

Tłıchǫ All-Season Road

GNWT Technical Report Responses to Wek'èezhì Renewable Resources Board Boreal Caribou

**Prepared for the Mackenzie Valley
Environmental Impact Review Board EA1617-01**

1 November 2017

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1 INTRODUCTION

The Government of the Northwest Territories (GNWT) submitted a Project Description Report (PDR) and an Adequacy Statement Response (ASR) to the Mackenzie Valley Environmental Impact Review Board (MVEIRB) for the environmental assessment of the Tłchq All-Season Road (TASR) Project (EA1617-01) in July 2016 and April 2017 respectively. Following completion of the ASR, the GNWT provided responses to information requests (June and July 2017), and attended the Technical Sessions hosted by MVEIRB in Behchokò from 15 to 17 August 2017. Further to this, there have been numerous meetings with all Parties to the environmental assessment, for which meeting reports have been provided to the MVEIRB Public Registry for EA1617-01.

On 23 October 2017, the Wek'èezhì Renewable Resources Board (WRRB) submitted their technical report to MVEIRB for the TASR Project outlining recommendations on remaining topics of concern with regards to boreal caribou ([PR#228](#)). This report provides responses to those recommendations, with the intent of providing the Developer's perspective on these remaining topics as the Project moves into the MVEIRB Hearings Phase.

To facilitate cross-referencing with the PDR and other relevant documents already submitted to the MVEIRB public registry for EA1617-01, this document refers to documents by their public registry number (i.e., the PDR is referred to as [PR#43](#)).

2 RECOMMENDATIONS AND RESPONSES

2.1 Assessment Endpoint

2.1.1 Recommendation (WRRB recommendation 1iv)

The WRRB recommends that the Assessment Endpoint should be revised to use a definition that recognizes uncertainty, and is applicable to the current state of tɔdzı habitat and population trend. The WRRB notes that the revised definition should be based on the 2011 integrated risk assessment ([PR#33](#)) that NT South was “as likely as not” to maintain a self-sustaining population over time.

Alternatively, the Assessment Endpoint could be based on the amount of habitat to improve the likelihood of the range being self-sustaining. In the 2011 Critical Habitat Assessment Appendix 2, the NWT South range needed 3% (731,964 ha) as a minimum amount of functional habitat to be restored over 50 years, to improve the likelihood of the range being self-sustaining.

2.1.2 Response

As described in the ASR and in the response to WRRB IR#1 ([PR#149](#)) and MVEIRB IR#1 ([PR#133](#)), the assessment endpoint of a self-sustaining and ecologically effective boreal caribou population is appropriate from a conservation and effects assessment perspective, is consistent with the current wildlife conservation literature, and has been used in previous environmental assessments. No alternative conservation-based assessment endpoints have been proposed either through the TASR process, or through other recent environmental assessments through the MVEIRB process. In fact, the recommendation provided by the WRRB (above) suggests that maintaining a self-sustaining caribou population is an appropriate endpoint.

Conclusions about whether the population of boreal caribou affected by the Project will remain self-sustaining and ecologically effective would be constrained if they were based solely on a single measurement indicator (e.g., habitat availability), as suggested by the WRRB. More robust conclusions are possible when the weight of evidence from several measurement indicators is considered. The measurement indicators considered in the ASR were habitat availability, habitat distribution and survival and reproduction. The amount of critical habitat was an important, but not exclusive, measure used to understand potential effects of the Project on boreal caribou and to determine whether a significant effect was likely.

