of respectful harvesting.

Respectful harvesting includes, but is not limited to, taking direction from Tłı̨chǫ leaders about where and when to hunt, knowing how to approach ɔekwǫ̀, which should be done softly, not by chasing animals with fast skidoos (Legat et al 2008).

**WRRB Recommendation 7: To monitor tǫdzı and their habitat by Tłı̨chǫ elders and harvesters who have Tłı̨chǫ knowledge of tǫdzı throughout Wekèezhı̀ı (See Appendix B).**

**References**

Jacobsen, Petter, Georgina Chocolate and Sjoerd van der Vielen. 2014. K'àgòò tı̨lıì Deè: Traditional Knowledge Study for the Proposed All-Season Road to Whatì. Behchokǫ̀ Tłı̨chǫ Research and Training Institute.

Legat, Allice, Georgina Chocolate and Madelaine Chocolate. 2008. *Monitoring the Relationship between People and Caribou.* (Modified Version of the Report, Monitoring Caribou: Tłı̨chǫ Laws and Indicators of Change). Yellowknife: West Kitikmeot Slave Study Society.

Dogrib Treaty 11 Council (DT11C). 2001. *Caribou Migration and the State of Their Habitat: Final Report.* Yellowknife: West Kitikmeot Slave Study Society.

## Appendix A – Tracking Change: Whatì Fish

# Tracking Change: Whatì Fish

The information in this report builds on and enhances information gathered in 2016 from elders in Whatì. The overall purpose is to develop a monitoring program for fish and fish habitat, based on what the elders have observed over time, using the Tłı̨chǫ knowledge system.

## Research Team and Methodology

During 2017 the research team included Charlie Jim Nitsiza, translator; Camilla Nitsiza, translator and community researcher; Sarah Taylor[1], assistant researcher; Allice Legat, primary researcher; and three youth associated with the Įmbè[2] program.

Researchers collected stories on the land and in the community on audiotape. Elders shared stories and information about what they know about fish, how to respect fish, what medicines fish have, and what changes they have seen. Camilla Nitsiza translated and transcribed all the information. Mary McCreadie and Allice Legat analyzed and wrote reports. Camilla Nitsiza met with the elders in early October 2017 to verify the information in this report.

### July 11 to 13

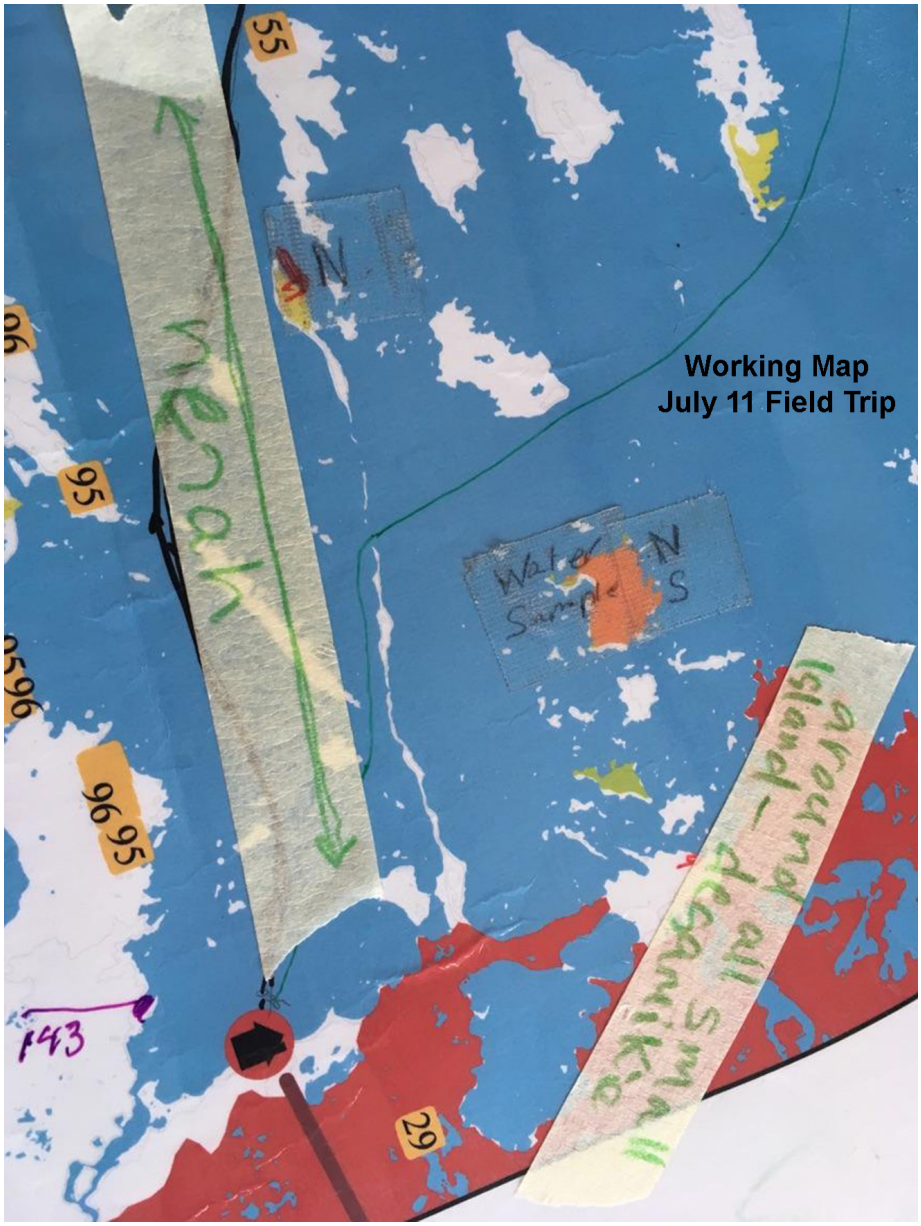
From July 11 to 13, Allice Legat and Sarah Taylor travelled to Whatì to gather information from elders and harvesters. Among other things, they discussed how people used fish, especially as medicine.

- July 11: Charlie Jim Nitsiza took Sarah Taylor out in his boat during which time they documented where the fish nets go in late May and June on the southeast side Nę?ah (see Working Map July 11 Field

[1] Sarah Taylor was part of the project only during the July meetings with elders.

[2] The Tłı̨chǫ Įmbè Program started in 2011. It is an intensive cultural learning program for senior high school and post-secondary students, connecting young people with elders to help ensure that Tłı̨chǫ language and culture are passed on to future generations. The program encourages participants to learn as much as they can about their unique culture, language, history, and land; and take pride in themselves and their communities. The program includes safety training and participants are certified in first aid, canoe safety, and bear awareness. To encourage leadership, the program hires participants from one year to take on leadership roles the next. The program runs in all Tłı̨chǫ communities each summer. Thirty participants, five group leaders, and 30 Elders are involved each year.

Trip). He pointed out important spots and the changes he has noticed.




- July 12: Elders Sophie Williah, Jimmy Nitsiza, Margaret Nitsiza, Jimmy B. Rabesca, and Mary Adele Rabesca met with Charlie Jim Nitsiza, Sarah Taylor, and Įmbè program participants at ʔenęgho (Burnt Island). The elders showed them where people set nets in June, on the north side of Nęʔah, detailing the information collected in 2016 on seasonal fishing (see Working Map of Seasonal Łıwe (fish) Areas). Later, Sarah Taylor interviewed the elders with

Charlie Jim Nitsiza translating.

- July 13: Sarah Taylor and Charlie Jim Nitsiza travelled to the cabin of elders Joe and Mary Madeline Champlain. They were interviewed about changes they had observed over the last decade and the importance of respect.

**August 28 to September 1**

Camilla Nitsiza interviewed elders in Whati. Įmbè program youth Tracella Romie, Judith Modest, and Sabrina Football helped her with the research and translation. The elders included Liza Jeremick'a, Sophie Williah, Margaret Nitsiza, Mary Madeline Champlain, and Mary Adele Rabesca. They discussed how to respect fish and sustainability of fish populations, and changes they have observed during their lifetime.

**September 7**

Camilla Nitsiza did follow-up interviews on Sept. 7, 2017 with Benny Jeremick'a, Liza Jeremick'a, Jimmy B. Rabesca, and Joe Champlain. These interviews focused on the experience of the former commercial fish plant, in addition to monitoring change and respecting fish. All of which can be associated to sustainability of fish populations.

