BOREAL CARIBOU IN THE WEK'ÈEZHÌI REGION

INTERIM RANGE PLAN

PLAN PROVISOIRE

POUR L'AIRE DE RÉPARTITION DU CARIBOU BORÉAL DE LA RÉGION DU WEK'ÈEZHÌI

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Government of Northwest Territories

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- Tłı̨chǫ Government
- North Slave Métis Alliance
- Yellowknives Dene First Nation
- Wek'èezhìı Renewable Resources Board
- Environment and Climate Change Canada
- GNWT departments: Environment and Natural Resources; Lands; Executive and Indigenous Affairs; Industry, Tourism and Investment; Justice; Municipal and Community Affairs; Infrastructure
- Zoetica Environmental Consulting Services
- Compass Resource Management

The Tłı̨chǫ Government and North Slave Métis Alliance also authored sections of the interim range plan describing the methods they used to document traditional knowledge of boreal caribou to support development of the plan.

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RÉSUMÉ (FRANÇAIS)

Pourquoi était-il nécessaire de mettre en place un plan provisoire pour l'aire de répartition du caribou boréal?

Le caribou boréal a été inscrit sur la liste des espèces menacées en vertu de la *Loi sur les espèces en péril* (LEP) du Canada en 2003 et en vertu de La *Loi sur les espèces en péril (TNO)*, en 2014. Aux TNO, une espèce en péril est une espèce susceptible de devenir une espèce en voie de disparition si les facteurs contribuant à sa diminution ne sont pas inversés.

L'habitat essentiel du caribou boréal, défini dans la LEP, correspond à au moins 65 % de l'aire de répartition du caribou boréal aux TNO (aussi appelé NT1 dans le plan fédéral), et il ne doit pas être perturbé pour garantir une probabilité de survie à long terme de 60 % à l'espèce. C'est pourquoi on doit protéger cet habitat.

En 2017, on a élaboré une stratégie de rétablissement de la population boréale de caribou en vertu de la *Loi sur les espèces en péril (TNO)*. L'un des objectifs de cette stratégie était que le GTNO s'engage à produire des plans régionaux pour l'aire de répartition du caribou boréal. Pour lancer le processus, le GTNO a mis en place un cadre de planification de l'aire de répartition du caribou boréal en août 2019. Ce cadre propose une approche coordonnée et cohérente pour élaborer cinq plans régionaux pour l'aire de répartition aux TNO, dont le plan provisoire pour l'aire de répartition du caribou boréal de la région du Wek'èezhìı.

On a élaboré ce plan provisoire en tenant compte des principes énoncés dans le cadre de planification, notamment : en faisant appel aux connaissances scientifiques et autochtones, en se laissant guider par le lien qui unit les gens et le caribou et en respectant un processus de collaboration.

Aux TNO, plusieurs autorités de gestion se partagent la responsabilité de protéger le caribou boréal et son habitat ainsi que de trouver un équilibre entre les besoins humains et les besoins de l'espèce. Pour favoriser la collaboration, on a formé, à l'automne 2019, un groupe de travail régional composé de représentants de gouvernements autochtones (gouvernement tłı̨chǫ, Première Nation des Dénés Yellowknives, *Alliance* des Métis du *Slave* Nord), de l'Office des ressources renouvelables du Wek'èezhìi, d'organismes fédéraux (Environnement et Changement climatique Canada) et de ministères du GTNO.

Pour respecter les échéances prévues du projet de route toutes saisons de la région des Tłı̨chǫ (à la mesure 6-1 de la partie 1 du rapport de l'Office d'examen des répercussions environnementales de la vallée du Mackenzie sur l'évaluation environnementale et les motifs de la décision du GTNO), il était nécessaire d'élaborer un plan provisoire pour l'aire de répartition du caribou boréal. Pour cette raison, le plan provisoire pour l'aire de répartition du caribou boréal de la région du Wek'èezhìı devait être terminé et présenté à l'Office des ressources renouvelables du Wek'èezhìi 90 jours avant l'ouverture de la nouvelle route, prévue en novembre 2021.

Limite de perturbation globale de l'habitat

La limite de perturbation globale de l'habitat du caribou boréal dans la région de planification de l'aire de répartition du Wek'èezhìı a été définie dans le cadre de planification. Parmi les perturbations possibles, notons les perturbations naturelles (p. ex. les feux de forêt), et les perturbations humaines (p. ex., le développement industriel et la construction d'infrastructure). La limite de perturbation globale d'une région correspond aux perturbations combinées (naturelles et humaines) auxquelles peut s'adapter une région tout en maintenant une population autosuffisante de caribou boréal. Dans la région du Wek'èezhìı, la limite (y compris les feux de forêt et les activités humaines) est de 40 %.

Pour calculer la limite de perturbation humaine à laquelle peut s'adapter une région sans dépasser la limite de perturbation globale, on doit calculer la différence entre les perturbations typiques et les perturbations maximales potentielles causées par les feux de forêt. C'est ce qu'on appelle le seuil de perturbation humaine. L'empreinte des feux de forêt dans la région de planification de l'aire de répartition du Wek'èezhìı permet une perturbation humaine de 4,5 % à 11 %.

Le cadre de planification définit également un système de gestion selon lequel le niveau de perturbation humaine dans lequel entre une région détermine quelle combinaison de catégories de gestion doit être incluse dans le plan régional pour l'aire de répartition (élémentaire, importante ou intensive). Par exemple, une région dont les perturbations humaines demeurent sous les 4,5 % se situe au niveau 1; une région dont les perturbations humaines sont plus élevées, mais demeurent entre 4,5 % et 11 % se situe au niveau 2; et une région dont les perturbations humaines sont plus élevées que de 11 % se situe au niveau 3. À l'heure actuelle, les perturbations humaines dans la région de planification du Wek'èezhìı s'élèvent à 0,9 % (niveau 1).

Donc, étant donné que la région du Wek'èezhìı est classée au niveau 1, un tiers de l'habitat doit être classé dans la catégorie de gestion « importante » (qui demande la mise en œuvre de mesures plus rigoureuses que la catégorie élémentaire) et pas plus des deux tiers classé pour gestion « élémentaire » (qui demande la mise en œuvre de mesures moins rigoureuses).

Cartes des régions importantes pour le caribou boréal et catégories de gestion

Le gouvernement tłı̨chǫ et l'Alliance des Métis du Slave Nord ont tenu des réunions communautaires et des entrevues avec les aînés, les chasseurs et les piégeurs pour recueillir des connaissances traditionnelles sur le caribou boréal et son habitat. On a utilisé les données traditionnelles et scientifiques à notre portée pour élaborer les cartes des régions importantes pour le caribou boréal. On s'est ensuite servi de ces cartes pour cerner les zones d'application des différentes catégories de gestion. En outre, pour mieux définir ces zones, dans certains des scénarios élaborés, on a pris en compte les perspectives de développement et les mesures de protection des terres en vigueur.

Lors des réunions tenues au printemps 2021, les représentants du groupe de travail du Wek'èezhìı ont conjointement décidé qu'il serait plus judicieux d'adopter une approche plus conservatrice pour protéger le caribou et dresser la carte des zones d'application des catégories de gestion. Ils ont également décidé qu'en raison de leur importance comme aire de mise bas, les zones longeant la côte du bras Nord du Grand lac des Esclaves chevauchant l'aire protégée proposée Dınàgà Wek'èhodì; une vaste zone à l'ouest de Lac La Martre, ainsi que pointe Whitebeach et les zones juste au sud, devraient être classées dans la zone de gestion « intensive ».

Certaines zones où des perspectives de développement se dessinent et où le potentiel d'exploitation des ressources est élevé demeurent soumises aux exigences de la catégorie de gestion « élémentaire » et ne seront pas touchées par le plan provisoire pour l'aire de répartition. Mentionnons, entre autres, un corridor d'au moins 2 km de largeur englobant la route 3 et la route toutes saisons de la région des Tłı̨chǫ pour permettre les travaux de construction et d'entretien routiers en cours.

Dans l'ensemble, les représentants du groupe de travail ont finalement convenu que la région de planification de l'aire de répartition du Wek'èezhìı serait divisée ainsi : 55 % de l'habitat entrerait dans la catégorie de gestion élémentaire, 30 %, dans la catégorie de gestion « importante » et 15 %, dans la catégorie de gestion « intensive ».

Mesures de gestion

Les mesures de gestion varient selon les trois catégories de gestion définies dans le cadre.

- *Zones à catégorie de gestion élémentaire :* zone dans laquelle les projets de développement seraient assujettis aux exigences déjà en vigueur. Les promoteurs sont encouragés à respecter les pratiques exemplaires et les lignes directrices concernant le caribou boréal.

- *Zones à catégories de gestion importante et intensive* : zone dans laquelle les mesures deviennent graduellement plus rigoureuses. L'objectif est de réaliser un gain net ou, du moins, de ne pas subir de perte nette en habitat.

On a établi les mesures de gestion selon une hiérarchie d'atténuation conventionnelle, qui tente (a) d'éviter et de (b) minimiser le plus possible les nouvelles perturbations, ainsi que de (c) réhabiliter l'habitat et de compenser sa perte. Lors des réunions, les représentants du groupe de travail ont décidé que les mesures de gestion proposées dans le cadre seraient intégrées dans le plan provisoire pour l'aire de répartition, accompagnées de certains ajouts et changements.

Les aires de mise bas fréquemment utilisées (comme les îles et le littoral) à l'intérieur de zones classées « intensive » doivent être complètement évitées. Les mesures précises de gestion ont été ajoutées pour réduire ou empêcher les perturbations sensorielles au moment de l'année pendant lequel le caribou boréal est le plus vulnérable (mise bas, élevage et fin de l'hiver).

Des détails supplémentaires ont été ajoutés pour apporter des précisions :

- Le moment où il est nécessaire de réaliser une réhabilitation fonctionnelle et écologique pour effacer l'empreinte des perturbations d'un projet de développement;

- Les critères à respecter pour déterminer si un site a été réhabilité convenablement;

- Le moment où la compensation pour la perte d'habitat doit commencer après une perturbation à long terme.

Dans les zones de gestion « importante » et « intensive », le plan de fermeture ou d'assainissement doit montrer comment seront effectuées les restaurations fonctionnelle et écologique d'un habitat après des perturbations causées par un projet de développement. S'il est impossible d'éviter de nouvelles perturbations à long terme, le promoteur devra, en règle générale, élaborer un plan de compensation de perte d'habitat qui prouve que les zones perturbées sont réhabilitées. Toutefois,

en raison du manque d'expérience pratique et d'orientation dans le domaine de la compensation de perte d'habitat aux TNO, le groupe de travail a recommandé que d'autres types de compensation soit envisagés, comme effectuer une contribution à la recherche sur la réhabilitation plutôt qu'effectuer personnellement une compensation à la perte d'habitat.

Instruments de mise en œuvre

Les instruments législatifs principaux proposés qui permettraient de mettre en œuvre le plan provisoire pour l'aire de répartition du Wek'èezhìı sont, notamment, le plan d'aménagement du territoire tłı̨chǫ (PATT), la *Loi sur la faune* et la *Loi sur l'aménagement des forêts*. La région définie dans le PATT et la région de planification de l'aire de répartition de la région du Wek'èezhìı se chevauchent à 19,2 %. Le PATT est actuellement à l'étude, et les responsables de l'examen envisagent des modifications et des ajouts au zonage actuel, ainsi qu'à l'utilisation et aux directives de protection des terres.

La majorité (80,4 %) de la région de planification de l'aire de répartition du caribou boréal du Wek'èezhìı fait partie des terres actuellement gérées par le GTNO. Bien que divers pouvoirs réglementaires et dispositions de la *Loi sur le faune* soient envisagés comme instruments de mise en œuvre du plan provisoire pour l'aire de répartition du caribou boréal sur les terres gérées par le gouvernement territorial, ce sont les deux articles ci-dessous que l'on privilégie.

L'article 93 de la *Loi sur le faune* porte principalement sur la protection des habitats pour la conservation d'espèces sauvages précises. Cet article permet de définir les habitats sur le plan géographique et qualitatif, et autorise la rédaction d'un règlement qui oblige les promoteurs à respecter les mesures de gestion énoncées dans le plan provisoire autorisé pour l'aire de répartition.

En vertu de l'**article 95**, on peut obliger les promoteurs à rédiger et à respecter un plan de gestion et de surveillance de la faune (PGSF) qui sera approuvé par le ministre. En attendant que les nouveaux règlements soient en vigueur en vertu de l'article 93 de la Loi, tous les promoteurs de nouveaux projets dans les zones de gestion « importante » et « intensive » devront élaborer un PGSF. En ce qui concerne les mesures de gestion liées particulièrement à la récolte du bois (consulter les sections 8.4 et 8.5 et les tableaux 12 et 13), c'est la *Loi sur l'aménagement des forêts* et ses règlements afférents qui sera le principal instrument de mise en œuvre.

Une petite partie de la région de planification de l'aire de répartition du caribou boréal, où un bail d'exploitation minière est toujours en vigueur, demeure sous administration fédérale. Cette zone, se trouvant dans l'aire de répartition NT1, fait l'objet d'une ordonnance en vertu de *la Loi sur les espèces en péril* qui protège l'habitat essentiel du caribou boréal. Pour mener des activités qui pourraient avoir une incidence sur cet habitat, les promoteurs doivent demander une autorisation en vertu de *Loi sur les espèces en péril* et respecter les exigences imposées.

Prochaines étapes

Dès que l'Office des ressources renouvelables du Wek'èezhìı aura examiné le plan provisoire pour l'aire de répartition du caribou boréal dans la région du Wek'èezhìı, on entamera l'élaboration d'un plan permanent pour l'aire de répartition du caribou boréal dans la région du Wek'èezhìı, que l'on envisage de terminer en mars 2023. Le plan provisoire restera en vigueur jusqu'à ce que le plan permanent soit approuvé et entre en vigueur.

EXECUTIVE SUMMARY

Why was an interim Boreal Caribou Range Plan needed?

Boreal caribou were listed as threatened under the federal *Species at Risk Act* (SARA) in 2003 and in the Northwest Territories (NWT) under the *Species at Risk (NWT) Act* in 2014. When a species is listed as "threatened," it means it is likely to become endangered in the NWT if nothing is done to reverse the factors leading to its decline.

Under the federal SARA legislation, critical habitat has been identified for boreal caribou and must be effectively protected within the NWT's boreal caribou range – referred to as NT1 in the federal plan. Critical habitat for boreal caribou is identified as maintaining at least 65% undisturbed habitat within the NWT's boreal caribou range to ensure a 60% probability of the population's long-term persistence.

Under the *Species at Risk (NWT) Act,* a boreal caribou recovery strategy was produced in 2017. As part of the NWT recovery strategy's objectives, the GNWT committed to producing range plans for boreal caribou. To initiate the process, an NWT *Framework for Boreal Caribou Range Planning* (the Framework) was created in August 2019. The Framework provides a coordinated and consistent approach for five regional range plans to be produced in the NWT. The Interim Wek'èezhìı Boreal Caribou Range Plan (Interim Range Plan) is one of these five regional plans.

The Interim Range Plan was prepared with the intention of following the Framework's principles including - among others - being informed by western science and Indigenous Knowledge (IK), being guided by people's relationship with caribou, and respecting a collaborative process.

Responsibility for protecting boreal caribou and their habitat, and balancing these actions with human needs is shared among many management authorities in NWT. As part of the collaborative process, a regional working group was formed in fall 2019. The working group is made up of representatives from Indigenous governments (Tłı̨chǫ Government, Yellowknives Dene First Nation, North Slave Métis Alliance), the Wek'èezhìı Renewable Resources Board, Federal Government agencies (Environment and Climate Change Canada) and GNWT departments.

An interim boreal caribou range plan was needed to meet the timeline required by Measure 6-1, Part 1 of the Mackenzie Valley Environmental Impact Review Board's Report of Environmental Assessment and Reasons for Decision for the Tłı̨chǫ All-Season Road (TASR) project. This measure required that the Wek'èezhìı boreal caribou range plan be completed and submitted to Wek'èezhìı Renewable Resources Board 90 days before the opening of the TASR. The TASR is scheduled to be completed in November 2021.

Total Habitat Disturbance Limits

The regional total habitat disturbance limit for the Wek'èezhìı range planning region was defined in the Framework. Habitat disturbance includes natural changes to caribou habitat (e.g., wildfire), and human activities such as industrial development and infrastructure. Regional total disturbance limits represent the combined amount of human and wildfire disturbance each region can accommodate while still maintaining a self-sustaining boreal caribou population. The total disturbance limit (including fire and human disturbance) in the Wek'èezhìı region is 40%.

A region's typical fire disturbance versus potential maximum fire disturbance indicates the range of human disturbance that region can likely tolerate without exceeding the total disturbance limit. This is referred to as the human disturbance threshold. The fire footprint in the Wek'èezhìı range planning region allows for a human disturbance range of between 4.5% and 11%.

The Framework established a tiered management system in which the human disturbance tier that a region falls within, informs which combination of management classes must be included in the regional range plan: Basic, Enhanced or Intensive. The Wek'èezhìı region would fall within Tier 1 if human disturbance remains below 4.5%, Tier 2 if disturbance increases but stays between 4.5% and 11%, and Tier 3 if disturbance were to exceed 11%. The current human disturbance is 0.9% of the Wek'èezhìı range planning region (Tier 1).

Since Wek'èezhìı falls within Tier 1, it requires a minimum of one third of habitat in the Enhanced management class (which requires more stringent management actions than the Basic management class) and no more than two thirds of habitat in the Basic class (where required management actions are not as strict).

Maps of Important Areas for Boreal Caribou and Management Classes

The Tłı̨chǫ Government and the North Slave Métis Alliance conducted community meetings and interviews with elders and harvesters to gather IK about boreal caribou and their habitat. Together, IK and western scientific information were used to develop maps of important areas for boreal caribou. These maps were then used to develop different scenarios for management class areas. Some of these scenarios considered economic development potential and existing land protections to help define potential management class areas.

At working group meetings in spring 2021, the Wek'èezhìı Working Group collectively decided that a more conservative approach to the map of management classes would be best to protect boreal caribou. The working group agreed that areas along the shoreline of the North Arm of Great Slave Lake overlapping with the proposed Dınàgà Wek'èhodì protected area should be classified as intensive management areas because of their importance as calving sites. They also designated a large area to the west of Lac La Martre, as well as Whitebeach Point and areas just to the south as intensive management areas for the same reason.

Some areas with development interests and higher resource development potential remained in the Basic management class and will not be affected by the Interim Range Plan. This includes a 2 km minimum corridor width along Highway 3 and the TASR to allow for ongoing activities related to road construction and maintenance.

Overall, the group agreed to a final division of management classes as follows: 55% of habitat was assigned as Basic management class, 30% was assigned as Enhanced management class, and 15% was assigned as Intensive management class in the Wek'èezhìı range planning region.

Management Actions

Management actions vary according to the three management classes, and were based on those presented in the Framework.

- *Basic management class areas:* development would be subject to standard requirements that are currently in place. Proponents are encouraged to follow best practices and guidelines for boreal caribou.
- *Enhanced and Intensive management class areas:* actions become progressively more stringent. The goal is a net gain or, at the least, no net loss of undisturbed habitat in these areas.

The management actions are grouped according to a standard mitigation hierarchy, which seeks to (a) avoid new disturbance, then (b) minimize necessary new disturbance as much as possible, and lastly (c) restore and/or offset any residual disturbance. At the working group meetings, it was decided that the management actions proposed in the Framework would be included with some additions and changes for the interim range plan.

Areas repeatedly used for calving (such as islands and shorelines) within Intensive management class areas must be completely avoided. Specific management actions have been added to reduce or avoid sensory disturbances at the times of year when the caribou would be most sensitive (calving, post-calving and late winter).

Additional details have been added to clarify:

- When is functional and ecological restoration required for a proposed development's direct disturbance footprint;
- What criteria can be used to determine that a site is adequately restored;
- When are habitat offsets required to compensate for new long-term habitat disturbance.

In Enhanced and Intensive management areas, a developer's closure and reclamation plans must show how project disturbance will be functionally and ecologically restored. If a proposed project cannot avoid new long-term disturbance footprints, typically developers must create a habitat offset plan that describes restoration of other areas of disturbance. However, due to limited experience and guidance for habitat offsets within the NWT, the regional working group recommended that other forms of offsetting be considered, such as contributions toward research on restoration in lieu of restoration-based habitat offsets carried out by the developer.

Implementation Tools

The primary proposed legislative tools to implement the Wek'èezhìı interim range plan include the Tłı̨chǫ Land Use Plan (TLUP), the NWT *Wildlife Act*, and the *NWT Forest Management Act*. The TLUP overlaps with 19.2% of the Wek'èezhìı boreal caribou range planning region. The TLUP is currently under review and changes or additions to the current zoning, considered land uses, and land protection directives may be considered as part of the review process.

The majority (80.4%) of the Wek'èezhìı boreal caribou range planning region falls within lands that are currently managed by the GNWT. Various sections and/or regulation making powers under the *Wildlife Act* are being considered but the two sections below are the preferred implementation instruments for the interim range plan on territorially managed lands.

Section 93 of the *Wildlife Act* focuses on protection of habitat for the conservation of specified wildlife species. This section was chosen because habitat can be defined either geographically or qualitatively. This section can also include preparing regulations stipulating that a developer must follow the management actions outlined in the approved interim range plan.

Under **Section 95**, developers can be required to prepare and comply with a Minister-approved Wildlife Management and Monitoring Plan (WMMP). Until new regulations are in place under Section 93 of the Act, a WMMP will be required for any new project proposed in an Enhanced or Intensive management area. For management actions related specifically to timber harvesting (see Section 8.4 and 8.5, and Tables 12 and 13), the current *Forest Management Act* and associated Forest Management Regulations will be the primary implementation instrument.

There is a very small parcel of federally-administered land in the Wek'èezhìı boreal caribou range planning region where an active mineral lease exists. Federally-administered lands within the NT1 boreal caribou range are subject to a federal order under SARA which protects boreal caribou critical habitat. Proponents can apply for a federal SARA permit to carry out activities that might affect critical habitat if certain conditions are met.

Next Steps

Once the Interim Wek'èezhìı Boreal Caribou Range Plan is reviewed by the Wek'èezhìı Renewable Resources Board, work will begin on the full Wek'èezhìı Boreal Caribou Range Plan, scheduled to be completed in March 2023. The interim range plan will be in effect until the full range plan is approved and begins to be implemented.

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ASTH	Allowable Sustainable Timber Harvest
BC	British Columbia
CIMP	Cumulative Impact Monitoring Program
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
CMA	Conference of Management Authorities
CNFDB	Canadian National Fire Database
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EIA	Department of Executive and Indigenous Affairs
ENR	Department of Environment and Natural Resources
EOSD	Earth Observation for Sustainable Development of Forests
ESA	Environmental Site Assessment
ESTR	Ecosystem Status and Trends Report
FCSAP	Federal Contaminated Sites Action Plan
FMA	Forest Management Agreement
FMD	ENR Forest Management Division
FVI	Forest Vegetation Inventory
GBL	Great Bear Lake
GIS	Geographic Information System
GNWT	Government of the Northwest Territories
GPS	Global Positioning System
IA	Important Areas for boreal caribou
IGO	Indigenous Government and Organization
IK	Indigenous Knowledge

ITI	Department of Industry, Tourism and Investment
LLMA	Lac La Martre Adventures
LWB	Land and Water Board
MVEIRB	Mackenzie Valley Environmental Impact Review Board
MVLWB	Mackenzie Valley Land and Water Board
NBAC	National Burn Area Composite
NRCan	Natural Resources Canada
NSMA	North Slave Métis Alliance
NT1	"Northwest Territories" range of boreal caribou in Canada
NTGS	Northwest Territories Geological Survey
NWT	Northwest Territories
PA	Protected Areas
PSPC	Public Services and Procurement Canada
RAP	Remedial Action Plan
RSF	Resource Selection Function
SARA	Federal Species at Risk Act
SARC	Species at Risk Committee
SK1	Saskatchewan's "Boreal Shield" range of boreal caribou in Canada
SpaDES	Spatial Discrete Event Simulation
SPARCS	Spatial Precipitation and Risk Calculation System
TASR	Tłı̨chǫ All-Season Road
TG	Tłı̨chǫ Government
TK	Traditional Knowledge
TLUP	Tłı̨chǫ Land Use Plan
TOR	Terms of Reference
TRTI	Tłı̨chǫ Research and Training Institute

UBC	University of British Columbia
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
VAR	Value at Risk
WG	Working Group
WLUP	Wek'èezhìı Land Use Plan
WLWB	Wek'èezhìı Land and Water Board
WMMP	Wildlife Management and Monitoring Plan
WRRB	Wek'èezhìı Renewable Resources Board
YKDFN	Yellowknives Dene First Nation

INTERIM RANGE PLAN FOR BOREAL CARIBOU IN THE WEK'ÈEZHÌI REGION OF THE NORTHWEST TERRITORIES RANGE

INTRODUCTION

Boreal caribou play an essential role in the lives of people in the Northwest Territories (NWT). They are highly valued from a spiritual, cultural and harvesting perspective. On a spiritual level, Indigenous people hold tremendous respect toward boreal caribou, and for many non-Indigenous people, boreal caribou are an indicator of a healthy ecosystem and a symbol of the North.

In various parts of Canada, boreal caribou are in serious decline due to extensive disturbance of their habitat. In the NWT, and the Wek'èezhìı region more specifically, there is still a great deal of intact habitat and a relatively healthy population of boreal caribou. However, careful land management, guided by range plans, will be necessary to maintain enough habitat to support a healthy caribou population into the future. The interim Wek'èezhìı Boreal Caribou Range Plan (hereafter "interim range plan") is one of 5 regional range plans that is being developed in the NWT (Figure 1).

The development of this interim range plan was guided by the NWT *Framework for Boreal Caribou Range Planning* and extensive input from the Wek'èezhìı Boreal Caribou Range Plan Working Group. In the creation of the interim range plan, the working group has done its best to follow the suggested principles from the Framework including: being informed by good science and Traditional Knowledge[1], being guided by people's relationship with caribou, and helping promote the social, economic and cultural well-being of people in the NWT. Other Framework principles to which this interim range plan has attempted to adhere include:

- Promoting transparency in decision-making during the range planning process;
- Respecting Indigenous land claim agreements and asserted or established Aboriginal and/or Treaty rights, agreements and principles;
- Respecting a collaborative process;
- Encouraging community engagement and involvement in implementing the interim range plan; and
- Recognizing the need to consider areas beyond each regional boundary to ensure habitat/genetic connectivity is maintained across the NT1 range.

[1] The term "Traditional Knowledge" has been used instead of "Indigenous Knowledge" to be consistent with the terminology used in some of the literature cited in the interim range plan, the GNWT's Traditional Knowledge policy, as well as with the section of the plan written by Tłı̨chǫ Government. However, it is recognized that the term "Indigenous Knowledge" is sometimes used interchangeably, and was the term used in the Terms of Reference for the Wek'èezhìı Working Group.

The working group will continue to strive toward meeting all these principles in the full Wek'èezhìı Boreal Caribou Range Plan.

This interim range plan has been developed based on the best Traditional Knowledge and western science available at the time. It has been developed at a very accelerated pace to meet the timeline of Measure 6-1, Part 1 from the *Report of Environmental Assessment and Reasons for Decision* for the Tłı̨chǫ All-Season Road project. This project requires submission of the range plan to the Wek'èezhìı Renewable Resources Board at least 90 days before the road opens for public use in November 2021. As such, there are uncertainties, unanswered questions, and incomplete sections of the document that will be addressed in the full Wek'èezhìı Boreal Caribou Range Plan, currently scheduled to be completed by end of March 2023.

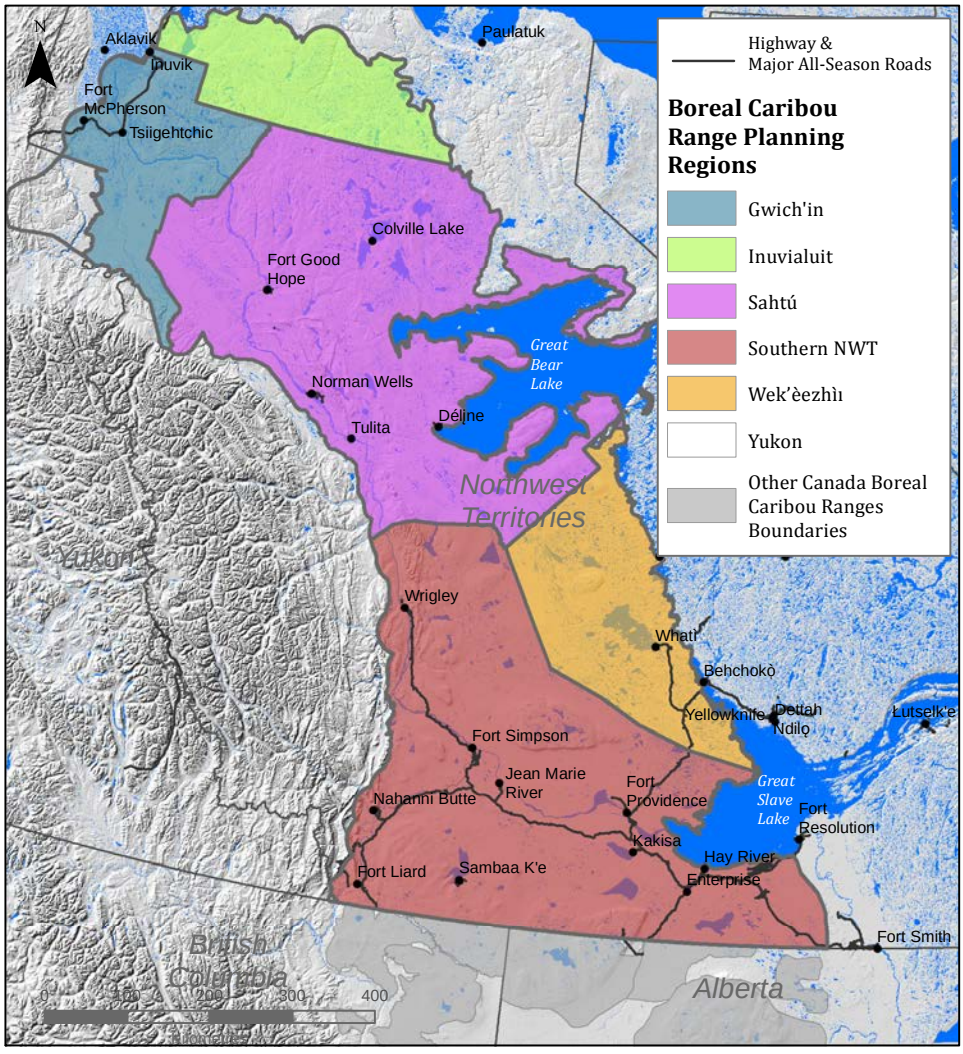

Figure 1. NWT boreal caribou range planning regions.

A. CONTEXT

1. RECOVERY PLANNING IN NORTHWEST TERRITORIES

Recovery planning for species at risk takes place in the Northwest Territories (NWT) under the *Species at Risk (NWT) Act* and under the federal *Species at Risk Act* (SARA). Management actions accompany this legislation to help species at risk recover, and local communities have monitoring and management projects that also add to the recovery of species.

Under both the federal and territorial species at risk legislation, boreal caribou (*Rangifer tarandus caribou)* were listed as threatened in 2003 and 2014, respectively. According to the territorial legislation, being assessed as threatened indicates that a species is likely to become endangered in NWT if nothing is done to reverse the factors leading to its extirpation or extinction.

If a species is listed as threatened under the federal SARA legislation, a recovery strategy identifying critical habitat must be produced within 2 years. Environment and Climate Change Canada (ECCC) completed a national recovery strategy for boreal caribou in 2012[2], which was then amended in 2020[3]. In the amended recovery strategy, critical habitat is identified as: i) the area within the boundary of each boreal caribou range that provides an overall ecological condition that will allow for an ongoing recruitment and retirement cycle of habitat, which maintains a perpetual state of a minimum of 65% of the area as undisturbed habitat in all ranges other than SK1, and a minimum of 40% undisturbed habitat in SK1; and ii) biophysical attributes required by boreal caribou to carry out life processes (ECCC 2020).

For boreal caribou, critical habitat describes the habitat necessary to maintain or recover self-sustaining local populations throughout their distribution. In creating the national recovery strategy, 65% undisturbed habitat was established as the management threshold that would provide a 60% probability for a local population to remain or become self-sustaining (Environment Canada 2008; Environment Canada 2011). The national recovery strategy released in 2012 directed the provinces and territories to each write range plans for their respective jurisdictions to demonstrate how habitat disturbance would be managed to achieve this target.

When a species is listed as threatened under the *Species at Risk (NWT) Act*, a recovery strategy must be prepared within two years of its listing. Recovery strategies are action-oriented planning tools that focus on activities for the protection and recovery of the species. They include an action framework that details specific actions to be undertaken by the management authorities responsible for boreal caribou.

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[2] Environment Canada. 2012. Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. xi + 138pp.

[3] Environment and Climate Change Canada. 2020. Amended Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. xiii + 143pp.

The NWT Recovery Strategy for Boreal Caribou was completed in 2017 and its six main objectives included the following: 1) Ensure there is adequate habitat across the NWT range to maintain a healthy and sustainable population of boreal caribou; 2) Ensure that harvest of boreal caribou is sustainable; 3) Obtain information to inform sound management decisions, including boreal caribou ecology, key habitat and population indicators, and cumulative effects; 4) Manage boreal caribou collaboratively, using adaptive management practices and the best available information; 5) Exchange information with NWT people about boreal caribou in all regions; and 6) Ensure (federal) recovery obligations for protecting critical habitat and maintaining a self-sustaining population are met or exceeded in NWT.[4]

As part of the implementation agreement that follows all recovery strategies (legislated under the *Species at Risk (NWT) Act*), and specific to Objectives #1 and #6, the Government of the Northwest Territories (GNWT) committed to preparing range plans for the NT1 range of boreal caribou.

The first step of the range planning process in NWT was the creation of the *Framework for Boreal Caribou Range Planning*[5], (hereafter "Framework"). The Framework provides a foundation and acts as a guide to producing 5 regional range plans in the territory: Southern NWT, Wek'èezhìı, Sahtú, Gwich'in, and Inuvialuit. It provides a consistent management approach that can be tailored to each region. With a focus on maintaining at least 65% undisturbed habitat across the NT1 range, the Framework also aims to achieve or maintain a permanent supply of large (>500 km^2) patches of suitable habitat within each regional portion of the NT1 range, to maintain the features of good caribou habitat, and to maintain habitat connectivity throughout the range. The main driver in the design of the Framework was caribou conservation and this will be reflected in the regional range plans, including the Wek'èezhìı region.

The production of the interim Wek'èezhìı Boreal Caribou Range Plan will not only help to fulfill the legal requirements under both the federal and territorial Species at Risk Acts, but also aims to reflect the main goal of the Framework: *to manage natural and human disturbance in order to provide adequate caribou habitat to ensure a healthy and sustainable boreal caribou population across their NWT range that offers harvesting opportunities for present and future generations.*

2. RANGE PLAN DEVELOPMENT PROCESS

The process for developing the interim range plan:

Responsibility for management and stewardship of boreal caribou and their habitat is shared amongst wildlife and land management authorities across the NWT, including the GNWT,

[4] Conference of Management Authorities. 2017. Recovery Strategy for the Boreal Caribou (*Rangifer tarandus caribou*) in the Northwest Territories. *Species at Risk (NWT) Act* Management Plan and Recovery Strategy Series. Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, NT. 57 + x pp.

[5] Government of the Northwest Territories. 2019. *A Framework for Boreal Caribou Range Planning*. Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, NT. 87 pp.

Indigenous Governments and Organizations (IGOs), renewable resources boards, regulatory boards, land use planning boards, and Federal Government agencies. In addition, many stakeholders take part in decisions about land management across the NWT. Therefore, successful development and implementation of boreal caribou range plans requires a collaborative approach.

The GNWT convened the Wek'èezhìı Range Plan Working Group to work collaboratively to develop a range plan for boreal caribou habitat in the Wek'èezhìı region. The working group is intended to represent all key interests[6] and serves as the primary forum for developing the range plan. The mandate of the working group is to take a collaborative and interest-based approach where all participants are invested in developing a mutually beneficial range plan that will provide direction for management of boreal caribou habitat.

The Wek'èezhìı working group convened in regular workshops between November 2019 and May 2021 to develop the interim range plan, following these high-level steps in the process:

1. Develop caribou habitat importance maps, based on Traditional Knowledge and scientific information;
2. Gather relevant information on other land uses to inform planning, such as direction from land use plans, location of protected areas, infrastructure plans, resource tenures and resource potential, etc.;
3. Co-develop a range of alternative management class maps that follow the guidance in the Range Planning Framework and reflect a balance among the interests of affected parties, as represented by regional working group members, and seek consensus on a preferred map;
4. Identify management actions for each management class area and specific relevant implementation approaches; and,
5. Recommend monitoring and adaptive management needs to fill important knowledge gaps.

The draft interim range plan was written by GNWT Environment and Natural Resources (GNWT-ENR) and Zoetica Environmental Consulting Services and distributed to the working group for review. The Tłı̨chǫ Government and North Slave Métis Alliance (NSMA) indicated a preference for their Traditional Knowledge (TK) to be included in the range plan independently of western science, rather than being incorporated together. The Tłı̨chǫ Government and NSMA wrote the sections of the range plan describing the process and results from TK mapping workshops and interviews.

After incorporating working group feedback, GNWT-ENR will submit the final draft of the interim range plan to the Wek'èezhìı Renewable Resources Board (WRRB) as a wildlife management proposal for their review and recommendation, in accordance with the Tłı̨chǫ Agreement. The final draft interim range plan will also be circulated for broader public review at the same time. GNWT-ENR will share the results of the public review and any proposed revisions to the plan in response

[6] Economic development interests were represented by the GNWT Department of Industry, Tourism and Investment. Private industry interests are represented on an External Stakeholders Advisory Working Group which was provided with an opportunity to review the draft interim range plan once it was completed.

to public review comments to the WRRB prior to the issuance of their recommendation or determination. Following these reviews, GNWT-ENR will make further revisions to the range plan, if required, and submit the final interim Wek'èezhìı Boreal Caribou Range Plan to Cabinet for GNWT approval.

Why an interim range plan was needed:

An interim range plan was needed due to Environmental Assessment (EA) Measure 6-1, Part 1 required for the Tłı̨chǫ All-Season Road (TASR) project. During the EA process, the Mackenzie Valley Environmental Impact Review Board's (MVEIRB) *Report of Environmental Assessment and Reasons for Decision* for the TASR project included three recommended measures pertaining to boreal caribou. Measure 6-1, Part 1 required completion of the Wek'èezhìı Boreal Caribou Range Plan before the road is opened for public use. During the decision phase of the EA, the responsible ministers consulted to modify the wording of several measures, including Measure 6-1. On October 25, 2018, the GNWT's Minister of Lands, on behalf of all responsible ministers, adopted the recommendation to approve the project, subject to the modified measures. As such, Measure 6-1, Part 1 (as modified by the responsible ministers) requires the following:

Measure 6-1:

Part 1: Develop and implement range plans

The GNWT-ENR will develop and implement a range plan for boreal caribou (tǫdzı) in the North Slave portion of the NT1 range, as required by the Recovery Strategy for the Boreal Caribou in the NWT. The GNWT-ENR will also develop and implement a range plan for any other region where boreal caribou (tǫdzı) may experience impacts related to the Project.

The range plan(s) will be developed collaboratively with Aboriginal groups and co-management partners. GNWT-ENR will complete and submit a range plan for the North Slave portion of the NT1 range to the Wek'èezhìı Renewable Resources Board for review under section 12.5.1 of the Tłı̨chǫ Agreement a minimum of 90 days before the Project is opened for public use.

The GNWT will work collaboratively with the Tłı̨chǫ Government, and other relevant Aboriginal and federal land management authorities to manage habitat to achieve the habitat disturbance threshold set out in this range plan to the greatest extent possible. The GNWT will consult with applicable Aboriginal groups as required.

The measure calls for the boreal caribou range plan to be submitted to the WRRB 90 days before the opening of the TASR. At the time that the EA was concluded, and the measures accepted by responsible ministers, the projected timeline for road construction was four years. This still allowed GNWT-ENR to meet its target deadline of April 2022 to complete the Wek'èezhìı range plan. However, since that date, the timeline for construction and opening of the road has been accelerated from four to two years. With the scheduled TASR opening now advanced to November 2021, the range plan would need to be submitted by August 2021. GNWT cannot request to modify the timeline in Measure 6-1, Part 1 once the responsible ministers have adopted MVEIRB's recommendations, with modifications.

GNWT-ENR distributed a letter to the Wek'èezhìı working group in August 2020, notifying members about the requirements of Measure 6-1, Part 1 and proposing that an interim boreal caribou range plan be prepared for the Wek'èezhìı region. During Workshop #3 in September 2020, the general consensus was that an interim range plan was the only feasible option. Due to COVID-19 restrictions that have delayed an important step in the range planning process – holding community meetings to gather TK about important areas for boreal caribou – it was proposed that the interim range plan be based on western science and TK information currently available and provided to GNWT-ENR. However, through the dedicated efforts of Wek'èezhìı working group members, community meetings were held by the Tłı̨chǫ Government in December 2020, and by NSMA between January and March 2021, and their respective TK collected during these meetings has been included in this interim range plan, along with their existing TK information.

The proposed interim range plan will be in effect until at least March 2023. This would give GNWT, IGOs, and co-management partners additional time to complete a full range plan respecting the process set out in the Framework, and including full consideration of the TK collected at future community meetings. Once the full range plan is completed and the implementation tools for it are in place, it will replace the interim range plan.

Who was involved in the range planning process?

The Wek'èezhìı working group consists of representatives from a cross-section of affected parties, including Tłı̨chǫ Government, Yellowknives Dene First Nation (YKDFN), NSMA, WRRB, ECCC, and GNWT departments, including Lands; Executive and Indigenous Affairs; Industry, Tourism, and Investment; and the following ENR divisions: Wildlife (North Slave region), Environmental Stewardship and Climate Change, and Forestry Management.

GNWT-ENR is responsible for leading collaborative range planning across five regions of the NWT. GNWT-ENR is also responsible for ensuring that the GNWT meets its obligations to Canada's *Species at Risk Act* and the commitments under its Section 11 Agreement[7]. GNWT-ENR has, and will continue to, lead the GNWT's duty to consult with Indigenous peoples with respect to asserted or established Aboriginal and/or Treaty rights. In addition to engaging Indigenous peoples throughout this planning process, formal s.35 consultation processes will be conducted by GNWT-ENR upon completion of a final draft interim range plan. An open public comment period will collect input from the broader public and organizations that are not represented in the Wek'èezhìı working group.

Between August 2019 and March 2020, Compass Resource Management served as neutral third-party analysts and facilitators, and EcoBorealis Consulting provided independent technical support and caribou ecology expertise for the Wek'èezhìı boreal caribou range planning process. In September 2020, Zoetica Environmental Consulting Services took over these roles, as well as providing independent support for the use and interweaving of TK throughout the range planning process.

[7] https://www.enr.gov.nt.ca/en/species-risk-act-conservation-agreement-conservation-boreal-caribou-2019

A list of working group members and a summary of the key points of discussion at the working group meetings are provided in Appendix A. Working group feedback and recommendations at the meetings, and the way in which this feedback was incorporated into the interim range plan and range planning process are included in Table A-1.

3. BOREAL CARIBOU - REGIONAL POPULATION DISTRIBUTION, TREND AND STATUS

3.1 Distribution in the Wek'èezhìı Region

In the Wek'èezhìı region, boreal caribou are referred to as "todzi" in Tłı̨chǫ and "tǫ̀ji" in Tetsǫ́t'ıné Yatıé. They occur in the area between Great Bear and Great Slave Lakes, west to the Mackenzie River and east to the Canadian Shield. "The place where Tǫdzı belong" (Legat and Chocolate 2012) is known in western science as the Taiga Plains, a broad level ecoregion in the NWT which extends into the Yukon, British Columbia (BC), and Alberta. The planning region boundary for boreal caribou in Wek'èezhìı follows the eastern boundary of this ecoregion (Figure 2).

The Taiga Plains is often referred to by Tłı̨chǫ as Nǫdìi, because of the number of plateaus in the region (Legat and Chocolate 2012). Boreal caribou are most found on the plateaus ʔedèezhìì (Horn Plateau and Horn Slopes), Shìıgǫǫ̀làala (Blackwater Upland), Gokw'ahshìì and Kwechoozhìì (Lac Grandin Upland), Gohdlı̨ı̨shìì (Great Bear Upland) and the mountains Whojıhchìı (Blackwater Upland) (spellings follow Legat and Chocolate 2012). Dene Knowledge of boreal caribou distribution north of Tsǫ̀tì (Lac La Martre) is particularly important as they have not been collared in this area of Wek'èezhìı (Figure 4). Few boreal caribou are seen on the east side of Tsǫ̀tì (Lac La Martre, the lake on which Whatì is located) (Legat and Wetrade 2013). Tłı̨chǫ elders emphasize that boreal caribou range is mainly to the west and south of Tsǫ̀tì. Métis people, including NSMA members, have also noted that the area along the Tłı̨chǫ All-Season Road alignment and the southern end Lac La Martre is used for harvesting boreal caribou (NSMA 2018).

Boreal caribou prefer high ground but they rut and calf throughout the forest ("bush"). Small and large islands are important for calving, as they provide some protection from predators. Islands such as Dıicho and Tàdłaadìı on Tsǫ̀tì (Lac La Martre), and Dınàgà in the North Arm of Great Slave Lake are important for calving and post-calving (Legat et al. 2019).

Boreal caribou wander outside of their preferred area, including at times being seen on the barren grounds (Legat and Chocolate 2012). In the winter they share space with barren-ground caribou (ʔekwǫ̀) in the boreal forest. There are rare times when barren-ground caribou stay among boreal caribou for a year and then migrate back to the tundra the following spring (Legat and Wetrade 2013). Infrequently, boreal caribou follow barren-ground caribou north to the tundra in spring and return in the fall (Legat and Wetrade 2013). Such observations have also been reported by the Tetsǫ́t'ıné (YKDFN 2018) and other Indigenous groups. Sahtú harvesters have observed boreal caribou in the company of the barren-ground caribou on both the north and east sides of Great Bear Lake (McDonald 2010), as have Inuvialuit harvesters (Inuvialuit Boreal Caribou Working Group Meeting February 16-17, 2021).

3.2 Population Trend

Traditional Knowledge

The status of the boreal caribou population in the NWT was last assessed by the NWT Species at Risk Committee in 2012. According to local observations from community meetings held by ECCC in 2010, the trend in boreal caribou population in the Mǫwhí Gogha Dè Nıı̨tłèè area has indicated a decline up to 2012 (SARC 2012). At these meetings (held in the Mǫwhí Gogha Dè Nıı̨tłèè communities in preparation for the national recovery strategy), many community members said they had observed a decline in boreal caribou. One elder in Behchokǫ̀ mentioned he has never seen an increase in boreal caribou in his lifetime (Environment Canada 2010c [Behchokǫ̀], as cited in SARC 2012). In some communities (including Whatì and Gamètì), some meeting participants pointed out they now see fewer caribou than they used to, and one community member believed that the number of boreal caribou was decreasing in the region overall (Environment Canada 2010c [Behchokǫ̀, Whatì, Gamètì], as cited in SARC 2012).

There are various reasons for the declines in boreal caribou population but the main threat is thought to be habitat loss, disturbance, and fragmentation. Boreal caribou require large intact areas of habitat to thrive; large-scale disturbance (e.g., intense forest fires or widespread timber harvesting) can cause them to avoid an area of their range, particularly since it reduces the quality of their food sources. Some harvesters have suggested this, pointing to the fact that boreal caribou are disappearing, possibly due to unhealthy habitat (Chocolate 2011, as cited in SARC 2012). The impacts of disturbance on habitat were echoed by another community member who explained that his community's main concern was forest fires because they "burn all the animal's food on the land" (Legat and Wetrade 2013). In a more recent study, Tłı̨chǫ harvesters in the area explained that currently there seems to be an increase in boreal caribou in their area, perhaps because they are returning due to fires elsewhere (Legat et al. 2019). The Legat et al. (2019) study concluded that, based on harvester information, boreal caribou in the Wek'èezhìı region currently appear to have a healthy and sustainable population overall.

Western Science

Boreal caribou population trend is monitored within two study areas within the Wek'èezhìı region (Figure 2), and results from the past 3-4 years indicate that populations are increasing in both areas (Table 1, Table 2).

In response to the EA for the TASR project, GNWT-ENR initiated a boreal caribou population monitoring program in the Wek'èezhìı region focused on the TASR corridor in March 2017, with the deployment of 20 GPS collars on adult female caribou. Five more collars were deployed in the North Slave TASR study area in March 2018, seven more in March 2019. There were no collars deployed in March 2020. As of December 31, 2020, there were 27 active collars in the North Slave TASR study area (Figure 2); there have been four mortalities, and one collar that released prematurely since the program began. Two of the mortalities appeared to be natural deaths with no evidence of predation (carcasses were completely intact), one was likely due to predation (only the collar was found, and was chewed up), and one collared animal was harvested. Annual survival rates of collared female caribou, as well as spring classification surveys used to estimate calf:cow ratios conducted in

February or March each year, are used to estimate annual rates of population trend (λ = adult female survival/[1-female calf recruitment]) following Latham et al.'s (2011) modification of Hatter and Bergerud's (1991) equation. In February/March 2020, a boreal caribou abundance survey was conducted (described below) which also served as the spring classification survey for the purpose of calculating the annual index of population trend. Table 1 and Figure 3 provide the annual adult female survival rate, calf:cow ratios and population trend index for the first 3 years of the monitoring program. To date high annual female survival rates (>0.90) and an increasing population trend (λ > 1) have been observed in the first three years of the program, but calf recruitment rates were lower in 2019-20 than the first two years.

Table 1. Adult female survival and calf:cow ratios from the North Slave TASR study area, which are used together to estimate the annual population trend, or lambda (λ). A value of 1.0 indicates a stable population; a value less than 1 indicates a declining growth rate; a value higher than 1 indicates an increasing growth rate.

Year (April 01-March 31)	Adult Female Survival	Calf:cow ratio	Population trend (lambda [λ])
2017-18	0.95	32.6 : 100	1.10
2018-19	1.00	37.2 : 100	1.19
2019-20	0.97	26.2 : 100	1.09

A collar-based boreal caribou monitoring program was also initiated in the Mackenzie Bison Sanctuary area (hereafter referred to as the Mackenzie study area) by GNWT-ENR South Slave region in 2015 with the deployment of 9 collars on adult females (Figure 2 and Figure 4). The sample size was increased to 30 collars between 2017 and 2020. Adult females collared within the South Slave region portion of this study area move frequently between the South Slave and North Slave GNWT administrative regions. The western limit of this study area is defined by Highway 3, and is monitored separately from the North Slave TASR study area because there have been very few crossings of Highway 3 by collared caribou. An increasing population trend has been observed in this study area each year from 2016 to 2020 (Table 2, Figure 3).

Table 2. Adult female survival and calf:cow ratios from the Mackenzie study area, which are used together to estimate the annual population trend, or lambda (λ). A value of 1.0 indicates a stable population; a value less than 1 indicates a declining growth rate; a value higher than 1 indicates an increasing growth rate.

Year (April 01-March 31)	Adult Female Survival	Calf:cow ratio	Population trend (lambda [λ])
2016-17	0.92	40.7 : 100	1.10
2017-18	0.87	33.6 : 100	1.01
2018-19	0.93	54.0 : 100	1.18
2019-20	0.97	56.4 : 100	1.24

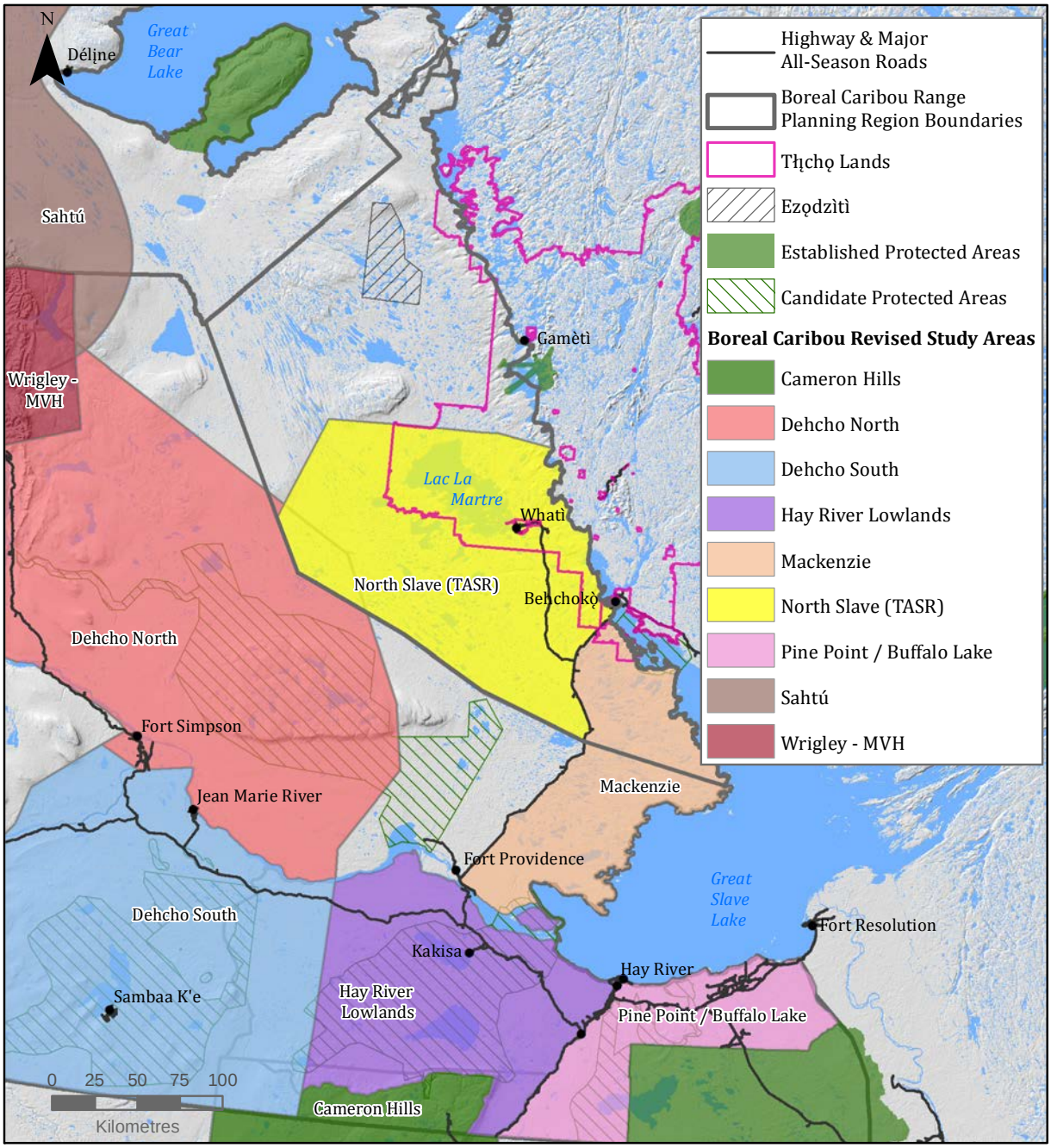
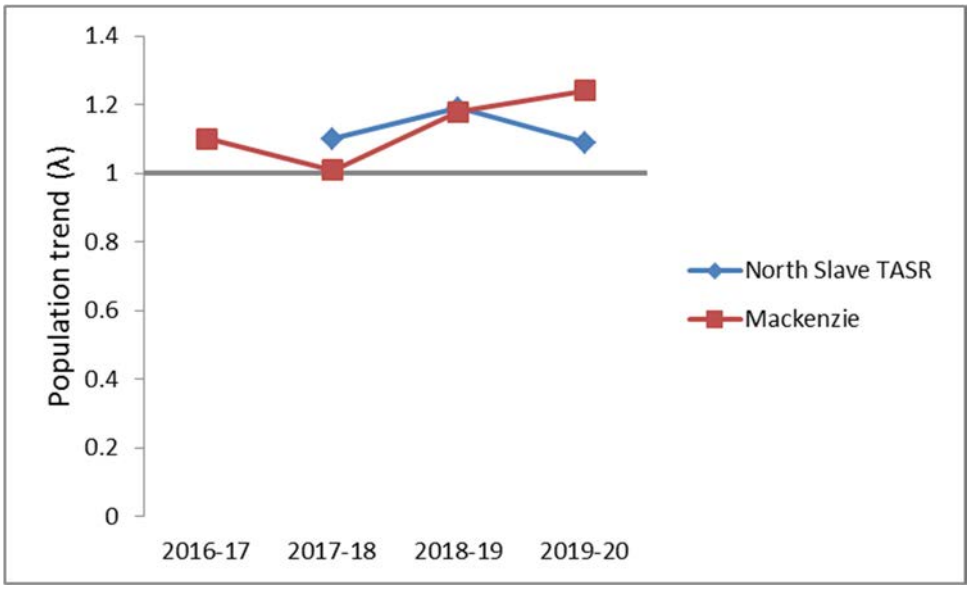


Figure 2. Boreal caribou monitoring study areas in the Wek'èezhìı and Southern NWT regions.

a)



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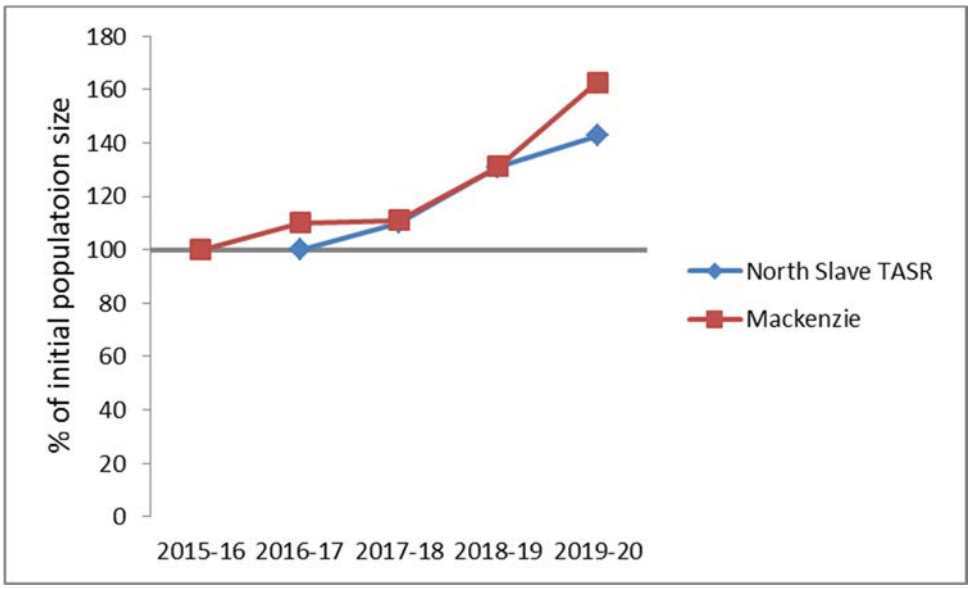

Figure 3. a) Population trend of boreal caribou (λ) observed within the North Slave TASR and Mackenzie study areas (see Figure 2 for study area boundaries). Lambda (λ) values >1 indicate an increasing population trend. b) Realized population change based on annual lambda (λ) estimates expressed as a percentage of the initial (unknown) population size in each study area.

3.3 Boreal Caribou Abundance

Boreal caribou are particularly challenging to enumerate through aerial surveys because they occur at low densities, are dispersed in small groups, and typically inhabit mature coniferous forests where they are difficult to detect due to canopy cover (DeMars et al. 2015). Previous abundance estimates for boreal caribou in the NWT have been largely based on extrapolations of observed or expected densities of caribou. Prior to 2020, within the North Slave region, GNWT-ENR conducted a boreal caribou occupation survey in November 2004, and documented boreal caribou observations

during moose and bison aerial surveys conducted between 1998-2004. The boreal caribou occupation survey conducted in 2004 yielded a density estimate of 2.62 boreal caribou/100 km^2 from an effective survey area of 726 km^2 (Hillis and Cluff 2005). Density estimates based on incidental sightings of boreal caribou from moose and bison aerial surveys conducted between 1998 and 2004 yielded density estimates between 0.17 to 3.44 boreal caribou/100 km^2 (Hillis and Cluff 2005), but should be considered less reliable than density estimates from dedicated boreal caribou surveys. A density of 1.3 caribou/100 km^2 was used by GNWT-ENR in 2012 to estimate a population size of 612 boreal caribou in the North Slave region (ENR 2012a, cited in SARC 2012).

More recently, GNWT-ENR conducted a two-phase aerial survey to estimate population abundance of boreal caribou within the North Slave TASR study area between February 19 and March 2, 2020 (Nietfeld and Hodson 2020). Within the 21,071 km^2 study area, a total of 414 boreal caribou (218 cows, 122 bulls, and 66 calves) in 73 groups were seen and an additional 163 boreal caribou (97 cows, 37 bulls, and 26 calves) in 31 groups were counted inside the study area while using telemetry to locate groups with collared boreal caribou (n=26) that would otherwise have been missed. The total number of boreal caribou counted within the study area was 577, resulting in a minimum density estimate of 2.74 caribou/100 km^2. Using this minimum density estimate, and applying it to the Wek'èezhìı range planning area which is 49,505 km^2, the extrapolated population size of boreal caribou in the Wek'èezhìı region is 1,356 individuals.

Figure 4 shows the movement paths of collared boreal caribou from different population monitoring study areas in the Southern NWT and Wek'èezhìı regions. It also shows a compilation of observations of groups of boreal caribou recorded during different wildlife surveys (including boreal caribou composition and abundance surveys) that were available within GNWT-ENR's Wildlife Management Information System database. It illustrates that there are few data available from collar-based monitoring programs and aerial surveys within the northern part of the Wek'èezhìı range planning area because that area has not been a focus for recent monitoring.

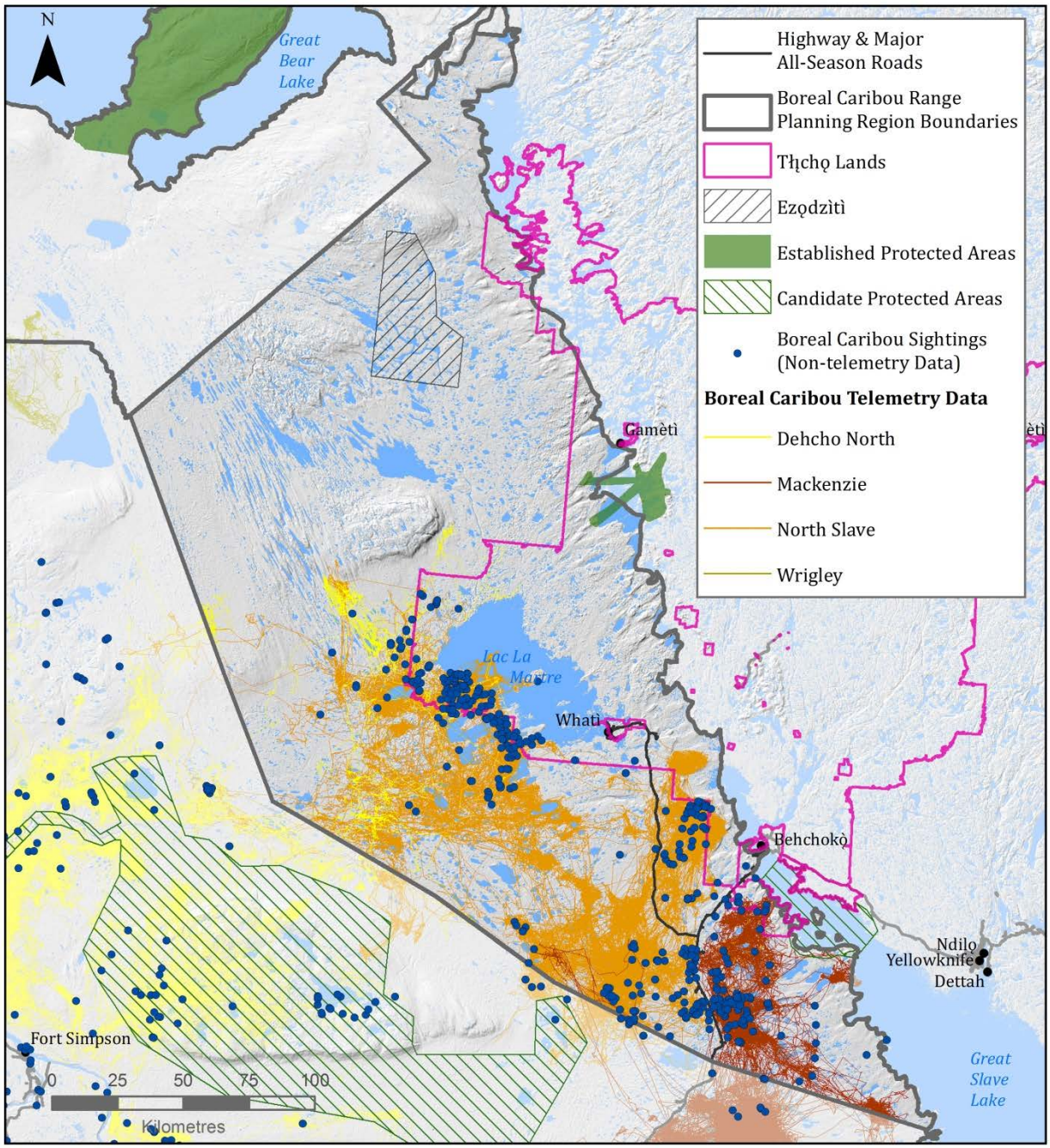

Figure 4. Boreal caribou movement paths based on collar data in the North Slave (TASR) and Mackenzie study areas, and boreal caribou sightings recorded during spring classification and abundance surveys.

4. HABITAT DISTURBANCE LIMITS AND TARGETS FOR THE WEK'ÈEZHÌI PORTION OF THE NT1 BOREAL CARIBOU RANGE

The national *Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada* (Environment Canada 2012) and the amended recovery strategy (ECCC 2020) require maintaining at least 65% undisturbed habitat in the NT1 range as whole to give boreal caribou a 60% chance of having a self-sustaining population. In order to achieve that goal, the Framework has identified a "minimum acceptable likelihood" that each range planning region should strive for in order to support self-sustaining populations of boreal caribou in the NT1 range as a whole, based on a "risk relationship" study conducted by ECCC in 2011. The regional minimum acceptable likelihood of maintaining self-sustaining populations in the Framework reflects differences in the natural levels of wildfire disturbance typical for each region (see Figure 6 in the Framework).

The Framework then defines "total disturbance limits" and tiered "human disturbance thresholds" based on those likelihoods. The regional total disturbance limit is the combined amount of human and wildfire disturbance each region can accommodate while still maintaining a self-sustaining boreal caribou population. The human disturbance thresholds were determined based on how much additional disturbance each region can accommodate (in order to stay within 60% undisturbed habitat) after the typical and maximum levels of wildfire disturbance are accounted for (see Figure 7 in the Framework).

The Wek'èezhìı region has naturally high levels of wildfire, so the minimum acceptable likelihood of a self-sustaining population is set at 50%, which corresponds to **a maximum total disturbance limit (human plus wildfire) of 40%** (or maintaining a minimum of 60% undisturbed habitat). If actual disturbance levels in every region were at their maximum total disturbance limits, the amount of disturbance in the NWT portion of the NT1 range would be 35%, thus respecting the threshold for critical habitat set out in the national recovery strategy (2012 & 2020). These total disturbance limits do not represent goals for disturbance in the NWT or in each region – instead, they represent management limits, beyond which the likelihood of maintaining self-sustaining caribou populations becomes unacceptably low.

The Framework defines three levels (tiers) of human disturbance for each region, based on regional variation in wildfire disturbance, to help define the level of management intensity required in the regional range plan (Figure 5).

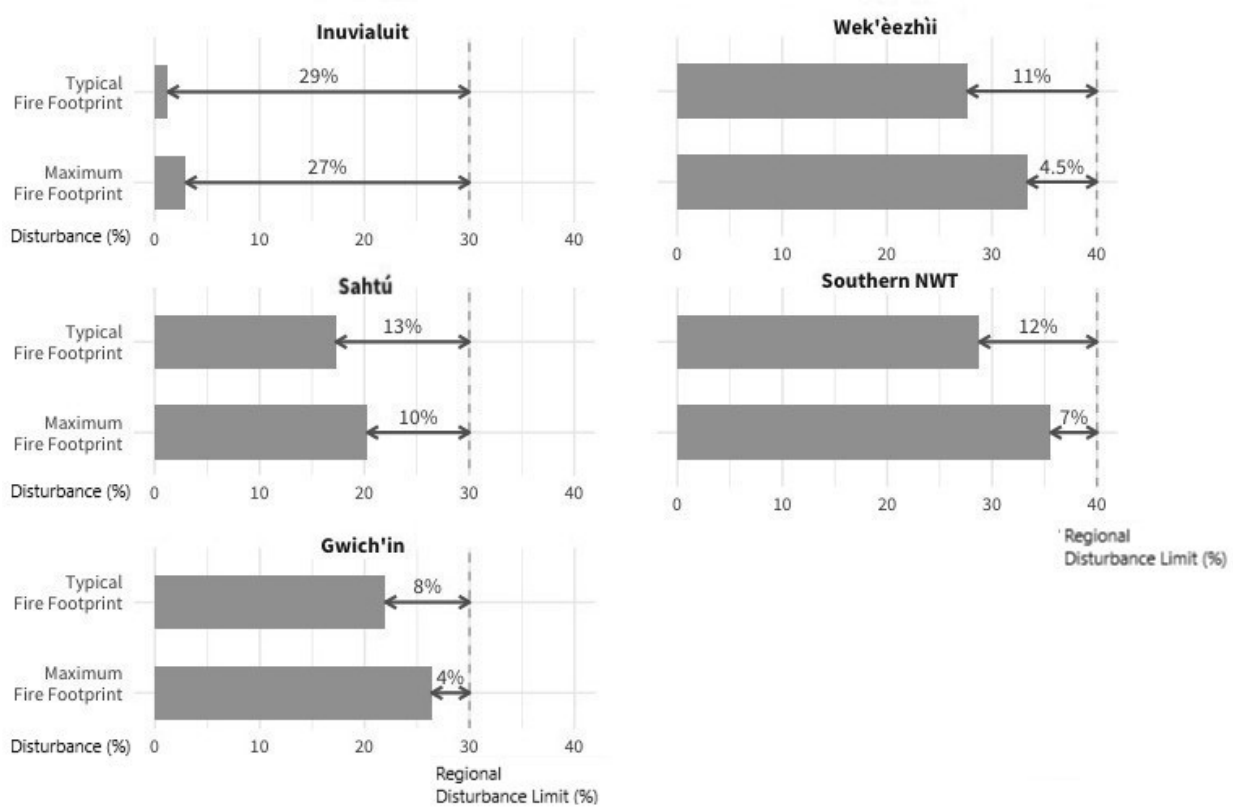

Figure 5. Regionally-specific human disturbance thresholds (horizontal arrows) are based on the difference between typical (median) and maximum 40-year fire footprints (bars) and the regional total disturbance limits (vertical dashed lines). These differences become the upper and lower bounds of Tier 2 (see Table 3).