The WRRB indicates that caribou in the NWT south range may not be self-sustaining based on review of a 2011 risk assessment for caribou (EC 2011). The WRRB further recommends that the assessment endpoint should be to achieve a self-sustaining population by recovering sufficient habitat in the southern portion of the NT1 range. However, the draft 2011 risk assessment referred to by WRRB was replaced by ECCC in favor of the final 2012 risk assessment (EC 2012) because during the public review period of the draft national recovery strategy the GNWT submitted comments to ECCC recommending that boreal caribou should be considered as one continuous population across the NWT and as such treated as a single population unit. The NWT status report on boreal caribou (Species at Risk Committee 2012) describes the rationale for considering one single continuous population in the NWT (page 75; references provided therein):

“Cluster analyses of location data obtained for 140 boreal caribou tracked with satellite collars for more than one year during 2002-2009 revealed two distributions suggesting two boreal caribou subpopulations in the NWT (Nagy et al. 2011; Nagy 2011) that are separated by about a 50 km gap centered on the Bear River drainage between Great Bear Lake and the Mackenzie River. This apparent gap in distribution may be an artifact of a temporary fire disturbance (EC 2011; Nagy 2011) and/or a lack of collar deployments in the local area (Sayine-Crawford and Popko pers. comm. 2012). Nagy (2011) acknowledges that some results are limited by the proportionately small number of animals that have been tracked annually and thus an artifact of regional collar deployments. A later analysis of collar data from 2009-2011 revealed some movement of collared caribou across the gap, however interpretation of this is limited as there were only five collared caribou in the immediate 25,000 km² area around the gap (Environment and Natural Resources 2012a). Boreal caribou in the NWT are currently being managed as a single population unit (EC 2012); more data are needed to clarify whether a gap in distribution exists.”

The final national recovery strategy for boreal caribou now considers the NT1 range to be one continuous local population, and the 65% undisturbed habitat threshold defining critical habitat applies at that scale. That being said, the GNWT acknowledges that there is currently more habitat disturbance in the southern portion of the NT1 range. One of the goals of range plans for the NT1 range will be to reduce the amount of habitat disturbance in the southern portions of the range to improve the likelihood of long-term self-sustainability of that portion of the NT1 boreal caribou population. Specific long-term targets for habitat disturbance in the southern portions of the range will be determined through engagement on a boreal

caribou range planning Framework for the NWT, which the GNWT is aiming to begin in winter 2018.

2.2 Measurement Indicators

2.2.1 Recommendation (WRRB recommendation 2iv)

The WRRB recommends that to reduce uncertainty in detecting and measuring effects of the TASR, the Developer should clarify the likely effect sizes, and the sensitivity of the indicators to detecting the effects for all three Measurement Indicators.

2.2.2 Response

The predicted residual incremental and cumulative effects associated with the Project are described in ASR Section 4.6.2.1 ([PR#110](#)). The effect sizes presented in the ASR are over-estimates of the likely effects of the Project on boreal caribou. For example, buffering was used around the potential footprint to ensure that the assessment did not underestimate the amount of habitat that would be lost. Similarly, 13 borrow sites were used for the assessment, although only a portion of these are likely to be used during construction. Road mortality was predicted to have a small adverse effect, even though data from other nearby highways in the NWT indicate almost no road mortality. Consequently, although there is uncertainty about the actual effect size, certainty that the assessment has not underestimated the potential effects of the Project is high.

Detectability of effects will vary among measurement indicators. Changes in habitat availability can easily be measured after the Project is developed and compared against predictions made in the ASR. In many cases, however, the ASR predicts a small or unmeasurable effect. Monitoring is not expected to detect these effects and distinguish them from natural variability. The GNWT acknowledges that natural variation in boreal caribou vital rates (e.g., survival, calf recruitment) exists at the Base Case and this measurement indicator may not be sensitive enough to detect the small effects predicted for the Project.

The GNWT recognizes that some uncertainty is present in any prediction. Consequently, in some cases where predicted effects are not expected to be measurable, monitoring will still take place as part of the Wildlife Management and Monitoring Plan (WMMP) to confirm that unexpected outcomes do not occur as a result of the Project. For example, where pathways were classified as Secondary or No Linkage in the ASR (summarized in Table 4 of the WMMP), the predicted effect was negligible or non-measurable, yet some of these are considered in the WMMP.

The level of effort proposed in the WMMP is intended to meet the information needs for Project and wildlife management, regulatory guidelines, or to provide triggers for more intensive monitoring should unexpected effects occur.

