

**A Range Assessment for the Clear Creek
Caribou Herd in Central Yukon**

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A Range Assessment for the Clear Creek Caribou Herd in Central Yukon

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March 2024 (Revised)

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Preface

This Range Assessment for the Clear Creek Caribou Herd in Central Yukon includes a summary of currently available technical information. It does not attempt to summarize traditional and local knowledge about the herd. Traditional and local knowledge can represent longer time frames than is represented in the available empirical datasets, provide information on animals that are not well represented in the empirical datasets (e.g., male caribou), and improve characterization of portions of a herd's range that are used sparsely or intermittently. A wealth of information exists in the form of traditional and local knowledge; however, this assessment focuses solely on empirical datasets.

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Cover photos provided by Fish and Wildlife Branch, Environment Yukon:

- Top left: Undisturbed low elevation caribou winter range, August 2022 – Hobo Creek (Photo: Government of Yukon/ M. Hornseth)
- Top right: Clear Creek Caribou, September 2019 rut survey (Photo: Government of Yukon/ M. O'Donoghue)
- Bottom left: Placer mining, August 2022 – Josephine Creek (Photo: Government of Yukon/ M. Hornseth)
- Bottom right: Resource road in alpine habitat, June 2022 – East Ridge (Photo: Government of Yukon/ M. Hornseth)

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Executive Summary

The purpose of the range assessment for the Clear Creek Caribou Herd in central Yukon is to summarize the current habitat and population status of the Clear Creek Caribou Herd, identify key risk factors, assess potential future impacts, and provide management objectives, recommendations and strategies for maintaining the integrity of seasonal habitats and reducing population-level impacts.

The Clear Creek Caribou Herd in central Yukon is currently estimated to consist of about 800 caribou and recent calf recruitment information suggests that the population is declining, although population limiting factors for the herd have not yet been identified. Clear Creek Caribou generally use low elevation forested areas during winter and higher elevations during calving, summer and fall rut and can migrate long distances between summer and winter ranges. Information based on radio-collared caribou in the late 1990s/early 2000s and on satellite-collared caribou in the late 2010s indicates that caribou have shifted their range use away from the southernmost portion of their range where placer mining and quartz mineral exploration activities have increased, especially during the snow-free seasons and especially since 2010. The most significant threat/management concern for the Clear Creek Caribou Herd is the high level of placer mining and quartz mineral exploration activity in the southern portion of the range and associated road access.

Two Caribou Assessment Areas (CAAs) were delineated in the total annual range by Yukon Fish and Wildlife Branch based on level of human activities. CAA1 (South) in the southern portion of the range includes most of the human-caused disturbances in the range and is separated from CAA2 (North) by the Klondike River and a tributary of the North McQuesten River. Fire disturbance is also more prominent in CAA1 (South) than in CAA2 (North). Although CAA2 (North) is larger than CAA1 (South), CAA1 (South) contains the majority of the known winter range and larger portions of known calving, summer and rut ranges than CAA2 (North).

Human-caused habitat disturbance can affect caribou habitat directly through physical disturbance to habitat or indirectly through sensory disturbance while human activities are being conducted. Indirect disturbance, using seasonal Zones of Influence (ZOIs), addresses caribou avoidance or decreased use of areas close to human development and activities, or increased risk of mortality associated with features within the development footprint. Placer mining and quartz mineral exploration activities are primarily conducted during the snow-free season and therefore ZOIs are applied to those activities only during the snow-free season and not during the winter season even though placer mining activities can begin as early as late winter. ZOIs do not address sensory disturbance from air-based activities such as repeated helicopter traffic at or around active quartz exploration programs, or from use of off-road vehicles beyond roads and trails since those activities are not associated with physical disturbance to the land.

Currently, the greatest total disturbance (fire + indirect impacts of human-caused disturbances) on the Clear Creek Caribou Range is during the snow-free season when most human activity occurs, with total disturbance of up to 67% of the Known Snow-free Range in CAA1 (South) and up to 76% of the Snow-free Recent Concentrated Use Area in CAA1 (South). Current total disturbance in the Known Winter Range and Winter Recent Concentrated Use Area in CAA1 (South) is much lower (27% and 6% respectively) and consists entirely of fire disturbance because human activities are not conducted during the winter season and therefore indirect impacts are not occurring.

In the future, fire and human-caused habitat disturbance is expected to increase. Two potential future scenarios (in 25 years) were assessed. For the Moderate scenario, placer mining was assumed to increase at the current average annual rate of increase (from 2010 to 2022), and a new quartz mine was assumed to be operating at the Red Mountain claim area, which included upgrading of existing access roads to an all-season road. For the High scenario, placer mining was assumed to increase at twice the current rate and new quartz mines were assumed to be operating at the Red Mountain and West Ridge claims, including upgrading of access roads to all-season roads.

The **greatest total area** of predicted future total disturbance (fire + indirect impacts of human-caused disturbances) is on the snow-free/summer ranges/habitats in CAA1 (South), with potential future mine development and placer mining adding onto already currently high levels of human-caused habitat disturbance. The **greatest increase** of predicted future total disturbance (fire + indirect impacts of human-caused disturbances) is on winter season ranges/habitats in CAA1 (South) with potential future mine development resulting in new indirect impacts from human-caused disturbances, when currently there are none.

Key risk factors for the Clear Creek Caribou Range include: currently high levels of placer mining and quartz mineral exploration activities and associated road access, primarily in CAA1 (South); potential for increased levels of industrial activity, including year-round operating mines; current and potential future levels of total habitat disturbance due to fires and indirect impacts from human activities; uncertainty regarding land use priorities in the portion of the range most heavily used by the Clear Creek Caribou Herd; uncertainty regarding how land use planning in the three planning regions overlapping the Clear Creek Caribou Range can be coordinated to address cumulative effects of habitat disturbance across the whole Clear Creek Caribou Range; lack of land protections for important seasonal ranges/habitats; and lack of information on population limiting factors contributing to persistently low calf recruitment, which indicates a declining population.

The recommended goal for population management is to maintain the Clear Creek Caribou Herd at or above the recent estimated population size of about 800 caribou, and at a stable or increasing population trend. Corresponding recommended objectives and strategies focus on: determining current population size, trend and primarily limiting factors; maintaining a harvest rate consistent with caribou populations with declining or unknown trends until a stable or increasing population trend is confirmed; and, preventing fatal and contagious diseases and parasites from spreading into the Clear Creek Caribou Range.

The recommended goal for range/habitat management is to maintain the Clear Creek Caribou Range in a condition that will support a minimum of about 800 caribou and that will allow caribou to continue to use historical ranges. Corresponding recommended objectives and strategies focus on: addressing cumulative effects of habitat disturbance across the whole Clear Creek Caribou Range; maintaining large, intact portions of the Clear Creek Caribou Range in a condition relatively undisturbed by human development and activities, and specifically in the area around the Known Fall Rut Range in CAA2 (North); maintaining high value intact winter range in a condition relatively undisturbed by human development and activities, and fire, especially in the Winter Recent Concentrated Use Area; assessing the impacts of habitat disturbance and human activities on Clear Creek Caribou using caribou recently collared in 2023/2024; and, implementing interim measures to contain access within the existing road and trail network until land use planning is completed for the whole range.

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1 Introduction

The Clear Creek Caribou (*Rangifer tarandus caribou*) Herd was only recently identified following a study of radio-collared caribou from 1997 to 2001 to investigate whether caribou living year round in the Clear Creek area were part of the Hart River Herd (O'Donoghue et al. 2001, O'Donoghue 2002). Although there is some exchange between the two herds, winter ranges are mostly distinct with the Clear Creek Caribou Herd occupying wintering areas located primarily south of the Klondike River (O'Donoghue et al. 2001, O'Donoghue 2002).

Clear Creek Caribou are part of the Committee on the Status of Endangered Wildlife in Canada's (COSEWIC's) Northern Mountain Caribou Designatable Unit, which includes herds from northern British Columbia, southern and central Yukon and southwestern Northwest Territories (COSEWIC 2014). These caribou typically live in areas with relatively shallow snow where they winter in low elevation forested areas or on windswept alpine slopes, and calve and summer at high elevations. Although predation is the main direct cause of caribou population declines in Canada, habitat disturbance from industrial activities and fire leading to changes in predator/prey relationships is the ultimate cause (Festa-Bianchet et al. 2011).

Northern Mountain Caribou in the Northern Mountain National Ecological Area, which includes all Northern Mountain Caribou in Yukon, are currently listed as Special Concern in Schedule 1 of the federal *Species at Risk Act*, indicating that these caribou "may become a threatened or an endangered species because of a combination of biological characteristics and identified threats". In Yukon, Northern Mountain Caribou are considered Vulnerable (Yukon Conservation Data Centre 2019), indicating that they are "at moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors" (NatureServe 2023).

In 2013, an approach was developed for conducting range assessments for Northern Mountain Caribou in Yukon to facilitate improved cumulative effects assessment and cumulative effects management (Francis et al. 2013). Two range assessments were subsequently conducted as pilot projects on the Carcross and Klaza caribou herds (Francis and Nishi 2015, 2016). In 2016, the Yukon Fish and Wildlife Team determined that the Clear Creek Caribou Herd had the highest level of conservation concern of all Northern Mountain Caribou herds in Yukon due to extensive industrial development throughout its range, which also provided high levels of access for hunters (Russell et al. 2023). Consequently, a range assessment for the Clear Creek Caribou Range was determined to be a high priority.

1.1 Purpose

The purpose of the range assessment for the Clear Creek Caribou Herd in central Yukon is to summarize the current habitat and population status of the Clear Creek Caribou Herd, identify key risk factors, assess potential future impacts, and provide management objectives, recommendations and strategies for maintaining the integrity of seasonal habitats and reducing population-level impacts.

1.2 Clear Creek Caribou - Overview

1.2.1 Annual Range

The annual range of the Clear Creek Caribou Herd lies in the central portion of Yukon, approximately 30 km northwest of Mayo and overlaps three other caribou ranges including the Hart River Caribou Range and Porcupine Caribou Range in the north, and the Fortymile Caribou Range in the southwest (Figure 1).

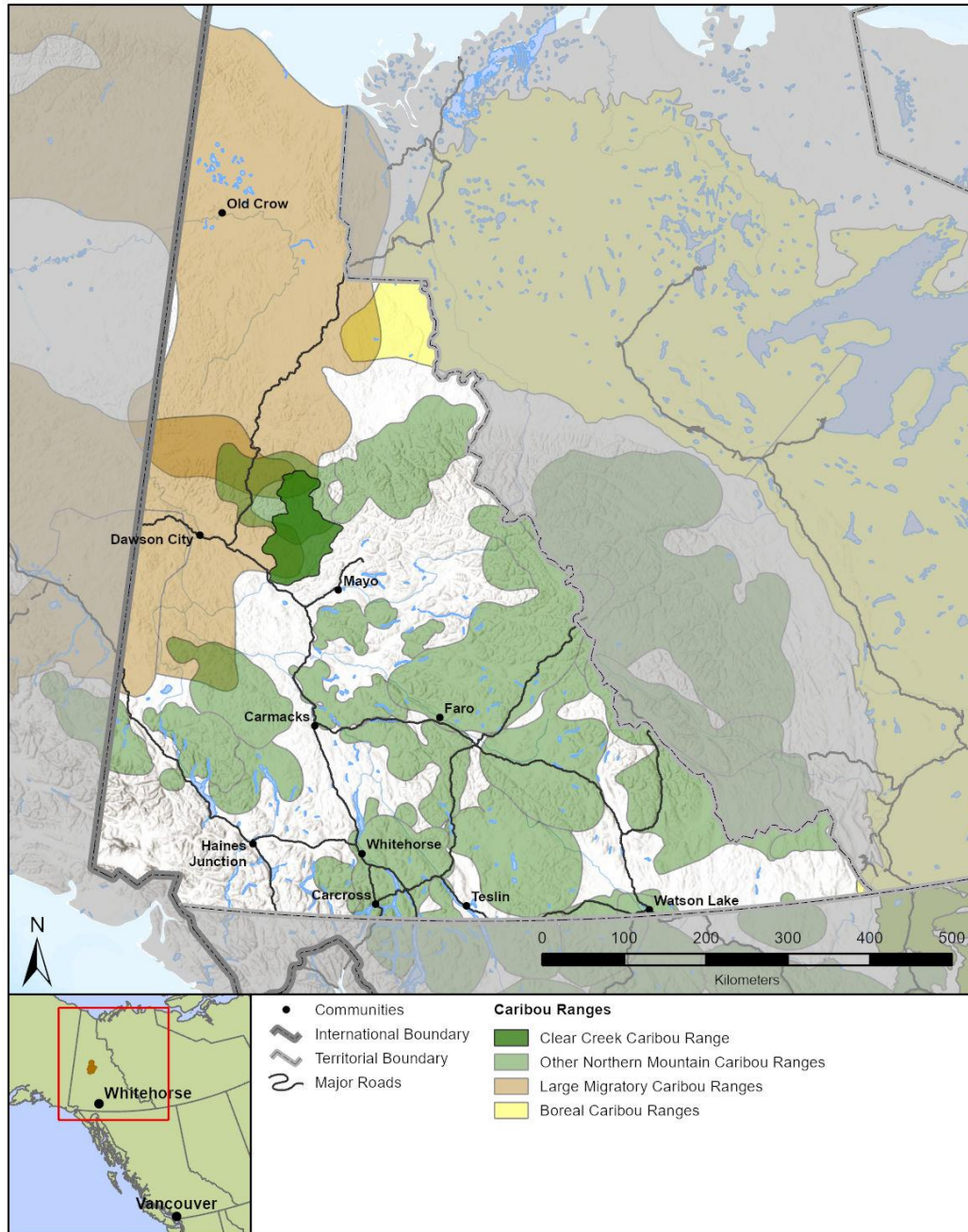


Figure 1. Location of Clear Creek Caribou Range in Yukon.

The Clear Creek Caribou Range extends from the McQuesten River in the south, to the West Hart and Hart rivers in the north (Figure 2). Industrial activities and associated roads are concentrated in the southern portion of the range, south of the Klondike River. Mineral exploration in the southern portion of the range expanded rapidly after 2010 (Potié 2022).