The tiered thresholds indicate the likelihood that various levels of human disturbance would threaten the region's ability to keep total disturbance below the long-term disturbance limit (i.e., 40%), given observed fire footprints (Table 3). Note that the Wek'èezhìı region is currently in Tier 1. If human disturbance is kept within Tier 1, the likelihood of exceeding the long-term total disturbance limit is very low, and consequently the likelihood of a self-sustaining population will be higher than the level set in the Framework. If human disturbance falls within Tier 2, there is a good chance that a region will stay below its long-term total disturbance limit. If human disturbance falls within Tier 3, there is a high likelihood of exceeding the long-term total disturbance limit, and consequently the likelihood of a self-sustaining population will be lower than the level set in the Framework.

Table 3. Human Disturbance Thresholds Tier Assignments (from *A Framework for Boreal Caribou Range Planning*, GNWT 2019).

Region	Total disturbance limit (%)	Human Disturbance Thresholds (%)			Current Human Disturbance		Mix of mgmt. classes required
		Tier 1	Tier 2	Tier 3	%	Tier	
Inuvialuit	< 30	< 27	27 – 29	> 29	1.3	Tier 1	
Gwich'in	< 30	< 4	4 – 8	> 8	6.9	Tier 2	
Sahtú	< 30	< 10	10 – 13	> 13	6.9	Tier 1	
Wek'èezhìı	< 40	< 4.5	4.5 – 11	> 11	0.8	Tier 1	
Southern NWT	< 40	< 7	7 – 12	> 12	16.1	Tier 3	

B. HABITAT INFORMATION

5. CURRENT HABITAT CONDITION AND IMPORTANT AREAS FOR BOREAL CARIBOU

5.1 Habitat Condition and Disturbance Levels

Within the Wek'èezhìı range planning region there is currently 0.92% human disturbance (buffered by 500 m), 31.9% fire disturbance (fires up to 40 years old as of fall 2019) and 32.3% total disturbance (accounting for overlaps between human and fire disturbance footprints; Figure 6). These estimates include the alignment and proposed borrow sources for the TASR project which is currently under construction. Because not all of the proposed borrow sources will likely be used for this project, the current estimate of human disturbance may be a slight overestimate. There is currently a total of 67.7% undisturbed habitat in the Wek'èezhìı range planning region (including lakes). Table 4 includes the size of the area (in hectares) and percentages of the Wek'èezhìı range planning region that are considered disturbed by either fire, human development, or a combination of both, based on the data displayed in Figure 6. Figure 7 shows the complete fire history available for the region, including fires >40 years old, broken down into different fire decades. This map helps to show where there are older fires that can now be considered undisturbed habitat (≥41 years old), and where the more recent fires have occurred. Table 5 outlines the area (hectares) and percent of the region that has burned, broken down into different fire decades, based on the data displayed in Figure 7. Figure 8 shows where there are other human disturbances (no buffer included) that have been mapped in other datasets that may not be captured in ECCC's 30 m resolution human disturbance data displayed in Figure 6. These datasets include footprints from the NWT Cumulative Impact Monitoring Program (NWT CIMP) – Inventory of Landscape Change project. The footprints are based on Land and Water Board (LWB) permit registry records,

disturbance features that were mapped within 10 km of Highway 3 and the TASR for the *Tłı̨chǫ All-Season Road Caribou (tǫdzı) Habitat Offset Plan* (Associated Environmental 2021), and a 15 m resolution disturbance dataset produced by ECCC in 2015. The disturbance features in these datasets were mapped using higher resolution satellite imagery than ECCC's 30 m resolution disturbance dataset, which is the one used to measure disturbance levels relative to the critical habitat threshold in the national recovery strategy. Because these other human disturbance features are too fine-scale to be detectable in the ECCC's 30 m resolution dataset, they are not included in the calculations of percent disturbance relative to the regional disturbance limits and thresholds set out in the Framework. Figure 8 illustrates that most of the human disturbance in the region is concentrated along Highway 3 and the TASR alignment. Figure 9 shows a map of undisturbed terrestrial habitat (excluding water bodies greater than 1 km^2 in size, mapped at a scale of 1:50,000) within the Wek'èezhìı range planning region, which makes up 28,154 km^2 (56.8%) of the region. This map is essentially the inverse of Figure 6 (but with water bodies excluded) and illustrates that most of the currently undisturbed habitat is concentrated in the northern half of the region, with few large patches remaining south of Lac La Martre.

Table 4. Fire, anthropogenic, and combined disturbance within the Wek'èezhìı range planning region.

Area of Fire Disturbance[a] (ha)	Percent of Region
1581680.26	31.92%
Area of Human Disturbance[b] (ha)	**Percent of Region**
45288.37	0.91%
Area of Fire and Human Disturbance[c] (ha)	**Percent of Region**
1604135.06	32.38%

[a] Fire disturbance is the combined 40-yr fire footprint from fires between 1980-2019

[b] Human disturbance includes a 500 m buffer around it.

[c] This is the combined overlapping footprint of fire and human disturbance (a.k.a "total disturbance").

Table 5. Fire history by decade within the Wek'èezhìı range planning region.

Year	Area (ha)	Percent of Region
1960-1969	43909.63	0.89%
1970-1979	443782.4	8.96%
1980-1989	164023	3.31%
1990-1999	683325.8	13.79%
2000-2009	131867.7	2.66%
2010-2019	613930.4	12.39%

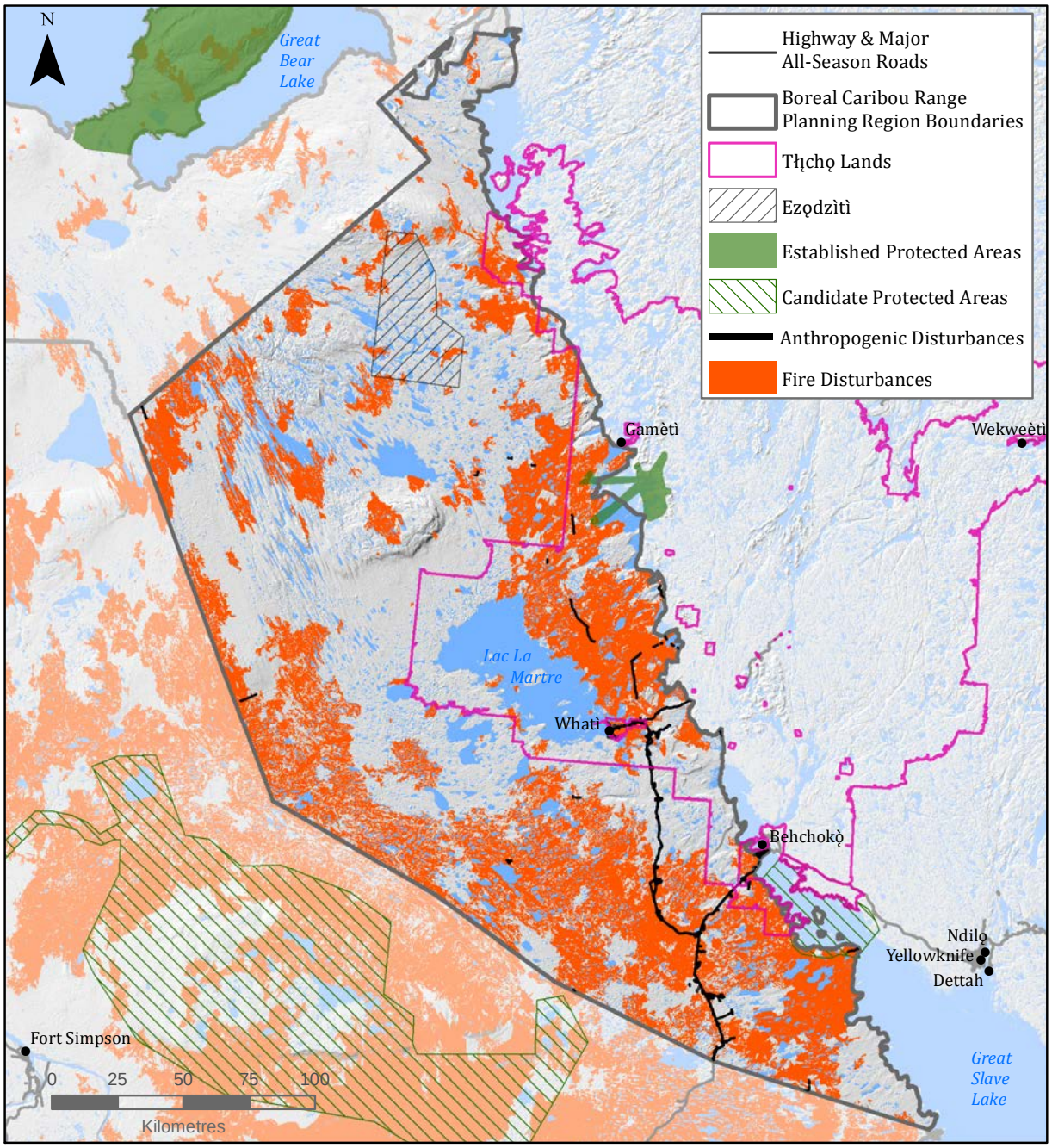

Figure 6. Current fire disturbance (up to 40 years old; 1980–2019) and anthropogenic disturbances (including 500 m buffer) which count towards the regional total disturbance limit. Fire disturbances are current to fall 2019, and anthropogenic disturbance is based on ECCC's 2015 buffered human disturbance layer, plus the buffered TASR project footprint.

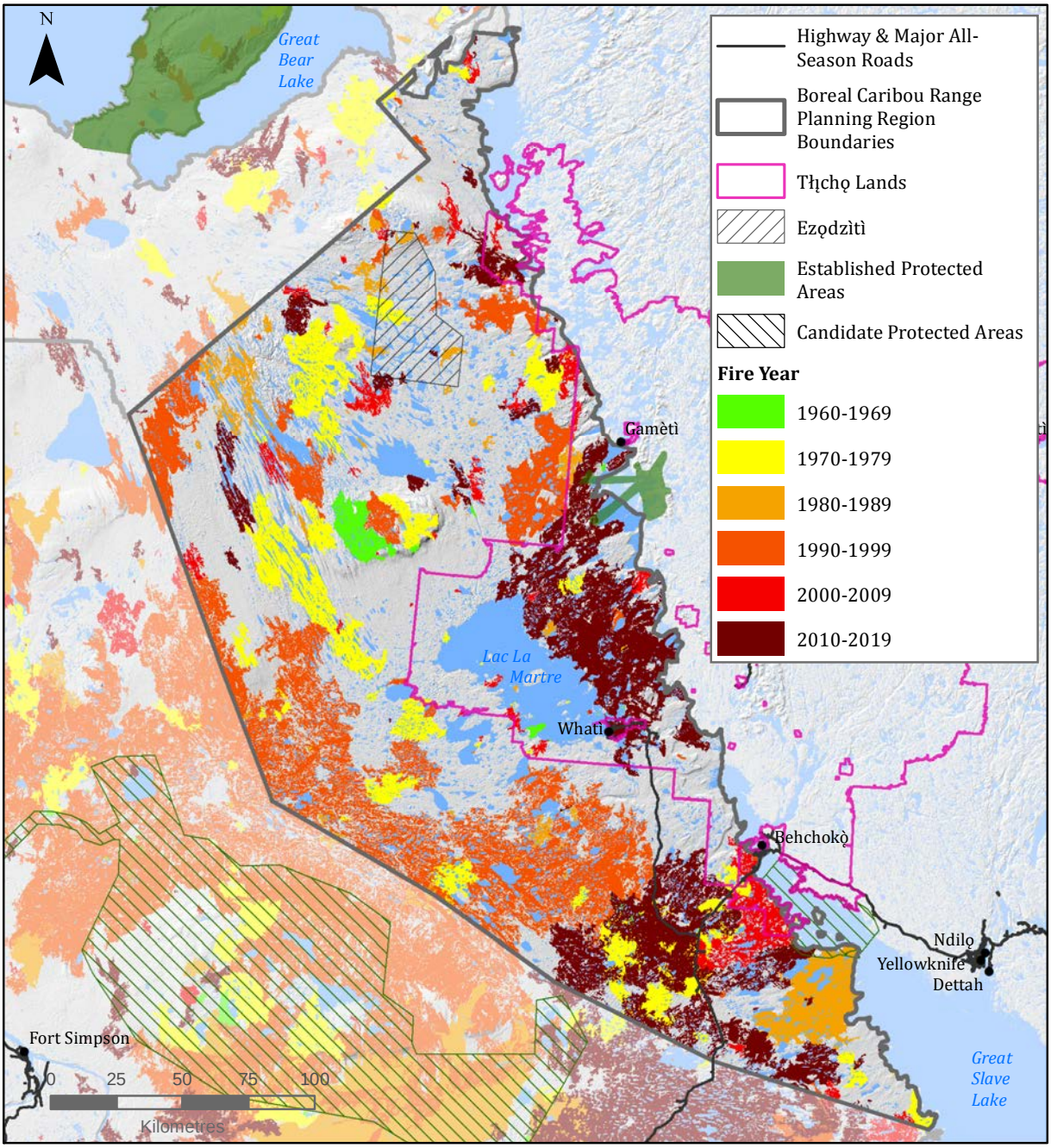

Figure 7. Fire disturbance history in Wek'èezhìı region: 1960–2019. Wildfires in the two oldest classes (1960–1969, and 1970–1979) are >40 years old and considered undisturbed caribou habitat.

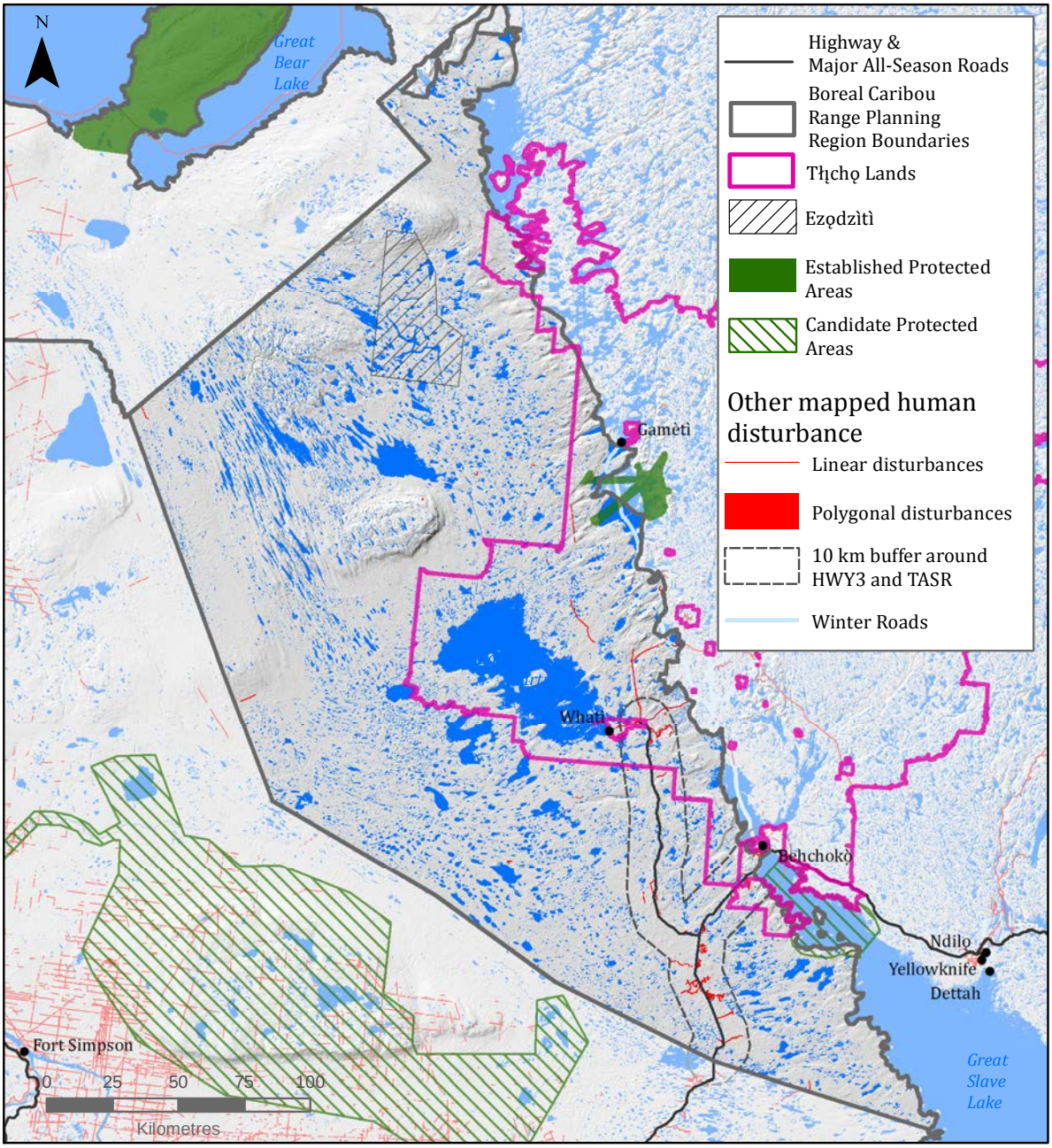

Figure 8. Other mapped anthropogenic disturbances (see Section 5.1 for a description of the data sources).

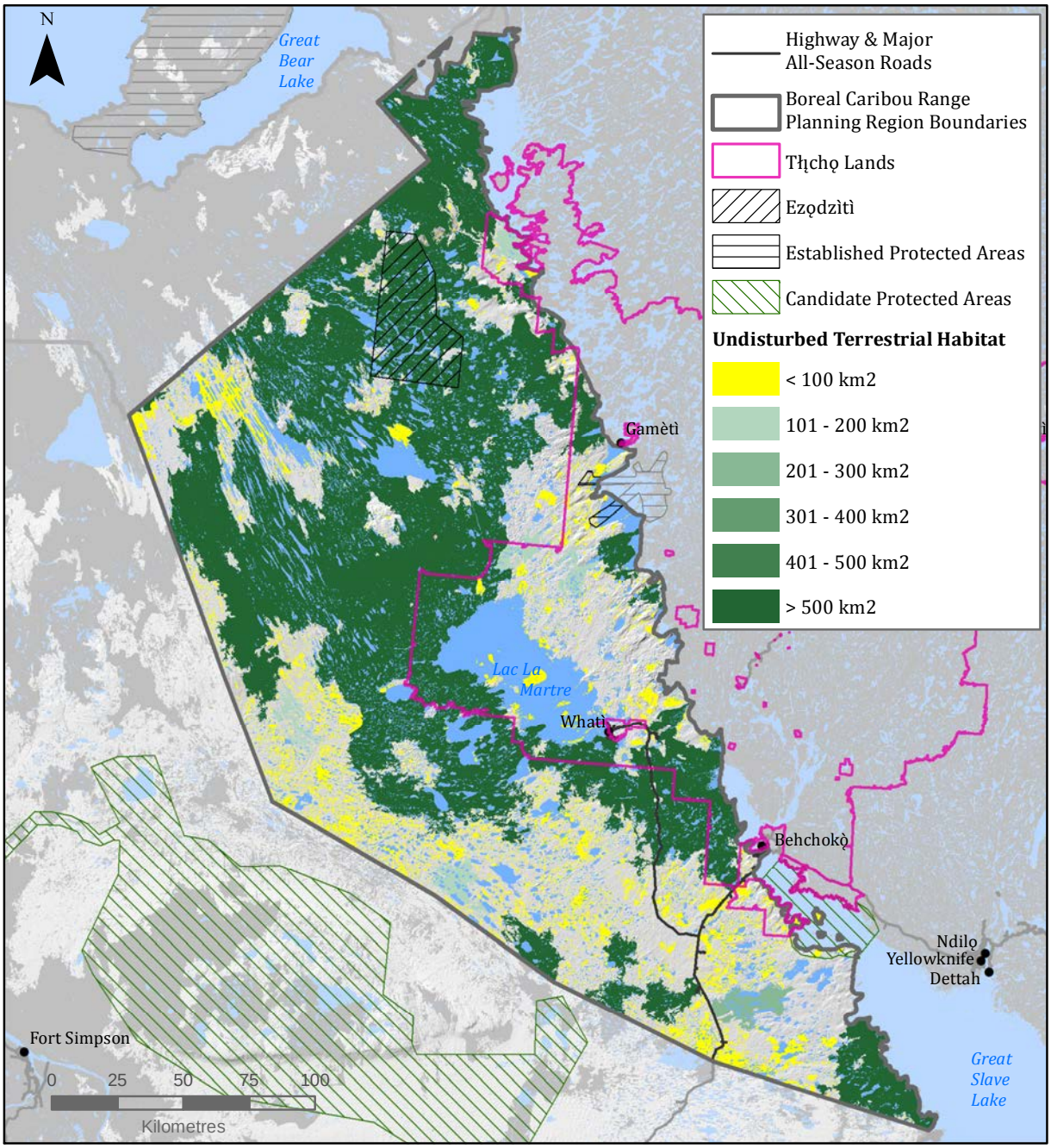

Figure 9. Undisturbed terrestrial habitat (excludes lakes mapped at a 1:50,000 scale).

5.2 Land Cover and Vegetation Communities

Earth Observation for Sustainable Development of Forests (EOSD) land cover data was used in resource selection function (RSF) models to evaluate boreal caribou habitat selection during different seasonal periods and to generate predictive maps of boreal caribou habitat preferences (Figure 10). This land cover data set was updated within the Taiga Plains ecozone by GNWT-ENR and Natural Resources Canada (NRCan) using Landsat Thematic Mapper imagery from 2007 and

2010 (see Figure 1 in DeMars et. al. 2020). The combination of land cover classes displayed in Figure 10 and fire age categories (Figure 7) were strong determinants of seasonal habitat selection patterns observed in RSF study (described in Section 5.3.1).

Table 6. Area and percent of EOSD land cover types in the Wek'èezhìı region.

Land Cover Type	Area (ha)	Percent (%) of Region
Water	1045436.58	21.1
Coniferous Open	984965.85	19.9
Coniferous Sparse	728293.86	14.7
Shrub Low	715179.78	14.4
Wetland-Treed	402646.32	8.1
Wetland-Shrub	303772.95	6.1
Coniferous Dense	267911.28	5.4
Wetland-Herb	198062.73	4.0
Shrub Tall	121487.13	2.5
Mixedwood Dense	37542.87	0.8
Mixedwood Open	28887.03	0.6
Broadleaf Dense	27845.01	0.6
Herb	25623.72	0.5
Broadleaf Open	20931.75	0.4
Rock/Rubble	20522.7	0.4
Exposed Land	9985.23	0.2
Bryoids	9458.82	0.2
Roads	1771.29	<0.1
Shadow	193.23	<0.1
Snow/Ice	0.18	<0.1

The most common land cover type in the Wek'èezhìı boreal caribou range planning region is "Water", followed by "Coniferous Open", "Coniferous Sparse", and "Shrub Low" (Table 6). The least represented land cover type is "Snow/Ice" and "Shadow". The Water land cover type represents lakes, reservoirs, rivers, and streams. Coniferous Open represents areas with 26-60% crown cover, with coniferous trees covering 75% or more of the total basal area. Coniferous Sparse represents areas with 10-25% crown cover, with coniferous trees covering 75% or more of the total basal area. Shrub Low represents areas with at least 20% ground cover, of which at least 1/3 are shrubs, and the average shrub height is less than 2 m. The Shadow land cover type are areas where the aerial imagery was covered by the shadow of either trees, clouds or other natural objects, and therefore the land cover under it could not be determined. Snow/Ice includes snow and ice on the landscape at the time the imagery was taken (NRCan and GNWT 2017).

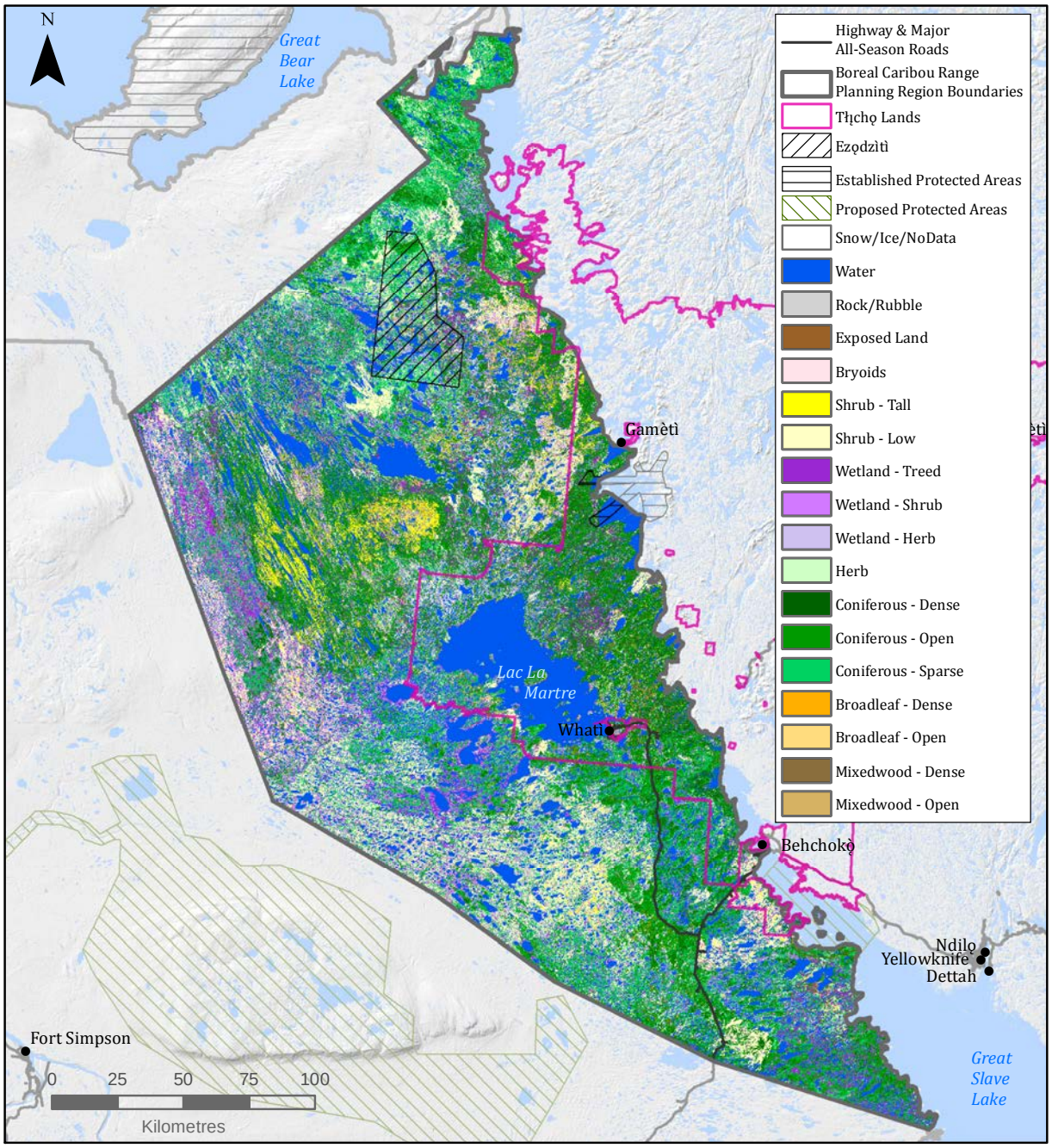

Figure 10. Land cover classes based on EOSD data that was used in the boreal caribou habitat preference models/maps.

5.3 Review of Traditional Knowledge and Western Scientific Literature about Boreal caribou Habitat Selection and Use

There is information available from both western scientific studies (Appendix B - Table B-1), and TK and local knowledge (Appendix B - Table B-2) that supports a general understanding of seasonal habitat selection, and habitat avoidance, by boreal caribou. For the most part, both western scientific and TK information corroborate one another, and provide an enhanced understanding of boreal caribou habitat selection. Within this section, the state of knowledge about habitat selection gleaned from relevant western scientific studies, an RSF study conducted in support of this range planning process, and TK/local knowledge are highlighted.

Biophysical attributes (i.e., habitat types) recommended for consideration as critical habitat for boreal caribou within the Taiga Plains Ecozone have previously been described in Appendix H of the national boreal caribou recovery strategy (ECCC 2020). While this ecozone includes the Wek'èezhìı region, it spans a much wider area that includes the NWT, and portions of the eastern Yukon, northern Alberta, and northeastern BC. As habitat selection patterns are partially influenced by the relative availability of biophysical attributes available to boreal caribou, which will vary among planning units, the interim Wek'èezhìı range plan was developed with an emphasis on the biophysical selection patterns revealed in local studies, local knowledge and TK, and RSF products created using collared caribou data that overlap the Wek'èezhìı region. These more local sources of information will lead to a more accurate understanding of habitat selection patterns within the region, and they are still generally consistent with the biophysical attributes listed in Appendix H of ECCC (2020).

5.3.1 Caribou Habitat Selection – Western Science

Habitat selection by boreal caribou is generally understood to be based on the species' need to support the energetic and nutrient requirements of life-history activities associated with the season (e.g., gestation, lactation, movement, growth, insect avoidance), while avoiding mortality risks (e.g., areas with high predation). The balance of these primary drivers will vary through the seasons, and the need to prioritize one over the other will also vary with habitat quality and availability, and the degree to which the species is facing other pressures that can cause displacement from optimal habitat (ECCC 2020). Western scientific studies have generally shown that boreal caribou require large tracts of mature and old growth coniferous forests and muskeg (treed wetlands), particularly those that contain jack pine, black spruce, and tamarack forests with lichens, sedges and mosses for forage (SARC 2012; ESTR Secretariat 2013; Appendix H in ECCC 2020; see Table B-1). Studies have generally supported the importance of habitat connectivity that permits boreal caribou movement between seasonally important habitats and among ranges, and that habitat selection and avoidance patterns differ among seasons (SARC 2012; ESTR Secretariat 2013; Appendix H in ECCC 2020(ESTR Secretariat 2013)(ESTR Secretariat 2013); see Table B-1).

Western scientific studies have provided information on patterns of seasonally-specific habitat selection in the NWT. Boreal caribou can be viewed as moving through four general seasons: 1) calving/post-calving (May to July), (2) summer (July to September), (3) rutting/fall (September to November), and (4) over-wintering (November to April), which are outlined in Figure 11. Within

each of the general seasonal periods, boreal caribou behaviour has been further broken down into seasonal activity periods based on marked changes in daily movement rates. The date ranges for the activity periods displayed in Figure 10 were based on an initial analysis of movement rates conducted by Nagy 2011 which were updated and slightly modified in an assessment of seasonal habitat selection patterns conducted by DeMars et al. 2020. During the calving/post calving period, boreal caribou females generally become more solitary as cows disperse to have their young (ECCC 2020). Many different types of habitats are potentially used during calving, with areas of high predator densities generally avoided (SARC 2012; ESTR Secretariat 2013; ECCC 2020; see Table B-1). During the calving/post calving period, the selection of open coniferous forests, tussock tundra, low shrub, riparian habitat, recently burned areas, south and west aspects, and hills/higher locations have all been noted (ECCC 2020). Calving has also been noted to occur in muskegs, marshes, and other water sources (ECCC 2020). Boreal caribou have also been noted to use small islands of mature black spruce or mixed forest within peatlands in old burns at the edge of wetlands in alder thickets with abundant standing water on lake shores (ECCC 2020). During calving, boreal caribou have also been noted to use old burns and neighbouring remnant unburned forests surrounding burns (ECCC 2020).

As boreal caribou calves age, habitat selection may shift through the summer and into the fall rutting period, towards areas that allow for the building up of body fat and mass to carry animals through the winter months; this is especially important for adult females to meet nutritional and energetic demand of lactation, gestation of young during the fall and winter, and calving the following spring (Denryter et al. 2020; Parker et al. 2009).

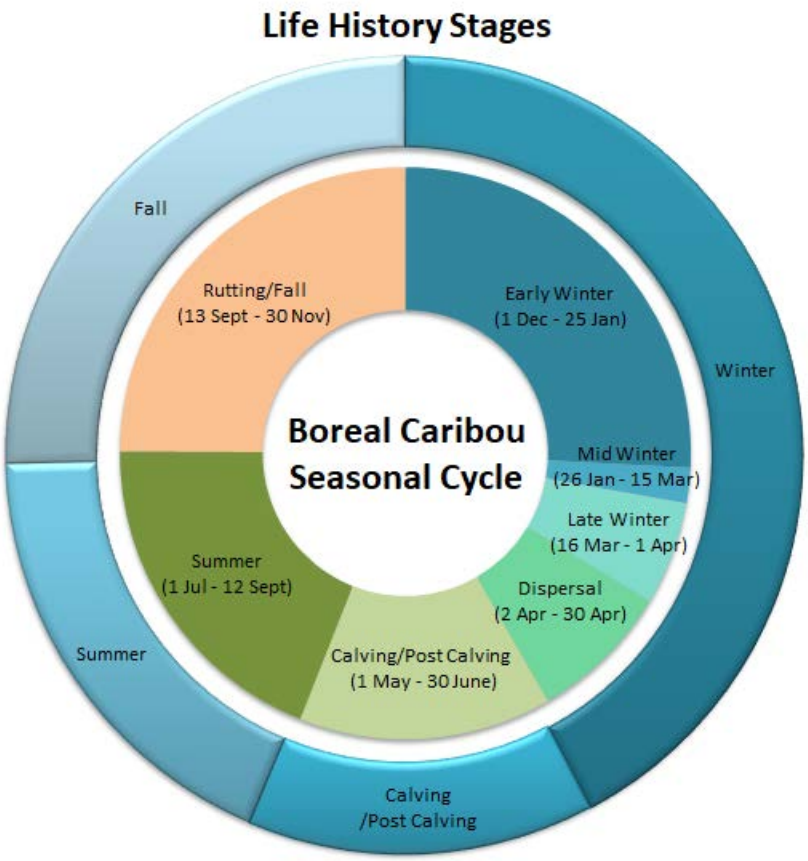

Figure 11. Basic seasonal periods, dates and corresponding activity periods within seasons for boreal caribou within southern part of the NT1 range of the NWT (dates simplified from those used in DeMars et al. 2020, and Section 8 - Table 11).

Western science provides information on general patterns of habitat avoidance in boreal caribou. Boreal caribou generally avoid areas with high levels of habitat fragmentation, such as seismic lines and other linear disturbances such as low use roads, as such features can benefit the hunting efficiency of predators like wolves (SARC 2012; ECCC 2020). However, the relationship between predators, prey, and roads is complex. Predictions regarding whether predators will use roads for hunting prey appear to be mediated by factors including overall development in an area and total road density, the main predator species' tolerance for traffic, and the predators' prior experience with human hunting (e.g., Dussault et al. 2012; Leblond et al. 2013). Boreal caribou have also been described as avoiding areas affected by forest fires and in some cases shifting their range to avoid fire disturbed areas (SARC 2012; ESTR Secretariat 2013; ECCC 2020); however, boreal caribou also select certain regenerating burns and adjacent habitat during some life-history phases (ECCC 2020). An RSF analysis of collar data in the NWT (DeMars et al. 2020) is described in more detail below and in Table B-1, and demonstrates the interaction between life-history phase and post-fire regeneration stage. In the NWT, boreal caribou spend the longest period of their annual cycle over-wintering. Boreal caribou are adapted to feeding on lichens, and to travelling on and foraging in snow. Boreal caribou require habitat with arboreal lichen (tree lichen) and generally shallower

snow (i.e., accomplished through snow interception of the canopy, wind and/or aspect and elevation) to enable efficient foraging for ground lichens (e.g., mature coniferous with closed canopies and upland or hilly areas exposed to wind). As snow depth increases, they remain in areas of dense pine or thick wooded black spruce with hanging lichen and access to open, mixed vegetation for ground forage. In late winter and early spring, they select habitat with both terrestrial and arboreal lichens.

Habitat Selection in the Northwest Territories

The GNWT-ENR undertook a comprehensive boreal caribou habitat selection study in the NWT to help support range planning. The study used collar locations from adult females collected between 2002 and 2018 across the NWT portion of the NT1 range (DeMars et al. 2020). This analysis included collar data from individuals in the North Slave TASR study area within the Wek'èezhìı region. Analyses considered habitat selection during 7 different activity periods (calving, summer, early fall, late fall, early winter, mid winter, and late winter), and an all-year model. The habitat selection models (RSFs) considered land cover types broken down into different decadal post-fire age categories (<10 years up to >60 years), and proximity or density of human disturbances like roads, seismic lines, well pads, cut blocks and settlements. The RSF models were used to generate predictive maps of seasonal and year-round boreal caribou habitat preferences, reflecting fire disturbance current to 2019 (Figure 12, and Appendix C). The seasonal predictive RSF maps were then used in analyses with Marxan software (Ball et al. 2009) to identify important areas that would provide the best habitat for boreal caribou across the different seasons (see Section 5.4.2). The RSF analysis also showed a pattern of boreal caribou avoiding major roads, and polygonal (non-linear) disturbances such as well pads and cut blocks, year-round. However, the strength of the avoidance was higher in the snow-free seasons. Boreal caribou also avoided areas with higher densities of linear disturbances (like seismic lines), and similarly, the strength of avoidance was higher in the snow-free seasons. Analyses also showed that, during the calving and summer seasons, recent burns (<10 years old) in several land cover types were among the top habitat selected. The preference for recent burns during calving and summer may reflect a greater abundance of nutritional forage in these areas at that time of year when it is important for lactating females raising calves (Denryter et al. 2020; Parker et al. 2009).

While boreal caribou showed higher selection for younger (<10 years) and older burns (>30 years), they avoided middle-aged burns (11-30 years), with the strength of these avoidance and use patterns varying among seasons (see Table B-1). From early fall to late winter, which collectively represent the longest seasonal period in the NWT, boreal caribou habitat preferences shifted towards greater use of coniferous, mixedwood, wetland and non-treed land cover types (e.g., bryoids and shrubs) that had not burned in at least 60 years, and to a lesser extent areas that had burned in the last 41-60 years. The switch to areas that had not burned in more than 60 years during winter likely reflects a reliance of boreal caribou on terrestrial and arboreal lichens as their main winter food, which are generally more abundant in older forests (Greuel et al. 2021). This RSF analysis also showed that, throughout the year, boreal caribou tended to strongly avoid older deciduous land cover types. Appendix H in ECCC (2020) corroborates this general pattern and suggests that caribou generally prefer forests that are >100 years old within the Taiga Plains.

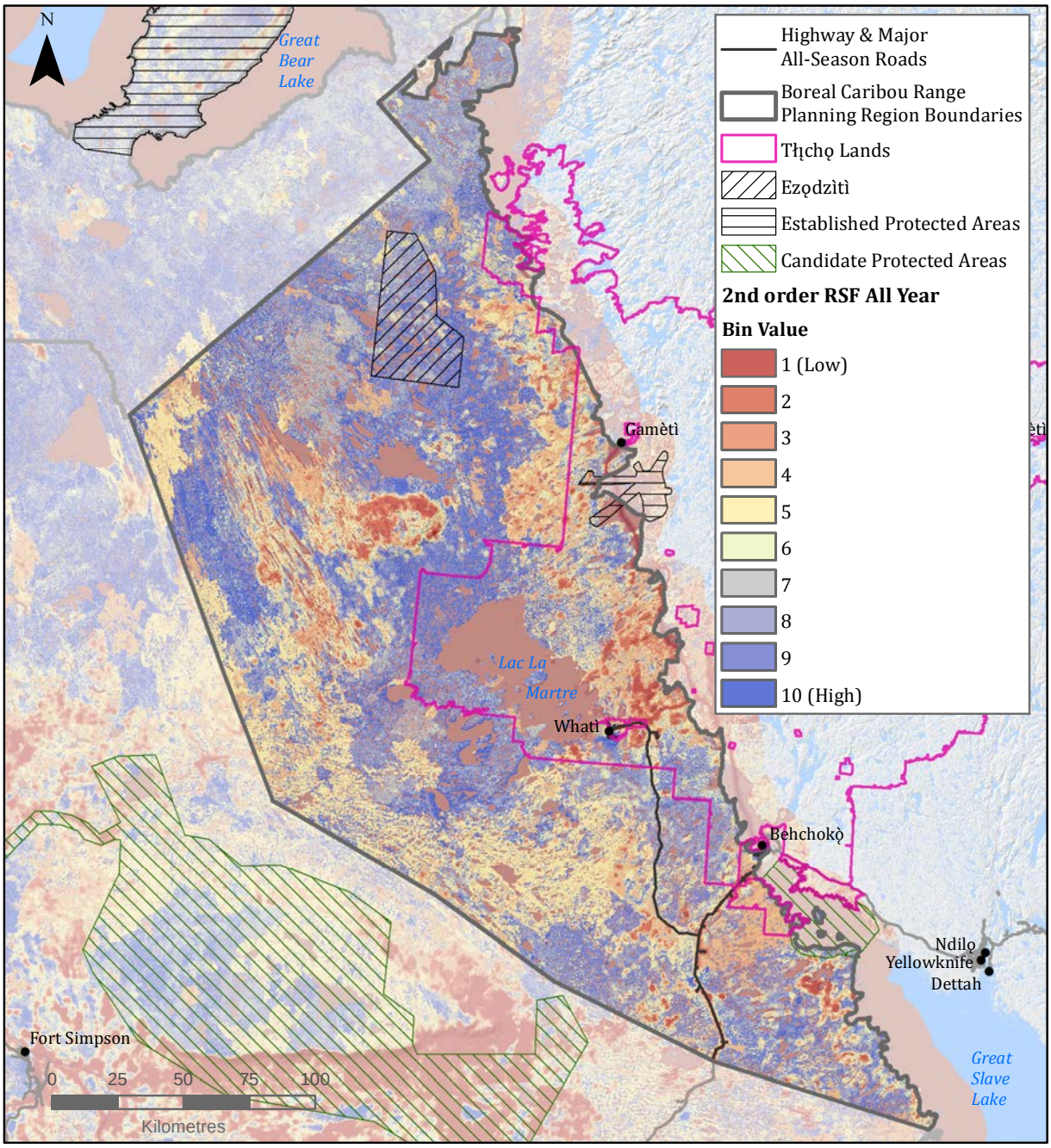

Figure 12. Relative likelihood of boreal caribou habitat selection predicted from the all-year RSF model. Predicted RSF values were binned into 10 categories. Bin 1 RSF values (red) represent areas most likely to be avoided, and Bin 10 (dark blue) represents areas with the highest relative likelihood of being selected by boreal caribou. For Boreal Caribou Habitat Selection (RSF) Maps, see Appendix C.

5.3.2 Caribou Habitat Selection – Traditional Knowledge

Members of the Tłı̨chǫ Government, YKDFN (Tetsǫ́t'ıné) and NSMA hold TK and local knowledge of boreal caribou in the Wek'èezhìı region. Boreal caribou are named tǫdzı in Tłı̨chǫ and tǫji in Tetsǫ́t'ıné. Tłı̨chǫ, Tetsǫ́t'ıné and Métis have always been dependent on boreal caribou, especially when barren-ground caribou are unavailable. Table B-2 (Appendix B) documents the specific habitat elements needed for boreal caribou life requisites as identified by TK.

The Tłı̨chǫ have conducted TK studies specific to boreal caribou (Legat and Chocolate 2012; Legat et al. 2019; Legat and Wetrade 2013; Legat and McCreadie 2015). Additionally, boreal caribou were discussed in a TK study for proposed mineral development (TRTI 2015) and during consultation for development of the offset plan for the TASR (Associated Environmental 2021).

The YKDFN discussed their knowledge of boreal caribou in a workshop for the TASR (YKDFN 2018). Tetsǫ́t'ıné have an extensive TK database but information is not readily accessible and was not available for this interim range plan. Knowledge of boreal caribou includes seasonal movements, preferred habitats, Highway 3 crossing location, calving grounds, hunting camp locations, and interactions between barren-ground caribou (ekwǫ) and boreal caribou (YKDFN 2018).

The NSMA have trapped and harvested wildlife in boreal caribou range since at least the early 1800s (NSMA 2018) and their work on documenting TK about boreal caribou remains ongoing. The results presented here are intended as a starting-point and are only a portion of NSMA knowledge of boreal caribou. Their respective TK collected during their most recent community mapping workshops are presented in Section 5.4.1, *Important Areas based on Traditional Knowledge*.

For this interim range plan, most available TK information to date comes from the Tłı̨chǫ. Tłı̨chǫ Knowledge stresses the importance of understanding the "character" of boreal caribou when considering their habitat needs (Legat and Chocolate 2012). Boreal caribou are shy, intelligent and hard to track; they are known to be fast, often too fast to secure a successful hunt (TRTI 2015). They are difficult to spot because they hide, stand still, and remain quiet, rarely standing out in the open (Legat and Chocolate 2012). For these reasons, hunters in the past used dogs to find them, and hunters learned to track their circular movements, and to spot them through small cracks in thick bushes (Legat and Chocolate 2012).

Tłı̨chǫ have mapped habitats from a TK perspective, and then evaluated their importance to tǫdzı. Most boreal caribou are found on plateaus, with fewer in the lowlands (Legat and Chocolate 2012). Eight regional scale ecoregions with importance to boreal caribou were identified (Legat et al. 2019). Boreal caribou like islands, and large islands are important for calving. They prefer high ground, but they rut and calve throughout the bush. Important unique habitats are comprised of esker tops, dangerous muddy areas, river oxbows, points of land, lake peninsulas, river/lake shores, sandy beaches, sandy hills and islands (Legat et al. 2019). Boreal caribou will sometimes wander outside of their typical areas and may be found on the barren grounds (Legat and Chocolate 2012). Their diet varies with the season; grazing on various types of lichens in the late fall and winter and foraging on various plants such as sedges, grasses, leaves, berries, and mushrooms in the spring, summer, and early fall (Legat and Chocolate 2012; Legat and Wetrade 2013).

Women play an important role with respect to boreal caribou, although their focus is somewhat different. They are familiar with different aspects of boreal caribou as they work on the hides, the meat, and prepare fat and bone grease, as described in Legat and Chocolate (2012). Boreal caribou are butchered in the same manner as other caribou, but the hide is much larger and more difficult to tan (Legat and Chocolate 2012). Most women prefer boreal caribou hides because they are large and good for clothing, but working with boreal caribou can prove to be challenging (Legat and Chocolate 2012).

Although most of the TK information currently available for the interim range plan is from the Tłı̨chǫ, all three Indigenous groups have raised concerns about habitat changes due to climate change and the resulting impacts on boreal caribou. These impacts include warmer and drier weather, changes in wind patterns, and changes to snow and ice conditions (Legat and McCreadie 2015; Tłı̨chǫ Research and Monitoring Program 2013). Fire is the major factor that has caused habitat disturbance, changing boreal caribou numbers and traditional use of Wek'èezhìı land (Associated Environmental 2021). Habitat changes have favoured moose and bison over boreal caribou, and predators such as wolves and bears (Associated Environmental 2021).

5.4 Important Areas for Boreal Caribou

5.4.1 Important Areas based on Traditional Knowledge

Mapping Tǫdzı Habitat using Tłı̨chǫ Traditional Knowledge:

The Tłı̨chǫ Government held a TK workshop on mapping tǫdzı (boreal caribou) habitat on December 8th and 9th, 2020. The two-day workshop involved 14 elders and harvesters from the four Tłı̨chǫ communities; Whatì, Behchokǫ̀, Gamètì and Wekweètì. The workshop was conducted with elders and harvesters who have knowledge and personal experience of the study area, and have hunted and trapped on that land throughout their lives. The elders place high value on the method of seeing and personally experiencing a place in their evaluation of what is true. They specify that the knowledge shared in this study is not hearsay heard or read somewhere, but is true, as they have seen it with their own eyes and experienced it personally (Legat 2012; Legat and Wetrade 2013).

Study Area

The study area was the Wek'èezhìı section of NT1. Tłı̨chǫ elders often refer to this ecozone as *nǫdıı* (see Figure 13 in this section), translated as the plateau, as most of the land rises to higher elevation from the lower elevation to the east called Į̀dàà and *ı̨kwę̀*. Legat and Wetrade (2013) described that within Wek'èezhìı, "the place where tǫdzı belong" is called *nǫdıı* due to the number of plateaus in the area. These plateaus are ʔedèezhìì, Shìıgǫǫ̀làala, Gokw'ahshìì, Gohdlı̨ı̨shìì, Kwechoozhìì, and the mountain ridge Whojıhchıì (Legat and Wetrade 2013: 8). As the Wek'èezhìı boundary does not follow natural landscape features, it was important during the workshop also to focus on areas outside of the boundary to understand tǫdzı movement and habitat use throughout the region.

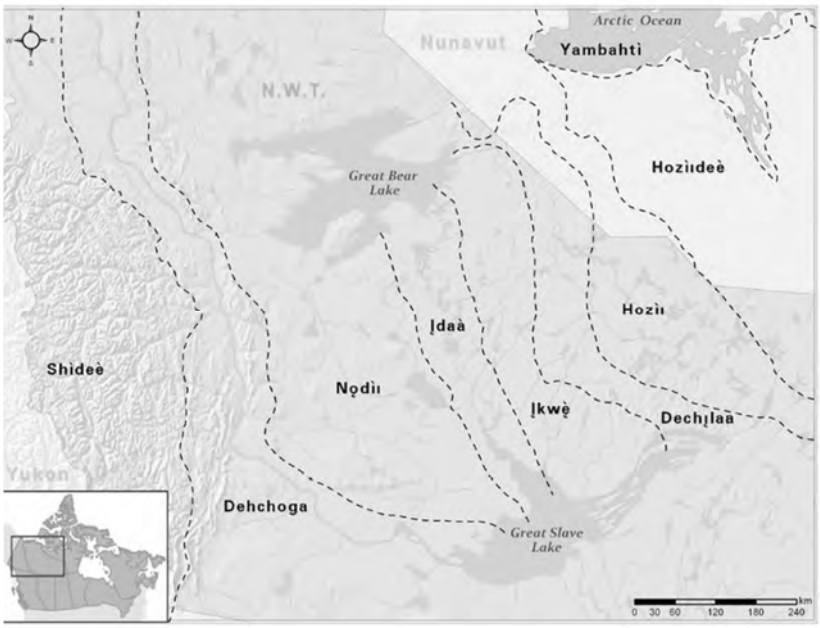

Figure 13. Tłı̨chǫ landscape units (Andrews 2011).

TK Mapping Method

The Tłı̨chǫ elders are familiar with mapping Tłı̨chǫ land use and caribou habitat from numerous other mapping exercises and travels along the Tłı̨chǫ trail network (Andrews et al. 1998; Zoe 2007). An approach developed with Tłı̨chǫ elders from previous mapping workshops was applied for mapping tǫdzı habitat. The Tłı̨chǫ Government named this the "Tłı̨chǫ trails" approach to mapping wildlife habitat. The essential part of the approach is by letting the story of travel initiate the mapping. The elders describe their trails and travel routes used from their communities into the tǫdzı harvesting area. The story of travel transforms the mapping exercise into an 'on the ground' approach, that lets the listener visualize the trails from being on the ground. After describing travel routes, the Tłı̨chǫ Government identified camps and cabins used for hunting and trapping along the trails. During the second part of the "Tłı̨chǫ trails" approach, the harvesters describe where they usually see tǫdzı tracks and activity, where they had success in hunting tǫdzı, and where they anticipate one can most likely be successful when hunting tǫdzı. Once tǫdzı habitat was identified, harvesters described critical tǫdzı habitat, by describing locations tǫdzı are observed throughout the seasons and certain landscape features, such as islands, peninsulas, lakes or habitat structures, that tǫdzı use at specific times of the year. Some of these features were identified as critical habitat. Legat and Wetrade (2013) identified specific habitat features using Tłı̨chǫ names such as *whagweè* described as "sandy soil mixed with black dirt and covered with sparse vegetation", and *tsoo* described as "waterlogged soil, bogs, thick vegetation. Translated as muskeg" (Legat and Wetrade 2013: 10). Additionally, the Tłı̨chǫ Government focused on identifying Tłı̨chǫ placenames associated with harvesters' land use and tǫdzı habitat. The placenames describe the relationship between specific habitat, land features and harvesting activities. Subsequently, placenames are

essential to understanding the relationship between Tłı̨chǫ and wildlife habitat use throughout the study area (Legat 2012).

The workshop set-up included a large table for each community's participants. Each table had a printed map (size 1:250 000) of the study area. Harvesters used permanent markers to draw lines and polygons describing their land use and tǫdzı habitat. A pre-determined set of colour coding was applied to distinguish different land use activities and tǫdzı habitat. The digitized map of Tǫdzı habitat was submitted by the Tłı̨chǫ Government for the interim boreal caribou range plan (Figure 14).

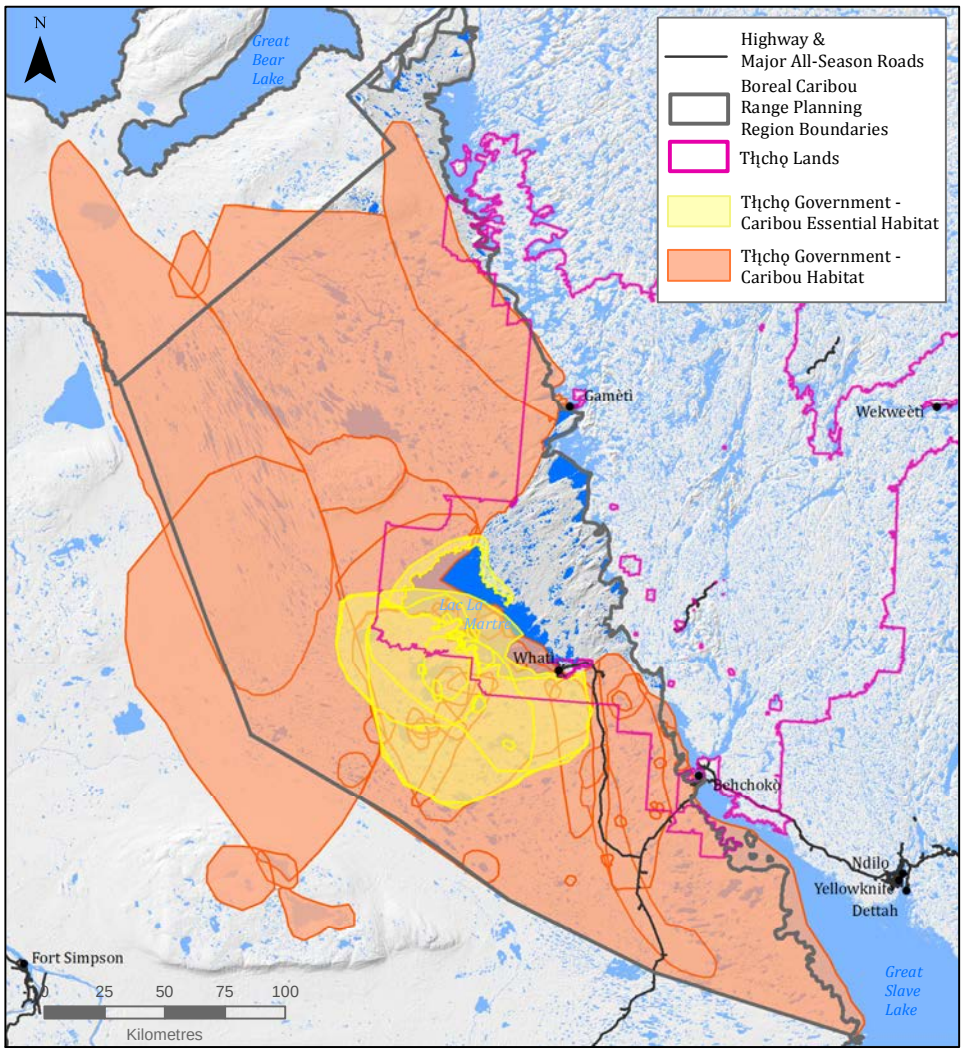

Figure 14. Boreal caribou habitat polygons identified by Tłı̨chǫ harvesters and elders at a workshop held on December 8-9, 2020 (data provided by the Tłı̨chǫ Government, map created by GNWT-ENR).

Boreal Caribou and Their Habitat – North Slave Métis Alliance (NSMA)

Between February and March 2021, NSMA held eighteen interviews with NSMA knowledge-holders to compile and document information about boreal caribou and their habitat.

Due to the COVID-19 pandemic, all surveys were done virtually through the Trailmark software, which allows users to drop points or draw polygons on a map following prompts or questions. Eighteen members aged 16 to 70 participated in this survey; most members completed the survey independently, though two elders came to the NSMA office for assistance with using mapping software on their devices. NSMA would like to use Trailmark surveys as a way to collect information from their out-of-town youth and members, as well as in-person interviews for elders and members in town.

NSMA members identified twenty points of interest where caribou have been repeatedly seen or could expect to be seen (Figure 15 and Figure 16). Ten of these locations were identified as being common road crossings for boreal caribou, while the other ten were grazing or calving areas. Twelve were in the North Slave or Wek'èezhìı region, while eight were in the South Slave or Dehcho region. Members indicated that these points of interest were of conservation value, though the survey didn't quantify conservation priorities as high, medium, or low. NSMA recommended that it should be assumed all identified points of interest are of high conservation priority.

NSMA members also identified twenty patches of habitat that should be prioritized for conservation; four of these regions were in the South Slave or Dehcho region, and sixteen were in the North Slave or Wek'èezhìı region. Eight of these patches indicated important forest habitat, and members specified several of these as being important spring/calving habitat. Interestingly, one of these patches of forest habitat was within Yellowknife city limits, within Fred Henne Territorial Park. Members also identified twelve patches of non-forest (rock, lichen, low shrub and/or open marsh) habitat; members specified that many of these regions were important for calving (islands), insect avoidance, and forage in late winter and early spring.

Figure 15. Locations where NSMA members have observed or expect to observe caribou.

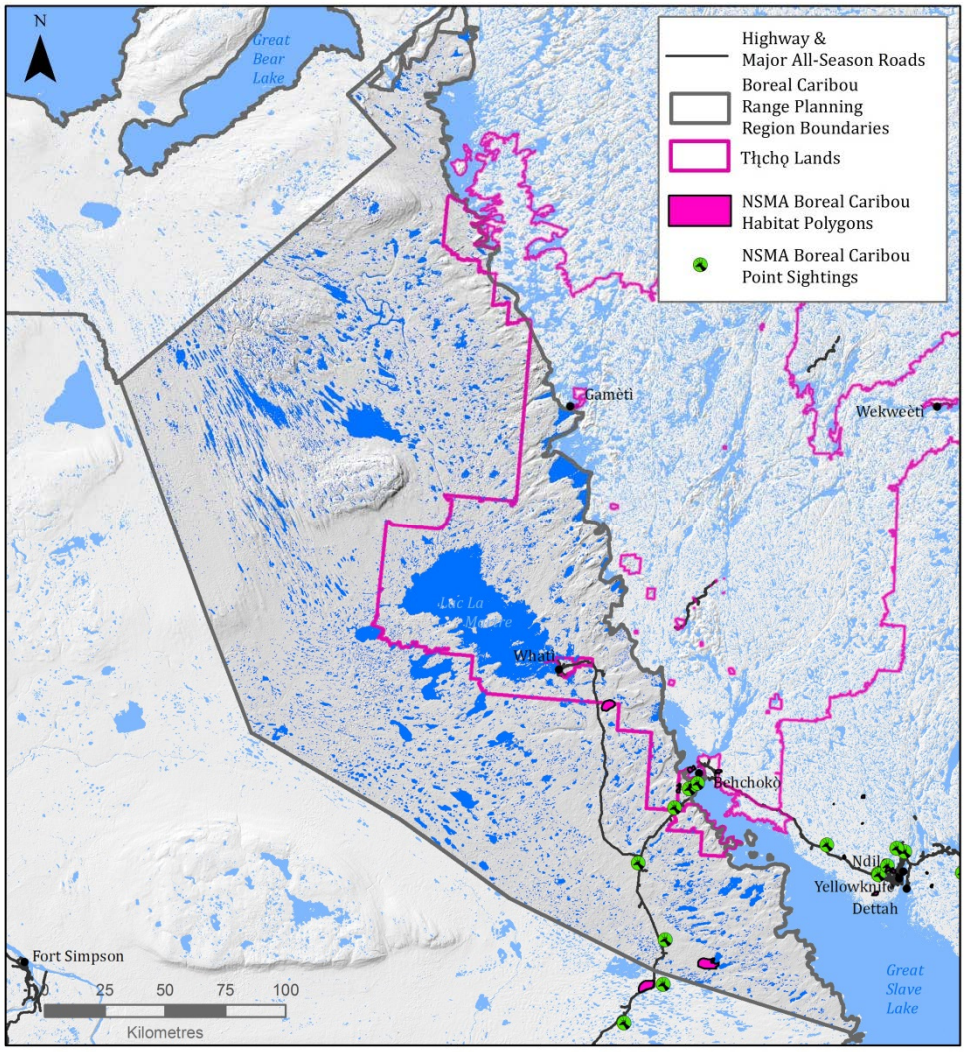

Figure 16. Boreal caribou habitat polygons and points of interest identified by NSMA members during surveys conducted between February-March 2021 (data provided by the NSMA, map created by GNWT-ENR).

5.4.2 Important Areas based on Western Science

Seasonal maps of predicted boreal caribou habitat selection based on the RSF models developed by DeMars et al. (2020), and known areas of high use by boreal caribou based on GPS collar locations, were used as the two main sources of information to develop western science-based maps of important areas for boreal caribou. Because the predictive seasonal RSF maps are very fine-grained (30 m pixel resolution), Marxan software, a spatial optimization program commonly used to support conservation planning (Ball et al. 2009), was used to combine and simplify the 7 seasonal RSF predictive maps into more generalized areas of important habitat. This was done by summing predicted seasonal RSF values within 5 km^2 planning units (hexagonal grid cells), and then using Marxan to select aggregations of planning units that provide high suitability habitat for boreal caribou across the different seasons. This size of planning units (5 km^2) was chosen to balance

computational demands[8] of running Marxan analyses at the broad scale of the NT1 range with planning units that were small enough to capture fine-scale variation in habitat suitability. The Marxan analyses were run using the predictive RSF maps at the scale of the whole NT1 range, with specific targets for representation of seasonal RSF value that had to be met in each individual range planning region. One of the principles highlighted in the range planning Framework (GNWT 2019) is the need to consider areas beyond each regional boundary to ensure habitat/genetic connectivity is maintained across the NT1 range. Conducting the Marxan analyses at the NT1 scale helped to ensure that areas of high suitability habitat that spanned regional boundaries, were maintained as contiguous patches. The Marxan analysis was further refined by locking in planning units with above average known use by boreal caribou based on collar location data into the final solution. Individual planning units were then assigned a High, Medium or Low importance ranking based on how often they were selected out of 600 separate Marxan model runs (Figure 17). It was assumed that planning units that were selected more frequently represent areas that are likely more important for boreal caribou because they provide higher suitability habitat in most seasons. A Low importance category (red) was assigned to planning units that were never selected in any of the model 600 runs, Medium importance (yellow) was assigned to planning units that were selected less than half the time, and High importance (blue) was assigned to planning units selected more than half the time. Further details on the Marxan methodology and analyses are described in Appendix D. High importance areas accounted for 39.3% of the range planning region, Medium importance areas accounted for 21.4%, and Low importance areas accounted for 39.3%.

[8] There were a total of 88,478 – 5 km^2 planning units in the NT1 range, which means that there are 88,478! (factorial) possible solutions for Marxan to choose from. For each Marxan scenario or representation target considered, Marxan was run 100 times. Each set of 100 runs would take several hours of computing time.

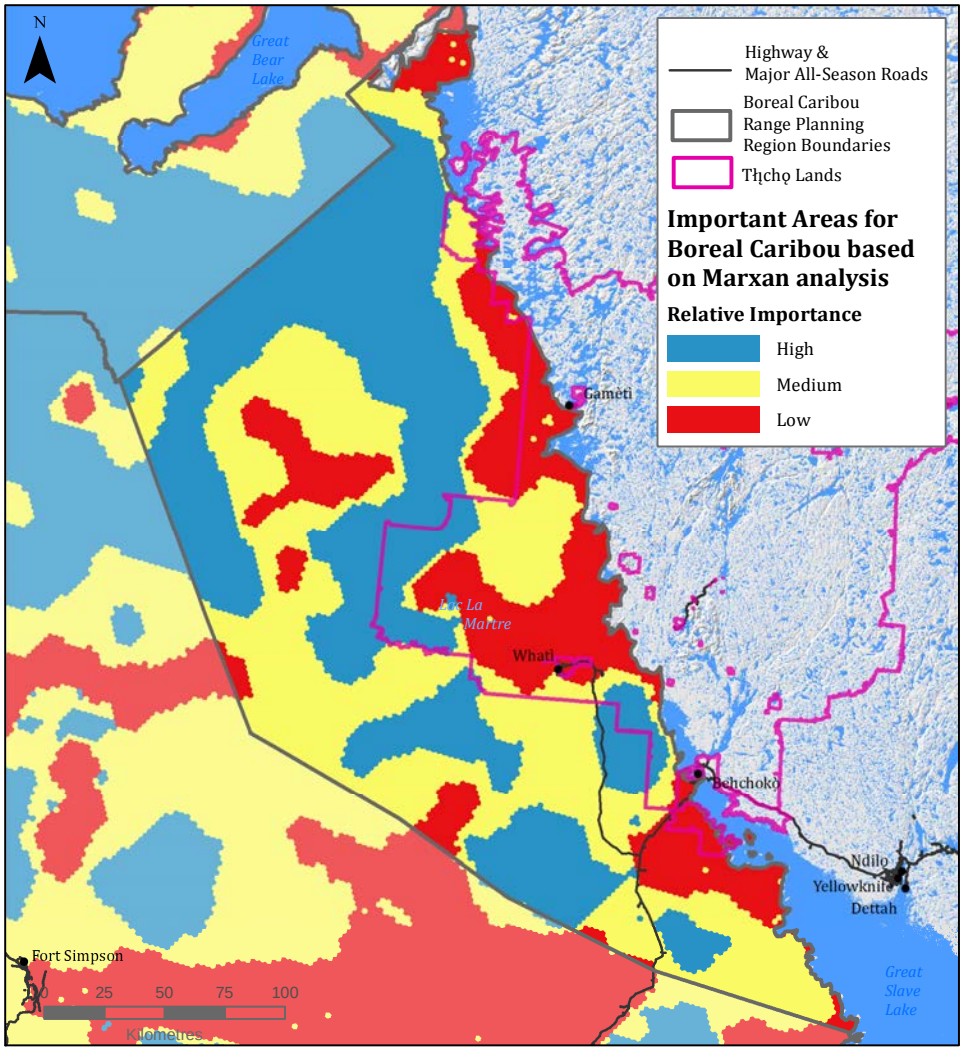

Figure 17. Important areas for boreal caribou in the Wek'èezhìı region, based on Marxan analyses using 7 seasonal predictive RSF maps and areas of high known use by boreal caribou based on GPS collar data. This base map was used to start the process of delineating management class areas.

6. EXISTING LAND PROTECTIONS AND DEVELOPMENT INTERESTS

Consistent with the Framework, boreal caribou range plans need to try to balance maintaining adequate habitat to support healthy boreal caribou populations with maintaining opportunities for economic and public infrastructure development (GNWT 2019). This section of the plan provides an overview of current land management, land use interests, and resource and infrastructure development potential within the Wek'èezhìı region. Many of the information sources described below were considered in the delineation of management class areas (Basic, Enhanced or Intensive) for the interim range plan (see Section 7.2 and Appendix E). The interim range plan used the best information currently available to the GNWT and drew on expertise from within different GNWT Departments and Divisions to try and predict areas where there may be higher potential for development activity. It should be acknowledged that there remains significant uncertainty about whether areas of higher resource development potential will be developed or not in the near future.

6.1 Tłı̨chǫ Wenek'e: Tłı̨chǫ Land Use Plan

The following section details the management zones of the Tłı̨chǫ Land Use Plan (TLUP) that fall within the boreal caribou range of the Wek'èezhìı region. Each zone has been designated for specific cultural, historical and ecological reasons, and therefore has their own legally-binding protections. How much of each management zone falls within the boreal caribou range, what developments (if any) are considered there, and how much of the Marxan-identified important area (Section 5.4.2) falls within those zones are discussed below. It should be noted that the TLUP is currently under review so these zones may change. The revised TLUP is scheduled to be finished in early to mid-2022.

Figure 18 shows the current TLUP zones in the Wek'èezhìı region. It is important to note that Ezǫ̨dzìtì (described further in Section 6.2), is not part of the TLUP. The candidate protected area - Dınàgà Wek'èhodì – overlaps partially with the TLUP. Management zones that fall within the boreal caribou range of the Wek'èezhìı region include Cultural Heritage Zones (Tłı̨chǫ Nawoo Ké Dét'ahot'ìı), Enhanced Management Zones (Asıı Haxowıı Gha Enehatǫ), Traditional Use Zones (Gowhadǫ̀ Yek'e t'ıı k'e), Habitat Management Zones (Dèk'èasıìʔedaà wehoodıa), and Land Use Exclusion Zones (Wehexlaxodıale). Table 7 summarizes the land uses that may be considered in each type of land use plan zone.