**Summary List of Elders**

| July 11 to 13 | August 28 to Sept. 1 | Sept. 7 |
|---|---|---|
| Sophie Williah<br>Jimmy Nitsiza<br>Jimmy B. Rabesca<br>Mary Adele Rabesca<br>Joe Champlain<br>Mary Madeline Champlain | Sophie Williah<br>Liza Jeremick'a<br>Margaret Nitsiza<br>Mary Adele Rabesca<br>Mary Madeline Champlain | Benny Jeremick'a<br>Liza Jeremick'a<br>Jimmy B. Rabesca<br>Joe Champlain |

## What We Learned

Community members want youth to understand their relationship with water and fish, and how to respect each to ensure they thrive. For the elders and harvesters, the success of the fisheries depends on people following the Tłı̨chǫ 'laws' associated with traveling on the land and respecting fish and water.

The following themes emerged from the information we collected.

- Importance of fish as a food resource
- Respecting fish as part of the Tłı̨chǫ way
- Monitoring change

### Importance of fish

The Tłı̨chǫ that live in Whatì have relied on fish as an important food resource as far back as memory serves. Relying solely on caribou or moose was/is not possible, as these animals don't always come to be harvested.

> *There are all kinds of fish here in the lake. There is dehdoo (sucker), ehts'ęę (pickerel), ı̨hdaa (jackfish), kwizhıı (white sucker), łıh (whitefish), łıwezǫǫ̀ (trout), nǫ̀hkwèe (loche), ts'ètı̨a (Arctic grayling), xahtıą̀ (slime whitefish), This is all the fish we have in the lake here [Whati].*
> *(Mary Madeline Champlain, August 30, 2017)*

> *The fish was our main source of food so we have to have respect for the fish. Sometimes it is hard to shoot a moose or other animals. Tǫdzı is very smart and hard to see them. If you want to shoot a tǫdzı you really sneak around to get them. Or they will see you first. If a person is very lucky they will shoot a tǫdzı. That is why people survive most on fish for food.*
> *(Joe Champlain, July 13, 2017)*

> *We live off the fish and also the water. We have to take care of it. We have to look after our tools [that we fix the fish with]. And if we don't take care of the fish in the water, it is not our control where the fish goes in the water. … If we don't look after the fish, it can disappear. We have to have respect for other animals as well.*
> *(Mary Madeline Champlain, August 30, 2017)*

> *What Sophie said is true. We have to have respect for fish. During that time there was no caribou so we live off fish.*
> *(Liza Jeremick'a, August 29, 2017)*

Fish was an essential food resource for dogs too. People needed dogs to get other food, such as todzì or moose, and to trap for furs. Without dogs, there was no money from trapping.

> *We used dog team. You see this lake it is very long. We used to travel on it by dog team. And we used to follow the dog team using snowshoes. If we didn`t catch any [fish] we wouldn't have any food to eat. We go there for trapping. If it is 40 or 50 below we still go out there. We do not have enough food. So we only rely on fish. That is how we work.*
> *(Jimmy B Rabesca, July 12, 2017)*

> *During fall time the people would make fish rack. They would get fish for cooking and some to make dry fish with. Sometimes they would make ts'et'à[middle part of the fish with the head attached]. … Most of the guts from the fish is fed to the dogs. And sometimes we would also eat fish from the fish rack. Once we boil it, people would eat the fish. Also the fish from the rack, it is kept for our brothers and fathers to take it along for the dogs. During that time, they would also take fish eggs too. They would bake bannock with fish eggs. Also they would mix the fish eggs with berries and they would eat it like that.*
> *(Mary Adele Rabesca, August 31, 2017)*

> *People used to gather fish for the dogs, over 20 dogs. They would get fish for all those dogs for their food. Even in the community of Whatì here on the shore—taba—there were fish hanging for the dogs' fish racks.*
> *(Joe Champlain, July 13, 2017)*

Fish was/is also an important source of medicines. Jimmy B. Rabesca and Jimmy Nitsiza share their stories.

> *The łıtł'o/łıwetł''o*[3] *is a greenish colour, like a speech bubble, and inside the stomach of the trout. They dry it and hang it and dry and then they pounded it and make it like powder and put it [in] water and then they drink it. They just take a little bit of it. Good for internal bleeding, and if you have a cut*

[3] Pronunciation depends on speaker and dialect.

*yourself will stop the bleeding).*
*(Jimmy B. Rabesca, July 11, 2017)*

*What they said about the trout is true. Even I heard a lot of people talk about the fish łıwıtł'o tso'ǫ [greenish-yellow colour bag in stomach of trout]. During the springtime when my wife [Margaret and I] were setting nets all of a sudden her eyes couldn't see good. So Margaret said my eyes are cloudy and she put some in her eyes and then after I put łewıcho tso'ǫ and later in the day her eyes became clear. And they say trout medicine is very good. Not only trout, also jackfish.*
*(Jimmy Nitsiza, July 11, 2017)*

**Respecting fish**

The elders repeatedly stressed the importance of respecting fish; that respecting fish was necessary to ensure they would continue to be available. Respecting fish is part of respecting all beings.

*We have to have respect for the fish and if we don't we will not be lucky. If we get unlucky we will not catch any fish at all. Because we live off the fish, we have to respect the fish.*
*(Mary Adele Rabesca, August 31, 2017)*

*They [mothers] always remind us if we do not look after our things, you would not be lucky. We have to have respect for all animals and make sure nothing is wasted.*
*(Mary Adele Rabesca, August 31, 2017)*

*People live off the fish from this lake. In some cases they do not catch any fish, and so that is why they were very careful in how they handled fish.*
*(Joe Champlain, July 13, 2017)*

*We have trout, white fish, ts'etɻa [grayling]. We are supposed to be careful about how we handle the bones of the fish. And if you handle it with care, we will be gǫts'ǫxodì [fortunate, spiritual good luck].*
*(Mary Madeline Champlain, August 30, 2017)*

*We watched them [our parents and elders] from a distance how they cleaned the fish. They would put fish on the side to be cooked and they would put fish guts aside for the dogs. They feed the dogs because they use the dogs for transportation. They don't throw anything from the fish; every part of the fish is used. They even watch out for the fish scale and also the*

> *floaters from the net.*
> *(Mary Adele Rabesca, August 31, 2017)*
>
> *People had respect for fish. We threw the guts on the land; we didn't want to throw rotten fish into the lake. We want to keep our water clean.*
> *(Benny Jeremick'a, September 7, 2017)*

During a verification session, some elders explained that different people have slightly different ways of respecting fish.

> *Some people put on the shore near the water and others put in the water close to the shore. I put the gut on the land. Either way the birds, like gulls and ravens will consume them and the land will be clean again. (Benny Jeremick'a, October 3, 2017)*
>
> *Yes fish can be throw in the water near the shore or put on the shore near the water. It's important the bird can get them. (Joe Champlain, October 3, 2017)*

Part of showing respect is not mixing fish blood with the blood of other animals.

> *If you are cleaning the moose meat or handling the moose meat do not touch the net. If you do, the fish are not going to come. That is how we show respect in the old days; this is how we survived.*
> *(Charlie Jim Nitsiza, July 11, 2017)*
>
> *Moose meat and fish are kept separate in tents and cabin. We do not keep them near each other. (Jimmy B. Rabesca, October 4, 2017)*
>
> *Our elders taught us to fix the fish first and then the meat afterwards.*
> *(Liza Jeremick'a, August 29, 2017)*

Women and men both set nets and check them. Women have a special role in how to respect fish, checking nets and preparing dry fish.