2.3 Temporal Boundaries

2.3.1 Recommendation (WRRB recommendation 3iv)

The WRRB recommends that the Developer revise the temporal boundaries to clarify their adaptive mitigation for longer-term effects and ecological trends which may require changes in monitoring and adaptive mitigation.

2.3.2 Response

The recommendation does not make clear whether the WRRB is referring to the temporal boundaries associated with ASR or those associated with the Wildlife Management and Monitoring Plan (WMMP, [PR#192](#)). The ASR concluded that the duration of effect for the three measurement indicators was long-term to permanent (ASR Table 4.6-2). These temporal boundaries are therefore very large and consider potential long-term effects of the Project.

The WMMP is planned to continue for five years into operation, at which point recommendations will be made regarding the scope of further monitoring through a Comprehensive Report (WMMP Section 6.1.3). Wildlife Effects Monitoring described in the WMMP (Section 5.2) indicates how current and on-going regional wildlife monitoring will be applied to the TASR. Long-term monitoring and adaptive management needs will be evaluated as part of the Comprehensive Report. Regional wildlife monitoring will continue by the GNWT into the future regardless of the status of the TASR or the WMMP.

2.4 Spatial Boundaries (Regional Study Area)

2.4.1 Recommendation (WRRB recommendation 4iv)

The WRRB recommends that the spatial boundaries for the RSA to be revised to refer to the NWT South (not NT1), as well as the Wek'èezhì/North Slave region.

2.4.2 Response

The NWT South range referred to by the WRRB was identified as a potential population unit as part of draft work undertaken by Environment and Climate Change Canada. This potential unit was ultimately revised for several important

reasons. Please see the response to WRRB recommendation 1iv (in Section 2.1.2) regarding the NT1 Range as an appropriate population unit for the assessment.

2.5 Base Case Conditions

2.5.1 Recommendation (WRRB recommendation 5iv)

The WRRB recommends that the Base Case be revised to include updated and additional information, specifically:

- a) Analyses of habitat including reporting on habitat availability and distribution relative to biophysical attributes; and,
- b) 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 using Tłıchǫ knowledge