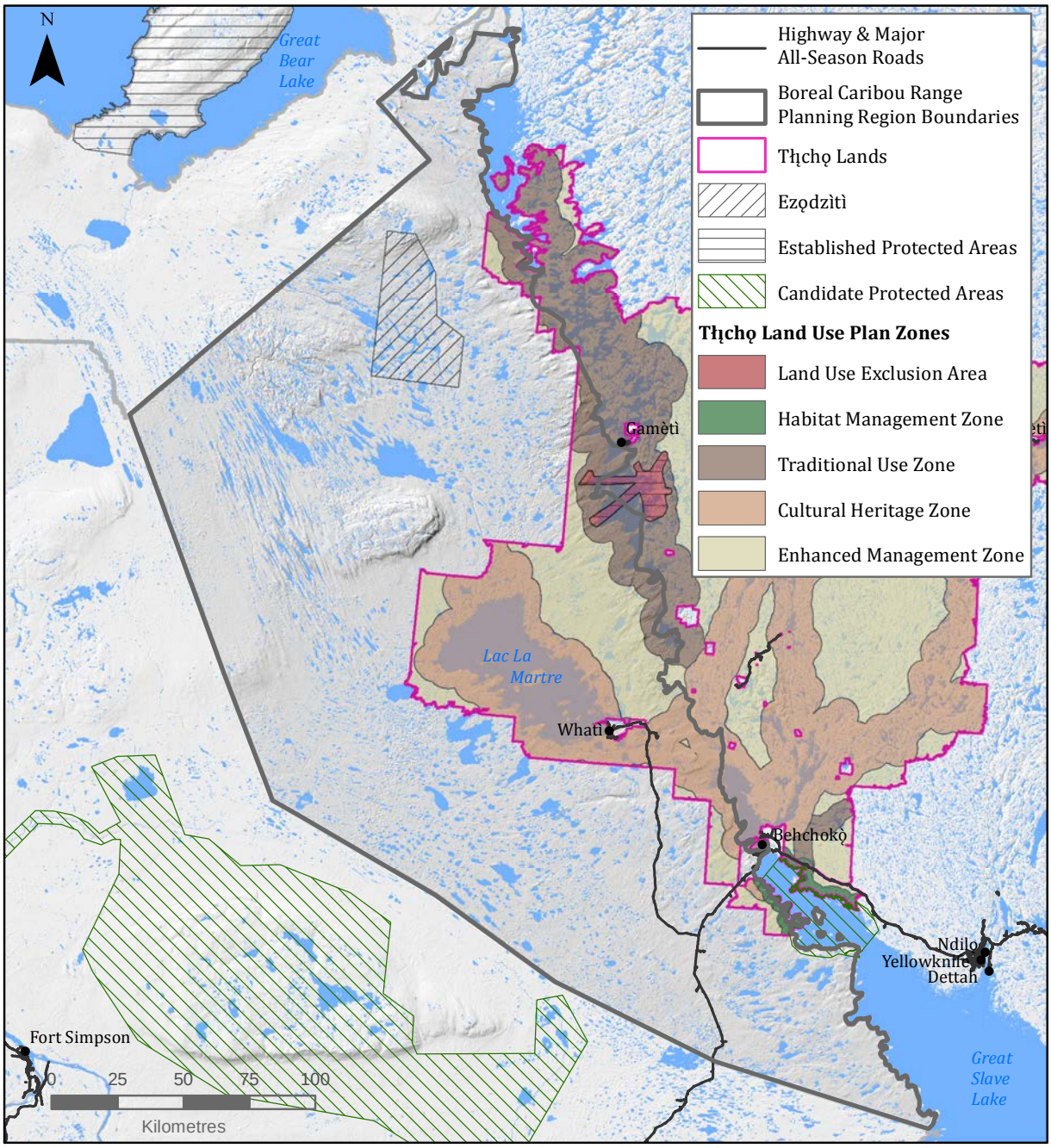

Figure 18. Tłı̨chǫ Land Use Plan management zones and protected areas.

Table 7. Tłı̨chǫ Land Use Plan management zones and the land uses that may be considered within each zone (Tłı̨chǫ Government 2012).

Management Zone	Land Uses Considered										
	Cabins / Camps	Non-exploitative scientific research	Transpor-tation corridor	Eco/ cultural tourism	Hydro power generation	Utility corridor	Quarries & Mineral Exploration	Commercial Forestry	Hunting / Fishing Lodge	Mines & Mineral Development	Oil/Gas Exploration & Extraction
Cultural Heritage Zone	✓	✓	✓	✓	✓	✓					
Enhanced Management Zone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Traditional Use Zone	✓	✓	✓	✓	✓	✓					
Habitat Management Zone	✓	✓	✓	✓							
Land Use Exclusion Zone	✓	✓	✓								

Land Use Exclusion Zones (Wehexlaxodıale) are areas on the landscape that are critically important to Tłı̨chǫ culture, and where the connection between Tłı̨chǫ heritage, culture and the land are especially strong (Tłı̨chǫ Government 2012). As such, the areas designated as Land Use Exclusion Zones will not be considered for development, and may qualify for further protection in the future (Tłı̨chǫ Government 2012). The Traditional Use Zone is centered around the Į̨daà Trail, an ancestral trail based along waterways and watershed areas, which is still in use today. Along the Į̨daà Trail are hunting, fishing and trapping areas, as well as many spiritual and burial sites, cabins, caribou trails and canoe routes (Tłı̨chǫ Government 2012).

The Cultural Heritage Zone is based on the trails of the historical Tłı̨chǫ figure Chief Monfwì. During difficult times, Chief Monfwì led his people down these trails, where they were able to secure enough food to survive. These trails are considered crucial to Tłı̨chǫ culture, identity and heritage (Tłı̨chǫ Government 2012). Some activities may be considered in the Cultural Heritage Zone so long as they do not disrupt the integrity of the trails. The Enhanced Management Zone is an area designated for "sustainable economic development" (Tłı̨chǫ Government 2012). The TLUP states this area should balance "continued protection of the environment and consideration of sustainable economic development proposals" (Tłı̨chǫ Government 2012).

The Habitat Management Zone includes part of a candidate protected area known as Dınàgà Wek'èhodì. The larger portion of Dınàgà Wek'èhodì was originally identified as a candidate protected area under the Protected Area Strategy due to its ecological significance, as it provides important habitat for birds and wildlife. The Habitat Management Zone (and Dınàgà Wek'èhodì) also has historical, traditional and cultural significance for the Tłı̨chǫ Peoples (Tłı̨chǫ Government 2012). In addition, YKDFN, the Northwest Territory Métis Nation and the NSMA have strong spiritual and cultural ties to this area.

The TLUP also states that it is committed to sustaining healthy boreal woodland caribou populations in the Tłı̨chǫ, and will:

"…integrate the collection and sharing of knowledge to manage the combined effects of:

1) *Natural disturbances and cycles in caribou abundance;*
2) *Human activities arising from hunting and land use; and*
3) *A changing climate"* (Tłı̨chǫ Government 2012).

The TLUP encompasses 19.2% of the Wek'èezhìı boreal caribou range planning region (Table 8). Habitat Management Zones and Land Use Exclusion Zones, which would correlate to an Intensive management class area in the range plan, cover 0.4% of the range planning area, but do not overlap with any of the High importance habitat identified by the Marxan analysis (displayed on Figure 17). Traditional Use Zones and Cultural Heritage Zones which may equate to Enhanced management class areas in the range plan, cover 12.6% of the range planning region, and capture 6.6% of the High importance habitat identified in the Marxan analysis (displayed on Figure 17). The Enhanced Management Zone which may be considered equivalent to a Basic management class area in the range plan, covers 6.3% of the range planning region, and contains 2.9% of the High importance habitat identified by Marxan analysis. The TLUP will be an important implementation tool for the

range plans, as it is a legally-binding document that reflects areas not only of ecological and cultural value, but areas that have potential for future development as well. The ways in which the TLUP can be an important implementation tool for the Wek'èezhìı Boreal Caribou Range Plan are discussed in more detail in Section 9.

Table 8. Breakdown of areas of the Wek'èezhìı range planning region covered by different Tłı̨chǫ Land Use Plan zones (may change in updated TLUP in 2022) and Ezǫdzìtì, and the percentage of High, Medium and Low importance habitat as identified by Marxan analyses that each area captures.

	Range Plan Management Class Equivalent	% of Wek'èezhìı range planning region	Importance areas identified by Marxan analysis		
			High %	Medium %	Low %
Tłı̨chǫ Land Use Plan Zones					
Habitat Management Zone	Intensive	0.2	0.0	0.0	0.5
Land Use Exclusion Zone	Intensive	0.2	0.0	0.1	0.4
Traditional Use Zone	Enhanced	3.2	0.1	3.6	6.1
Cultural Heritage Zone	Enhanced	9.4	6.5	11.3	11.2
Enhanced Management Zone	Basic	6.3	2.9	12.7	6.1
Sub-total		***19.2***	*9.5*	*27.8*	*24.3*
Ezǫdzìtì	Intensive	2.8	7.1	0.0	0.0
No designation (areas outside the Tłı̨chǫ Land Use Plan and Ezǫdzìtì)	Basic[9]	78.0	83.5	72.2	75.7

6.2 Established and Candidate Protected Areas

Figure 19 shows the established and candidate protected areas in the boreal caribou range of the Wek'èezhìı region. According to ENR, protected areas "are the backbone or core of a conservation network as they are ecologically intact and have the highest level of protection, including prohibitions on industrial development. Protected areas are permanent, resilient, and are effectively managed and monitored (ENR 2016). There are two established protected areas: Wehexlaxodıale and Ezǫdzìtì, and a candidate protected area: Dınàgà Wek'èhodì, that overlap the boreal caribou range.

[9] Reflects current management class equivalency without a range plan in place.

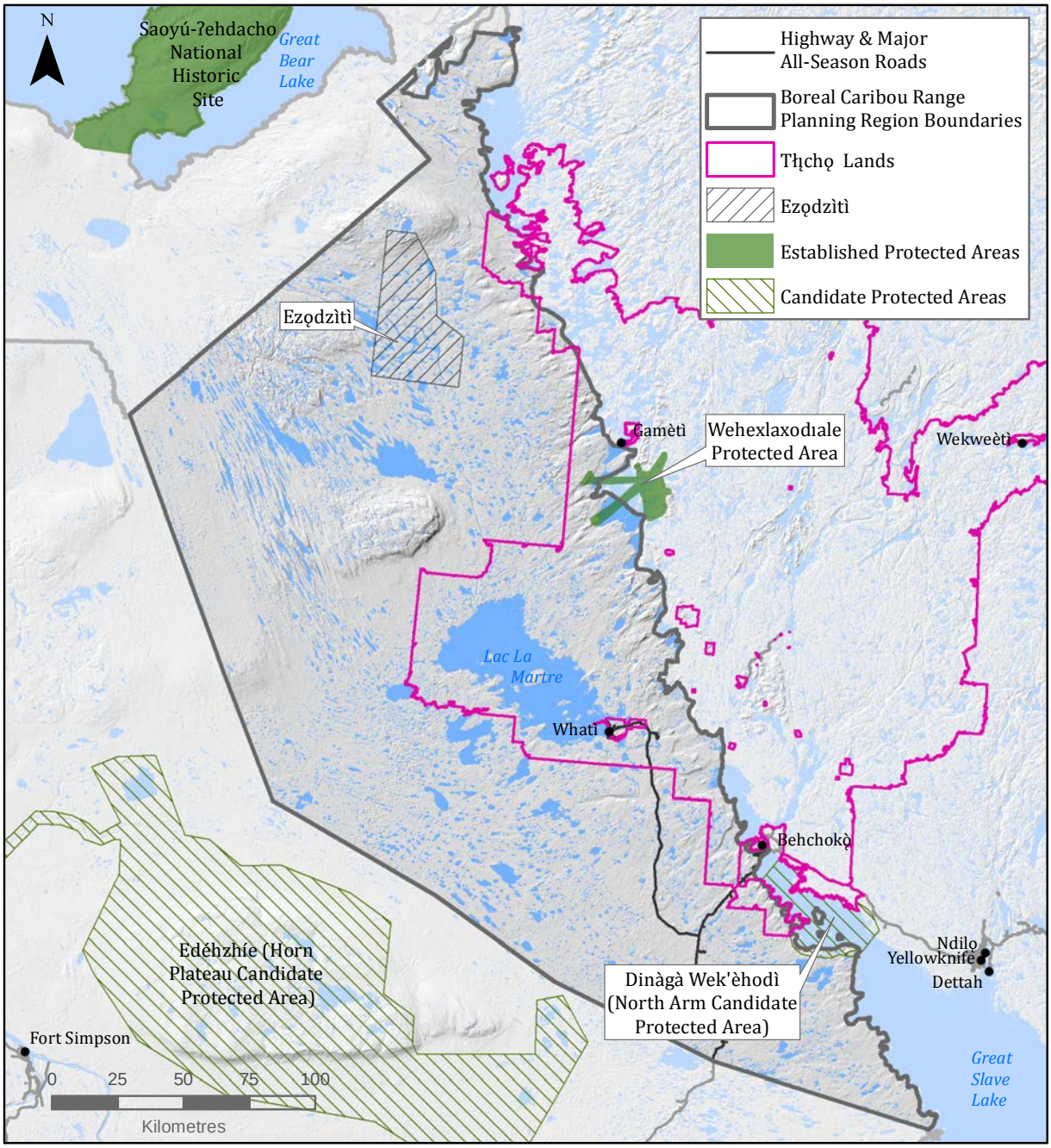

Figure 19. Protected areas within the NT1 boreal caribou range of the Wek'èezhìı region.

Dınàgà Wek'èhodì (North Arm of Great Slave Lake - candidate Protected Area): Dınàgà Wek'èhodì is a candidate protected area under the *Protected Areas Act* that currently has interim protections with surface and subsurface land withdrawals under the Northwest Territories Lands Act. It is located within the Wek'èezhìı Resource Management Area, and the northeast and southwest boundaries are adjacent to Tłı̨chǫ settlement lands. The area is very culturally and ecologically significant to the Tłı̨chǫ due to its historical, traditional and cultural value (ENR 2021a). In addition,

YKDFN, the Northwest Territory Métis Nation and the NSMA have strong spiritual and cultural ties to this area. Dınàgà Wek'èhodì also provides habitat for various species at risk, including boreal caribou, and has been identified as a federally Important Bird Area and a key migratory bird site in the NWT (ENR 2021a). However, Dınàgà Wek'èhodì only covers 0.2% of the Wek'èezhìı range planning area. The portion of Dınàgà Wek'èhodì on Tłı̨chǫ Lands is designated in the TLUP as a Habitat Management Zone; please refer to Table 7 for land uses that may be considered within this zone.

Wehexlaxodıale (Land Use Exclusion Zone): Wehexlaxodıale is a Land Use Exclusion Zone established under the TLUP, which is scheduled under Tłı̨chǫ Land Use Plan Law. The Tłı̨chǫ Government is the governing authority on Tłı̨chǫ Lands, and since the TLUP states that "development proposals shall not be considered" within the Wehexlaxodıale area, it has the full protections granted to it under the TLUP. The TLUP identifies this protected area as critically important to Tłı̨chǫ heritage and culture, and therefore is in need of full protection. In order to protect this area, "development proposals shall not be considered" and "areas within this zone may be considered for further protection measures" (Tłı̨chǫ Government 2012). Wehexlaxodıale is a combination of two sites; Gots'ǫkàtì (Mesa Lake) and Hoòdoòdzo (Wolverine Hill or Sliding Hill). Gots'ǫkàtì is the place where caribou meat was stored for people returning from the barren grounds, and is known as the 'freezer'. Gots'ǫkàtì also contains burial sites, and is a site where some current Tłı̨chǫ peoples were born. Hoòdoòdzo is one of the most sacred sites linked to the legend of *Yamǫ̀zhah*, and is located on a large ridge with a 'slide' that is 1 m wide and 30 m long. The Wehexlaxodıale area covers 0.2% of the Wek'èezhìı range planning area.

Ezǫdzìtì: The Ezǫdzìtì area is of cultural and historical importance to the Tłı̨chǫ peoples, and has permanent protection from the granting of any interests by Government to preserve this important area. Section 17.6 in the *Tłı̨chǫ Land Claims and Self-Government Agreement* states:

> "*17.6 EZǪDZÌTÌ*
>
> *17.6.1 The area known as Ezǫdzìtì and described in the appendix to this chapter is a heritage resource of historical and cultural significance to the Tłı̨chǫ First Nation and to all Canadians.*
>
> *17.6.2 Government shall not grant any interests in Ezǫdzìtì*" (Tłı̨chǫ Government 2003)

Within the TLUP, Ezǫdzìtì is classified as a "Tłı̨chǫ Heritage Area" (Tłı̨chǫ Government 2012). The Ezǫdzìtì heritage area is located entirely within the boreal caribou range of the Wek'èezhìı region and covers 2.8% of the range planning region. This heritage area also falls entirely within an area of High importance habitat as identified by the Marxan analyses.

6.3 Land and Resource Tenure

6.3.1 Tłı̨chǫ, Territorial, Federal Lands

Figure 20 shows lands that are owned and/or managed by the Tłı̨chǫ, Territorial or Federal Governments within the boreal caribou range of the Wek'èezhìı region. The Tłı̨chǫ Lands are Settlement Lands from the *Tłı̨chǫ Land Claims and Self-Government Agreement* and make up 9,505

km² (19.2%) of the range planning area. Territorial Land makes up the majority of the Wek'èezhìı range planning region at 39,844 km² (80.4%), and the remainder falls under municipal boundaries (Community Governments of Whatì, Gamètì and Behchokǫ̀) (165 km², 0.33%), and Federal land (5.9 km², 0.01%). The only Federally managed land is Wrigley Point, south of Whitebeach Point on the northwestern shore of Great Slave Lake.

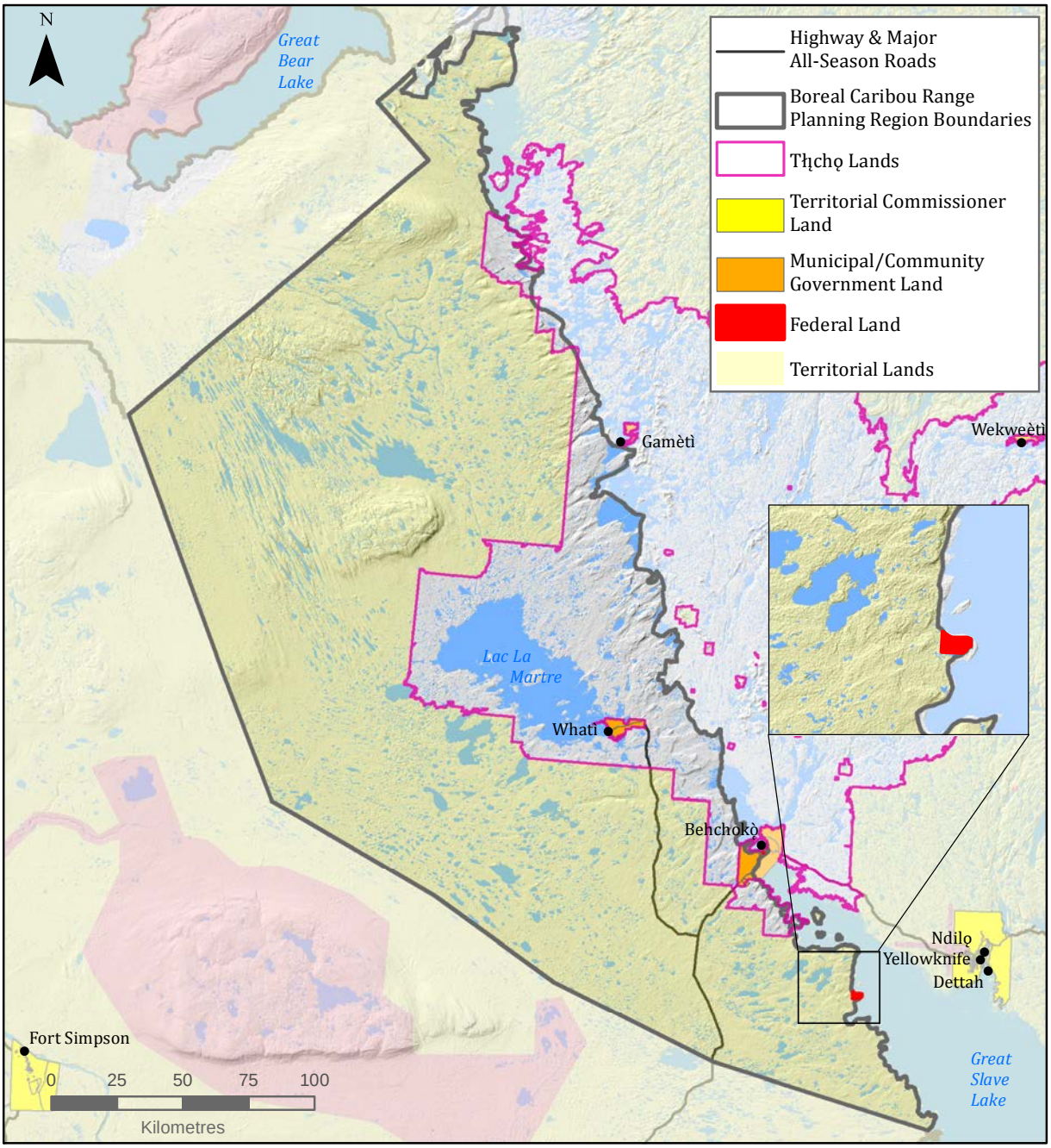

Figure 20. Land management authority in the boreal caribou range of the Wek'èezhìı region.

6.3.2 Land Withdrawal Areas and other Regulated Areas

The only land withdrawal area within the boreal caribou range in the Wek'èezhìı region is a portion of Dınàgà Wek'èhodì, a candidate protected area (North Arm of Great Slave Lake), which has Surface/Subsurface Land protection while its candidacy is being considered (see Section 6.2 for further details on this candidate protected area). This land withdrawal is set to expire October 9, 2022.

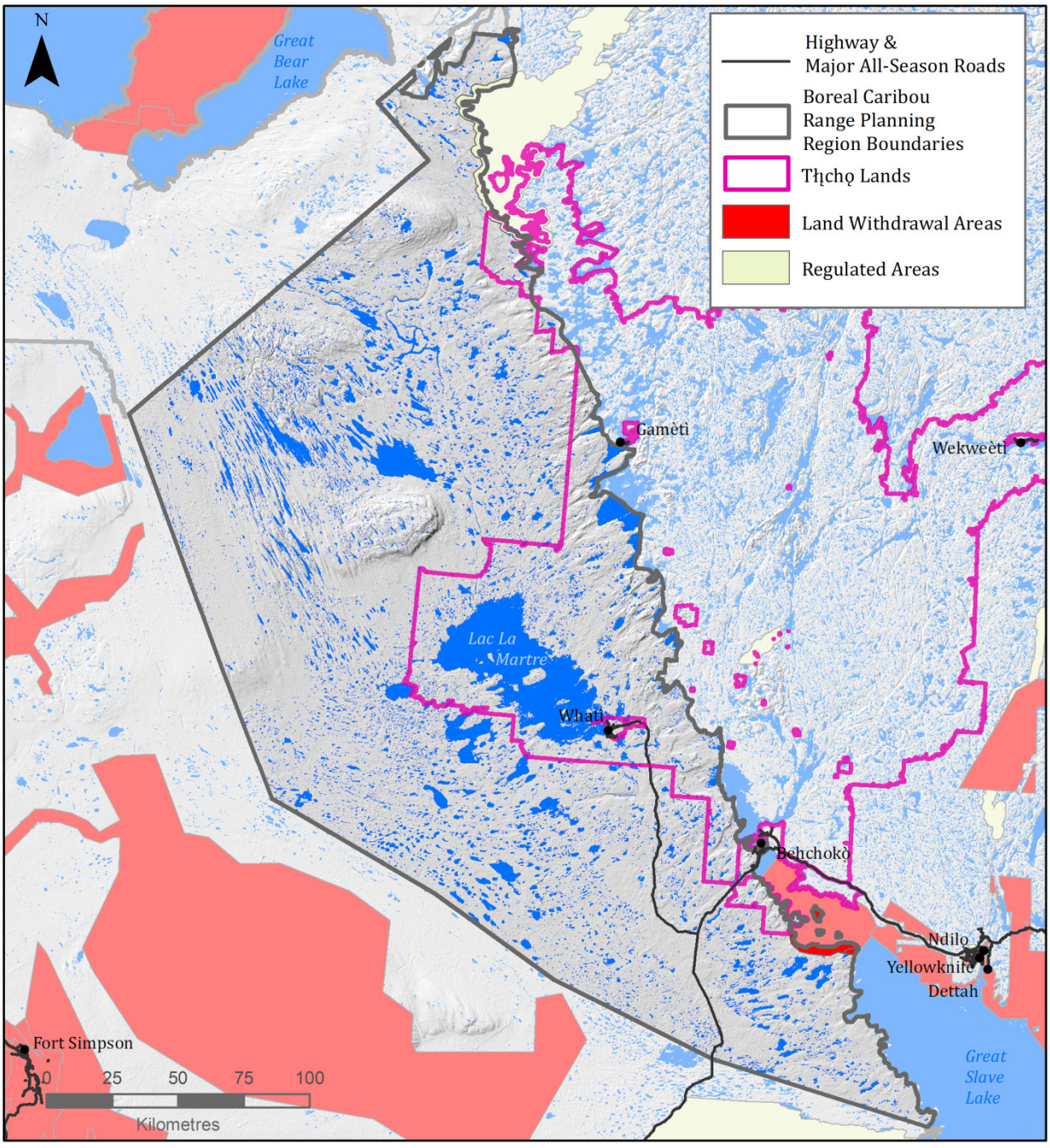

Figure 21. Land withdrawal and regulated areas in the boreal caribou range of the Wek'èezhìı region.

The regulated area overlapping with the north-eastern edge of the boreal caribou range in Figure 21 is the White Eagle Falls Surface/Subsurface No Compensation Zone, under the *Northwest Territories Lands Act* (Land Withdrawal Order R-061-2014). Any proposed development in this area must first contact the GNWT Department of Lands, the respective Indigenous Government (Tłı̨chǫ if in the Wek'èezhìı Region) and the Wek'èezhìı Land and Water Board (WLWB) to determine if there are any restrictions or reservations.

6.3.3 Active Land Use Permits and Water Licences

Figure 22 shows the active land use permits and water licences within the boreal caribou range of the Wek'èezhìı region. This figure is based on LWB permit registry data current to the end of 2020, and may not include recent permits or licences that were issued in 2021. The active land use permits and water licences are for activities such as infrastructure (roads, hydro lines, etc.), mineral exploration, water licences, and small scale timber harvesting.

Figure 22 also shows the active water licences issued for use in the construction of the TASR, as well as drinking water for the workers and their camps (ref # W2016L8-0001). The water licences were issued May 28, 2019 and expire May 29, 2026 (NWT Centre for Geomatics 2013).

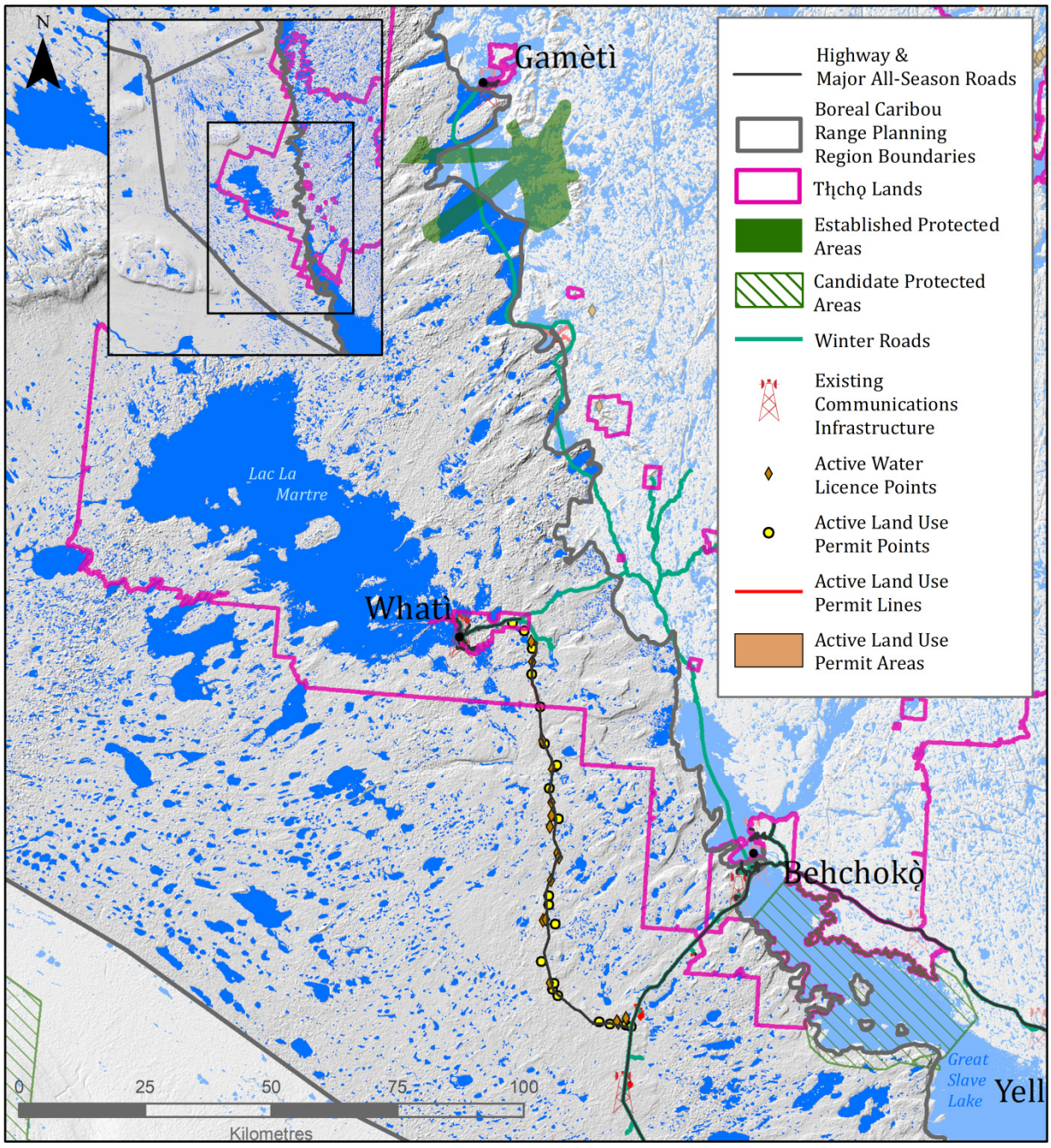

Figure 22. Active land use permits, water licences and other active infrastructure in the boreal caribou range of the Wek'èezhìı region.

6.3.4 Active Permits along Roadways

Tłı̨chǫ All-Season Road (TASR)

The TASR is a 97 km gravel highway that is currently under construction between Highway 3 and Whatì, connecting to the existing Whatì All-Season Road. The purpose of the road is to increase the ease of transportation of goods and people within the Tłı̨chǫ region, thereby reducing cost of living for its residents and increasing social opportunities. In addition, the all-season access can attract interest from industry for exploration and development of natural resources. The road is projected to be completed in November 2021 (North Star Infrastructure and Kiewit 2021).

In Figure 22, the points along the TASR show where there are active Land Use Permits (reference # W2016S0009 & W2016E0004) for geotechnical investigations and construction of the TASR. The permits are up for renewal on January 10, 2022 (W2016S0009) and May 29, 2024 (W2016E0004) (NWT Centre for Geomatics 2013). Since the TASR will need ongoing maintenance even after its completion, these quarries may remain in use for the duration of the range plan (i.e., until its first review). As well, the last 17 km of the TASR is located on Tłı̨chǫ Lands. In order to proceed with the project, the GNWT and Tłı̨chǫ Government came to an agreement on a land exchange. However, the land exchange cannot occur until construction of the road is completed and a survey has been conducted to determine the amount of land the GNWT will provide to the Tłı̨chǫ in exchange for the TASR lands. The land obtained for the TASR provides surface rights to the GNWT, but the land transferred in exchange will provide surface and subsurface rights to the Tłı̨chǫ Government.

Highway 3

Along Highway 3, there are areas of both ongoing and inactive activity. Active land uses along Highway 3 include areas owned by the GNWT Department of Infrastructure for ongoing operations and maintenance of Highway 3 from the TASR to Fort Providence (Reference # MV2010X0012), and Highway 3 and 4 between the TASR and Behchokǫ̀ (Reference # MV2010X0006). There is also a small woodcutting operation (Reference# W2018W0001) at the junction between the TASR and the existing highway, captured under Active Land Use Permit Areas. This operation is owned by Sands Enterprises, and is active until 2023. There are additional small-scale woodcutting operations along Highway 3, but their permits have expired (NWT Centre for Geomatics 2013). The "Existing Communications Infrastructure" shows the locations of telecommunication towers.

6.3.5 Mineral Tenure

Figure 23 displays areas where there is active mineral tenure within the Wek'èezhìı range planning region. While there are no active Prospecting Permits within this area, there are active Mineral Claims and Mining Leases. Mineral Claims are areas where a proponent has been granted exclusive rights to prospect for, and develop mineral discoveries on, a portion of land for a specific period of time. Mineral claims are no larger than 1,250 hectares (ha) in size, and can be held for a maximum of 10 years. A proponent must have a valid Prospectors Licence before staking a mineral claim, and mineral claims often come after a proponent has prospected and explored the area being claimed. Areas that are claimed have been physically staked (i.e., the boundaries have been flagged) by the proponent. Under most circumstances, in order for the claim to be valid past 2 years, work valued at $10/ha for the first 2-year period must be completed, and at least $5/ha for every year after that (ITI 2018).

Before a mineral claim can be leased, it must be surveyed in accordance with the Canada Lands Surveys Act. Holders of a Mineral Claim may then obtain a Mining Lease. Mining leases can last 21 years if all the requirements to obtain the lease are met. A mining lease is acquired if the proponent intends to sell or dispose of the minerals it extracts, if the gross value of the minerals is over $100,000 per year. Holders of a mining lease are allowed to enter full-scale production of the mine if surface leases are obtained beforehand (ITI 2018).

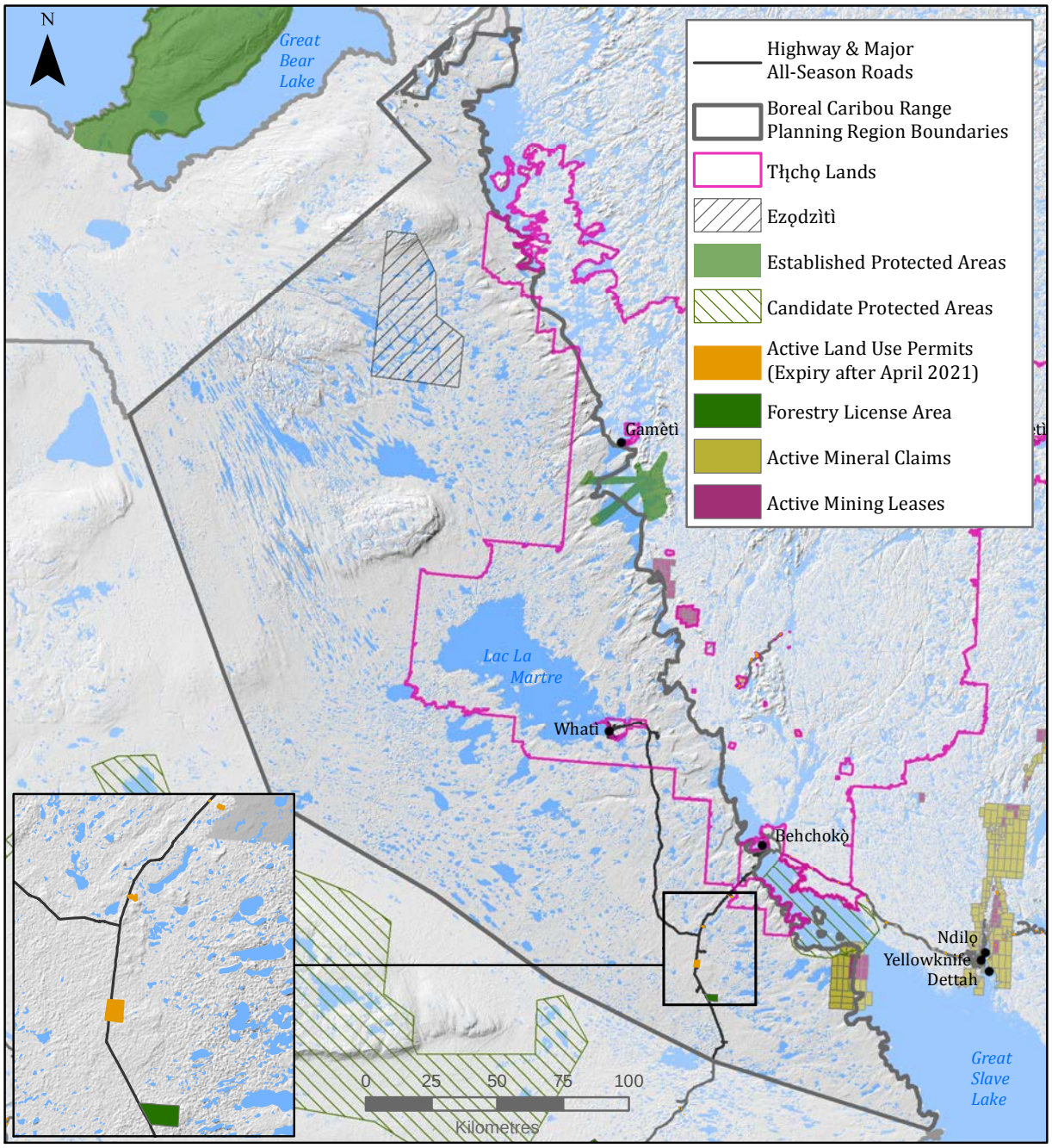

Figure 23. Active mineral claims, mining leases and other land use permits in the boreal caribou range of the Wek'èezhìı Region.

While some of these mining leases are not within the boreal caribou range, they are directly adjacent to it, and therefore impacts from mining in these areas could still negatively affect boreal caribou. The first section of active mining leases just south of Gamètì are held by BFR Copper & Gold Inc. for the Mazenod Project, which is still in the exploration stage of drilling, geophysical surveys, geochemical sampling, etc. (BFR Copper & Gold Inc. 2020). The second set of active mining leases, just south of the Mazenod Project, are owned by Fortune Minerals; no further information about the leases is available at this time. The active mineral claims east of Whatì belong to the NICO Cobalt-Gold-Bismuth-Copper Project owned by Fortune Minerals. The NICO project is described in more detail in Section 6.4.1. The small cluster of active mineral leases, located south of the NICO project, is owned by Rover Metals Corp. for the Cabin Lake Gold Property. Exploration drilling finished in October of 2020, with holes showing as much as 7.94 grams per tonne gold. The project will be making use of the winter road from Behchokǫ̀ to the site to reduce drilling costs (Rover Metals Corp 2021).

The last cluster of mining leases and mineral claims, adjacent to Great Slave Lake in the southern end of the boreal caribou range, are now a Joint Venture between Explor Silica Ltd. and the initial interest owner for the Chedabucto Silica Properties project. One of the mineral claims is on the parcel of federal land described in Section 6.3.1. Explor Silica conducted exploration efforts at the Chedabucto Silica Properties in 2016, which resulted in its "earn-in" and acquired interest in the project in 2018 (Cision 2020). On October 19, 2020, Explor Silica obtained 100% of the ownership of the mineral tenure related to this project.

6.3.6 Oil and Gas Rights

There are currently no active Licences or Declarations for oil and gas within the boreal caribou range of the Wek'èezhìı region at this time. Refer to Section 6.5.3 for information on the oil and gas potential within the boreal caribou range of the Wek'èezhìı region.

6.3.7 Timber Harvest Permits and Licences

As shown in Figure 23, there is only one active forestry licence in the boreal caribou range of the Wek'èezhìı region, which is also included under "Active Land Use Permit Areas". These are small woodcutting operations (Reference# W2018W0001) owned by Sands Enterprises, which are active until 2023. There are currently no Forest Management Agreements (FMAs) within the Wek'èezhìı region. Under "Forestry Licence Area", there is one small cut and haul firewood operation (Highway 3 KM 74 Wood Ops) just south of the Sands Enterprises sites, owned by a private citizen (reference # W2015W0007), which expired in 2020 (NWT Centre for Geomatics 2013).

6.4 Planned Infrastructure and Development Projects

This section describes currently known planned infrastructure and development projects in the boreal caribou range of the Wek'èezhìı region.

6.4.1 NICO Mine Access Road

Figure 24 shows the NICO Mine Land Use Boundary and proposed NICO Mine Access Road. The NICO deposit was discovered by Fortune Minerals in 1996. The deposit contains cobalt, gold,

copper, and over 10% of the world's bismuth reserves. The EA for the mine is complete, and the mine and accompanying mill have been approved by GNWT and the Tłı̨chǫ Government. Construction of the mine is set to commence when project financing is secured, although test mining has already begun. The mine is projected to supply minerals for 20 years. As of May 2020, Fortune Minerals began developing a new mine plan and schedule, to gain earlier access to higher grade minerals using a combination of open pit and underground mining methods (Fortune Minerals Inc. 2021).

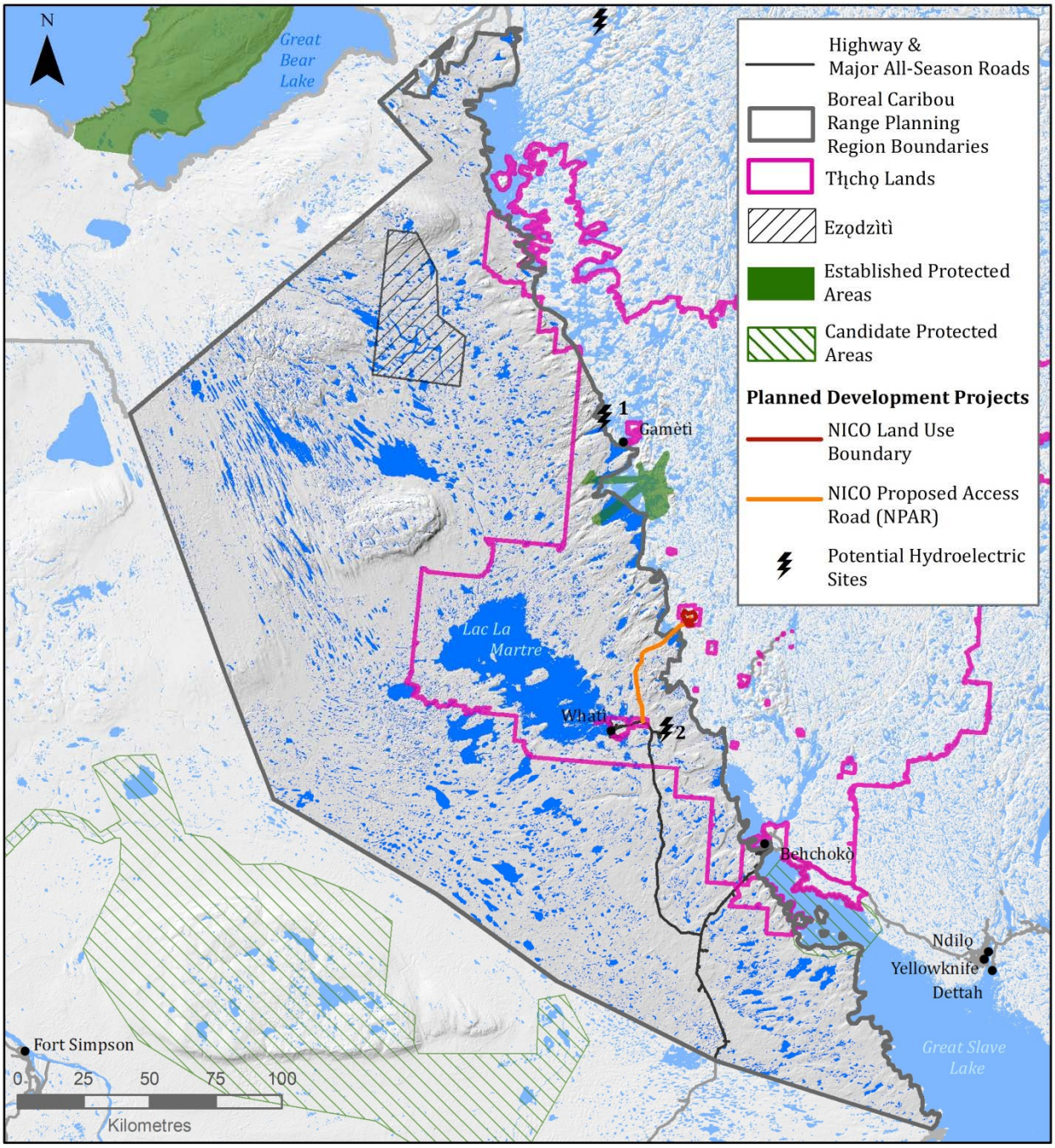

Figure 24. Planned development projects within the NT1 boreal caribou range, Wek'èezhìı region. The number labels correspond to potential hydroelectric development which are described in further detail in Section 6.4.2.

6.4.2 Potential Hydroelectric Sites

Figure 24 also includes the locations of potential hydroelectric sites. The point just northwest of Gamètì (#1) is for the proposed Rae-Taka Hydro Project. The proposed Rae-Taka Hydro Project

would be a 500-kW hydropower plant, created to offset the diesel power currently used in the community of Gamètì. The plant would be located 11 km northwest of Gamètì, and would be comprised of 800 m of land between the Rae and Taka Lakes. The goal of this project is to provide long-term, zero greenhouse gas emission power to the community. A pre-feasibility study was conducted in October 2006, which evaluated three locations; DeVries River, Camsell River at the Outlet of Rae Lake, and an 800 m section of land between Rae Lake and Taka Lake (see Figure 25 below). The site labeled "Rae-Taka" was chosen. A feasibility study was submitted for approval in March 2021, and the current goal is to begin construction between 2023 and 2024, if the project is approved by the Tłı̨chǫ Government (PO Sjöman Hydrotech Consulting 2020). Figure 26 shows the location of the proposed transmission line from Rae-Taka to Gamètì.

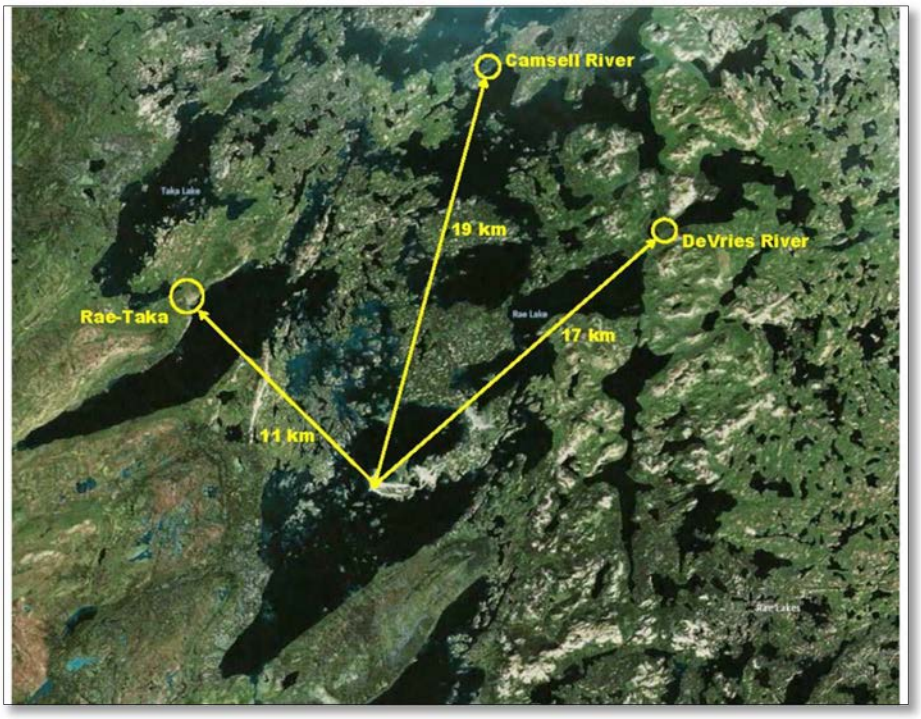

Figure 25. Pre-feasibility study areas for Rae-Taka Hydro Project (PO Sjöman Hydrotech Consulting 2020).

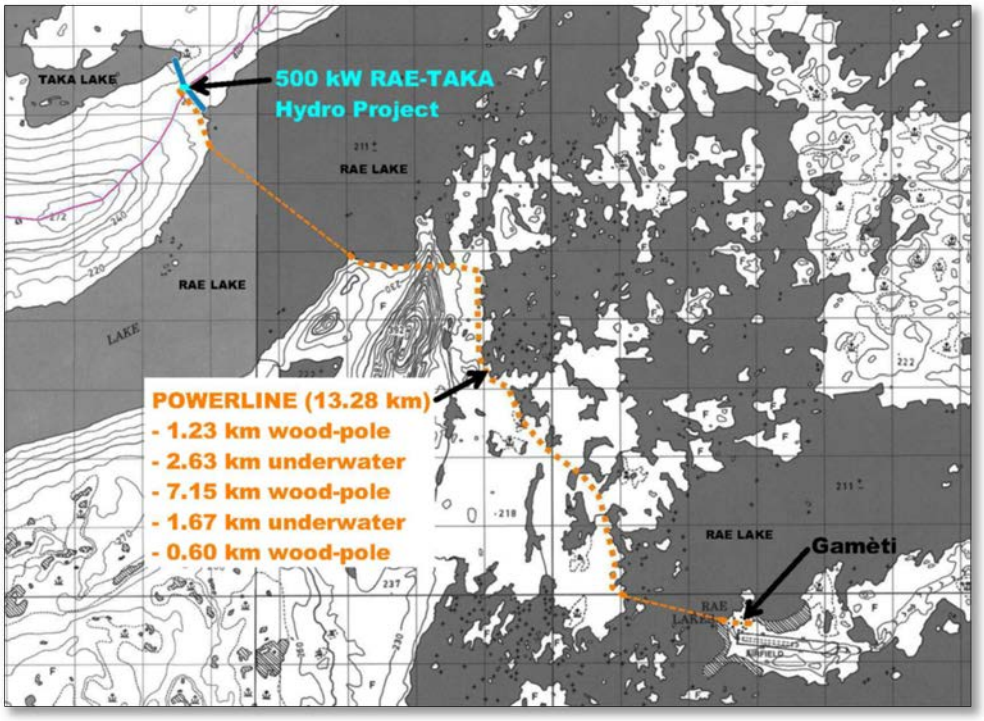

Figure 26. Proposed transmission line from Taka Lake to Gamètì for the Rae-Taka Hydro Project (PO Sjöman Hydrotech Consulting 2020).

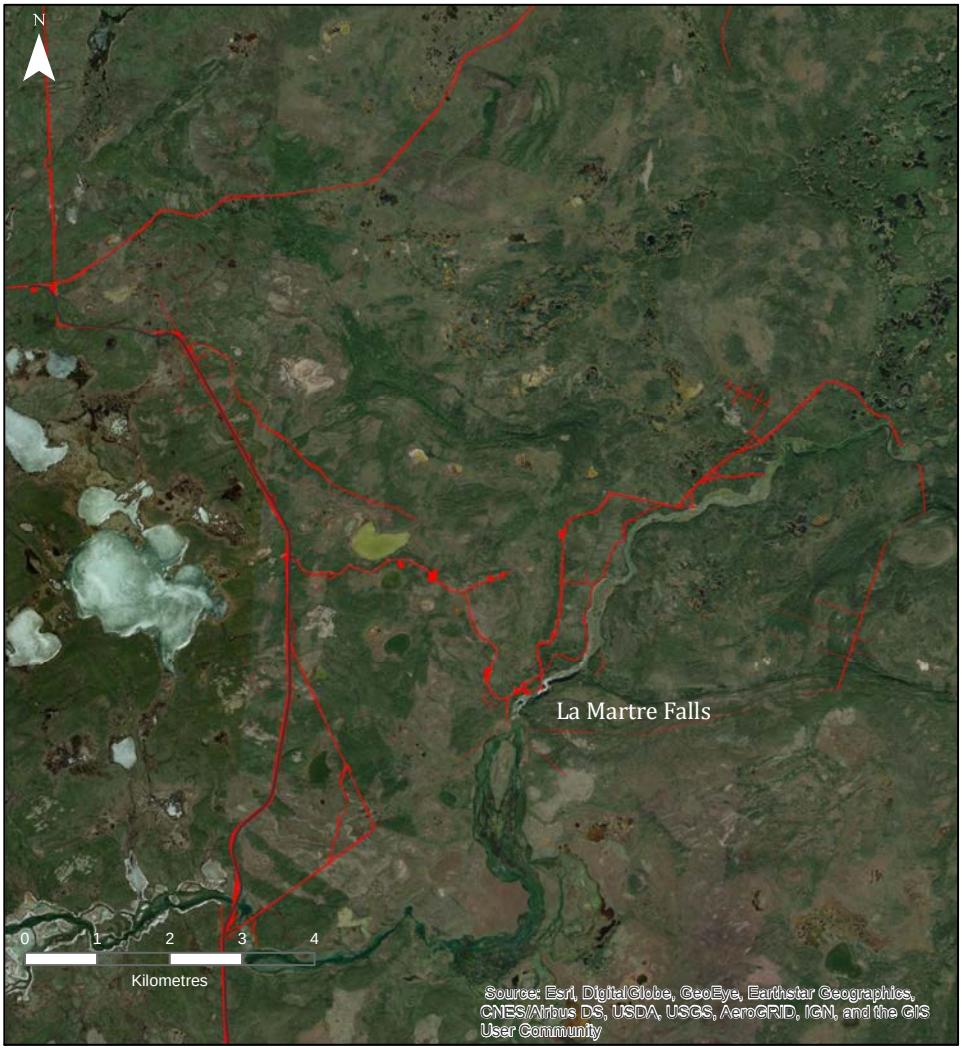

Figure 27. Current infrastructure and human disturbance features (in red) around the proposed Lac La Martre Hydroelectric Plant. Human disturbance features were based on the NWT Inventory of Landscape Change Map Viewer - Land and Water Boards permit registry database (NWT Centre for Geomatics 2013).

The site just southeast of Whatì (#2) shown in Figure 24 is the proposed site at Lac La Martre Falls. This site was studied by the community of Whatì in an attempt to cut their dependence on electricity from diesel generators; the proposed system would be powered by running water from the Lac La Martre Falls (FCM 2021).

Figure 27 above shows roads and/or trails, and geotechnical sites for investigations into the feasibility of the proposed Lac La Martre hydroelectric plant (Reference # W2010S0007). The permit for the geotechnical investigation is active, although activity at this site ended in 2016 (NWT Centre for Geomatics 2013). If the hydroelectric project commences, the infrastructure created for the investigations, and the pre-existing roads/trails, will most likely be utilized.

According to the *Northwest Territories Energy Report* (GNWT 2011), there are 27 megawatts (MW) of undeveloped potential in the La Martre River, and the feasibility of a 13 MW hydro facility on the La Martre River is currently being assessed. As of 2011, GNWT had contributed over $750,000 to this project towards site investigations, baseline environmental data, economics and project engineering and design (GNWT 2011). See Figure 28 below for location of the proposed hydro site, as well as potential transmission lines.

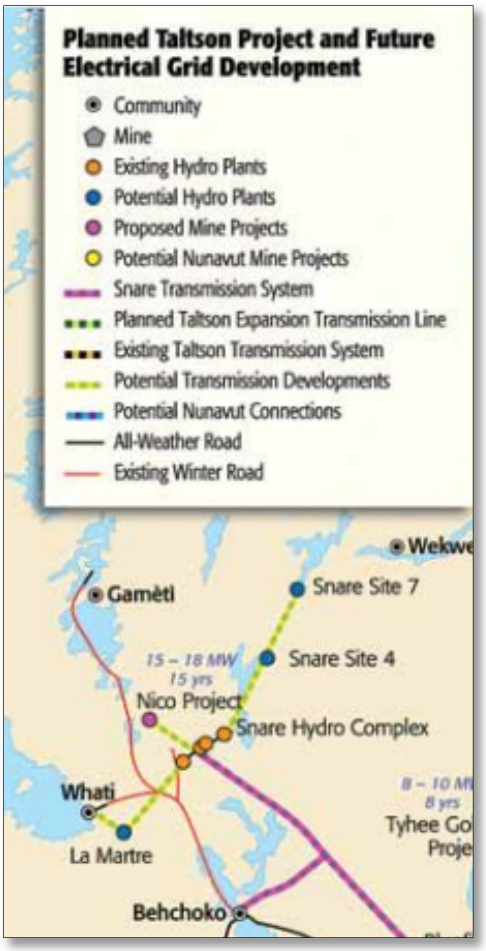

Figure 28. Future electrical grid development within the boreal caribou range of the Wek'èezhìı region. Image captured from Figure 12 within the *NWT Energy Report* (GNWT 2011).

6.4.3 Contaminated Sites

Figure 29 shows key "contaminated sites" within the Wek'èezhìı region that are adjacent to the boreal caribou range. These sites have been highlighted in the range plan due to the remediation activities that are scheduled to occur within the next 5 to 10 years (or sooner) at the time of writing this plan. Due to the proximity of these sites to the boreal caribou range (especially the Horn Plateau/Marian Lake: REX Property (1)), access to the sites may be necessary through the range and would overlap with potential boreal caribou habitat. The data points for these contaminated

sites were provided by both Crown-Indigenous Relations and Northern Affairs Canada, Contaminants and Remediation Division (CIRNAC-CARD) and the GNWT. A contaminated site is usually the result of commercial, industrial and/or waste disposal activities, which have resulted in the 'contamination' of the land. This contamination usually occurs through inadequate storage of chemicals, spills, leaks and the disposal of waste (ECCC 2012). In this case, all five contaminated sites featured in this plan were the result of mines and/or mineral exploration.

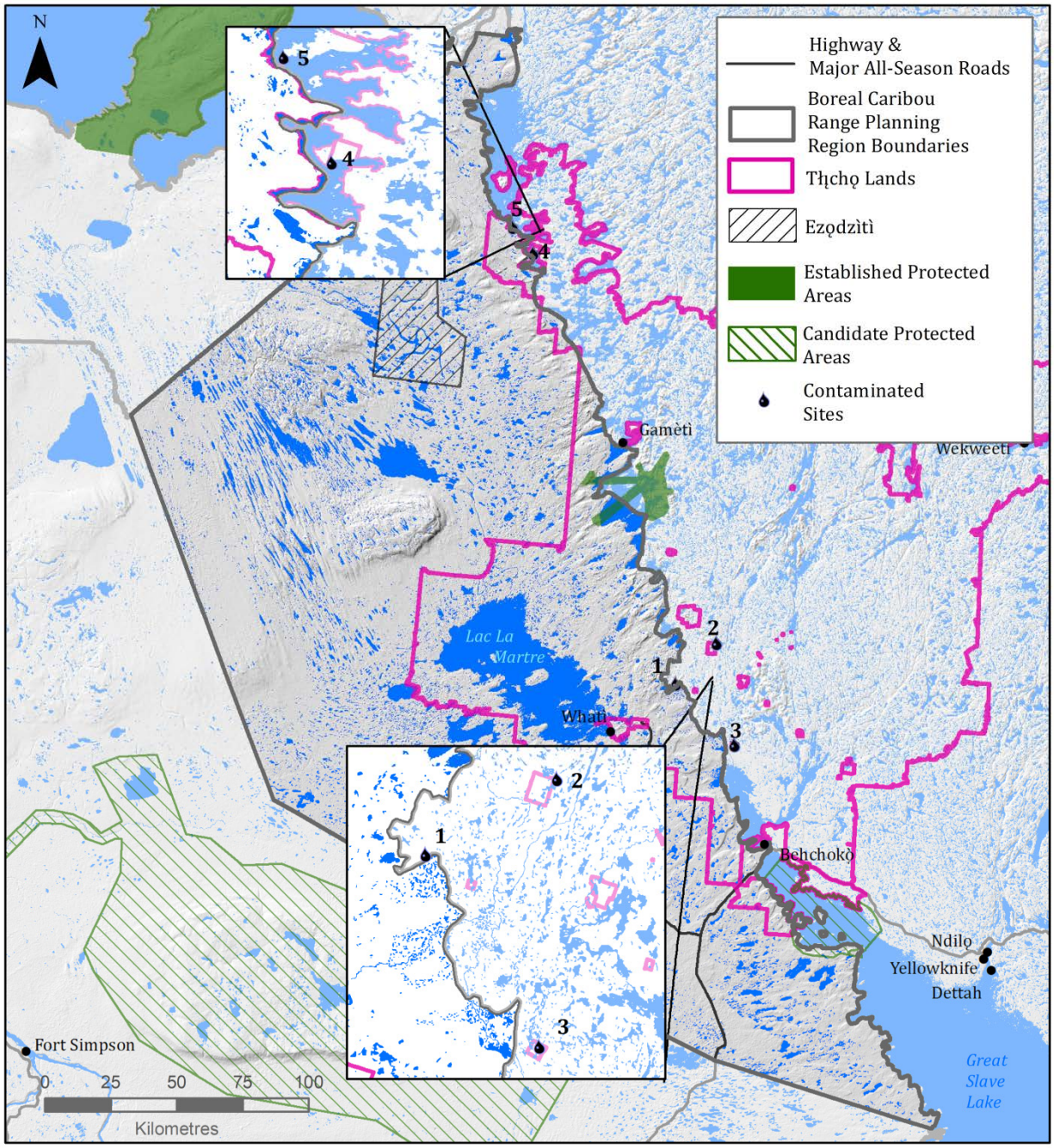

Figure 29. Contaminated sites within the boreal caribou range of the Wek'èezhìı region. See text for descriptions of sites labeled by numbers.

The five contaminated sites featured in this range plan are: The Horn Plateau/Marian Lake Area: Rex Property project (#1), Rayrock Mine (#2), the Sun-Rose Claim Group property project (#3), and the Hottah (Beaverlodge) (#4) and Indore Mine (#5) projects.

Horn Plateau/Marian Lake Area: Rex Property (#1): The Rex Property was a uranium exploration site on the North side of Sheldon Lake. Despite being named "Horn Plateau", the site is not actually on the plateau. The site was active from mid-1950 to mid-1970. A Phase 1 and Phase 2 Environmental Site Assessment (ESA) has been completed, and Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) has planned remediation funding under Phase 4 (2020 to 2024) of the the Federal Contaminated Sites Action Plan (FCSAP) (Government of Canada 2021). A Remedial Action Plan (RAP) was drafted by AECOM in 2020, on behalf of Public Services and Procurement Canada (PSPC), to remediate the entire *Kwetᶓ̨ɂaà* area, which includes the Rex Property (AECOM 2020).

Rayrock Mine (#2): Rayrock Mine was an underground uranium mine that operated from 1957 to 1959, 145 km northwest of Yellowknife. Remediation was completed at this site in 1997, and a monitoring program commenced from 1998 to 1999. However, in 2012, a Performance Assessment Report was completed which proposed new monitoring activities at the site. Most recently, the Tłı̨chǫ and Federal Governments are working together to create a plan to further remediate the Rayrock Mine and surrounding area (Kwetᶓ̨ɂaà) (Williams 2021). A Public Hearing was held April 28-30, 2021, after which the WLWB will decide whether to grant the project a water licence (until 2027) and land use permit (until 2025) to continue remediation efforts in the area (Williams 2021). Despite remediation in the 1990s, there is still considerable contamination to the land; in 2017, sampling at Mill Lake concluded that sediments within the lake were contaminated to the point where they posed potential human and environmental health risks, and an action plan to drain the lake was created in 2018 (Williams 2021). A RAP was drafted by AECOM in 2020, on behalf of PSPC, to remediate the entire *Kwetᶓ̨ɂaà*-Rayrock Mine area (AECOM 2020).

Currently, plans for monitoring the Rayrock Mine site span generations into the future; the Tłı̨chǫ Government has requested a timeline be designed by the Federal Government that provides solutions to the area that will impact it for a thousand years into the future (Williams 2021).

Sun-Rose Claim Group Property (#3): This site is a former uranium exploration site on the north side of Chico Lake. It is located adjacent to the winter road route between Marian Lake and Snare Lake Hydro junction. This site had a Phase 2 ESA completed in 2013, and is also receiving funding under Phase 4 of FCSAP for remediation. An RAP was drafted by AECOM in 2020, on behalf of PSPC, to remediate the entire *Kwetᶓ̨ɂaà* area, which includes the Sun-Rose Claim property (AECOM 2020).

Hottah (Beaverlodge) Mine (#4): The Hottah mine is a former uranium mine located approximately 100 km north of Gamètì which changed ownership several times between 1943 and 1977, and then was handed over to the Crown. The current site has unsecure mine openings (mine shaft, trenches), radiation and uranium levels in waste rock near pits, burned remains of former buildings and miscellaneous scrap (Government of Canada 2013).

Indore Mine (#5): Indore Mine is a uranium mine that operated on-and-off between 1950 and 1956. It is located 12 km from the Hottah Mine and approximately 112 km north of Gamètì. A small amount of tailings remain on the land around the site, and there is slightly elevated radioactive waste rock and sediment. In addition, there are unsecured mine openings (mine shaft and adit) as

well as remains of former buildings and dump sites, miscellaneous debris and materials containing asbestos, and elevated uranium levels in the waste rock (Government of Canada 2013).

CIRNAC completed ESAs on the Hottah and Indore Mines in 2009 followed by a period of extensive engagement with Tłı̨chǫ Leadership and Elders up to 2011. Final engineering assessment data was gathered in 2013 to finalize the remedial options selected with the Tłı̨chǫ. While the sites were briefly combined with the Great Bear Lake (GBL) Remediation Project in the Sahtú region, they have since been removed as the logistical plans for the GBL Project have been revised. The implementation schedule for Hottah and Indore Mines has not yet been finalized but the project remains a priority within the Northern Contaminated Sites Program (Pike 2021).

6.5 Renewable and Non-Renewable Resource Potential

This section contains maps of the mineral, hydrocarbon, and forestry potential within the boreal caribou range of the Wek'èezhìı region. These maps are important to the process of designating management classes, as they provide insight into where resource extraction and development may occur in the future.

6.5.1 Mineral Potential

Interim Mineral Prospectivity Map

The Northwest Territories Geological Survey (NTGS) prepared an interim mineral prospectivity map to provide an up-to-date characterization of mineral resource potential within the NT1 boreal caribou range (Figure 30). Based on the available data, mineral prospectivity of the region was categorized as follows, in decreasing order of known resource development potential:

Mines / Known Deposits – These are areas with mines, past producing mines or documented mineral resources or reserves from advance exploration. These areas are deemed to have the highest known potential mineral prospectivity.

Site Specific Data Indicating Known High Mineral Potential – These areas have strong mineral exploration results or other geoscience data products that are indicative of known high mineral prospectivity. The presence of geological structures associated with known mineral deposits or proximity to known mineral deposits, as well as geophysical targets derived from detailed airborne or ground-based geophysics, are examples of the types of data used for this classification.

Site Specific Data Indicating Elevated Mineral Potential – These areas have mineral exploration results or other geoscience data products, such as till or stream sediment sampling, that are indicative of elevated mineral prospectivity. This sort of data would typically be mineral showings, strong results from regional sampling programs or the presence of geological structures conducive to the formation for mineral deposits.

Regional Data Indicating Elevated Mineral Potential – These areas have regional geoscience data, such as airborne geophysics, or geologic data that are indicative of a broad region of elevated mineral prospectivity.

Regional Diamond Potential – Includes areas where available data indicates that lithospheric thickness is compatible with the presence of diamond deposits. Note that this underlies the entire NT1 boreal caribou range.

Mineral Showings within the boreal caribou range are also presented in Figure 30. Mineral showings are drill sites and reconnaissance that resulted in mineral veins being discovered. The minerals in these showings are mostly uranium in the central and north of the boreal caribou range, and copper and iron in the south near Great Slave Lake.

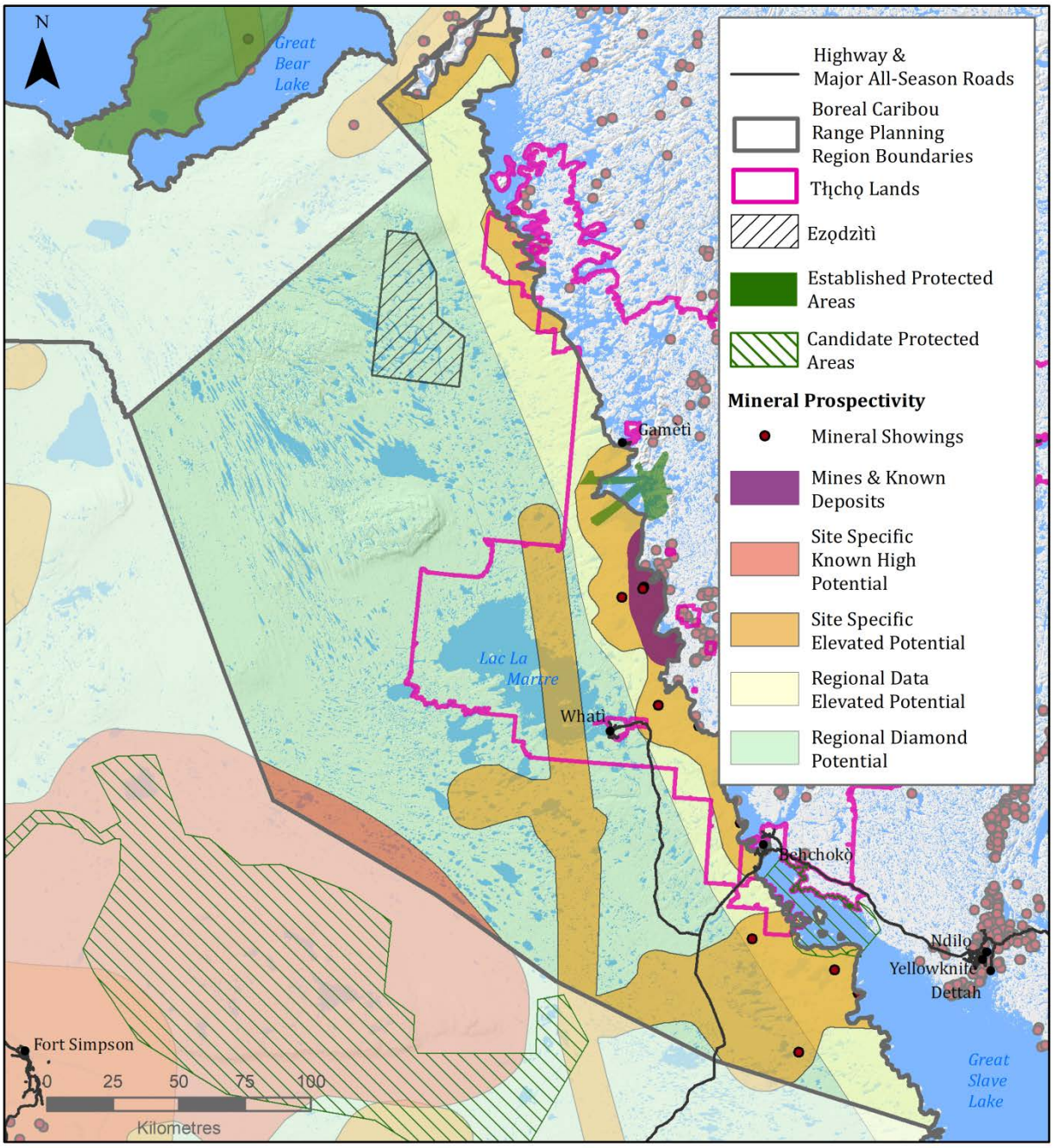

Figure 30. Mineral prospectivity for the boreal caribou range of the Wek'èezhìı region. Data provided by NTGS Office in April 2021.