> *People had a very good life at that time [in the past]. And when they go fishing they used to have respect for the fish. How they handled the fish. … During the month of May, I used to check nets with my sister. … When my father goes trapping, we [sister and her] set the nets. He used to tell us not to step over the nets or over the rope. And also the fish blood that goes on the snow. We eat fish. It is our main source of food so we need to have respect for the fish. And my mum also used to remind us all the time that we*

*do not go over the nets. Be careful how you handle the nets. Not only do people eat the fish, but it is for the dogs too.*
*(Sophie Williah, July 12, 2017)*

*As a woman, we have to do all this work. We have to work on fish. It is a lot of work. If we make dry fish, and then we have to take the łıwebo [fat—middle part] out, and then tie them together and then you hang them on the pole and then we cut out the ìhnaǫ̀kwǫǫ [fish sticks]. Once I make dry fish, then the guts are put in the water near the shore so the birds, like gulls, ravens get them. This is how we take care of the fish.*
*(Mary Madeline Champlain, July 13, 2017)*

*My mother taught me how to clean a fish, how to cut the throat out of a fish, how to cut the bones out [of the throat area. They would take the bones so there was not blood spilling on the meat]. … My mother would teach me how to put the nets aside [in wintertime] and check it. Once we bring the fish home and place it on a canvas mat, she would ask me to take the scale off the fish. … By the age of 12, I would know how to make a dry fish.*
*(Liza Jeremick'a, August 29, 2017)*

*Our family have always taught us to have respect for fish. We are not allowed to go over the fish blood and also we have to keep the fish mat in good condition. That is what we were told by our family.*
*(Sophie Williah, August 29, 2017)*

*If you check the fish during the wintertime, make sure you do not go over the fish blood on the snow and also do not go over the rope. Also, watch the chisel and we are not allowed to step over the nets. … Also make sure you do not let blood spurt on the ground. If even a little drop does women cannot step over it..*
*(Liza Jeremick'a, August 29, 2017)*

*If we make dry fish from one fish it is a lot of work. You take off the scale of the fish, you cut it open, then you slice it, and then you cut it across to make dry fish. Then you take the fat from the middle part. It is our job to have respect for the fish.*
*(Margaret Nitsiza, August 30, 2017)*

**Monitoring change**

Local monitoring is an integral part of using and respecting fish.

> *People really live off fish here in Whatì. So they really respect fish and if there are some changes in the fish they know right away.*
> *(Charlie Jim Nitsiza, July 11, 2017)*

Elders have observed many different changes, such as fewer fish, smaller fish, and fish moving to different locations. They speculate about the possible causes of change.

> *Because of this fire [2014] that we had, maybe all the ashes went into the lake and the smoke went into the lake and that is the reason the fish moved to a different location or a new location. Right now we do not catch any fish now [like this summer] even though we set the net. Mostly we caught jackfish, and jackfish used to go in a grasses area, and maybe they have moved to the middle of the lake now because of the ashes and the smoke. And the white fish have gone to a deeper area. We are now catching more jackfish than whitefish. … Even yesterday we didn't catch any fish at all. We keep setting our nets in different areas but we get very few. Sometimes only three fish, and sometimes we get five to seven white fish and that is all.*
> *(Joe Champlain, July 13, 2017)*

> *During that time [late 1960s) the fish were so big and healthy. But today everything is different. Near Dıicho [Big Island] the fish are small. I live here all my life and I've seen changes. … In the last two years a lot has changed. Fish are smaller; we don't know why it happened.*
> *(Liza Jeremick'a, September 7, 2017)*

> *A couple of years ago fish had lots of white spots. But today we don't see any more white spots in fish. … It was not like that before, everything changes all the time, nothing stays the same.*
> *(Benny Jeremick'a, September7, 2017)*

> *When I first move here there were lots of fish. I think because of the power plant, airstrip near the lake, there's not as many fish as before. Maybe all the fish went to end of the lake. … During fall there used to be lots of fish out on the lake, but in past two or three years there seem to be less fish. Maybe smoke goes into the lake. … I've been fishing all summer and I didn't get many fish; it's not like before. … Lately we catch mostly jackfish; we hardly catch white fish or trout. Usually jackfish used to be around the shore*

> *but they seem to be going out in the middle of lake, maybe it's because of forest fire smoke.*
> *(Joe Champlain, September 7, 2017)*

> *We used to have a net size of five and a half because the fish used to be big. Now today because the fish is smaller and like I said you would see a lot of them in the water like you would set your net over there all through the nets, they would go right through the nets. You know it wasn't like that before and last summer same thing too, the small ones.*
> *(Charlie Jim Nitsiza, July 11, 2017)*

Elders are even seeing fish they have never seen in this lake before.

> *I think it was Bobby Nitsiza that was telling me that they caught a fish in the net; [and] they have never seen a fish like that before he said. Could be a trout, but they didn't have a camera so they didn't take a picture of it. They've never seen a fish like that before.*
> *(Charlie Jim Nitsiza, July 11, 2017)*

Among the other changes and possible causes of change, elders often spoke about how fish are not being respected the way that they should be. A common phrase they used when talking about respecting fish is "today everything is different".

> *People in the past treated fish with respect. … Maybe it's because of that we don't catch lots of fish; we're supposed to treat fish with respect. I remember back then people treat fish with respect.*
> *(Joe Champlain, September 7, 2017)*

> *Us elders we are talking about fish; we have to be very careful with fish because we grew up eating fish from this lake; we have to respect the fish. Today everything is different. Today like we have people playing around with the fish—no respect.*
> *(Jimmy Nitsiza, July 12, 2017)*

> *Young people have their own home do not have respect for the bones—either animal or fish bones. … I think the reason why we have so few fish is because they do not take care of the fish bones. In the past when we wanted to make dry fish, we had three big containers of whitefish. But today we don't get any fish although we set two nets in the lake. Sometime I think it's because they do not take care of the fish bones.*
> *(Mary Madeline Champlain, July 13, 2017)*

*But today everything is different and we hardly catch fish. Maybe its because people don't watch the fish blood, maybe they go over the net. Maybe that's the reason why we don't have that much fish now.*
*(Sophie Williah, August 29, 2017)*

*Today everything is different and we live in a very modern world today. Today they don't watch out for the fish blood and they throw away the fish guts to the dump, on the ground. Sometimes we take youth out on the land and we don't know if they step over fish blood. We don't know. Today they have disrespect for fish blood. … We are treating fish with disrespect by throwing the fish to the dump. … We had a lot of respect for the fish at that time [in the past] and now we have disrespect for the fish; now we don't catch as many as before. We don't know what caused for the fish to disappear, maybe it's because we have disrespect for the fish.*
*(Liza Jeremick'a, August 29, 2017)*

*But today everything is different. We see fish and fish guts thrown away. Even the guts being thrown on the land, it can be eaten by other animals like bears or wolves. That is what they should do but they are not doing that.*
*(Mary Adele Rabesca, August 31, 2017)*

*The place called Dehgamık'e [nets around islands] there was lots of white fish before. We cannot play around with the fish; it is disrespectful. Sometimes when you do work, too much laugher is not good. Now the fish are disappearing. We do not know what happened to them. Now the smoke and the ashes all went in the water so with everything else that is why the fish disappeared. Same with fish and caribou; it is just disappearing. The fish do not [like] meat from the store [on the same plate]. … Before there were so many fish, you see fish here and there. Now-a-days you do not see fish in the water, no fish.*
*(Mary Madeline Champlain, July 13, 2017)*

*I think we have to treat fish with respect … this is what the elders used to say. I find that people treated fish with respect but today it's different. Maybe that is the reason why there hardly any fish. We also have to treat all animals with respect. … In olden day our elders had respect for everything but today it's not like that.*
*(Joe Champlain, September 7, 2017)*

The benefit of local monitoring is clearly demonstrated with the example of the commercial fish plant. In 1969-70, a man named Casey Jones built and opened a commercial fish plant in Whatì. Men set nets and fished with boats and motors, and women worked at the plant cleaning fish.

> *We had two boats with motors and five nets. My brother Charlie and I set nets near Dıicho [Big Island]. There [was] always lots of fish in that area. … Once we bring the fish back to camp the women would clean them. … All the fish were transported to Hay River. When we caught the fish with nets it was all jumbo fish.*
> *(Benny Jeremick'a, September 7, 2017)*

> *I start working right away. The men would check the nets at 4:00 in the morning and we start work at 6:00 in the morning. There were trout, big white fish; the trout were so big we had a hard time cutting off the head. … We work from 6:00 am to 6:00 pm.*
> *(Liza Jeremick'a, September 7, 2017)*

At this time, fish was very plentiful; Tłı̨chǫ people showed respect for fish.