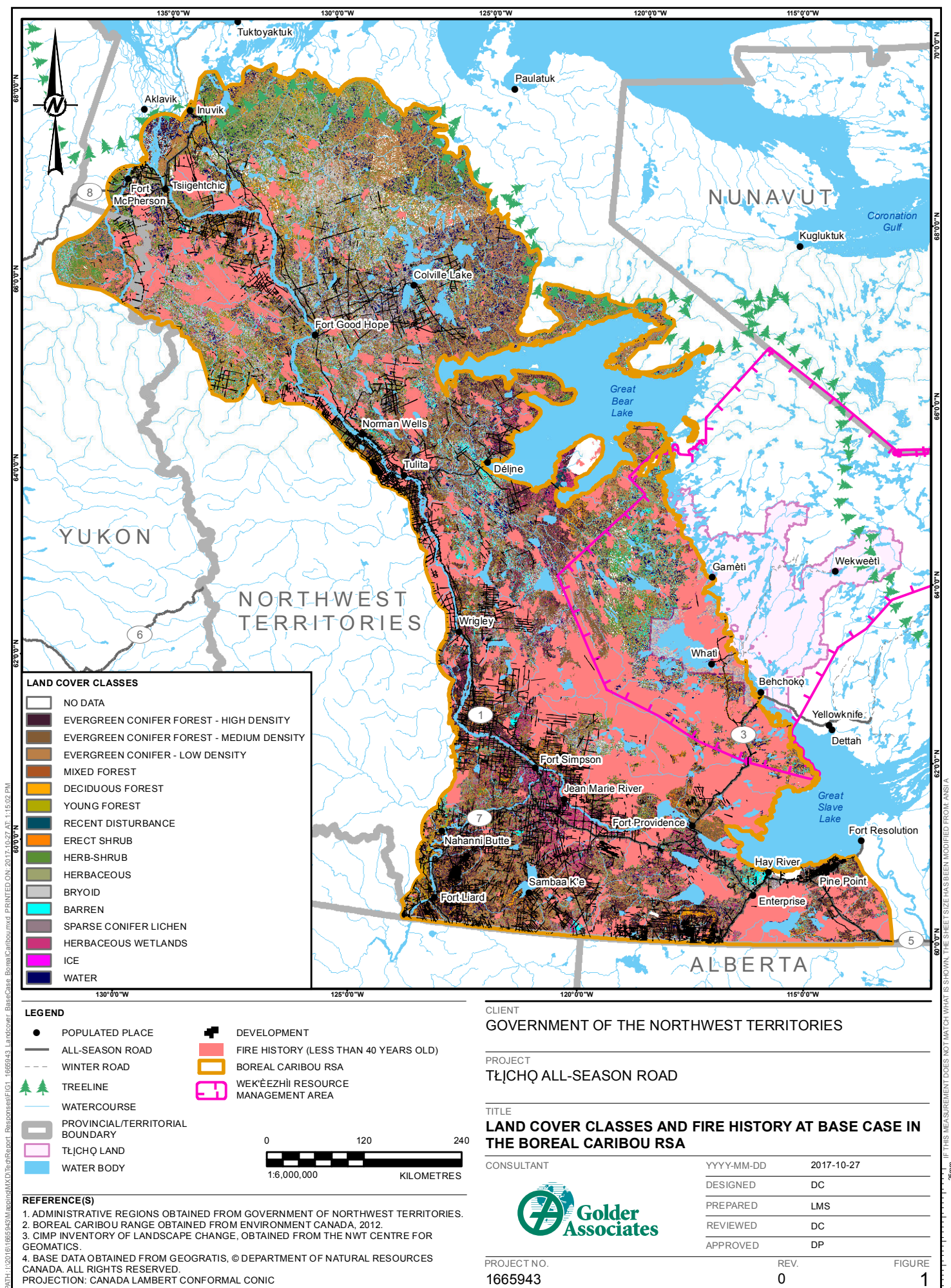
2.5.2 Response

The approach used to assess the Project-related incremental and cumulative effects to boreal caribou habitat followed the critical habitat mapping guidelines of Environment and Climate Change Canada (EC 2012) and was appropriate for meeting the Terms of Reference. The EC (2012) approach is based on estimating the percent of undisturbed habitat and assumes all critical habitat types are necessary for boreal caribou to be self-sustaining.

As noted in ASR Section 4.2.2, Landsat SPOT 4/5 (SPOT) imagery data (Olthof et al. 2015) was used to delineate the abundance and distribution of biophysical attributes of boreal caribou at the Base Case and was also used as the base habitat layer for all wildlife valued components. Fire and development data through 2016 were intersected with the imagery to described the existing environment (Base Case). The area summaries of the SPOT imagery land covers at Base Case for the NT1 Range are provided in Table 1. For illustrative purpose the land cover areas at the Project Case are also provided in Table 1. The associated distribution of these land covers at the Base Case is provided in Figure 1.

Table 1. Landsat SPOT 4/5 Land Cover Area in the NT1 Range at the Base Case and Project Case

Land Cover Class	Base Case (ha)	Project Case (ha)	Area altered by Project (ha)
No data	829,414	829,396	-18
Evergreen conifer forest (high density)	2,637,986	2,637,676	-310
Evergreen conifer forest (medium density)	2,095,513	2,095,492	-21
Evergreen conifer (low density/non-forest)	5,531,060	5,530,365	-695
Mixed forest	376,792	376,482	-311
Deciduous forest	468,313	468,173	-140
Young forest	566,494	566,492	-3
Recent disturbance	130,185	130,185	0
Erect shrub	134,894	134,893	-1
Herb - shrub	2,361,295	2,361,282	-13
Herbaceous	1,210,968	1,210,958	-10
Bryoid	2,315,039	2,315,029	-10
Barren	602,772	602,749	-23
Sparse conifer lichen	2,422,808	2,422,769	-39
Herbaceous wetlands	1,250,117	1,250,095	-22
Ice	316	316	0
Water	3,289,049	3,288,884	-164
Burn: 0-5yrs (2011-2016)	2,417,292	2,414,605	-2,687
Burn: 6-10yrs (2006-2010)	247,047	247,047	0
Burn: 11-20yrs (1996-2005)	1,210,404	1,210,404	0
Burn: 21-40yrs (1976-1995)	6,284,543	6,284,505	-38
Burn: >40yrs (1975 and earlier)	1,638,760	1,638,759	0
Buffered development disturbance	3,697,637	3,702,142	4,504