6.5.2 Aggregate Potential (for quarries and borrow sources)

There is an ongoing project conducted by the NTGS which researches the occurrence of "Industrial Minerals" in the NWT. Industrial minerals include limestone, sand, granite and carving stone. The project aims to document the occurrence of industrial minerals, and suggest possibilities for their development, either based on inquiries from potential excavators, or as a response to current or

projected industrial needs. Although this project is new, maps on limestone and silica have already been completed (see Figure 31 below). Further studies will focus on salt, mica, graphite and pegmatite (NTGS 2021a).

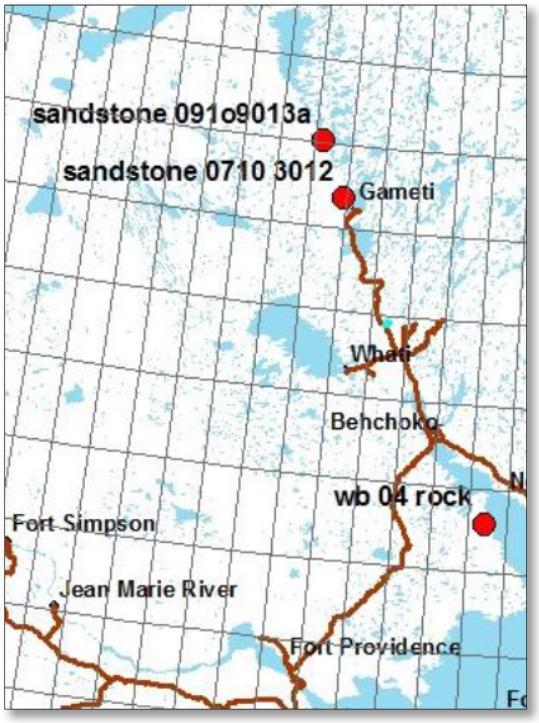

Figure 31. Sandstone samples taken in the NT1 range during 2013 Sampling Program. Image captured from Figure 26 in the *Preliminary Investigation of Silica Resources of the Northwest Territories* report (Watson 2014).

Figure 31 shows sample locations (sandstone 091o9013a & sandstone 07103012) of sandstone taken in 2013 in the Gamètì, Hardisty Lake Area (Watson 2014). According to the report, due to the structure and attributes of the sandstone (i.e., fineness, angularity, impurity) they are low grade and not thought to be suitable for most "high-silica" applications. However, they are useful for construction, playgrounds or as traction sand (Watson 2014).

Figure 32 below shows the locations of giant quartz veins that are of "unusual size" (Watson 2014). The veins are up to 300 m wide and extend laterally up to 50 km. The veins are mostly quartz, but in some places contain other potentially economic minerals, and it is possible that high-silica materials could be produced from the veins. However, due to the processes that would need to be employed to extract the economic minerals, it is unlikely that it would be profitable to do so (Watson 2014).

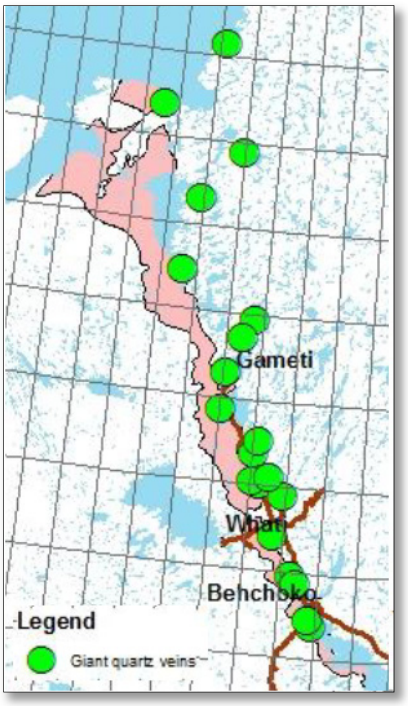

Figure 32. Location of giant quartz veins in NT1 region. Image captured from Figure 34 in the *Preliminary Investigation of Silica Resources of the Northwest Territories* report (Watson 2014).

6.5.3 Oil and Gas Potential

As shown in Figure 33, conventional hydrocarbon play potential has not been mapped for the Wek'èezhìı region at the time of writing this plan. The Southern NWT and Sahtú regions, however, have many areas of Moderate to High hydrocarbon potential adjacent to the Wek'èezhìı boreal caribou range planning area.

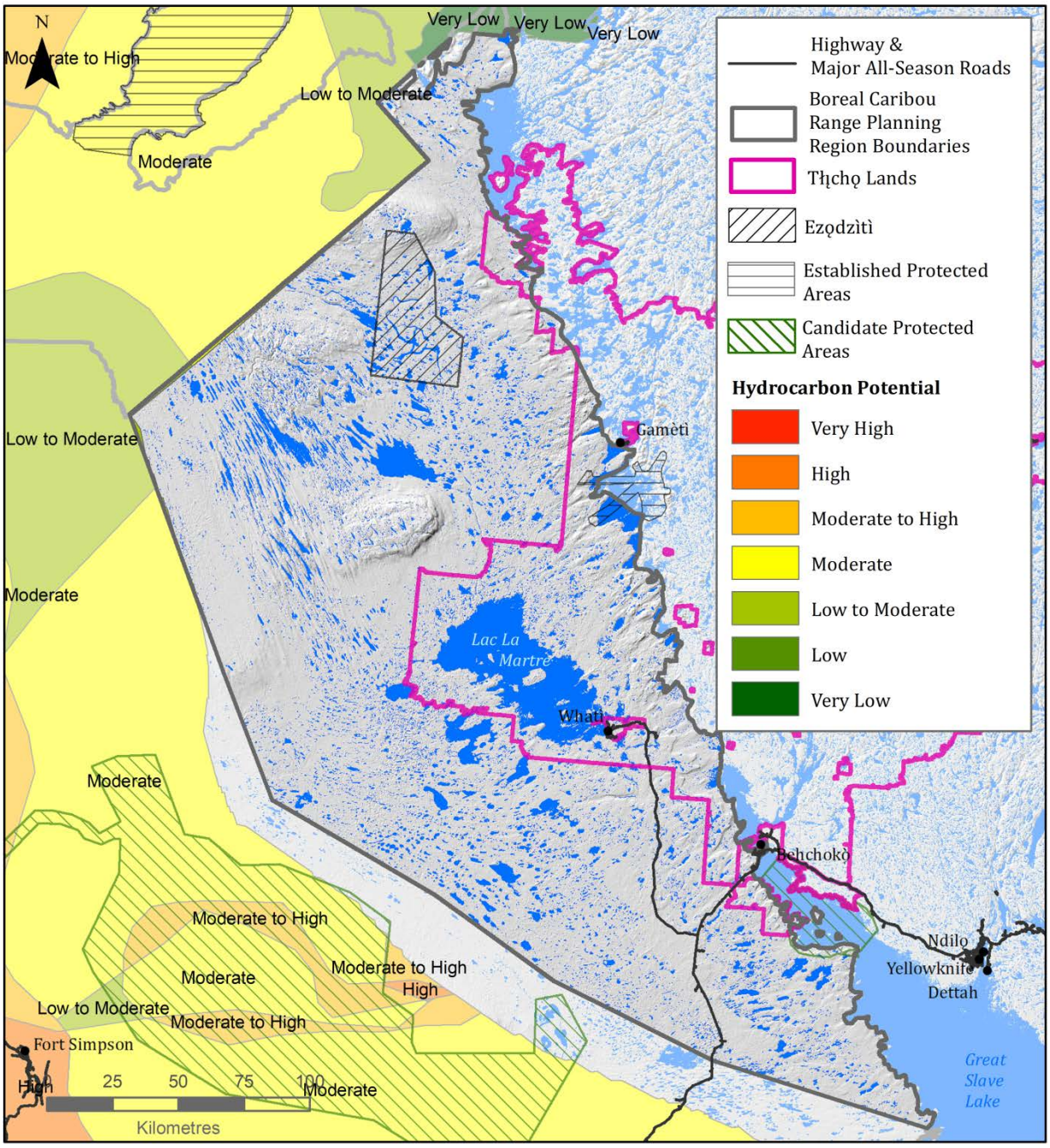

Figure 33. Conventional hydrocarbon potential within the NT1 boreal caribou range of the Wek'èezhìı region (data from Gal and Udell 2005).

6.5.4 Forestry Potential

Areas with available Forest Vegetation Inventory (FVI) data were used to describe forestry potential within the Wek'èezhìı region (Figure 34).

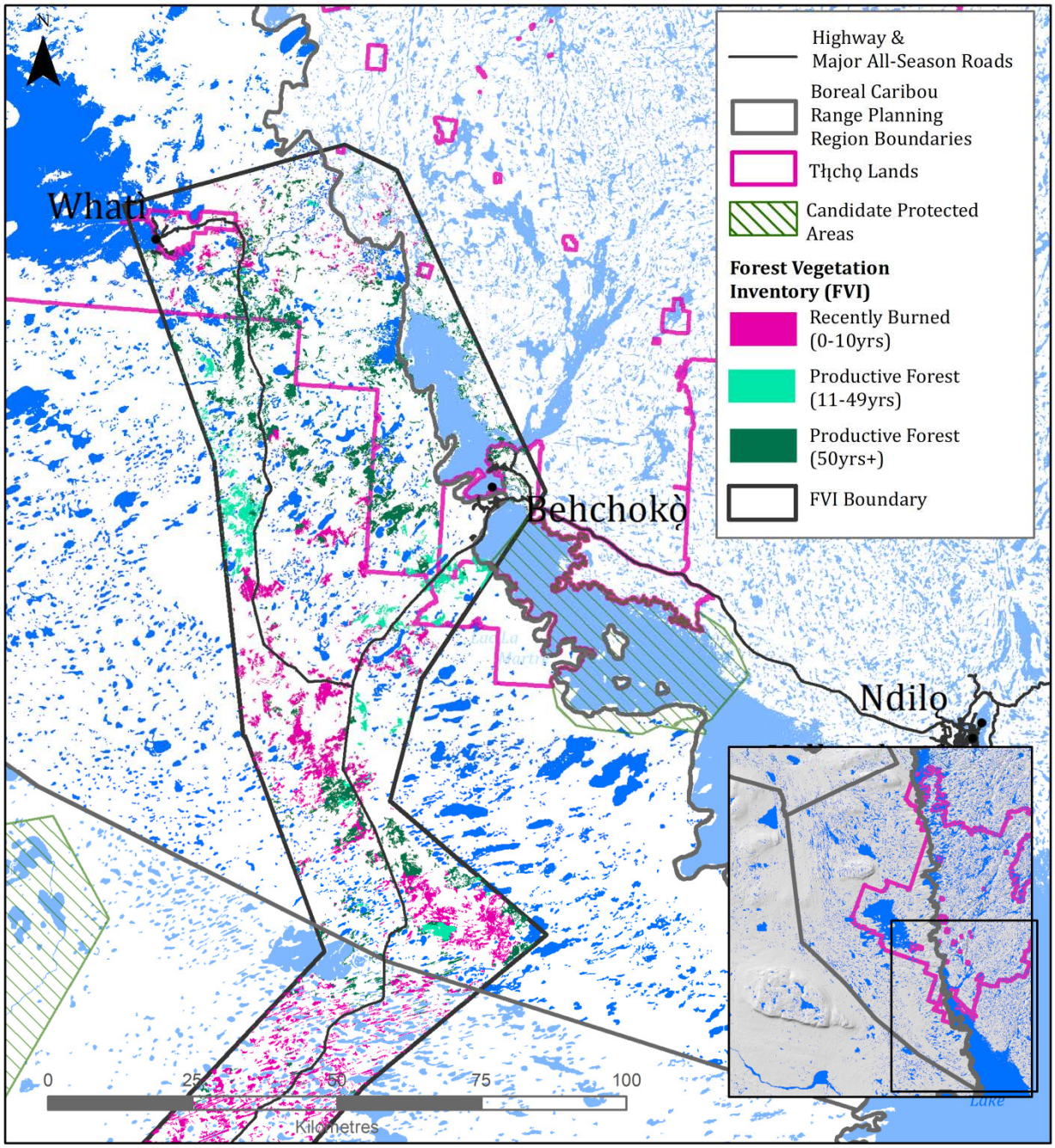

Figure 34. Areas with high forestry potential in the Wek'èezhìı region.

The purpose of this inventory is to provide information for timber supply analysis and to guide forest development activities. A FVI is typically conducted on areas where there is capacity for commercial timber harvest or local use, where there are potential development concerns that must be addressed in more detail, or where there is a need for more information on forest vegetation for other purposes (ENR 2021b). The FVI data in the Wek'èezhìı region was originally created in 2011 and stand ages were updated by overlaying recent fires in the region, and recalculating stand ages

current to 2021. To characterize forestry potential, forest stands were first broken down into "productive" and "unproductive" forests. "Productive" forest stands were defined as those with a minimum Site Index value of 8 (which means stands have a height of at least 8 m at 50 years) and a minimum crown closure of 30%. Productive forest stands were then broken down into three age categories: Recently burned (≤10 years old, currently suitable for salvage harvesting); 11-49 years old (will be suitable for timber harvesting in the future); and ≥50 years old (currently suitable for timber harvesting). Unproductive forest stands and non-forested polygons within the FVI were assumed to have little potential for commercial forestry.

Firewood Harvesting Areas

Please see Figure 23 in Section 6.3 for active cut block areas in the boreal caribou range of the Wek'èezhìı region. There is no large-scale commercial harvesting of trees within the boreal caribou range of the Wek'èezhìı region at this time.

6.5.5 Geothermal Potential

Figure 35 shows the geothermal potential of the boreal caribou range within the Wek'èezhìı region. Geothermal energy is thermal (heat) energy that is generated and stored in the earth. It is created when uranium, thorium and potassium radioactively decay in the earth's crust, and flow to the earth's surface. Geothermal energy is a clean energy source that can be used in power generation, heating buildings, and natural bath spas (NTGS 2021b). The area west of Whatì, adjacent to Lac La Martre and going south to the border of the region, has high potential as a geothermal energy source. No geothermal energy projects are currently being investigated for the region (GNWT 2011).

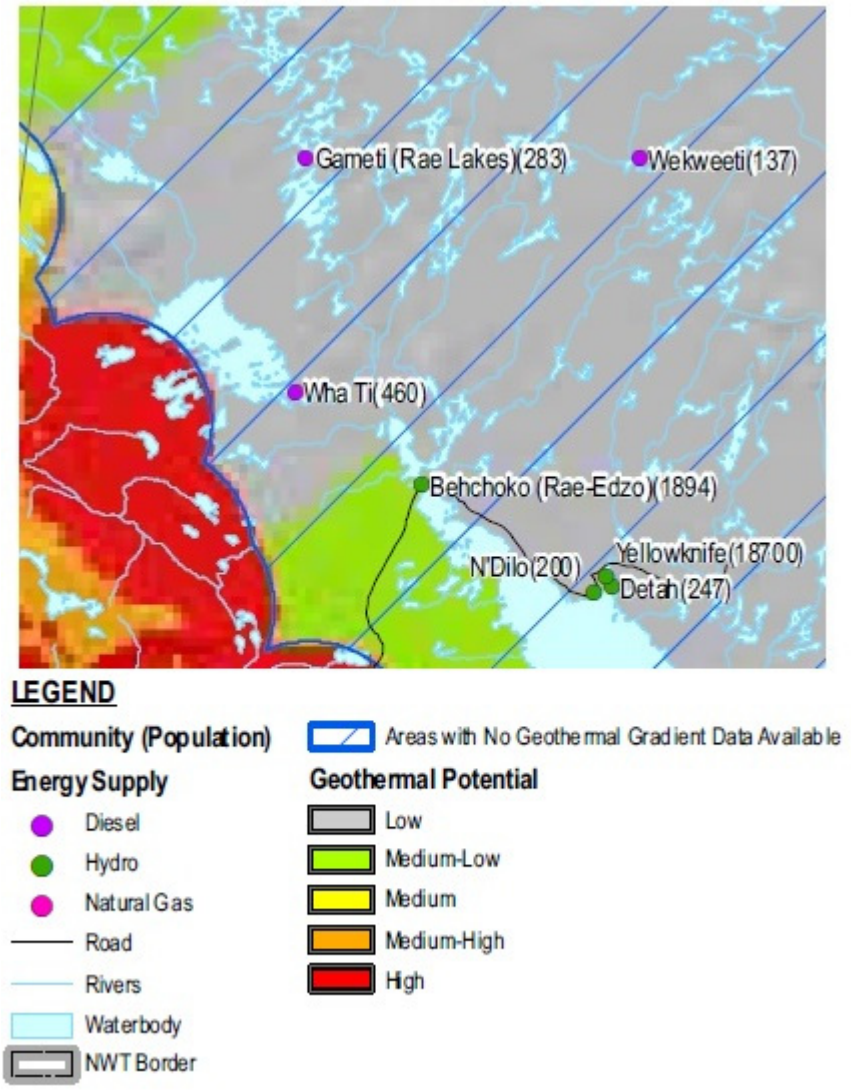

Figure 35. Geothermal favourability in the NT1 range, taken from larger Geothermal Favourability Map from the Geothermal Energy Resources fact sheet (GNWT 2011).

6.5.6 Tourism

The only tourism outfitter in the boreal caribou range of the Wek'èezhìı region is Lac La Martre Adventures (LLMA) near Whatì. LLMA is a fishing lodge located on an island in Lac La Martre. LLMA is strictly catch-and-release, and less than 200 tourists are allowed to stay at the lodge per year.

7. MANAGEMENT CLASSES

7.1 Mix of Management Classes Recommended by the Framework

As discussed in Section 5, the level of human disturbance in a range planning region determines which Tier (ranging from 1-3) that region falls within (see Table 3). This in turn informs which combinations of management classes (Basic, Enhanced and Intensive) should apply to that region (see Table 9). For a region falling into Tier 1 – such as Wek'èezhìı – the Framework recommends that that range plan needs at least one third of the area in the more robust Enhanced class and up to two thirds of the area can be assigned to the Basic management class. If habitat is designated in the Basic management class, development activities in that area would typically be subject to the standard requirements already in place. For habitat assigned to the Enhanced or Intensive classes, more stringent management actions in these areas are required. The management classes assigned to a region are established by comparing the current human disturbance relative to regional human disturbance thresholds (in other words, the Tier in which the region falls).

Table 9. Illustration of how human disturbance thresholds and relative habitat importance are used to determine Basic (green), Enhanced (yellow) and Intensive (red) management classes that apply to a given region. Reproduced from Table 2 in the Framework.

Human disturbance thresholds	Relative importance of an area for Boreal Caribou		
	Low	Medium	High
Tier 3	*Basic*	*Enhanced*	*Intensive*
Tier 2	*Basic*	*Enhanced*	*Enhanced*
Tier 1	*Basic*	*Basic*	*Enhanced*

Maps displaying areas considered important for boreal caribou, combined with other factors such as development interests, protected areas etc., are used to guide where and how the management classes are delineated within a region. Typically, Enhanced and Intensive areas should be applied to areas that are of higher importance to caribou. As part of this process, TK and local knowledge have played an integral role in delineating management classes within the Wek'èezhìı range planning region.

In regions that fall within Tier 1, it should be noted that the assignment of only one third of habitat in the Enhanced management class is a minimum requirement, but a more protective range plan could be proposed based on consensus of the regional working group. Existing land use management zones (e.g., Cultural Heritage Zones or Habitat Management Zones on Tłı̨chǫ land), and protected areas, which prohibit many types of land use, could correspond to or exceed the requirements of an Intensive management class area. As such, for Tier 1 regions like Wek'èezhìı, it is possible that more than the minimum one third of habitat may be assigned to the Enhanced class,

and/or there may be areas assigned to the Intensive class even though Tier 1 regions do not require it.

7.2 Map of Management Classes (Basic, Enhanced and Intensive)

To delineate management class areas for the interim Wek'èezhìı range plan, Marxan (Ball et al. 2009) was first used to explore four different scenarios that considered:

1) Habitat importance for boreal caribou based on western science information (Caribou-centric; same approach used to delineate important areas for caribou described in Section 5.4.2);
2) Habitat importance + protected areas and certain TLUP zones locked-in;
3) Habitat importance + cost (development potential); and,
4) Habitat importance + cost + protected areas locked-in.

The methods for running these scenarios in Marxan and interpretation of the results are explained in detail in Appendix E. In Scenarios 2 and 4, existing and candidate protected areas (including Ezǫdzìtì), as well as Cultural Heritage, Habitat Management, Land Use Exclusion, and Traditional Use zones from the TLUP were "locked-in" to the Marxan solutions, meaning that Marxan always had to select planning units that fell within these areas in its solution. The rationale for Scenarios 2 and 4 was to explore the selection of existing land protections to use as Enhanced management areas in the range plan. The "cost" layer used in Scenarios 3 and 4 was a representation of resource development potential in the region that considered resource potential for forestry, minerals and oil and gas, as well as regulatory access to resources (i.e., where there is active resource tenure or areas that permit exploration and development of these resource sectors) and proximity to infrastructure like all-season and winter roads. In Scenarios 1-4, 5 km^2 planning units selected by Marxan in more than half of the 600 runs performed for each scenario were converted into Enhanced management areas.

Because TK and habitat connectivity based on movements of boreal caribou were not directly considered in Marxan, two further scenarios were developed by manually editing the results of Scenario 1. Scenario 5 added planning units in the Enhanced management class where they overlapped with areas identified as Essential Habitat by the Tłı̨chǫ (Figure 14), as well as polygons for important habitat identified by the NSMA (Figure 16). Habitat connectivity within the Wek'èezhìı range planning area was considered by adding further planning units to the Enhanced management class where they coincided with obvious movement corridors between Enhanced management areas identified in Scenario 1, based on the movement paths of collared caribou (see Appendix E and Figure E-13 for further details). Scenario 5 was the most conservative in terms of the percentage of the region in Enhanced management areas (51.8%).

Since the Framework recommended that a minimum of 1/3 of the region be placed in Enhanced management areas, Scenario 6 was developed to try and scale back (reduce) Scenario 5 closer to the amount of area in Enhanced management in Scenario 1 (39.3%). This was done by manually editing Scenario 5 to convert planning units in Enhanced areas to Basic management, where planning units met the following criteria:

- Planning units along edges of Enhanced polygons in the northern part of the region that were less frequently selected by Marxan (based on 'Super Sum' solution selection frequency; see Appendix D) or had lower RSF values across all seasons.
- Planning units in Lac La Martre that were mostly water and had no collar data movement paths.
- Planning units with high forestry or mineral potential and low number of caribou movement paths, mostly along the TASR corridor.
- Planning units south of Lac La Martre and east of the TASR that were below the raised plateau west of Marian Lake and had a low number of movement paths.
- Planning units that intersected with the 60 m rights-of-way of the TASR and Highway 3, except where planning units overlapped with 1 km segments along the TASR that had high numbers of caribou road crossings (concentrated movement corridors).

These edits resulted in Scenario 6 having 41.5% of the range planning region in Enhanced management areas.

Scenarios 1-6 were then compared based on a number of caribou indicators and development indicators to assess which scenario might provide the best balance between caribou habitat protection and economic development opportunity (see Appendix E, Figures E-15 to E-20, and Table E-2).

The Wek'èezhìı range plan working group explored Scenarios 1-6 at the May 19-20, 2021 meeting, and then decided on a preferred scenario to move forward with to make further adjustments. The working group discussed the pros and cons of each scenario and tried to come to consensus on a preferred scenario to use to make further manual adjustments. The Wek'èezhìı working group collectively decided that the interim range plan should begin with a more conservative approach, and therefore Scenario 5 was preferred because it included TK and connectivity among important areas for caribou, and was the most protective for boreal caribou overall. At a previous meeting of the working group (April 21-22, 2021), it was agreed that areas repeatedly used by boreal caribou for calving (e.g., islands and peninsulas in Lac La Martre and along the shoreline of Great Slave Lake) should be classified as Intensive management areas. The Tłı̨chǫ Government requested that the entire area that was identified as Essential Habitat during their December 2020 TK gathering workshops (see Figure 14) should be classified as an Intensive management area, as most of this area includes important calving habitat. There was also much discussion about the importance of the shoreline and islands along the North Arm of Great Slave Lake and Whitebeach Point area due to their use by boreal caribou for calving sites and for relief from insects during the summer season. The working group agreed that planning units along the shoreline of the North Arm and overlapping with the candidate Dınàgà Wek'èhodì, as well as Whitebeach Point and areas just to the south, should be classified as Intensive management areas.

Using Scenario 5 as a starting point, these adjustments were made to come up with Scenario 7 (Appendix E, Figure E-21). These adjustments resulted in Scenario 7 having 52.8% of the region in Enhanced/Intensive management areas. The working group then discussed ways to scale back Scenario 7 to bring the amount of area in Enhanced/Intensive management back down again, such

as by converting Enhanced areas in the northern part of the region that overlapped recent fires back to Basic management. This was essentially the same type of adjustment that was made to come up with Scenario 6, so it was decided to take Scenario 6 and incorporate the same Intensive management areas from Scenario 7. This resulted in Scenario 8 (Appendix E, Figure E-22) which is the final map of management class areas that the working group came to consensus to put forward in the final draft of the interim Wek'èezhìı range plan. Scenario 8 had a total of 45% of the region in Enhanced (30%) and Intensive (15%) management areas.

Using Scenario 8, the boundaries of Enhanced and Intensive management areas were then smoothed in ArcGIS to eliminate the jagged edges created by the hexagonal planning units used in Marxan. Further edits were made to capture islands within the Intensive management area in the North Arm and Whitebeach Point area of Great Slave Lake that are used for calving, which are outside the current NT1 range boundary. A minimum 1 km wide corridor along each side of Highway 3 and the TASR (i.e., 2 km minimum width) were left as a Basic management area to allow for ongoing activities related to road construction and maintenance (e.g., accessing borrow sources). The final map of management class areas is presented in Figure 37. Enhanced and Intensive management areas account for 45% of the region (Table 10).

Table 10. Spatial summary of final management class area delineation for the interim Wek'èezhìı Boreal Caribou Range Plan.

Management Class	Number of Areas	% of Wek'èezhìı Range Planning Region	Minimum Patch Size (km^2)	Average Patch Size (km^2)	Maximum Patch Size (km^2)
Basic	6	55	0.2	4,588.8	15,293.8
Enhanced	7	30	40.4	2,141.4	9,765.9
Intensive	2	15	681.7	3,700.0	6,718.3
Grand Total	**15**	**100**	**0.2**	**3,328.2**	**15,293.8**

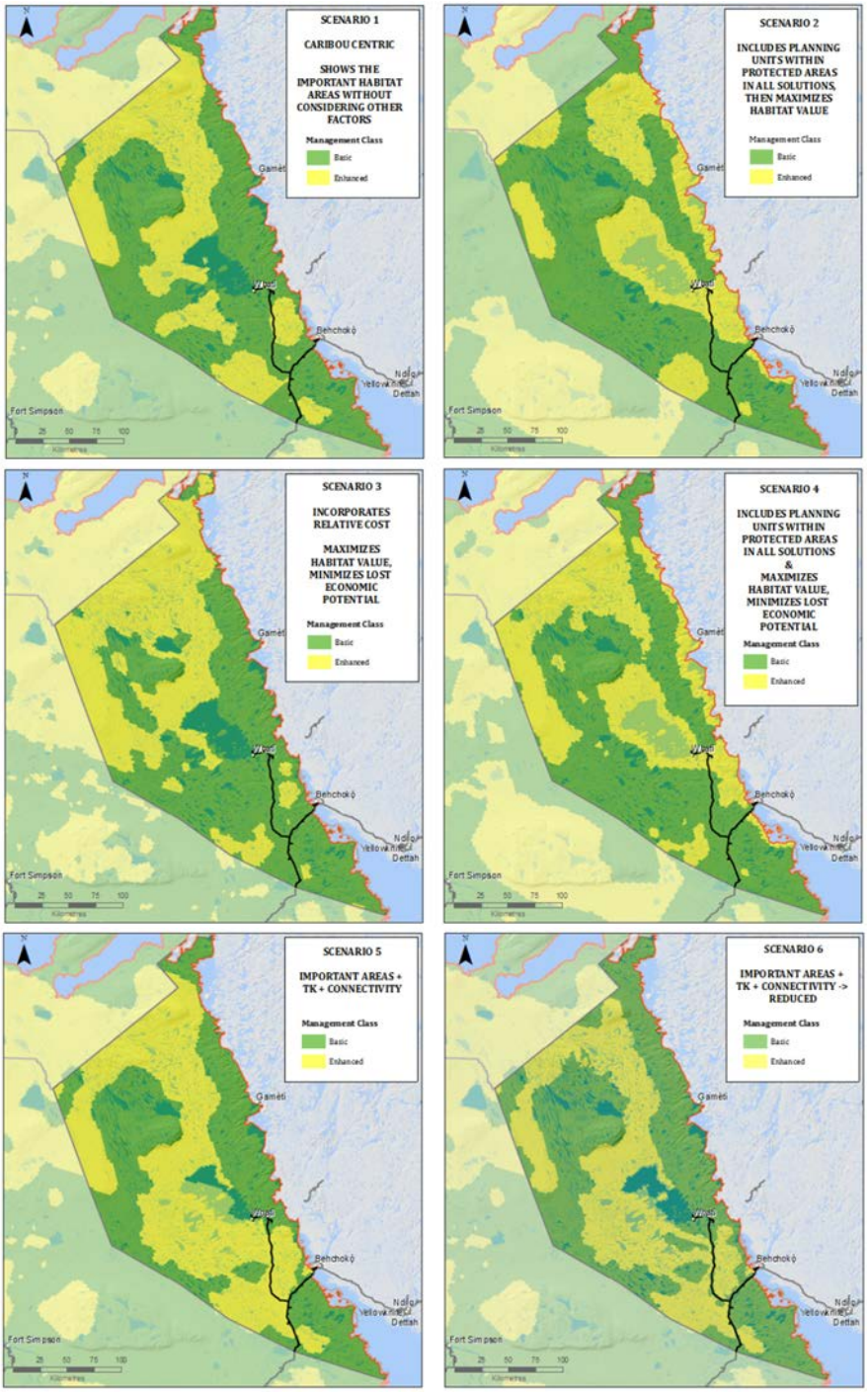

Figure 36. Range plan management class scenario maps based on Marxan analyses (Scenarios 1-4), and manual adjustments to include Traditional Knowledge and connectivity between patches (Scenarios 5-6).

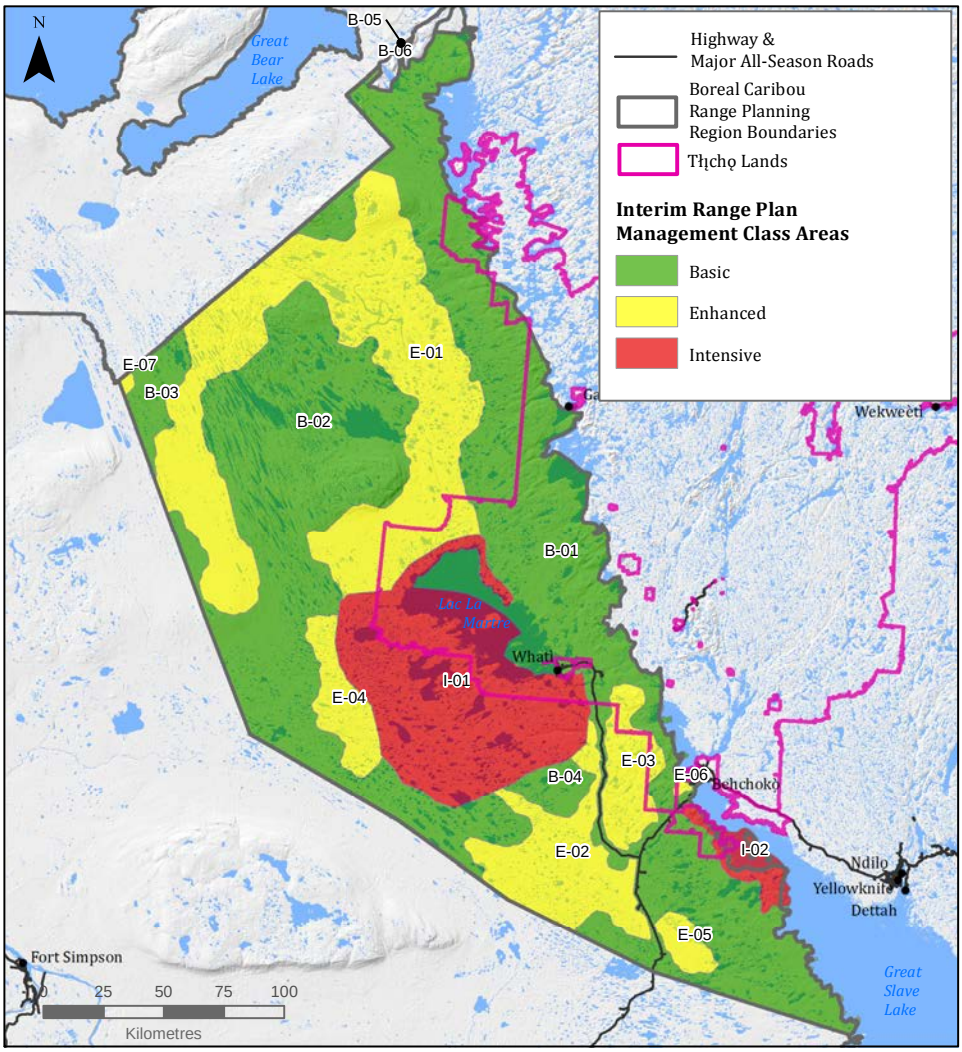

Figure 37. Final map of management class areas for the Interim Wek'èezhìı Boreal Caribou Range Plan. Management class areas are labeled by the type of area (B=Basic, E=Enhanced, and I=Intensive) and a number.

7.2.1 How Management Classes Impact Development Interests

The following section describes how current development interests, planned development projects and areas of higher resource development potential overlap with Basic, Enhanced and Intensive management areas. It is important to note that, as described in Section 8 of the plan, development is not prohibited within Enhanced or Intensive management areas, but will be subject to more stringent management requirements to limit habitat and sensory disturbance to boreal caribou.

Active Land Uses/Leases

Within the boreal caribou range of the Wek'èezhìı region, only one group of active mining leases and mineral claims overlap with an Intensive management class area (area I-02), which are mining

leases and mineral claims belonging to Explor Silica Ltd. and the initial interest owner for the Chedabucto Silica Properties. The intensive area around the mining leases and mineral claims is the Whitebeach Point area, which has been designated as an Intensive management area due to the boreal caribou calving habitat along the shoreline and on the adjacent islands. Further TK about this area will be documented through future work with the YKDFN which will be considered in the full Wek'èezhìı Boreal Caribou Range Plan.

Any land use activities that are currently permitted or licenced (i.e., land uses that have active land use permits and/or water licences), or for which permit or licence applications have already been submitted at the time the interim range plan is formally approved, will be exempt from the management actions identified in this plan. See Section 8 for Management Actions necessary for potential mineral extraction activities within Intensive management classes.

Mineral Potential

There are some areas of higher mineral development potential which overlap with Enhanced and Intensive management class areas (see Figure 38 below), but much of the area of higher mineral potential along the eastern edge of the range boundary is captured within a Basic management area. Some of the "Site Specific Elevated Potential" areas to the west of Whatì, west of Highway 3, and along the North Arm of Great Slave Lake fall within Enhanced and Intensive management class areas. In addition, there is a "Regional Data Elevated Potential" area along the North Arm of Great Slave Lake that overlaps with the Intensive management class around the Whitebeach Point area.

Management actions applied in the Enhanced and Intensive classes are intended to help ensure no net loss, or a net gain, in the amount of undisturbed boreal caribou habitat within those areas due to anthropogenic activities over the long term – they are not intended to strictly prohibit development. See Section 8 for Management Actions necessary for potential mineral extraction activities within Enhanced and Intensive management classes.

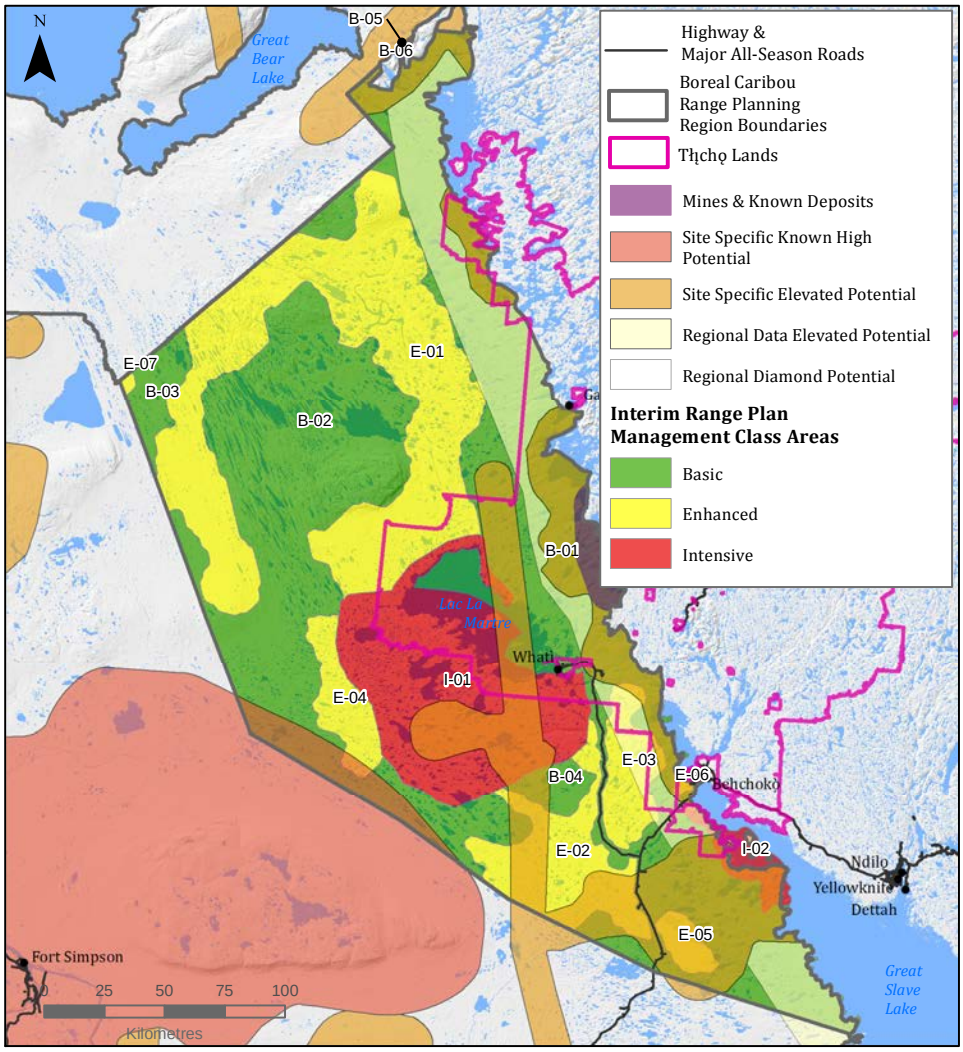

Figure 38. Overlap of mineral prospectivity map with Basic, Enhanced and Intensive management areas in the interim range plan.

Forestry Potential

Much of the "Productive Forest" (see Section 6.5.4 for description of how productive forests were defined) shown in Figure 39 below is located within Enhanced management class areas (E-02, E-03, and E-05), a smaller portion in Intensive management areas (I-01, and I-02). The Enhanced areas to the east and west of the TASR alignment capture both areas of high habitat suitability and connectivity corridors between those patches based on collared caribou movement paths. Subject to the management actions outlined in Section 8 of the plan, commercial timber harvesting is possible within Enhanced management areas, and salvage logging is possible within Intensive management areas. There is currently one small commercial timber harvesting operation within the Wek'èezhìı range planning region owned by Sands Enterprises (see Section 6.3.7). Areas of

productive forest also remain with the Basic management class area along Highway 3 and the TASR, the west side of Marian Lake and around the communities of Whatì and Behchokǫ̀.

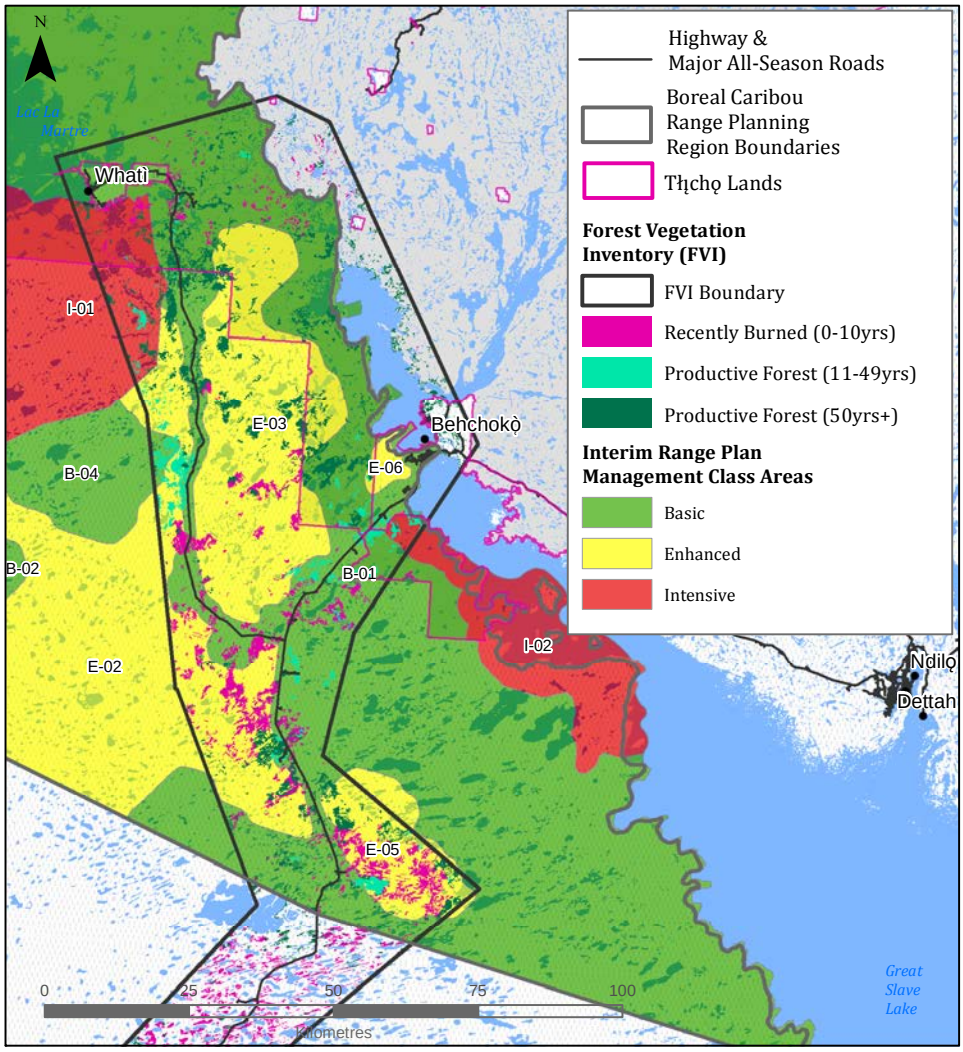

Figure 39. Overlap of areas with higher forestry potential with Basic, Enhanced and Intensive management areas in the interim range plan.

Planned Infrastructure

The potential hydroelectric projects and NICO Mine Access Road are all located within Basic management class areas in the Wek'èezhìı boreal caribou range planning area.

Remediation Projects

All of the remediation projects currently underway or scheduled within the Wek'èezhìı boreal caribou range planning area fall within Basic management class areas.

Geothermal Potential

Areas of high geothermal potential fall within Enhanced and Intensive management class areas within the Wek'èezhìı boreal caribou range planning area. However, there are no geothermal energy projects currently being investigated for the region.

8. MANAGEMENT ACTIONS

8.1 Management Actions

This section describes management actions that are designed to avoid, minimize, restore or offset disturbance of boreal caribou habitat. Rather than defining specific management actions that only apply in specific management class areas, the management actions listed in the tables below are to be applied in all areas of each management class type (Basic, Enhanced or Intensive) identified in the interim range plan.

Management actions applied in the Enhanced and Intensive classes (yellow and red boxes, respectively) are intended to help ensure no net loss, or a net gain, in the amount of undisturbed boreal caribou habitat within those areas due to anthropogenic activities over the long term. To achieve this, the management actions are designed to:

- require developers to demonstrate that any new habitat disturbance is avoided or minimized to the greatest extent possible through means such as re-use of existing disturbance features;
- require that any unavoidable new long-term habitat disturbance proposed in Enhanced and Intensive class areas must be offset through actions such as off-site restoration or other means; and,
- require more stringent standards for on-site restoration of newly disturbed areas once projects are completed to help ensure that they are put on a successional trajectory to return to pre-disturbance conditions as quickly as possible.

It is understood that it may take several decades to restore biophysical attributes of boreal caribou habitat on disturbed sites, and thus off-site restoration may not immediately compensate for new disturbance. Offsets will typically be required over a larger area than the new disturbance from a project so that, over the long term, the pace of habitat restoration should exceed that of new disturbance resulting in a net gain in undisturbed habitat.

The management actions in the following sections and tables are grouped according to a standard mitigation hierarchy, which seeks to (a) avoid new disturbance, then (b) minimize necessary new disturbance as much as possible, and lastly (c) restore and/or offset any residual disturbance. Management actions to address sensory disturbance to boreal caribou have been included in Table 14, and Table 16 includes additional actions for managing wildfire disturbance.

The tables are focused on the four primary development sectors that have the potential to affect the greatest area of the NT1 range – oil and gas (including geophysical exploration), forestry, linear infrastructure (roads, pipelines and utility corridors, including associated borrow sources and quarries), and mineral exploration and mining. Management actions related to sensory disturbance are intended to apply to all development sectors. Other sectors that contribute less to the human disturbance footprint can be added to future versions of the range plan if needed.

8.2 Activities Exempt from Range Plans

Any land uses or activities that are permitted or licenced (i.e., uses existing on the land currently or that are under construction), or for which permit or licence applications have already been submitted at the time the interim range plan is formally approved, will be exempt from the management actions identified in this plan. However, activities that require new permits or approvals (e.g., new activities on the land), or activities that require permit or licence renewals, where such activities will be substantially modified from those allowed under existing permits/licence, will be required to comply with the interim range plan.

Any activity that is below the threshold for requiring a Land Use Permit under the *Mackenzie Valley Land Use Regulations* is exempt from the management actions in this interim range plan, except for those pertaining to mitigation of sensory disturbance from the use of aircraft.

Similar to the TLUP, some activities will be exempt from the management actions listed in the interim range plan when carried out on Territorial public lands or Commissioner's lands. These include: the exercise of Aboriginal and/or Treaty rights to harvest and activities incidental to such rights, such as travel over land and development and use of cabins.

8.3 Management of Sensory Disturbance

Although the management actions outlined in the tables below primarily focus on avoiding, minimizing, restoring and offsetting habitat disturbance, additional actions have been included in Table 14 to address sensory disturbance to boreal caribou during the most sensitive seasons. GNWT is in the process of developing guidelines for development projects in boreal caribou habitat that will contain further specific guidance for mitigating sensory disturbance. Developers are encouraged to consult the guidelines, once they become available, prior to applying for licences or permits.

The calving, post-calving, and late winter activity periods are considered to be when boreal caribou have the highest sensitivity to sensory disturbance. Exploration and development activities should be avoided during these periods when caribou are most sensitive (i.e. at highest risk periods) to the greatest extent feasible (Table 11).

Table 11. Sensitivity of boreal caribou to sensory disturbance during different activity periods.

Season	Activity Period	Date Range[1]	Sensitivity	Caribou Ecology / Rationale
Winter	Early Winter	1 Dec - 25 Jan	Lowest	Boreal caribou are beginning to shift towards greater use of older forest/wetland habitats, but have relatively high daily movement rates.
	Mid Winter	26 Jan - 15 Mar	Medium	Movement rates are decreasing and habitat use focused mostly in conifer forests/wetlands that haven't burned in >40 yrs.
	Late Winter	16 Mar - 1 Apr	**Highest**	Lowest daily movement rates; caribou in largest groups at this time of year; narrow range of habitat types selected (conifer forests/wetlands that haven't burned in >60 yrs); increased energetic costs of moving through deep snow.
	Dispersal	2 Apr - 30 Apr	Medium	Females spread out to find suitable calving sites; vulnerability during late gestation, period of higher adult female mortality; wider range of habitat types used during dispersal.
Calving / Post-calving	Calving / Post-calving	1 May - 30 Jun	**Highest**	Calves most susceptible to mortality during this period.
Summer	Summer	1 Jul - 12 Sept	Medium	Period of higher susceptibility to mortality for adult females; critical period for females to regain body condition; wider range of habitat types used during summer than winter.
Fall	Rut	13 Sept - 4 Oct	Medium	Disturbance during peak rut could result in lower pregnancy rates. More individuals susceptible to disturbance since they are in larger groups at this time of year.

Season	Activity Period	Date Range[1]	Sensitivity	Caribou Ecology / Rationale
	Late Fall	5 Oct – 30 Nov	Lowest	Boreal caribou are still using a wide variety of habitat types at this time of year; relatively high daily movement rates.

[1] Note: Based on seasonal date ranges defined by Nagy (2011) and presented in the *Species Status Report for Boreal Caribou (Rangifer tarandus caribou) in the Northwest Territories* (SARC 2012), which were based on changes in movement rates from collared female caribou. These date ranges were further refined as part of a NWT boreal caribou resource selection function modeling project that includes more recent collar data collected over a broader area of the range (DeMars et al. 2020).

8.4 Avoiding New Disturbance through Land Tenure, Rights and Resource Allocation Decisions

These management actions (Table 12) are related to decisions about whether to:

- Open areas to Calls for Nomination (also referred to as Expressions of Interest) and Calls for Bids for oil and gas exploration[10], which could then lead to issuance of exploration licences and subsequent applications for permits to carry out exploration work (land use permits and water licences). The GNWT has an "open call" process, which allows companies and communities interested in potentially securing oil and gas rights in the NWT to submit an Expression of Interest for petroleum lands in the onshore regions of the territories. However, if the Minister of Industry, Tourism and Investment receives a request to make a Call for Bids in relation to a particular area, section 13(2) of the *Petroleum Resources Act* requires the Minister to consider it in selecting lands to be specified in a Call for Bids.

- Enter into forest management agreements (FMAs) for commercial timber harvesting, and if so, how to define FMA boundaries and annual sustainable timber harvest volumes in consideration of regional disturbance limits and thresholds defined in this plan and high importance caribou habitat. Section 9 of the NWT *Forest Management Act* allows the Minister of Environment and Natural Resources to enter into agreements with provincial or territorial governments, persons, institutions or firms relating to the harvesting of timber, research respecting forests, or the management of forests. The FMA can authorize the agreement holder to conduct these activities without obtaining a permit or licence.

Note that issuance of surface tenures on GNWT-administered lands for industrial and commercial development (e.g., licences of occupation for roads, easements for utility corridors, commercial leases) are not included in this category, as these types of tenure are usually not issued until other permits/licences have been obtained. They are therefore not considered as an appropriate instrument to avoid disturbance.

[10] For more information on oil and gas rights management, go to https://www.iti.gov.nt.ca/en/services/oil-and-gas-rights-management

Issuance of prospecting permits and mineral claims are also not included in this category because, under the NWT's current system for issuing subsurface rights to minerals, gems and coal, the only lands that are not open for prospecting or staking are those set out in Section 5 of the Northwest Territories *Mining Regulations*.[11] It is also prohibited to go onto the surface to prospect or stake a claim in areas where the surface rights to lands have been granted or leased by the Crown (including privately owned settlement lands), unless the surface rights holder has consented to it or the Northwest Territories Surface Rights Board has authorized entry.

[11] For more information on administration of mineral rights see the following resources:
https://www.iti.gov.nt.ca/sites/iti/files/guide_to_the_new_mining_regulations.revised.may_9.2018.pdf
https://www.iti.gov.nt.ca/sites/iti/files/2469_-_iti_-_mining_rights_180627_eng_-_final.pdf
Northwest Territories Mining Regulations: https://laws-lois.justice.gc.ca/PDF/SOR-2014-68.pdf
Territorial Lands Act: https://laws-lois.justice.gc.ca/PDF/T-7.pdf

Table 12. Management actions to avoid new disturbance through land tenure, rights and resource allocation decisions.

Sector	Basic	Enhanced	Intensive
Oil and Gas Issuance of exploration rights (i.e., calls for nominations, calls for bids)	B1 – Areas can be opened up to calls for nominations and calls for bids.	E1 – Areas can be opened up to calls for nominations and calls for bids.	I1 – Advise not opening up new areas in this management class to calls for nominations or bids, especially in areas that are known to be used repeatedly by boreal caribou for calving.
	B2 – Applicants are notified in calls for bids that conditions imposed on exploration activities within lease areas may be subject to change according to the condition of the range which may bump an area up to a higher management class.[12]	E2 – Applicants are notified in calls for bids that: (a) conditions imposed on exploration activities within lease areas will be more stringent, and (b) changes in the condition of the range may bump an area up to a higher management class in which even more restrictive conditions on development approval would apply.[12]	
	B3 – Exploration licences issued as per usual.	E3 – Exploration licences issued as per usual.	
Forestry (Issuance of long-term Forest Management Agreements [FMAs])	B4 – Issuance of long-term FMAs as per usual.	E4 – Issuance of long-term FMAs with condition that long-term forest management plans will be required to demonstrate ongoing supply of large undisturbed habitat patches within the management class area.	I2 – Only FMAs for salvage logging in recently disturbed habitat will be issued in Intensive management class areas. Forest management plans for salvage logging must demonstrate avoidance of undisturbed habitat when accessing cut blocks and complete avoidance of any calving locations that

[12] This reclassification would occur only as range plans are revised.

			are known to be used repeatedly.
Forestry (defining Allowable Sustainable Timber Harvest [ASTH] levels)	B5 – Encourage consideration of boreal caribou habitat in determination of ASTH.	E5 – Large patches of suitable caribou habitat within FMA planning areas should be removed from calculations of ASTH; or, E6 – Caribou habitat supply targets and caribou habitat patch size constraints should be included in ASTH analysis.	I3 – Areas with evidence of intensive use by boreal caribou should be removed from consideration in calculating ASTH volumes for salvage logging, including any calving locations that are known to be used repeatedly.

8.5 Avoiding and Minimizing New Habitat Disturbance from Developments during Project Design, Review, and Implementation

The actions proposed in this section (Table 13) focus on project design and location to minimize new habitat disturbance. These actions include:

- The use of existing disturbances;
- Limits on the dimensions/configuration of new disturbance (e.g., limits on linear feature width, well pad dimensions, aggregation of cut blocks);
- Locating new disturbance to be within close proximity or parallel to existing disturbance (to ensure overlapping buffered disturbance footprints and minimize the contribution of a project to the existing buffered disturbance footprint);
- Sharing access (multiple proponents using same access);
- Complete avoidance of undisturbed habitat and of disturbed habitat that will transition into undisturbed habitat in the next 10 years, especially those areas that currently or will soon provide biophysical attributes of critical habitat;
- Avoidance/minimization of fragmentation of large patches of undisturbed or currently disturbed habitat that will transition into undisturbed habitat in the next ten years.

The TLUP, *Wildlife Act* and *Forest Management Act* are the primary legal instruments (see Section 9 for further details) that will be used to require that developers follow the specific management actions for Enhanced and Intensive management class areas outlined in Sections 8.5 and 8.6 of interim range plan; however, GNWT-ENR will use the public review process for Land Use Permit and Water Licence applications carried out by the Wek'èezhìı and Mackenzie Valley Land and Water Boards to assess whether proposed developments will conform with the required management actions in Enhanced and Intensive management class area. As such, developers should describe how the management actions will be followed in these applications. While the interim range plan will not be directly implemented through Land Use Permit or Water Licence condition, a Land and Water Board may choose to include conditions in their permits and licences that are consistent with the range plan requirements. Where a developer proposes to deviate from the management actions required in Enhanced and Intensive management class areas that will be reflected in future regulations, they will be required to obtain a permit under the relevant legislation before the proposed action can be taken.

Table 13. Management actions to avoid and minimize new habitat disturbance from developments during project design, review, and implementation.

Sector	Basic	Enhanced	Intensive
Oil and Gas Issuance of land use permits and water licences to carry out exploration for or production of oil and gas (*not including geophysical (seismic) surveys which are addressed in a separate section of the table below*). Applies to well pads, camps, and other facilities required for oil and gas exploration or production except access roads and pipelines (*addressed under linear developments*).	B6 – Developers are encouraged to use areas of existing disturbed habitat to the greatest extent feasible to minimize new disturbance. B7 – Encourage avoidance of new disturbance in habitat types that are preferred by boreal caribou (RSF bins 7 and higher on seasonal RSF maps in Appendix C); locate new disturbance in habitat types that do not provide biophysical attributes, where feasible.	E7 – Developers must demonstrate that they have minimized the amount of new habitat disturbance to the greatest extent possible by using areas of existing disturbance, and by minimizing the area of any unavoidable new disturbance. E8 – Where new disturbance is unavoidable, demonstrate that new disturbance will be located in habitat types that are not preferred by boreal caribou (RSF bins 6 and lower on seasonal RSF maps in Appendix C) greatest extent feasible. E9 – Camps and processing facilities: use areas of existing disturbance, located as close to associated linear developments as possible.	I4 – Developers must demonstrate that they have minimized the amount of new habitat disturbance to the greatest extent possible by using areas of existing disturbance that will not transition into undisturbed habitat within the next 10 years. I5 – If complete avoidance of undisturbed habitat and/or disturbed habitat 30-40 years old is not feasible, developers are required to demonstrate that all reasonable alternative means of undertaking the activity have been considered, and the alternative adopted will result in the smallest footprint in undisturbed and/or disturbed habitat 30-40 years old possible. I6 – Where new disturbance is unavoidable, demonstrate that new disturbance will be located in habitat types are not preferred by boreal caribou (RSF bins 6 and lower on seasonal RSF maps in Appendix C).

			Calving locations that are known to be used repeatedly must be completely avoided.

Table 13 (Cont'd). Management actions to avoid and minimize new habitat disturbance from developments during project design, review, and implementation.

Sector	Basic	Enhanced	Intensive
Forestry Issuance of Timber Cutting Permits and Timber Cutting Licences[13] *(Does not to apply to Free Timber Cutting[13] Permits or long-term FMAs.)*	B8 – Issue Timber Cutting Permits and Licences as per usual.	E10 – Issue Timber Cutting Permits and Licences as per usual.	I7 – Timber Cutting Permits and Licences for salvage logging can be issued, subject to applicants demonstrating avoidance of undisturbed habitat and disturbed habitat 30-40 years old that will be transitioning to undisturbed habitat in the next 10 years. Calving locations that are known to be used repeatedly must be completely avoided.
Unless permit/licence applications are for salvage logging, it's assumed that they will affect undisturbed habitat.	B9 – Notify applicants that management class designation applied to an area may change in during future revisions of the regional range plan.	E11 – Applicants for Timber Cutting Permits and Licences are required to demonstrate use of harvest patterns that emulate natural disturbance, spatial aggregation of cut blocks to reduce dispersion of forest harvesting areas and associated amount of road access, and creation of future large	

[13] A Timber Cutting Permit is a harvest allocation for a period not exceeding one year and for not more than 5,000 m^3 of timber. A Timber Cutting Permit may require the permit holder to submit an operating plan. A Timber Cutting Licence is a multi-year timber harvest allocation or a single year allocation that exceeds 5000 m^3 and requires submission of a Long-term Development Plan and Annual Operating Plans (GNWT-ENR. 2005. Commercial Timber Harvest Planning and Operations Standard Operating Procedures Manual). Free Timber Cutting Permits are issued for a period not exceeding one year and for not more than 60 m^3 of timber (*Forest Management Regulations* s.22).

		patches of undisturbed habitat.	
		E12 – Developers are required to use existing linear features to access timber to greatest extent possible and avoid routing new access through undisturbed habitat patches that will not be harvested where possible. Access must avoid large contiguous patches of undisturbed habitat that do not contain merchantable timber to the greatest extent possible.	

Table 13 (Cont'd). Management actions to avoid and minimize new habitat disturbance from developments during project design, review, and implementation.

Sector	Basic	Enhanced	Intensive
Linear Developments Linear developments such as roads, utility corridors, and pipelines; excluding ground-based geophysical surveys (seismic) which are addressed in the section below. *Note that both linear and polygonal developments may be grouped under the same land use permit or water licence.*	B10 – Encourage developers to minimize creation of new linear features and access by using existing linear features or sharing access.[14]	E13 – Developers shall demonstrate that existing linear features and access will be used/shared to the greatest extent feasible.[14]	I8 – Developers are required to use existing linear features and access, when available and where doing so would result in a smaller disturbance footprint for the project.[14]
	B11 – Where new access is required, encourage the use of construction practices, seasonality of use, routing and road design that will minimize impacts to boreal caribou and their habitat.	E14 – Where new access is required, developers shall demonstrate that construction practices, seasonality of use, routing and road design will minimize impacts to boreal caribou and their habitat to the greatest extent feasible for the project. E15 – Where new disturbance is unavoidable, demonstrate that routing will favour habitat are not preferred by boreal caribou (RSF bins 6 and lower on seasonal RSF maps in Appendix C) to the greatest extent feasible.	I9 – Where new access is required, developers shall demonstrate that construction practices, seasonality of use, routing and road design will minimize impacts to boreal caribou and their habitat to the greatest extent feasible for the project. I10 – Where new disturbance is unavoidable, demonstrate that routing will favour habitat types that are not preferred by boreal caribou (RSF bins 6 and lower on seasonal RSF maps in Appendix C) to the greatest extent feasible. Calving locations that are known to be used repeatedly must be

[14] Note: S.10 of the *Mackenzie Valley Land Use Regulations* already prohibit, unless explicitly authorized by a permit, the clearing of a new line, clearing or right-of-way, where an existing line, trail or right-of-way can be used.

			completely avoided.
		E16 – Use narrowest class of access road required.	I11 – New access permitted adjacent to existing linear features only where the density/height/canopy closure of regeneration on the existing linear feature exceeds that of the surrounding habitat.
		E17 – Minimize sightlines by using doglegs or meandering route as much as safety permits.	

Table 13 (Cont'd). Management actions to avoid and minimize new habitat disturbance from developments during project design, review, and implementation.

Sector	Basic	Enhanced	Intensive
Oil and gas Ground-based geophysical surveys (seismic)	B12 – Encourage use of low-impact seismic techniques.[15] B13 – Encourage re-use of existing linear disturbances that are not in an advanced state of regeneration.	E18 – Use of low-impact seismic techniques is required. E19 – Developers are required to demonstrate re-use of existing linear disturbances that are not in an advanced state of regeneration to the greatest extent feasible. E20 – Where new disturbance is unavoidable, demonstrate that new disturbance will be located in habitat types that are not preferred by boreal caribou (RSF bins 6 and lower on seasonal RSF maps in Appendix C) to the greatest extent feasible.	I12 – Only seismic exploration using hand cut lines <3 m wide, meandering lines, and avoidance cutting techniques will be permitted. If helicopter assisted portable seismic techniques are proposed, they will only be permitted to take place outside of late winter, calving and post-calving periods. I13 – Developers are required to demonstrate re-use of existing linear disturbances that are not in an advanced state of regeneration to the greatest extent feasible. I14 – Where new disturbance is unavoidable, demonstrate that new disturbance will be located in habitat types that are not preferred by boreal caribou (RSF bins 6 and lower on seasonal RSF maps in Appendix C) to

[15] **Low-impact seismic**: the objective of low-impact seismic exploration is to create a narrow, continuously meandering line. The low-impact seismic method ensures that the maximum width of a low-impact seismic line will not exceed 5.0 m unless specifically approved, includes hand- or mechanically cut lines, ensures a maximum 200 m line-of-sight on any line, avoids larger standing trees by meandering, and generally does not disturb the soil and ground cover (GNWT 2015).

			the greatest extent feasible. Calving locations that are known to be used repeatedly must be completely avoided.

Table 13 (Cont'd). Management actions to avoid and minimize new habitat disturbance from developments during project design, review, and implementation.

Sector	Basic	Enhanced	Intensive
Mineral Exploration and Mining (excluding associated access roads) Exploration for or production of mineral resources. Includes activities such as line cutting, ground-based geophysical surveys, drilling, stripping, pitting, quarrying, trenching, blasting, mining infrastructure including mills, surface building, camps, power lines, open pit mines, tailings impoundments that may require clearing land.	B14 – Encourage use of existing linear features to conduct geological mapping and sampling, claim staking and delineation, access drilling locations. B15 – Encourage avoidance of new disturbance in habitat types that provide biophysical attributes of critical habitat; locate new disturbance in habitat types that are not preferred by boreal caribou (RSF bins 6 and lower on seasonal RSF maps in Appendix C), where feasible. B16 – Minimize the length and width of new lines cleared to delineate or stake claims. B17 – Encourage the use of existing clearings and disturbed areas for camps, drilling locations, bulk sampling, mining facilities, waste rock	E21 – Developers are required to demonstrate that they have minimized the amount of new habitat disturbance to the greatest extent possible by using areas of existing disturbance. E22 – Developers must demonstrate that the length and width of new lines cleared to delineate or stake claims is minimized (e.g., by using lines <1.5 m wide), and the use of hand cutting techniques that leave large trees standing is encouraged. Leave vegetation breaks along linear features to limit predator travel and search efficiency. E23 – Developers are required to demonstrate that mining infrastructure will be located within existing clearings to the greatest extent feasible, and as close to associated linear developments as possible. E24 – Where new disturbance is unavoidable, demonstrate that new	I15 – Developers must demonstrate that they have minimized the amount of new habitat disturbance to the greatest extent possible by using areas of existing disturbance that will not transition into undisturbed habitat within the next ten years. I16 – If complete avoidance of undisturbed habitat and/or disturbed habitat 30-40 years old is not feasible, developers must demonstrate that all reasonable alternative means of undertaking the activity have been considered, and the alternative adopted will result in the smallest footprint in undisturbed and/or disturbed habitat 30-40 years old possible. I17 – Developers must demonstrate that the length and width of new lines cleared to delineate or stake claims is minimized (e.g., by using lines <1.5 m wide), and the use of hand cutting techniques that leave large trees

	piles, tailings facilities, etc. B18 – Encourage avoidance of new disturbance in habitat types that are preferred by boreal caribou (RSF bins 7 and higher on seasonal RSF maps in Appendix C); locate new disturbance in habitat types that do not provide biophysical attributes, where feasible.	disturbance will be located in habitat types that are not preferred by boreal caribou (RSF bins 6 and lower on seasonal RSF maps in Appendix C) to the greatest extent feasible.	standing is encouraged. Leave vegetation breaks along linear features to limit predator travel and search efficiency. I18 – Where new disturbance is unavoidable, demonstrate that new disturbance will be located in habitat types that are not preferred by boreal caribou (RSF bins 6 and lower on seasonal RSF maps in Appendix C) to the greatest extent feasible. Calving locations that are known to be used repeatedly must be completely avoided.

Table 14. Management actions to avoid and minimize sensory disturbance from developments during project design, review and implementation.

Sector	Basic	Enhanced	Intensive
All Sectors – Ground-based activities	B19 – Schedule project activities that have the potential to cause sensory disturbance to occur outside of the highest risk periods for boreal caribou (see Table 11) to the greatest extent feasible. B20 – Implement a project-specific program to monitor boreal caribou sightings within 500 m of construction, operations, closure or any other project activities. It is recognized that the ability to detect caribou within 500 m of project activities may be limited when operating within densely forested habitat. B21 – If caribou are observed within 500 m prior to starting up activities that could lead to sensory disturbance or startling of caribou, delay starting up until the caribou have moved at least 500 m away from the site of project activities. If caribou approach active project activities within 500 m, monitor and document their behaviour, and suspend activities if there is an imminent threat of injury or	E25 – Developers must demonstrate that project activities that have the potential to cause sensory disturbance are scheduled to occur outside of the highest risk timing windows for boreal caribou (see Table 11) to the greatest extent feasible. Where such activities cannot be scheduled outside of these periods, developers shall demonstrate alternate approaches that will minimize sensory disturbance to the greatest extent feasible. E26 – Developers must implement a project-specific program to monitor boreal caribou sightings within 500 m of construction, operations, closure or any other project activities. While it is recognized that the ability to detect caribou within 500 m of project activities may be limited when operating within densely forested habitat, developers shall propose methods to increase detectability of caribou in such habitat. E27 – If caribou are observed within 500	I19 – Project activities that have the potential to cause sensory disturbance to boreal caribou must be scheduled to occur outside of the highest risk periods for boreal caribou (see Table 11). Activities causing sensory disturbance must be completely avoided in calving locations that are known to be used repeatedly, during the spring dispersal, calving and post-calving seasons (Table 11). I20 – Developers must implement a project-specific program to monitor boreal caribou sightings within 500 m of construction, operations, closure or any other project activities. While it is recognized that the ability to detect caribou within 500 m of project activities may be limited when operating within densely forested habitat, developers shall propose methods to increase detectability of caribou in such habitat. I21 – If caribou are observed within 500 m prior to starting up activities that could

	mortality to the caribou. B22 – Minimize idling of equipment and vehicles to the extent practicable. B23 – Do not approach boreal caribou closer than 250 m if they are encountered when traveling by snowmobile. B24 – Implement a no harassing, feeding, or approaching or hunting wildlife policy (including but not limited to boreal caribou).	m prior to starting up activities that could lead to sensory disturbance or startling of caribou, start-up shall be delayed until the caribou have moved at least 500 m away from the site of project activities. If caribou approach active project activities within 500 m, monitor and document their behaviour, and suspend activities if there is an imminent threat of injury or mortality to the caribou. E28 – Equipment and vehicles shall not be left idling except where absolutely required. Developers shall explain and justify such circumstances. E29 – Boreal caribou shall not be approached closer than 250 m if they are encountered when traveling by snowmobile. E30 – A no harassing, feeding, or approaching or hunting wildlife policy (including but not limited to boreal caribou) shall be implemented and enforced.	lead to sensory disturbance or startling of caribou, start-up shall be delayed until the caribou have moved at least 500 m away from the site of project activities. If caribou approach active project activities within 500 m, monitor and document their behaviour, and suspend activities if there is an imminent threat of injury or mortality to the caribou. I22 – Equipment and vehicles shall not be left idling during the highest risk periods (Table 11). At other times of year, if equipment and vehicles must be left idling for operational reasons, developers shall explain and justify. I23 – Boreal caribou shall not be approached closer than 250 m if they are encountered when traveling by snowmobile. I24 – A no harassing, feeding, or approaching or hunting wildlife policy (including but not limited to boreal caribou) shall be implemented and enforced.