> *At that time a lot of elders were alive and used to say to us "Although you people are taking fish out of the lake, you will treat fish with respect and clean the fish properly and sell the fish. If we don't treat fish with respect, it can disappear." … Elders always use to remind us, even our parents too; they wanted us to do everything right, always with respect and monitor.*
> *(Jimmy B. Rabesca, August 12, 2017)*

> *The men did the work and were told not to throw fish in the lake. They told us to keep the water clean and don't throw fish guts along the beach too, not even fish head. If we threw fish in the lake and it gets rotten, we might not have fish in the future. … we didn't throw away fish and even the men that check nets didn't throw away fish so the water can be pure. After work the men would throw the fish guts on islands and also when they clean the container, don't spill in the lake. The lake might get polluted and we might not catch fish too. … we always had respect for fish and also the water.*
> *(Liza Jeremick'a, September 7, 2017)*

Based on their respect for fish, and their observations and knowledge of fish, the leaders and elders decided to close the plant, to help ensure the fish thrived.

> *After five years the fish went down. And Jimmy Nitsiza Sr. and Johnny Nitsiza and Louie Beaulieu mentioned they want to shut the plant down for maybe five years to see if there will be more fish again. But later the building burnt down and the fishing plant was not opened again. (Benny Jeremick'a, September 7, 2017)*

## Conclusions

Today, as in the past, people in Whatì rely on fish as an important source of healthy food. Store-bought options are very expensive and often less nutritious. It is well known that for a healthy diet it is essential to include country foods, such as fish. And with caribou less available, fish becomes an even more important food resource.

Whatì elders and harvesters have recently experienced some negative changes to the success of local fish populations: smaller sizes, unusual distribution, fewer numbers, different species, etc. As harvesters, they constantly monitor conditions and quickly become aware of change. At the same time, there is some uncertainty about how these changes will evolve in the near and distant future, especially given the multiple factors that contribute to change—some known and some as yet unknown. It is essential to continue to build on the elders' and harvesters' knowledge and to monitor fish and water with a system that coincides with Tłı̨chǫ knowledge. Only this approach will help ensure the future success of Whatì fish populations.

**Summary of main fish species associated with Whatì**

| Tłı̨chǫ | English |
|---|---|
| Dehdoo | Sucker |
| Ehts'ę̀e | Pickerel |
| Į̀hdaa | Northern pike or jackfish |
| Kwèzhıì | Similar to dehdoo (sucker) but has fish scales on it and lives near rivers[4] |
| Łıh | Lake whitefish |
| Łìhtsoa | Ciscoes |
| Łıwezǫǫ̀ | Lake trout |
| Nǫkwèe | Loche – associated with Whatì River |
| Ts'èt̨ą/ʔehts'į̀ą | Often translated as Arctic grayling, but some elders and fishers say it is not a grayling |
| Wıìle | Inconnu/coney |

[4] Benny Jeremick'ca, October 3, 2017

# Appendix B – TK Research and Monitoring

Thcho Government

# TK Research and Monitoring

## For Thcho Assembly

**Allice Legat, Camilla Nitsiza and Madeline Chocolate**

**11/26/2010**

# Table of Contents

# Tłı̨chǫ Philosophy

Grand Chief Jimmy Bruneau directed the Tłı̨chǫ people to know both Western and Tłı̨chǫ knowledge so each Tłı̨chǫ citizen would be strong like two people. Bruneau's philosophy and direction was not new to the Tłı̨chǫ people, who have always been interested in the ways and knowledge of others. This philosophy has been noted in both their oral narratives and the journals of the trading post factors. Each tells of Tłı̨chǫ leaders learning the knowledge and negotiating techniques of trading post factors to ensure the best return for their people's furs. This philosophy is also evident - in oral narratives telling of activities leading up to discussions with the Federal Commissioner in 1921 when Mǫ̀whì signed Treaty 11. The stories explain that Tłı̨chǫ were aware of the European perspective based on information they acquired from the Slavey and Chipewyan further south. Upon learning from the experience of their southern neighbours they were better prepared to deal with the Treaty Party.

Tłı̨chǫ oral narratives stress the importance of understanding a problem, finding a solution and taking action. Their approach to learning, knowing and taking action is evident in most Tłı̨chǫ oral narratives, as well as the manner in which past research projects were approached. The Tłı̨chǫ have rarely allowed others to do research to address a problem they wish to know about themselves. They insist that they take an active part in research and monitoring. Specifically the Tłı̨chǫ:

- Explained to the managers of Rayrock Mine (1950s) that their observations were indicators of serious problems in the environment. They identified problems that they observed with plants and wildlife –such as beaver, marten and fish. These problems were particularly evident to those Tłı̨chǫ who either used the area frequently or worked at the mine.
- Insist research focus on their needs and priorities – take for example the priorities set by the Dogrib Renewable Resources Committee during the early 1990s: where caribou, habitat, water and heritage were of greatest concern.
- Insist on adequate funding to ensure Tłı̨chǫ researchers were employed as permanent, full time employees for the life of research projects – take for example the Traditional Justice and Traditional Medicine project in Whatì (1987-92); the Traditional Governance project in Gametì (1993-1996); and the caribou and place names projects in all the Tłı̨chǫ communities (1996-2001).
- Use the participatory action research (PAR) method that includes researcher training; an elders – both male and female elders – committee/s; rigorous research methods carried out by Tłı̨chǫ researchers and overseen by the elders' committee; and verification of shared information. The PAR process ensures accurate understanding of the traditional knowledge that is

documented and ensures it leads to positive actions based on the recommendations.

Today, it is vital that the Tłı̨chǫ lead by undertaking their own harvesting and monitoring studies as the impacts of development on Tłı̨chǫ lands and the environment are becoming ever more evident. The Tłı̨chǫ Government and agencies have been given the authority to manage the land in the Tłı̨chǫ Agreement, but to do this effectively requires a system of research and monitoring that will feed into management decisions.

The Tłı̨chǫ Knowledge Research and Monitoring Program, which includes the collection of harvest information, outlined below is based on Tłı̨chǫ philosophy. First, the current issues for which this TK program was designed to solve are discussed, followed by a summary of the discussion with Tłı̨chǫ citizens that helped formulate the solutions. Thirdly, the program structure is described. There are five appendices that outline activities, outputs, and the evaluation questions so the TK Research and Monitoring Program can be improved through time. Appendices are as follows:

- Appendix I consists of the Program Design and Implementation Plan.
- Appendix II outlines the Evaluation Frameworks for both the on-going program activities and for the implementation activities.
- Appendix III is the Program Outline and Evaluation Framework for Monitoring Caribou from a TK Perspective.

It should be noted that evaluation is done to ensure the best possible TK is being documented for future monitoring, education and understanding of the Tłı̨chǫ perspective.

# Current Issue

The Tłı̨chǫ Agreement directs Boards, Agencies and the Tłı̨chǫ Government to i)use traditional knowledge, ii) promote cultural perspectives, and iii) select Board members that have knowledge of Tłı̨chǫ way of life. Yet the current systems – most of which are based on Western perspectives and the British legal system – make it difficult for Tłı̨chǫ knowledge (TK) to be used in a manner that is consistent within the Tłı̨chǫ cultural perspective and way of life.

The Agreement states that:

Section 12.1.6

> *In exercising their powers under this chapter, the Parties and the Wek'èezhìi Renewable Resources Board shall take steps to acquire and use traditional knowledge as well as other types of scientific information and expert opinion.*

Section 13.1.5

> *In exercising their powers in relation to forest management, the Government of the Northwest Territories, the Tłı̨chǫ Government and the Wek'èezhìi Renewable Resources Board shall take steps to acquire and use traditional knowledge as well as other types of scientific information and expert opinion.*

Section 14.1.4

> *In exercising their powers in relation to the management of plants, the Government of the Northwest Territories, the Tłı̨chǫ Government and the Wek'èezhìi Renewable Resources Board shall take steps to acquire and use traditional knowledge as well as other types of scientific information and expert opinion.*

Section 22.1.7

> *In exercising their powers, the Mackenzie Valley Environmental Impact Review Board and the Wek'èezhìi Land and Water Board shall consider traditional knowledge as well as other scientific information where such knowledge or information is made available to the Boards.*

Furthermore, Section 12.5.5 of the Tłı̨chǫ Land Claim and Self-government Agreement (the Agreement) states that the Wek'èezhìi Renewable Resources Board (WRRB) shall:

> *(a) Make a final determination, in accordance with 12.6 or 12.7, in relation to a proposal*
>
> *i. Regarding a total allowable harvest level for Wek'èezhìi, except for fish,*

Modern harvest studies often ask harvesters to fill out survey forms in English, or to provide limited information that can be taken out of context. These studies may fail because they are not compatible with how Tłı̨chǫ knowledge, including information about harvest, is transmitted through oral narratives.