As noted previously in response to WRRB recommendation 2iv (Section 2.2.2), the GNWT acknowledges the natural variation in vital rates of boreal caribou (e.g., survival, reproduction), as described by the WRRB. Attributing changes in these vital rates to the Project may not be possible given the small effects predicted for the Project and the high natural variation in these rates.

A summary of the available information on boreal caribou harvest is presented in the response to WRRB IR#5 ([PR#145](#)). The ASR considered information regarding harvest provided by the Traditional Knowledge Report ([PR#28](#)), and while the report provides a description of the harvest distribution of valued components during the Base Case, the GNWT acknowledges that the levels of boreal caribou harvest at the Base Case is an uncertainty, and this has been previously identified in response to WRRB IR#5 ([PR#145](#)).

The potential for climate change and forest fire to affect boreal caribou was discussed in the ASR ([PR#110](#)) in Sections 4.2.2.1, 4.2.3.1, 4.5 and 4.6.2. Wildfire trends specific to the Wek'èezhì Resource Management Area were also assessed in response to WRRB IR#9 ([PR#142](#)).

2.6 Mitigation

2.6.1 Recommendation (WRRB recommendation 6iv)

The WRRB recommends:

- a) Monitoring techniques and mitigation actions should be expanded to use the experience from elsewhere for avoiding, minimizing and recovery effects. Revisions to mitigation should specify criteria to measure effectiveness of mitigation and how thresholds are specifically applied to changes in mitigation and monitoring;
- b) 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;
- c) A collaborative oversight committee should refine and revise the adaptive mitigation thresholds for incremental and cumulative effects and ensure that they are consistent with the NWT and national recovery planning; the committee (working group) would also serve as a forum for continued development and refinement of collaborative tǫdɔ research in Wek'èezhì; and,

- d) Building on (iii), consideration of use of establishment of conservation agreements (as mentioned in federal Action Plan) to provide a framework to achieving population and distribution objectives for tǫdzı.

2.6.2 Responses

Response to WRRB Recommendation 6iv(a)

As described in Section 2.2, 2.3 and 2.3.1 of the ASR ([PR#110](#)), the residual effects analysis considered the efficacy of mitigation based on scientific knowledge, Traditional Knowledge, logic, and experience with similar developments elsewhere. Where there was uncertainty about the effectiveness of mitigation, a precautionary approach was applied and mitigation was assumed to be less effective.

For example, vehicle strikes were considered a Primary pathway in the ASR and speed limits were identified as mitigation (Section 4.3.2.3). As identified in the ASR ([PR#110](#)) and in response to WRRB IR#10 ([PR#142](#)), the scientific literature supports the conclusion that the risk of vehicle-wildlife strikes increases with both higher traffic volume and higher speed. Review of caribou collisions along Highway 3 in response to WRRB IR#10 indicated that one caribou mortality has occurred between Fort Providence and Frank Channel from 2006 to 2016, which is a section of highway approximately twice as long as the Project, where average annual daily traffic volumes have ranged from 240 to 950 vehicles with a 90 km per hour speed limit. The Project will have 70 km per hour speed limit and is predicted to average 20 to 40 vehicles per day through the RFD Case. The evidence provided in support of the ASR indicates that a 70 km speed limit is likely to be effective at reducing mortality risk to boreal caribou and other wildlife. The WMMP ([PR#192](#)) also has provisions for monitoring vehicle-wildlife strikes and mitigation can be enhanced through adaptive management.

The GNWT agrees with the WRRB that measuring the efficacy of mitigation is an important part of adaptive management. The WMMP includes an annual Mitigation Audit, intended specifically to measure the effectiveness of mitigation. The Tłıchǫ Government will assist in providing traditional knowledge to guide WMMP adaptive management ([PR#216](#)).