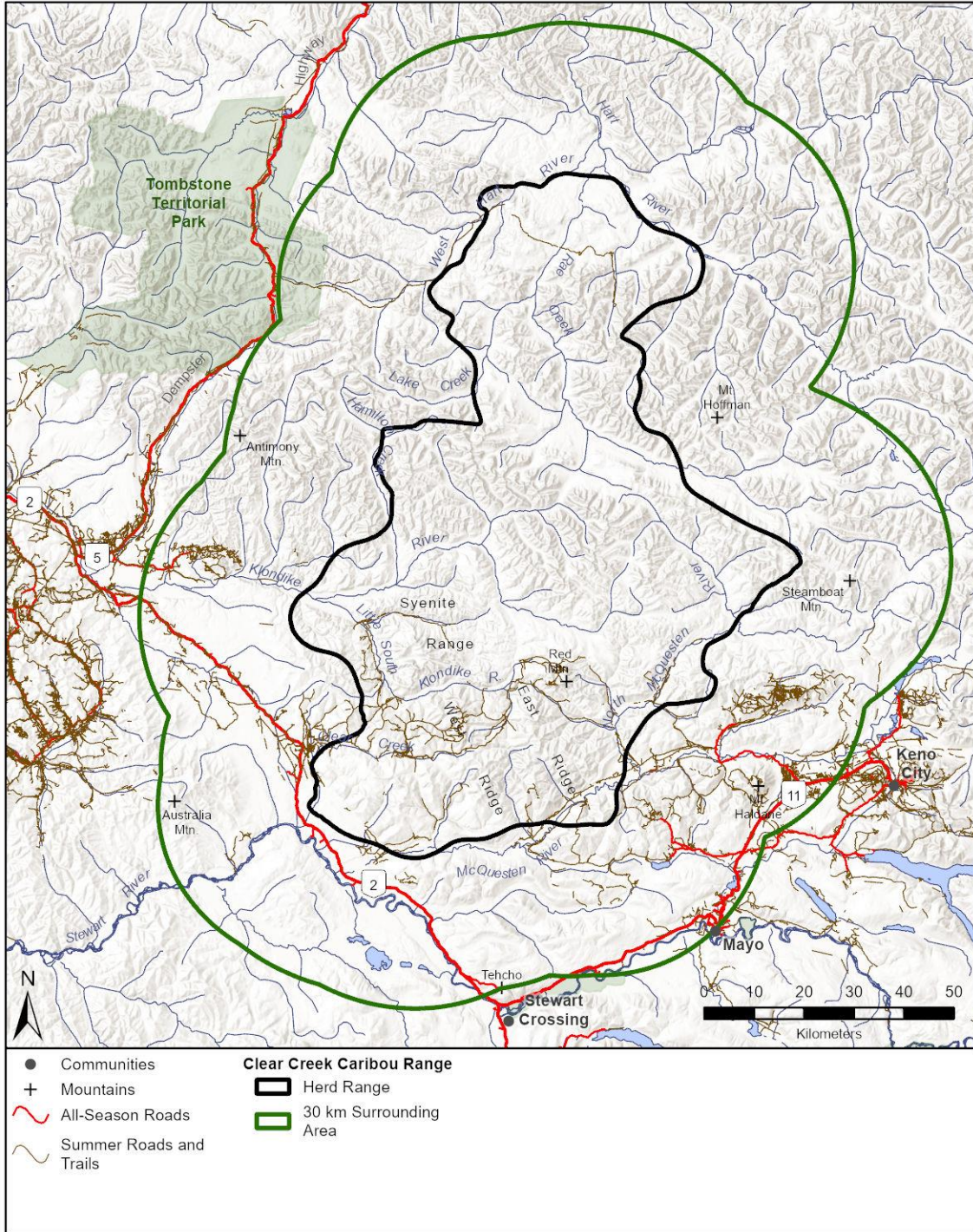


Figure 2. Clear Creek Caribou Range in Yukon.

The predator/prey system in the range includes moose (*Alces alces*), wolves (*Canis lupus*), grizzly bears (*Ursus arctos*), black bears (*Ursus americanus*), and to a lesser extent Dall sheep (*Ovis dalli dalli*). The 30-km Surrounding Area approximates the area adjacent to the range where predator/prey dynamics could influence predator-prey dynamics within the range. Because predator territories and home ranges are large, and predators using areas within the Clear Creek Caribou Range are also likely using areas outside of Clear Creek Caribou Range, habitat conditions affecting predator/prey dynamics in the area surrounding the range will also affect caribou within the range.

1.2.2 Ecology

Clear Creek Caribou seasonal movements and habitat use are typical of Northern Mountain Caribou, with caribou using primarily high elevations during the snow-free season, and lower elevations during winter (O'Donoghue et al. 2001, O'Donoghue 2002, Potié 2022).

In spring, adult female caribou mostly use low elevation areas as they travel en route to calving sites in higher elevation habitats (Potié 2022, Appendix 1). During calving, adult female caribou are highly dispersed throughout the annual range (O'Donoghue 2002, Potié 2022). Dispersed calving at high elevations is an anti-predator strategy where caribou forgo high quality forage at low elevations to distance themselves away from other prey (such as moose) and predators that use lower elevations at that time of year, and away from other caribou that are calving at high elevations (Bergerud et al. 1984). Calving success of caribou that calve at high elevations is higher than for caribou that calve at low elevations (Seip and Cichowski 1996). Following calving, adult females and their calves may group up into post-calving aggregations, spending most of their time at high elevations (O'Donoghue 2002, Potié 2022). During the fall rut in September and early October, caribou aggregate on traditionally used alpine plateaus (O'Donoghue 2002, Potié 2022). Fall migration is more diffuse than spring migration, as caribou move from high elevations to winter ranges at lower elevations (see Appendix 1). During winter, Clear Creek caribou primarily use mature spruce forests at low elevations, although some are found on windswept alpine slopes (O'Donoghue et al. 2001, O'Donoghue 2002, Potié 2022).

Known seasonal ranges for calving, summer and fall rut, based on satellite-collared caribou and aerial survey information, are located in the southern two-thirds of the range, while the known winter range also includes areas in the northern portion of the range (Figure 3). In the late 1990s and early 2000s, caribou concentrated in the East Ridge and West Ridge area in the southern part of the range during calving, summer and fall rut, but since then use has shifted northward (Potié 2022, see Section 3.8.2.1).

During winter, caribou predominantly forage on ground lichens (Farnell and McDonald 1990, Farnell et al. 1991, Gullickson and Manseau 2000, COSEWIC 2014). Lichens are poor competitors against other types of vegetation (they do poorly where other vegetation grows well), they grow very slowly and are highly susceptible to physical disturbance and can take decades to recover to pre-disturbance levels (Ahti 1977, Helle et al. 1983, Rowe 1984, Russell and Johnson 2019). Snow conditions (e.g. snow depth, hardness, ice layers) can affect how well caribou can access ground lichens, although they can forage in over one meter of snow (Brown et al. 1990, Johnson et al. 2000). During summer, caribou increase their use of vascular and other plants, but also continue foraging on lichens (COSEWIC 2014).

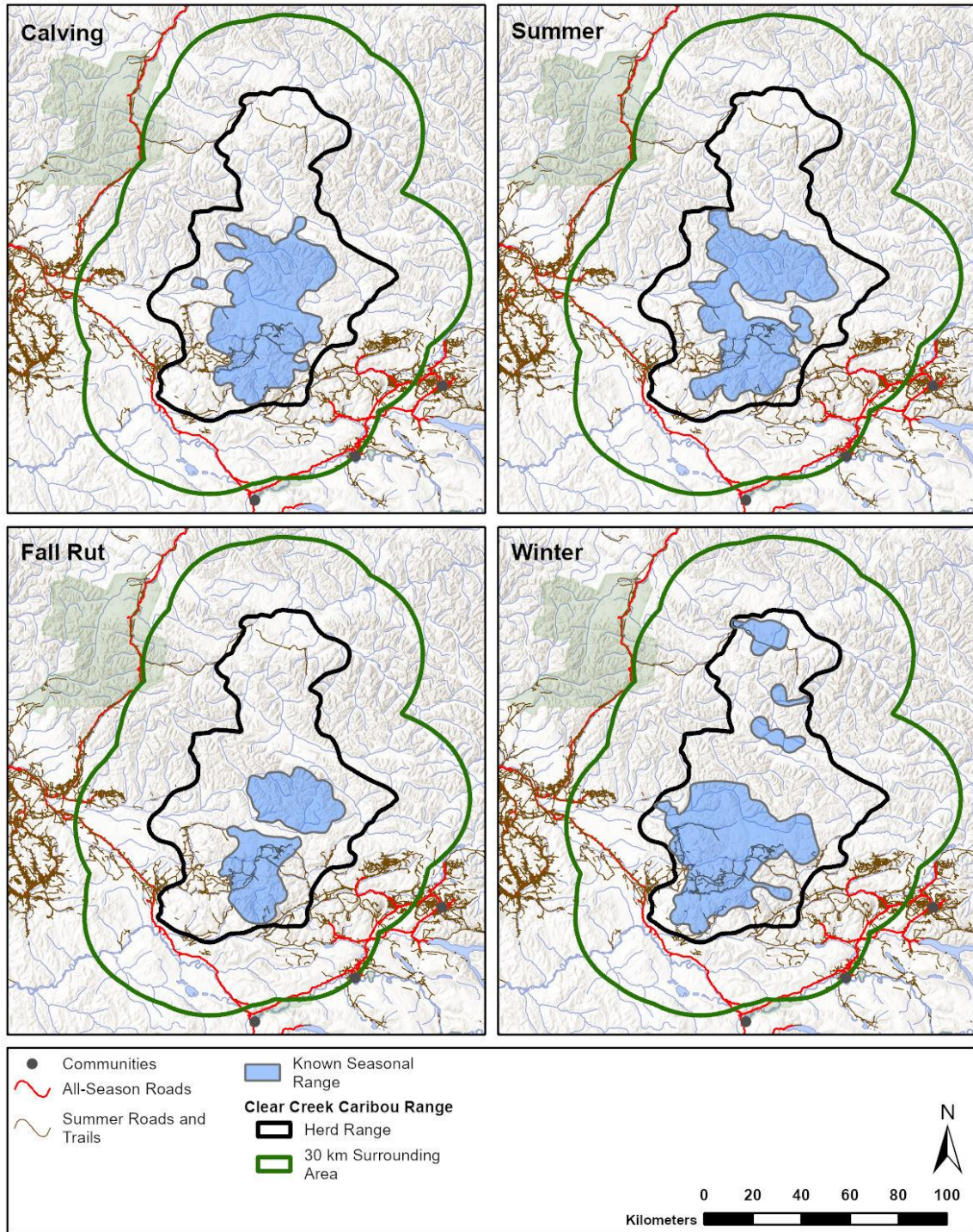


Figure 3. Known seasonal ranges (calving, summer, rut, winter) of the Clear Creek caribou population.

Reproductive capacity of caribou is low compared to other members of the deer family: they generally don't breed until they are two years old and therefore have their first calf when

they are three, and they only have one calf (twinning is very rare; COSEWIC 2014). Consequently, population recovery following a decline is slow.

1.2.3 Population Condition

The Clear Creek Caribou Herd is currently estimated at 792 animals (Russell et al. 2023). Although a population trend based on the two population surveys conducted for the herd (2001, 2018) was difficult to determine due to issues with calculating a sightability correction factor for the 2001 survey, the population is likely stable or slowly declining (Russell et al. 2023). Recent calf recruitment data also suggest that the population is declining (see Section 3.8.1.2). No information is available on population limiting factors.

1.2.4 Threats/Management Concerns

The most significant threat/management concern for the Clear Creek Caribou Range is the high level of industrial activity in the southern portion of the range and associated road access (Potié 2022). Staking for quartz claims began in the late 1970s with a rapid expansion of quartz exploration and placer mining starting in 2010 (Potié 2022). Most of the industrial activity is occurring in the southern portion of the range in an area that was heavily used by caribou in the late 1990s/early 2000s, and that currently lacks land use management objectives developed through a land use planning process. In some areas, such as the lower reaches of the Clear Creek drainage, land use management objectives have been developed in a draft plan (Dawson Land Use Plan - see Section 3.3) that allow for a high level of industrial resource use. Additional mineral exploration and placer mining is anticipated, including the potential development of two quartz mines in the near future on Red Mountain and West Ridge (see Section 2.5.4).

Road access associated with industrial activities could result in direct mortality through vehicle strikes, lead to reduced habitat effectiveness due to sensory disturbance, and provide access for hunters. Any new roads in a previously unroaded area will also facilitate further expansion of the road and trail network and of industrial activities by increasing logistical and economic feasibility. Linear features can also result in faster travel by wolves and increased predator efficiency.

2 Methods

2.1 Caribou Data Sources

Data collected specifically on the Clear Creek Caribou Herd include satellite and radio-collared caribou locations, rut survey locations and composition counts, population estimates, and licensed harvest data (Table 1, Figure 4).

From October 1997 to March 2001, a study was conducted on caribou collared with Very High Frequency (VHF) radio-collars. A total of 17 radio-telemetry flights were conducted to locate caribou (1 in 1997, 6 in 1998, 3 in 1999, 5 in 2000, and 2 in 2001). A sample size ranging from 8 to 20 collared caribou was maintained throughout the study. Including capture sites and mortality locations, a total of 276 locations were collected.

More recently, a study on caribou collared with satellite Global Positioning System (GPS) collars was conducted from March 2017 to October 2019. The collars transmitted one location each day. Sample size varied through the study with 24 to 31 active collars during the first 20 months (March 2017 to Oct 2018), 9 to 23 active collars during the next 8 months (November 2018 to June 2019) and 7 or fewer active collars for the last few months of the study. A total of 13,593 locations were collected.

Table 1. Sources of caribou data for the Clear Creek Caribou Herd.

Data	Data availability	Range of # of active collars (time period)	Data collection
VHF radio-collared caribou locations	Oct 1997 to Mar 2001	• 8-20 (Oct 1997 to Mar 2001)	<ul style="list-style-type: none"> • 17 telemetry flights (approx. 4-6 per 12 month period) • 276 total locations (includes capture sites)
GPS radio-collared caribou locations	Mar 2017 to Oct 2019	<ul style="list-style-type: none"> • 24-31 (Mar 2017 to Oct 2018) • 9-23 (Nov 2018 to June 2019) • 1-7 (July - Oct 2019) 	<ul style="list-style-type: none"> • 1 daily location per collar • 13,593 total locations
Rut surveys	1997-2021	N/A	• 12 surveys in late September/early October
Population estimates	2001 2018	N/A	<ul style="list-style-type: none"> • March 2001 Stratified Random Block Survey • Sept/Oct 2018 Mark-Resight Surveys
Harvest Data	1995-2021	N/A	• Annual

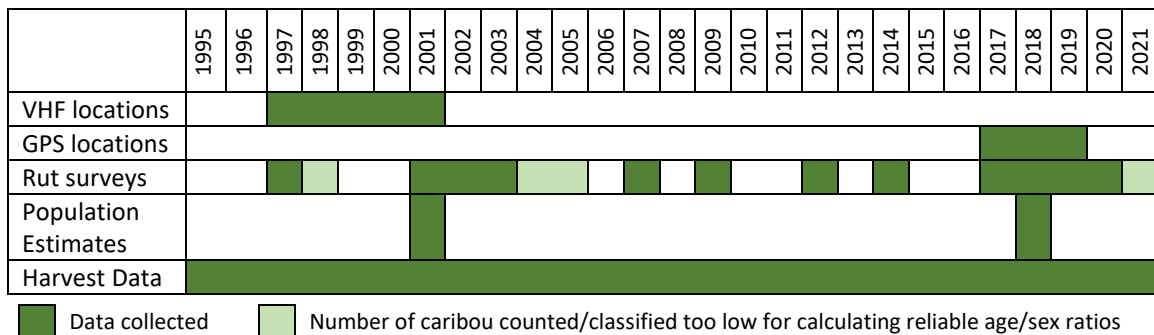


Figure 4. Caribou data availability for Clear Creek Caribou Herd, 1995-2021.