All Sectors – Use of aircraft[16]	B25 – Do not fly below 300 m (1,000 feet) when over important boreal caribou habitat.[17] B26 – Avoid flying over, or alter your flight path, to avoid habitat types that are preferred by boreal caribou (RSF bins 7 and higher on seasonal RSF maps in Appendix C) whenever feasible, but especially during the highest risk periods as defined in Table 11. B27 – Do not take off or land in in habitat types that are preferred by boreal caribou (RSF bins 7 and higher on seasonal RSF maps in Appendix C) during the highest risk periods whenever feasible (see Table 11). B28 – Do not directly fly towards boreal caribou with young or towards important	E31 – Do not fly below 300 m (1,000 feet) within Enhanced management class areas except where absolutely required for operational purposes. Developers shall explain and justify such operational requirements in their applications for permits and licences. E32 – Do not take off or land in habitat types that are preferred by boreal caribou (RSF bins 7 and higher on seasonal RSF maps in Appendix C) during the highest risk periods (see Table 11), except where absolutely required for operational purposes. Developers shall explain and justify such operational requirements. E33 – Do not directly fly towards boreal caribou with young or towards important	I25 – Do not fly below 300 m (1,000 feet) within Intensive management class areas, except where absolutely required to meet safety requirements, or to take off and land. I26 – Do not take off or land in habitat types that are preferred by boreal caribou (RSF bins 7 and higher on seasonal RSF maps in Appendix C) during the medium and highest risk periods (see Table 11), except where absolutely required for safety purposes. I27 – Do not directly fly towards boreal caribou with young or towards important caribou habitat features (e.g., mineral licks, calving areas). I28 – If/when boreal caribou are spotted from the air, do not fly towards, follow,

[16] Some of the actions listed in this table are applicable to the use of drones or unmanned aerial vehicles; however, with respect to flight altitudes, current regulations require that drones be flown below an altitude of 122 m (400 ft) and within line-of-sight (https://tc.canada.ca/en/aviation/drone-safety/flying-your-drone-safely-legally). Drone operators are also required to comply with the *Wildlife Act* and regulations which prohibits disturbance or harassment of wildlife, and requires a Wildlife Research Permit or Wildlife Observation Permit from GNWT-ENR if drones are to be used for the purpose of wildlife research, monitoring, or viewing wildlife.

[17] There may be specific circumstances which require flying at lower altitudes or at times of year which are a higher risk for caribou, either for safety reasons, or to achieve the specific objective of the aerial survey. For example, this could include inspections along a pipeline right-of-way or operational access. It is up to the Proponent to justify why the specific circumstances of the project necessitate a deviation from the guidelines. Flights related to wildlife monitoring will also be exempt from these altitude requirements, as low altitude flights are necessary for wildlife surveys and are subject to consultation and review by IGOs prior to issuance of Wildlife Research Permits.

	caribou habitat features (e.g., mineral licks, calving areas). B29 – If/when boreal caribou are spotted from the air, do not fly towards, follow, chase, harass, hover over, or circle them. B30 – Ascend to a higher flight path or veer away if running, panic, or other startle responses are observed in caribou below. B31 – Schedule flights during the lowest risk category for boreal caribou (as defined in Table 11) whenever feasible, and maintain over-flight altitudes >300 m (1,000 ft) unless a lower altitude is specifically required to meet the objectives of the flight. B32 – Contact the regional ENR office for information if low-level flights are necessary during the calving period. During the calving period, caribou go into hiding to have their calves. Low flying is especially harmful, stressing the female, which can cause separation from calves and lead to calf mortality. B33 – Observe wildlife from a safe distance to minimize disturbing and	caribou habitat features (e.g., mineral licks, calving areas). E34 – If/when boreal caribou are spotted from the air, do not fly towards, follow, chase, harass, hover over, or circle them. E35 – Ascend to a higher flight path or veer away if running, panic, or other startle responses are observed in caribou below. E36 – Flights shall be scheduled during the lowest risk category for boreal caribou (as defined in Table 11), and maintain over-flight altitudes >300 m (1,000 ft) unless a lower altitude is specifically required to meet the objectives of the flight. Developers shall explain and justify such operational requirements. E37 – Observe wildlife from a safe distance to minimize disturbing and stressing boreal caribou. If the animal changes its behaviour, you are too close. Limit your time in the area and avoid surprising (e.g., sneaking up on) wildlife. E38 – Natural open areas or existing clearings shall be used for helipads. If	chase, harass, hover over, or circle them. I29 – Ascend to a higher flight path or veer away if running, panic, or other startle responses are observed in caribou below. I30 – Flights shall be scheduled during the lowest risk category for boreal caribou (as defined in Table 11), and maintain over-flight altitudes >300 m (1,000 ft) unless a lower altitude is specifically required to meet safety requirements. Developers shall explain and justify such safety requirements. I31 – Observe wildlife from a safe distance to minimize disturbing and stressing boreal caribou. If the animal changes its behaviour, you are too close. Limit your time in the area and avoid surprising (e.g., sneaking up on) wildlife. I32 – Natural open areas or existing clearings shall be used for helipads. If new clearings for helipads are required they must not exceed 35 m in diameter, or as required for safe operation. Developers shall explain and justify such operational requirements. No new helipads will be permitted in calving

	stressing boreal caribou. If the animal changes its behaviour, you are too close. Limit your time in the area and avoid surprising (e.g., sneaking up on) wildlife. B34 – Use natural open areas or existing clearings, where available, for helipads. Clearing of new helipads must not exceed 35 m in diameter, or as required for safe operation.	new clearings for helipads are required they must not exceed 35 m in diameter, or as required for safe operation. Developers shall explain and justify such operational requirements.	locations that are known to be used repeatedly.

8.6 Balancing/Offsetting New Habitat Disturbance through Habitat Restoration

Within Basic management class areas, developers are expected to follow existing NWT closure and reclamation guidelines (links to guidelines provided in Table 15), and boreal caribou habitat-specific guidelines once they are developed.

Within Enhanced and Intensive management class areas, developers are required to develop closure and reclamation plans for their project that will demonstrate how new **short-term** disturbances will be functionally restored in the near term, and ecologically restored in the long term.

If, after demonstrating that all reasonable alternative means of undertaking development activities have been considered, and that a proposed development will create a new **long-term** disturbance footprint within Enhanced and Intensive management class areas, developers are required to develop a **habitat offset plan.** This plan must describe functional and ecological restoration of other existing areas of legacy disturbance to compensate for the new **long-term** disturbance. The intent of the offset requirements for new **long-term** disturbances is to promote more rapid functional and ecological restoration of existing legacy disturbances. This will help ensure that the pace of habitat recovery from human-caused disturbance in the region equals or exceeds the pace of new human-caused disturbance. In addition to the offset requirements, developers are required to functionally and ecologically restore the project's direct **long-term** disturbance footprint once project activities on those sites have concluded.

8.6.1 Hierarchy for Selection of Offset Locations

Selection of appropriate offset locations will prioritize legacy disturbances in other Enhanced or Intensive management areas within the Wek'èezhìı region, followed by existing disturbances in Basic management areas in Wek'èezhìı. If insufficient areas are available for offsets within the Wek'èezhìı region, existing disturbances in Enhanced or Intensive management areas in boreal caribou range planning regions adjacent to the Wek'èezhìı region may be considered.

8.6.2 Definition of Short-term versus Long-term Habitat Disturbances

Short-term disturbances are defined as those where the combined operational lifetime and predicted time for the feature to be considered functionally restored once no longer needed would be <40 years. The operational lifetime refers to the period of time in which the disturbance footprint is being actively used by the developer to fulfill their project objectives. Typically, short-term disturbances will be sites where there is minimal disturbance to the soil organic layer or root mat.

Long-term disturbances are defined as those where the operational lifetime of the footprint plus the predicted time for the disturbance to be functionally restored would be >40 years. Typically, long-term disturbances will be sites where the soil organic layer, root mat and above ground vegetation are completely removed or covered over, such as for mines, pits, quarries, borrow sources, tailings ponds, waste rock piles, all-season roads, etc.

These definitions of **short-term** versus **long-term** disturbances are intended to recognize that even when development footprints are only in use for short periods, not all sites can be quickly or easily restored, or restored at all, which could result in a net increase in human disturbance footprint over time if they are not offset by habitat recovery elsewhere. It is also acknowledged that ecological restoration of both short-term and long-term disturbances may take longer than 40 years.

8.6.3 Definitions of Functional versus Ecological Restoration

"Functional restoration" is generally focused on reducing the ability of predators and humans to use linear features as travel corridors that increase the odds of encounters with caribou and caribou mortality in the short-term, or to prevent repeated disturbances caused by vehicular traffic which may impede longer-term regeneration of vegetation. Functional restoration can be achieved by attaining a sufficient height and density of re-vegetation on linear features to impede movement of predators and people or by using line blocking treatments such as piling slash and debris, bending trees over the line or erecting barriers and fences. Functional restoration is therefore intended to address the functional response of predators to these linear features, but does not necessarily address the numerical response of predators to increased alternate prey levels associated with early-seral vegetation in recently disturbed habitat.

Although specific criteria for determining when a linear feature can be considered functionally restored still need to be defined for the NWT, lessons learned from restoration projects and research in southern jurisdictions can serve as interim guidance. Recent studies in Alberta have found that vegetation heights of 0.50-0.70 m were sufficient to reduce wolf selection for linear features and movement speeds on linear features (Dickie et al. 2017, Finnegan et al. 2018). In order for wolf movement speeds to be reduced to those equivalent to surrounding undisturbed forest, at least 33% of the vegetation on seismic lines had to exceed 4.86 m (Dickie et al. 2017). Vegetation heights exceeding 2.4-4.3 m also seem to be effective at deterring off-road vehicle use (Pigeon et al. 2016). Vegetation regrowth on linear disturbances also needs to meet certain density criteria in order to impede predator movements. Draft guidelines from Alberta recommend tree regeneration densities of 800 stems/ha on dry uplands and lowland low density treed (e.g., open fens) sites, and 1,000 stems/ha on upland, transitional and lowland treed (e.g., black spruce bog) sites (Government of Alberta 2017). To meet these vegetation density targets, coniferous saplings need to be between 60-80 cm high and deciduous saplings need to be at least 120 cm high (Government of Alberta 2017). Shrub species do not contribute towards meeting the vegetation height and density targets, because the longer-term goal is for re-establishment of vegetation that can reach a minimum height of 5.0 m (Pyper and Broadley 2019, Government of Alberta 2017). Other line blocking treatments such as piling slash and debris, bending trees over the line or erecting barriers and fences may be needed in addition to site preparation and reforestation treatments to limit predator and human use of linear features in the near term before vegetation reaches the minimum height and density targets.

"Ecological restoration" focuses on ensuring or accelerating the longer-term recovery of vegetation in disturbed areas that will provide biophysical attributes required by caribou (e.g., restoration of lichen ground cover, or conifer-dominated forest cover), and the return of an area to

pre-disturbance composition and structure. This may also involve advancing recovery of disturbed areas to a point where they no longer provide early-seral vegetation that may contribute to increased densities of alternate prey species such as moose and deer. In practice, active ecological restoration may involve site preparation, creating favourable microsites using woody debris, and planting or seeding with native species that are characteristic of pre-disturbance conditions. These treatments may be implemented at the same time as functional restoration treatments, and may help to achieve both functional and ecological restoration objectives.

Site-specific ecological restoration objectives will have to be developed for each project on a case-by-case basis taking into account the type of vegetation community, vegetation structure (height/density) and successional stage of specific sites prior to disturbance. Developers are responsible for adequately documenting pre-disturbance conditions at their project locations to inform the development of their ecological restoration objectives in their closure and reclamation plans.

8.6.4 Offset Ratios and Types of Offsets Considered

Given limited experience with implementing functional and ecological restoration of boreal caribou habitat in the NWT, and the lack of current GNWT policy and guidance for requiring, implementing, and monitoring habitat disturbance offsets, offset ratios required for projects that create new **long-term** disturbance in Enhanced and Intensive management class areas have not been defined in this interim range plan. Developers' offset plans will be reviewed and approved on a case-by-case basis. Other forms of offsetting besides habitat restoration, including direct or indirect contributions towards research and development of functional and ecological restoration practices for boreal caribou habitat in the NWT, may be considered in lieu of restoration-based habitat offsets carried out by the developer.

8.6.5 Activities Exempt from Functional and Ecological Restoration Requirements

In the tables of management actions below (Table 15), low impact seismic exploration and mineral prospecting activities that have similar characteristics to low impact seismic operations will be exempt from functional and ecological restoration requirements in Enhanced and Intensive management areas. The rationale for this is that low impact seismic exploration techniques seek to mitigate improved access and facilitated travel for people and predators and to facilitate natural regeneration by design (GNWT 2015). This is accomplished by using narrow, meandering lines with a line of sight <200 m, leaving vegetation breaks or using doglegs at intersections with other linear features, avoiding clearing large trees, avoiding disturbance to the duff layer and vegetative root mat, and re-use of existing linear features. Low intensity mineral prospecting activities can also employ many of the same strategies as low impact seismic exploration where it is necessary to use cut lines to explore or delimit a claim. For example, lines can be cut to a width of less than 1.5 m using hand tools only, and vegetation breaks can be left to limit line of sight (Government of Ontario 2020). Where seismic exploration or mineral prospecting activities do not meet the criteria for equivalence with low impact seismic exploration techniques they will be subject to the functional and ecological restoration requirements.

Table 15. Management actions to balance/offset new habitat disturbance through habitat restoration.

Sector	Basic	Enhanced	Intensive
Functional Restoration **Oil and gas** (*except low impact seismic*) **Linear developments**	B35 – Developers should follow current closure and reclamation requirements and guidelines as defined in the Northern Land Use Guidelines series[18] and the Mackenzie Valley Land and Water Board (MVLWB) Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories[19].	*For **long-term** linear disturbance footprints:* E39 – Unavoidable disturbance in undisturbed habitat will be offset using functional restoration methods to impede predator travel and human access. Selection of offset locations will follow the hierarchy described in the pre-amble to this table.	*For **long-term** linear disturbance footprints:* I33 – Unavoidable disturbance in undisturbed habitat will be offset at a higher ratio than in the Enhanced category. Functional restoration methods will be applied to linear restoration offsets to impede predator travel and human access. Selection of offset locations will follow the hierarchy described in the pre-amble to this table.
Forestry (*applies only to access roads*)		*For **short-term** disturbance footprints:* E40 – Short-term linear features that are part of the project footprint will be functionally restored as soon as they are no longer in use. Linear features	*For **short-term** disturbance footprints:* I34 – Short-term linear features that are part of the project footprint will be functionally restored as soon as they are no longer in use. Linear features

[18] https://www.lands.gov.nt.ca/en/northern-land-use-guidelines-seismic
https://www.lands.gov.nt.ca/en/northern-land-use-guidelines-camps
https://www.lands.gov.nt.ca/en/northern-land-use-guidelines-pits-and-quarries
https://www.lands.gov.nt.ca/en/northern-land-use-guidelines-roads-and-trails

[19] https://mvlwb.com/sites/default/files/wlwb_5363_guidelines_closure_reclamation_wr.pdf

Sector	Basic	Enhanced	Intensive
Mineral exploration and mining (*except mineral prospecting activities that would meet similar criteria as low impact seismic exploration*)		that will be in use intermittently for multiple years will be functionally restored once no longer needed for the project.	that will be in use intermittently for multiple years will be functionally restored once no longer needed for the project.

Table 15 (Cont'd). Management actions to balance/offset new habitat disturbance through habitat restoration.

Sector	Basic	Enhanced	Intensive
Ecological Restoration **Oil and gas** *(except low impact seismic)* **Linear developments** **Mineral exploration and mining** (*except mineral prospecting activities that would meet similar criteria as low impact seismic exploration*)	B36 – Developers should follow current closure and reclamation requirements and guidelines as defined in the Northern Land Use Guidelines series[20] and the MVLWB Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories[21].	*For **short-term** linear and polygonal disturbance:* E41 – If disturbance of undisturbed habitat is unavoidable, use of restoration treatments that will ensure more rapid return to pre-disturbance vegetation composition and structure will be required.	*For **short-term** linear and polygonal disturbance:* I35 – If disturbance of undisturbed habitat, and disturbed areas that are 30-40 years old, is unavoidable, use of restoration treatments that ensure more rapid return to pre-disturbance vegetation composition and structure will be required.
		*For **long-term** linear and polygonal disturbance footprints:* E42 – Unavoidable long-term disturbance in undisturbed habitat will be offset. E43 – Use of restoration treatments in offset areas that ensure more rapid	*For **long-term** linear and polygonal disturbance footprints:* I36 – Unavoidable long-term disturbance in suitable boreal caribou habitat (presently disturbed or undisturbed) will be offset at a higher ratio than in the Enhanced category.

[20] https://www.lands.gov.nt.ca/en/northern-land-use-guidelines-seismic
https://www.lands.gov.nt.ca/en/northern-land-use-guidelines-camps
https://www.lands.gov.nt.ca/en/northern-land-use-guidelines-pits-and-quarries
https://www.lands.gov.nt.ca/en/northern-land-use-guidelines-roads-and-trails
[21] https://mvlwb.com/sites/default/files/wlwb_5363_guidelines_closure_reclamation_wr.pdf

Sector	Basic	Enhanced	Intensive
		return to pre-disturbance vegetation composition and structure are required. Selection of offset locations will follow the hierarchy described in the pre-amble to this table.	I37 – Use of restoration treatments in offset areas that ensure more rapid return to pre-disturbance vegetation composition and structure are required. Selection of offset locations will follow the hierarchy described in the pre-amble to this table.
Forestry *(applies only to cut blocks harvested under Timber Cutting Permits or Timber Cutting Licences*)	B37 – As per current Commercial Timber Harvest Planning and Operations Standard Operating Procedures Manual[22].	E44 – For harvest of conifer-dominated stand types, where natural regeneration is unlikely to return a site to conifer-dominated tree cover within 40 years, use of reforestation treatments that ensure a more rapid return to pre-disturbance conifer dominated stand type is required. This measure does not apply to salvage harvesting of burned stands.	I38 – For harvest of conifer-dominated stand types, where natural regeneration is unlikely to return a site to conifer-dominated tree cover within 40 years, use of reforestation treatments that ensures a more rapid return to pre-disturbance conifer dominated stand type is required. This measure does not apply to salvage harvesting of burned stands.

[22] GNWT. 2005. Commercial Timber Harvest Planning and Operations Standard Operating Procedures Manual. Department of Environment and Natural Resources. 33 pgs. Available at: https://www.enr.gov.nt.ca/sites/enr/files/reports/commercial_timber_procedures_manual.pdf

8.7 Managing Natural Disturbance

Wildfire is inevitable across most of the territory, and is an important part of the natural boreal forest ecosystem. Fire management resources (e.g., people, equipment, airplanes, etc.) are limited, and directing resources to fighting wildfires in caribou habitat means that other resources are needed to protect communities and property. Many of the wildfires that would be most impactful to caribou habitat are very large and remote, which are nearly impossible to control. On the other hand, wildfire management actions taken to protect human life and property can sometimes indirectly protect caribou habitat in the surrounding area.

The primary mechanism for GNWT to consider caribou habitat in responding to wildfire is through their "Values at Risk" (VAR) hierarchy, outlined in the NWT *Forest Fire Management Policy*[23]. Human life and infrastructure/property are the top priorities that guide GNWT's decisions about wildfire response, but natural resource values (such as caribou habitat) can factor in as an additional priority. For this management tool to be effective, key habitat areas identified as VAR should be limited in number and comprise specific areas of high priority. The ability of GNWT to protect these key habitat areas from wildfire will be limited by remaining resources in that wildfire season, and by distance to fire bases. In addition, these patches will not be protected indefinitely because doing so can lead to longer-term fuel loading, which in turn leads to increased burn probability and other ecological problems. Caribou habitat areas managed as VARs should be reviewed every 5 years (at the mid-term range plan review), or more regularly as needed.

Treatments to reduce fuel loads such as prescribed burns and fire breaks can be used in some cases (and under the right conditions) to attempt to protect areas of interest. Approaches such as prescribed burns and re-vegetation of burned habitat have been used only rarely[24]. GNWT does not have a well-developed prescribed burning program and currently only conducts burns to protect communities. GNWT does not currently replant after wildfires because the burned areas are often too large to replant effectively, and because natural regeneration is often as successful or more successful than planted seedlings. The large-scale application of these types of treatments is limited by the large expanse of the taiga forest in the NWT and the costs associated with taking action in remote areas. Nonetheless, there may be opportunities to take action in some years recognizing that the benefits of that action may be negated by wildfires in the future.

Feasibility studies into fuels treatments to protect older patches of forest and re-vegetation of burned areas would allow the assessment of the effectiveness, costs (both financial and human), logistics and the potential application of these approaches more broadly.

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[23] Northwest Territories Forest Fire Management Policy 53.04. www.enr.gov.nt.ca/sites/enr/files/documents/53_04_forest_fire_management_policy.pdf

[24] It should be noted that back burning is frequently used as an active fire management response to limit the spread of fires, and is considered separately from prescribed burning which is not conducted as an active fire response.

The management actions described below (Table 16) are focused on reducing fuel loads to limit the spread or intensity of wildfires should they occur within specific areas, and whether and how to respond to wildfires that do ignite within different management class areas.

8.7.1 Identifying Habitat Patches as Values at Risk for Boreal Caribou

In order to identify high priority boreal caribou habitat patches to designate as VAR for consideration in fire management decisions, the late winter predictive RSF model was used (see Appendix C, Figure C-6). The rationale for focusing on late winter habitat is that boreal caribou are displaying their strongest preference for areas that have not burned in at least 60 years at that time of year, and to a lesser extent, areas that have not burned in the last 40-60 years (DeMars et al. 2020). Older forests relied upon by boreal caribou in late winter should be more vulnerable to wildfire due to higher accumulation of fuels as forests age. To focus in on the most highly selected late winter habitat, areas with predicted RSF scores falling in RSF bins 8-10 were used, as they had the highest selection ratios (based on a comparison of the number of used vs. random locations falling within each of the 10 RSF bins). This was further narrowed down to areas in RSF bins 8-10 that occurred in patches >60 km^2 in size, based on an assessment of late winter home range sizes that showed that 90% of boreal caribou had home ranges that were 60 km^2 or greater at that time of year (Figure 40). The predictive RSF maps (Appendix C) are fine-scale raster layers, with predicted habitat preferences calculated for 30 x 30 m grid cells of 900 m^2 (0.0009 km^2). This results in very detailed polygons when only the patches >60 km^2 consisting of late winter RSF bins 8-10 were considered. To simplify things for fire management decision making, a grid of 1 x 1 km cells was overlaid on top of the late winter polygons, and the proportion of each grid cell covered by these polygons was calculated. Grid cells with >25% coverage of late winter habitat polygons were considered in the final boreal caribou VAR grid layer, and were broken down into 3 categories (25-50%, 50-75% and >75% coverage of highly preferred late winter habitat; Figure 41). The boreal caribou VAR grid layer based on late winter habitat aligns fairly well with caribou fire protection priority polygons identified by the Tłı̨chǫ Government based on community workshops held in 2019 (Figure 42). Most of the VAR patches also fall within Enhanced and Intensive management class areas in the interim range plan, although there are a few large patches that fall within Basic management areas (Figure 43). The boreal caribou VAR grid layer, Tłı̨chǫ Government fire protection priority polygons, and map of management class areas has been provided to GNWT-ENR Forest Management Division for incorporation into their fire management decision mapping support tool called “SPARCS” (Spatial Precipitation and Risk Calculation System). This information will be used in fire management decisions in summer 2021 and onwards, and will need to be updated every 5 years or so.

Limitations and other considerations

Decisions about whether to action fires that start within areas identified as VARs for boreal caribou are made on a case-by-case basis and will depend on a number of factors, including:

- the number of fires burning at any given time;
- other higher priority values that may be threatened elsewhere (human life and property);
- distance from fire bases;

- fire growth rate and direction of spread; and,
- whether the NWT is experiencing a drought year versus a wetter than average summer.

Figure 40 to Figure 43 show a 70 km radius around communities that have fire management resources (bases). Generally, initial attack of fires is limited to areas within this radius. In many cases GNWT may not be able to action fires that start within a boreal caribou VAR area. Allocating resources to a fire in boreal caribou habitat that is far from a fire base may divert resources that are quickly needed elsewhere to address higher priorities like human life and property. When responding to a fire in a boreal caribou VAR area, response options include both a direct initial attack, or an indirect attack such as using prescribed fire. More recently, prescribed fire is being incorporated into response practices to help slow fire growth or help break up forest connectivity to reduce potential fire growth and reduce risk to VAR areas. Where initial attack is attempted and is unsuccessful, another response including abandoning response on the fire may have to be undertaken. In the event that an initial attack is unsuccessful, a Wildfire Situation Analysis will be completed to assess response options against the Forest Fire Management Policy.

Any fire response decisions will need to consider the natural range of variation in fire disturbance and forest age class distribution, and fire regime characteristics typical of the ecological units within the region (e.g., ecoregions). GNWT-ENR Forest Management Division is currently working on improving knowledge of NWT fire regimes and natural range of variation. Ultimately, fire response should not force the forest environment into an unnatural state, especially to the point where fuel build-up results in very severe fires. In wetter years it may be preferable to let fires burn to reduce fuel loading and fuel continuity, so that more severe large fires are less likely during drought years.

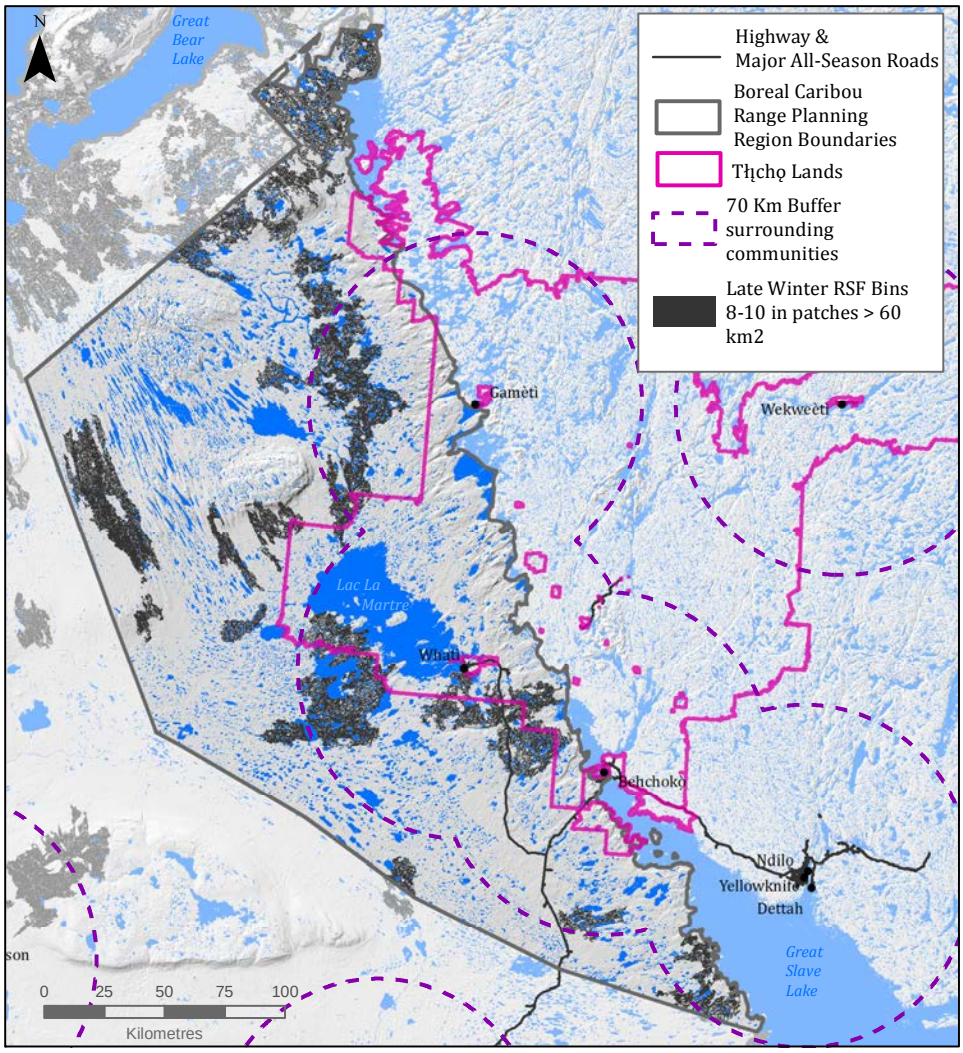

Figure 40. Late winter habitat highly selected by boreal caribou corresponding to RSF bins 8-10, occurring in patches >60 km^2.

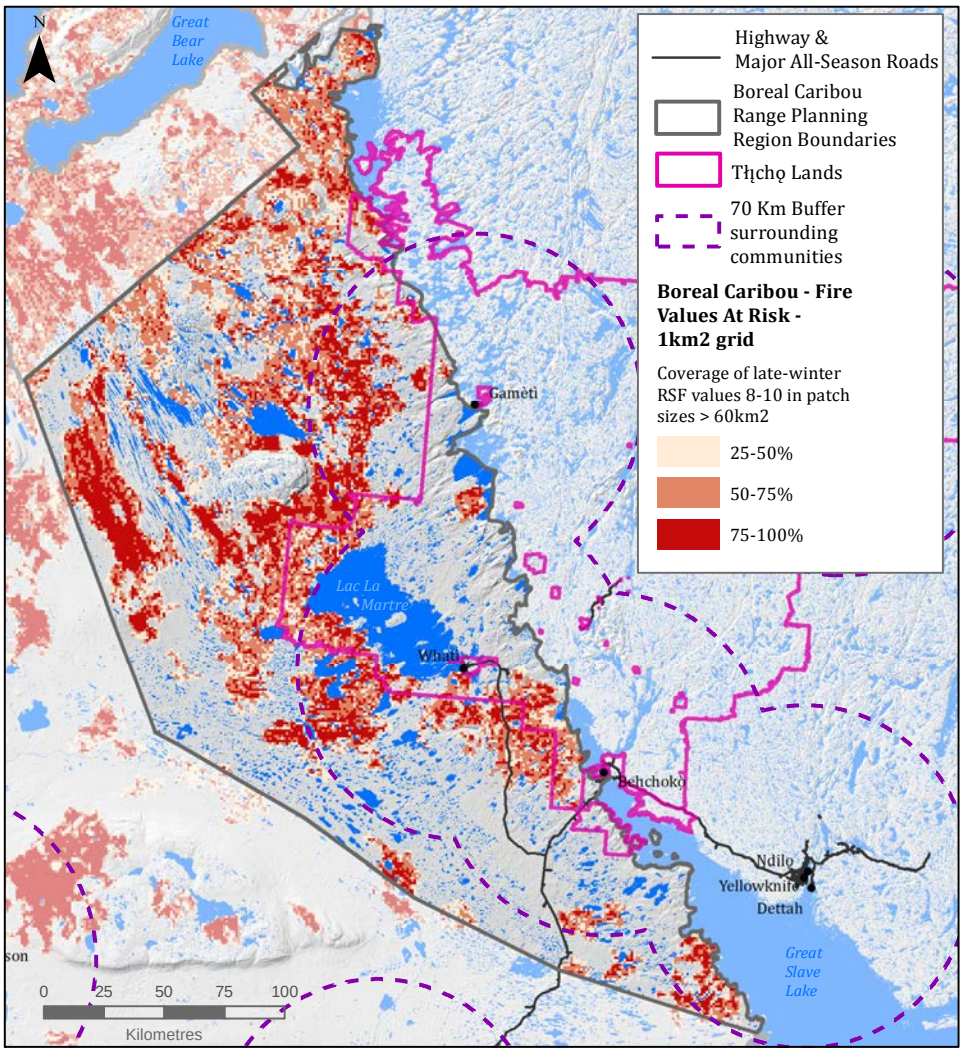

Figure 41. Boreal caribou fire Value at Risk (VAR) grid layer showing the percentage coverage of >60 km^2 patches of highly selected late winter habitat within 1 km^2 grid cells.

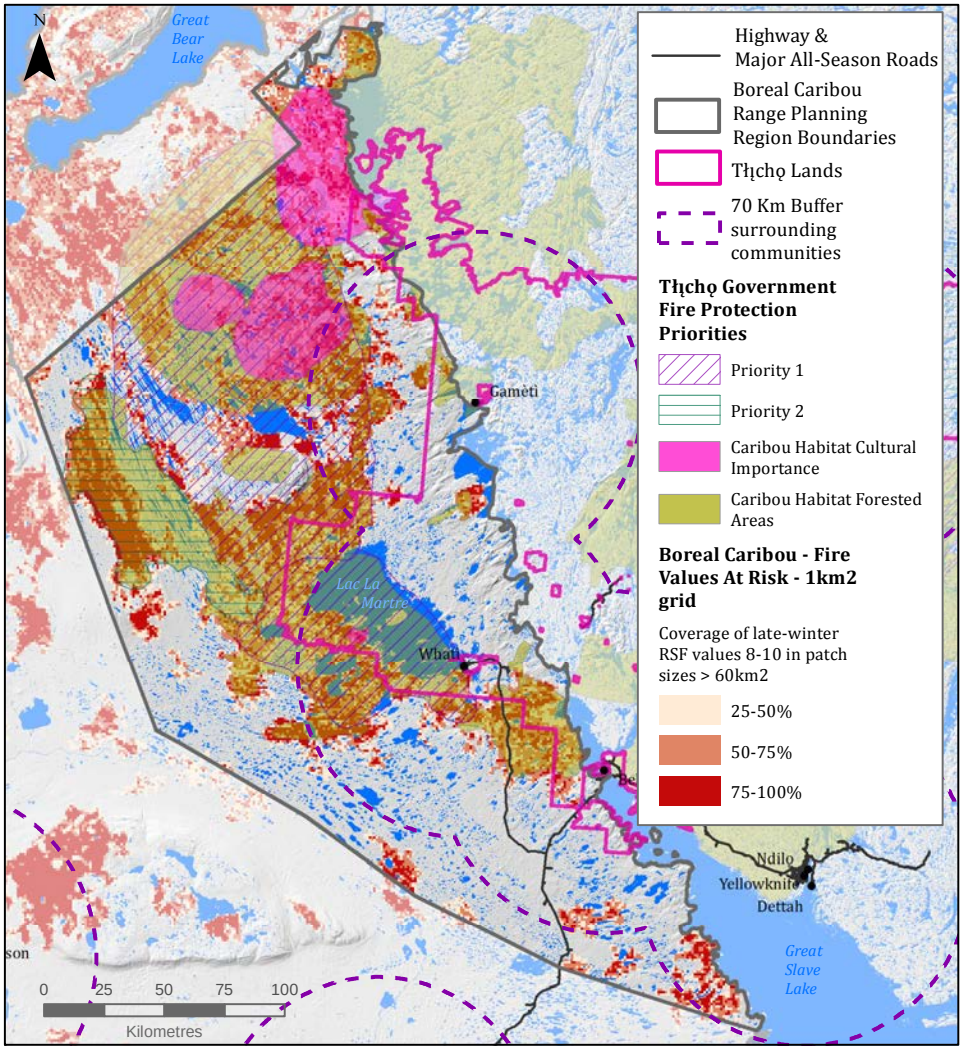

Figure 42. Overlap between the boreal caribou fire Value at Risk (VAR) grid layer and fire protection priority polygons identified by the Tłı̨chǫ Government at community workshops held in 2019.

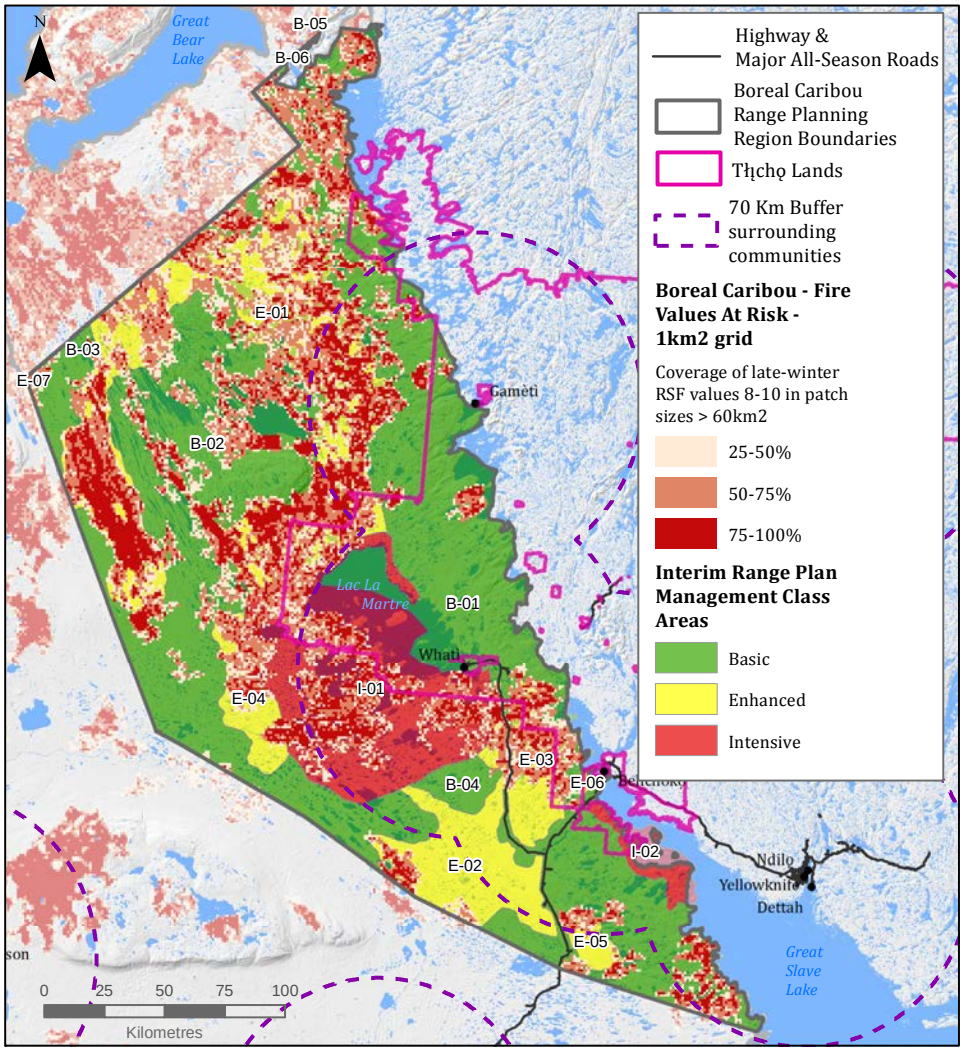

Figure 43. Overlap between the boreal caribou fire Value at Risk (VAR) grid layer and Basic, Enhanced and Intensive management class areas in the interim Wek'èezhìı range plan.

Table 16. Wildfire management actions.

Sector	Basic	Enhanced	Intensive
Wildfire - Reduction of fuel loads or creation of fuel breaks.	None	E45 – Feasibility studies of prescribed burns or timber harvesting to reduce fuels or create fuel breaks.	I39 – Feasibility studies of prescribed burns or timber harvesting to reduce fuels or create fuel breaks.
Wildfire - Active response to wildfires.	B38 – Follow current fire management policy	E46 – Identify high-priority boreal caribou habitat patches as VAR.	I40 – Identify high-priority boreal caribou habitat patches as VAR
Wildfire - Regeneration of burned areas.	None	None	I41 – Feasibility studies and trial of re-seeding and/or replanting burned areas in strategic locations.

8.8 Resources to Assist Developers in Following Management Actions

GNWT-ENR is in the process of developing on online mapping tool called the "NWT Species and Habitat Viewer". This viewer contains a boreal caribou tab that allows proponents to view current spatial data related to boreal caribou in the NWT, and will include spatial data layers that are needed to assist developers and regulators in following the management actions outlined in this interim range plan. For example, the NWT Species and Habitat Viewer will include maps of the management class areas, undisturbed habitat, fire disturbance, human disturbance, and seasonal RSF maps. Developers can also contact GNWT-ENR at wmisteam@gov.nt.ca to request copies of these spatial data layers through a Data Release Agreement. For more information visit: https://www.enr.gov.nt.ca/en/services/research-and-data-nwt/wildlife-management-information-system

9. IMPLEMENTATION INSTRUMENTS

9.1 Tłı̨chǫ Land Use Plan

The TLUP overlaps with 19.2% of the Wek'èezhìı boreal caribou range planning region. Figure 44 shows where Candidate and Established Protected Areas, Ezǫ̨dzìtì, and the TLUP zones overlap with the management classes; a detailed breakdown is provided in Table 17. The TLUP is undergoing review and the possibility exists that in the new version (due out in 2022), the zones will be revised. However, at the time of preparing this interim range plan, the current TLUP (published in 2013) with its existing zones was used.

The TLUP already excludes many types of land use activity from consideration within Cultural Heritage, Habitat Management, Land Use Exclusion and Traditional Use zones. As a result, it may already provide a higher level of habitat protection than the management actions require for Enhanced and Intensive management areas outlined in Section 8. For the area in the Enhanced management class, 12.7% is captured within Cultural Heritage and Traditional Use zones, as well as Ezǫ̨dzìtì; while 2.5% is captured within the Enhanced Management Zone. For the area in the Intensive management class, 30.0% is captured within Cultural Heritage and Habitat Management zones; while 2.7% is captured within the Enhanced Management Zone. Amendments to the TLUP may be necessary to implement the management actions required for Enhanced and Intensive management class areas in the range plan where they overlap with areas of TLUP Enhanced Management Zone. For the area in the Basic management class, 13.3% is captured within Cultural Heritage, Habitat Management, Land Use Exclusion, and Traditional Use zones. The restrictions of these TLUP zones likely exceed the management actions recommended for Basic management class areas, because most types of development are not considered in these TLUP zones.

Table 17. Breakdown of Tłı̨chǫ Land Use Plan zones and established/candidate protected areas that overlap with Basic, Enhanced and Intensive management class areas. Areas labeled "No designation" are those occurring outside of the approved Tłı̨chǫ Land Use Plan and established/candidate protected areas (including Ezǫdzìtì).

Management Class Type	Land Designation	km^2	Percentage (%) of total area of Management Class Type
Basic	Cultural Heritage Zone	1994.26	7.24%
	Enhanced Management Zone	2532.41	9.20%
	Habitat Management Zone	<0.01	<0.01%
	Land Use Exclusion Zone	78.94	0.29%
	Traditional Use Zone	1581.76	5.74%
	Ezǫdzìtì	34.77	0.13%
	No designation	21310.82	77.40%
	Basic Total:	*6187.38*	*100.00%*
Enhanced	Cultural Heritage Zone	592.66	3.95%
	Enhanced Management Zone	380.38	2.54%
	Traditional Use Zone	0.09	<0.01%
	Ezǫdzìtì	1305.03	8.71%
	No designation	12711.55	84.80%
	Enhanced Total:	*2278.16*	*100.00%*
Intensive	Cultural Heritage Zone	2104.77	28.44%
	Enhanced Management Zone	196.65	2.66%
	Habitat Management Zone	115.83	1.57%
	Candidate Protected Area - Dınàgà Wek'èhodì	330.14	4.46%
	No designation	4652.56	62.87%
	Intensive Total:	*2747.39*	*100.00%*

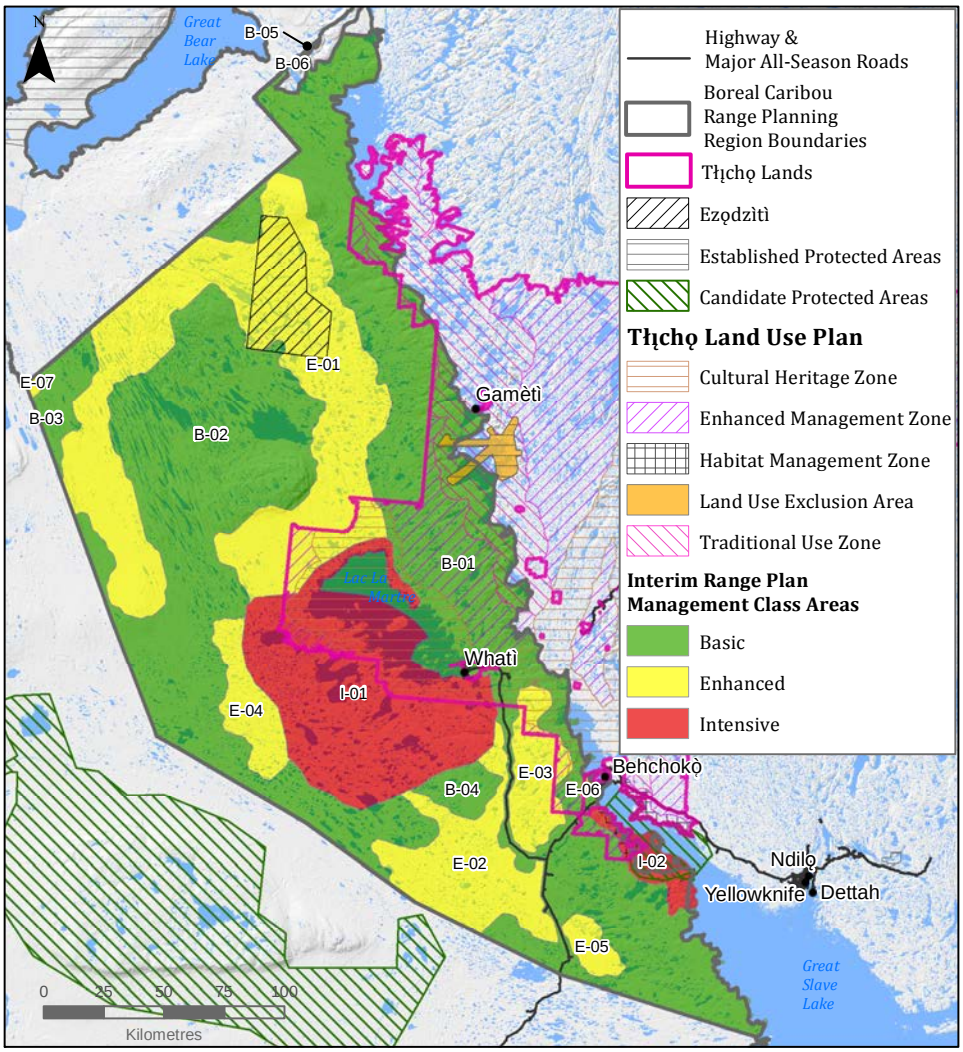

Figure 44. Overlap of Tłı̨chǫ Land Use Plan zones, Ezǫdzìtì, established protected areas, and candidate protected areas with Basic, Enhanced and Intensive management areas in the interim range plan.

9.2 Implementation Instruments on Territorially-administered Lands

Roughly 81% of the Wek'èezhìı range planning region falls within currently territorially-administered lands, and 0.33% falls within municipal lands. Of the area within the Enhanced management class, about 93% is territorially-administered land, and about 67% of Intensive management class area is territorially administered. Various sections of the *Species at Risk (NWT) Act* and the NWT *Wildlife Act* were considered and discussed as potential implementation tools for the interim range plan on territorially-administered lands. These implementation tools were presented as possibilities and discussed at Wek'èezhìı working group meetings #4 and #5 in April and May 2021. Following feedback from working group members and further discussion, two sections from the NWT *Wildlife Act* were chosen as preferred implementation instruments on territorially-administered land: Habitat Protection (s.93, z.61) and Wildlife Management and Monitoring Plans (s.95, z.64). Conservation Areas (s.89) and other regulation making powers

under the *Wildlife Act* are also being considered. Additionally, it may be determined that new regulations under the *Wildlife* Act could apply to both territorially-managed lands and Tłı̨chǫ lands, and that both the *Wildlife Act* and TLUP could work in tandem to implement the interim range plan on Tłı̨chǫ lands. For management actions related specifically to timber harvesting (see Section 8.4 and 8.5, and Tables 12 and 13), the *Forest Management Act* and associated Forest Management Regulations will be the primary implementation instrument, through decisions about whether to enter into Forest Management Agreements, or to issue Timber Cutting Permits and Timber Cutting Licences, and through specific conditions included in these agreements, permits and licences. Decisions about whether to open up areas to Calls for Bids for oil and gas exploration (see Section 8.4 and Table 12) are made under the *Petroleum Resources Act*.

Preferred implementation instruments under the *Wildlife Act*:

a) Habitat Protection (s.93, z.61)

Section 93 of the *Wildlife Act* states that "No person shall substantially alter, damage or destroy habitat". This habitat protection provision of the *Wildlife Act* was chosen because it allows for development of regulations to broadly protect habitat without necessarily having to spatially define a specific area to which they apply (i.e., through metes and bounds described in regulations). This was considered as a more flexible tool compared to s.89 of the Act, for example, which focuses on designating areas within NWT as conservation areas. The purpose of s.89 is very similar to that of s.93, except that under s.89, the area chosen for conservation can only be defined geographically (spatially). S.93 allows the area to be more broadly defined either geographically or qualitatively (e.g., a salt lick, lambing area, etc.).

Regulations can be written to define what constitutes substantial alteration, damage or destruction of specific habitat and the regulations will provide a means of enforcing the Act. Functionally, this also means a permit, licence or some other legal authority must be created and then granted, before any activity can take place, thus preventing the developer from substantially damaging or destroying specific wildlife habitat. For example, a new regulation under s.93 could be created, stating that a developer must follow the management actions outlined in the approved interim range plan when operating in Enhanced and Intensive management class areas. Permits to deviate from the specific management actions could be granted on a case-by-case basis provided certain conditions are met (e.g., similar to the conditions for obtaining a federal permit to destroy critical habitat), such as proving that the intent or desired outcome of the management action can still be achieved through alternate means.

Regulations can begin to be drafted once the Interim Range Plan has been approved. During this time, until the new regulations are in place, a Minister-approved Wildlife Management and Monitoring Plan (explained below) will be required for any new project proposed in an Enhanced or Intensive management area.

b) Wildlife Management and Monitoring Plans (WMMPs) (s.95, z.64)

Developers can be required to prepare and adhere to a Minister-approved Wildlife Management and Monitoring Plan (WMMP), if the proposed activities satisfy any of the conditions outlined in

s.95(1) of the *Wildlife Act*. WMMPs were chosen as an implementation tool since there are already regulations in place enabling the Minister to require and approve a WMMP, and to enforce compliance with it.

The existing WMMP Process and Content Guidelines (GNWT 2021a) include range plans as a trigger for requiring an approved WMMP, and can be used to determine if a proposed development project will alter, damage or destroy an area of habitat large enough to exceed a threshold or compromise meeting goals or targets identified in a range plan. In the case of the Wek'èezhìı interim range plan, if a development project were to cause the total human disturbance footprint to exceed the 4.5% disturbance threshold for the Wek'èezhìı region, the requirement of a WMMP will be triggered.

Under s.95, z.64(ii), a regulation could be created requiring WMMPs for projects that occur in specific range plan management class areas. Until new regulations are in place under s.93/z.61 (Habitat Protection) or s.95/z.64(ii), as a general policy, GNWT-ENR will require a Minister-approved WMMP for any new project that is proposed in an Enhanced or Intensive management area identified in the range plan. GNWT-ENR would require developers to demonstrate through the WMMP how the applicable management actions outlined in the range plan will be implemented in these areas.

9.3 Implementation Instruments on Federally-administered Lands

Within the southeastern area of the Wek'èezhìı region of the NT1 boreal caribou range, there is a small federally-administered parcel of land (see Figure 20). There is an active mineral lease held by Explor Silica that encompasses the entirety of this federal land.

Some federally-administered lands have been designated as critical habitat for boreal caribou. On June 7, 2019, the Government of Canada issued an order to protect critical habitat of boreal caribou on federal lands in Canada[25] under subsection 58(2) of the federal *Species at Risk Act* (SARA). This protection order excludes *Indian Act* lands, properties administered by the Parks Canada Agency that are not federal protected areas, and devolved lands in the Yukon and NWT.

Although land can be designated as critical habitat, a person or organization may still indicate interest in conducting an activity in that designated habitat. In such a case, the federal Minister of Environment and Climate Change may issue a permit or enter into an agreement with that person/organization allowing them to engage in the activity which could potentially affect a listed wildlife species, and/or any part of its critical habitat. The permit is difficult to obtain and may only be issued (or an agreement entered into), if one or more of the following criteria are met: (a) the activity is scientific research relating to the conservation of the species and conducted by qualified persons; (b) the activity benefits the species or is required to enhance its chance of survival; or (c) affecting the species is incidental to carrying out the activity. The applicant must also demonstrate that all reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted. Those issuing the permit (or entering into

[25] See Canada Gazette Part II, Vol. 153, No. 13, Registration SOR/2019-188, available at: http://gazette.gc.ca/rp-pr/p2/2019/2019-06-26/pdf/g2-15313.pdf

an agreement) must also be satisfied that the applicant has taken all feasible measures to minimize the impact of the activity on the species or its critical habitat and that the activity will not jeopardize the survival or recovery of the species. It is important to note that activities outside federally administered lands where the 500 m buffer around a project footprint extends onto federally-administered land may also require a permit under the federal SARA.

10. FORECASTS OF FUTURE HABITAT

10.1 Projected Recovery of Fire Disturbance

In the next five years since the fire history map was last updated (2020-2024), an area of 1,049 km^2 (2.1% of the region) is expected to transition back to undisturbed habitat; and another 591 km^2 (1.2%) will transition back to undisturbed habitat between 2025-2029 (Figure 45).

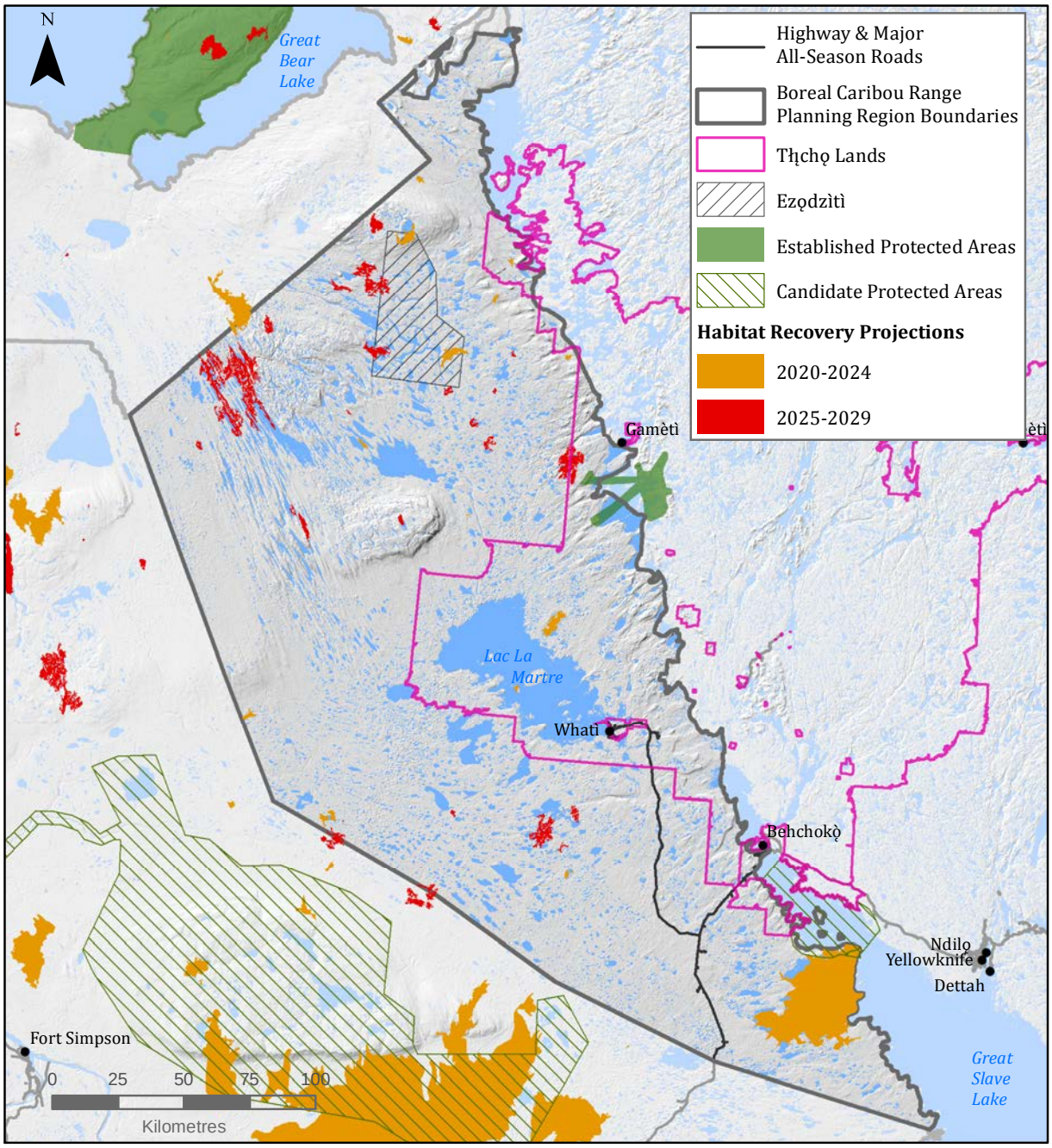

Figure 45. Projected habitat recovery from fires in Wek'èezhìı region.

10.2 Projected Recovery of Human Disturbance

This section will be completed for the full range plan. The TASR Caribou Habitat Offset Plan will help to identify specific areas that will be restored in the future.

10.3 Projections of Future Fire Disturbance

This section will be completed for the full range plan. Projections will be based on annual average area burned in the range planning region, and predictions from ongoing climate change/fire modeling studies (e.g., ECCC/NRCan Western Boreal Initiative Project).

10.4 Projections of Future Human Disturbance

This section will be completed for the full range plan.

10.5 Priority Areas for Habitat Restoration

This section will be completed for the full range plan. The TASR Caribou Habitat Offset Plan will identify candidate areas for habitat restoration.

C. MONITORING, ADAPTIVE MANAGEMENT AND REVIEW

11. KNOWLEDGE GAPS AND RESEARCH PRIORITIES

This section will be fleshed out further in the full range plan. For the interim range plan, research priorities and knowledge gaps identified during regional working group meetings have been summarized below.

During the working group meeting in April 2021, the Wek'èezhìı working group identified research on restoration in the NWT as a knowledge gap and research priority. There is currently a lack of precedent, experience, and infrastructure (e.g., local nurseries with local native species) in the north to support restoration; and there is currently no inventory of candidate sites in the NWT that require restoration/reclamation, to help prioritize efforts within or outside the Wek'èezhìı region. As such, the Wek'èezhìı working group collectively decided that management actions for the interim range plan should not include prescriptive recommendations for offsetting. Rather, for the short term, proponents should be required to contribute to restoration research (see Section 8).

Although ecological and functional restoration methods for caribou habitat have been developed in other jurisdictions such as Alberta and BC, especially for restoration of linear features (summarized in Pyper et al. 2014; Golder Associates 2012, 2015), the effectiveness of these methods has not been tested in the taiga forests of the NWT. It is expected that much will be learned through restoration efforts undertaken as part of the TASR Caribou Habitat Offset Plan, which may include both restoration of linear features and reforestation of burned areas (Associated Environmental 2021). However, a detailed Implementation Plan that includes site-specific treatment prescriptions and monitoring still needs to be developed. Lessons learned from offsetting conducted for the TASR and through ongoing restoration research will help enable adaptive management for boreal caribou range planning.

Another knowledge gap and research priority identified by the Wek'èezhìı working group is the current lack of caribou collar data in the northern half of the Wek'èezhìı range planning region, as most collars deployed to date have focused on the southern area surrounding the TASR (see Figure

4). During the April 2021 meeting, the Wek'èezhìı working group noted that boreal caribou have been observed west of Gamètì and suggested deploying collars in this area. As described in Section 5.4.2 and Appendix D, important areas for boreal caribou based on western science are derived from RSF models and GPS collar locations. Collar data from the northern portion of the Wek'èezhìı region may reveal additional areas of importance for caribou (e.g., calving locations, movement paths and connectivity) to help revise and refine management class area designations for the full Wek'èezhìı range plan.

Additional knowledge gaps and research priorities, such as those outlined in Appendix C of the Framework, will be described in the full range plan.

12. MONITORING POPULATION STATUS

The main goal of the boreal caribou range plan within the Wek'èezhìı region is to maintain adequate habitat to enable a stable or growing boreal caribou population trend in this region. Part of the range plan includes monitoring the population status of boreal caribou to ensure that the regional range plan is achieving its goals. The monitoring program for tracking the population status of boreal caribou within the Wek'èezhìı region is currently designed to enable the GNWT-ENR to track calf recruitment and adult female survival rates in order to calculate an annual index of population trend. The monitoring program that will be used to support the interim range plan will be built from existing programs and will be re-examined for its ability to track population changes between the current range plan and the final range plan. Each revision of the full range plan, to be released every 5-10 years, will enable the GNWT-ENR to examine population trends, and to adapt the range plan and monitoring as required.

The GNWT-ENR has already established a boreal caribou population monitoring program in the Wek'èezhìı region. Boreal caribou population trends are currently monitored within two study areas within the Wek'èezhìı region: North Slave TASR and Mackenzie (Figure 2, Section 3.2). The TASR monitoring program was triggered in response to the EA conducted for the road project, which will connect Highway 3 to the Community Government of Whatì boundary. The Mackenzie study area monitoring program was initiated to better understand boreal caribou use of the large fires that occurred in 2014. Both population monitoring programs have produced results over the past 3-4 years that indicate that boreal caribou populations are increasing in both study areas (Table 1 and Table 2, Section 3.2).

The suitability of these monitoring programs in meeting the needs of informing success of the range plan will be re-examined during the completion of the full range plan for Wek'èezhìı. Regular reviews and updates to the full range plan will also involve a re-examination of monitoring results and changes needed within the monitoring plan design and spatial focus. The details of the population monitoring programs that are currently underway are included below.

The GNWT has already committed to continue to monitor the population trends of boreal caribou in the region for at least 5 years after the TASR opens to the public, until the end of 2026. This

commitment is articulated within the WMMP for the TASR (GNWT 2021b). An additional abundance survey for boreal caribou may also be completed within the next five years of monitoring for the TASR project. Specific monitoring methods are described in further detail in Section 3.2, and in the TASR WMMP.

13. MONITORING HABITAT DISTURBANCE

GNWT-ENR measures and updates wildfire disturbance on an annual basis and contributes this data to the National Burn Area Composite (NBAC) and Canadian National Fire Database (CNFDB) datasets maintained by NRCan. GNWT-ENR uses a combination of the NBAC (1986-2019) and CNFDB (pre-1986) datasets to calculate fire disturbance within the NWT boreal caribou range. GNWT-ENR updates these estimates annually once updates to the national databases have been made and are available for download.

Human habitat disturbance is monitored and updated through two main information sources. For periodic comprehensive updates to the human disturbance footprint within the NT1 range, GNWT-ENR relies on habitat disturbance mapping completed for all boreal caribou ranges across Canada by ECCC. These disturbance maps are based on a nationally consistent methodology which is based on human disturbance visible on a 1:50,000 scale on Landsat imagery. These periodic updates can be used to provide disturbance estimates that capture both new human disturbance, and previous human disturbance which is no longer visible on satellite imagery. Disturbance has been mapped using this approach in 2010 and 2015. The timing of the next updated ECCC disturbance dataset is currently unknown.

For annual estimates of new human disturbance, the NWT CIMP, administered by GNWT-ENR, maintains a spatial data set of LWB Permit Registry data for projects requiring land use permits and water licences. This database is updated annually, and LWB permit registry records are used to capture the spatial footprint of projects either using GIS layers provided by project proponents or by digitizing visible disturbance from available satellite imagery. This data source can be used to provide updated annual estimates of new habitat disturbance that has occurred since the last time the ECCC's national human disturbance dataset was updated, but cannot be used to determine how much old human disturbance may have recovered since that time.

14. REPORTING ON RANGE PLAN IMPLEMENTATION

The status of implementation of the interim Wek'èezhìı Boreal Caribou Range Plan must be reported in 3 different forums. One of these is the Conference of Management Authorities (CMA) in NWT. Established under the *Species at Risk (NWT) Act*, the CMA is the group of wildlife co-management boards and governments that share management responsibility for the conservation and recovery of species at risk in the NWT. The production of range plans was one of the management actions to which GNWT committed as part of the 2017 *Recovery Strategy for the*

Boreal Caribou in the Northwest Territories. As part of this commitment, GNWT must report annually to the CMA to inform them of its progress on implementation of the range plan.

As part of the EA conducted by the MVEIRB for the TASR, one of the legal requirements is that GNWT must produce an annual report for MVEIRB, detailing how any measures in the EA have been implemented. The annual report is typically due in October each year.

As part of the construction of the TASR project, GNWT had to apply to the WLWB for a water licence. This water licence is in effect until May 2026. As part of the requirements of the licence, GNWT is required to report annually to the WLWB, until the licence expires. The annual water licence reports are due at the end of March each year.

15. INFORMATION SHARING WITH OTHER RANGE PLANNING REGIONS

Due to the very tight timeline for creating the interim Wek'èezhìı range plan, information from this process was not shared with other regions for feedback. Similarly, information from other regions on their range planning processes was not considered due to the later timelines and status of the range planning processes in other regions. The interim Wek'èezhìı range plan will undergo a public review which will provide organizations from other range planning regions an opportunity to review and comment on the plan. As work continues on developing the full Wek'èezhìı range plan, further information will be exchanged and considered among those working on regional range plan processes.

16. TIMELINE

The interim range plan is due to be submitted to the WRRB in August 2021 (current submission target is August 13). The full Wek'èezhìı range plan is not due until March 2023. The interim range plan will remain in effect until the implementation tools for the full Wek'èezhìı range plan are in place.

17. FIVE-YEAR MID-TERM RANGE PLAN REVIEW

17.1 Triggers for Earlier Range Plan Review and Update

This section will be completed in the full range plan.

18. TEN-YEAR RANGE PLAN REVIEW AND UPDATE

This section will be completed in the full range plan.

GLOSSARY

Anthropogenic: caused by human activity.[26]

Biophysical attributes: habitat characteristics required by boreal caribou to carry out life processes necessary for survival and recovery.[26]

Critical habitat: means the habitat that is necessary for the survival and recovery of the species and that is identified as the species' critical habitat in the national recovery strategy. For boreal caribou, critical habitat is: i) the area within the boundary of each boreal caribou range that provides an overall ecological condition that will allow for an ongoing recruitment and retirement cycle of habitat, which maintains a perpetual state of a minimum of 65% of the area as undisturbed habitat in all ranges other than SK1, and a minimum of 40% undisturbed habitat in SK1; and, ii) biophysical attributes required by boreal caribou to carry out life processes.[26]

Development: any public, commercial or industrial undertaking or venture, including support and transportation facilities, related to the extraction of renewable or non-renewable resources, and any infrastructure related to transportation and utilities.

Ecological restoration: habitat restoration treatments that focus on ensuring or accelerating the longer-term recovery of vegetation in disturbed areas that will provide biophysical attributes required by caribou (e.g., restoration of lichen ground cover, or conifer-dominated forest cover), and the return of an area to pre-disturbance composition and structure.

Fire disturbance: the combined non-overlapping footprint of wildfires from the last 40 years.

Forty-year (40-yr) fire footprint: is the total non-overlapping area burned by wildfires within a given forty-year period. For example, the 40-year fire footprint for 2019 is the total non-overlapping area burned by wildfires between 1980 and 2019.

Functional restoration: habitat restoration treatments that are generally focused on reducing the ability of predators and humans to use linear features as travel corridors that increase the odds of encounters with caribou in the short-term, or to prevent repeated disturbances caused by vehicular traffic which may impede longer-term regeneration of vegetation.

Habitat importance: the relative importance of an area for boreal caribou based on local, traditional and/or western scientific knowledge.

Human disturbance: anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance.[26]

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[26] Environment and Climate Change Canada. 2020. Amended Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. xiii + 143pp. https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/plans/Rs-CaribouBorealeAmdMod-v01-2020Dec-Eng.pdf

Human disturbance threshold: management thresholds for human disturbance that indicate the likelihood that a region would be able to keep total disturbance below the long-term disturbance limit, given variation in observed 40-yr fire footprints.

Indigenous/Traditional Knowledge: knowledge and values, which have been acquired through experience, observation, from the land or from spiritual teachings, and handed down from one generation to another[27].

Likelihood of self-sustaining status: the probability that a boreal caribou population will experience stable or positive population growth over a 20-year period.[26]

Long-term disturbances: habitat disturbances from human activity where the amount of time that the disturbed area is in use for a development project plus the predicted time for the feature to be functionally restored once no longer needed would be >40 years. This includes permanent disturbance features which are expected to be used in perpetuity (e.g., public highways, communities).

Long-term total disturbance limit: limit for the total amount of disturbance (human + fire), beyond which the likelihood of maintaining a self-sustaining population within a given range planning region would become unacceptably low.

Management class: an area delineated in a regional range plan where specific management actions for managing disturbance to boreal caribou and their habitat will be required. Three categories of management classes may be identified in each range plan – Basic, Enhanced and Intensive - representing increasingly intensive management requirements.

Marxan: a spatial optimization program commonly used to support conservation planning, designed to achieve minimum targets for representation of conservation features for the smallest possible cost or within the smallest area possible.[28]

NT1: the range of boreal caribou in the Northwest Territories and Yukon.

Offsets: the process of creating environmental benefits to compensate for the residual negative environmental impacts of development projects or programs (after all reasonable measures have been taken to avoid and minimize the losses).[29]

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[27] Government of Northwest Territories. 2005. 53-03 - Northwest Territories Traditional Knowledge Policy. https://www.eia.gov.nt.ca/sites/eia/files/content/53.03-traditional-knowledge.pdf

[28] Game, E. T. and H. S. Grantham. 2008. Marxan User Manual: For Marxan version 1.8.10. University of Queensland, St. Lucia, Queensland, Australia, and Pacific Marine Analysis and Research Association, Vancouver, British Columbia, Canada.

[29] Business and Biodiversity Offset Program. 2013. To No Net Loss and Beyond. An Overview of the Business and Biodiversity Offsets Programme (BBOP). Washington, D.C. Available at: https://www.forest-trends.org/wp-content/uploads/bbop/bbop-overview-document_2012_v11_april-22_2013_web-pdf.pdf

Range: the geographic area occupied by a group of individuals that are subject to similar factors affecting their demography and used to satisfy their life-history processes (e.g., calving, rutting, wintering) over a defined time frame.[26]

Range plan: a plan describing how habitat disturbance from human development activity and wildfires will be managed to maintain adequate habitat to ensure a healthy and sustainable boreal caribou population that offers harvesting opportunities for present and future generations.