The application of adaptive mitigation in the WMMP is consistent with other documents in the Northwest Territories (De Beers 2014, DDEC 2016, Canadian Zinc 2016), Nunavut (AEM 2017) and Alberta (Golder 2016, 2017), and considers recent advice from the MVEIRB (2017) regarding adaptive management. Specific examples of other wildlife monitoring programs that provide thresholds for adaptive

mitigation that may be applicable to the TASR would be welcomed and considered for the WMMP.

Response to WRRB Recommendation 6iv(b)

The GNWT can implement temporary road closures for the purpose of minimizing disturbance to barren-ground caribou and public safety concerns due to risk of vehicle collisions if there was evidence that a large group was likely to migrate across the road.

The larger question of access management would require multi-party agreement, as the TASR will be on public land. This issue may be referred to the working group described below.

Response to WRRB Recommendation 6iv(c)

The GNWT is agreeable to establishing an overarching corridor working group that is similar to the GNWT's Inuvik Tuktoyaktuk Highway Corridor Working Group and is not limited to wildlife. Please refer to the GNWT submission to the public registry on October 27, 2017 for further details regarding this corridor working group ([PR#239](#); [PR#237](#)).

Response to WRRB Recommendation 6iv(d)

It is the GNWT's understanding that Environment and Climate Change Canada (ECCC) is proposing to enter into negotiations with the GNWT, and other parties as appropriate, to establish conservation agreements under section 11 of the federal *Species at Risk Act*. These agreements would describe commitments each party is making to protect and recover boreal caribou. While the GNWT is open to exploring such an agreement with ECCC, the GNWT cannot provide any further detail about how they will be used to achieve the population and distribution objectives for boreal caribou until ECCC initiates such negotiations.

2.7 Residual Effects Analysis

2.7.1 Recommendation (WRRB recommendation 7iv)

The WRRB recommends that:

- a) The Residual Effects analysis be revised to more comprehensively assess incremental and cumulative effects to reduce current uncertainty;

- b) The range plan for Wek'èezhì/North Slave be completed by the end of April 2018, with interim thresholds provided for development in Wek'èezhì/North Slave in time for the November 15-17, 2017 Public Hearing; and,
- c) The conclusions for 'small' effects which are not expected to exceed the resilience or adaptability limits of tǫdzı be examined in the context of recovery planning and critical habitat. The context is the draft NWT Recovery Plan (p. 25; [PR#33](#)), as Approach 1.4 states: "Where the cumulative habitat disturbance surpasses the threshold for a self-sustaining population, management authorities may need to recommend to regulatory agencies and land use planning boards that development activities be scaled back or not approved in a particular area, until sufficient habitat regenerates to offset the new disturbance."

2.7.2 Responses

Response to WRRB Recommendation 7iv(a)

As indicated in the response to WRRB IR#2 ([PR#142](#)), the approach used in the ASR was to maximize the predicted effects to reduce the potential that effects could be underestimated. The conclusions presented in the assessment are based on maximum predicted effects and are likely greater than the actual outcomes of developing the Project. That is, the assessment was precautionary and effects were overestimated where uncertainty was identified.

A higher level of uncertainty for predicted effects was identified for reasonably foreseeable developments (RFDs). Accurate predictions about future projects that may be proposed by governments or private entities and may interact with the TASR to affect boreal caribou at the NT1 scale are difficult to make. The RFDs identified for the NT1 range and used in the ASR ([PR#110](#)) were deemed adequate by the MVEIRB ([PR#71](#)).

Part of the uncertainty identified by the WRRB in the rationale for their request to revise the residual effects analysis relates to the buffer applied to disturbance when estimating effects to caribou habitat. The ASR followed EC (2012) guidelines and applied a 500 m buffer. This buffer determined through analysis completed to support the critical habitat mapping guidelines set forth by ECCC (EC 2011). In summarizing the results of this analysis EC (2011) states "Little statistical support was found for distinguishing different types of anthropogenic disturbances (e.g., linear and polygonal types). However, supporting analyses of a range of buffer widths demonstrated that a 500 m buffer on anthropogenic disturbance provided an

appropriate, minimum approximation of the zone of influence of these features on caribou demography.” This was determined to be the most conservative approach (EC 2011).