Helicopter surveys during the fall rut were conducted in late September/early October during 12 years between 1997 and 2021. Fall rut surveys are designed to obtain a sample of rut groups, and thus did not necessarily cover the entire fall rut seasonal range in each year. Caribou seen were counted and classified. Attempts were also made to conduct surveys in 1998, 2004, 2005 and 2021, but total numbers classified were too low to calculate reliable age/sex ratios due to poor weather or survey timing (Yukon Fish and Wildlife unpublished data, O'Donoghue 2007, 2021).

Two population surveys have been conducted for the Clear Creek Caribou Herd: a stratified random block survey conducted from March 15 to 19, 2001 (O'Donoghue et al. 2001), and a mark-resight survey conducted from September 28 to October 5, 2018 (Russell et al. 2023). For the stratified random block survey, the survey area was divided into 99 survey blocks, which were stratified into primary, secondary and nil blocks based on number of caribou and caribou sign seen during a fixed-wing flight. A total of 22 blocks were intensively surveyed for caribou by helicopter, and caribou densities from those surveys were then extrapolated to the rest of the study area to estimate population size. The mark-resight survey used the GPS collared caribou as the "marked" sample during three resighting surveys conducted by helicopter. The population estimate was calculated based on the proportion of marked caribou that were seen during the surveys (Russell et al. 2023).

Licensed harvest data are available annually since 1979; however, reliable harvest data are only available since 1995. Harvest is tracked for resident hunters, non-resident special-guided hunters, and non-resident hunters.

2.2 Caribou Population Status and Trend

Specific surveys may be conducted to determine population size and trend (see previous section); however, population trend may also be inferred from calf recruitment, while potential reproductive issues could be inferred from adult sex ratios. Environment Yukon's *Science-based Guidelines for Management of Northern Mountain Caribou in Yukon* provides guidelines for fall calf recruitment (based on fall rut surveys) and adult sex ratios (Environment Yukon 2016a, Table 2). Because calf recruitment can be variable from year to year, population trend inferred from calf recruitment data is based on data from multiple years (e.g. 5 to 10). Harvest guidelines are also recommended based on population trend (Environment Yukon 2016a, Table 2).

Table 2. Calf recruitment, sex ratio and harvest rate guidelines for Northern Mountain Caribou in Yukon (from Environment Yukon 2016a).

Calf recruitment and sex ratio guidelines		
Population parameter	Recommended minimum ratio	Comments¹
Fall calf recruitment	20-25 calves/100 cows	This rate is generally required for stable population growth.
Sex ratio	30 bulls/100 cows	This rate should ensure all females have the opportunity to reproduce.
Harvest rate guidelines		
Population trend	Recommended bull-only harvest rate	Comments¹
Declining	up to 1% of total population size	This harvest rate may be considered.
Stable	up to 2% of total population size	This harvest rate is likely sustainable
Increasing	up to 3-4% of total population size	This harvest rate is likely sustainable
Unknown	up to 1% of total population size	This harvest rate should mitigate the potential for an unsustainable harvest.

¹ From Environment Yukon (2016a)

2.3 Caribou Seasonal Ranges and Habitats

Clear Creek Caribou seasonal range information in this assessment is primarily based on location data from satellite and radio-collared caribou, winter and fall population surveys, and rut surveys.

GPS location data and expert knowledge were used to determine six seasons for the Clear Creek Caribou Herd (McClelland and Finnegan 2022, Table 3). This range assessment for the Clear Creek Caribou Herd focuses on calving, summer, fall rut and winter seasons. In addition, some analyses combine calving, summer and fall rut seasons into a "snow-free" season. Information for spring migration, fall migration and the snow-free season is provided in Appendix 1.

Table 3. Clear Creek Caribou seasons.

Season	Dates
Spring Migration	Apr 12 to May 16
Calving	May 17 to Jun 16
Summer	Jun 17 to Sep 17
Fall Rut	Sep 18 to Oct 6
Fall Migration	Oct 7 to Dec 5
Winter	Dec 6 to Apr 11
(Snow-free)	(May 17 to Oct 6)

In this assessment, four approaches were used to define seasonal ranges and habitats (Table 4).

Table 4. Approaches for defining seasonal ranges and habitats for the Clear Creek Caribou Herd.

Approach	Data Sources/Analysis	Description
Known Seasonal Ranges	<ul style="list-style-type: none"> VHF locations (1997-2002) GPS locations (2017-2019) Rut survey locations (1997-2021) Winter population survey locations (2001) Expert knowledge 	<ul style="list-style-type: none"> Areas encompassing known areas of caribou use based on all collar and survey location data collected since 1997.
Recent Concentrated Use	<ul style="list-style-type: none"> GPS locations (2017-2019) Kernel Density Estimates (KDEs) 	<ul style="list-style-type: none"> Areas encompassing areas of recent (2017-2019) concentrated use (50% KDE).
Predicted Habitat Value	<ul style="list-style-type: none"> GPS locations (2017-2019) Biophysical attributes Habitat disturbances Resource Selection Functions (RSFs) 	<ul style="list-style-type: none"> High, moderate and low predicted seasonal habitat value within the Clear Creek Caribou Annual Range, based on recent (2017-2019) GPS satellite-collared caribou use and current biophysical attributes.
Potential Range	<ul style="list-style-type: none"> Bioclimate zones 	<ul style="list-style-type: none"> Areas of potential winter range (low elevation) and summer range (high elevation) based on bioclimate zones.

Known Seasonal Ranges incorporate all radio-collared and satellite-collared caribou locations, rut survey locations, and winter population survey locations to define areas that have been known to be used by caribou, either currently (GPS locations, rut survey locations) or previously (VHF locations, rut survey locations, winter population survey locations) (see Figure 3). Known Seasonal Ranges were generated by Yukon Fish and Wildlife Branch staff using kernel density estimation (KDE) to identify the 95% utilization distribution (UD) isopleth for all recent collar location data (2017–2019), which was then overlaid with aerial survey and VHF collar locations and manually modified to incorporate locations that did not fall within the 95% UD isopleth. For Recent Concentrated Use areas, KDEs were used to delineate areas of concentrated use by caribou where 50% of the GPS locations in each season occurred. The 50% KDEs do not necessarily include previous areas of concentrated use by caribou based on VHF locations from the late 1990s. For Predicted Habitat Value, Resource Selection Functions (RSFs) based on GPS satellite-collared caribou locations and biophysical attributes (e.g. vegetation cover, current forest age, snow conditions, human-caused habitat disturbance, fire) were used to predict where high, moderate and low value seasonal habitats currently occur within the Clear Creek Caribou range (McClelland and Finnegan 2022). Because Predicted Habitat Value is based on current suitability of a habitat to support caribou, some high-quality habitats that are currently impacted by disturbances and therefore are not currently suitable for caribou, may have a lower habitat value than if the habitat was not affected by disturbance. In general, Clear Creek Caribou use high elevations in snow-free seasons, and low elevations in winter (O'Donoghue 2002). Therefore, Potential Summer and Winter Ranges were delineated based on high elevation and low elevation bioclimate zones/subzones (see Section 3.1.1). Area summaries for each seasonal range/habitat approach are provided in Appendix 2.

2.4 Human Land Use and Land Status

Information on current human land use and land status in this assessment was based on spatial layers available through GeoYukon (Table 5).

In addition to summarizing extent of current active quartz/mineral and placer mining tenures, historically active tenures were also summarized by time periods to determine change in activity levels since the 1970s. A tenure was considered active during a specific time period if the tenure was staked any time before October 1st of the final year of the period, and expired any time after May 31st of the first year of the period (Table 6). It was assumed that it was unlikely that field activities took place in the calendar year if tenures were staked after September 30, and conversely, it was assumed that it was unlikely that activities took place in the calendar year if a tenure expired on or before May 31. Tenures with a status of "Pending" were not included in the summaries.

Anthropogenic (human-caused) surface disturbance mapping developed by the Government of Yukon is based on human-caused linear and areal features that are detectable on the ground or visible in satellite or aerial imagery (Powell 2023). Anthropogenic surface disturbance mapping used in this assessment was based on the version available in July 2022. In some cases, surface disturbance mapping may have been underestimated, overestimated, and/or misclassified. However, the mapping provides important insight into the distribution and relative extent of each type of disturbance.

Table 5. *GeoYukon spatial layers used for describing and assessing human land use and land status in the Clear Creek Caribou Range.*

Category	GeoYukon Spatial Layers
First Nations	<ul style="list-style-type: none"> • First Nation Traditional Territories • First Nation Settlement Lands
Land Management Zones	<ul style="list-style-type: none"> • Yukon Planning Regions • Dawson Land Management Units • Peel Land Management Units • Protected Areas
Orders in Council and Ministerial Orders	<ul style="list-style-type: none"> • Areas withdrawn from new staking (mining) • Areas withdrawn from new oil and gas dispositions • Off-Road Vehicle Management Areas
Recreation, Tourism and Hunting	<ul style="list-style-type: none"> • Game Management Areas • Outfitting Concessions
Resource Use Tenures	<ul style="list-style-type: none"> • Quartz mining claims • Quartz mining leases • Placer mining claims • Placer mining leases • Quartz mines • Historical mineral and placer tenures • Forestry Cutting Permit • Forestry Personal Use Fuelwood Areas • Agriculture tenures
Land Disturbance	<ul style="list-style-type: none"> • Anthropogenic surface disturbance - areal features • Anthropogenic surface disturbance - linear features

Table 6. *Criteria used for assessing whether quartz/mineral and placer tenures were considered active in the Clear Creek Caribou Range during time periods from 1971 to 2022.*

Period	Tenure status	Tenure staked before	Tenure expired after
1971-1980	Active or Expired	October 1, 1980	May 31, 1971
1981-1990	Active or Expired	October 1, 1990	May 31, 1981
1991-2000	Active or Expired	October 1, 2000	May 31, 1991
2001-2010	Active or Expired	October 1, 2010	May 31, 2001
2011-2015	Active or Expired	October 1, 2015	May 31, 2011
2016-2022	Active or Expired	October 1, 2022	May 31, 2016

2.5 Assessment of Risk Factors

2.5.1 Caribou Assessment Areas

The Clear Creek Caribou Range was divided into two Caribou Assessment Areas (CAAs) by Yukon Fish and Wildlife Branch, based on level of human activities (Figure 5, Table 7). CAA1 (South) in the southern portion of the range includes most of the human-caused disturbances in the range, and is separated from CAA2 (North) by the Klondike River and a tributary of the North McQuesten River.

Although CAA2 (North) contains a larger portion of the Clear Creek Caribou Range than CAA1 (South), CAA1 (South) contains the majority of the known winter range and larger portions of known calving, summer, and rut ranges than CAA2 (North) (Table 7). Most historic caribou use in the range (based on VHF caribou locations) was focussed in CAA1 (South). Recent caribou use (based on GPS caribou locations) suggests increased use of CAA2 (North), especially during the fall rut (see Section 3.8.2.1).

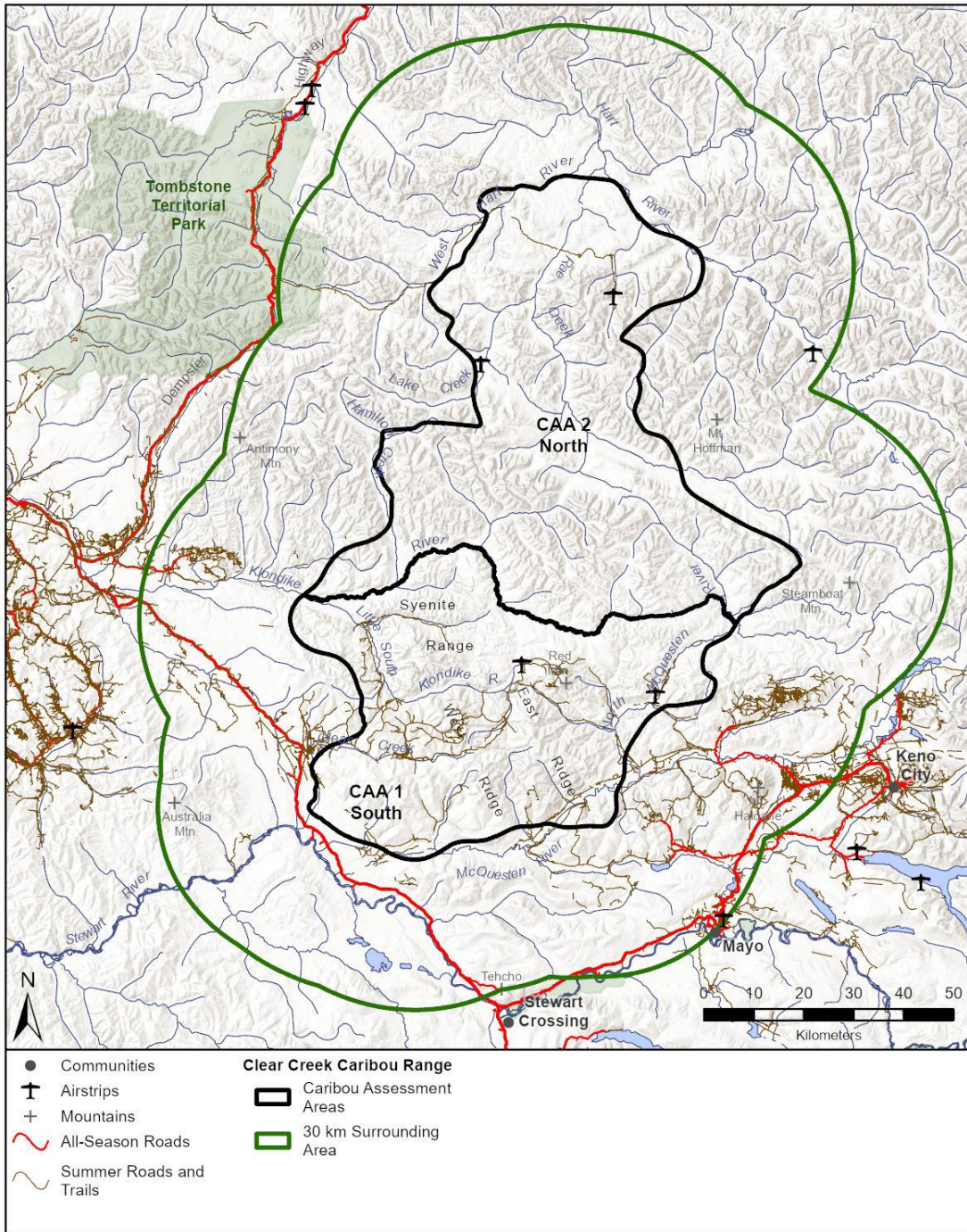


Figure 5. Caribou Assessment Areas in the Clear Creek Caribou Range.

Table 7. Caribou Assessment Areas in the Clear Creek Caribou Range.

Caribou Assessment Area (CAA)	% of Annual Range	% of Known Seasonal Range				Significance to Caribou
		Calving	Summer	Rut	Winter	
CAA1 (South)	43.0	59.2	54.6	54.5	71.7	<ul style="list-style-type: none"> contains important historically and recently used calving, summer and fall rut ranges contains most (72%) of the known winter range and a majority (59%) of the known calving range
CAA2 (North)	57.0	40.8	45.4	45.5	28.3	<ul style="list-style-type: none"> contains lower levels of human-caused disturbances contains an important recent concentration of caribou during fall rut
Total Area (ha)	755 700	242 697	249 025	154 337	267 327	

2.5.2 Human-caused Disturbance

Human-caused disturbance to habitat can have both direct effects on habitat and caribou, and indirect effects. Direct effects on habitat include habitat degradation or loss associated with the direct human development footprint, and are measured by the size of the area affected by the development footprint (hectares), and the length of linear features (km). Indirect effects can extend far beyond the development footprint due to caribou avoiding or decreasing their use of areas close to human development and activities, or due to increased risk of mortality associated with features within the development footprint. The area associated with indirect effects of human development and activities is known as the Zone of Influence and is measured by calculating the size of the area that is included within a specified distance from the disturbance feature.