Resource Selection Function (RSF): Analytical framework used to model and generate predictive maps of animal habitat selection, which typically compare resource units associated with locations "used" by individuals to resource units associated with a random sample of locations that are available to individuals within a certain spatial scale of interest.[30]

Self-sustaining population: a population of boreal caribou that on average demonstrates stable or positive population growth over the short-term (≤20 years), and is large enough to withstand stochastic events and persist over the long-term (≥50 years), without the need for ongoing active management intervention.[26]

Sensory disturbance: disturbance to caribou caused by noise, light, vibration, or smell.

Short-term disturbances: habitat disturbances from human activity where the amount of time that the disturbed area is in use for a development project plus the predicted time for the feature to be functionally restored once no longer needed would be ≤40 years.

SK1: Saskatchewan's "Boreal Shield" range of boreal caribou in Canada

Total disturbance: habitat showing: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years (without buffer).[26]

Undisturbed habitat: habitat not showing any: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years (without buffer). Disturbance within the 500 m buffer would result in a reduction of the undisturbed habitat.[26]

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[30] Manly, B. F. J., L. McDonald, D. L. Thomas, T. L. McDonald, and W. P. Erickson. 2002. Resource selection by animals: statistical design and analysis for field studies. Second edition. Kluwere Academic Publishers, New York, NY.

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UNITS OF MEASUREMENT

%	percent
cm	centimetre
ft	foot
ha	hectare
km	kilometre
km^2	square kilometre
kW	kilowatt
m	metre
m^2	square metre
m^3	cubic metre
MW	megawatt
yr	year
K	thousand – e.g., 1:250K scale map

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APPENDIX A – Wek'èezhìı Working Group Meetings to Date

1. Wek'èezhìı Boreal Caribou Range Plan Working Group Members

Organization	WG Member / Alternate Member
Tłı̨chǫ Government (TG)	Michael Birlea Petter Jacobsen Stephanie Behrens Mark Poskitt John Nishi
Yellowknives Dene First Nation (YKDFN)	Sarah Gillis
North Slave Métis Alliance (NSMA)	Catherine Fauvelle Jessica Hurtubise (Alternate)
Wek'èezhìı Renewable Resources Board (WRRB)	Randi Jennings / Laura Meinert Jody Pellissey (Alternate)
GNWT ENR Wildlife	Lisa Worthington, James Hodson
GNWT ENR Forestry (North Slave Region)	Lawrence Lewis
GNWT ENR Environmental Stewardship and Climate Change	Claudia Haas Lillith Brook (Alternate)
GNWT Industry, Tourism, and Investment (ITI)	Tejas Kashyap Johnny Lennie (Alternate)
GNWT Lands	Scott Stewart Clint Ambrose (Alternate)
GNWT Executive and Indigenous Affairs (EIA)	Buddy Williams Roshan Begg (Alternate)
Environment and Climate Change Canada (ECCC)	Bruce Laurich

2. Working Group Workshop 1 – November 13, 2019

Table A-1. Range plan development process: Wek'èezhìı working group meetings from November 2019 – May 2021.

Key points of discussion WG Workshop #1	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
	TERMS OF REFERENCE (TOR)	
Participation in the working group	• Missing important perspectives (e.g., Dehcho First Nations, another member from GNWT Lands)? • How will information from other regional boreal planning processes be brought forward to inform the Wek'èezhìı process?	• Dehcho First Nations and GNWT Lands representatives for South Slave and Dehcho regions are involved in the Southern NWT range planning process. GNWT will ensure that the five regional range plans align. Opportunities to collaborate and share information and data will be explored. • ENR's Boreal Caribou Range Planning Team has produced a newsletter to be distributed to all regional WGs. It describes the status of the five regional range plans and other topics generally related to range planning. Sharing experience/knowledge among the five various regional range planning processes is the role of the Boreal Caribou Range Planning Advisory Group. • Regional WGs will communicate progress at critical points of the range planning process (see TOR and *Timelines* discussion below).
Respecting sensitive or confidential Indigenous Knowledge (IK) data, and information, particularly in mapping exercises	• Approaches taken by TG and YKDFN shared with the group; differences between approaches and capacity. • YKDFN are developing a data sharing agreement. • Need to ensure that respect guides the sharing of information.	• Appendix B in TOR includes principles that specifically speak to the sharing of IK and information. • The consultants facilitated a discussion with all IGO representatives at WG Meeting #1 to solicit feedback. • GIS techniques will mask and protect confidential information.

Key points of discussion WG Workshop #1	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
Timelines	• Timeline of proposed schedule should be moved up; April/May preferred to host community meetings. • Flag key points where the WG will liaise with the advisory committee or other range planning processes.	• TOR timeline for community mapping meetings changed to April–August 2020. • TOR revised to indicate that at critical points (e.g., upon completion of major milestones), Wek'èezhìı WG will coordinate opportunities to communicate progress with the Range Planning Advisory Group and with other regional range planning WGs to ensure consistency across the NWT planning processes.
Meeting locations	• Rotate planning meeting locations to road accessible communities to enhance engagement. • In-person meetings preferred; video conference options will be investigated.	• After consideration, ENR decided that group meetings are better held in Yellowknife because all attendees have offices in Yellowknife, and it is a cost savings that can potentially support additional funds being directed toward contribution agreements for IGOs.
Implementation and approval of range plans	• Implementation is essential for the range plans to be effective.	• Next step after interim range plan has been approved: ENR and WG will explore tools for implementation. Potential options include *Species at Risk (NWT) Act*, *Wildlife Act*, Tłı̨chǫ Land Use Plan. • Preferred implementation tools for the interim range plan, as identified by the WG, are included in Section 9.
EXISTING INFORMATION TO SUPPORT RANGE PLANNING		
Regional land use planning	• TG currently updating Tłı̨chǫ Land Use Plan (TLUP); mapping information will be valuable for range planning. • Land use planning and boreal caribou range planning should align.	• TLUP mapping (e.g., established protected and candidate protected areas, Tłı̨chǫ private lands and land use zones) has been incorporated into range planning maps to inform decision-making about management class areas (Sections 6 and 7).
IK workshops	• TG: Workshops with elders/harvesters is an internal, trust-building process. • TG: Need to talk through the process beforehand	• ENR will assist with securing financial support for IGOs to conduct community mapping meetings. • Greater financial support was available for IGOs in

Key points of discussion WG Workshop #1	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
	so there is clear understanding of what is needed. • YKDFN: Preference to collect IK in a group to benefit from collective memory. • TG and YKDFN: Funding to support IK workshops and preparation is needed.	2019-20 fiscal year; some opportunities exist for 2020-21 fiscal year but funding is more limited. • Straightforward funding applications process for IGOs.
Existing IK studies	• TG members: IK and habitat mapping work related to construction of Whatì road, relevant studies from barren-ground caribou habitat, mapping completed as part of the TLUP (e.g., unburned areas as boreal caribou habitat). • WRRB: IK study with elders (2012-2017) focused on boreal caribou habitat during different parts of the year, but not a lot of winter work. • WRRB: Nearly all identified habitat is considered important; there is overlap between Dehcho and Wek'èezhìı caribou ranges. • YKDFN: Exploring options for digitizing information; will identify existing information that may be shared. • NSMA: Conducted interviews and mapped information on land use activities in 2015; currently updating land use mapping and hoping to develop study in North Arm.	• If existing IK and habitat mapping can be shared with ENR, this information and data will be used for boreal caribou range planning (as defined in data sharing agreements). • Information gathered at community meetings will help fill information gaps (e.g., seasonal caribou habitat use). • Previously collected TK studies and newly collected TK by TG and NSMA in 2020-2021 have been interwoven into the interim range plan (Sections 3 and 5).
Existing western science studies	• GNWT Stewardship and Climate Change: Wek'èezhìı region protected areas - Dınàgà Wek'èhodì, Ezǫdzìtì, Wehexlaxodıale; monitoring assessments and flight line data available. • ECCC has an up-to-date place name database; will provide information related to federally protected areas. • GNWT ENR: Boreal caribou collaring data, predictive caribou habitat maps (Resource	• Federal and provincial protected areas, as well as those identified in the TLUP, have been added to mapping layers to be used for range planning (Section 6). • Using RSF and collar data; ENR used Marxan to create preliminary maps showing important areas for boreal caribou (Section 5.4.2; Appendix D).

Key points of discussion WG Workshop #1	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
	Selection Function, RSF); disturbance maps; active resource leases maps and information may be missing.	
GATHERING INDIGENOUS KNOWLEDGE TO INFORM RANGE PLANNING		
Important considerations for gathering IK and community workshops	• Canvass diverse voices, including elders, youth, women and harvesters. • Work to ensure that a verification process is in place to help ensure IK was correctly understood, interpreted, and applied. • Community workshops are best led by IGOs themselves. • Different communities across the Wek'èezhìı region should work from the same base maps, and ideally use the same base questions, to generate information that is comparable and more easily applied to the range planning process. • Discussed the possibility of using topographical maps (e.g., Google Earth/Maps), but experience of TG and NSMA to date has been mixed. • Potential to use flight line imagery, such as the NWT Forest Management Division's Ecosystem Classification Photo Map: https://www.geomatics.gov.nt.ca/en/services/web-mapping-applications/forest-management-divisions-fmd-ecosystem-classification-photo-map	• Because IK is so important to the process, and particularly key in mapping important caribou areas, gathering IK will be a priority focus, particularly in the next 6-8 months. • Community meetings are led by IGO members; ENR has offered to attend meetings to support IK gathering, if needed. • Community meeting participants have included elders, harvesters and youth. • ENR and WG worked together to develop a plan for IK gathering, including potential interview questions and verification processes. • ENR offered maps and mapping services to IGOs for community mapping meetings. Maps initially developed at a scale of 1:250K; communities can request finer resolution maps for specific areas as needed.
IK model-based approach for identifying important caribou habitat	• Fine-scale IK information may not be useable at the landscape scale of a range plan.	• Model-based approach can help make IK applicable beyond the local scale to the landscape scale.

3. Working Group Workshop 2 – February 12, 2020

Key points of discussion WG Workshop #2	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
CARIBOU HABITAT IMPORTANCE MAPS		
All-year vs. seasonal predictions for important caribou habitat	• All-year predictions may underrepresent or dilute seasonally important habitat areas. • Connectivity/corridors between the important areas is an important information gap. • Connectivity will need to be considered, especially when incorporating the range plans from different regions. • YKDFN: TK offers a rich amount of detail on the travel routes of caribou.	• After consideration, ENR selected a model that adds the values for each season together instead of an all-year average prediction, so that the resulting map will consider seasonally important areas for caribou. Marxan was also selected as a tool to create these maps; Marxan is an optimization tool that helps to select the objectively best option for land conservation. • Connectivity was indicated as an anticipated theme for discussion in community IK gathering workshops. • Connectivity was evaluated by looking at movement paths from the collar data and was built into maps of management class areas (Section 7.2).
Future caribou habitat projections	• Spatial Discrete Event Simulation (SpaDES) model could support the goal of building a resilient range plan (particularly as the WG draws management classes) by sharing information on climate predictions, with a focus on forecasting fire disturbance, forest succession, and potentially development, and implications for caribou habitat suitability or demographics in different range planning areas. • SpaDES could allow us to examine the management classes that we develop and to predict which one might be appropriate in the future. • IK can be integrated for caribou and other topics.	• UBC/Pacific Forestry Centre is committed to continued information sharing with ENR; will be working to update the SpaDES model to be context-specific to the range planning process. • ENR followed up with SpaDES team to clarify scope of their involvement/partnership with range planning process; • Results from this project were unavailable in time for the interim range plan, but ENR staff are participating on a number of technical advisory groups related to the SpaDES project.

Key points of discussion WG Workshop #2	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
	• Model could be useful in the future when we want to look at the predictive outcome of the management plan.	
Tłı̨chǫ Land Use Plan	• In the process of being updated – could be 18 months before it is complete. • Timeline of update aligns with boreal caribou range planning process; information developed for the range plan will likely be useful for the updated TLUP. • Need to expand on the needs of caribou within the TLUP; currently does not specify management actions related to caribou habitat management.	• WG will begin evaluating how well the TLUP zones capture areas of more highly selected habitat during different seasons based on the RSF models.
Wek'èezhìı Land Use Plan	• Very early stages; GNWT, Government of Canada, and TG developing business plan for funding. • Ideal timeline is to develop the WLUP over 4-year period. • Boreal caribou range plan will be completed before WLUP, so range plan can offer guidance and leadership for land use plan.	• WLUP will likely not be used for boreal caribou range planning. • GNWT will support development of the WLUP and will aim for the range plan and land use plan to be aligned.
How can IK and western science complement each other as part of the range planning process?	• Protecting Indigenous intellectual property is priority. • Communities are at differing points in terms of their willingness, trust, and capacity to share detailed IK. • Ongoing discussions between ENR and all IGOs in the Wek'èezhìı region will be important to support meaningful community involvement. <u>Principles and practices for IK gathering:</u> • Working with knowledge keepers requires deep, respectful listening to the wisdom and knowledge being shared, and minimal contributions from the researcher.	• Appendix B in the TOR outlines the principles to guide sharing of IK, data, and information. These principles complement and reinforce data sharing agreements established between individual IGOs and the GNWT, and other IK protocols or guidance documents brought forward by WG members. • ENR follows up with IGOs periodically to offer support and learn about the status of IK gathering. • ENR offered to visit communities and/or attend Chief in Council meetings to discuss Wek'èezhìı range planning and framework; discussed potential for meeting with YKDFN leadership/staff, although were unable to do so due to COVID

Key points of discussion WG Workshop #2	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
	• A rigid/prescriptive agenda or set of questions is generally not welcomed and considered inappropriate. • Place names are a source of extensive knowledge and should be carefully documented and understood. • An important step in IK gathering is verifying that the information was interpreted and documented accurately. • Reporting back to knowledge holders about how their information was used in decision-making is important. <u>Example: Bathurst Caribou Range Planning Process:</u> • Generally perceived as a strong example of IK and western science working together. • TG research: Asked elders/harvests where they travel, where they see caribou and what they would like to put on the map. Place names are key. • YKDFN research: Similar methodology as TG; verifying data with elders is very important.	restrictions. • IGOs are leading community mapping meetings and follow recommended principles and practices for IK gathering; hoping to build greater willingness and trust among communities.
ENR potential to support gathering of IK – land cover posters	• ENR can create posters using air-photos and Landsat imagery from EOSD dataset and Dene terms describing land cover. • WG noted that multi-season and higher resolution land-based photos are needed, and also requested photos of geology and hill slopes.	• IGOs conducted their IK research and didn't feel it was necessary to use posters.
Resource development and potential	• Resource development potential in NWT is significant. • ITI encourages investment in NWT mining, and encourages interested companies to contact local First Nations groups.	• Range planning will consider development interests when making decisions about management class areas and management actions (Sections 6, 7, 8). • ENR has collected data layers for mineral rights, oil and gas rights, timber harvesting permits, as well

Key points of discussion WG Workshop #2	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
		as potential for these sectors and hydroelectric projects (Section 6). • ENR has also collated data layers for active land use permits and water licences, quarry permits, and new/planned developments (Section 6).

4. Working Group Workshop 3 – September 16, 2020

Key points of discussion WG Workshop #3	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
Tłı̨chǫ All-Season Road Environmental Assessment (TASR EA) and Wek'èezhìı Interim Range Plan	• Working copy of TOR accepted, but if interim range plan is pursued, timeline in the TOR would need to change to reflect new timeline. • Alternative to interim range plan is to continue with original plan and not meet deadline of August 2021, but there are legal risks for not meeting TASR EA Measure 6-1, Part 1 – an injunction would prevent road from opening. • Interim range plan was the only feasible option, accepted by WRRB and TG[31]. • Would need to work with existing TK literature; TG has new TK research reports that they will share with ENR. • Some interim land withdrawals have lasted for decades and were not really useful.	• TOR timeline has not been officially updated, but WG has been notified about new timeline/workplan for completing the interim range plan. • Full range plan will continue to be developed, including identifying implementation tools. Since interim land withdrawals sometimes last for decades, and are not always effective, it is unlikely they would be used as a tool to implement the range plan.
Review of IGOs' plans for community mapping meetings	• Scheduling community mapping meetings delayed due to COVID-19; still planned to happen, aiming	• TG hosted IK gathering meetings in December 2020 and NSMA conducted IK gathering

[31] The recommendation of creating an interim range plan was also accepted by YKDFN in a phone call between GNWT and YKDFN on October 28, 2020. YKDFN agreed that under the circumstances, an interim range plan was the best option to pursue.

Key points of discussion WG Workshop #3	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
	for November and/or December 2020. • COVID restrictions change how they can hold the meetings.	interviews from Jan-March 2021.
Habitat disturbance maps	• Undisturbed habitat in NWT has increased from 69% to 69.5% (more fire-disturbed habitat >40 years old than new burns). • Disturbance map/stats need to include TASR, which will increase current human disturbance by ~1% (still below Tier 1 human disturbance threshold). • Adding lakes as undisturbed habitat?	• ECCC disturbance maps current to 2015 and used for interim range plan (Section 5.1); supposed to update every 5 years but 2020 data not available yet. • ENR added new disturbance data, but it is harder to identify "recovered habitat" without ECCC assistance. • As part of federal recovery strategy, lakes are included as undisturbed habitat. For NWT range planning, terrestrial and island habitats will be delineated as important areas for boreal caribou, and large lakes considered not as important.

5. Working Group Workshop 4 – April 22-23, 2021

Key points of discussion WG Workshop #4	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
Use of Marxan to help identify important areas for caribou	• General agreement that Marxan (and ENR's approach) is a good tool to use for range planning. • Seasonal use and habitat connectivity are important; need to consider collar data and TK. • Use a combination of Marxan and group input (visual review to interweave TK layers).	• ENR analyzed collar data and built connectivity into maps of management class areas (Section 7.2). • Various Marxan scenarios were presented at WG Meeting #5, and manual review and editing was done to create the final map of management class areas (Section 7.2).
Approach to developing a "cost" layer for use in Marxan	• For the interim range plan, start with: - Equal values for the 3 industry sectors (Oil & Gas, Minerals, Forestry). - 3 cost elements: calculate resource potential	• ENR revised initial approach to developing "cost" layer with WG recommendations; presented at WG Meeting #5. • ENR added seasonal considerations for road

Key points of discussion WG Workshop #4	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
	and regulatory access for each sector (70% weighting), combine these values, then add proximity to road (30% weighting). - (Seasonal) road access important for certain industries, increases cost. • Revisit approach for full range plan when more information and time are available.	access for interim range plan by creating two road layers: all-season roads alone, and all-season roads + winter ice roads (Appendix E). • The resulting Marxan maps (6 management plan scenarios) were reviewed and discussed at WG Meeting #5.
Recent TK gathering workshops by IGOs	• TG presented on December 2020 TK workshop that explored "Tǫdzı range through the seasons": - Essential and critical habitats identified by communities - Verification workshop planned for fall 2021. • Some similarities, some differences noted between TG's TK map and Marxan. • For the interim range plan, TG prefers to keep their TK separate until refining management class areas. • Adding TG's verified TK into Marxan can be explored for the full range plan. • NSMA had internet connection problems and was unable to participate/present at this WG meeting.	• ENR overlaid Marxan maps with TG's TK maps and had a separate meeting with TG to discuss overlaid maps before WG Meeting #5. • ENR followed up with NSMA about their TK gathering interviews; NSMA provided a summary and spatial data that are included in Sections 5.4.1 and 7.2. • TK from TG and NSMA have been kept separate from western science in the interim range plan.
Interim range plan Table of Contents	<u>Section 4, Current habitat condition and important areas for Tǫdzı:</u> • Include TASR disturbance (adds ~1% disturbance). • Using 40-year threshold for "undisturbed" areas (from ECCC), but RSF suggests caribou use 60-year burns for winter habitat in NT1 range. • TG suggested including their TK from TASR work (including TK about caribou and climate change). • Inclusion of TK maps may require writing help from IGOs. • For interim range plan, TG prefers to keep their TK	• ENR may consider 40 to 60-year burned habitat separate from 60-year burns (for full range plan). • TG and NSMA wrote up the results of their recent TK gathering workshops and interviews (Section 5.4.1). • All sections in the Table of Contents have been kept; some sections have less information with rationale. • Draft interim range plan sections were discussed briefly at WG Meeting #5; member organizations also provided written feedback that was

Key points of discussion WG Workshop #4	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
	as a separate section in the plan. <u>Section 5, Existing land protections and development interests:</u> • No commercial or guided harvesting known in Wek'èezhìı region, except maybe fishing. <u>Section 8, Implementation instruments:</u> • Wek'èezhìı Land Use Plan is still at least 5 years away from completion. <u>Section 9, Forecasts of future habitat:</u> • Climate change should be added as a separate subsection in full range plan. <u>Section 11, Monitoring population status:</u> • Consider Indigenous Guardians program as overarching outcome for all 5 regional plans. <u>General discussion/recommendations:</u> • WRRB reminded the group that they did not approve changes to plan content, only timeline.	incorporated into the plan.
Options for management actions	• All management actions should apply in all Enhanced management areas. • Add mineral prospecting to exempt activities. • TG suggested having "no-go" zones for known calving areas for all sectors at all stages of development. • Applicable management class(es) for "no-go" zones to be decided after reviewing maps. • Also need to consider sensory disturbance to caribou. • General agreement that prescriptive restoration and offset requirements (e.g., offset ratios) cannot be made without further information and research in NWT. • Use a phased-in approach to offsetting, with more	• ENR added a definition of "low-impact activities" to range plan for clarity about exemptions and requirements (Section 8.2). • ENR added sensory disturbance measures from draft *NWT Caribou Guidelines* as guidelines for Basic management class, restrictions for Enhanced/Intensive (Section 8.3, Table 14). • ENR incorporated WG recommendations about management actions for restoration and offsetting into interim range plan (Section 8.6). • ENR will start the process of developing a Restoration & Offsetting Framework (not for interim range plan).

Key points of discussion WG Workshop #4	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
	focus on restoration research now. • Offsetting should focus on Wek'èezhìı first but can expand to other regions. • Need a Restoration & Offsetting Framework for transparency and support for developers.	
Options for implementation tools	• Pieces of the interim range plan can be added to the 5-year review of TLUP. • Legislative changes will take at least 2 years; can start the process now for full range plan. • Stronger legal tools for Intensive management class areas (e.g., calving sites) and lighter tools for Enhanced areas. • WRRB actively assisting range planning process/review/approvals but does not have useful measures for implementation. • WG requested more time to review table of implementation tools with organizations/departments.	• ENR will discuss with legal department about what is possible on GNWT vs. Tłı̨chǫ lands. • Preferred implementation tools were discussed briefly at WG Meetings #4 and #5; member organizations also provided written input. • ENR to look into starting the process for regulatory changes for known areas of high importance for caribou.

6. Working Group Workshop 5 – May 19-20, 2021

Key points of discussion WG Workshop #5	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
***Constitution Act*, s.35 and UNDRIP considerations**	• YKDFN stated that proper consultation has not been conducted with them yet as per s.35 and UNDRIP. • YKDFN feels that the information at this WG meeting is too technical and asked about funding, technical experts, GIS capacity. • YKDFN cannot make decisions until information is presented to and approved by communities and	• Tłı̨chǫ Government explained that GNWT-ENR had offered funding to all the IGOs to conduct TK gathering workshops; Tłı̨chǫ Government and NSMA had used this funding to conduct their community mapping workshops/interviews. • Interim range plan timeline unfortunately does not allow for formal s.35 consultation before submission to WRRB.

Key points of discussion WG Workshop #5	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
	Chief and Council; in person, not through Zoom. • YKDFN mentioned that gathering their TK could be done two ways: wait for land claim agreement or meet with communities sooner. • YKDFN expressed concern about accommodating development interests over protection of caribou and culturally important areas, such as mineral leases near Whitebeach Point. • YKDFN expressed concern about sensitive boreal caribou leaving the area and not coming back, the impact of forest fires and mushroom pickers, and a need for stronger protected area legislation.	• Formal s.35 consultation on interim range plan will begin in mid-August 2021. • ENR agrees that community meeting/workshop needed with YKDFN, but expects that it will likely not occur until fall 2021 due to YKDFN capacity challenges and resulting delay in submitting funding application. • ENR offered to arrange a phone call with YKDFN to discuss range planning process, TK and local knowledge, observations and concerns, need for community workshop, etc.
Use of Marxan to explore 6 different range plan scenarios	• Uncertainties about cost layer data (resource potential – hydrocarbons, mining, forestry) need to be acknowledged and new information added later. • YKDFN emphasized that these are shared land use areas and their TK and land use plan have not been incorporated into scenarios. • Collar data need to be analyzed further to identify important calving locations. • WG reached an understanding that protected areas and TLUP zones were not made for boreal caribou habitat, and do not need to be locked in to Marxan as Enhanced since they offer habitat protection and limit development through other means. • General agreement that Scenarios 5 and 6 (important areas for caribou + TK + connectivity) are better options to work with. • Scenario 5 preferred by majority as it is the most conservative; WG expressed some concern about	• ENR presented how total cost calculations have been updated to incorporate WG feedback from Meeting #4. • ENR will incorporate YKDFN's TK and land use planning information as soon as it can be provided, but not for interim range plan due to timeline. • ENR will conduct further seasonal analyses of collar data for full range plan. • WG reminded that the full range planning process will continue for another two years (due March 2023). • ENR showed that existing mineral leases are in Basic management class areas and would not be affected (Section 7.2.1). • ENR moved forward with Scenarios 5 and 6 during this WG meeting (see next key points of discussion).

Key points of discussion WG Workshop #5	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
	removal of water areas in Scenario 6 as shorelines and islands are important for caribou. • GNWT ITI preferred Scenario 4 (maximizes habitat value, minimizes lost economic potential) because of resource potential.	
Add important areas for caribou from TK as Intensive management class areas	• TG requested that all essential habitat polygons identified from recent TK workshops be designated as Intensive, including calving areas on peninsulas and islands (no-go zones). • YKDFN emphasized the importance of Whitebeach Point area for caribou; also of significant cultural importance. • WG agreed that Whitebeach Point and shoreline north of this area should be designated as Intensive. • Collar data show calving area on Great Slave Lake south of Whitebeach Point – WG requested adding as Enhanced or Intensive. • General agreement that it is better to start more conservative, then refine areas after verification with elders (TG's TK) and consider whittling down Enhanced/Intensive if there is opposition later. • TG also noted important TK work (including mapping) done by Alice Legat and Rita Wetrade in 2013 initiated by WRRB.	• ENR added TG's essential habitat polygons, Whitebeach Point and south of this area, shoreline along Great Slave Lake around Dinàgà Wek'èhodì, and TLUP Habitat Management Zone as Intensive management class areas (Section 7.2). • ENR had added no-go zones for calving locations in the management actions for Intensive class in draft interim range plan (Section 8); could also number the no-go zones to provide clarity for proponents. • ENR will investigate how to incorporate spatial TK data presented in Legat's (2013) report – *Boreal Caribou Habitat and Disturbance in Wek'èezhìı – Tłı̨chǫ Knowledge Component* into the full range plan.
Ratio of Basic/Enhanced areas vs. Framework plan for Wek'èezhìı region	• General agreement among WG that assigning >1/3 of region into Enhanced/Intensive is acceptable/preferred. • TG argued that Enhanced/Intensive does not mean no-go for development, but ENR said that the management actions in these areas may be cost-prohibitive.	• ENR had created Scenario 6 as a "reduced" version of Scenario 5 to try to balance out the ratio of Basic/Enhanced. • "Final" scenarios being considered are above 1/3 Enhanced and now include Intensive areas (more than Framework objectives for Wek'èezhìı region). • WG decisions and the process used to reach the

Key points of discussion WG Workshop #5	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
	• ENR explained that greatly deviating from Framework then interim range plan could be rejected by GNWT internal review (economic interests) and Cabinet. • ENR also noted experience from SNWT region: perspectives from 22 Indigenous communities, where interests include access to resources. • ENR recommended keeping Enhanced/Intensive below 50% to be more palatable; general agreement from the WG that this is OK after adding requested modifications (see key points of discussion above).	final map of management class areas are summarized in Section 7.2 of the interim range plan.
Wildfire management and priority areas for caribou Values at Risk	• ENR presented their identified values at risk (VAR) for caribou for fire management based on late winter RSF, as well as TG's identified VAR and buffers around communities. • Good overlap between ENR and TG layers; also good overlap between VARs and Enhanced management areas. • GNWT FMD appreciated discussion and seeing community rationale for shifting fire management priorities. • ENR asked if WG is comfortable including these fire management maps into interim range plan – agreed as a good starting point.	• ENR included fire management maps into interim range plan (Section 8.7.1); may need to modify as we learn more.
Other adjustments to create scenarios 7 and 8	• Scenario 7 created from Scenario 5, with added important areas = 53% Enhanced/Intensive. • WG discussed areas in Wek'èezhìı region that could be changed from Enhanced to Basic to bring the ratio back down, such as severely burned areas or in the NW region where development is unlikely.	• ENR smoothed out the polygons (hexagonal planning units). Ratio of Basic vs. Enhanced/Intensive did not change much; the final spatial summary is presented in Table 10. • ENR will look into using minimum patch size to cut out small, unmanageable patches for the full range plan.

Key points of discussion WG Workshop #5	Working group feedback and recommendations	How feedback was incorporated into range plan or range planning process
	• Scenario 8 created from Scenario 6 (already whittled down), with added important areas = 46% Enhanced/Intensive. • WG recommended smoothing out areas and not leaving small "fingers" of different management classes. • TG suggested considering minimum patch size (along with connectivity and caribou movement) for full range plan. • YKDFN asked about using traditional place names on the maps and in the range plan, starting with Whitebeach Point. • General agreement that Scenario 8 is good enough for the interim range plan but more work is needed for the full range plan.	• ENR agreed to use traditional place names but will need YKDFN's help (and other IGOs if they are interested); not possible for interim range plan. • Scenario 8 selected as the basis for the final map of management class areas in interim range plan (Section 7.2), to be refined for full range plan.
Management actions, implementation tools, and draft interim range plan	• WG suggested that the management actions be numbered to help keep track and for referencing. • TG gave a brief summary of their lawyer's edits to the table of implementation tools but they still need to discuss; will email ENR with feedback ASAP. • NSMA also needs to fully review and discuss implementation tools; will provide feedback in a week. • In general, WG has not had a chance to read the draft interim range plan circulated on May 12 and will provide written comments instead. • WRRB requested that a section describing boreal caribou distribution in the Wek'èezhìı region based on available western science and TK be included.	• ENR presented how management action tables have been updated to incorporate WG feedback from Meeting #4. • ENR numbered the management actions for clarity (Sections 8.4 to 8.7). • ENR incorporated TG and NSMA feedback on implementation tools (Section 9). • ENR added a section about boreal caribou distribution in the Wek'èezhìı region (Section 3.1). • ENR incorporated WG's written input on draft interim range plan.

APPENDIX B – Key Findings: Boreal Caribou Habitat Preferences

Table B-1. Western science overview of key findings of boreal caribou habitat preference and requirements in terms of food resources, protection from predators and alternative prey species, and reproduction. Key aspects of habitat selection are considered herein for the following life-history phases; (1) calving (May to July), (2) post-calving (July to September), (3) rutting (September to November), and (4) over-wintering (November to April). Two life processes may be combined where the key habitat selection criteria refer to a transitional period between processes.

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection[32]	Requirements for reproduction
Environment and Climate Change Canada. 2020. **Amended Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada.** Species at Risk Act Recovery Strategy Series. Ottawa, ON. 143pp.	Canada	• Mature to old growth coniferous forest of 100 years or older. • Forests with jack pine (*Pinus banksiana*), black spruce (*Picea mariana*), tamarack (*Larix laricina*), lichens, sedges, & moss. • Large areas of muskegs & spruce peatlands intermixed with upland or hilly areas. • Prefer bogs over fens. • Prefer flatter areas with smaller trees & willows, or hills & higher ground. • Require connectivity of habitat types within a range & between ranges.	• Tend to avoid early stage, successional forests, & recently disturbed areas. • **Over-Wintering:** Require habitat with arboreal lichen & shallower snow to enable foraging for ground lichens (i.e., mature coniferous with closed canopies & upland or hilly areas exposed to wind). As snow depth increases, they remain in areas of dense pine or thick wooded black spruce with hanging lichen & access to open, mixed vegetation for	• Require large range areas to reduce risk of predation from wolf & bear, & interspecific competition with moose & deer. • To avoid predation by remaining unnoticed, they use a variety of habitat including muskegs, bodies of water, & mature & old growth forests. • Avoid early stage, successional forests, & recently disturbed areas since these habitats impede movement & attract other ungulates.	• Unavailable, inadequate, or degraded habitat can negatively affect reproductive success & calf survival. • **Calving:** Preferred areas include open coniferous forests, tussock tundra, low shrub, riparian habitat, recently burned areas, south & west aspects, & hills/higher locations. Also, calve in muskegs, marshes, & other water sources. They use small islands of mature black spruce or mixed forest within peatlands in old burns at

[32] Protection from predators, alternative prey species, weather, wildfire, and anthropogenic disturbances

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection[32]	Requirements for reproduction
			ground forage. In late winter and early spring, they select habitat with terrestrial & arboreal lichens.	• **Over-Wintering**: Use open coniferous forest with adequate cover, abundant lichens & abundant riparian areas. Also observed in muskegs & spruce-lichen forests, fire regenerated stands, sparsely vegetated habitat, herbaceous & tall shrub habitat, & areas with sphagnum moss & scattered spruce.	the edge of wetlands in alder thickets with abundant standing water on lake shores. • **Post-calving:** Muskegs, areas with access to muskegs, open meadows on higher grounds, areas close to water, & mixed bush areas. Also require open coniferous forests with abundant lichen, low shrub, riparian, tussock tundra, sparsely vegetative habitat, recent burns, & west aspects. • **Calving/Post-Calving:** Use old burns & neighbouring remnant unburned forests. • **Rutting:** Require open coniferous & mixedwood forests, low shrub, riparian, tussock tundra, recent burns, & west aspect. Also use muskegs with suitable lichens, sedges, mixed bush areas, & areas of higher ground, as well as regenerating burns &

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection[32]	Requirements for reproduction
					sparsely vegetated habitat.
ESTR Secretariat. 2013. **Taiga Plains Ecozone Evidence for Key Findings Summary Report.** Canadian Councils of Resource Ministers. Ottawa, ON. 109pp.	Taiga Plains Ecozone	• Dependent upon intact blocks of mature boreal forest found in the Taiga Plains. • Adversely affected by land fragmentation. • Taiga Plains Ecozone provides some of the largest habitats due to mature or old growth coniferous forests & peatlands, which are the preferred habitats. • Treed fen & bog peatlands are crucial for survival in northern Alberta, which applies to the entire zone of sporadic permafrost that reaches into southern NWT.	N/A	• Can shift their range use to avoid burned areas should sufficient old growth forest remain. Large fires prepare the conditions for future large, even-aged stands of mature forest that are important for caribou survival.	N/A
Species at Risk Committee. 2012. **Species Status Report for Boreal Caribou (*Rangifer tarandus caribou*) in the Northwest Territories.**	NWT, Canada	• Use a variety of habitat including bogs, fens, & areas around peatlands with low to moderate cover of lichen-bearing black & white spruce forests. • Prefer open old growth lichen-bearing conifer forests most of the year. • **Over-Wintering**: In the	• Mostly select areas undisturbed by fire, as fire destroys their main food source, lichen, & leaves young seral stands. • May use or select recently burned areas, as these open habitats can provide access to other high quality forage sources (i.e., herbaceous vegetation &	• Seismic lines, as well as other linear disturbances, are avoided, as such features can benefit the hunting efficiency of predators. Ability to avoid linear disturbances decreases as the densities of these features increase.	• Females avoid high densities of linear disturbances, such as seismic lines, during periods when females & calves are most vulnerable to predators or hunters, & preferred areas more than 400 m from seismic lines.

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection[32]	Requirements for reproduction
Species at Risk Committee. Yellowknife, NT. 148pp. Western Scientific Information (*TK Information from this report is summarized in Table B-2).		Gwich'in & Sahtú areas RSF[33] showed that open conifer lichen & open woodland needle-leaf land cover types were the most selected. This also occurs during the pre-calving, calving, & post-calving periods. They also use recent burns, riparian, tussock tundra, low shrub, & open mixed needle-leaf land cover types. • **Post-Calving/Rutting:** According to the RSF, tussock tundra & recent burns were the most selected land cover type. • Also used open habitat such as sparse/non-vegetated, lichens, low shrub, & open conifer.	shrubs), can provide protection from predators & insects, & can provide desirable areas to rut. • **Over-Wintering**: Adapted to feeding on lichens, & to travelling on & foraging in snow.	• **Post-Calving/Rutting:** Sometimes select open habitats, such as tundra & recent burns, for insect relief.	
DeMars, C. et al. 2020. **Influence of land cover, fire and human disturbance on habitat selection by boreal caribou**	NWT, Canada	• Caribou generally showed higher selection for younger burns (<10 yrs old) and older burns (>30 yrs old) and avoided middle-aged burns (11–30 yrs old). • Among non-burned land-cover types (>60 yrs old), bryoids, wetlands (treed, shrub, and herb) and	• Selection for burns by caribou in the NWT appeared to be strongest during the snow-free seasons, followed by increasing avoidance of burns ≤30 yrs old from early to late winter. • **Calving and Summer:** Burns in the 1-10, 11-20, and 31-	• **Year-round:** Caribou generally selected areas further away from major roads and polygonal disturbances such as well pads and cut blocks. • **Calving – Summer – Fall:** Avoidance of areas with high linear feature	• **Calving:** Burns in the 1-10, 11-20, and 31-40 yr age classes were frequently within the top selected 10 land cover types during calving and summer. Unburned (>60 yrs old) bryoids, wetlands (treed, shrub, and herb)

[33] Resource selection function

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection[32]	Requirements for reproduction
in the NWT. [*unpublished draft*] Environment and Natural Resources, Government of the Northwest Territories. Yellowknife, NT. 234pp.		conifer forests with minimal canopy cover (open and sparse) were generally among the top selected land cover types across all seasons. Tall and short shrub land cover types were also selected at rates higher than the reference class (dense conifer forest). • Broadleaf forests (deciduous; >60 yrs old), in contrast, were generally among the lowest ranked land-covers across all seasons. Boreal caribou also avoided areas with higher proportions of broadleaf forests within a 1 km radius.	40 yr age classes were frequently within the top selected 10 land cover types during calving and summer. The trend of burns being highly ranked continued into early fall, though the age classes of these burns were generally older. Preference for recent burns during the snow-free season may be associated with greater forage abundance or quality in these areas and the higher nutritional demands experienced by lactating females during this period. • **Winter:** Preference for areas that hadn't burned in 40-60 yrs and >60 yrs during winter likely reflected greater reliance on lichens as primary winter food source. During mid- and late winter, caribou showed increasing selection for unburned (>60 yrs) forested areas and mixedwood forests and dense conifer forest became more highly ranked.	density strongest during the snow-free season.	and conifer forests with minimal canopy cover (open and sparse) were generally among the top selected across all seasons. • **Fall (rut):** The trend of burns being highly ranked continued into early fall, though the age classes of these burns were generally older. Unburned (>60 yrs old) wetlands and open/sparse conifer were still among top 10 land cover types selected.

Table B-2. Overview of Traditional Knowledge on the key findings on boreal caribou habitat preference and requirements with respect to: food resources, protection from predators, and alternative prey species, and reproduction. Key aspects of habitat selection are considered herein for the following life-history phases: (1) calving (May to July), (2) post-calving (July to September), (3) rutting (September to November), and (4) over-wintering (November to April). Two life processes may be combined where or when the key habitat selection criteria refer to a transitional period between processes. In some cases, location is noted on a regional scale smaller than the NWT, which may be helpful if regional differences in patterns of habitat use begin to emerge.

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
Legat, A. and G. Chocolate. 2012 (May). **Boreal Caribou Habitat and Habitat Use in Wek'èezhìı.** Wek'èezhìı Renewable Resources Board. Yellowknife, NT. 17pp.	Wek'èezhìı region	• Preferred habitat includes plateaus, muskegs, & upland slopes. • Also found in the bush in the lowland; however, prefer this area when the muskeg dries out & becomes hard. They prefer hard ground as they can travel more quickly, & it will not harm their hooves or legs.	• As well as lichen feed on birch leaves, willow leaves, grasses and sedges. • **Rutting/Over-Wintering:** Graze on various types of lichen. • **Calving/Post-Calving**: Stay around water to avoid wolves, & feed on abundant food in the area. Forage on various plants such as sedges, grasses, leaves, berries, & mushrooms.	• Use thick bush to camouflage themselves from predators. • Use mud to cover themselves as protection against insects. • Depending on season, adults & calves use high plateaus & islands to protect themselves from predators.	• Generally, prefer higher ground; however, use the bush to rut & calf. • **Calving/Post-Calving:** Swim to islands with their calves.
Legat, A., M. McCreadie, C. Nitsiza, and C. Nitsiza. 2019. **Tǫdzı (Boreal Caribou) and the State of Their Habitat**. Wek'èezhìı Renewable Resources Board. 103pp.	Wek'èezhìı region	• Live in boreal forest; do not migrate. • Move around to find food and habitat favourable for calving and escaping predators and pests.	• In summer use a wide variety of areas and foods; in winter focus on different types of lichens. (Report has a detailed list of foods used by caribou and their Tłı̨chǫ names.)	• Only come into the open when they are safe from predators. • Spend most of time in very bushy areas (Dehdłı̨ı̨) as it camouflages them	• Prefer high ground, but they rut and calve throughout the "bush". • Large lakes with islands (dıı) are important calving

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
		• May travel through areas where they do not feed, such as very young forests, and burned and clear-cut areas. • Prefer lakes or protected streams in summer and low and clear areas in early winter where they can run quickly from predators. • Like plateaus year-round, but especially in the spring and summer where they can find dry ground as well as streams, ponds, and lakes. • Prefer mature forest, but not very old forest where the canopy prevents lichen growth.		from humans, wolves, lynx, and bears. • Dahdègahɔǫ̀ (water-soaked land, known to have water underneath, with a variety of flora) – Tǫdzı sink into water to escape from insects. • Ewààshìì – sandy hills that Tǫdzı visit to escape insects. • Graze on grazes on ewàà (sandy beaches) and cool off in water while escaping insects. • What'àa (esker tops) provides kwetsò (black rock tripe) and ɔadzį̀į̀ (lichen) in summer and winter. Also good place to escape insects in summer and predators as ground is hard and easy to run on.	areas.
Legat, A. and R. Wetrade. 2013 (March). **Boreal Caribou Habitat and Disturbance in**	Wek'èezhìı region	• This is an earlier version of work that is included in the Legat			

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
Wek'èezhì -Tłı̨chǫ Knowledge Component. Wek'èezhìı Renewable Resources Board and Lands Protection Dept, Tłı̨chǫ Government. 22pp.		et al. (2019) report.			
North Slave Métis Alliance (NSMA). 2018. North Slave Métis Alliance Report of Traditional Knowledge Study for the Proposed Tłı̨chǫ All-Season Road Project. March 31, 2018. 41 pp.	Wek'èezhìı region	This report focuses on traditional use of land, rather than habitat preferences of boreal caribou.			
Yellowknives Dene First Nation Land and Environment. 2018. **Traditional Knowledge Report Summary: Tłı̨chǫ All Season Road.** Yellowknife, NT. 6pp.	Wek'èezhìı region	• Like gravel, dry areas, open country, & 'old man's beard', a moss that hangs plentifully on trees in this area. • The Tłı̨chǫ All Season Road (TASR) will interfere with caribou who like higher ground. • Not all the caribou go to the Horn Plateau in wintertime, & some stay in the TASR area.			
Dehcho First Nations. 2011 (Jan). **Traditional Knowledge Assessment**	Dehcho region	• Spread out throughout marsh and wetlands during	• Rely on ground and hanging lichens as well as grasses;		• Generally calve in wetlands, marshlands, or even burn areas

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
of Boreal Caribou (Mbedzih) in the Dehcho Region. Prepared by Dehcho First Nations for Canadian Wildlife Service. 49pp.		the spring calving period. • Stay close to and in areas with greater amounts of muskeg terrain throughout summer. • Move more freely in fall and early winter throughout a range of habitats, while gathering into larger groups. • Overwinter in larger groups in areas that have higher amounts of thicker brush (both black spruce and pine) while remaining close to muskeg and 'willow prairie' areas that harbor ground lichens and sedge grasses. • Correlation between boreal caribou and pine forested areas. • Large number of 'endaa' (wallows or licks) throughout Dehcho.	remain close to habitat where this type of food is accessible. • Areas with 'white muskeg' are known to be good habitat as well as areas with rich 'hanging moss'.		that are difficult for predators to access.
Dehcho First Nations. 2011 (Jan). **Traditional**	Southern NWT	• Occupy "high ground" and "thick brush"			• Lowland area between the Wrigley Plateau and

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
Knowledge Assessment of Boreal Caribou (Mbedzih) in the Dehcho Region. Prepared by Dehcho First Nations for Canadian Wildlife Service. 49pp. **Appendix 3: Wrigley (Pehdzeh Ki First Nation, or PKFN)**	(PKFN territory)	during the winter months. • Spend more time in muskeg and "wetlands" during the spring and summer months. • Early spring and fall transitional periods with more movement occurring. • Black spruce and pine forest areas during winter, likely due to moss/lichen cover. • Areas with "white muskeg" known to be particularly good habitat as well as areas with "hanging moss". • Boreal caribou move away from burnt areas initially but make seasonal and limited use of these areas within a few years, as travel corridors and for browsing on fresh growth (likely sedges and grasses).			the Mackenzie River is considered to be good calving habitat.

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
Dehcho First Nations. 2011 (Jan). **Traditional Knowledge Assessment of Boreal Caribou (Mbedzih) in the Dehcho Region**. Prepared by Dehcho First Nations for Canadian Wildlife Service. 49pp. **Appendix 4: Fort Simpson (Liidlii Kue First Nation, or LKFN)**	Southern NWT (LKFN territory)	• Muskeg areas in early winter; move to higher ground and areas with a mix of muskeg and thicker bush as winter progresses. • In early spring, if snow is crusty, often along the highways. • Summer, move less as they forage on new growth as well as lichens. • Early fall, seen along or crossing bigger rivers. • Often found in areas with jack pine and areas with good lichen cover, and hanging lichens. • Do not use open 'bog' areas , such as the large bog that lies between Fort Simpson and Jean Marie River.			
Sambaa K'e Dene Band (SKDB) (Crosscurrent Associates Ltd.). 2009. **Sambaa K'e Dene Band. Woodland Caribou**	Southern NWT (SKDB territory)	• Winter – generally choose habitat that provides dense cover, softer snow	• Require access to open areas to forage for sedges and grasses during winter.		

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
(Mbedzih) Field Survey Project: 2008-2009 Final Report. Confidential. 24pp.		conditions, and ready access to a variety of winter forage. • Move within a larger and more varied habitat range during early winter (October through December) than late winter (January through March. • Movement decrease and become more concentrated throughout winter, even within preferred habitat areas.			
Dehcho First Nations. 2011 (Jan). **Traditional Knowledge Assessment of Boreal Caribou (Mbedzih) in the Dehcho Region.** Prepared by Dehcho First Nations for Canadian Wildlife Service. 49pp. **Appendix 2: Trout Lake (Sambaa K'e Dene Band, or SKDB)**	Southern NWT (SKDB territory)	• Go where food is accessible and do not stay in one place; shift locations year by year depending on the availability of lichens and other factors. • Early winter, while the snow is still scarce, occupy muskeg areas, but as snow gets deeper move into areas with a combination of dense pine and thickly	• Stay in thickly forested habitat during mid- to late winter because forage is easier to access (such as tree and ground lichens and sedges and grasses along the edges of 'willow prairies') and as security from predators.	• In summer, on hot days, boreal caribou stay in heavily mossed areas and lay on the moss (that has permafrost beneath) in order to stay cool.	• In early spring, don't go in open areas while the snow is crusted; they wait until the crust softens then they spread out all over the land for calving.

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
		wooded black spruce (referred to as 'dedłini') forest and more open, mixed vegetation foraging areas. • Avoid lower and wetter muskeg areas and remain in the thicker forest cover and higher ground during the mid- to late winter months. • Number of endaa (caribou wallows) throughout Sambaa K'e.			
Dehcho First Nations. 2011 (Jan). **Traditional Knowledge Assessment of Boreal Caribou (Mbedzih) in the Dehcho Region.** Prepared by Dehcho First Nations for Canadian Wildlife Service. 49pp. **Appendix 5 : Jean Marie River (Jean Marie River First Nation, or JMRFN)**	Southern NWT (JMRFN territory)	• Prefer areas with thick bush during the winter, move into marsh areas for calving. • Use mixed bush areas during the summer and fall, although more time is spent in muskeg areas. They are seen along rivers in the late summer and early fall. • Generally stay in areas where there are			

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
		ground and tree lichens. • Correlation between boreal caribou and pine forested areas. • Special habitat areas include old growth forest to the north of the community across Dehcho; an area with a mix of frost heaves (that harbor lichens) and wallows/licks around Tthóógéé Túé; and a few areas with thick hanging lichens along the Jean Marie River and south of Willow Lake on the Horn Plateau.			
Dehcho First Nations. 2011 (Jan). **Traditional Knowledge Assessment of Boreal Caribou (Mbedzih) in the Dehcho Region.** Prepared by Dehcho First Nations for Canadian Wildlife Service. 49pp. **Appendix 6: Fort Providence (Fort Providence Resource Management Board, or FPRMB)**	Southern NWT (FPRMB territory)	• The Horn Plateau has a good mix of high ground (with thick brush and some old growth forest), muskeg, and wetlands. It is rich in ground lichens and has areas rich in hanging lichens as well. It provides year-round habitat.			• Big Island (Nduro) is significant calving habitat. It is a wetland and is isolated from the mainland so provides protection from predators.

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
		• Forest fires generally damage habitat and boreal caribou will not stay in those areas for decades, until the lichens recover.			
Dehcho First Nations 2011 (Jan). **Traditional Knowledge Assessment of Boreal Caribou (Mbedzih) in the Dehcho Region.** Prepared by Dehcho First Nations for Canadian Wildlife Service. 49pp. **Appendix 7: Kakisa (Ka'a'gee Tu First Nation, or KTFN)**	Southern NWT (KTFN territory)	• Most of KTFN area is prime boreal caribou habitat; has right balance of wetlands, muskeg-willow prairies, black spruce forests, and other mixed vegetation that caribou seem to prefer. • The area between and west of Kakisa and Tathlina Lakes, particularly around Etaáhdlîî, is rich in ground and hanging lichens. Similar habitat lies to the east of these major lakes. • Wetland portions of Cameron Hill were good calving and summer habitats for boreal caribou, but this may have changed with development.			

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
Dehcho First Nations. 2011 (Jan). **Traditional Knowledge Assessment of Boreal Caribou (Mbedzih) in the Dehcho Region.** Prepared by Dehcho First Nations for Canadian Wildlife Service. 49pp. **Appendix 1: Nahanni Butte (Nahɔą Dehé Dene Band, or NDDB)**	Southern NWT (NDDB territory)	• Prefer high ground, particularly in winter, but in the spring and summer months also utilize 'muskeg' areas. • Prefer habitat with lichens and stay in or around those areas. For the most part, feeding requirements drive their movements and habitat choices. • After a fire, boreal caribou do not go back into the area because the ground cover and feed has been destroyed.			
Deninu Kue First Nation (DKFN) (LGL Ltd.). 2017. **Traditional Use Study: Boreal Caribou Habitat and Habitat Use Study**. Final Report. 83pp + appx	Southern NWT (DKFN territory)		• Arboreal and terrestrial lichens important all year. • Summer – moss, lichens, willows, shrubs, and berries. • Fall – moss, lichens, willows, berries, grasses, and tree bark. • Winter – moss, lichens, and willows. • Spring – moss,	• Wet meadows / muskeg used for water and for predator detection / avoidance.	• Wet meadows (a.k.a. prairies) important during calving; supply water and forage, in addition to offering predator visibility and good escape terrain.

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
			lichens, willows, shrubs and new grasses.		
Acho Dene Koe First Nation (ADKFN) (Landmark Resource Management Ltd.). 2018 (Oct). **Acho Dene Koe First Nation Boreal Caribou Traditional Knowledge and Cumulative Impacts Qualitative Assessment. Non-Confidential Final Report**. Submitted to CIMP (Cumulative Impact Monitoring Program) GNWT YK and MVLWB. 36pp.	Southern NWT (ADKFN territory)	• Water bodies are important features. • Ten important muskeg areas identified scattered throughout but especially frequent in the southern and eastern portions. • A large area identified surrounding the numerous lakes in the southeast portion including TooChoo (Celibeta) Lake; deemed as significant caribou habitat containing favourable vegetation.	• Use variety of vegetation and mineral licks. • Important vegetated area containing caribou food sources, such as "old man's beard" lichen and spruce trees, was identified along a trail running from Bovie Lake to TooChoo (Celibeta) Lake. TooChoo Lake was also noted for the good grass it provides. • Other plants eaten include willow trees and a particular grass called geese grass, referred to as Xahdoú.		• Cows spread across vast tracts of thick forest to calve.
K'atl'odeeche First Nation (KFN). 2019 (Apr). AFSAR 2018/19 **KFN Mapping of Traditional Knowledge Based Critical Habitat Areas: GIS Methodology**.	Southern NWT (KFN territory)	• Four of 12 TK habitat types deemed optimal for boreal caribou; 3 wetlands and 1 forested: • Wetland herb - Naguihtth'Xie.			

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
		• Wetland-Non-treed – Shrub Low - Gujtth'jle. • Wetland-Treed-Conifer-open: the kaa (also include open coniferous). • Closed conifer: Goh shih (literally translates 's 'pine ri'ge' but includes a variety of closed conifer habitat).			
Dehcho First Nations. 2011 (Jan). **Traditional Knowledge Assessment of Boreal Caribou (Mbedzih) in the Dehcho Region**. Prepared by Dehcho First Nations for Canadian Wildlife Service. 49pp. **Appendix 8: Hay River Dene Reserve (K'atl'odeeche First Nation, or KFN)**	Southern NWT (KFN territory)	• Inhabit areas with a mix of muskeg, willow, spruce, tamarack, and poplar. • Use more open country through summer and fall, including muskeg; and stay in thicker bush during the colder winter months. • Bison, which are present around the east end of Big Buffalo Lake, and woodland caribou do not seem to mix.	• Although they stay in thick bush in the winter for protection, they still feed on the 'muskeg prairies' where ground lichens are plentiful, so proximity of habitat is important.	• The area along the west and north base of the Cameron Hills is good protective habitat because it is harder for hunters and predators to penetrate, due to hills, multiple creeks, and thicker timber.	• Calve in wetlands/muskeg.
Gunn, F.E. 2009. **Traditional ecological knowledge of boreal**	Southern NWT (Wood	• "Usually in muskeg", where bison don't go because they sink and	• Ground lichens, tree lichens and willow.		• Select wet areas for predator avoidance during calving.

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
woodland caribou in western Wood Buffalo National Park. MA Thesis, Royal Roads University, Victoria BC. 168pp.	Buffalo National Park)	caribou do not. • In all seasons, affinity for proximity to water (little lakes, rivers, creeks). • Use "big prairies" and "big open areas" west of Buffalo Lake.			• Calve in the Cameron Hills (west of Hay River) and Swan Lake area, although may extend over a wider area. • Calve on islands, or in swampy areas, for protection from wolves. • Calve in mountains (Caribou Mountains).
Sahtú Renewable Resources Board (R. McDonald). 2010 (Dec). **Boreal Caribou Traditional Knowledge Collection Study in the Sahtú Settlement Area.** Prepared for Canadian Wildlife Services. 9pp.	Sahtú region	• Near rivers in spring where they seek out salt licks. • Winter, travel wherever there is adequate cover provided by forest growth and hard ground. • Fall go to high ground and come together for the annual rut, but not in large numbers. • Prefer old growth areas and have tendency to stay away from winter roads because of noise pollution.	• Primary foods include willow tips, grasses, white lichen, and spruce tree moss. • Salt licks actively sought out.	• Near rivers and lakes during times of high insect infestation.	

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
Gwich'in Social and Cultural Institute (K. Benson). 2011 (Jan). **Gwich'in Traditional Knowledge: Woodland Caribou, Boreal Population**. 34 pp + appx	Gwich'in region	• Seek timbered hills in winter and water in summer. • Two timelines for re-entry into areas burned by forest fires. • Short timeline of a few years; long-term timeline of between two and four (or more) decades. • Related to how quickly deciduous feed such as grass and browse are available, compared to how much time lichen may take to return; may also relate to the intensity of the burn.	• Nįhdàadąįį, refers to the lichen that the caribou eat, often called moss or white moss. • Also eat willows, willow leaves, sedges, and grass in the summer. • Eat aquatic vegetation from lakes. • Known to eat a variety of foods all year, but when hunted in winter stomachs are full of lichen. • Also eat tree buds in winter. • Known to eat muskrat push-ups or houses.	• In winter, spend more time in treed locations, in particular if it's foggy. • Presence of hills and higher ground may be more important than tree cover, although trees are also important.	• Calve throughout area. Cows select locations where prevailing winds keep flies and mosquitoes away. May seek higher locations for the breeze, or may stay close to water.
Zimmer, A., A. Veitch and R. Popko. 2002 (May). **Historic and Current Movements and Distribution of Boreal Woodland Caribou Below Treeline in the Sahtú, Settlement Area.** Dept. Of Resources, Wildlife and Economic Development, Norman Wells NT. 27pp.	Sahtú region	• Most (34% of 145 observations from 40 interviews) in mountains/high hills. • 14% each in muskeg (wetlands) and dense vegetation. • 11% river shores. • 8% in old growth forest. • 7% on burn edges.		• Escape insects by going into water and sleep in swampy areas.	

Paper/Citation	Location	General habitat preferences	Requirements for food resources	Requirements for protection	Requirements for reproduction
		• <3% each in 7 other habitat types. • Hang out in big hills and mountains; they come down from the hills to mate.			

APPENDIX C – Seasonal Boreal Caribou Habitat Selection (RSF) Maps

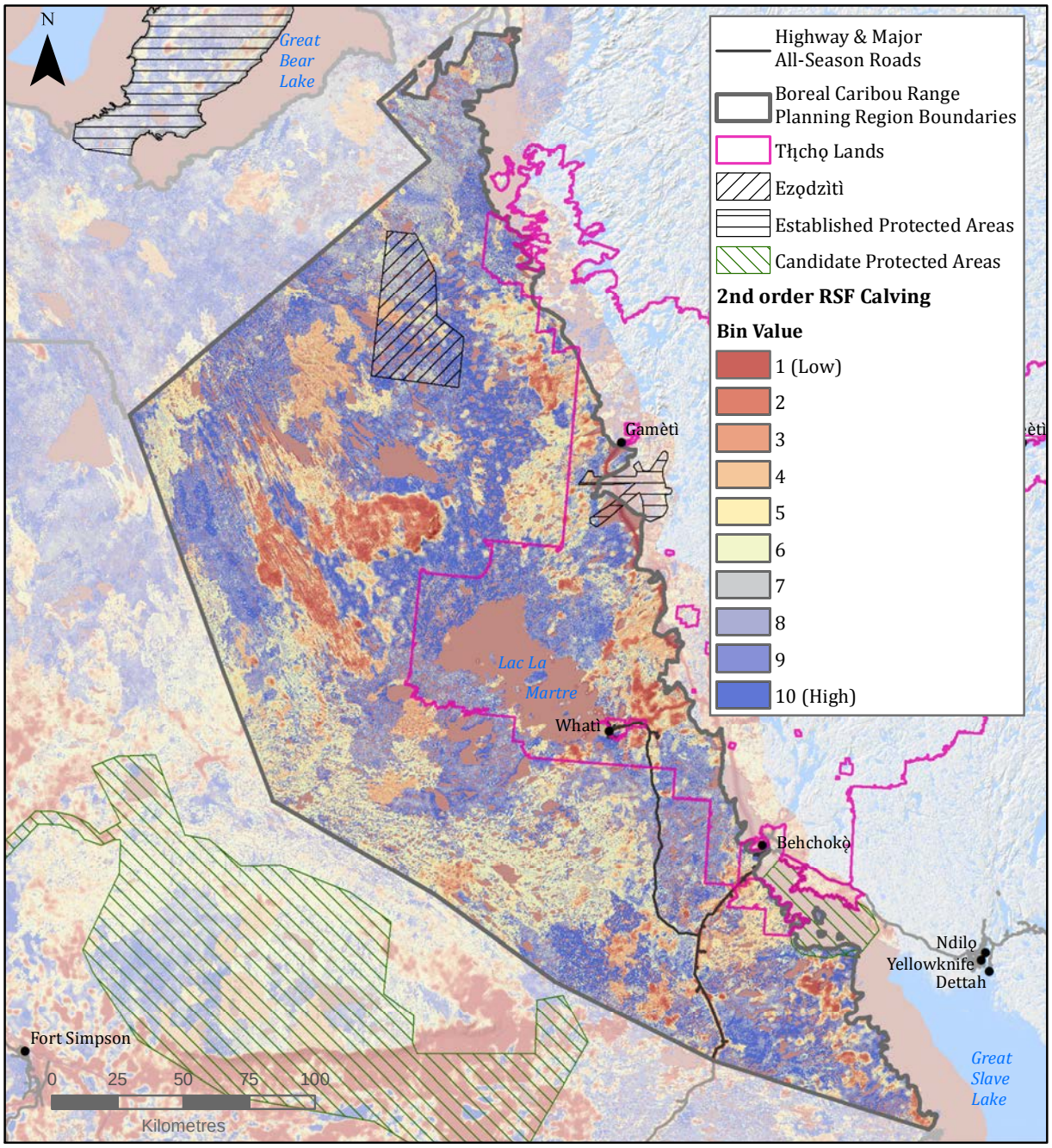

Figure C-1. Caribou habitat selection: calving.

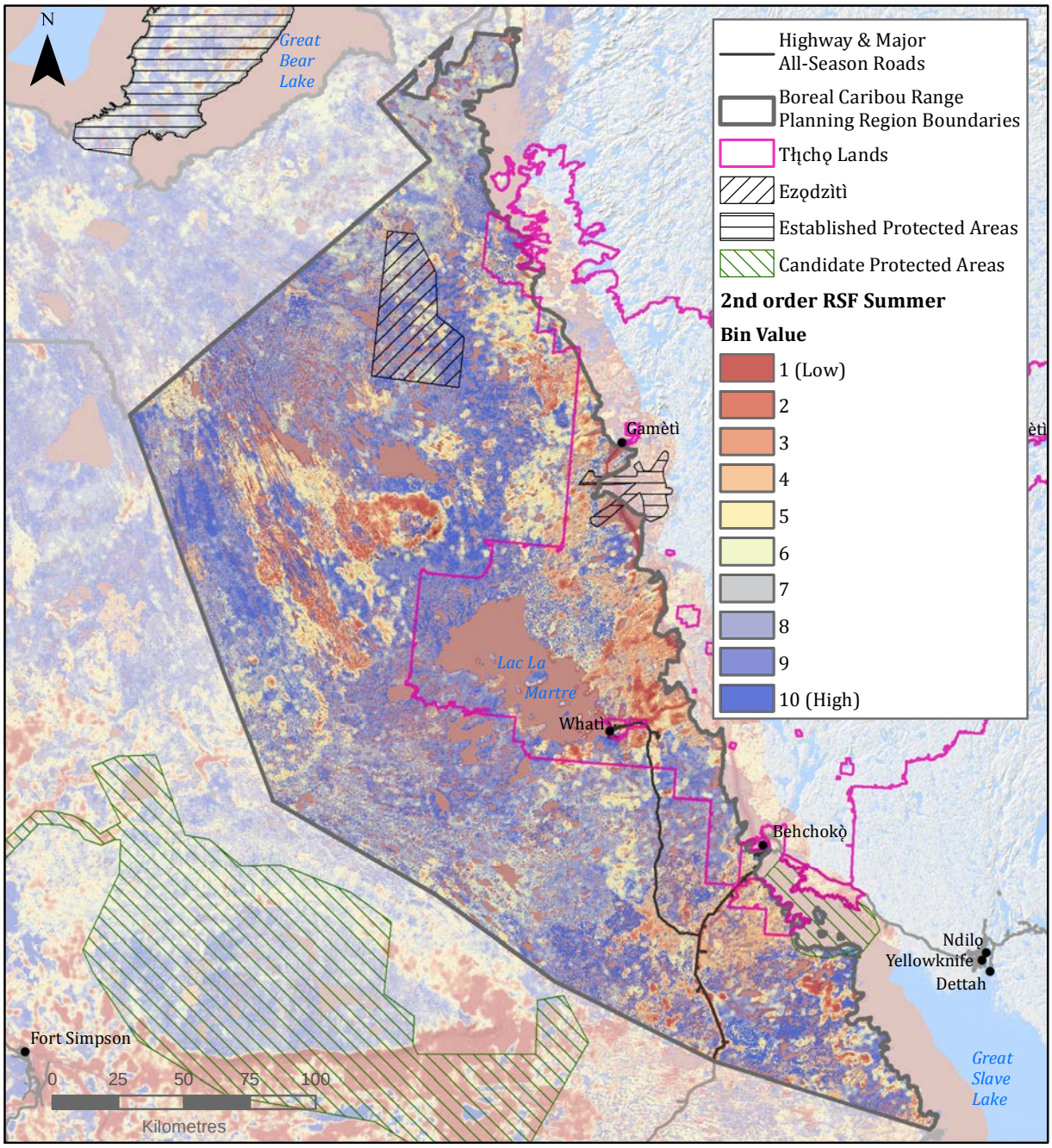

Figure C-2. Caribou habitat selection: summer.

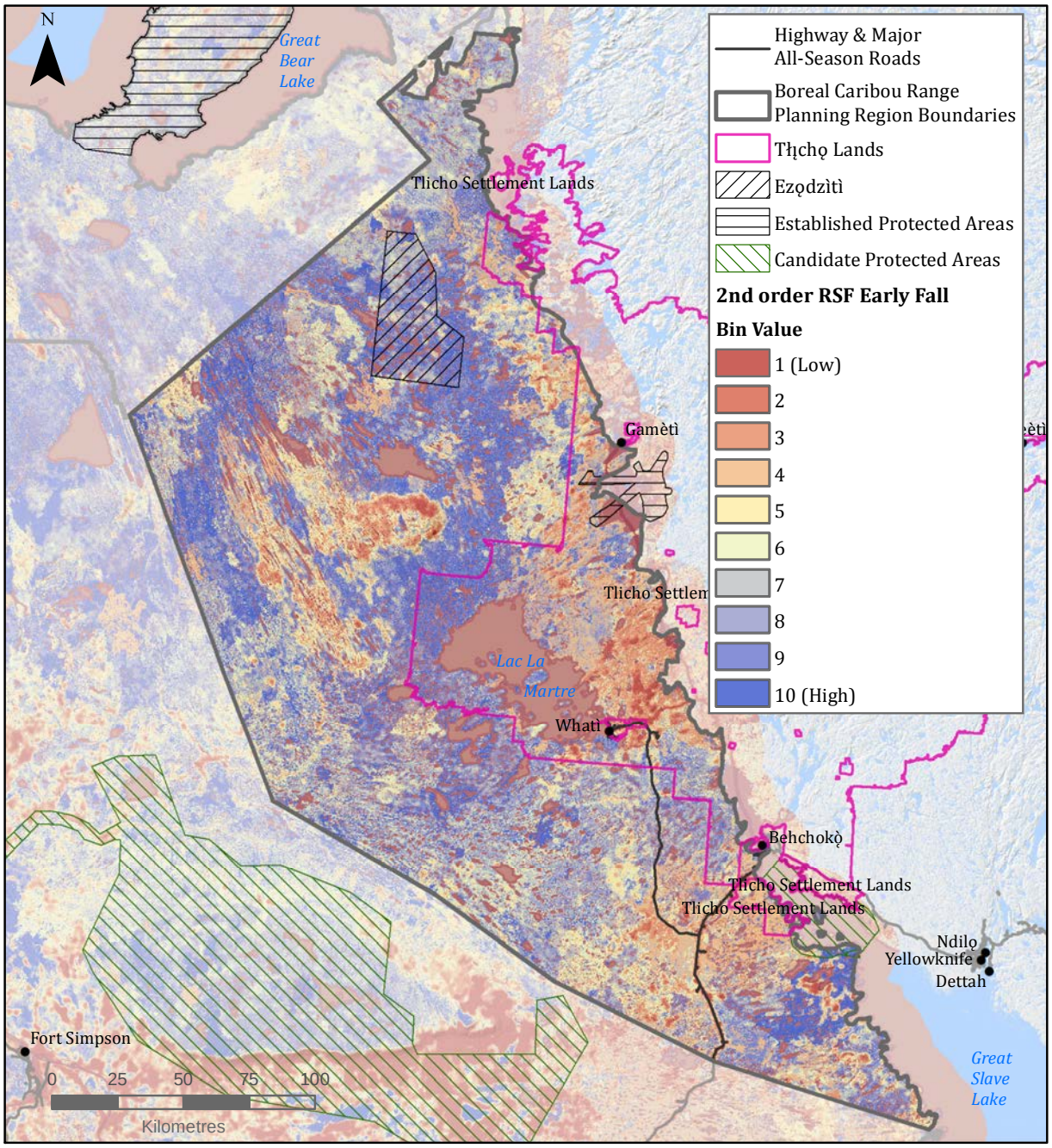

Figure C-3. Caribou habitat selection: early fall.