Additionally, EC (2011) indicates that “A sensitivity analysis indicated that the disturbance-recruitment relationship applied with a 500 m disturbance buffer width produced stable estimates of the effect of anthropogenic disturbance on caribou recruitment. Moreover, the 500 m width appeared to capture basic information about the effects of fragmentation or the spatial configuration of human disturbance on the landscape in addition to the effects of habitat loss. Only two of the six disturbance configuration metrics tested had a significant effect on caribou calf recruitment, after controlling for the percentage anthropogenic disturbance buffered by 500 m: edge density, a surrogate for quantifying the changes in the permeability of the landscape to predators, and the nearest-neighbour distance between disturbance patches, a surrogate measure of landscape connectivity. These two metrics of disturbance configuration were incorporated into the subsequent analysis to identify the relationship between population (recruitment) and habitat conditions (disturbance)”.

The approach by EC (2011) related an avoidance effect to boreal caribou demography, so the 500 m buffer captures an ecological effect. It is important to note that the application of the buffer conservatively assumes that the area within the 500 m buffer is functionally not available to caribou even though studies of caribou distribution demonstrate a gradient of reduced use with distance from point-sources of disturbance (e.g., Dyer et al. 2001; Polfus et al. 2011).

Other concerns identified by the WRRB in their rationale relate to uncertainty about road mortality and increased predation risk. Given that there has only been one documented collision with a caribou on Highway 3 between 2006 and 2016 (response to WRRB IR#10, [PR#142](#)), the ASR conclusion that the risk of road mortality is low is well supported by available data. Because the TASR will follow an existing trail, linear feature density will change little from existing conditions and changes in predation by wolves, bears, or people are not expected to be substantial.

A final concern relates to the spatial scale of the boreal caribou assessment. This concern has been addressed in other responses, provided in Section 2.1.

For all of these reasons, the GNWT stands by the residual effects analysis presented in the ASR.

However, the concern of the WRRB with respect to the residual effects analysis also relates to monitoring. The GNWT has stated further consultation with regards to the WMMP will be considered prior to approval ([PR#211](#), [PR#209](#), [PR#213](#)), and the GNWT remains open to meet with interested parties if requested ([PR#171](#)), providing more opportunities for coordination and cooperation between parties within the project-specific focus of the WMMP.

Response to WRRB Recommendation 7iv(b)

The GNWT is currently developing a draft Framework for boreal caribou range planning in the NWT that will propose regional range plans, regional disturbance thresholds, and a tiered approach to implementing actions to manage habitat disturbance based on the relative importance of areas for boreal caribou and other factors. The GNWT is aiming to begin external engagement on the draft Framework in winter 2018. Given the co-management context in which wildlife management occurs in the NWT, development and implementation of regional range plans will depend on a variety of land and caribou managers supporting the framework. As such regional range planning will proceed once a final Framework has been agreed to. The GNWT will thus not be able to complete a range plan for the Wek'èezhì/North Slave portion of the boreal caribou range by the end of April 2018, and cannot propose or implement interim disturbance thresholds for development in this portion of the range until engagement on the range planning Framework has taken place. It should be noted however that regional range planning will focus on the southern portion of the range first, where disturbance levels are highest, i.e. the Dehcho, South Slave and Wek'èezhì/North Slave regions.

Response to WRRB Recommendation 7iv(c)

The ASR concluded that the TASR project, in addition to reasonably foreseeable developments in the NT1 range, would not cause the range wide management threshold of 35% habitat disturbance (or 65% undisturbed habitat) to be exceeded. As populations are expected to be self-sustaining when there is >65% undisturbed habitat, it was therefore concluded that the TASR project would not cause the resilience or adaptability limits of boreal caribou to be exceeded. On this basis, it would not be inconsistent with Approach 1.4 of the NWT Recovery Plan for management authorities to recommend that the TASR proceed at this time.

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