2.5.2.1 Zones of Influence

Yukon Fish and Wildlife Branch provided distances for Zones of Influence (ZOIs) for caribou for linear and areal disturbances from the Yukon Government's Surface Disturbance Mapping, based on scientific literature (Table 8, Table 9). Because ZOIs for individual disturbance features can vary in length depending on factors such as adjacent habitat, and intensity and duration of human activities, "Narrower" and "Wider" ZOIs were provided to assess lower and higher potential levels of impacts respectively.

Categories of linear and areal disturbance from Yukon Surface Disturbance Mapping were combined in this assessment as indicated in Table 8 and Table 9 for reporting purposes (Assessment Tables) and display purposes (Assessment Maps). Activities associated with each type of disturbance were defined as Snow-free (i.e. occurring only during the snow-free season), or All Year (i.e. occurring during both snow-free and winter seasons). ZOIs for winter included only All Year activities, while ZOIs for the snow-free season included both All Year and Snow-free activities. Currently, because human activities in the Clear Creek Caribou Range are conducted

almost exclusively during the snow-free season, there are few or no indirect impacts to caribou (i.e. ZOIs) during the winter season despite the presence of the human development footprint on the ground.

Table 8. Categories of areal human habitat disturbance and associated zones of influence (ZOIs) used in this assessment (from Yukon Fish and Wildlife Branch).

Categories of Human Habitat Disturbance				Zone of Influence (ZOI) (meters) ²		Season ³
Assessment Maps	Assessment Tables	Yukon Surface Disturbance Mapping ¹		Narrower	Wider	
		Industry Type	Disturbance Type			
Mining - Quartz	Quartz Mining - Significant (N/A ⁴)	• Mining	• Quartz Mining - Significant	4000	10000	All Year
	Quartz Mining - Minor		• Quartz Mining - Minor	1000	4000	Snow-free
Mining - Placer	Placer Mining - Significant	• Mining	• Placer Mining - Significant	1000	4000	Snow-free
	Placer Mining - Minor		• Placer Mining - Minor			Snow-free
Mining - Other	Mining (unspecified)	• Mining	• Mining	1000	4000	Snow-free
	Drill Pad		• Drill Pad			Snow-free
	Mining - building		• Building	2000	5000	Snow-free
	Mining - camp		• Camp			Snow-free
Other camps/ buildings	Other camps	• Rural	• Camp	250	1500	Snow-free
	N/A ⁴	• Rural	• Homestead			All Year
	N/A ⁴	• Rural • Urban	• Rural Residential			All Year
Clearings	Clearing	• All	• Clearing	250	1000	Snow-free
	Cul-de-sac/Turn Area		• Cul-de-sac/Turn Area			Snow-free
	Gravel Pit/Quarry		• Gravel Pit/Quarry			Snow-free
	Pullout/Turn Area		• Pullout/Turn Area			Snow-free
	N/A ⁴		• Road Cut and Fill			Snow-free
	N/A ⁴		• Roadside Gravel			Snow-free
Airstrip	Airstrip	• Transportation	• Airstrip	1000	4000	Snow-free
Unknown	Unknown	• Unknown	• Unknown	250	1000	Snow-free
Agriculture	N/A ⁴	• Agriculture	• Agriculture	250	1500	All Year
Forestry	N/A ⁴	• Forestry	• Forestry	250	900	All Year
Urban	N/A ⁴	• Urban	• Building	250	1500	All Year
	N/A ⁴		• Dam			All Year
	N/A ⁴		• Industrial			All Year
	N/A ⁴		• Landfill			All Year
	N/A ⁴		• Recreation Areas			All Year
	N/A ⁴		• Tower	250	250	All Year
	N/A ⁴		• Urban			All Year

¹ 2022 Yukon Surface Disturbance Mapping based on satellite images from 2013-2019.

² Narrower ZOIs assess the potential for lower levels of impacts while Wider ZOIs assess the potential for higher levels of impacts, depending on adjacent habitat, intensity and duration of human activities, etc.

³ Snow-free season = calving + summer + fall rut seasons

⁴ Although these surface disturbances were not found within the Clear Creek Caribou Range, they were found in adjacent areas so ZOIs were developed in case the ZOI from the disturbance extended into the range.

Table 9. Categories of linear human habitat disturbance and associated zones of influence (ZOIs) used in this assessment (from Yukon Fish and Wildlife Branch).

Categories of Human Habitat Disturbance			Zone of Influence (ZOI) (meters) ¹		Season ³
Assessment Maps	Assessment Tables	Yukon Surface Disturbance Mapping (Disturbance Type) ²	Narrower	Wider	
Highways	N/A ⁴	• Highway	1000	4000	All Year
Other Roads	Other Roads	• Access Assumed	1000	4000	Snow-free
		• Access Road			Snow-free ⁵
		• Local Road			All Year
		• Unpaved Road			Snow-free
		• Arterial Road			All year
		• Collector Road			All Year
	N/A ⁴	• Right of Way	250	250	All year
	N/A ⁴	• Driveway	250	1000	All Year
		• Laneway			
Survey/Cutlines	Survey/Cutlines	• Survey/Cutline	250	250	Snow-free
		• Survey/Cutline - Placer			Snow-free
		• Survey/Cutline - Quartz			Snow-free
Trails	Trails	• Trail	250	250	Snow-free
Trenches	Trenches	• Trench	250	250	Snow-free
Unknown	Unknown	• Unknown ⁶	250	250	Snow-free
		• Unknown NRN			All Year
Utility	N/A ⁴	• Electric Utility Corridor	1000	1000	Snow-free
		• Unknown	1000	1000	Snow-free

¹ Narrower ZOIs assess the potential for lower levels of impacts while Wider ZOIs assess the potential for higher levels of impacts, depending on adjacent habitat, intensity and duration of human activities, etc.

² 2022 Yukon Surface Disturbance Mapping based on satellite images from 2013-2019.

³ Snow-free season = calving + summer + fall rut

⁴ Although these surface disturbances were not found within the Clear Creek Caribou Range, they were found in adjacent areas so ZOIs were developed in case the ZOI from the disturbance extended into the range.

⁵ Although access roads are considered active only in the snow-free season, the main Clear Creek road may open as early as March in some years

⁶ Does not include Unknown in Utility

Examples of Thresholds - Box 1

A number of thresholds have been used for various purposes to define maximum acceptable levels of habitat disturbance (see Examples of Thresholds - Box 2). Although they may be useful as general guides, they are not directly applicable to calculations of habitat disturbance for the Clear Creek Caribou Range in this assessment.

For boreal caribou ranges, 35% is the maximum habitat disturbance threshold for the total annual range, where total habitat disturbance is calculated by including a 500 meter buffer around human-caused disturbances (to account for areas avoided or rarely used by caribou as a result of sensory disturbance from human activities) and adding that area to the area affected by fires that are less than 40 years old (EC 2011, 2012). This threshold was based on a scientific analysis of boreal caribou population information and habitat disturbance, where a relationship was developed showing that calf recruitment decreased as habitat disturbance increased (EC 2011). Further analysis indicated that a boreal caribou population had a 60% probability of being self-sustaining when 35% of the total annual range was disturbed. Probability of being self-sustaining increased as the level of habitat disturbance decreased. Because the relationship between habitat disturbance and calf recruitment is characterized by a continuum of risk and not an inflection point (Johnson and Ray 2021), the 35% disturbance threshold is a management decision that accepts a probability of boreal caribou population persistence of 60%. Reid et al. (2013) found that although some relationships developed for boreal caribou could reasonably approximate population status of the Northern Mountain Carcross Caribou Herd, those models could not accommodate spatially separate seasonal ranges, especially winter ranges, and widespread and permanent shrub and sparsely vegetated habitats, which often occur at high elevations.

For the Recovery Strategy for Southern Mountain Caribou (EC 2014), although a similar relationship between Northern Group (Northern Mountain Caribou) population viability and habitat disturbance has not been developed, the boreal caribou threshold was used as a threshold for the low elevation winter range and matrix portions of Northern Group caribou ranges, which experience frequent stand-disturbing (fire) events (i.e. where ecological conditions are similar to those of boreal caribou ranges). For high elevation winter and/or summer ranges of Northern Group caribou ranges where stand-disturbing (fire) events are rare or very infrequent, a threshold of no/minimal habitat disturbance was used. Unlike most boreal caribou ranges, which consist of primarily low elevation habitats, Northern Group caribou ranges include both low elevation and high elevation areas with differing ecological conditions, and therefore applying the 35% threshold to the total annual range was not appropriate.

Thresholds for habitat disturbance for boreal caribou and for the Northern Group of Southern Mountain Caribou, both use 500 meter buffers for all human-caused disturbance. Because the Zones of Influence (ZOIs) used in this assessment of the Clear Creek Caribou Range are more specific to individual types of human-caused disturbances and differ in width from the 500 meter buffer, the areas of human-caused disturbance calculated using the ZOIs cannot be directly evaluated using the boreal caribou or Northern Group of Southern Mountain Caribou thresholds.

For the Draft Dawson Land Use Plan, surface disturbance thresholds were developed for four levels of human activities based on a range of considerations, and were not developed specifically for caribou (DRPC 2022). Unlike habitat disturbance calculations in this assessment for the Clear Creek Caribou Range, the Draft Dawson Land Use Plan thresholds only consider human-caused surface disturbance and therefore do not take into account areas avoided or rarely used by caribou as a result of sensory disturbance from human activities, or habitat disturbance due to fire, both of which affect caribou use and habitat. The Draft Dawson Land Use Plan thresholds are also calculated for Land Management Units, which do not necessarily reflect caribou range ecological function or value.

Examples of Thresholds - Box 2

Source	Scale	Metric	Definition of Disturbed	Threshold	Considerations
Boreal Caribou Scientific Assessment (EC 2011) Boreal Caribou Recovery Strategy (EC 2012)	Total Annual Range	% of Total Annual Range disturbed	Disturbed = surface area of human-caused habitat disturbance (including a 500 m buffer) plus surface area of fires <40 years	maximum of 35% of Total Annual Range disturbed	<ul style="list-style-type: none"> a 500 m buffer around human-caused habitat disturbance was used in the threshold because a relationship between calf recruitment and total disturbance (human-caused disturbance [including a 500 m buffer] + fires <40 years [unbuffered]) had been developed a boreal caribou population has a 60% probability of being self-sustaining when 35% of the total range is disturbed
Southern Mountain Caribou Recovery Strategy: (critical habitat categories that apply to Northern Group [Northern Mountain type] caribou) (EC 2014)	Low Elevation Winter Range + Type 1 Matrix Range ¹	% of Low Elevation Winter Range + Type 1 Matrix Range disturbed	Disturbed = surface area of human-caused habitat disturbance (including a 500 m buffer) plus surface area of fires <40 years	maximum of 35% of Low Elevation Winter Range + Type 1 Matrix Range disturbed	<ul style="list-style-type: none"> although a relationship between Northern Group (Northern Mountain Caribou) population viability and habitat disturbance has not been developed, the boreal caribou threshold was used as a threshold for the portions of Northern Group caribou ranges that experience frequent stand-disturbing (fire) events (i.e. where ecological conditions are similar to those of boreal caribou ranges)
	High Elevation Summer and/or Winter Range	% of High Elevation Summer and/or Winter Range disturbed	Disturbed = surface area of human-caused habitat disturbance (including a 500 m buffer) plus surface area of fires <40 years	No/minimal area of High Elevation Summer and/or Winter Range disturbed	<ul style="list-style-type: none"> in the portions of Northern Group Caribou ranges that experience rare or very infrequent stand-disturbing (fire) events, a no/minimal disturbance level threshold was used to reflect the likely level of habitat disturbance under a natural disturbance-only regime
Draft Dawson Land Use Plan ² (DRPC 2022)	Land Management Unit (LMU)	% of LMU affected by human-caused surface disturbance	Disturbed = surface area of human-caused habitat disturbance (no buffer)	Four thresholds depending on allowable level of human activities: ISA1: 0.25% ISA2: 1.0% ISA3: 2.0% ISA4: 4.0%	<ul style="list-style-type: none"> area of human-caused surface disturbance (with no buffer or ZOI) does not take into account areas avoided or rarely used by caribou as a result of sensory disturbance from human activities these thresholds do not include fire disturbance, which also affects caribou habitat and use these thresholds were not developed specifically for caribou LMU spatial configuration and allowable level of human activities do not necessarily reflect caribou range ecological function or value
	Land Management Unit (LMU)	Linear feature density	km/km ²	Four thresholds depending on allowable level of human activities: ISA1: 0.25 km/km ² ISA2: 0.5 km/km ² ISA3: 1.0 km/km ² ISA4: 2.0 km/km ²	<ul style="list-style-type: none"> these thresholds were not developed specifically for caribou LMU spatial configuration and allowable level of human activities do not necessarily reflect caribou range ecological function or value

¹ Type 1 Matrix Range = areas within a local population unit's annual range that have not been delineated as summer or winter range, and may include seasonal migration areas and areas of lower use compared to delineated seasonal ranges

² ISA = Integrated Stewardship Area; ISA1 = Lowest Development; ISA2 = Low Development; ISA3 = Moderate Development; ISA4 = Highest Development

2.5.3 Current Range Condition

To assess current range condition, area affected by habitat disturbance was calculated for: fires less than or equal to 50 years old; human-caused disturbances + ZOIs; and total habitat disturbance (human-caused disturbances +ZOIs, combined with fires less than or equal to 50 years old).

For human-caused disturbances, area affected was calculated using both Narrower and Wider ZOIs (Table 10). ZOIs were applied to each human-caused habitat disturbance and all ZOIs were merged into a combined ZOI to avoid double-counting overlapping ZOIs. Similarly, for total habitat disturbance, the combined ZOIs were merged with the spatial layer for fire disturbance less than or equal to 50 years old to avoid double-counting overlaps between fires and ZOIs. ZOIs are not applied to fire disturbance.

Table 10. Metrics calculated for current habitat disturbances on the Clear Creek Caribou Range.

Disturbance	Narrower ZOI	Wider ZOI
Fire (≤50 years)	Total area of fires ≤50 years old	
Human-caused	Current human-caused disturbances + combined Narrower ZOI	Current human-caused disturbances + combined Wider ZOI
Total disturbance	Current human-caused disturbances + combined Narrower ZOI merged with Total area of fires ≤50 years old	Current human-caused disturbances + combined Wider ZOI merged with Total area of fires ≤50 years old

Human-caused habitat disturbance was calculated for winter using "All Year" ZOIs, and for the snow-free period using both "Snow-free" and "All Year" ZOIs (see Table 8 and Table 9).