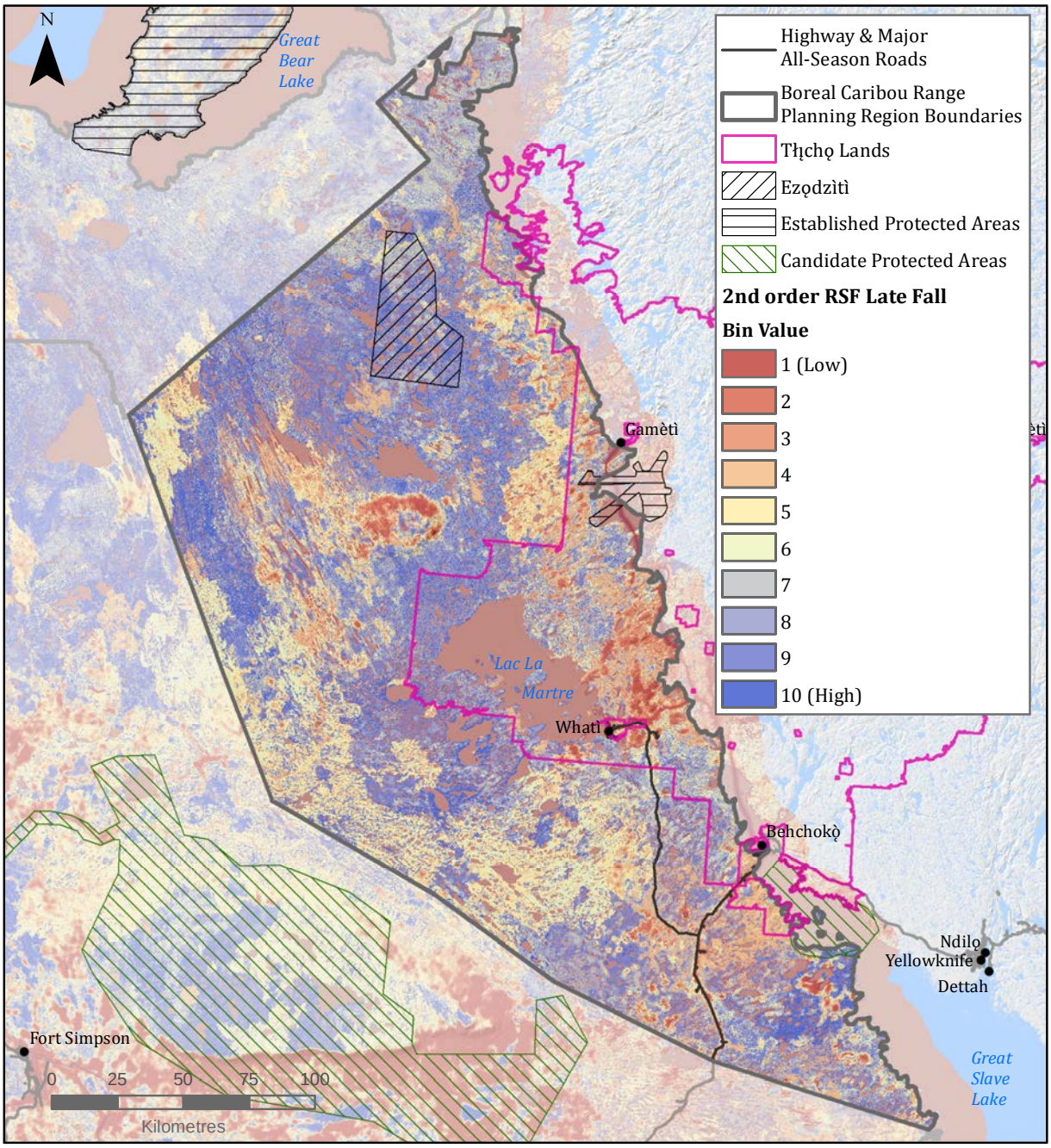

Figure C-4. Caribou habitat selection: late fall.

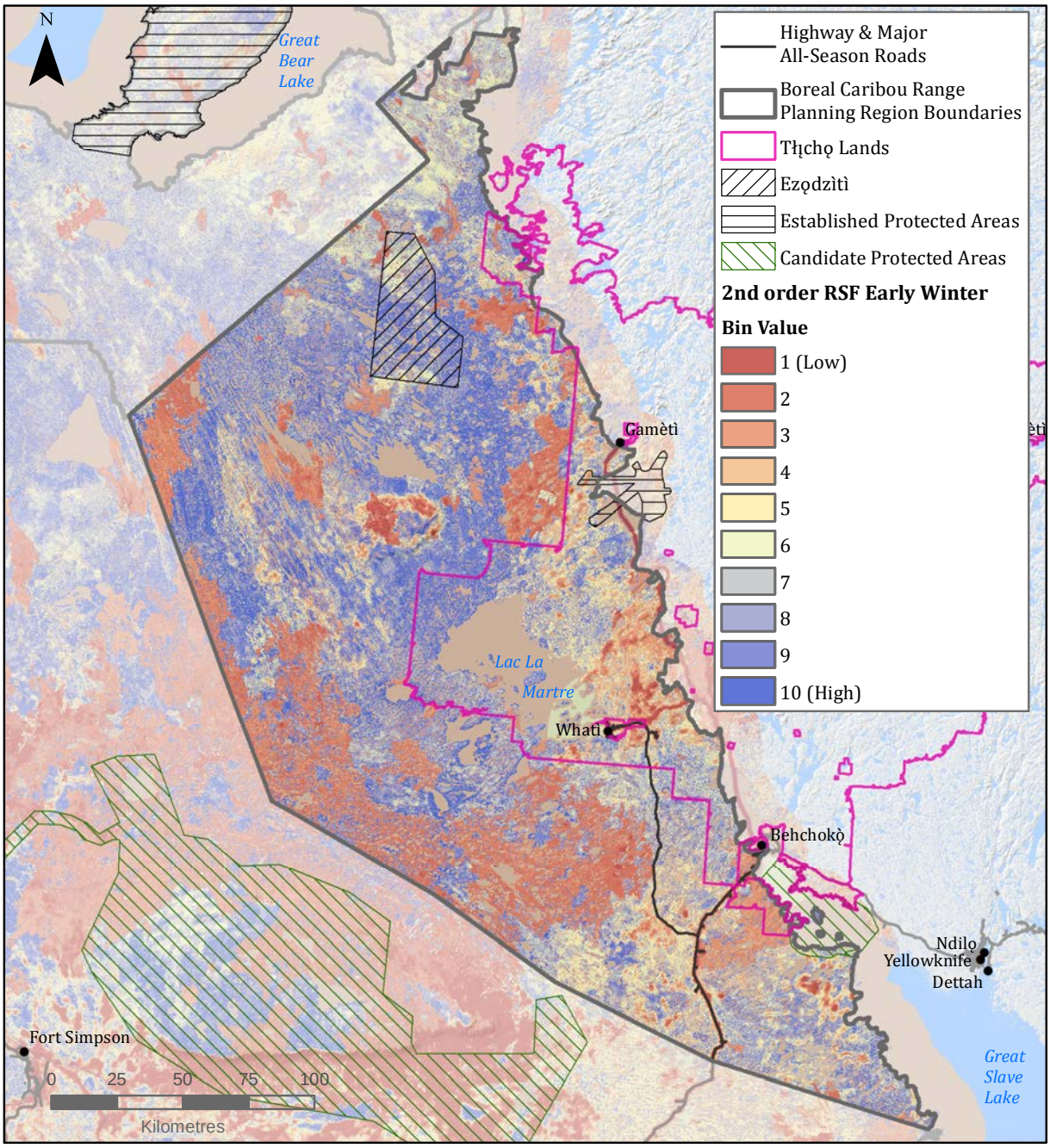

Figure C-5. Caribou habitat selection: early winter.

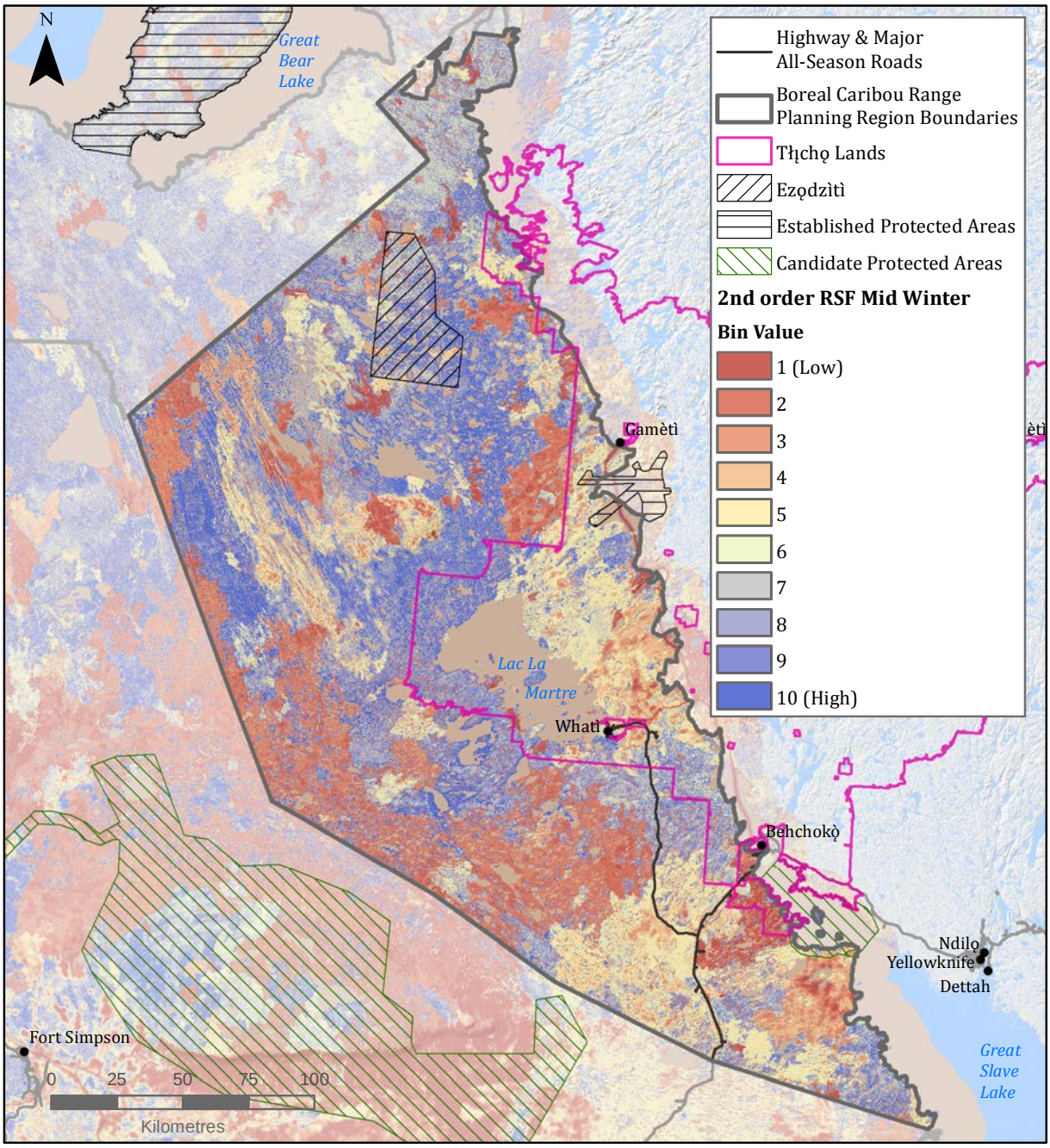

Figure C-6. Caribou habitat selection: mid winter.

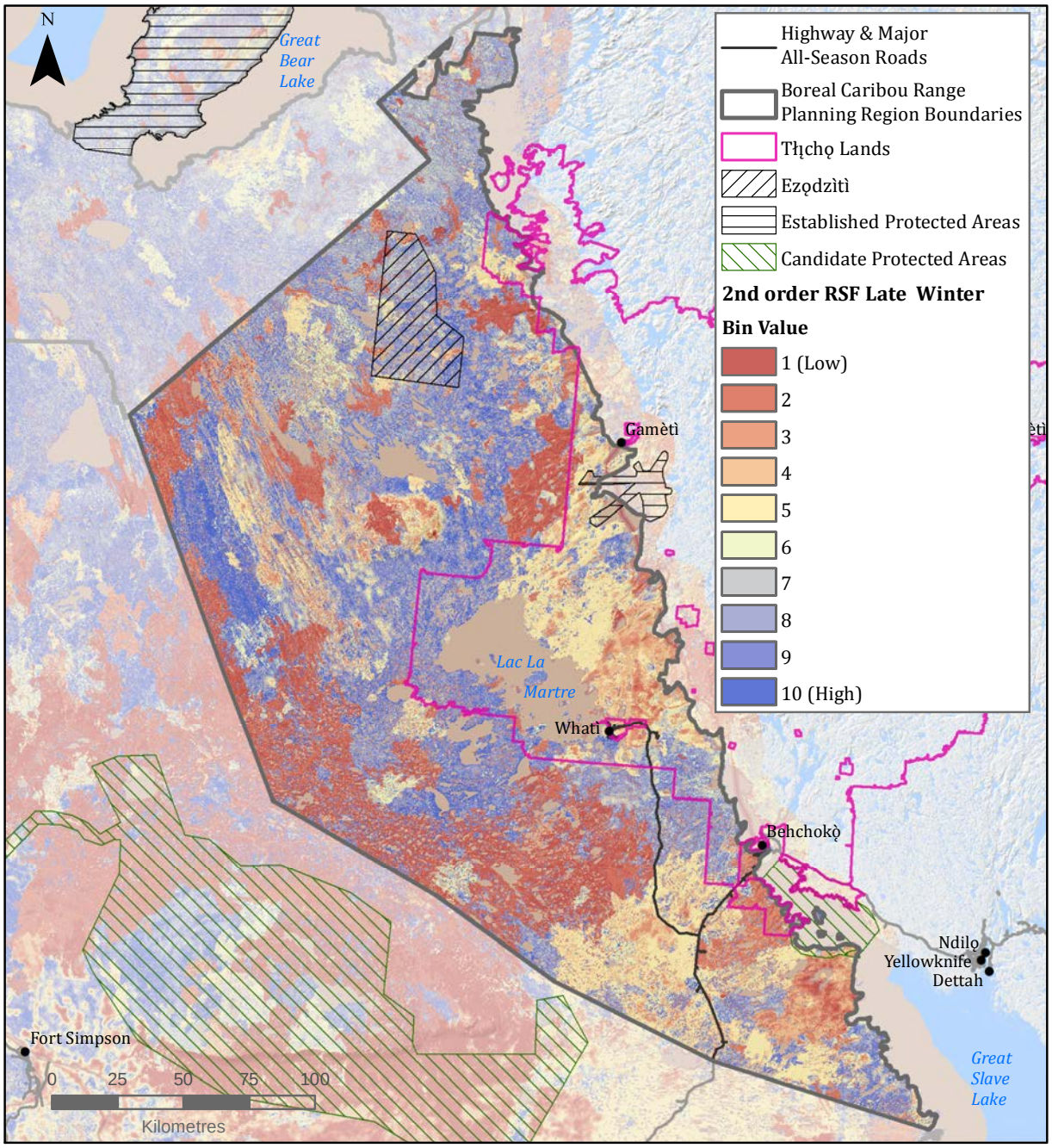

Figure C-7. Caribou habitat selection: late winter.

APPENDIX D – Using Marxan to Delineate Important Areas for Boreal Caribou based on Seasonal Habitat Preference (RSF) Maps and GPS Collar Data

Introduction

What is Marxan?

Marxan software (Ball et al. 2009) was used to delineate important areas for boreal caribou based on seasonal habitat preference maps and boreal caribou collar data from the NWT.

Marxan software is a decision support tool for conservation network design which has been used in conservation planning around the world (Game and Grantham 2008, Ardon et al. 2010), including the NWT (Gah et al. 2008). Marxan is a spatial optimization program which is designed to achieve minimum targets for representation of conservation features for the smallest possible cost or within the smallest area possible (Game and Grantham 2008). Marxan can assist with identifying a range of potential solutions to complex planning spatial planning processes, but is intended to be used in collaboration with other forms of knowledge and final solutions may require fine-tuning based on stakeholder input and expert opinion (Ardon et al. 2010).

The following is a summary of information provided in the Marxan user manual (Game and Grantham 2008) and Marxan tutorials developed by Morrell et al. (2015, 2017):

To use Marxan, conservation planning areas are broken down into smaller conservation planning units. Once conservation targets and objectives are defined, Marxan assigns scores to planning unit configurations which are based on the particular configuration's ability to meet the conservation objective while minimizing the cost. The lower the score, the better the solution. Using a heuristic algorithm known as "simulated annealing", Marxan compares a large number of possible configurations and finds the one with the overall lowest score that meets the conservation target. This process can be repeated multiple times to see which planning units are consistently selected in the lowest score configuration. Marxan assigns a score to each planning unit configuration based on a mathematical formula called the **objective function**. The formula for the objective function is:

Score of the configuration being tested = ($\Sigma Cost$) +

+ ($Boundary\ Length\ Modifier \times \Sigma Boundary\ Length\ of\ the\ reserve\ system$)

+ ($\Sigma Species\ Penalty\ Factor \times Penalty\ incurred\ for\ unmet\ targets$)

"Cost" can be represented by area of planning units or as missed opportunity costs of displaced activities (as a monetary value or on some relative qualitative scale of cost). The lower the cost of a unit, the more likely it will be included in the Marxan solution.

The boundary length of a reserve system is a way to quantify the connectivity of configuration of planning units (or the edge to area ratio). By setting a higher "boundary length modifier" value, Marxan will assign higher scores to configurations with many small and isolated patches, and lower

scores to configurations with a more clumped distribution. Because Marxan identifies the configuration with the lowest score, more clumped solutions will be identified when the boundary length modifier value is increased.

A "species penalty factor" can also be included that increases the score (i.e., assigns a penalty) when planning units that fail to meet conservation targets (e.g., don't contain a target species) are selected, and this lowers the likelihood that these planning units will be represented in the final solution.

Methods

Preparation and inputs for spatial planning units

ArcGIS Desktop 10.8 software (Esri Inc.) was used to prepare the spatial data layers that were needed to create the data input files for the Marxan analyses. The NT1 boreal caribou range was overlaid with a hexagonal grid of 5 km^2 "planning units". Planning units were assigned a code to represent the range planning region that they fell within. The 7 seasonal predictive RSF raster layers (based on models in DeMars et al. 2020; see Section 5.4.2 and Appendix C of the interim range plan), current to 2019, were summarized as 7 separate "conservation features" in the planning unit layer. The predictive seasonal RSF raster layers consist of 30m x 30m raster cells, each having an RSF bin score ranging from 1 to 10, with bin 1 representing cells most likely to be avoided by caribou and bin 10 representing cells most likely to be selected ("preferred") by boreal caribou. Predicted RSF bin values were summed by season within each of the 5 km^2 hexagonal cells, resulting in 7 columns in the attribute table each representing the summed seasonal RSF scores by planning unit (Figure D-1 a,b). The seasonal RSF rasters were used as separate conservation features to ensure representation of seasonally preferred habitat types which can differ substantially throughout the year, rather than relying on the all-year RSF model which tends to average habitat selection patterns across the year and may not reflect seasonal nuances.

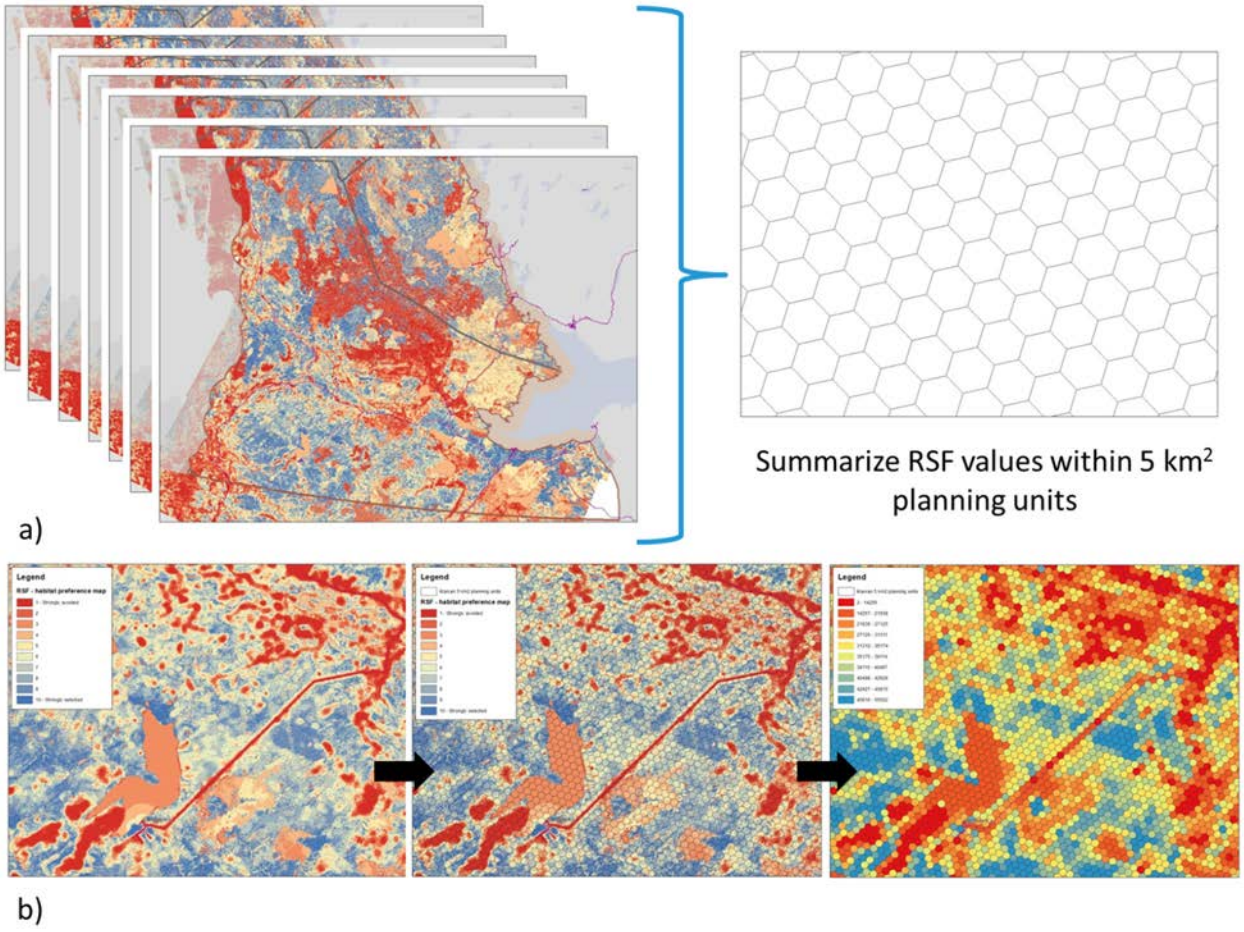

Figure D-1. a) Seven seasonal RSF maps (calving, summer, early fall, late fall, early winter, mid-winter and late winter) were overlaid with a grid of 5 km^2 hexagonal cells representing planning units used in Marxan analyses; b) an illustration from the Sambaa K'e (Trout Lake) area of how RSF bin scores were summed within 5 km^2 hexagonal cells representing planning units.

Marxan analyses

Marxan analyses were run using planning units for the entire area of the NT1 range for which seasonal predictive RSF maps could be generated from the models in DeMars et al. 2020 (Figure D-2). This excluded an area in the northwestern part of the NT1 range that extends into the Yukon, and part of the southeastern corner of the range that occurs within Wood Buffalo National Park. Marxan analyses considered planning units from across the entire area, but representation targets on the seasonal RSF values had to be met within each of the range planning regions. This approach was taken so that areas of preferred habitat that span regional range planning boundaries were not artificially split, as would have been the case if RSF layers had first been clipped to the range planning regions and Marxan analyses run separately on a region by region basis.

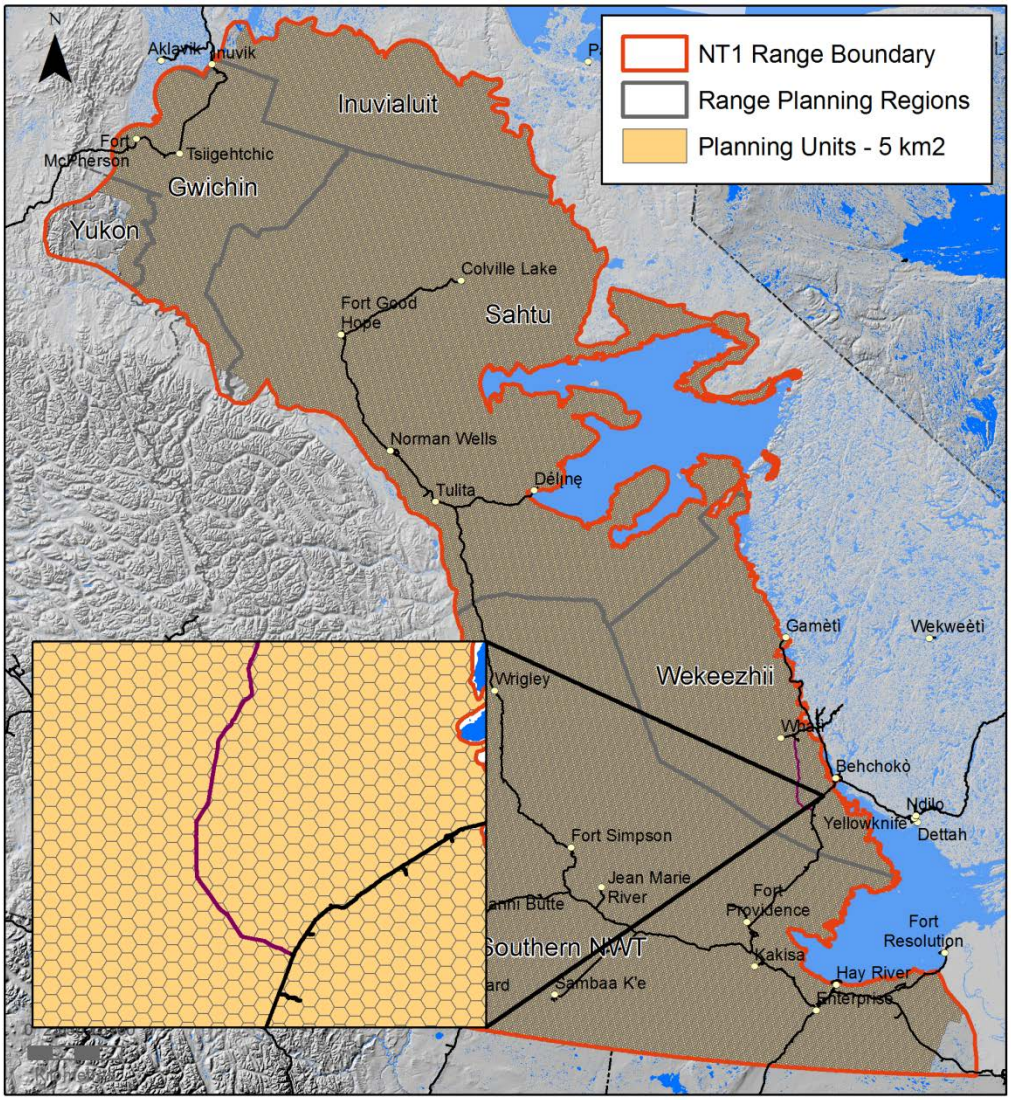

Figure D-2. Spatial extent of 5 km^2 planning units which were used in Marxan analyses.

To determine an appropriate boundary length modifier (BLM), Marxan analyses were initially run using a representation target of 50% of the cumulative RSF value in each region for each season, and boundary length modifier values ranging from 0.1 to 3.0[34]. Low boundary length modifier values tend to provide an overdispersed (scattered) solution with many small patches, and high values can produce an overly clumped solution which tends to "sweep in" more planning units with low caribou habitat value. A consistent "cost" value of 2500 was used across all planning units, and a species penalty factor of 10 was applied. A boundary length modifier of 0.75 was determined to provide the best balance between overdispersion and overly clumped solutions (Figure D-3).

[34] Boundary length modifier values tested included 0.1, 0.175, 0.25, 0.375, 0.5, 0.75, 1.0, 1.5, 2.0, and 3.0

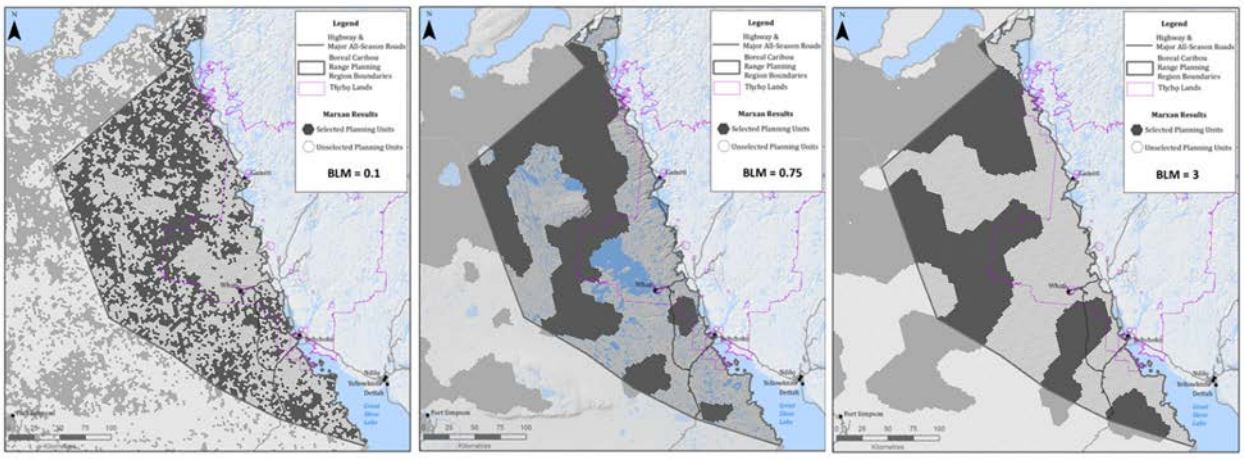

Figure D-3. Marxan results from runs using a 50% representation target on regional cumulative RSF values and boundary length modifier (BLM) values of 0.1 (left), 0.75 (middle), and 3.0 (right).

Using the boundary length modifier of 0.75, Marxan runs were then carried out using representation targets of 20%, 30%, 40%, 50%, 60% and 70% of the regional cumulative seasonal RSF values. The cumulative regional seasonal RSF values represent the sum of the seasonal RSF values across all planning units within each range planning region for each season. A total of 100 runs were completed for each representation target (600 runs total), and the frequency that each planning unit was selected in the Marxan solution from each of the 100 runs was calculated. It was assumed that planning units that were more frequently selected across the 100 runs represented areas of higher importance to boreal caribou because they correspond to planning units with high RSF values across most seasons. A 'super sum' solution was then calculated by adding the selection frequencies for each planning unit across the 6 different representation targets, yielding the number of times that a planning unit was selected out of 600 runs (Figure D-4). Maps of the results from each of the representation targets and the 'super sum' solution were colour coded into three categories: Red = Planning units that were never selected in any runs; Yellow = Planning units that were selected in more than one but less than half the runs; and Blue = Planning units that were selected in more than half the runs.

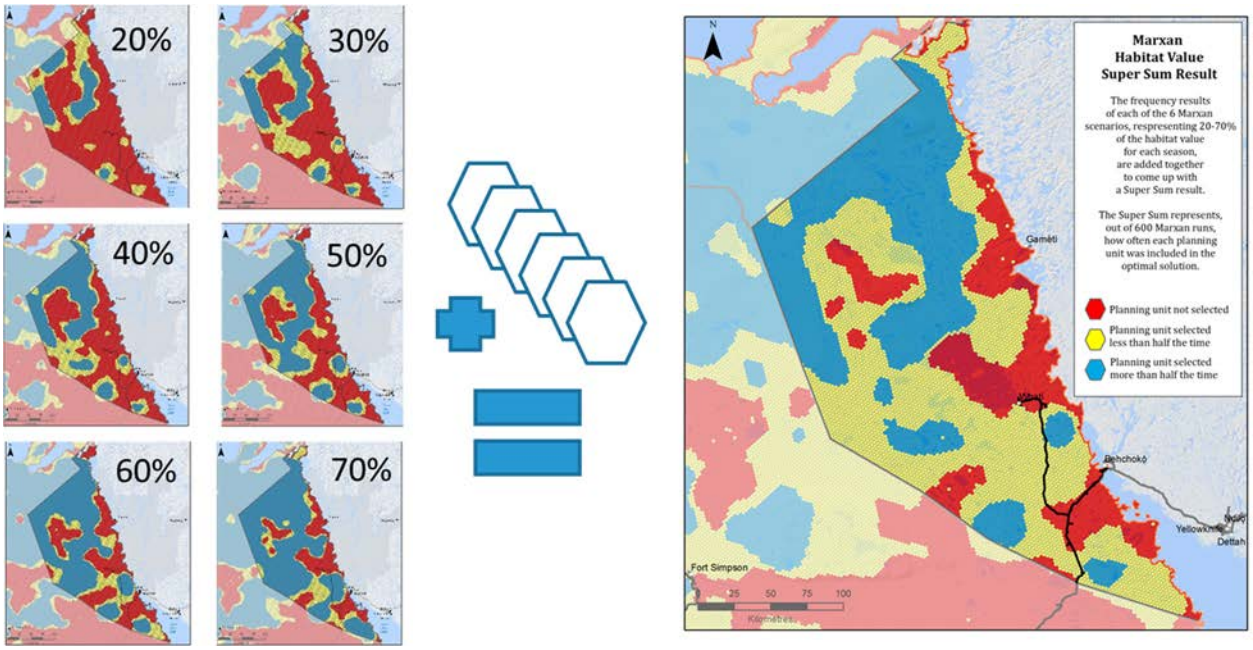

Figure D-4. Marxan results based on representation targets of 20% to 70% of the cumulative regional RSF value for each season (100 runs per target; left panel), and the 'super sum' solution (right panel) representing the selection frequency of planning units across the 600 runs from all representation targets. Planning units were colour coded by selection frequency: Red = Planning units that were never selected in any runs; Yellow = Planning units that were selected in more than one but less than half the runs; and Blue = Planning units that were selected in more than half the runs.

The results of the 'super sum' solution from the Marxan runs based on the seasonal RSF values were then evaluated for how well they captured areas of known use by boreal caribou based on collar data. It was apparent that there were areas with high concentrations of collar locations that were not being captured in the Marxan solutions (Figure D-5). One explanation for this is that collar data from the Mackenzie study area (see Figure 4 in the main body of the interim range plan) was not included in the RSF models developed by DeMars et al. (2020) because these collars were deployed following a large fire from 2014 and there was concern that inclusion of this data would bias the RSF models towards predicting selection of recent burns. Despite excluding this data from the RSF models, DeMars et al. (2020) found evidence for selection for recent burns during the calving and summer. Because boreal caribou showed greater selection for areas that haven't burned in >60 years during the fall and winter seasons, the RSF models predict moderate to lower suitability habitat in the Mackenzie study area throughout most of the year because most of it is in recent burns. Another example is the exclusion of planning units corresponding with islands within Lac La Martre that had evidence of use based on collar data. These may have been excluded from the Marxan solution because they represented more isolated planning units that would have increased the 'cost' of the solution if they had been included due to boundary length modifier.

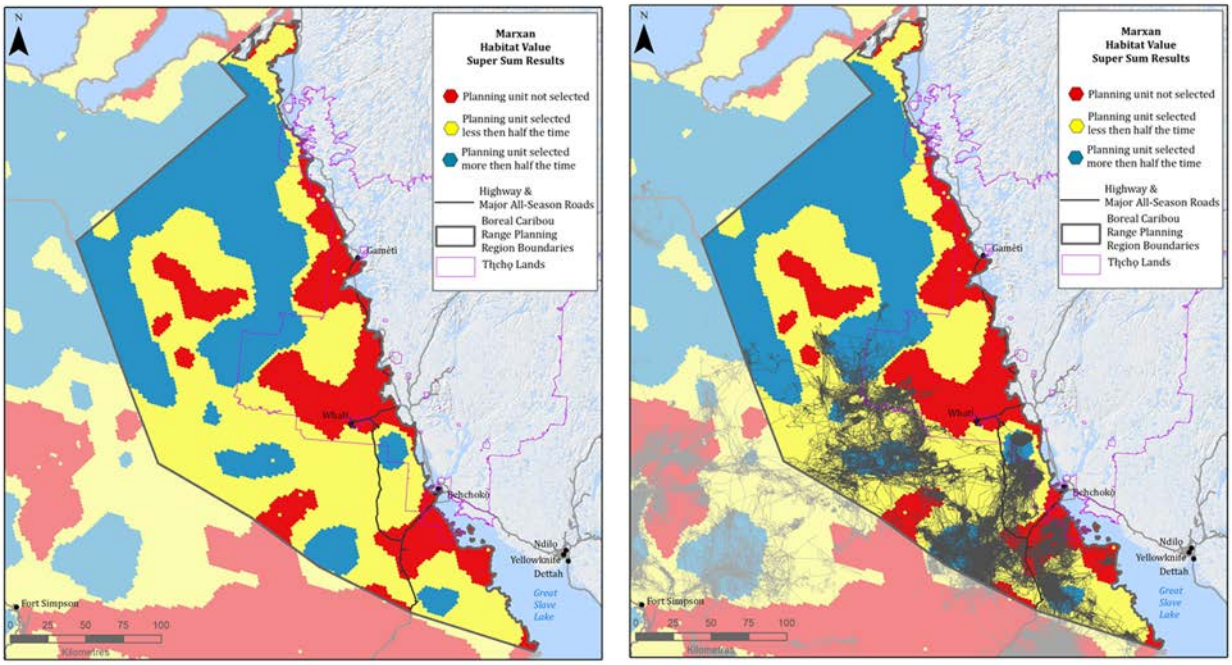

Figure D-5. Side-by-side comparison of the Marxan 'super sum' solution based on 20%-70% representation targets for regional cumulative seasonal RSF values without (left panel) and with (right panel) movement paths of collared boreal caribou (grey lines). The black rectangles illustrate areas with known use by boreal caribou that were not included in Marxan solution (i.e., planning units were never selected).

To address this issue, a new layer was created that represented a collar data density index within planning units to highlight areas of higher know use by boreal caribou (Figure D-6). Boreal caribou monitoring study areas were first separated into distinct non-overlapping polygons. The number of collar locations was then counted within planning units falling inside each of these polygons (based on 1 collar location per day per individual). The number of collar locations in each planning unit was divided by the total number of collar locations in the study area polygon and multiplied by 100 to represent the percentage of that study area's collar locations contained in each planning unit. This index was then standardized among study areas by dividing each planning unit's value by the maximum value of all planning units in that study area and multiplying by 100. This resulted in a collar data density index that range between 0 and 100, that was more comparable among the different study area polygons, because some areas have had monitoring programs in place for longer periods of time or have had higher collar deployment effort. A series of Marxan runs with representation targets of 20% to 70% of the cumulative regional collar data density index were then performed (not including the RSF layers), and the 'super sum' solution was created from the 600 runs. Planning units were then binned into three categories of selection frequency: Red = planning units never selected; Yellow = planning units selected in more than one run but less than half the runs; and Blue = Planning units that were selected in more than half the runs (Figure D-6).

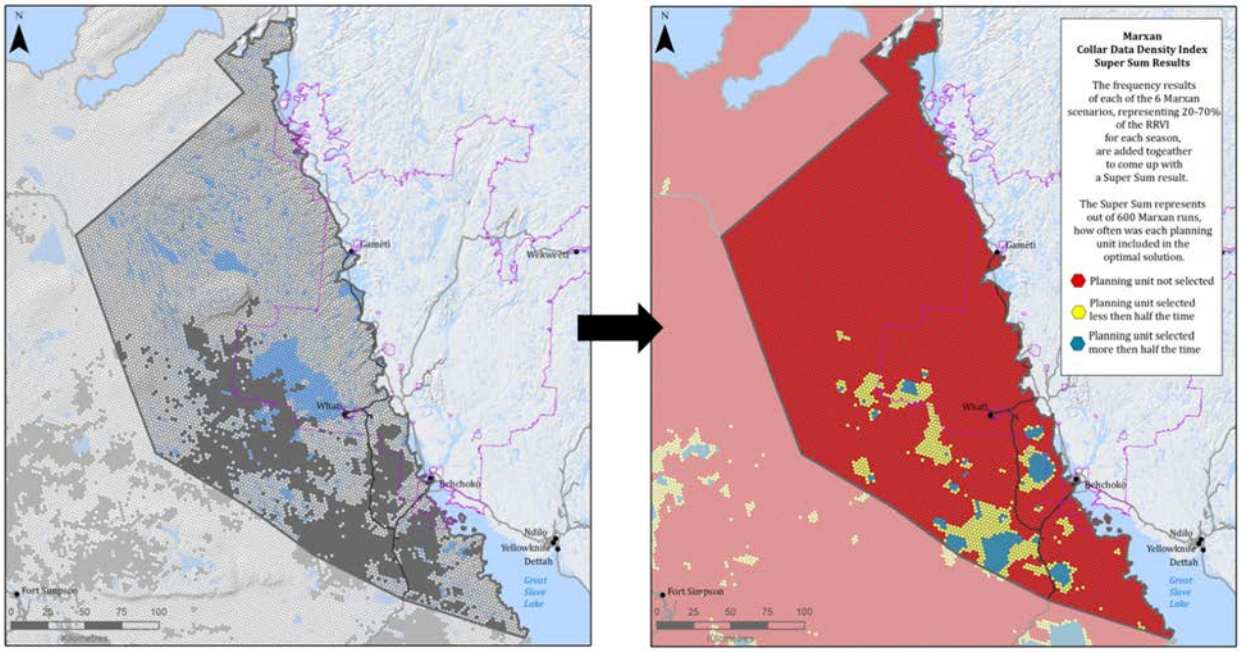

Figure D-6. Planning units containing collar locations (dark grey; left panel) and 'super sum' result from Marxan runs using representation targets of 20%-70% of the cumulative regional collar data density index (100 runs per target; 600 runs total). Planning units were binned into 3 categories: Red = Planning units that were never selected in any runs; Yellow = Planning units that were selected in more than one but less than half the runs; and Blue = Planning units that were selected in more than half the runs.

Marxan runs with the seasonal RSF layers were then re-run using the same 20%-70% representation targets, but this time the planning units with higher known use based on the collar data density index (blue units in Figure D-6 – right panel) were then 'locked in' to the Marxan solutions. This means that Marxan had to select these planning units in each run, and this tended to create 'gravity' around the 'locked in' planning units because Marxan tried to arrive at a clustered solution. Figure D-7 shows the results of the 'super sum' solution from the Marxan runs with areas of high known use 'locked in', with planning unit selection frequency shown on a relatively continuous scale (left panel) and binned into 3 categories. Figure D-8 provides a side-by-side comparison of the Marxan 'super sum' solutions without (left panel) and with (right panel) areas of high known use based on the collar data density index 'locked in'. The right panel in Figure D-8 provides a representation of "High" (blue), "Medium" (yellow), and "Low" (red) importance areas for boreal caribou on a relative scale.

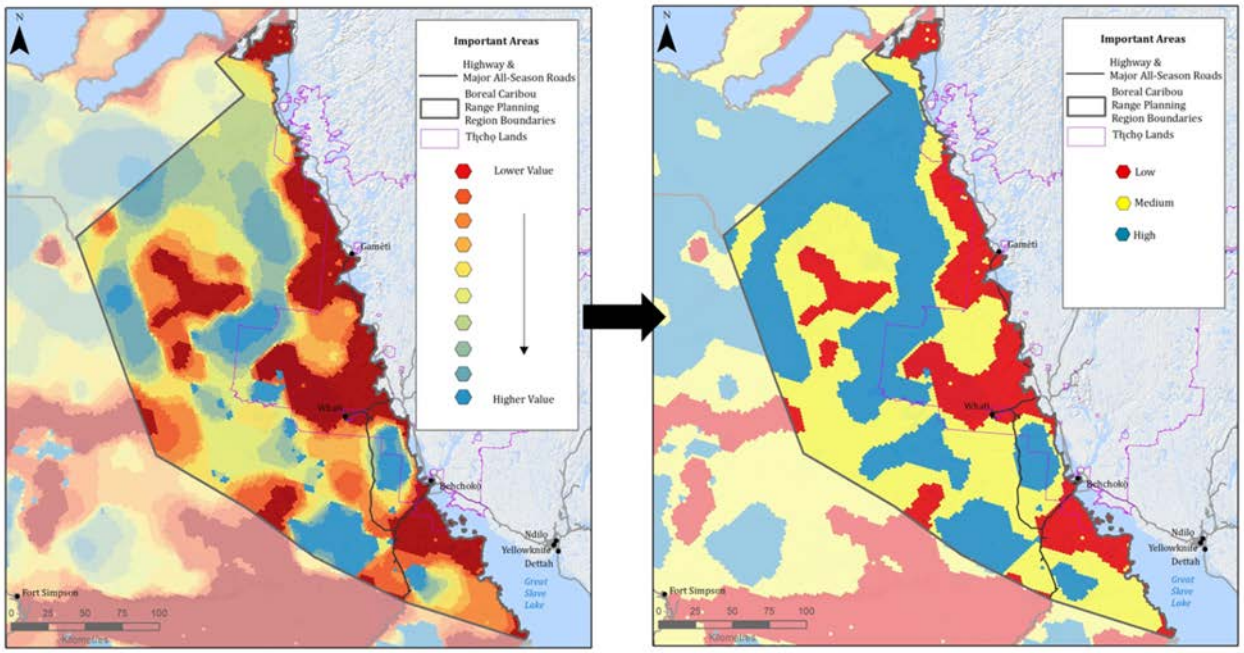

Figure D-7. 'Super sum' results from Marxan runs with 20%-70% representation targets for regional cumulative seasonal RSF value and areas of high collar data density "locked in". The left panel shows planning unit selection frequency binned into 10 classes from low (never selected) to high, and the right panel shows planning unit selection frequency divided into 3 bins representing relative habitat importance: Low (Red) = Planning units that were never selected in any runs; Medium (Yellow) = Planning units that were selected in more than one but less than half the runs; and High (Blue) = Planning units that were selected in more than half the runs.

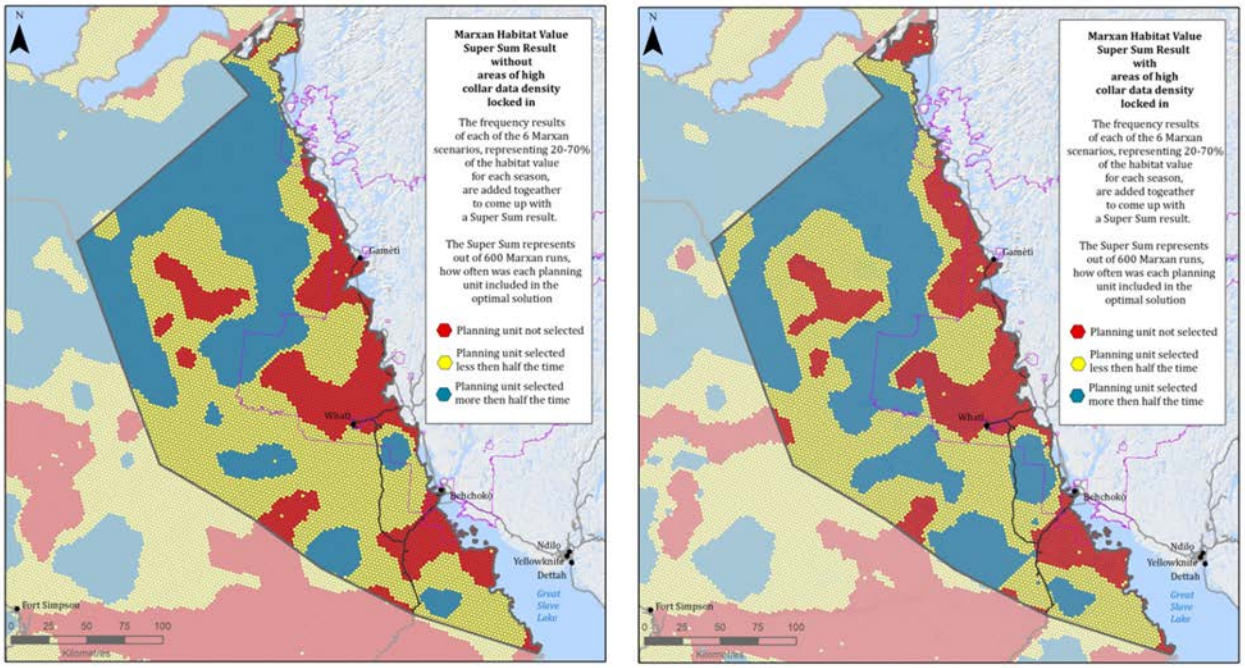

Figure D-8. Side-by-side comparison of the Marxan 'super sum' solutions without (left panel) and with (right panel) areas of high collar data density locked in.

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APPENDIX E – Using Marxan to Explore Different Range Plan Scenarios

After using Marxan (Ball et al. 2009) to delineate important areas for boreal caribou based on seasonal habitat preference (RSF) maps and GPS collar data (Appendix D), further Marxan analyses were carried out to incorporate consideration of resource development potential and existing land protection in the Wek'èezhìı boreal caribou range planning region. These analyses were used to generate different scenarios for what the map of management class areas for the interim range plan might look like. Resource development potential was considered in Marxan by representing it as a relative cost, and existing land protections in the region were considered by locking in planning units that occurred within areas that provide levels of habitat protection that might be considered equivalent to an Enhanced or Intensive management class area, as described in the range planning Framework.

Four scenarios were run in Marxan:

- **Scenario 1:** Select planning units based only on habitat importance for caribou (equivalent to the Marxan analysis used to identify important areas).
- **Scenario 2:** Select planning units based on habitat importance while locking in protected areas and certain land use planning zones.
- **Scenario 3:** Select planning units based on habitat importance and relative cost (development potential).
- **Scenario 4:** Select planning units based on habitat importance, relative cost, and locking in protected areas and certain land use planning zones.

Creation of a Resource Development Potential Layer to Represent "Cost" in Marxan

The relative cost value of planning units was defined in terms of their relative resource development potential value. When Marxan selects planning units, it attempts to maximize the value of areas selected for boreal caribou while minimizing the cost of the planning units selected in the final solution of each run. Here "cost" essentially represents missed development opportunity or missed revenue potential if a planning unit was selected for inclusion in an Enhanced or Intensive management class area for boreal caribou. Although areas within Enhanced and Intensive management areas do not preclude development, the cost of carrying out development in those management areas would likely be much higher due to the more stringent management actions required. Cost was represented as an index on a relative scale because the potential monetary value of the primary resources considered (oil and gas, minerals, and timber) in planning units could not be estimated. Cost considered three factors for each planning unit: 1) Resource Potential; 2) Regulatory Access to the Resource; and 3) Proximity to Infrastructure (Figure E-1). This approach to representing resource development potential was based on methods developed for conservation planning in northern British Columbia (Suzuki and Parker 2016). "Resource Potential" considered the relative abundance, value or likelihood of finding a resource of value in a given area. "Regulatory Access" considered whether a proponent would be allowed to obtain tenure and

permits to explore for, or develop, a resource in an area given existing land protections (i.e., land withdrawals, protected areas, and land use plan zones that prohibit certain types of development). "Proximity to Infrastructure" was considered in two separate GIS layers. The first layer considered proximity to all-season roads, and the second layer considered proximity to all-season roads + winter roads. For the hydrocarbon resource potential layer, proximity to pipelines was also considered. Given that hydrocarbon potential information in the Wek'èezhìı region was not available (see Figure 33 in the range plan, which is based on Gal and Udell 2005), hydrocarbon potential contributed little to the cost value of planning units within the region.

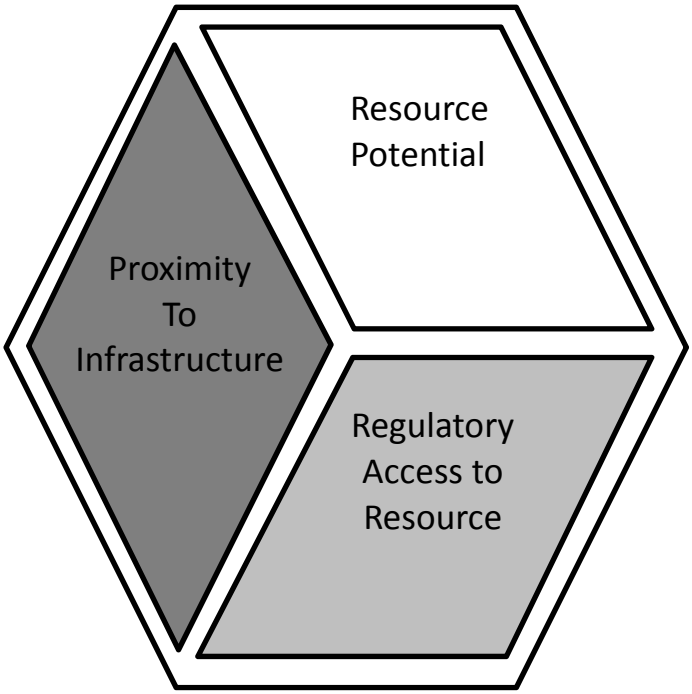

Figure E-1. Cost associated with 5 km^2 hexagonal planning units used in Marxan analyses considered resource potential, regulatory access to resources and proximity to infrastructure. Cost in each planning unit was represented on a relative scale.

Resource development potential layers for the Minerals, Oil and Gas (Hydrocarbon), and Forestry sectors were first created as raster files with a 30 m pixel resolution at the scale of the NT1 range. Resource development potential (including consideration of regulatory access) was ranked on a similar scale (0-450) for each of the 3 sectors. The scores for the 3 sectors where then summed, and combined with the score for proximity to infrastructure. The process for developing the final cost layer considering all 3 sectors and proximity to infrastructure is described in further detail below. The cost value of pixels was then summed within each 5 km^2 planning unit, and summed cost values within planning units were re-scaled between 3500-12,500. In Marxan Scenarios 1 and 2, where resource development potential was not considered, all planning units were given a base cost value of 2500. All Marxan scenarios were run at the scale of the NT1 range with representation targets for

seasonal boreal caribou RSF layers and the collar data density index layer that had to be met within each range planning region, similar to the approach described in Appendix D.

Mineral Resource Development Potential

Mineral resource potential was quantified on a relative scale based on the Interim Mineral Prospectivity map provided to GNWT-ENR by the Northwest Territories Geological Survey (NTGS) (see Section 6.5.1 of the range plan for further details on this layer). Areas with mines and known deposits were given the highest score (150), while areas with regional diamond potential (essentially the entire NT1 boreal caribou range) were given the lowest score (30). Figure E-2 shows how the different mineral prospectivity categories were ranked. Where different mineral prospectivity layers overlapped, areas were assigned the score for the layer with the higher prospectivity rating (Figure E-2).

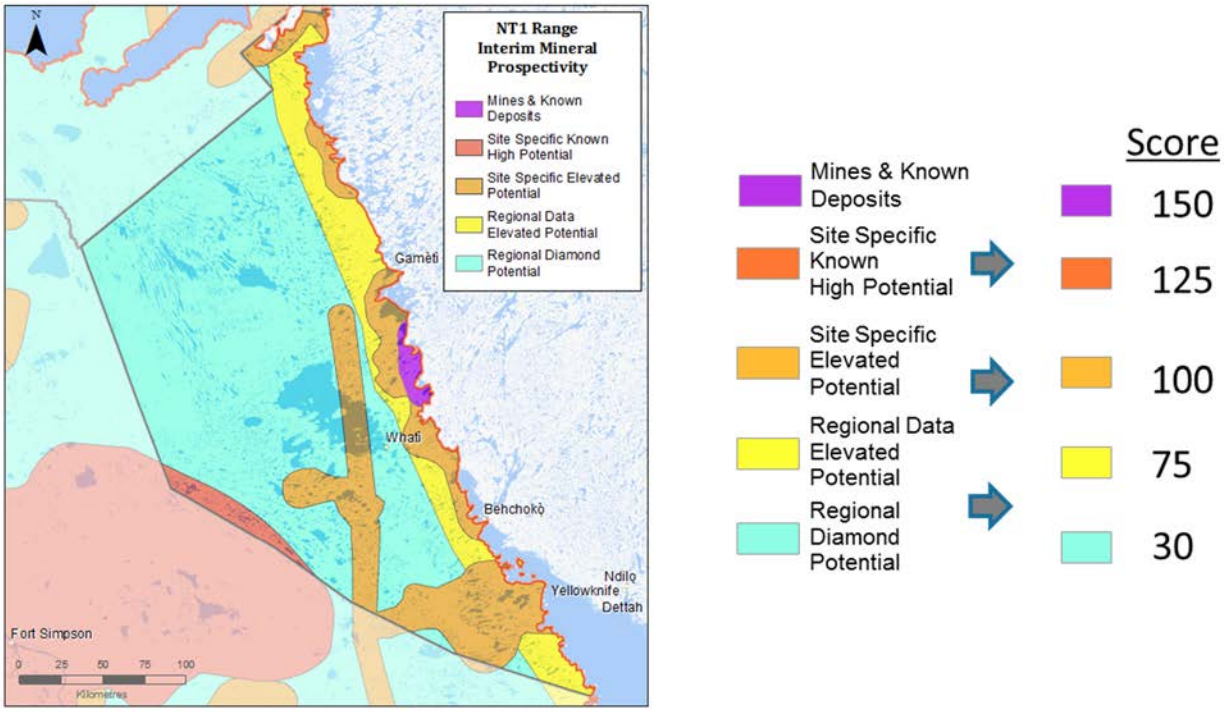

Figure E-2. Derivation of relative mineral resource potential scores based on a map of mineral prospectivity categories provided to GNWT-ENR by the NTGS.

Resource potential scores were then multiplied by a score for regulatory access. Areas that have existing active tenure for mineral exploration or mining were given a multiplier of 3, areas that are open for mineral exploration and mining were given a multiplier of 2, and areas that are not open for mineral exploration or development were given a score of 1 (Figure E-3). Areas that were considered not open for mineral exploration and mining included Cultural Heritage Zones, Traditional Use Zones, Habitat Management Zones, and Land Use Exclusion Zones within the Tłı̨chǫ Land Use Plan, Ezǫdzìtì, and the Dınàgà Wek'èhodì candidate protected area (Figure E-3).

Multiplying the resource potential score by the regulatory access score provided an overall resource development potential score ranging between 30 and 450 (Figure E-4).

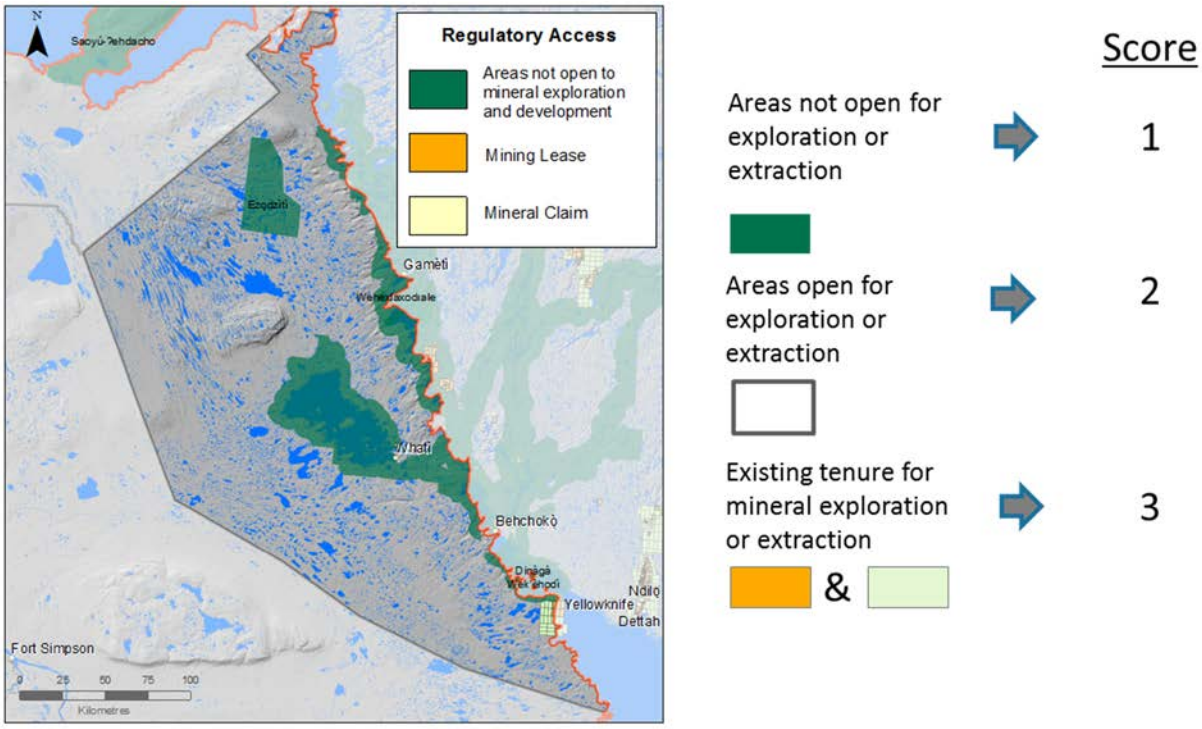

Figure E-3. Regulatory access categories for mineral exploration and mining in the Wek'èezhìı range planning region and corresponding multipliers used to calculate a mineral resource development potential index layer. Areas open for exploration or extraction, are those that are not green on the map. Regulatory access scores were multiplied by the resource potential scores shown in Figure E-2.

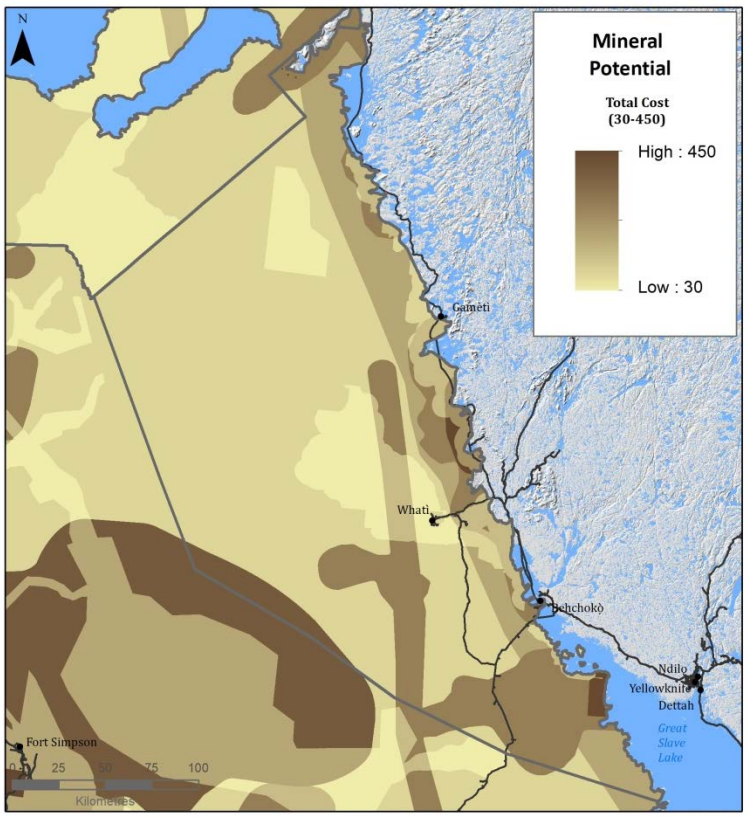

Figure E-4. Final mineral resource development potential layer incorporating considerations of relative mineral prospectivity and regulatory access.

Oil and Gas (Hydrocarbon) Resource Development Potential

Hydrocarbon resource potential was characterized using the "Compiled Hydrocarbon Play Polygons for mainland Northwest Territories" data set (Gal and Udell 2005). This layer characterizes hydrocarbon potential on a relative scale from very low potential to very high potential. These categories of hydrocarbon potential were numbered from 1 to 7, and then re-scaled to scores between 14 and 100 as described in Figure E-5. An additional layer was provided to GNWT-ENR by the NTGS which included polygons delimiting the most promising hydrocarbon plays on mainland NWT (J. Rocheleau, NTGS, unpublished data; *note - none of these areas overlap with the Wek'èezhìı region*). An additional score of 50 was added for these areas to the scores based on Compiled Hydrocarbon Play Polygons. Areas with no hydrocarbon potential data were assigned a value of 0. This yielded total scores ranging between 0 and 150.

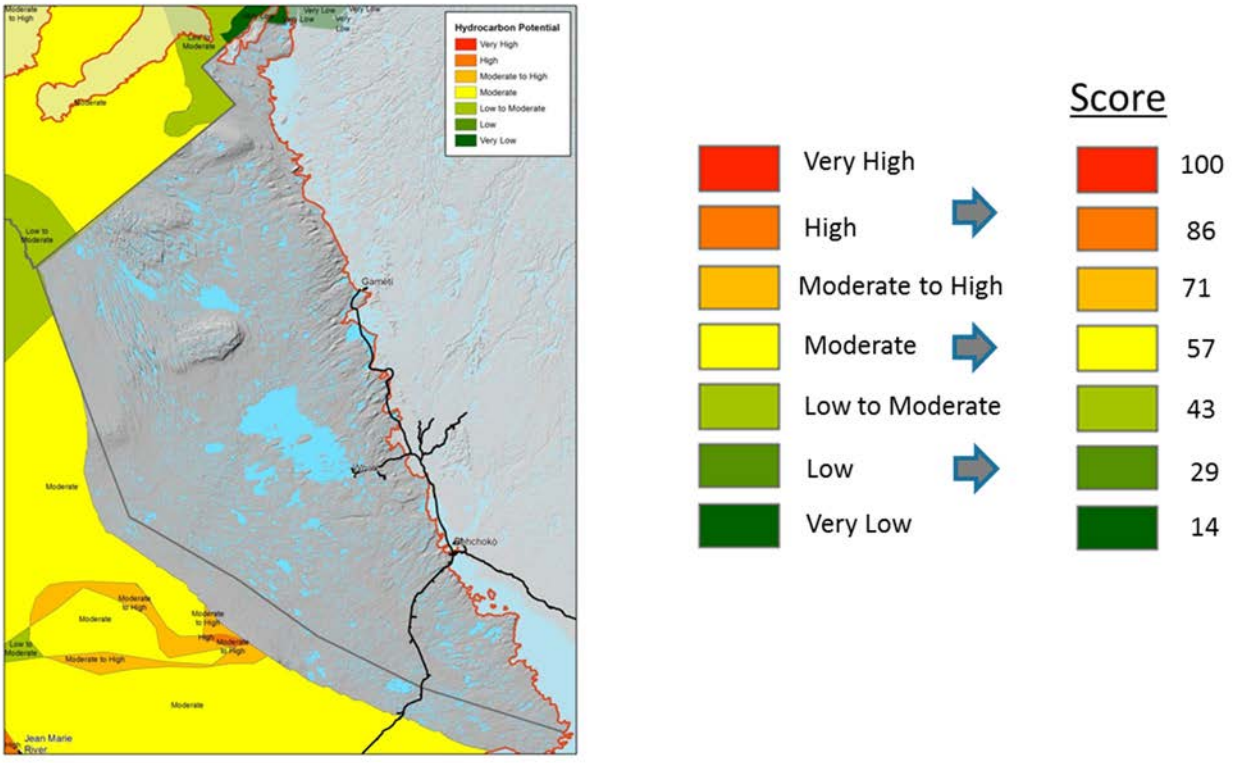

Figure E-5. Derivation of hydrocarbon resource potential scores based on the "Compiled Hydrocarbon Play Polygons for mainland Northwest Territories" data set (Gall and Udell 2005).

For regulatory access in the Wek'èezhìı region, the same approach as shown in Figure E-3 (regulatory access for mineral exploration and mining) was used, with areas with existing active oil and gas tenure receiving a multiplier of 3, areas open to oil and gas exploration were given a multiplier of 2, and areas that are not open to oil and gas exploration were given a multiplier of 1. In addition to relative hydrocarbon potential and regulatory access, the proximity to existing pipelines was also considered in the hydrocarbon development potential layer. An inverse distance to pipeline score was added to the relative hydrocarbon potential score. The hydrocarbon potential multiplied by regulatory access score was given a weighting of 60% and proximity to pipelines was given a 40% weighting in the calculation of the overall score:

Hydrocarbon development potential = $0.6 \times [\textit{hydrocarbon potential} \times \textit{regulatory access}]$

$+ 0.4 \times [\textit{proximity to pipelines}]$

Scores were scaled between 0 and 450. Because of the absence of hydrocarbon potential polygons in the Wek'èezhìı range planning region, the hydrocarbon potential score for planning units in the region had low values (~25) which reflected only influence of distance to the nearest pipeline (Figure E-6).

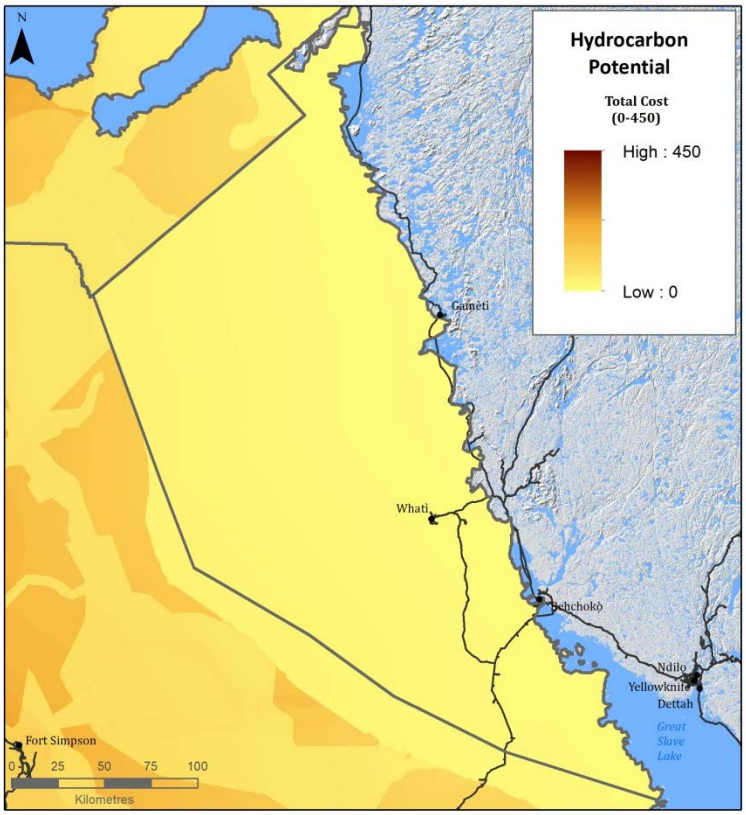

Figure E-6. Final hydrocarbon development potential layer considering relative hydrocarbon potential, regulatory access and proximity to existing pipelines.