This project was designed to ensure that both monitoring and realistic harvesting numbers can be recorded in a culturally appropriate manner. This will help alleviate the problem that many respondents choose not to answer correctly harvest study questions posed by non-community members. (see Harvest Study Report, 2009).

## Finding a Solution

In 1999-2000, the Tłı̨chǫ Regional Elders' Committee – under the direction of *K'àowo*[1] Jimmy Martin – requested Dogrib Treaty 11 staff who were working with the elders to bring male and female harvesters from each community to discuss a Tłı̨chǫ monitoring program. Funding for this meeting was secured from Cumulative Impacts and Monitoring Program, Environment Canada. The elders and harvesters directed staff to initiate monitoring around the diamond mines – with research/hunting camps located in strategic locations around the mines that would enable harvesters to observe the behaviour of caribou in relation to the mines. They also suggested a camp be located at Gots'ǫkàtì and Deèzhàatì so caribou behaviour could be compared with non-mining areas.

In September 2008 the Wek'èezhìi Renewable Resources Board (WRRB) and the Tłı̨chǫ Government started work towards implementing a Tłı̨chǫ monitoring program. Also at that time members of the Wek'èezhìi Forum requested that work be done to develop TK policy.

The TK program design with associated policy guidelines were developed based on discussions held during the household visits made by the Project Team between April 2009 and December 31, 2009. All households in the three fly-in communities of Gametì, Wekweetì and Whatì were contacted. Behchokǫ̀ has a significant population therefore only those households with active harvesters and elders were contacted. During these visits Tłı̨chǫ researchers, under the direction of. Allice Legat, explained the importance of Tłı̨chǫ knowledge in the Tłı̨chǫ Agreement and the possibility of establishing a monitoring program as originally laid out by the elders and harvesters in 1999. Two Tłı̨chǫ researchers – Ms. Camilla Nitsiza and Ms. Madelaine Chocolate - did conducted the household visits, although Ms. Mary Adele Wetrade did assist Madelaine

[1] Translated as 'boss'. The role is significantly different than the Western concept for 'chair'.

those committees - would encourage individuals to visit the Tłı̨chǫ Knowledge Research and Monitoring office and report their observations and harvest.

Researchers documenting the information would be trained to note whether the individual is an experienced or inexperienced harvester, and whether or not they are a full-time or part-time harvester; and whether or not their main activity at the time of sighting resources was harvesting.

### *Sharing Information*

Throughout all discussions it became clear that community members would be more open about sharing their harvesting information as well as their observations if they understood that their oral narratives and their observations - 'raw data' - would remain with and be safeguarded by the Tłı̨chǫ Government, and kept in the Tłı̨chǫ communities.

Several individuals expressed that they feel they are being "checked-up on" when non-Tłı̨chǫ ask questions and are worried that it can be used against them.

### *Schedule of Interviews*

Based on the manner in which Dene pass information, it was made abundantly clear during household visits and during the TK Regional Working Group meetings, that oral narratives are the process for sharing detailed information. (see also Basso, Cruikshank, Goulet, and Sharp on the importance of oral narratives among all Dene). For this reason the researchers/interviewers will be trained to use an interview guide while documenting information shared by harvesters.

The TK Regional Working Group thought the office should be open at least five days a week so harvesters could report when convenient and on an ongoing basis so numbers and observations are recorded quickly.

### *Expectations of Harvesters and Elders*

All Tłı̨chǫ citizens with whom the researchers spoke liked the idea that monitoring skills and harvesting information would be given back to the community every few months – by the Tłı̨chǫ researchers. They thought the communities could benefit from hearing this information and verifying the researchers' interpretations so misunderstandings could be clarified.

The TK Regional Working Group thinks that reporting back to the community at public meetings is extremely important. If the researchers share a summary of what they have heard with the community, then harvesters will be more likely to provide their observations and harvest numbers. They reasoned that the harvesters would know they

were being heard and that their knowledge and information was being documented accurately. For example,

1. Their observations of the environment about health of animals and state of habitat, etc - are being heard;
2. Harvesters will feel secure that harvesting data is correct and their elders and leaders can use the information for management decisions.

### *Compensation for Harvesters*

This has not been discussed with harvesters during the household visits or at the elders and harvesters meetings. During past discussions with elders, it was thought that harvesters should report on a volunteer basis, but should be compensated when attending the verification and sharing meetings when more information on their observations can be noted. Only those harvesters who participated on a volunteer basis would be compensated at the verification and working group meetings.

It is proposed that this is a decision for the Tłı̨chǫ leadership after being discussed at a Tłı̨chǫ Assembly, recognizing that availability of resources may be a constraint.

### *Reporting*

Since using Tłı̨chǫ knowledge in environmental management is important to Tłı̨chǫ, it is recommended that after the verification meetings with elders and harvesters, report/s – annual or bi-annual - should be written for the Chief Executive Council that would then be released to the public – Boards, agencies, Industry, Federal and Territorial governments.

### *Duration of Harvest Study within Monitoring Program*

During the household visits, the community meeting and the TK Regional Working Group meetings, the vast majority (young people did not speak to this topic) of Tłı̨chǫ citizens thought the harvest study within the monitoring program should be on-going.

# Program Structure

The Tłı̨chǫ Knowledge Research and Monitoring Program is designed to capture knowledge in a manner that is compatible with the Tłı̨chǫ cultural perspective. It is also designed to acknowledge the continued importance of oral narratives as the medium with which to share information and the importance of Tłı̨chǫ land based activities in learning and being able to apply and promote Tłı̨chǫ knowledge.

## Program Goals

A Tłı̨chǫ Knowledge Research and Monitoring Program will support goals that assist the Tłı̨chǫ Government, and the boards and agencies under the Tłı̨chǫ Agreement, to fulfill their mandate within the co-management regimes. It will also provide direction to industry and non- Tłı̨chǫ researchers on expectations and costs. This program will support the following program outcomes:

1. Tłı̨chǫ knowledge and perspectives are utilized in management and decision-making.
2. The Tłı̨chǫ Government and its boards and agencies have the information they need to play a strong role in co-managing the environment, and to support programs such as education.
3. The Tłı̨chǫ Government has the information it needs to play a strong role in managing caribou and other wildlife, plants and forests; and has its own information and reports to support bargaining and negotiations.
4. Harvesting maintains its role as a respected and important economic and social endeavour.
5. Tłı̨chǫ knowledge, perspective and language are strengthened through oral narratives and land-based activities.
6. Integrated knowledge transfer is occurring across generations.
7. Tłı̨chǫ place names are documented accurately to express bio-geographical information, and to support the process of acquiring official place name status.

## Social Impacts

If the program successfully achieving the above goals, it will help to support broader social impacts such as the following:

- Tłı̨chǫ citizens will fulfil their traditional stewardship responsibilities to care for the land.

- TK is transmitted in a manner that is compatible with Tłı̨chǫ culture and social structure.
- Tłı̨chǫ language is strong and used in daily conversations.
- Tłı̨chǫ citizens are emotionally and spiritually healthy.
- There is a structured process for Tłı̨chǫ youth to learn land-based skills and knowledge.
- Tłı̨chǫ place names become official.

## Program Design and Implementation

The establishment of a fully developed, effective Tłı̨chǫ Knowledge Research and Monitoring Program is a necessary but ambitious undertaking. It will require substantial resources and careful planning. It will also require investment in training and in information technology. The program will take approximately two years to implement, and five years to become fully operational. It will take at least two years to develop TK policies, guidelines and directives that are consistent with the Tłı̨chǫ perspective and the Tłı̨chǫ Agreement, and provide direction and clarity for boards, agencies and TG departments that is both practical and respectful of Tłı̨chǫ knowledge. Guidelines and directives developed for boards, agencies and TG departments will reflect Tłı̨chǫ Government policy on access and use of Tłı̨chǫ knowledge.