Habitat disturbance due to fires, human-caused disturbance (+ZOIs), and total habitat disturbance was then calculated as a percentage of: known seasonal ranges (winter, snow-free), recent concentrated use areas (50% KDEs for winter and snow-free), predicted habitat value (RSFs for winter and summer), and potential range (winter, summer). Summer was used for predicted habitat value because an RSF for the combined snow-free season was not available.

2.5.4 Potential Future Range Condition

Potential future range condition was predicted for 25 years into the future (2047) for fire and human-caused habitat disturbance.

For fire, an approach was used similar to the one used in the Range Assessment for the Klaza Caribou Range (Francis and Nishi 2016). Moderate to high burn probability (25-50%) for the Future Period (2019-2048) from *Modeling Future Wildlife Risk in Yukon* (AECOM 2021) was used to predict where fire would occur in the Clear Creek Caribou Range within 25 years. Because the model included data for recent fires up to 2018, we modified the burn probability map by adding fires that occurred from 2019 to 2022, and converting the burn probability within

those burn perimeters to zero, to reflect the reduction in burn probability following fire. Also, all existing burns in the Clear Creek Caribou Range were aged by 25 years and burns that were greater than 50 years in 2047 were converted to unburned areas. The future total area burned (≤ 50 years old) was calculated by adding the area of existing burns that would still be less than 50 years old in 2047, to the area that was predicted to be burned by 2047. Although the burn probability map that was used in this assessment (AECOM 2021) did not include the northern portion of the Clear Creek Caribou Range, burn probability that was available for a portion of the northern part of the range was less than 25%. Also, the burn probability map used in the Klaza caribou range assessment (Ember Research Services Ltd. 2016) included the northern part of the Clear Creek Caribou Range with a burn probability of 0%. Results from both burn probability models suggest that fires were unlikely to occur by 2047 in the northern portion of the Clear Creek Caribou Range that was not covered by the AECOM (2021) burn probability model.

Two scenarios were considered for potential future human-caused habitat disturbance by 2047, based on the potential for two operating quartz mines within the Clear Creek Caribou Range and additional placer mining (Table 11). The Moderate scenario includes an operating quartz mine at the Red Mountain claims with access roads upgraded to an all-season road. Area disturbed at the mine for the Moderate scenario was set at 25% of the total area of claims, and was represented as a circle in the centre of the claim area. The High scenario includes operating quartz mines at both Red Mountain and West Ridge claims with access roads upgraded to an all-season road. Area disturbed at both mines for the High scenario was set at 50% of the total area of claims at each site, and was represented as a circle in the centre of each claim area. Neither scenario includes new roads, just upgrading of existing roads to all-season roads.

Table 11. Potential future scenarios for human-caused habitat disturbance in the Clear Creek Caribou Range in 25 years (2047).

Disturbance	Moderate Scenario	High Scenario
Quartz mining	<ul style="list-style-type: none"> Red Mountain: operating quartz mine (25% of current claim area disturbed) upgrade of access roads to Red Mountain claims to all-season roads 	<ul style="list-style-type: none"> Red Mountain: operating quartz mine (50% of current claim area disturbed) West Ridge: operating quartz mine (50% of current claim area disturbed) upgrade of access roads to Red Mountain and West Ridge claims to all-season roads
Placer mining	<ul style="list-style-type: none"> Area of placer development increasing at the current average annual rate of increase (from 2010 to 2022: 9.49%/year), for a total increase of 237% in 25 years, then estimating adjustments for overlapping ZOIs based on current degree of ZOI overlap. 	<ul style="list-style-type: none"> Area of placer development increasing at double the current average annual rate of increase (from 2010 to 2022: 9.49%/year), for a total increase of 475% in 25 years, then estimating adjustments for overlapping ZOIs based on current degree of ZOI overlap.

Predictions for spatial location of new placer mining activity were not possible. Therefore, predicted area affected by placer mining by 2047 was calculated (but not spatially

represented) by applying the current average annual rate of change in the area covered by placer claims between 2010 and 2022 (9.49%/year) to the current area disturbed by placer mining including ZOIs. For the moderate scenario, the current average annual rate of increase was applied over 25 years, for a 237% increase. For the High scenario, double the current rate of increase was applied for a 475% increase. Adjustments were then made to account for overlapping ZOIs in the future, using the current degree of ZOI overlap to estimate future potential overlap. A detailed description of the methods used for these calculations is provided in Appendix 3. Placer mining occurs during snow-free months and therefore these calculations were applied only to the snow-free/summer season.

Predictions for restoration of currently-disturbed areas were also not possible and not included in either scenario.

Although two potential future scenarios are assessed, maps were generated only for the Moderate scenario.

3 Clear Creek Caribou Range Condition

3.1 *Biophysical Setting*

3.1.1 **Ecoregions and Bioclimate Zones/Subzones**

The southern two-thirds of the Clear Creek Caribou Range lies within the Boreal Cordillera Ecozone in the McQuesten Highlands Ecoregion, with smaller portions of the range in the Taiga Cordillera Ecozone in the Mackenzie Mountains (25%) and in the North Ogilvie Mountains (7%) ecoregions (Figure 6). Most of the caribou range consists of mountainous terrain and associated valleys, with elevations ranging from about 750 m to 1500 m, although some peaks rise as high as 2100 m (Smith et al. 2004).

The climate includes generally long and cold winters with January temperatures averaging about -25 C, and short, cool and moist summers with July temperatures averaging about 8-15 C depending on elevation (Smith et al. 2004, Environment Yukon 2016b). Annual precipitation ranges from 300 mm to 600 mm with heaviest precipitation in July and August (40-80 mm/month) and lowest from December to May (20-30 mm/month) (Smith et al. 2004).

Most of the Clear Creek Caribou Range lies within the Extensive Discontinuous (50-90%) permafrost zone, except for the northernmost portion in the area near the confluence of the Hart and West Hart rivers, which lies in the Continuous (90-100%) permafrost zone (Smith et al. 2004).

Low elevation areas in the Clear Creek Caribou Range consist of the Boreal High bioclimate zone in the southern portion of the range, and the Subarctic Woodland zone in the northern portion of the range, while high elevation areas include the Subalpine (Boreal + Subarctic) and Alpine Tundra (Boreal + Subarctic) zones (Figure 6, Table 12). Open-canopied forests at low elevations are dominated by white spruce (*Picea glauca*), black spruce (*Picea mariana*) and subalpine fir (*Abies lasiocarpa*), with increased presence of trembling aspen

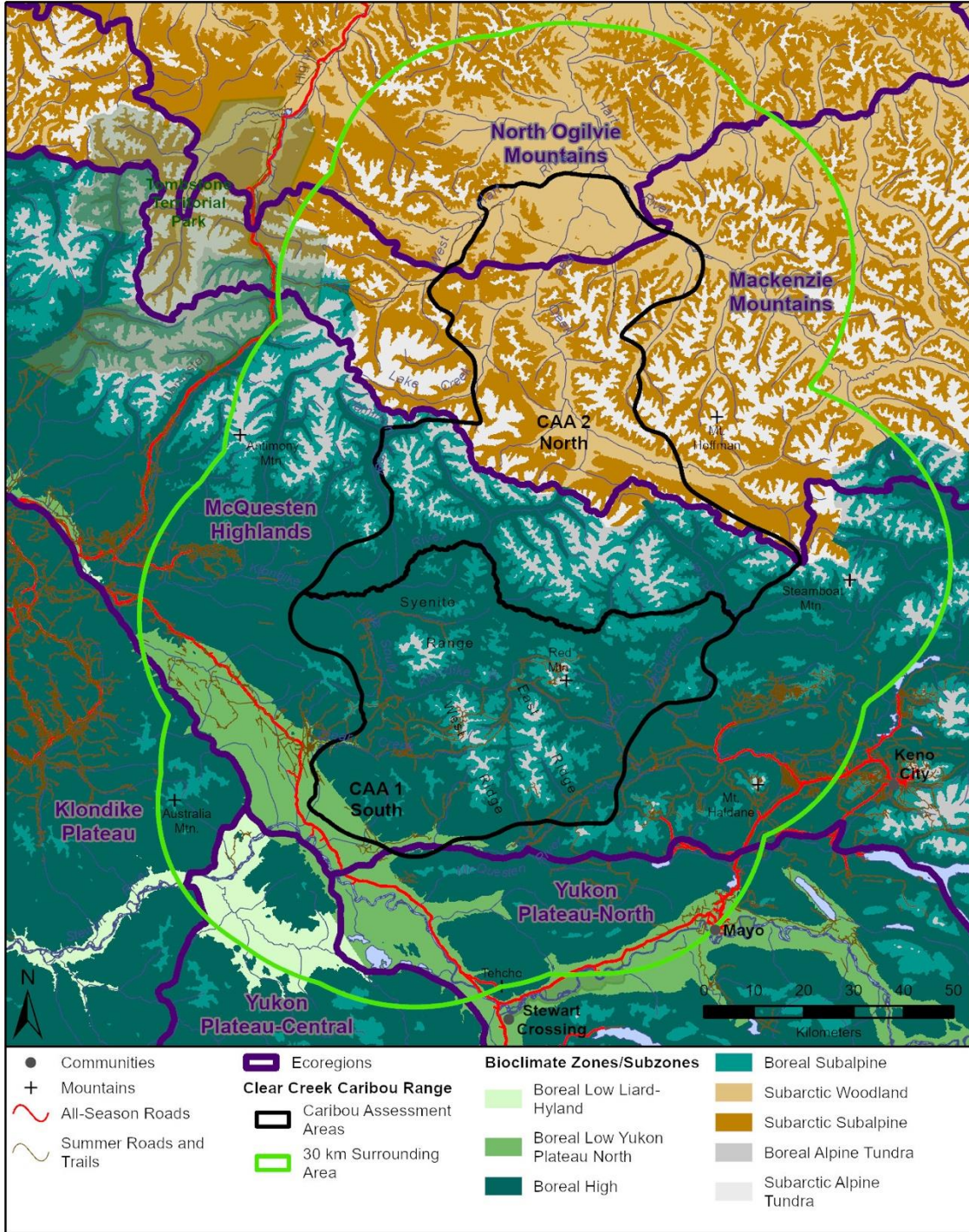


Figure 6. Ecoregions and Bioclimate Zones and Subzones in the Clear Creek Caribou Range.

(*Populus tremuloides*) and white birch (*Betula papyrifera*) in the southernmost portion of the range (Smith et al. 2004, Environment Yukon 2016b). Subalpine forests are made up of sparse conifer canopies (<10% tree cover) and medium to tall shrub communities, with treeline at about 1200 m (Smith et al. 2004, Environment Yukon 2016b). Ground lichens are common on

drier sites at both low and high elevations, shrub birch-willow communities are common at middle elevations and in moist areas, and forbs are prevalent in floodplains and on seepage sites on mountain slopes (Smith et al. 2004).

Overall, the total Clear Creek Caribou Range contains more area of low elevation bioclimate zones than high elevation zones (Table 12). Low elevation bioclimate zones make up 72% of the known winter range, the majority of which consist of the Boreal High bioclimate zone in CAA1 (South). The snow-free known seasonal ranges (calving, summer, fall rut) are more associated with higher elevation bioclimate zones, especially the known fall rut range (Table 12). Although between 35% and 49% of the known snow-free season ranges are made up of low elevation habitats, caribou are mostly using high elevations during the snow-free season (see Sections 1.2.2 and 3.8.2).

Table 12. Bioclimate zones/subzones in the Clear Creek Caribou Range.

Elevation	Bioclimate Zone/ Subzone	% of Annual Range ¹	% of Known Seasonal Range ¹			
			Calving	Summer	Fall Rut	Winter
Caribou Assessment Area 1 (South)						
Low	Boreal Low - Yukon Plateau North	1.6	0	0	0	0.1
	Boreal High	31.7	36.5	32.2	25.4	51.8
High	Boreal Subalpine	8.3	18.8	18.4	23.7	17.1
	Boreal Alpine Tundra	1.4	3.9	4.0	5.4	2.8
<i>CAA1 (South) - Total low elevation</i>		<i>(33.3)</i>	<i>(36.5)</i>	<i>(32.2)</i>	<i>(25.4)</i>	<i>(51.9)</i>
<i>CAA1 (South) - Total high elevation</i>		<i>(9.7)</i>	<i>(22.7)</i>	<i>(22.4)</i>	<i>(29.1)</i>	<i>(19.8)</i>
Caribou Assessment Area 2 (North)						
Low	Boreal High	10.5	11.2	11.2	9.5	9.3
	Subarctic Woodland	13.4	1.1	0.3	0	10.4
High	Boreal Subalpine	9.2	14.8	18.1	22.5	3.4
	Subarctic Subalpine	14.0	2.9	2.9	0.9	4.3
	Boreal Alpine Tundra	4.5	8.8	10.3	11.2	0.6
	Subarctic Alpine Tundra	5.4	2.1	2.5	1.3	0.3
<i>CAA2 (North) - Total low elevation</i>		<i>(23.9)</i>	<i>(12.3)</i>	<i>(11.5)</i>	<i>(9.5)</i>	<i>(19.7)</i>
<i>CAA2 (North) - Total high elevation</i>		<i>(33.1)</i>	<i>(28.6)</i>	<i>(33.8)</i>	<i>(35.9)</i>	<i>(8.6)</i>
Total (CAA1 + CAA2)						
<i>Range - Total low elevation</i>		<i>(57.2)</i>	<i>(48.7)</i>	<i>(43.8)</i>	<i>(34.9)</i>	<i>(71.6)</i>
<i>Range - Total high elevation</i>		<i>(42.8)</i>	<i>(51.3)</i>	<i>(56.2)</i>	<i>(65.1)</i>	<i>(28.4)</i>
Total Area (ha)		755 700	242 697	249 025	154 337	267 327

¹ Numbers in brackets are subtotals

3.1.2 Ground Lichens

Ground lichens are distributed throughout the Clear Creek Caribou Range with concentrated areas of higher abundance in the northern part of the range, in the Little South Klondike River and Clear Creek drainages, and in the area to the northwest and northeast of Red Mountain (Figure 7).