Forestry Potential

Forest Vegetation Inventory (FVI) data provided by GNWT-ENR Forest Management Division was used to characterize forestry potential (or timber potential). FVI data is limited in geographic scope, and within the Wek'èezhìı range planning region, it is limited to a band along Highway 3 and the Tłı̨chǫ-All-Season Road (TASR) (Figure E-7). The FVI data in the Wek'èezhìı region was originally created in 2011 and stand ages were updated by overlaying recent fires in the region, and recalculating stand ages current to 2021. Productive forest stands (based on Site Index Value) were broken down into three age categories: Recently burned (<10 yrs old, currently suitable for salvage harvesting); 11-49 years old (will be suitable for timber harvesting in the future); and >50 years old (currently suitable for timber harvesting). Unproductive forest stands and non-forested polygons within the FVI were assumed to have little potential for commercial forestry. These 4 categories were assigned relative scores from ranging from 25 (Unproductive forest stands and non-forested polygons) to 150 (Productive stands >50 yrs old), as illustrated in Figure E-7. Areas outside of the FVI extent were assigned a value of 0. Timber resource potential scores were then multiplied by scores for regulatory access using a similar approach as described for mineral resource development potential in Figure E-3. Areas with existing forestry tenure (forest management

agreements/commercial timber licences) were given a multiplier of 3, areas that are open for commercial timber harvesting were given a multiplier of 2, and areas not open to commercial timber harvesting were given a multiplier of 1, to yield a timber resource development potential score varying between 0 and 450 (Figure E-8).

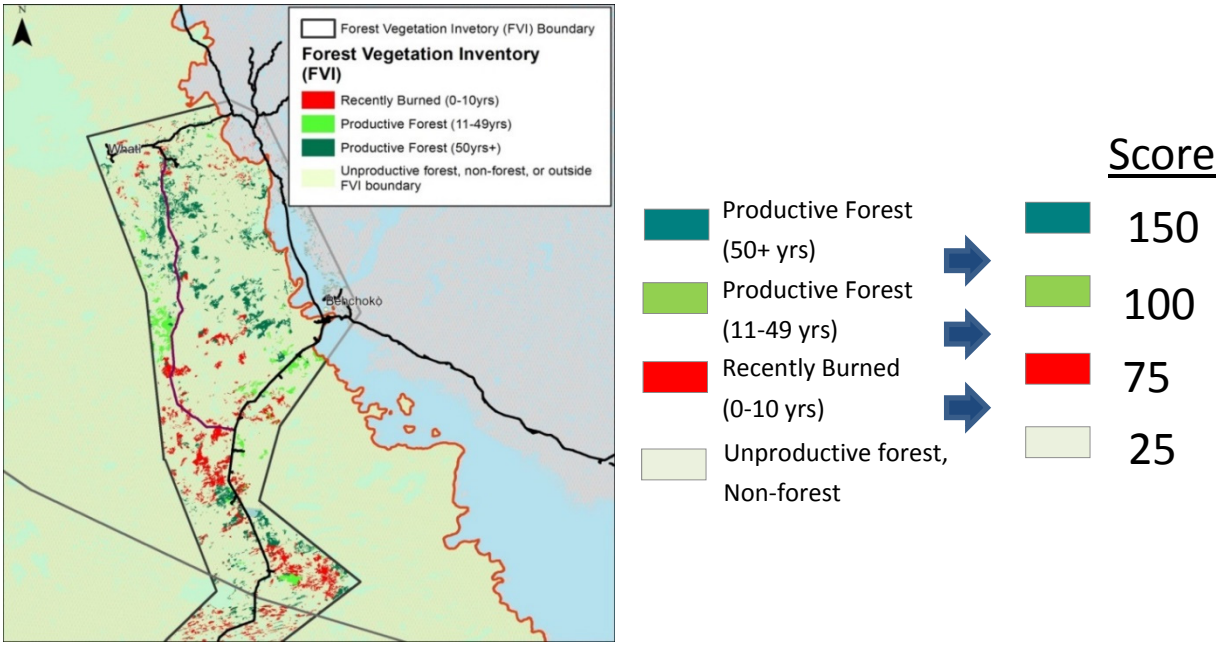

Figure E-7. Derivation of relative forest resource potential scores based on Forest Inventory Data broken into 4 different categories.

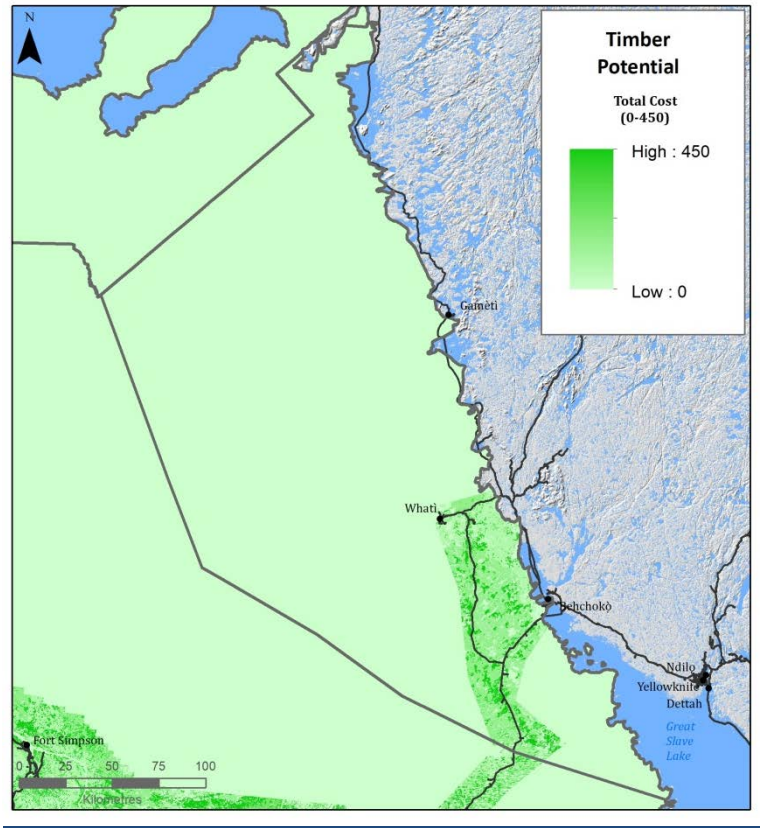

Figure E-8. Final timber resource development potential layer based on multiplying forest resource potential scores (ranging from 0 to 150) by regulatory access scores (1 to 3).

Proximity to Infrastructure

Two distance to infrastructure layers were created, one based on distance of raster cells to the nearest all-season road, and the second based on the distance to the closest all-season road or winter road. These two separate layers were created to acknowledge that proximity to all-season roads may be a more important consideration for development potential than distance to the nearest winter road, which are only open for a limited time each year. The two layers were created by calculating a reverse path distance to each type of road in ArcGIS, and the reverse path distance scores were then rescaled between 0 and 100, with 0 representing areas that are the farthest from any road, and 100 representing areas that are directly adjacent to a road (Figure E-9).

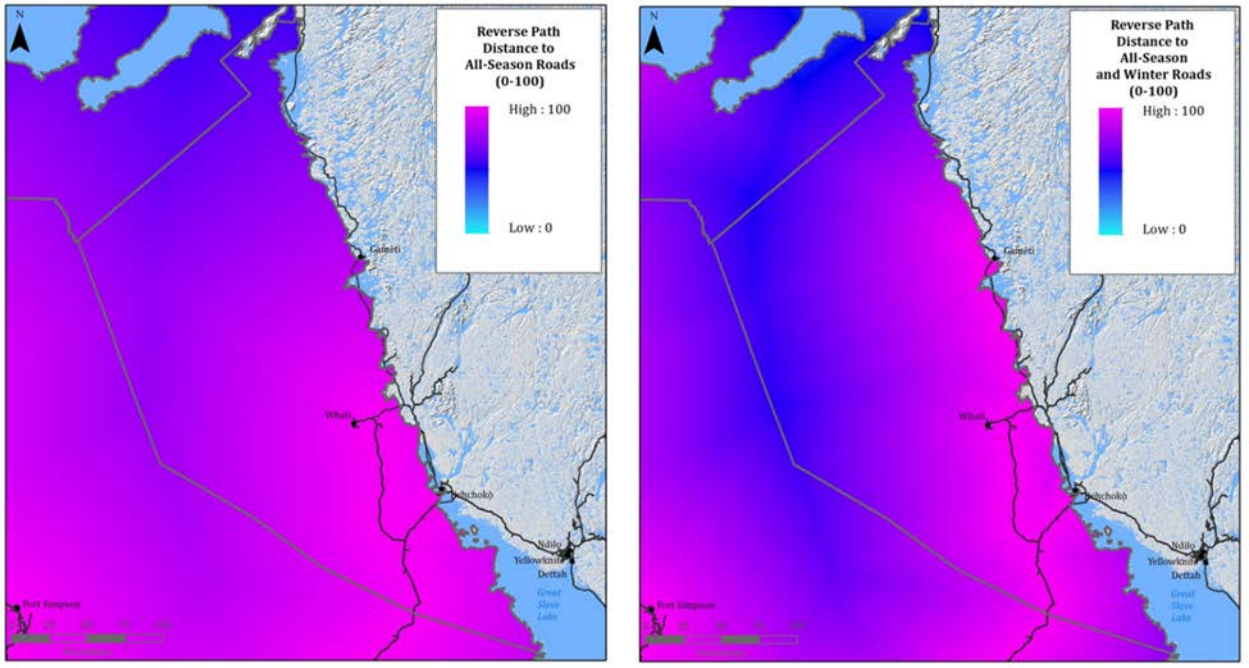

Figure E-9. Raster layers representing proximity to all-season roads (left panel), and proximity to all-season + winter roads (right panel). Reverse path distance scores were scaled between 0 and 100, with values of 100 representing areas directly adjacent to a road, and 0 representing the furthest possible distance from roads.

Combined Cost Layer for Resource Development Potential

To generate a single "cost" layer for use in Marxan representing resource development potential for all three resource sectors (minerals, oil and gas, and forestry), the scores for the three sector-specific resource development potential layers were added together; and then the scores for the two proximity to infrastructure layers were added to the resource development potential scores. The summed resource development potential scores from the three sectors were given a weighting of 60% in the combined total "cost" score, proximity to all-season roads was given a 20% weight, and proximity to all-season + winter roads was given a 20% weight. The following formula describes the approach to coming up with the "Total Cost" score:

Total Cost = 0.6 × [(*mineral resource potential* × *regulatory access*)

+ (0.6 × [*hydrocarbon potential* × *regulatory access*] + 0.4 × [*proximity to pipelines*])

+ (*forestry resource potential* × *regulatory access*)]

+ 0.2 × *proximity to all-season roads*

+ 0.2 × *proximity to all-season & winter roads*

The Total Cost scores were then rescaled between 0 and 100, with areas with a 0 score representing the lowest development potential and areas with a score of 100 representing the highest resource development potential (Figure E-10 – left panel). For the Marxan analyses, raster pixel values from the Total Cost layer were summed within each 5 km² planning unit, and the Cost Value of each planning unit was rescaled between 3500 and 12,500 (Figure E-10 – right panel).

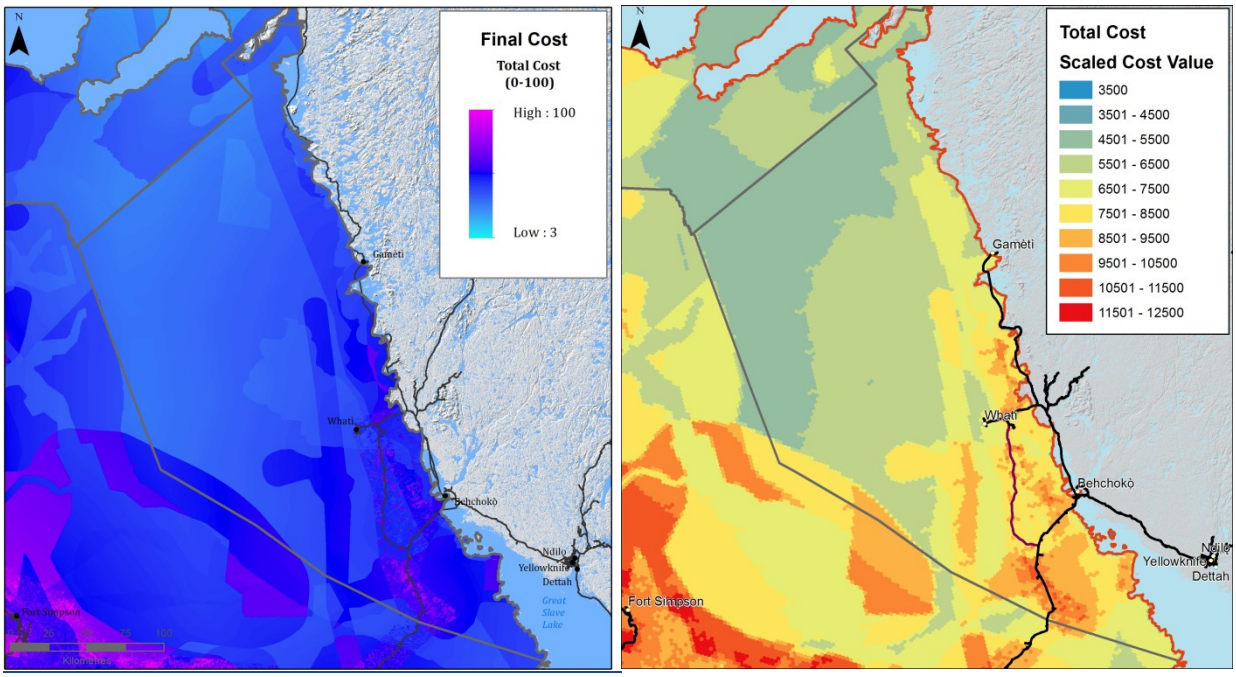

Figure E-10. Final Total Cost layer combining mineral, oil and gas, and forestry resource development potential as well as proximity to infrastructure (left panel) and Total Cost values summed within 5 km² planning units and rescaled between 3500 and 12,500 for use in Marxan analyses (right panel).

Scenarios 1 to 4 – Marxan Scenarios and Results

Four sets of Marxan analyses were run to generate potential scenarios of what maps of management class areas might look like in the Wek'èezhìı range planning region. The four scenarios, and the Marxan parameters used in each of the scenarios, are described in Table E-1 below. Similar to the approach described in Appendix D, a range of representation targets from 20% to 70% of the cumulative regional seasonal RSF value was used in each scenario, and Marxan was run 100 times for each representation target. The frequency with which planning units were selected in the final solution from each of the 100 runs × 6 representation targets was tallied to come up with a 'Super Sum' solution, which represents the number of times a planning unit was selected by Marxan out the 600 total runs. Planning units were then divided into three categories: those that were never selected in any of the 600 runs (red), planning units that were selected in less than half the 600 runs (yellow), and planning units that were selected more than half the time (blue) (Figure E-11).

Table E-1. Marxan analysis scenarios and translation of Marxan results into management class area maps.

Scenario	Description	Marxan Settings	Translation to Management Class Areas
1	**Caribou-centric**: Select planning units based only on habitat importance for caribou (equivalent to the Marxan analysis used to identify important areas)	- Representation targets of 20%-70% of cumulative regional seasonal RSF value - Areas with above-median collar data density index values locked in - Boundary Length Modifier = 0.75 - Cost value for all planning units = 2500	- Planning Units selected in more than half of the Marxan runs from the 'Super Sum' solution (based on 600 runs) were converted into Enhanced management class areas (yellow) - Planning Units that were selected less than half the time, and Planning Units that were never selected in any model runs were converted into Basic Management class areas (green)
2	**Caribou + Protected Areas Locked-in**: Select planning units based on habitat importance while locking in protected areas and certain land use planning zones	- Representation targets of 20%-70% of cumulative regional seasonal RSF value - 75% of cumulative regional collar data density index value - Boundary Length Modifier = 0.75 - Cost value for all planning units = 2500 - Planning units within protected areas and certain land use plan zones locked in to Marxan solution	
3	**Caribou + Cost**: Select planning units based on caribou importance and cost (resource development potential)	- Representation targets of 20%-70% of cumulative regional seasonal RSF value - 75% of cumulative regional collar data density index value - Boundary Length Modifier = 0.75 - Cost value for all planning units = 3500 to 12,500 (based on Total Cost layer)	
4	**Caribou + Cost + Protected Areas Locked-in**: Select planning units based on caribou importance, cost, and locking in protected areas and certain land use planning zones	- Representation targets of 20%-70% of cumulative regional seasonal RSF value - 75% of cumulative regional collar data density index value - Boundary Length Modifier = 0.75 - Cost value for all planning units = 3500 to 12,500 (based on Total Cost layer) - Planning units within protected areas and certain land use plan zones locked in to Marxan solution	

Scenario 1, which only considered representation targets for cumulative regional seasonal RSF value and areas of above-median collar data density locked in, is equivalent to the approach used to generate the map of important boreal caribou areas described in Appendix D. It is essentially a "Caribou-centric" scenario as it only considers value of planning units to caribou. Scenarios 2-4 included additional consideration of relative cost (resource development potential) and/or existing land protections. In Scenarios 2-4, a representation target of 75% of the cumulative regional collar data density index was used, rather than locking in areas of above-median collar data density as in Scenario 1. Scenarios 2 and 4 locked in planning units that fell within established protected areas and land use plan zones that prohibit most types of development (areas in dark green in Figure E-3). Locking in these planning units meant that Marxan always had to include them in the final solution. Scenarios 3 and 4, which considered resource development potential as a relative cost, meant that Marxan looked for the solution that met representation targets for boreal caribou values while minimizing cost. Figure E-11 provides a side-by-side comparison of the 'Super Sum' solutions from Scenarios 1-4. Representation targets for regional cumulative seasonal RSF value and cumulative collar data density index were met in all four scenarios.

To generate maps of management class areas, planning units that were selected in more than half of the 600 runs in each scenario were translated into Enhanced management areas (yellow), and planning units never selected, or selected less than half the time, were translated into Basic management areas (green) (Figure E-12).

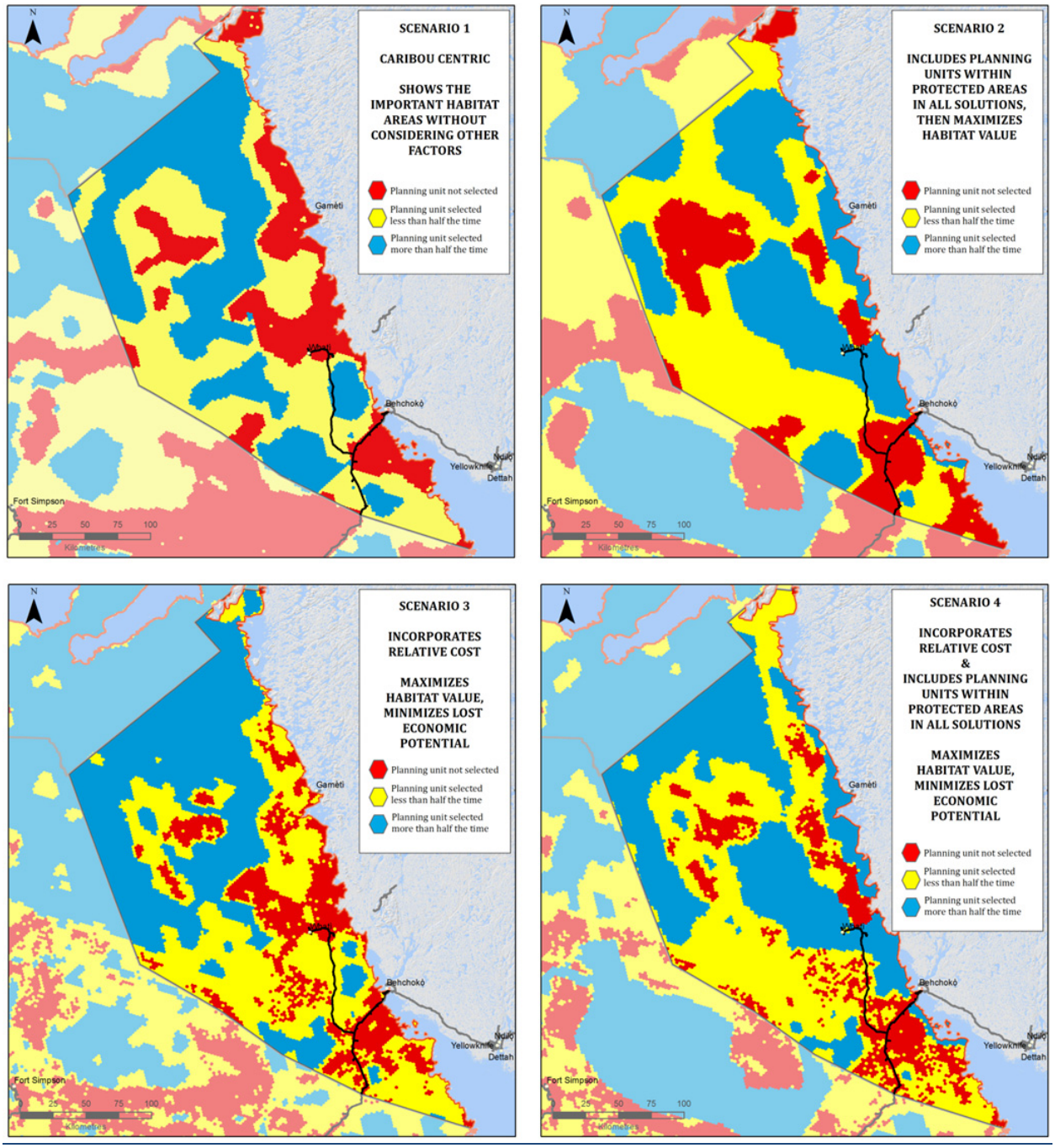

Figure E-11. 'Super Sum' solutions from Marxan Scenarios 1 to 4, with planning units colour coded by selection frequency (i.e., number of times selected out of 600 Marxan runs). Planning units that were never selected in any of the 600 runs are in red, planning units that were selected in less than half the 600 runs are in yellow, and planning units that were selected more than half the time are in blue.

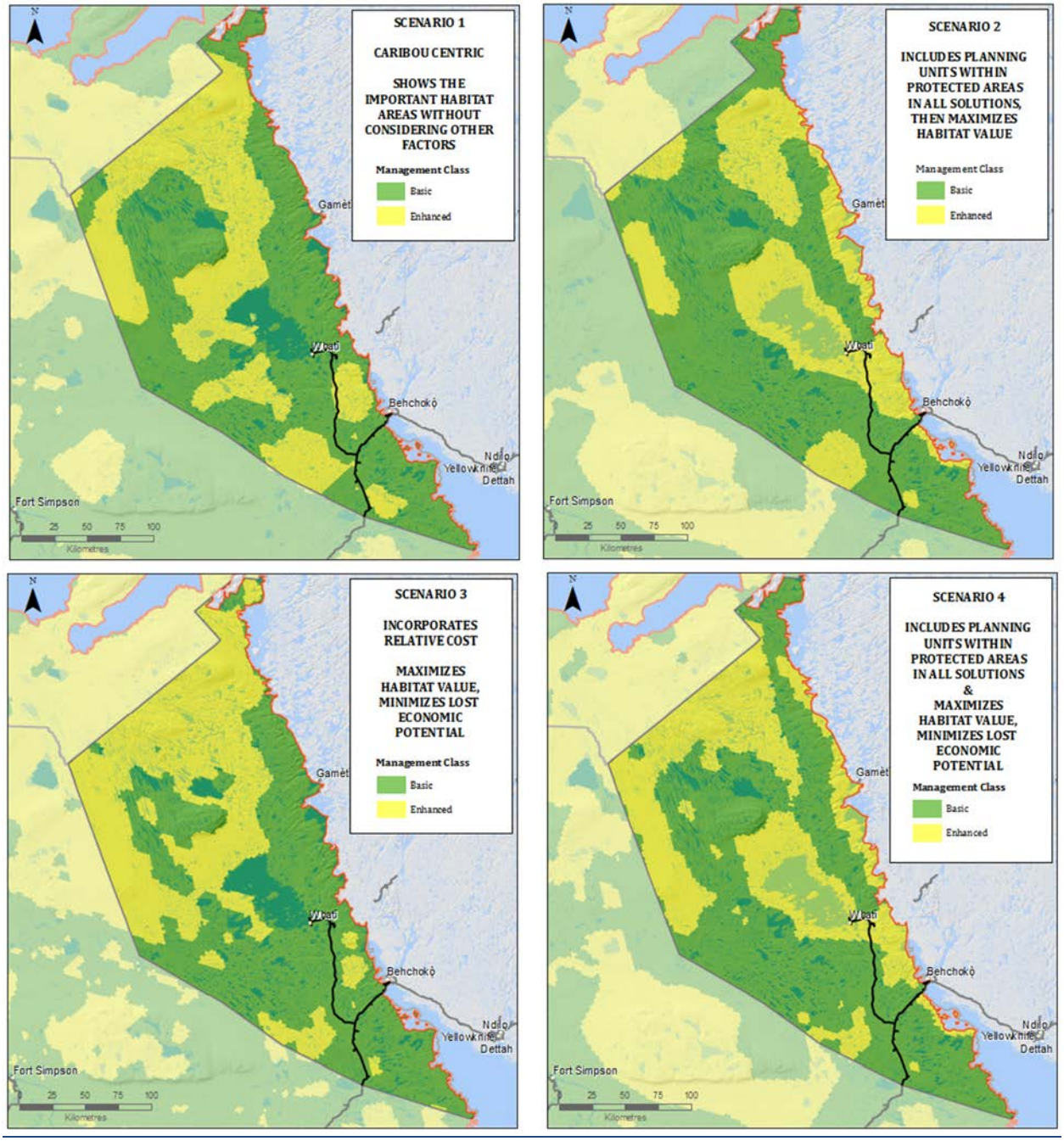

Figure E-12. Translation of Marxan results into Enhanced and Basic management class areas. Planning units that were selected in more than half of the 600 runs were translated into Enhanced management areas (yellow), and planning units never selected, or selected less than half the time, were translated into Basic management areas (green).

Scenarios 5 & 6 – Adding in Consideration of Traditional Knowledge and Connectivity

Scenario 5 – Caribou Centric Important Areas + TK polygons + Connectivity

Manual adjustments to Scenario 1 were made to add in important areas identified based on Traditional Knowledge (TK) and to provide connectivity between potential Enhanced areas based on movement paths generated from collared boreal caribou GPS locations. TK polygons and points were shared by the Tłı̨chǫ Government and North Slave Métis Alliance (NSMA) and are described further in Section 5.4.1 of the range plan. Scenario 1 was chosen as the starting point for manual adjustments, because Enhanced management areas identified through this scenario had the highest overlap with the TK information provided. Planning units overlapping with areas identified by the Tłı̨chǫ Government as Essential Habitat were converted to Enhanced management areas, as were planning units overlapping polygons provided by the NSMA. Movement paths of collared caribou were then used to identify planning units that overlapped with movement corridors between Enhanced management areas identified in Scenario 1, and these planning units were also converted to Enhanced management areas. Some additional planning units west of Lac La Martre that had high densities of movement paths were also added as Enhanced management areas. These manual adjustments resulted in Scenario 5 (Caribou Centric Important Areas + TK polygons + Connectivity), which provided much more area in Enhanced management (51.8%) than Scenarios 1-4 (range 36.8% to 42.9%). Figure E-13 illustrates how Scenario 1 was manually edited to produce Scenario 5.

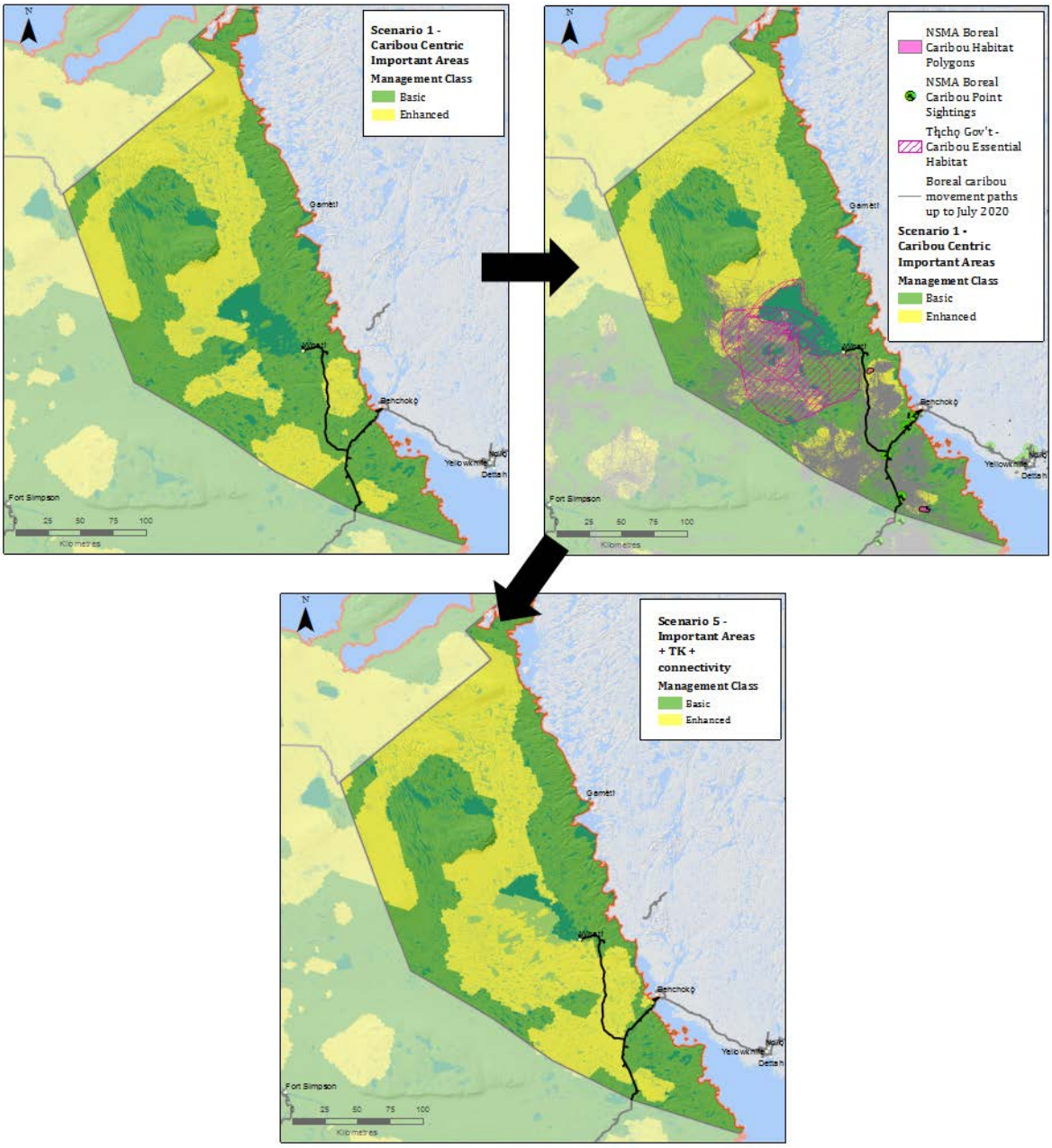

Figure E-13. Development of Scenario 5 based on converting planning units that overlap Essential Habitat areas identified by the Tłı̨chǫ Government, important areas identified by the NSMA, and movement corridors based on collar data, from Basic to Enhanced management areas.

Scenario 6 – Scaled back ("reduced") version of Scenario 5

As Scenario 5 placed much more of the region within Enhanced management areas (51.8%) than was recommended as the minimum target in the Framework (at least 1/3 of the region, or 33%), manual adjustments were made to Scenario 5 to try and reduce the amount of area in Enhanced

management to something closer to Scenario 1 (39.3%). To do this, planning units that met the following criteria were converted from the Enhanced to Basic management class:

- Planning units along edges of Enhanced polygons in the northern part of the region that were less frequently selected by Marxan (based on 'Super Sum' solution selection frequency) or had lower RSF values across all seasons.
- Planning units in Lac La Martre that were mostly water and had no collar data movement paths.
- Planning units with high forestry or mineral potential and low number of caribou movement paths, mostly along the TASR corridor.
- Planning units south of Lac La Martre and east of the TASR that were below the raised plateau west of Marian Lake and had a low number of movement paths.
- Planning units that intersected with the 60 m rights-of-way of the TASR and Highway 3, except where planning units overlapped with 1 km segments along the TASR that had high numbers of caribou road crossings (concentrated movement corridors).

These manual adjustments resulted in Scenario 6 (Figure E-14) which had 41.5% of the region in Enhanced management class areas.

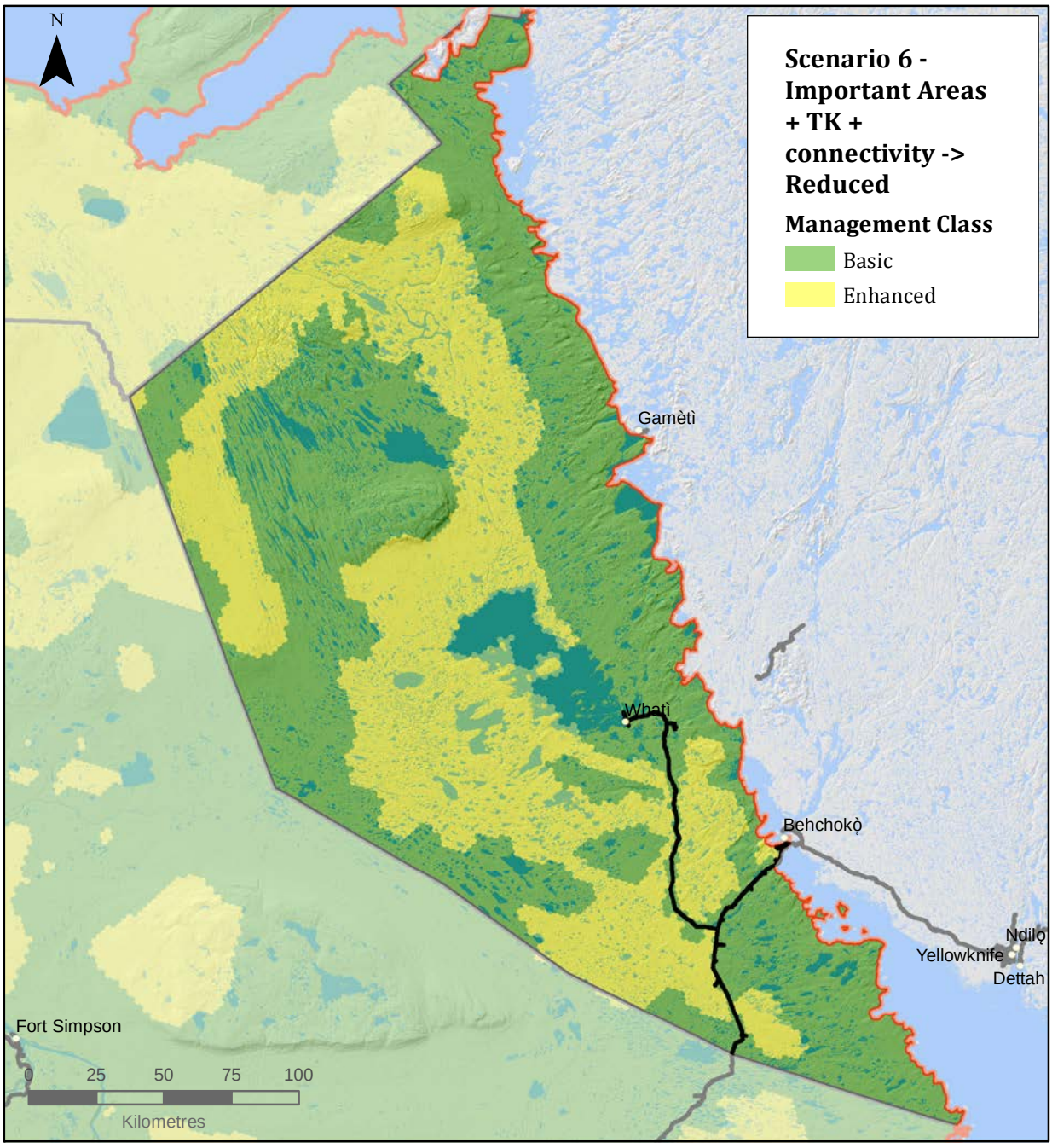

Figure E-14. Scenario 6, which is a scaled back ("reduced") version of Scenario 5 based on manual edits to bring the proportion of the region in Enhanced management areas closer to Scenario 1.

Comparing Scenarios 1-6

The four scenarios (Scenarios 1-4) based on Marxan analyses, plus the two additional scenarios (5-6) based on manual edits to Scenario 1 to incorporate TK and connectivity between Enhanced management areas, were compared based on a series of indicators for caribou habitat suitability and development potential:

Caribou indicators

- Percentage of the region in Enhanced management class areas (*as outlined in the Framework the minimum target for a region in Tier 1 for human disturbance is at least 1/3 of the region in Enhanced areas, more area in Enhanced would be better for caribou habitat protection*)
- Average seasonal RSF value of planning units in Enhanced vs. Basic management class areas (*higher average seasonal RSF value within Enhanced areas indicates that better quality habitat would be prioritized for caribou)*
- Percentage of undisturbed terrestrial habitat captured in Enhanced vs. Basic management class areas (*higher percentage of available undisturbed habitat within Enhanced areas could help to meet regional undisturbed habitat targets)*
  Spatial distribution of Enhanced management class areas and incorporation of TK and connectivity (*e.g., are Enhanced areas spread throughout the region, or concentrated in only one part of the region?*)

Development potential indicators

- Percentage of the region in Enhanced management class areas (*less area in Enhanced management is better for development potential*)
- Percentage of cumulative regional Total Cost captured in Enhanced vs. Basic management class areas (*more of the Total Cost captured in Basic management areas is better for development potential*)
- Percentage of cumulative regional Mineral Development Potential captured in Enhanced vs. Basic management class areas (*more of the Mineral Cost captured in Basic management areas is better for mineral development potential)*
- Percentage of cumulative regional Forestry Development Potential captured in Enhanced vs. Basic management class areas (*more of the Timber Cost captured in Basic management areas is better for forestry development potential)*

Comparison of Scenarios

Caribou Indicators:

Scenario 5 (Caribou Centric Important Areas + TK polygons + Connectivity) had the largest proportion of the region in Enhanced management areas (51.8%), while Scenario 2 (Important Areas with Protected Areas locked in) had the lowest area in Enhanced management (36.8%; Figure E-15). Manual edits to Scenario 5 brought the amount of area in Enhanced management in Scenario 6 down to 41.5%. In terms of the average seasonal habitat suitability of planning units captured in Enhanced management areas, Scenarios 1 (Caribou Centric Important Areas) and 3 (Important Areas with Economic Cost) consistently had planning units with the highest average RSF values across all seasons, followed closely by Scenarios 5 and 6 (Figure E-16). Locking protected areas and certain land use plan zones into the Marxan solutions (Scenarios 2 and 4) consistently resulted in lower habitat suitability within Enhanced areas, mainly because much of the existing land protection in Wek'èezhìı is focused around water bodies, and water is ranked as a

low suitability land cover type in the RSF models. Scenarios 1, 3, 5 and 6 captured a larger proportion of the undisturbed terrestrial habitat available within the Wek'èezhìı region within Enhanced management areas, whereas Scenarios 2 and 4, which locked in protected areas and considered cost, had a larger proportion of the undisturbed habitat within Basic management areas (Figure E-17). Although Scenario 3, which considered Economic Cost, maintained similar average habitat suitability for caribou within Enhanced management areas as Scenario 1 (Caribou Centric), Scenario 3 concentrated most of the planning units selected for Enhanced management within the northern half of the Wek'èezhìı region (see Figure E-12), which could have implications for range recession if habitat disturbance then became concentrated in the southern half of the region. Scenario 4 also tended to concentrate more of the Enhanced management areas in the northern half of the region. Scenarios 5 and 6 included areas deemed essential and important for boreal caribou based on TK, as well as connectivity corridors between areas of concentrated habitat use by boreal caribou, within Enhanced management areas (Figures E-13 and E-14). By making manual reductions to the amount of planning units in Enhanced management in Scenario 5, Scenario 6 still maintained average seasonal RSF values within remaining Enhanced management planning units similar to Scenario 5 (Figure E-16).

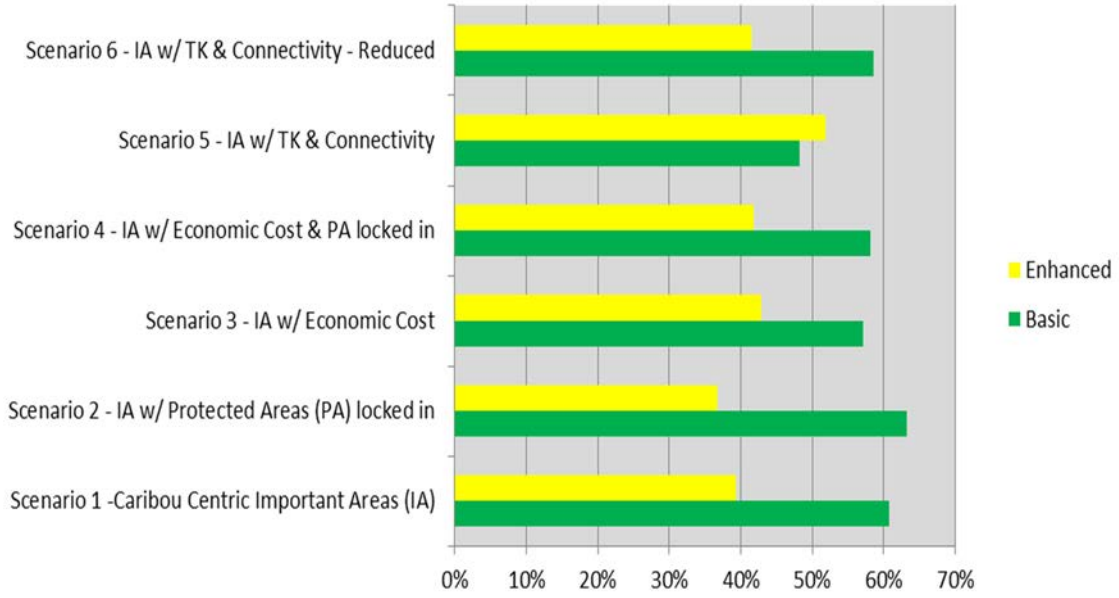

Figure E-15. Percentage of the Wek'èezhìı range planning region in Enhanced and Basic management areas in each scenario.

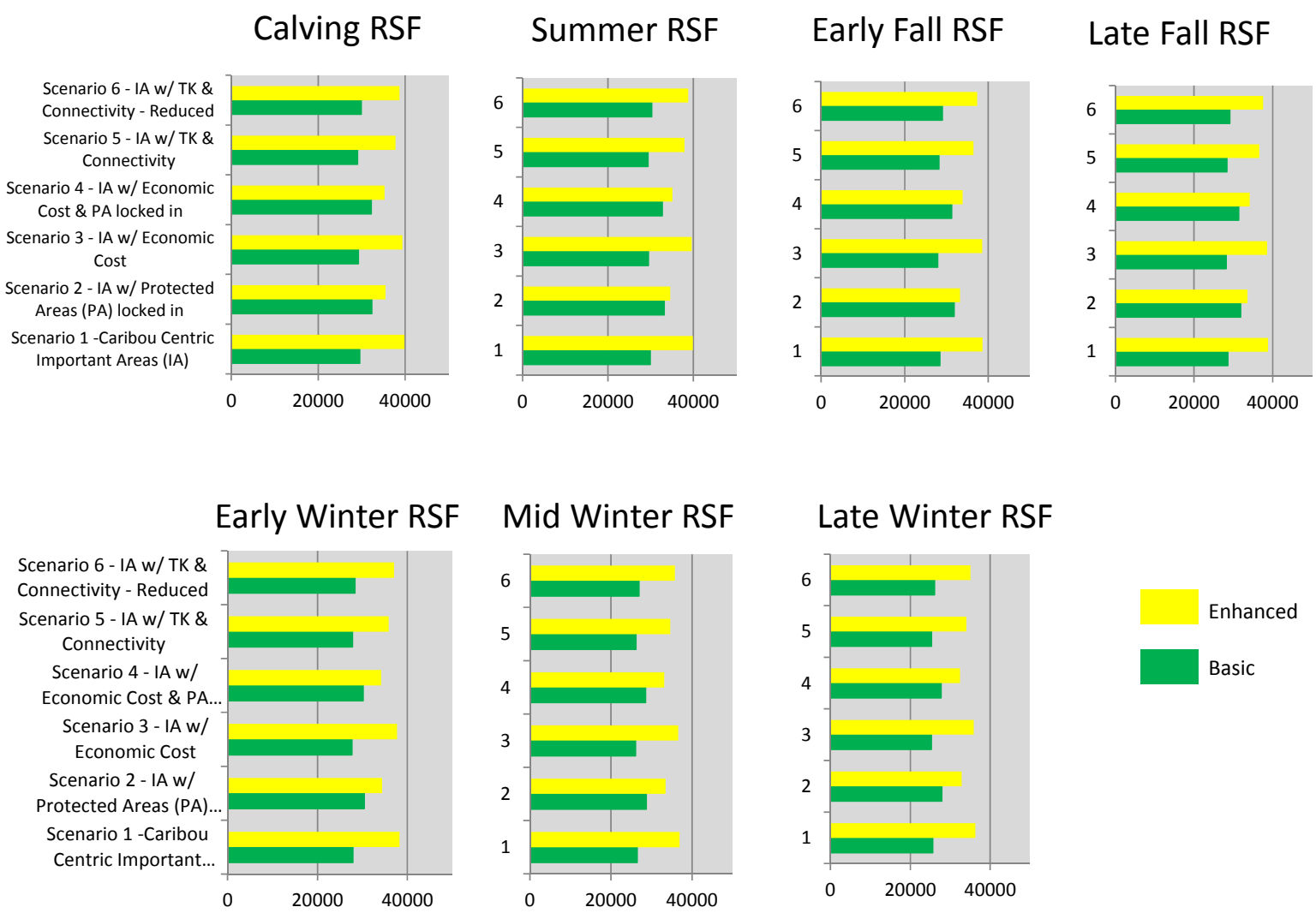

Figure E-16. Comparison of Scenarios 1-6 in terms of average cumulative seasonal Resource Selection Function (RSF) value within 5 km^2 planning units. Scenarios with higher average cumulative RSF values within Enhanced management planning units are indicative of scenarios that capture higher value habitat (based on RSF) within Enhanced areas.

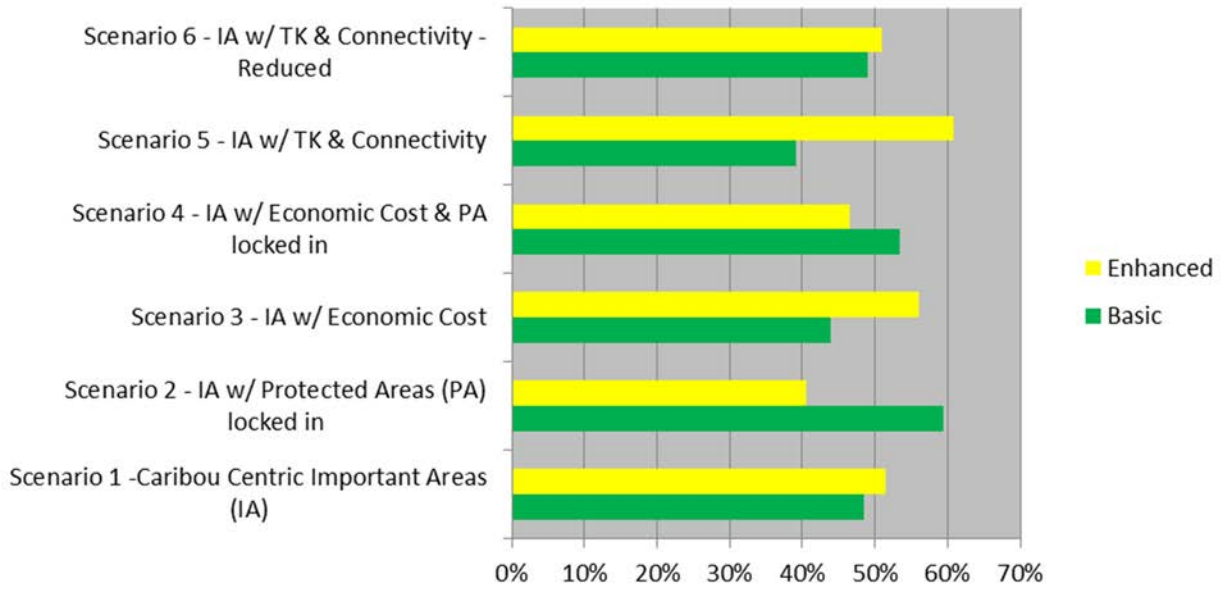

Figure E-17. Percentage of available undisturbed terrestrial habitat within the Wek'èezhìı range planning region captured within Enhanced and Basic management areas.

Development Indicators:

The impact of each scenario on resource development potential was assessed in terms of the percentage of the region captured in Enhanced management areas, and the percentage of the cumulative regional sum of Total Cost value in each planning unit captured within Basic management areas. Having more of the Cost value captured in Basic management areas indicates that more of the areas with higher resource development would be subject to less strict management requirements for boreal caribou, which is better for regional resource development potential. The mineral and forestry sectors were also considered separately to look at the impact of each scenario on these two sectors. This was done by looking at the percentage of the cumulative regional scores for Mineral development potential and Forestry potential (not including consideration of proximity to roads) captured in Basic management areas. Higher percentages in Basic management areas indicate that a greater amount of the mineral and forestry resource potential would be left in areas subject to less strict management requirements for boreal caribou.

Scenario 5 would be most limiting for resource development overall due to it having the highest percentage of the region within Enhanced management areas (Figure E-18), while Scenario 2 (Important Areas with Protected Areas locked in) would have the smallest impact on resource development potential because most of the Enhanced management areas would be concentrated within areas with existing land protections that already preclude most types of development (see Figures E-3, E-12 and E-15). Scenario 3 maintained the highest amount of forestry development potential within Basic management areas (Figure E-20), whereas Scenarios 1-4 all performed similarly in terms of maintaining mineral development potential within Basic management areas (Figure E-19). Scaling back Scenario 5 to Scenario 6 resulted in increasing levels of mineral

development potential within Basic management areas, similar to Scenario 1 (Figure E-19). Scenario 6 also increased the proportion of forestry development potential within Basic management areas relative to Scenario 5, but would still be more limiting for forestry development than Scenario 1 (Figure E-20). This is due to the movement corridors that were added to Scenarios 5 and 6 as Enhanced management areas which are concentrated along the TASR corridor and overlap with much of the area where the FVI exists.

Table E-2 provides a summary of the scenario comparisons based on the Caribou and Development indicators, and ranks each scenario from 1 (low) to 6 (high) based on the scenario's performance relative to each indicator. A scenario ranked 6 for a caribou indicator would be best for caribou, and a scenario ranked 6 on a development indicator would be best for development. It is important to note that some scenarios performed very similarly on some indicators, which is not reflected in the 1 to 6 ranking scale.

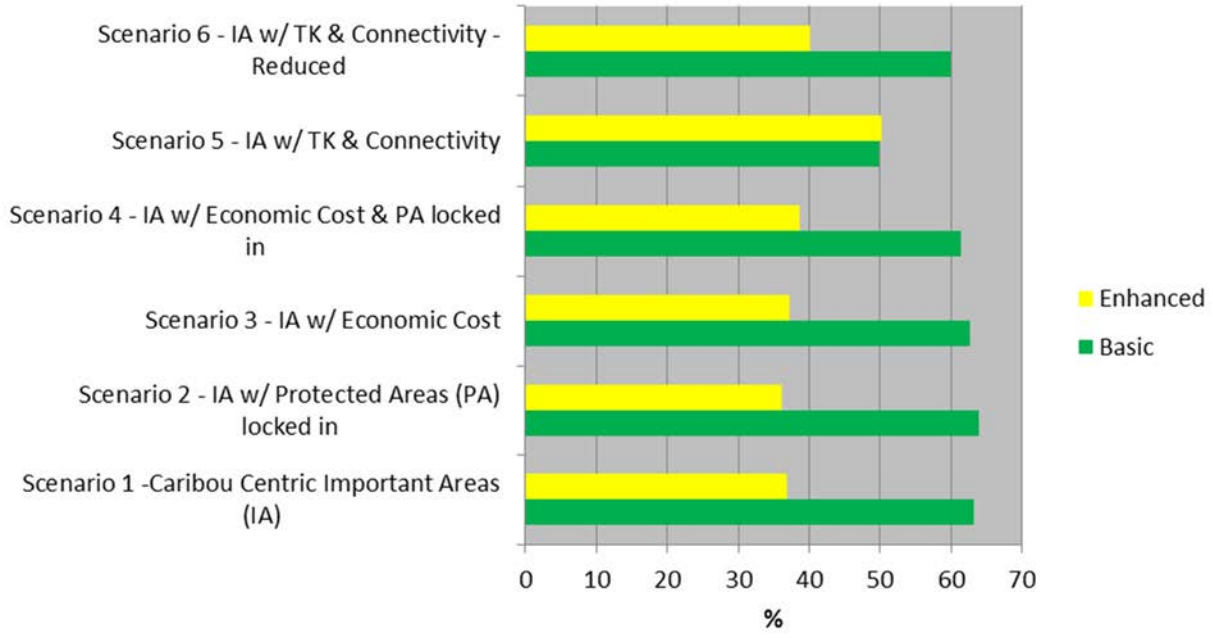

Figure E-18. Percentage of cumulative regional Total Cost captured within Enhanced and Basic management areas. Scenarios with a higher percentage of the Total Cost within Basic management areas are considered better for development potential.

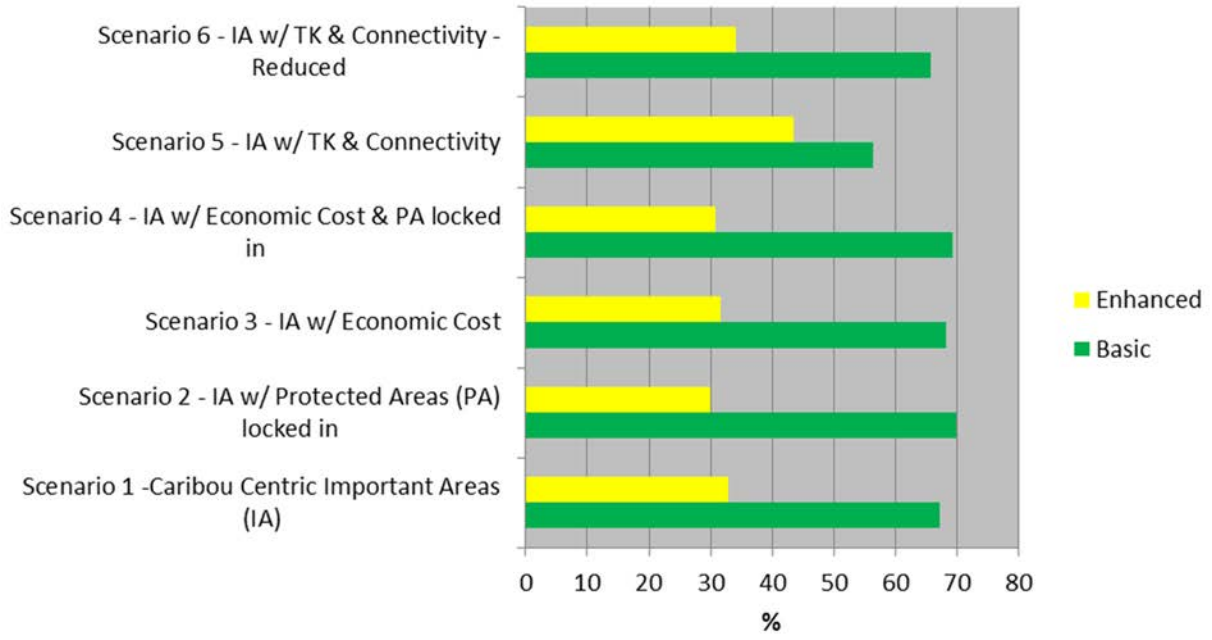

Figure E-19. Percentage of cumulative regional Mineral Development Potential within Enhanced and Basic management areas.

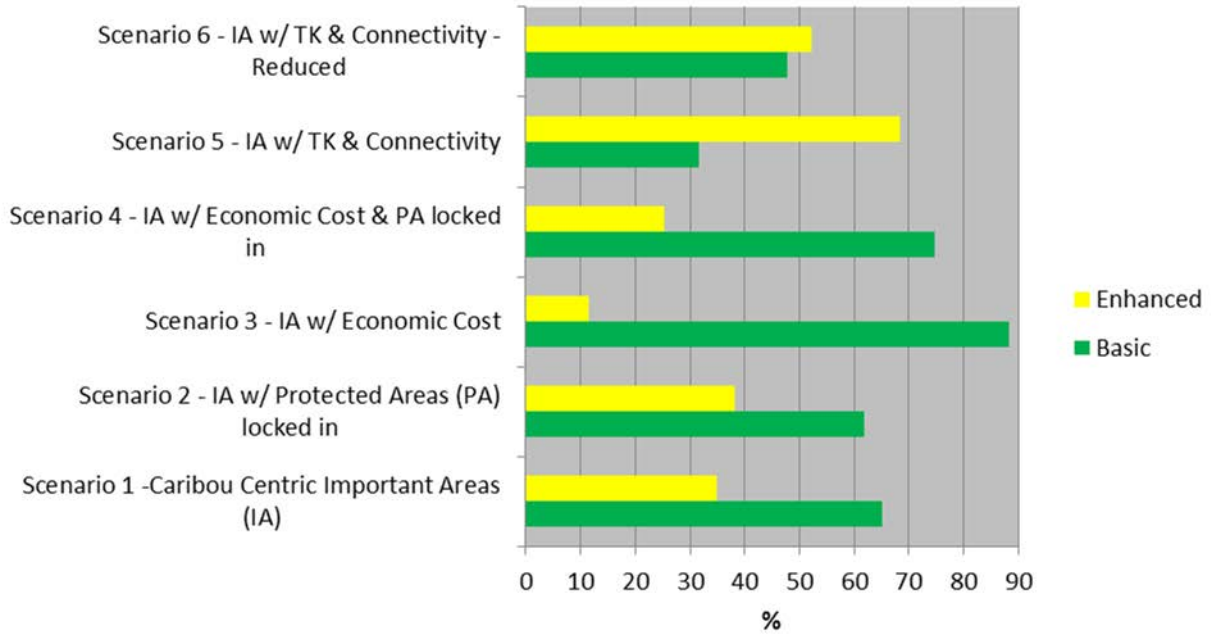

Figure E-20. Percentage of cumulative regional Forestry Development Potential within Enhanced and Basic management areas.

Table E-2. Summary of performance of different range plan management class map scenarios based on caribou and development indicators. In each row, scenarios are ranked from low (1) to high (6) in terms of their performance for each indicator.

Indicators		Scenario 1 Caribou Centric Important Areas (IA)	Scenario 2 IA w/ Protected Areas (PA) locked in	Scenario 3 IA w/ Economic Cost	Scenario 4 IA w/ Economic Cost & PA locked in	Scenario 5 IA w/ TK & Connectivity	Scenario 6 IA w/ TK & Connectivity - Reduced	Notes
Caribou Indicators	% Region in Enhanced Mgmt. Class	2	1	5	4	6	4	Scenario with higher % in Enhanced ranks higher from a caribou perspective
	Average seasonal RSF value	6	2	5	1	3	4	
	Proportion of terrestrial undisturbed habitat in Enhanced	4	1	5	2	6	3	
	Spatial considerations	No connectivity between patches	Selects fewer areas with known caribou presence	Concentrates Enhanced area in northern part of the region	Concentrates Enhanced area in northern part of the region	Incorporates TK polygons and Connectivity, still low representation east of HWY3	Incorporates most of TK polygons and most of Connectivity, still low representation east of HWY3	

Indicators		Scenario 1 Caribou Centric Important Areas (IA)	Scenario 2 IA w/ Protected Areas (PA) locked in	Scenario 3 IA w/ Economic Cost	Scenario 4 IA w/ Economic Cost & PA locked in	Scenario 5 IA w/ TK & Connectivity	Scenario 6 IA w/ TK & Connectivity - Reduced	Notes
Development Indicators	% Region in Enhanced Mgmt. Class	5	6	2	3	1	4	Scenario with higher % in Enhanced ranks lower from development perspective
	Total Cost Layer (including distance to roads)	4	3	6	5	1	2	Higher ranked scenarios leave more areas of higher development potential (high cost) captured in Basic mgmt. areas
	Mineral Development Potential	2	4	5	6	1	3	
	Forestry Development Potential	4	3	6	5	1	2	

Scenarios 7 & 8 – Addition of Intensive Management Areas

Scenarios 1 to 6 were presented to the Wek'èezhìı boreal caribou working group at a meeting on May 19-20, 2021. The working group discussed the pros and cons of each scenario and tried to come to consensus on a preferred scenario to use to make further manual adjustments. The majority of the working group preferred Scenario 5, because it included TK and connectivity among important areas for caribou, and was the most conservative and protective for boreal caribou overall. At a previous meeting of the working group (April 21-22, 2021), it was agreed that areas repeatedly used by boreal caribou for calving (e.g., islands and peninsulas in Lac La Martre and along the shoreline of Great Slave Lake) should be classified as Intensive management areas. The Tłı̨chǫ Government also requested that the entire area that was classified as Essential Habitat based on their TK should be classified as an Intensive management area. Most of the polygons within this Essential Habitat area identified by the Tłı̨chǫ Government include calving areas as an important feature. There was also much discussion about the importance of the shoreline and islands along the North Arm of Great Slave Lake and Whitebeach Point area due to their use by boreal caribou for calving sites and for relief from insects during the summer season. The working group agreed that planning units along the shoreline of the North Arm and overlapping with the candidate Dınàgà Wek'èhodì, as well as Whitebeach Point and areas just to the south, should be classified as Intensive management areas (including offshore islands in these areas). Using Scenario 5 as a starting point, adjustments were made to add these Intensive management areas to come up with Scenario 7 (Figure E-21). These adjustments resulted in Scenario 7 having 52.8% of the region in Enhanced/Intensive management areas. The working group then discussed ways to scale back Scenario 7 to bring the amount of area in Enhanced/Intensive management back down again, such as by converting Enhanced areas in the northern part of the region that overlapped recent fires back to Basic management. This was essentially the same type of adjustment that was made to come up with Scenario 6, so it was decided to take Scenario 6 and incorporate the same Intensive management areas from Scenario 7. This resulted in Scenario 8 (Figure E-22) which is the final map of management class areas that the working group came to consensus to put forward in the final draft of the interim Wek'èezhìı range plan. Scenario 8 has a total of 44.8% of the region in Enhanced (30.0%) and Intensive (14.8%) management areas. The polygons of management class areas from Scenario 8 based on the 5 km^2 hexagonal planning units were then adjusted in ArcGIS to smooth the edges of the polygons, and the final result is shown in Section 7.2 of the range plan (Figure 37).

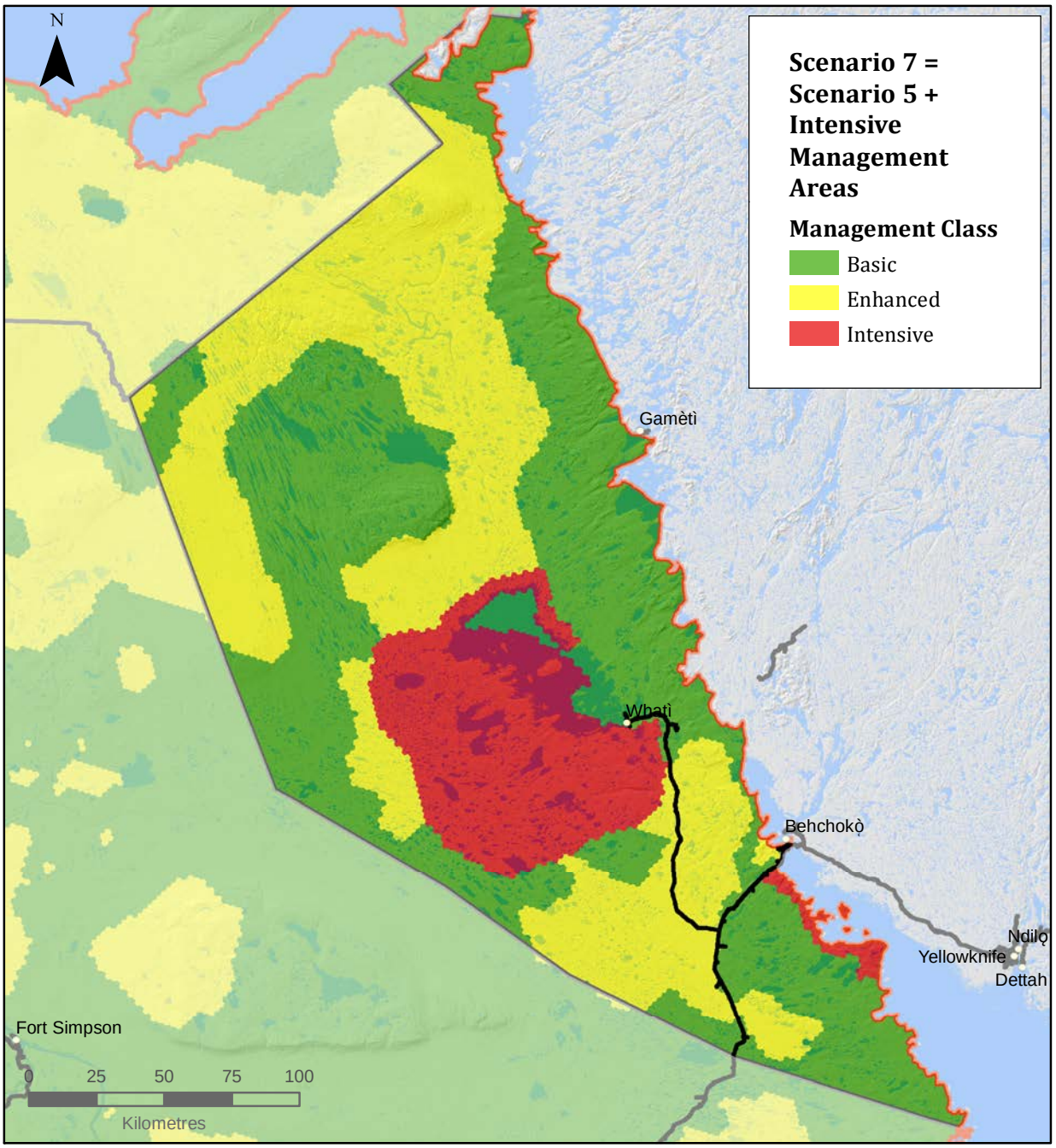

Figure E-21. Scenario 7 management class map which was produced by taking Scenario 5 and converting the Essential Habitat area identified by the Tłı̨chǫ Government to an Intensive management area, and adding Intensive management areas along the shoreline and island of the North Arm of Great Slave Lake and Whitebeach Point area.

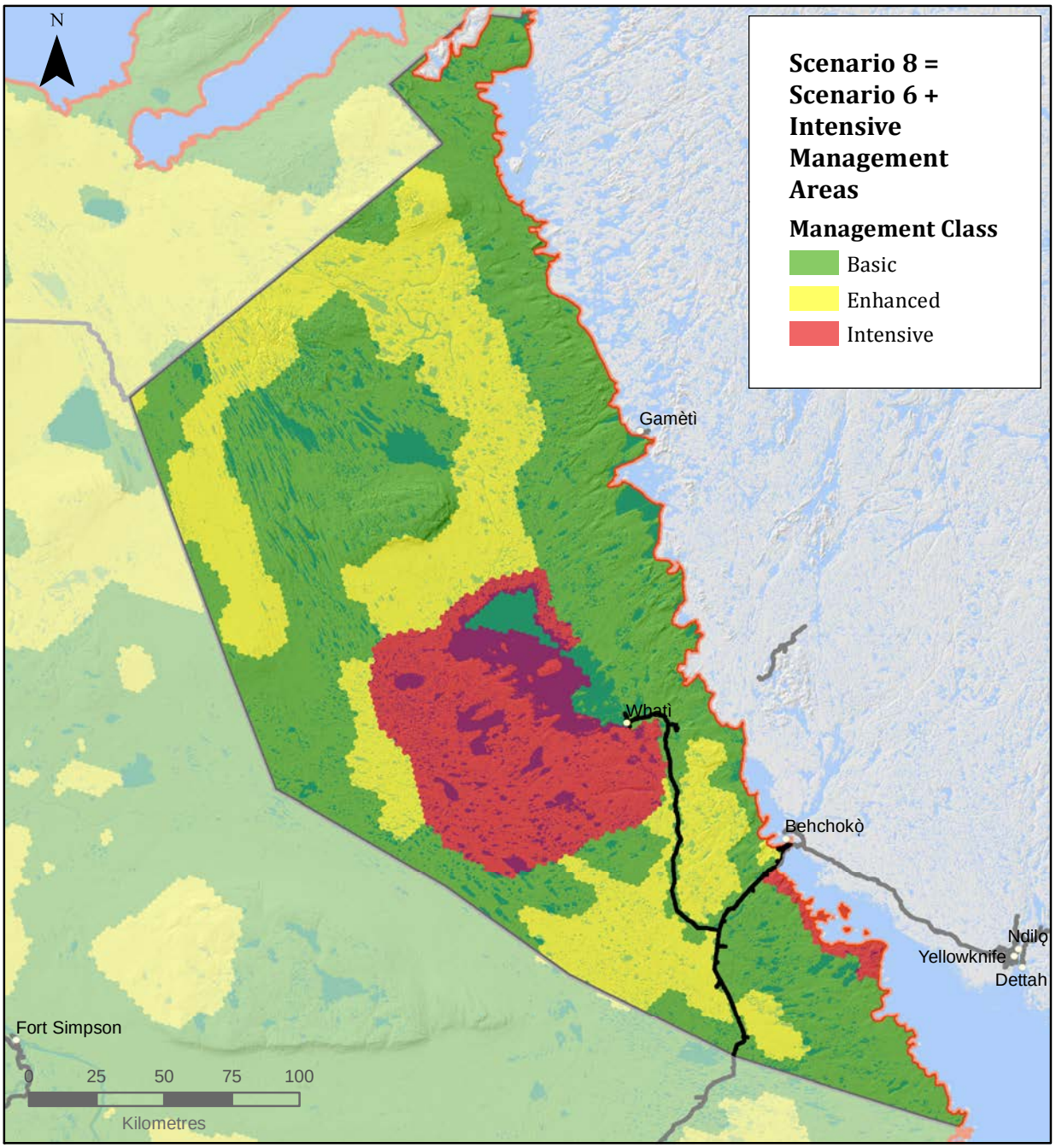

Figure E-22. Scenario 8 management class map which was produced by taking Scenario 6 and converting the Essential Habitat area identified by the Tłı̨chǫ Government to an Intensive management area, and adding Intensive management areas along the shoreline and island of the North Arm of Great Slave Lake and Whitebeach Point area.

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