There are several activities that need immediate attention if the program is going to provide information for caribou management, for the Environmental Assessment of the proposed highway route within Wek'èezhìi, and for Fortune Mineral's mining venture, with respect to impacts on land, wildlife and water.

To ensure harvesters' and elders' observations, knowledge and harvest are documented and used, the following activities will be undertaken within the next two years when initiated in November 2010:

1. Establish a comprehensive database to support the organization and storage of Tłı̨chǫ monitoring and harvest data in a manner that is consistent with oral narrative and protocol;
2. Digitize and enter existing information into the database;
3. Establish operating procedures for the program, including human resource policies and procedures, compensation policies, and development of research methods;
4. Establish training programs for researchers and data entry clerks;
5. Hire and train staff;

6. Undertake promotion and outreach to ensure that communities understand and support the program, and that harvesters participate;
7. Establish community Elders' Committees;
8. Develop a Tłı̨chǫ Knowledge Policy for approval by the Tłı̨chǫ Government.

Appendix I contains a more detailed outline of the proposed structure of the program, including a comprehensive list of proposed activities required to implement the program and a comprehensive list of program activities over the longer term, together with anticipated outputs from those activities.

Appendix II contains a draft evaluation framework for implementation evaluations in Year 2, and a more fulsome outcome evaluation in Year 5. These evaluations will help to measure whether the program is on track to achieve the goals/outcomes outlined above.

The Tłı̨chǫ are faced with two urgent issues that require immediate attention: i) the need for caribou monitoring in the face of current concerns about the integrity and health of the Bathhurst caribou herd and harvest numbers; and ii) the Fortune Minerals and all-weather road proposals. It is proposed that program implementation be fast-tracked with specific regard to these two issues. More detail on the activities required for the Special Project: Caribou Monitoring and Harvest Study can be found in Appendix III. Special Project Design for Environmental Assessments TK baseline research associated with Fortune Minerals and the proposed road will be completed in the near future.

In addition the Tłı̨chǫ Government requires knowledge of several areas that are being proposed as protected areas.

# Tłı̨chǫ Knowledge Research and Monitoring Program
# Summary Table of Proposed Structure

### *SOCIAL IMPACTS*

- Tłı̨chǫ citizens will fulfil their traditional stewardship responsibilities to care for the land.
- Tłı̨chǫ knowledge is transmitted in a manner that is compatible with Tłı̨chǫ culture and social structure.
- Tłı̨chǫ language is strong and used in daily conversations.
- Tłı̨chǫ citizens are emotionally and spiritually healthy.
- There is a structured process for Tłı̨chǫ to youth learn land-based skills and knowledge.
- Tłı̨chǫ place names become official

### *GOALS*

- Tłı̨chǫ knowledge and perspectives -are utilized in management and decision-making.
- The Tłı̨chǫ Government and its boards and agencies have the information they need to play a strong role in co-managing the environment, and to support programs such as education.
- The Tłı̨chǫ Government has the information it needs to play a strong role in managing caribou and other wildlife, plants and forests; and has its own information and reports to support bargaining and negotiations.
- Harvesting maintains its role as a respected and important economic and social endeavour.
- Tłı̨chǫ knowledge, perspective and language are strengthened through oral narratives and land-based activities.
- Integrated knowledge transfer is occurring across generations.
- Tłı̨chǫ place names are documented accurately to express bio-geographical information, and to support the process of acquiring official place name status.

### *ACTIVITIES*

- Establish a comprehensive database to support the organization and storage of Tłı̨chǫ monitoring and harvest data in a manner that is consistent with oral narrative and protocol.
- Digitize and enter existing information into the database.
- Establish operating procedures for the program, including human resource policies and procedures, compensation policies, and development of research methods.
- Hire and train staff – research, data entry, etc.
- Undertake promotion and outreach to ensure that communities understand and support the program, and that harvesters participate.
- Establish an Elders' Committees to guide the programme.
- Develop a Tłı̨chǫ Knowledge Policy[1] for approval by the Tłı̨chǫ Government.
- Evaluate the program to make sure it is achieving the goals.
- Implement culturally appropriate research and monitoring activities.

# Appendix I
# Program Design and Implementation

# Program Design and Implementation
# Tłı̨chǫ Knowledge Research and Monitoring Program

## Program Structure: Ongoing

| | *ACTIVITIES*<br>*(What needs to be done)* | *OUTPUTS*<br>*(What we hope to achieve)* |
|---|---|---|
| **Data Base** | Maintain and update database regularly after each interview<br><br>Produce reports regularly and review at community meetings and with Elders' Committee<br><br>Produce reports in response to requests | • Database is up to date and capable of creating reports upon demand<br>• Baseline information is available for environmental assessments, and environmental management<br>• The store of Tłı̨chǫ knowledge is expanded as new information is entered into the database |
| **Tłı̨chǫ Knowledge Policy** | The policy and associated directives provide appropriate guidance for TG elected representatives and staff, and external agencies | • The role of Tłı̨chǫ knowledge is understood<br>• Industry is clear about TG expectations<br>• Boards are clear about TG expectations<br>• Federal and Territorial Governments are Clear on TG expectations |
| **Collaborate with TG Departments** | Sharing of information and expertise established through inter-department guidelines | • Process for intra-TG access to data base.<br>• Information on TCSA tapes entered in data base.<br>• Information on TK tapes storied in Land Department entered in data base.<br>• Tłı̨chǫ language training schedule.<br>• Land Department uses TK information and reports for management of land, wildlife and associated habitat. |

| | *ACTIVITIES*<br>*(What needs to be done)* | *OUTPUTS*<br>*(What we hope to achieve)* |
|---|---|---|
| **Training** | On-going training for program staff to ensure they are effective cultural interpreters | • Process for on-going training established.<br>• Process for inter-department training to access and use data base to complete land, wildlife and other applications and permits.<br>• Trained TK community researchers are available to work with harvester and elders.<br>• Database administrator is trained to maintain the database.<br>• Staff have the skill to:<br>  o Efficiently document interviews.<br>  o Use interview guidelines.<br>  o Maintain archives and produce reports.<br>  o 'Go after' concepts of Tłı̨chǫ and English terms.<br>  o Write Tłı̨chǫ.<br>  o Identify similarities and differences between Tłı̨chǫ and western management ideals. |
| TK Elders' Committee/s | Tłı̨chǫ elders provide on-going guidance to the program | • Elders' Committee is functioning effectively<br>• Elders play a meaningful role in all phases of program<br>• Elders work with Tłı̨chǫ citizens to know their traditional roles and responsibilities |
| Promotion and Outreach | Elders and leaders promote and explain the program to Tłı̨chǫ citizens<br>Community meetings are held to promote program and review information.<br>Establish network with WRRB and WLWB to ensure they have information needed for environmental management decision.<br>Describe program in academic papers and settings. | • Community residents are aware of the program and its importance for Tłı̨chǫ knowledge<br>• Tłı̨chǫ citizens support the program<br>• A majority of harvesters participate in the program by providing information<br>• Biannual reports are released publicly<br>• Tłı̨chǫ knowledge program gains credibility with a broader audience<br>• Success in external fund-raising |

| | *ACTIVITIES*<br>*(What needs to be done)* | *OUTPUTS*<br>*(What we hope to achieve)* |
|---|---|---|
| **Culturally appropriate research, monitoring and harvest study** | Implement culturally appropriate process for researchers to interview and receive information from elders and harvesters<br><br>Establish protocols for providing monitoring and harvesting reports to appropriate agencies<br><br>Conduct field camps with elders and Tłı̨chǫ researchers (including those in Land Department) to review data, expand database and build skills of researchers<br><br>Collaborate with TCSA to link youth to the program | • Harvesters and elders are comfortable with the interview process<br>• Tłı̨chǫ knowledge is transmitted in a culturally appropriate manner<br>• Tłı̨chǫ place names are effectively documented<br>• Three field camps are held annually, with 50 participants including youth<br>• Field camps include participation across four generations<br>• Information compiled by researchers is verified and expanded upon<br>• Harvesters are fairly and appropriately compensated for their contribution.<br>• Trends are made available to agencies on a timely basis |
| **Research and Monitoring Methodology** | Program operates efficiently and effectively<br><br>Participatory Action Research method utilized<br>• Interview guidelines utilized<br>• Information organized<br>• Team members understand final goals<br>• On-going training accomplished<br><br>Program is successful in achieving goals | • Useful information being collected and analyzed<br>• Working within budget<br>• Evaluation frameworks are established<br>• Evaluation reports are completed<br>• Program changes are made as required based on evaluation |