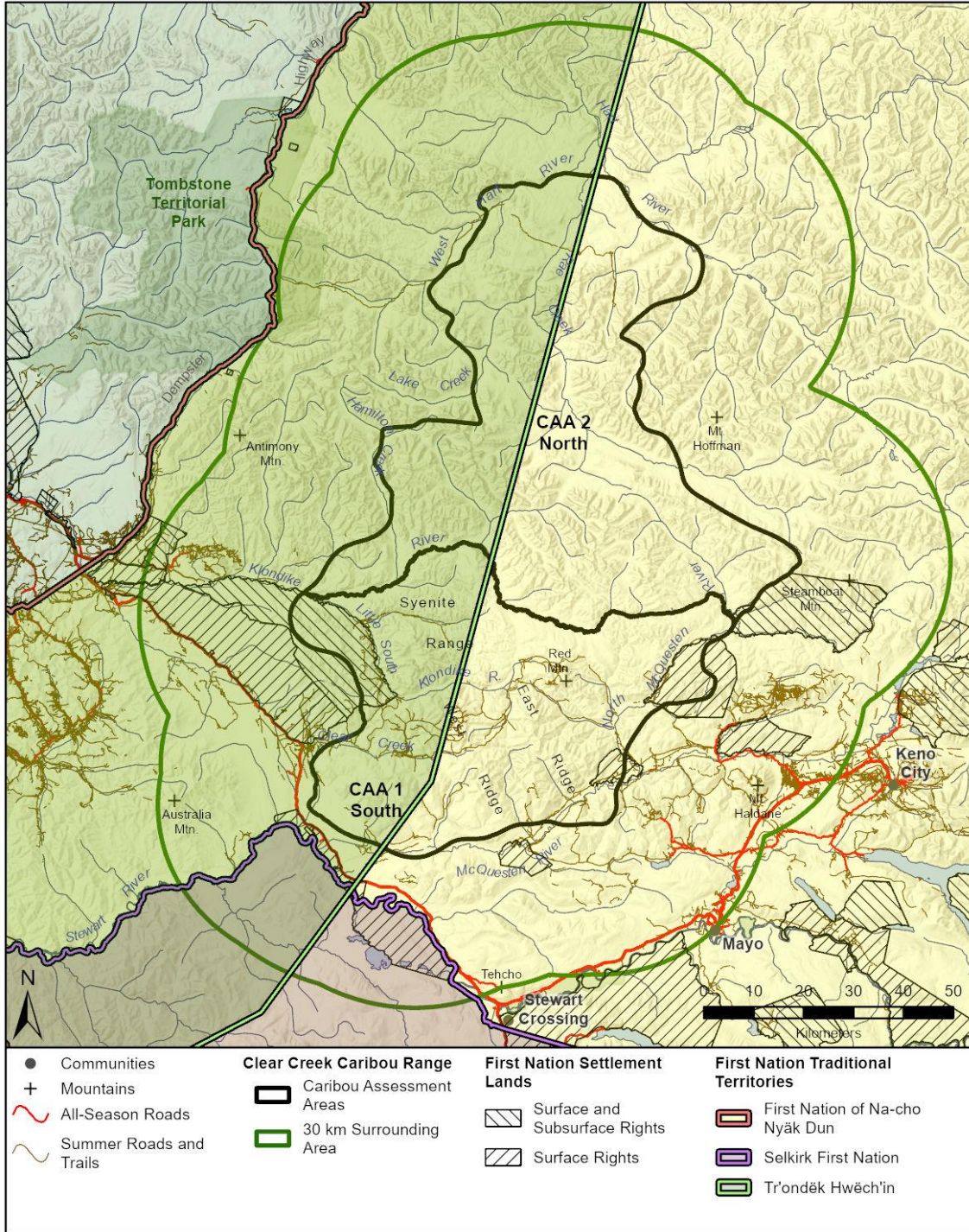


Figure 8. First Nations Traditional Territories and Settlement Lands in the Clear Creek Caribou Range.

within the Traditional Territory of the Na-Cho Nyäk Dun. The western portion of the range is included in an area of overlap between the Traditional Territories of the Na-Cho Nyäk Dun and Tr'ondëk Hwëch'in, and the southern portion of the 30-km Surrounding Area includes an area of

overlap between the Traditional Territories of the Na-Cho Nyäk Dun, Tr'ondëk Hwëch'in and Selkirk First Nation.

A portion of the Clear Creek Caribou Range west of the Little South Klondike River lies within settlement lands with surface and subsurface rights for the Tr'ondëk Hwëch'in; the area to the west in the 30-km Surrounding Area is an area of settlement lands with just surface rights (Figure 8). Settlement lands for the Na-Cho Nyäk Dun include five areas with surface rights in the southeastern portion of the Clear Creek Caribou Range and southern and southeastern portion of the 30-km Surrounding Area in the McQuesten River and North McQuesten River areas, and one area with surface and subsurface rights in the Steamboat Mountain area, adjacent to the eastern boundary of the caribou range.

The closest communities to the Clear Creek Caribou Range are located to the southeast of the range (Figure 8). The community of Mayo is the largest of the three communities with a population of about 450 people, about half of whom are Na-Cho Nyäk Dun people that live in and around the village (Village of Mayo 2023). About 180 people live in the village, with the remainder living in the surrounding area. Keno City and Stewart Crossing are smaller communities with 20 and 10 people respectively (Statistics Canada 2023).

3.3 Land Management Zones and Protected Areas

The Clear Creek Caribou Range falls within three planning regions: Peel Watershed, which overlaps the northern portion of the range; Dawson, which overlaps the west-central portion of the range; and Northern Tutchone, which overlaps the eastern and southern portions of the range (Figure 9). A final land use plan was completed for the Peel Watershed Planning Region in 2019 (PWCP 2019) and a draft plan developed for the Dawson Planning Region in 2022 (DRPC 2022) is currently being reviewed and may be revised. Land use planning for the Northern Tutchone Planning Region has not yet started.

About half of Clear Creek Caribou total range and known winter range, and most of the known calving (79%), summer (75%) and rut (97%) ranges overlap the Northern Tutchone Regional Planning Area, which currently does not have any recommended land use management zoning or direction (Figure 9, Table 13). However, the territory-wide Off-Road Vehicle (ORV) Management Area Regulation applies in alpine areas (>1400 m), which restricts the use of ORVs to existing trails, except for authorized activities or as authorized in a trail management plan (see Appendix 4).

The portion of the Clear Creek Caribou Range in the Peel Watershed Planning Region lies almost entirely within the West Hart River Land Management Unit (LMU 4), with a smaller portion in the Hart River Land Management Unit (LMU 6) (PWPC 2019, Figure 9, Table 13). Both LMUs are zoned as Wilderness Areas, which:

- are managed for conservation or protection of ecological and cultural resources and wilderness character;
- do not allow new industrial land-use disposition or new surface access; and,
- are intended as interim, not permanent, protection, which will be jointly reviewed periodically (PWPC 2019).

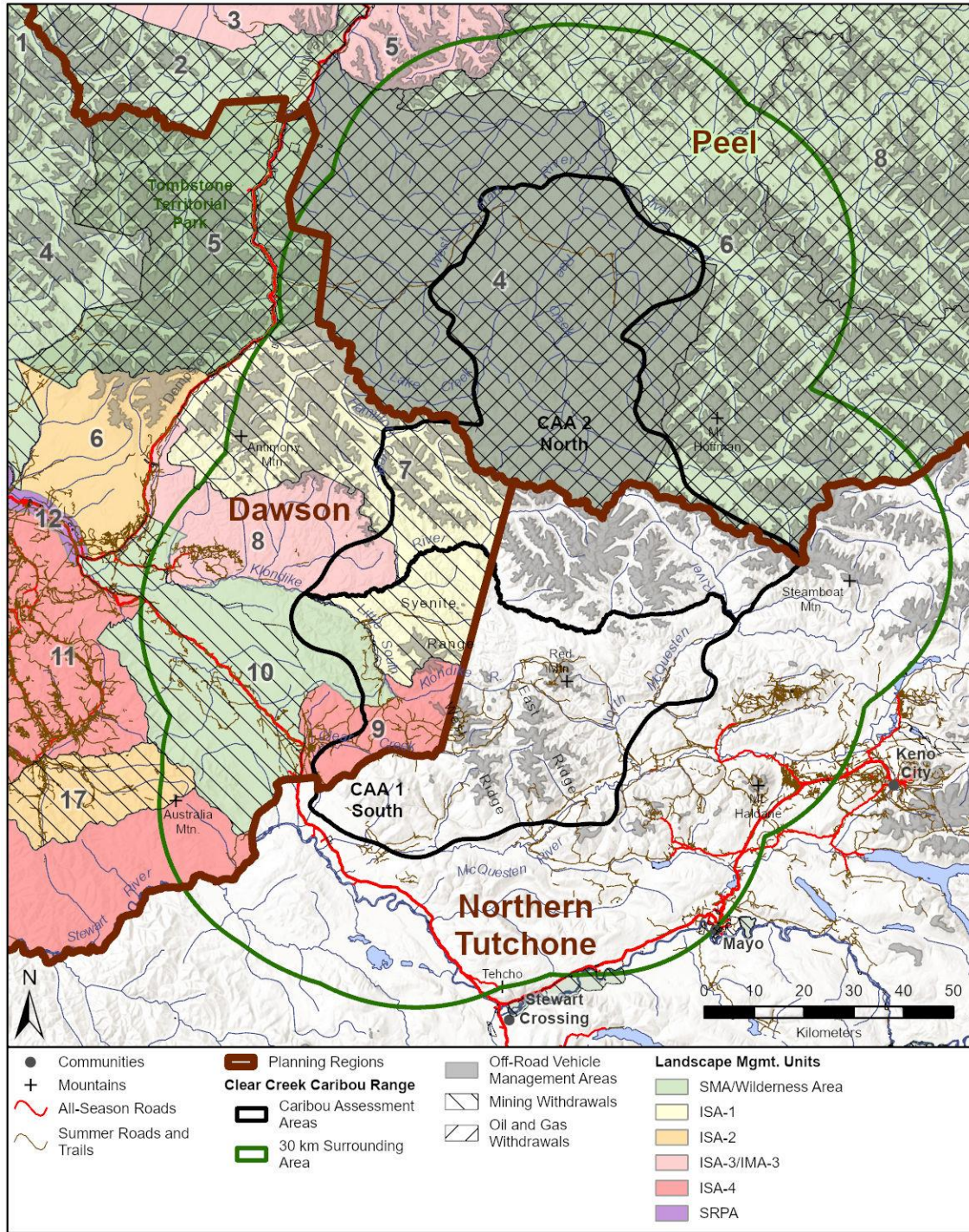


Figure 9. Planning regions and landscape management units in the Clear Creek Caribou Range. Landscape management units (LMUs) include: Wilderness Areas, Special Management Areas (SMA), Integrated Stewardship Areas (ISA; Dawson); Integrated Management Areas (IMA; Peel), and Sub-Regional Planning Area (SRPA; Dawson). LMU numbers shown within the Clear Creek Caribou Range are cross-referenced to Table 13.

Table 13. Planning Regions and Land Management Units (LMUs) that overlap the Clear Creek Caribou Range.

Land Management			% of Annual Range	% of Known Seasonal Range				Land Withdrawals for New Dispositions ²		Off-Road Vehicle Management Areas	Other
Planning Region	Unit (LMU)	Category ¹		Calving	Summer	Fall Rut	Winter	Mining	Oil and Gas		
Caribou Assessment Area 1 (South)											
Dawson	7) Wehtr'e (Antimony)	ISA1	6.5	6.6	10.3	1.0	18.0	Dec 1 2024		>1400 m	Caribou Stewardship Area
	9) Clear Creek	ISA4	4.4	3.6	0.8	1.3	7.9			>1400 m	
	10) Tintina Trench	SMA	2.5	0.0	0.0	0.0	2.2				
Northern Tutchone	N/A	N/A	29.6	49.0	43.6	52.3	43.6			>1400 m	
Caribou Assessment Area 2 (North)											
Peel Watershed	4) West Hart River	WA	30.4	4.4	4.0	0.7	15.1	Jan 1 2030	Jan 1 2030	All of LMU	
	6) Hart River	WA	1.6	0.0	0.0	0.0	0.0	Jan 1 2030	Jan 1 2030	>1400 m	
Dawson	7) Wehtr'e (Antimony)	ISA1	7.1	5.8	10.0	0.4	3.9	Dec 1 2024		>1400 m	Caribou Stewardship Area
	8) Brewery Creek	ISA3	1.9	0.5	0.0	0.0	1.4			>1400 m	
Northern Tutchone	N/A	N/A	16.1	30.2	31.3	44.4	7.8			>1400 m	
Total Area of Annual Range/Known Seasonal Ranges											
Total Area (ha)			755 700	242 697	249 025	154 337	267 327				

¹ ISA = Integrated Stewardship Area; N/A = Not applicable; SMA = Special Management Area; WA = Wilderness Area

² Orders in Council, and Ministerial Orders apply before dates indicated; see Appendix 4

Restrictions include no new mineral or placer claims, or oil and gas dispositions before January 1, 3030 (Table 13, Appendix 4). All of West Hart River LMU (4) has been identified as an ORV Management Area with ORV use allowed only on the portion of the Hart River Trail specified in the Regulation, except for authorized activities or as authorized in a trail management plan (Figure 9, Appendix 4).

The portion of the Clear Creek Caribou Range in the Dawson Planning Region overlaps portions of four LMUs, with the largest overlap with the Whetr'e (Antimony) LMU (LMU 7; DRPC 2022, Figure 9, Table 13). The Whetr'e (Antimony) LMU is categorized as an Integrated Stewardship Area (ISA) 1, which allows low levels of resource development, and is overlaid by a Caribou Stewardship Area in recognition of the importance of the area to the Clear Creek and Hart River caribou herds (DRPC 2022, Appendix 4). Restrictions include no new mineral or placer claims before December 1, 2024 (DRPC 2022, Table 13, Appendix 4). The other three LMUs include: Tintina Trench (LMU10) Special Management Area, which allows very low levels of industrial resource use (there are currently no restrictions on new mineral or placer claims in the portion of LMU10 within the Clear Creek Caribou Range); Brewery Creek (LMU8) in the ISA3 category, which allows moderate levels of industrial resource use; and, Clear Creek (LMU9) in the ISA4 category, which allows for high levels of industrial resource use (DRPC 2022, Table 13, Appendix 4). Recommended LMU boundaries and protection/resource use levels in the Dawson Recommended Land Use Plan (DRPC 2022) are still draft and may be revised.

Currently, there are no protected areas within the Clear Creek Caribou Range (Figure 9).

3.4 Tourism, Recreation and Hunting

Limited information is available on recreation and tourism in the Clear Creek Caribou Range. The area around the headwaters of Lake Creek and Rae Creek has been identified as having high potential for wilderness recreation/tourism activities, and wilderness horseback riding opportunities have been identified in the Lake Creek headwaters, and Clear Creek/West Ridge areas (PWPC 2019, DRPC 2022).

Portions of two Outfitter Concessions are included in the Clear Creek Caribou Range (Figure 10). About 30% of Outfitter Concession #3 (Tombstone Outfitters) overlaps the western portion of the range, and about 18% of Outfitter Concession #4 (Midnight Sun Outfitting Ltd.) overlaps the eastern portion of the range. There is no Outfitter Concession in the southern portion of the range.

The Clear Creek Caribou Range includes all or most of seven Game Management Areas (247, 249, 253, 254, 255, 256, 260) and portions of four (248, 250, 252, 259) (Figure 10). The main Game Management Areas overlapping the Known Fall Rut Range are 252-256 and 259. The hunting season for caribou in the Clear Creek Caribou Range runs from August 1 to October 31, with a harvest limit of one male caribou per licensed hunter (Government of Yukon 2022a). There are no Outfitter Concessions overlapping Game Management Areas 253 and 256-258.

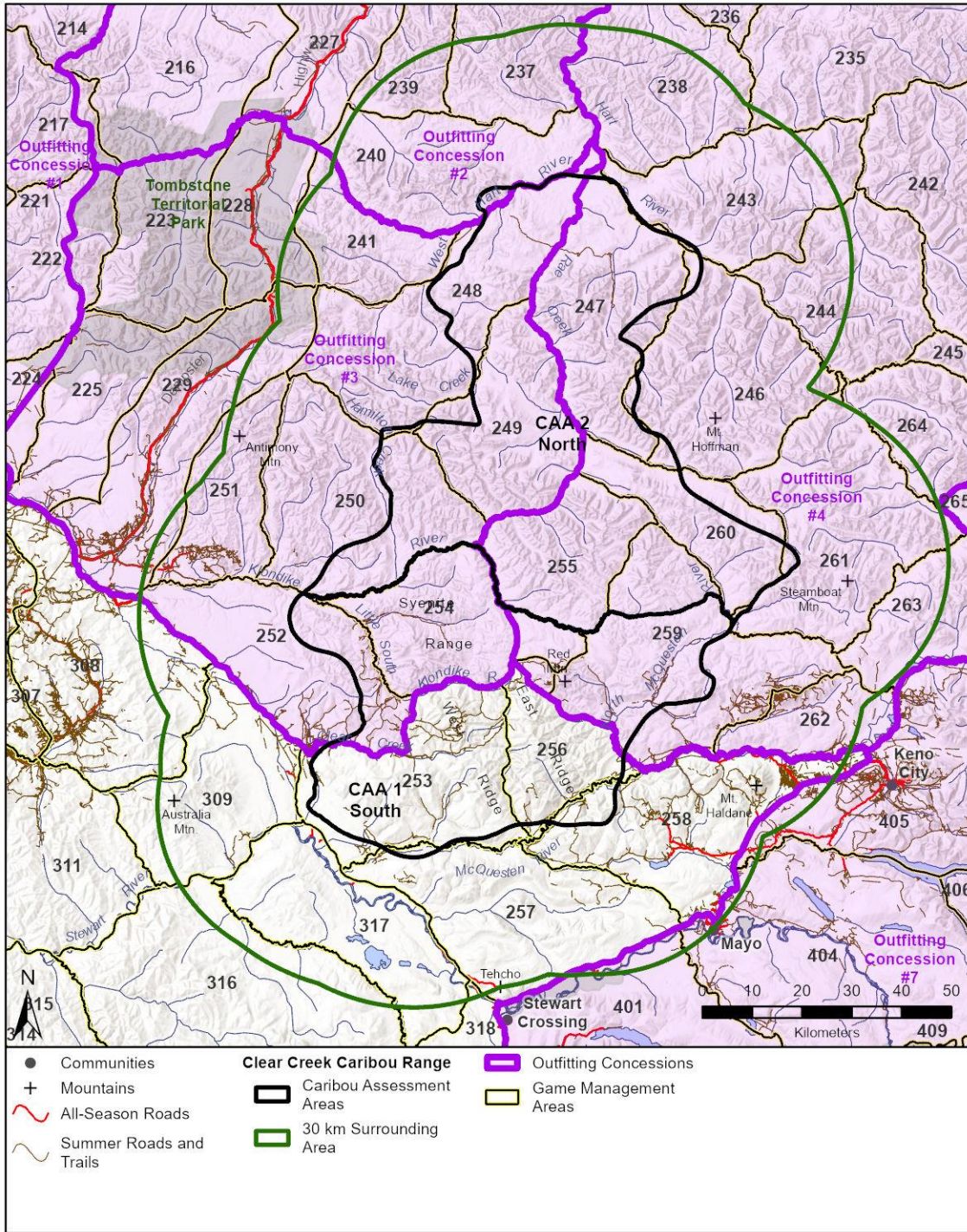


Figure 10. Game Management Areas and Outfitting Concessions in the Clear Creek Caribou Range.

3.5 Resource Use Tenures

Current (2022) resource use tenures are predominantly quartz claims and placer claims with the greatest concentration in the southern part of the range in the Clear Creek, West Ridge and East Ridge areas, where quartz claims cover 25% of CAA1 (South) (Table 14, Figure 11). Extensive areas of quartz and mineral claims are also located adjacent to the southeast and west-central portions of the range. Much of the northern portion of the range in CAA2 (North) was withdrawn from mineral exploration (69%) and oil and gas dispositions (56%) in 2021 and 2022. Lands withdrawn from disposition in the Dawson Planning Region expire in December 2024 while lands withdrawn from disposition in the Peel Watershed Planning Region expire in 2030 (Table 13). Quartz claims that were active prior to the withdrawals and have not yet expired overlap some of the withdrawal areas. Currently, only 3 ha are covered by forestry cutting permits in the range.

Table 14. Area covered by current (2022) resource use tenures and land use restrictions in the Clear Creek Caribou Range.

Tenure/Land Use Restriction	Area (ha)				
	Annual Range	Known Seasonal Range			
		Calving	Summer	Fall Rut	Winter
Caribou Assessment Area 1 (South)					
Quartz claim	78 264	52 155	53 599	46 267	42 466
Placer claim	12 098	6 484	5 615	4 723	7 900
Placer lease	602	602	602	602	602
Cutting permit	3	0	0	0	0
Mining withdrawal	49 543	16 158	25 897	1 495	48 422
Oil and gas withdrawal	0	0	0	0	0
ORVM restriction	24 828	21 593	22 321	19 380	17 373
Total area	324 954	143 573	136 059	84 173	191 789
Caribou Assessment Area 2 (North)					
Quartz claim	6202	0	0	0	0
Placer claim	0	0	0	0	0
Placer lease	0	0	0	0	0
Cutting permit	0	0	0	0	0
Mining withdrawal	295 113	24 740	34 933	1 697	50 735
Oil and gas withdrawal	241 411	10 769	10 058	1 115	40 251
ORVM restriction	296 469	47 549	54 270	32 520	44 043
Total area	430 746	99 125	112 966	70 164	75 537
Total (CAA1 + CAA2)					
Quartz claim	84 467	52 155	53 599	46 267	42 466
Placer claim	12 098	6 484	5 615	4 723	7 900
Placer lease	602	602	602	602	602
Cutting permit	3	0	0	0	0
Mining withdrawal	344 656	40 897	60 829	3 192	99 156
Oil and gas withdrawal	241 411	10 769	10 058	1 115	40 251
ORVM restriction	321 297	69 142	76 591	51 900	61 416
Total area	755 700	242 697	249 025	154 337	267 327

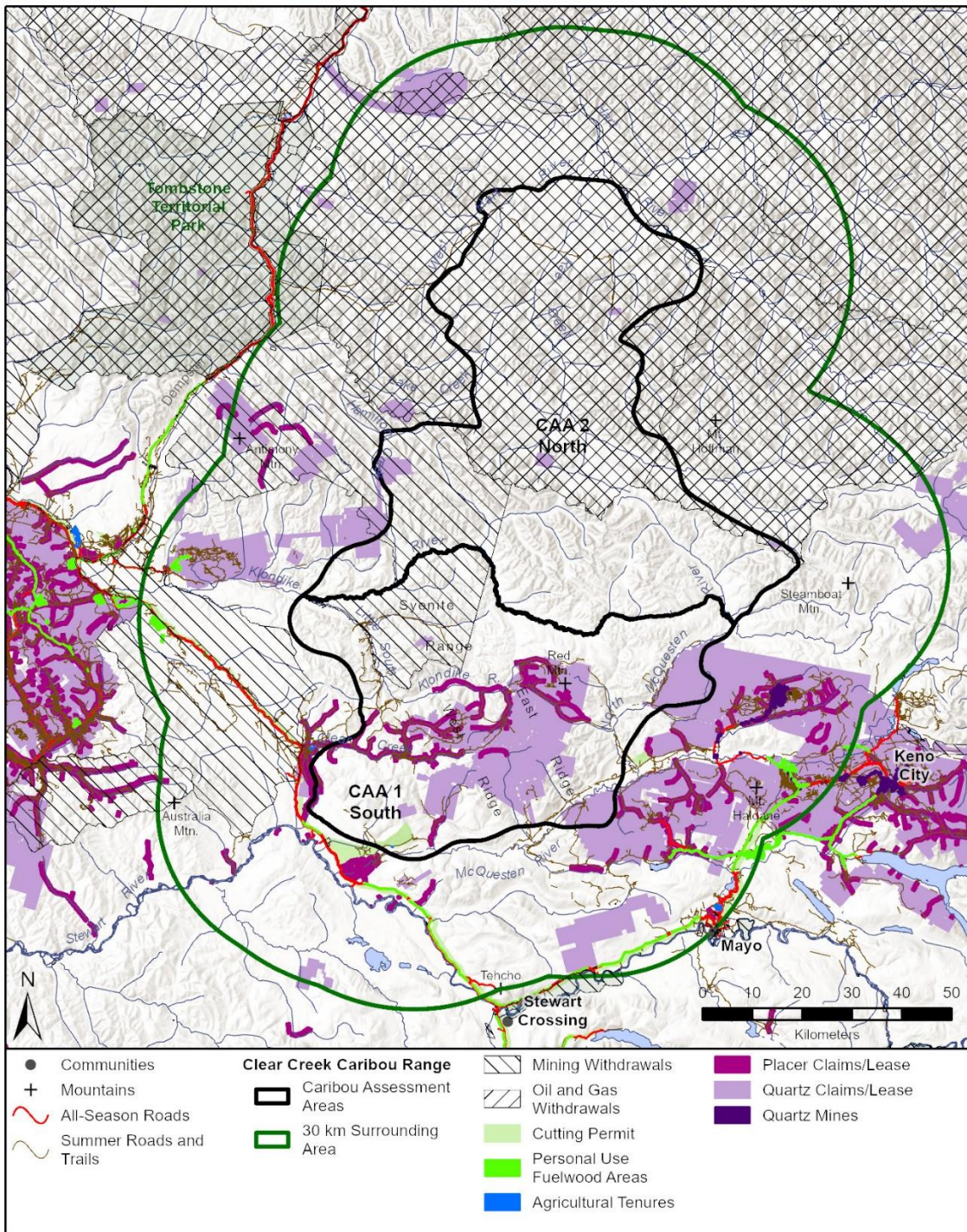


Figure 11. Current (2022) resource use tenures in the Clear Creek Caribou Range. Mining and oil and gas withdrawals were implemented in the Peel Planning Region (northern portion of range) in 2020 and in the Dawson Planning Region (western portion of range) in 2021 and 2022 respectively.

3.5.1 Mineral Exploration and Development

Mineral exploration and development began in the Clear Creek Caribou Range in the late 1970s with the first quartz claims staked in 1978 (Potié 2022, Figure 12). By 1988, most of West Ridge was staked and by 1994 exploration had expanded into East Ridge and Red Mountain (Potié 2022). The greatest increase in the area covered by quartz and mineral claims occurred after metal prices increased in 2010 (Potié 2022, Figure 12). Expansion of mineral exploration activities in areas adjacent to the herd range followed a similar pattern to the expansion pattern within the range (Figure 12).

3.6 Human Habitat Disturbance Footprint (Current)

Linear features and areal disturbances caused by human activities are concentrated in CAA1 (South), primarily in the Clear Creek drainage, West Ridge, the northern portion of East Ridge, and the area around Red Mountain (Figure 13). Concentrations of human-caused areal disturbances are also located in areas adjacent to the Clear Creek Caribou Range to the southeast, to the southwest in the Clear Creek drainage, and along Highway 2.

Linear features in the Clear Creek Caribou Range total 764 km, with the highest density in CAA1 (South) at 0.22 km/km² (Table 15).

Table 15. Total length and density of linear features in the Clear Creek Caribou Range based on 2022 surface disturbance mapping (satellite imagery from 2013-2019).

Caribou Assessment Area	Area (km ²)	Total Length of Linear Features (km)	Average Density of Linear Features (km/km ²)
CAA1 (South)	3 250	716	0.22
CAA2 (North)	4 307	48	0.01
Total Range (CAA1+CAA2)	7 557	764	0.10

Although some individual disturbances may have been underestimated, overestimated and/or misclassified, placer mining is by far the dominant areal disturbance in the Clear Creek Caribou Range, directly affecting over 1,000 ha, and is most prominent in the CAA1 (South) portion of the known winter range (Table 16, Figure 14). Clearings are also most prominent in the CAA1 (South) portion of the known winter range.

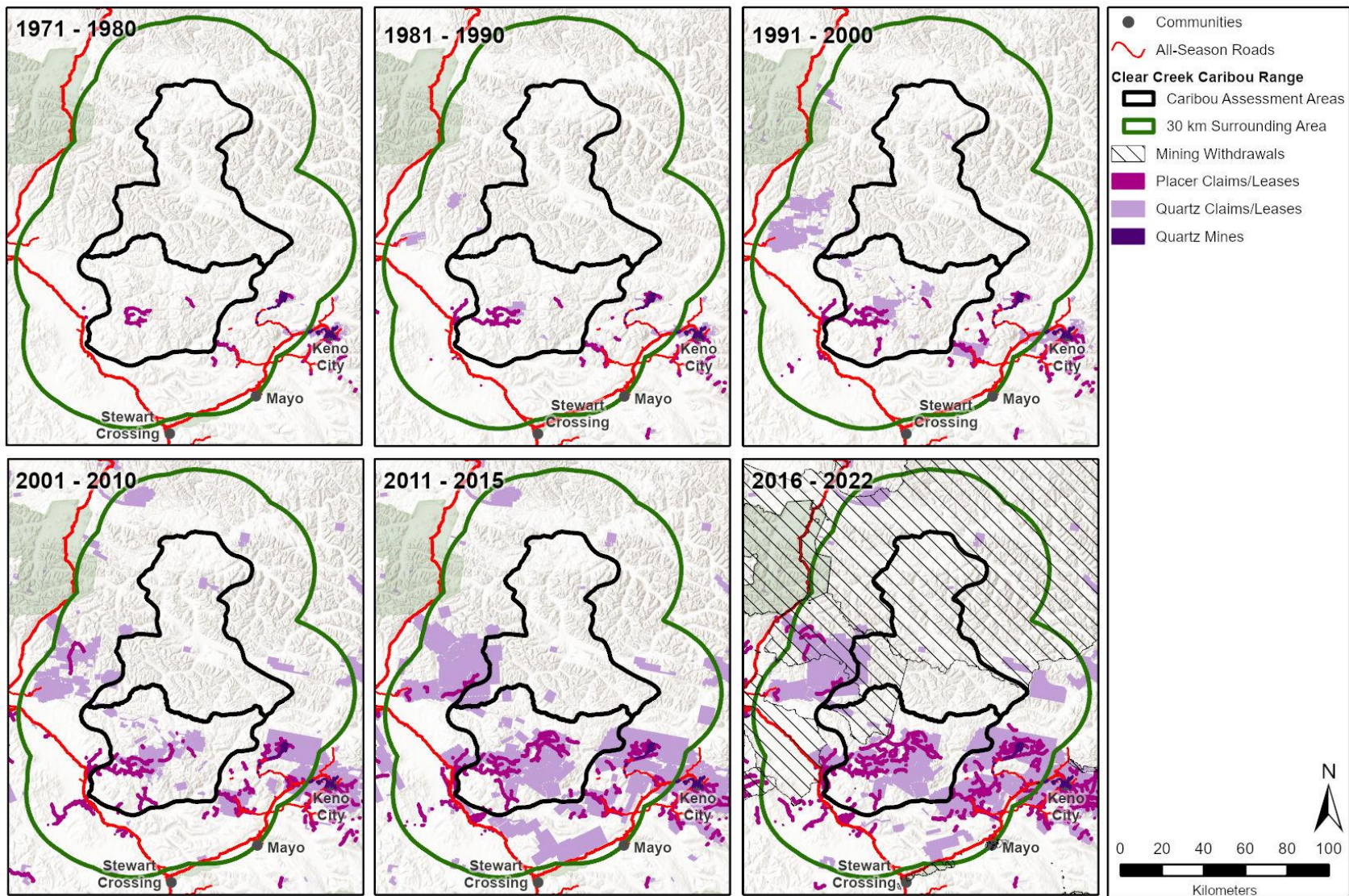


Figure 12. Mining tenures in the Clear Creek Caribou Range from 1971 to 2022. Mining withdrawals were implemented in the Peel Planning Region (northern portion of range) in 2020 and in the Dawson Planning Region (western portion of range) in 2021 and 2022 respectively. Locations of roads are based on spatial information from 2022.