# Program Design and Implementation
# Tłı̨chǫ Knowledge Research and Monitoring Program

## Program Structure: Implementation Phase

| | *ACTIVITIES*<br>*(What needs to be done)* | *OUTPUTS*<br>*(What we hope to achieve)* |
|---|---|---|
| **Data Base** | Design and develop database to compile and retain Tłı̨chǫ knowledge and to follow oral narrative protocol<br>Copy tapes and photos in digital format.<br>Enter photo information into photo data base | • Comprehensive and functioning database completed and operational<br>• Tapes and photos can be used via computer and internet |
| **Tłı̨chǫ Knowledge Policy** | Comprehensive TK policy approved by TG | • WLWB and WRRB policies can complement TG<br>• Industry knows TG's expectations<br>• TK staff understand role of TK for future |
| **Training** | Identify staff training requirements and design training plans | • Staff will have the skills required to make the program a success<br>• Training programs are designed for all aspects of program operations |

| | *ACTIVITIES*<br>*(What needs to be done)* | *OUTPUTS*<br>*(What we hope to achieve)* |
|---|---|---|
| **TK Elders' Committee/s** | Elders Committee are established and functioning as per the Terms of Reference | • Terms of reference are established and approved by TG<br>• Elders Committee is operational<br>• Elders are guiding the design and implementation of the program<br>• Elders are working with community residents to know their traditional roles and responsibilities |
| **Promotion and Outreach** | Promote and explain the program to Tłı̨chǫ citizens | • Community residents are aware of the TKRM program<br>• Tłı̨chǫ citizens support the program |
| | Describe steps taken to develop program in academic setting | • Tłı̨chǫ knowledge program gains credibility with a broader audience<br>• Success in external fund-raising |
| **Program Administration** | Develop operating procedures for the program<br><br>Develop comprehensive guidelines for program including issues such as harvester compensation, participation criteria<br><br>Develop activity outline for pilot projects:<br><br>Main office established<br><br>Budget finalized<br><br>Funding is secured for program start-up and fund-raising plans are developed | • Job descriptions are written and staff are hired<br>• Required policies and procedures are in place<br>• Compensation policy for participating harvesters is implemented<br>• Concept of "harvester" is defined for the purposes of the program<br>• Protocol for community meetings is established<br>• Protocol for producing and distributing reports is established<br>• caribou monitoring and harvest study<br>• Baseline for Fortune minerals and proposed road<br>• Office space secured<br>• Archival section established<br>• Core funding requirements for six years determined<br>• Final budget approved by TG<br>• Effective fund-raising approach results in external funding support (industry, GNWT, DFO, WLWB, WRRB) |

| | *ACTIVITIES*<br>*(What needs to be done)* | *OUTPUTS*<br>*(What we hope to achieve)* |
|---|---|---|
| **Research and Monitoring Methodology** | Implement culturally appropriate process for harvesters to share observations and harvest | • Harvesters are comfortable with the process<br>• Tłı̨chǫ knowledge is transmitted in a culturally appropriate manner |
| | Describe program development process in academic paper and present at conference | • Papers written<br>• Conference attended |

# Appendix II
# Evaluation Frameworks

# Evaluation Frameworks
# Tłı̨chǫ Knowledge Research and Monitoring Program

## Evaluation Framework: Five-Year Outcome Evaluation

| *Evaluation Issue* | *Evaluation Question* | *How Will we Measure It?* | *What information will be needed and where will we find it?* | *Who will collect this Information for Evaluations and When?* |
|---|---|---|---|---|
| **Goal #1: Tłı̨chǫ knowledge and perspectives are used in environmental management and decision-making** | Is Tłı̨chǫ knowledge used by the Tłı̨chǫ Government, Boards, other governments to inform environmental management and decision-making?<br><br>Is industry aware of Tłı̨chǫ Government expectations regarding use of Tłı̨chǫ knowledge? Is this reflected in development proposals?<br><br>Are harvester observations being used to flag emerging trends and issues for regulatory agencies? | # of reports requested by all government agencies and Boards<br><br># of regulatory decisions that incorporate Tâîchô knowledge in written decisions<br><br># of times Tłı̨chǫ knowledge is reflected in government plans and policies<br><br># of reports requested by industry<br><br># of emerging issues flagged through harvester observations | Program files – TKRMP, TG, WRRB, WLWB<br><br>Information requests will be entered into the database on an on-going basis<br><br>Information from external agencies, e.g. federal and territorial departments, MVEIRB, MVLWB<br><br>Database reports | Program management in consultation with other agencies<br><br>Contractor or Program Management to conduct interviews with external agencies, file research as required |

| *Evaluation Issue* | *Evaluation Question* | *How Will we Measure It?* | *What information will be needed and where will we find it?* | *Who will collect this Information for Evaluations and When?* |
|---|---|---|---|---|
| **Goals #2 and #3:**<br><br>**The Tłı̨chǫ Government and its boards and agencies have the information they need to play a strong role in co-managing the environment and to support programs such as education.**<br><br>**The Tłı̨chǫ Government has the information it needs to play a strong role in managing caribou and other wildlife, plants and forests; and has its own information and reports to support bargaining and negotiations.** | Is the level of information available sufficient to meet the needs of government agencies for management decisions?<br><br>Is the program documenting information on all aspects of harvesting, including harvest data, observations about trends, observations from women's as well as men's processing of products?<br><br>Is the database working as an effective tool to access information?<br><br>Have Tâîchô government agencies and boards used the information in reports?<br><br>Are boards and agencies satisfied with the information that has been provided?<br><br>Is information being used to inform curriculum development? | # of information requests received<br><br># of requests turned down because information not available<br><br># of reports produced in response to requests<br><br>Compliance with established reporting protocols<br><br>Reflection of information provided in regulatory and environmental decision-making<br><br>Level of satisfaction with reports provided<br><br>Incorporation of TKRMP information incorporated into curriculum development | Database<br><br>Program files<br><br>Review of regulatory and environmental decisions and reports<br><br>Consultation with other TG agencies | Archivist and database manager<br><br>Program management<br><br>External contractor to conduct file review, consult clients |

| *Evaluation Issue* | *Evaluation Question* | *How Will we Measure It?* | *What information will be needed and where will we find it?* | *Who will collect this Information for Evaluations and When?* |
|---|---|---|---|---|
| **Goal #4:**<br>**Harvesting maintains its role as a respected and important economic and social endeavour** | Is the proportion of Tłı̨chǫ citizens involved in harvesting activities increasing, decreasing or staying stable?<br><br>What role does harvesting play in providing food to Tâîchô households?<br><br>How many Tłı̨chǫ citizens are earning an income from harvesting activities?<br><br>Are young people requesting time with harvesters so they can learn harvesting skills, including use of resources through production of crafts? | # of residents involved in harvesting and related activities<br><br># of harvesters participating in the TKRMP<br><br>Amount of country food consumed by Tâîchô citizens<br><br>Income from trapping<br><br>Income from production of traditional crafts (including clothing) | Baseline information on participation in harvesting activities<br><br>Participation and consumption rates from database<br><br>Income information from census, GNWT | Baseline information - program management to compile as soon as possible<br><br>Community researchers to enter results of harvester debriefs daily<br><br>Program management to work with external contractor to compile |

| *Evaluation Issue* | *Evaluation Question* | *How Will we Measure It?* | *What information will be needed and where will we find it?* | *Who will collect this Information for Evaluations and When?* |
|---|---|---|---|---|
| **Goal #5: Tłı̨chǫ knowledge, perspective and language are strengthened through oral narratives and land- based activities** | Is TKRMP information being shared in a manner that is culturally appropriate?<br><br>Is the program utilising the expertise of families with knowledge in specific geographical areas?<br><br>Is the Elders' Committee effective in providing guidance to the program and participating in on-going evaluation?<br><br>Is the program achieving recognition and credibility outside the Tłı̨chǫ area? | # of citizens participating in TKRMP review meetings, and trends<br><br># of participants who are comfortable with the process, and trends<br><br># of harvesters visiting the offices or requesting home visits, and participation trends<br><br>Effectiveness of research methodology in acquiring enhanced Tâîchô knowledge<br><br>Role of the Committee in influencing program operations and reports<br><br>Number of presentations to external agencies or academic conferences<br><br>External requests for information | Database<br><br>Program files<br><br>Interviews with program participants and clients (using appropriate methods) to determine effectiveness<br><br>Focus groups and file research<br><br>Elders' Committee evaluation | Community researchers through regular data inputs<br><br>Program management<br><br>External contractor |

| *Evaluation Issue* | *Evaluation Question* | *How Will we Measure It?* | *What information will be needed and where will we find it?* | *Who will collect this Information for Evaluations and When?* |
|---|---|---|---|---|
| **Goal #6: Integrated knowledge management and transfer is occurring across four generations** | Are field camps being held on a regular basis?<br>How effective are the field camps in providing a forum for knowledge and values transfer?<br>Is the knowledge of elders being transmitted successfully to younger generations?<br>Is information from the TKRMP being used to educate youth and inform school curricula? | # and regularity of field camps<br>Field camp participation rates and level of knowledge acquired by participants<br>Satisfaction levels of field camp participants<br>Ability of youth and elders to communicate about Tłı̨chǫ knowledge in the Tłı̨chǫ language<br>Youth awareness of program and understanding of Tłı̨chǫ knowledge<br>Incorporation of TKRMP information and methods into school programs | Program files<br>Field camp pre- and post-tests<br>Field camp evaluation results<br>Explore partnership with TCSA to monitor<br>TCSA program files and staff | Pre- and post-tests to be designed in Year 2 and administered by program staff at all field camps<br>Field camp evaluation format to be designed in Year 1 and administered by program staff at all field camps<br>Program management and external contractor |

| | | | | |
|---|---|---|---|---|
| Goal #7: Information on Tâîchô place names is documented accurately to express bio-geographical knowledge, and to support the process of official place names | Is place name information being compiled and documented through research process? | # of place names identified through research methods | Database | Community researchers to update database daily |
| | Are place names translated and spelled correctly to ensure accuracy of meaning? | Review place names for accuracy and satisfaction | Researchers and Elders' Committee to conduct regular review. | Program management to establish process in Year 2 |
| | Is information being used to support the process of establishing Tłı̨chǫ names as official place names? | # of official place names processed based on TKRMP information | Tłı̨chǫ Government toponymy files? | External contractor to compile |

# Appendix C – Habitat Types: Tǫdzı and Proposed Tłı̨chǫ All Season Road

# Habitat Types:[1] Tǫdzı and Proposed Tłı̨chǫ All Season Road

The information in this report builds on the information gathered over the last several years from elders and harvesters in Bechokǫ̀ and Whatì. The overall purpose will be to monitor *tǫdzı* (boreal caribou) and the state of their habitat along the proposed Tłı̨chǫ All Season Road (TASR) using Tłı̨chǫ knowledge. Monitoring will be based on what Tłı̨chǫ have observed over time and shared through stories, and then compared with current Tłı̨chǫ harvesters' observations.

*Tǫdzı track covered by wolf print.*
*(Compliments of A. Legat, 170626)*

## Research Team and Methodology

The research team included Camilla Nitsiza, community researcher and translator, and Allice Legat, primary researcher. Both documented stories and evidence of habitat types along the proposed road with a focus on habitat types preferred by tǫdzı. Our question was: Are there habitat types preferred by tǫdzı along the proposed TASR route?

This report demonstrates that tǫdzı have a relationship with the land on which TASR will be constructed.

[1] Tłı̨chǫ names of habitat types are listed on pages four (4) and five (5).

This report grew from the technical session on TASR, where there was a lack of information associated with habitat types used by tǫdzı.

### September 12 to 19, 2017

From September 12 to 19, Camilla Nitsiza interviewed Bobby Migwi, and Elders George Drybones, Charlie Apple, and Phillip Huskey. During these interviews, they pointed out specific habitat types, and where they had harvested tǫdzı.[2]

### September 25 and 26, 2017

On September 25, Allice Legat interviewed Joe Rabesca, and on September 26, she travelled with him to view habitat types documented by Camilla and herself.

***Dègǫtł'oa is being torn up by vehicles.***
*(Compliments of A. Legat, 170926)*

## What We Learned

Harvesters and elders want the land protected for all wildlife. They know roads drive most wildlife, with the possible exception of bison,[3] away from an area. This was documented in *K'àgòòtıłìì: Traditional Knowledge Study for the Proposed All-Season Road to Whatì.* Tǫdzı are particularly sensitive to noise and activities.[4]

[2] Locations of harvesting have not been included in this report as we are interested in the habitat types only.
[3] Jacobsen, Petter, Georgina Chocolate and Sjoerd van der Vielen. 2014. *K'àgòòtıłìì: Traditional Knowledge Study for the Proposed All-Season Road to Whatì.* Behchokǫ̀: Tłı̨chǫ Government, Tłı̨chǫ Research and Training Institute.
[4] Ibid

Research has indicated the boreal population in the NWT may have fared better than woodland caribou in other parts of Canada. Nevertheless, the NWT Species at Risk Committee stated that woodland caribou (boreal population) are "likely to become endangered in the Northwest Territories if nothing is done to reverse the factors leading to its extirpation or extinction."[5]

Prior to 2014, Tłı̨chǫ elders in Behchokǫ̀ and Whatì explained that tǫdzı had been moving northwest due to the number of fires within Wekèezhìı.[6] During the last two years, Whatì harvesters have been saying that tǫdzı are moving to the area west and south of Whatì, probably due to the forest fires in the Sahtú. Similarly, harvesters from the Dehcho are saying tǫdzı are moving east of ʔedèezhìì (Horn Plateau).[7] This information suggests there is an increase in the number of tǫdzı around TASR.

Bobby Migwi explained, "I've seen over 50 tǫdzı, there are small [ponds and] lakes here". The area is west of his camp, which is adjacent to the TASR, and along the trapping trail that both his dad and grandfather were the boss of before he took over. Elder George Drybones continues, "We used to see moose now and then [and] also tǫdzı. … When the small lakes or ponds dry up, grasses grow between the cracks." [8]

***Whagweè: Vegetation returning around Bobby Migwi's camp adjacent to TASR.*** ***(Compliments of A. Legat, 170926)***

[5] Species Status Report Boreal Caribou in the Northwest Territories December 2012.
[6] Legat, Allice and Georgina Chocolate 2012. *Boreal Caribou Habitat and habitat Use in Wek'èezhìı.* Yellowknife: Wek'èezhìı Renewable Resource Board.
[7] Elder Joe Rabesca (TASR: 170926)
[8] TASR: 170912-18.

## Habitat Types

Habitats types which tǫdzı frequent and are adjacent to TASR.

| **Tłı̨chǫ** | **Description** |
|---|---|
| *ʔehdaa* | Point of land reaching out into lake. |
| *ʔelatì* | Translates as ‘clay lake’. When dry, these are safe to walk on but can be dangerous when wet. |
| *Dèdagaoɔá* | Explained as ‘floating land’ or ‘land that covers water’. |

*ʔelatì:*
*Here we saw tǫdzı tracks on ɔela beach. Picture shows ʔehdaa in the middle, right side of picture.*
*(Compliments of A. Legat, 170926)*

| Tłı̨chǫ | Description |
|---|---|
| *Dègǫtł'oa* | Translated as 'like a meadow'. There is a lot of Dègǫtł'oa along TASR. |
| *Gonìı̨tǫa* | Valley with a creek and very thick bush. |
| *Shìgwegeh* | Two large hills with thick bush and a stream running through the valley. One such place is at the northern end of TASR in association with ʔehtł'èt̀ideè (James River) that crosses TASR. |
| *Tł'otsoa* | A small water hole surrounded by grasses. Often associated with dèdagaoɔ́ or ts'oo. |
| *Ts'oo* | Translated as 'muskeg'. |
| *Whagweè* | Sandy soil mixed with black dirt and covered with sparse vegetation. |
| *What'áa* | Translated as 'esker'. |

***What'àa: In this case there is one on each side of a small valley with a creek (habitat type could be Gonìı̨tǫa). This creek is dry most falls, but in spring, the creek flows into small ponds and lakes, and eventually into Whatawoodià (Mosquito Creek).***