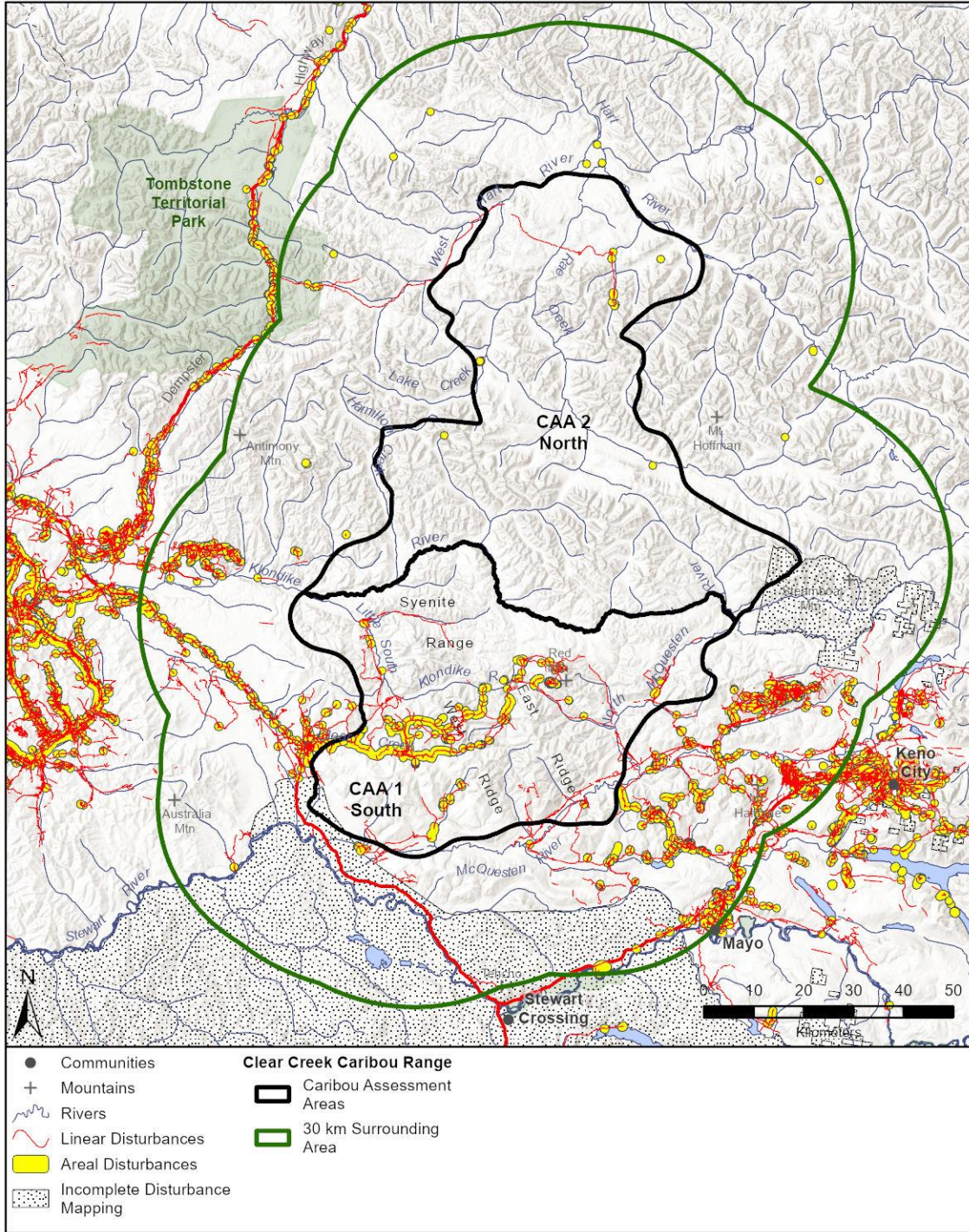


Figure 13. Habitat disturbance footprint due to human activities in the Clear Creek Caribou Range based on 2022 Yukon Surface Disturbance Mapping (satellite imagery from 2013-2019). A small buffer has been added to areal disturbances to make them more visible on the map. Incomplete Disturbance Mapping = portions of the map that may not include all habitat disturbances due to human activities.

Table 16. Area directly affected by human-caused habitat disturbances in the Clear Creek Caribou Range based on 2022 Yukon Surface Disturbance Mapping (satellite imagery from 2013-2019).

Disturbance Type	Area affected by human-caused habitat disturbances (ha)				
	Annual Range	Known Seasonal Range			
		Calving	Summer	Fall Rut	Winter
Caribou Assessment Area 1 (South)					
Airstrip	7.7	3.4	3.4	3.4	3.4
Clearing	16.1	1.0	4.8	1.0	12.4
Cul-de-sac/Turn Area	1.2	1.0	1.0	1.0	1.2
Pullout/Turn Area	1.5	1.5	1.5	1.5	1.5
Gravel Pit/Quarry	0.2	0.1	0.1	0.1	0.2
Drill Pad	2.5	2.4	2.4	2.4	2.4
Mining - Building	0.0	0.0	0.0	0.0	0.0
Mining - Camp	2.4	0.2	0.2	0.2	2.4
Mining - Unspecified	0.6	0.6	0.6	0.2	0.2
Placer Mining - Minor	14.6	12.5	12.3	12.3	12.5
Placer Mining - Significant	1025.6	247.4	161.1	164.6	809.8
Quartz Mining - Minor	5.2	0.8	0.8	0.8	5.2
Other Camps	0.6	0.5	0.5	0.5	0.6
Unknown	0.1	0.1	0.1	0.1	0.1
Linear Features ¹	434.6	157.4	153.4	135.8	257.0
Total Area Disturbed ²	1454.9	408.4	328.3	310.6	1059.2
Total Area CAA1	324 954	143 573	136 059	84 173	191 790
Caribou Assessment Area 2 (North)					
Airstrip	4.0	0.0	0.0	0.0	0.0
Mining - Building	1.4	0.0	0.0	0.0	0.0
Other Camps	1.6	0.0	0.8	0.0	0.0
Linear Features ¹	51.2	0.0	0.0	0.0	21.5
Total Area Disturbed ²	57.2	0.0	0.8	0.0	21.5
Total Area CAA2	430 745	99 125	112 966	70 164	75 537
Total (CAA1 + CAA2)					
Airstrip	11.8	3.4	3.4	3.4	3.4
Clearing	16.1	1.0	4.8	1.0	12.4
Cul-de-sac/Turn Area	1.2	1.0	1.0	1.0	1.2
Pullout/Turn Area	1.5	1.5	1.5	1.5	1.5
Gravel Pit/Quarry	0.2	0.1	0.1	0.1	0.2
Drill Pad	2.5	2.4	2.4	2.4	2.4
Mining - Building	1.4	0.0	0.0	0.0	0.0
Mining - Camp	2.4	0.2	0.2	0.2	2.4
Mining - Unspecified	0.6	0.6	0.6	0.2	0.2
Placer Mining - Minor	14.6	12.5	12.3	12.3	12.5
Placer Mining - Significant	1025.6	247.4	161.1	164.6	809.8
Quartz Mining - Minor	5.2	0.8	0.8	0.8	5.2
Other Camps	2.2	0.5	1.3	0.5	0.6
Unknown	0.1	0.1	0.1	0.1	0.1
Linear Features ¹	485.8	157.4	153.4	135.8	278.5
Total Area Disturbed ²	1512.1	408.4	329.1	310.6	1080.6
Total Area CAA1+CAA2	755 700	242 697	249 025	154 337	267 327

¹ Area for linear features was calculated by multiplying linear feature length by width, provided in 2022 Yukon Surface Disturbance Mapping

² The Total Area Disturbed calculation excludes portions of linear features where they overlap with area-based disturbances to avoid double-counting the area of overlap; therefore, Total Area Disturbed presented in this table is lower than what is calculated by simply summing areas of all individual disturbances, including linear disturbances.

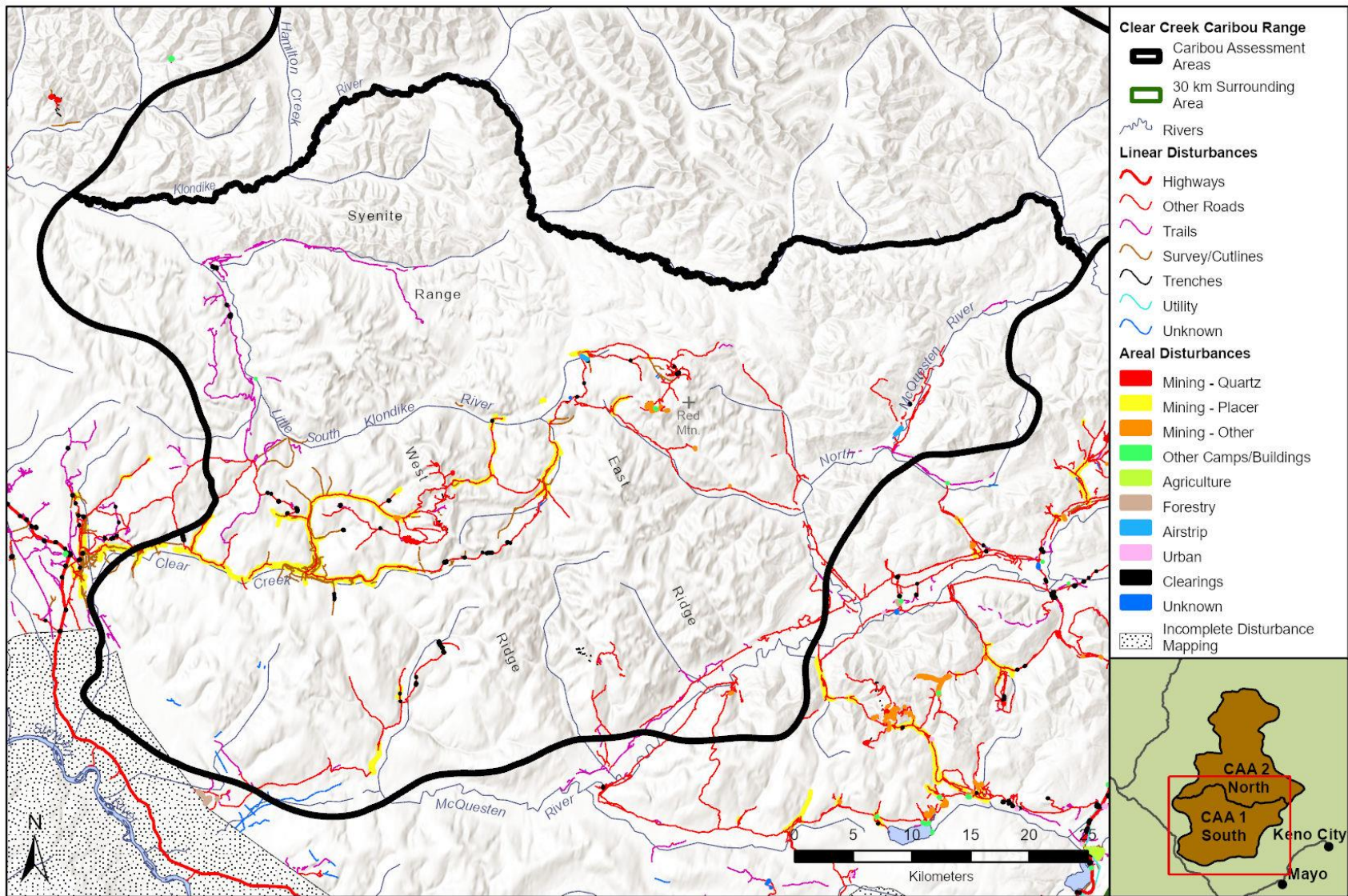


Figure 14. Habitat disturbance footprint due to human activities in the southern portion of the Clear Creek Caribou Range based on 2022 Yukon Surface Disturbance Mapping (satellite imagery from 2013-2019). Incomplete Disturbance Mapping = portions of the map that may not include all habitat disturbances due to human activities.

3.7 Natural Disturbances

3.7.1 Fire

Fire disturbance has primarily affected the southern portion of the Clear Creek Caribou Range with few fires recorded in the northern portion (Table 17, Figure 15). The greatest effect of fires ≤ 50 years is on the CAA1 (South) portion of the known winter range, where 26% of the total area and 34% of the area covered by vegetated fuel types have been affected (Table 17). The known fall rut range, which is dominated by high elevation habitats, is the least affected known seasonal range.

Most of the area burned in the Clear Creek Caribou Range was burned during four fire years: 1994, 1999, 2013 and 2021 (Figure 16). In 2021, the area burned included a single fire that was 18 473 ha in size in the southwestern portion of CAA1 (South).

Fire activity has also been high in the 30-km Surrounding Area adjacent to the southern portion of the range, including a 111 000 ha fire straddling the Stewart River in 2019 (Figure 15). Fires adjacent to the range can affect the Clear Creek Caribou Herd by increasing habitat favoured by moose and altering predator/prey dynamics both outside and inside the range.

Table 17. Total area burned by recorded fires less than 50 years old (1973-2022) in the Clear Creek Caribou Range.

Fires ≤ 50 years (1973-2022)	Annual Range	Known Seasonal Range			
		Calving	Summer	Fall Rut	Winter
Caribou Assessment Area 1 (South)					
Area burned (ha) ¹	71 785	26 024	32 011	7 527	50 870
% burned of annual/known seasonal range	22.1	18.1	23.5	8.9	26.5
% burned of vegetated fuel types in range ²	26.3	26.0	35.9	14.8	33.7
Total area (excluding water)	324 942	143 573	136 059	84 173	191 789
Caribou Assessment Area 2 (North)					
Area burned (ha) ¹	12 825	2 008	1 317	943	4 580
% burned of annual/known seasonal range	3.0	2.0	1.2	1.3	6.1
% burned of vegetated fuel types in range ²	5.6	5.8	3.3	2.9	7.2
Total area (excluding water)	430 510	99 106	112 947	70 152	75 519
Total (CAA1 + CAA2)					
Area burned (ha) ¹	84 610	28 032	33 328	8 470	55 450
% burned of annual/known seasonal range	11.2	11.6	13.4	5.5	20.7
% burned of vegetated fuel types in range ²	17.5	20.9	27.4	11.7	26.3
Total area (excluding water)	755 452	242 679	249 006	154 324	267 308

¹ Area burned represents the combined area burned since 1973. In some areas, more recent fires overlapped older fires; in these cases the area of overlap was attributed to the most recent fire to avoid double-counting the area burned.

² Vegetated fuels types include areas that can potentially burn (i.e. excludes rocky areas, water, etc.).

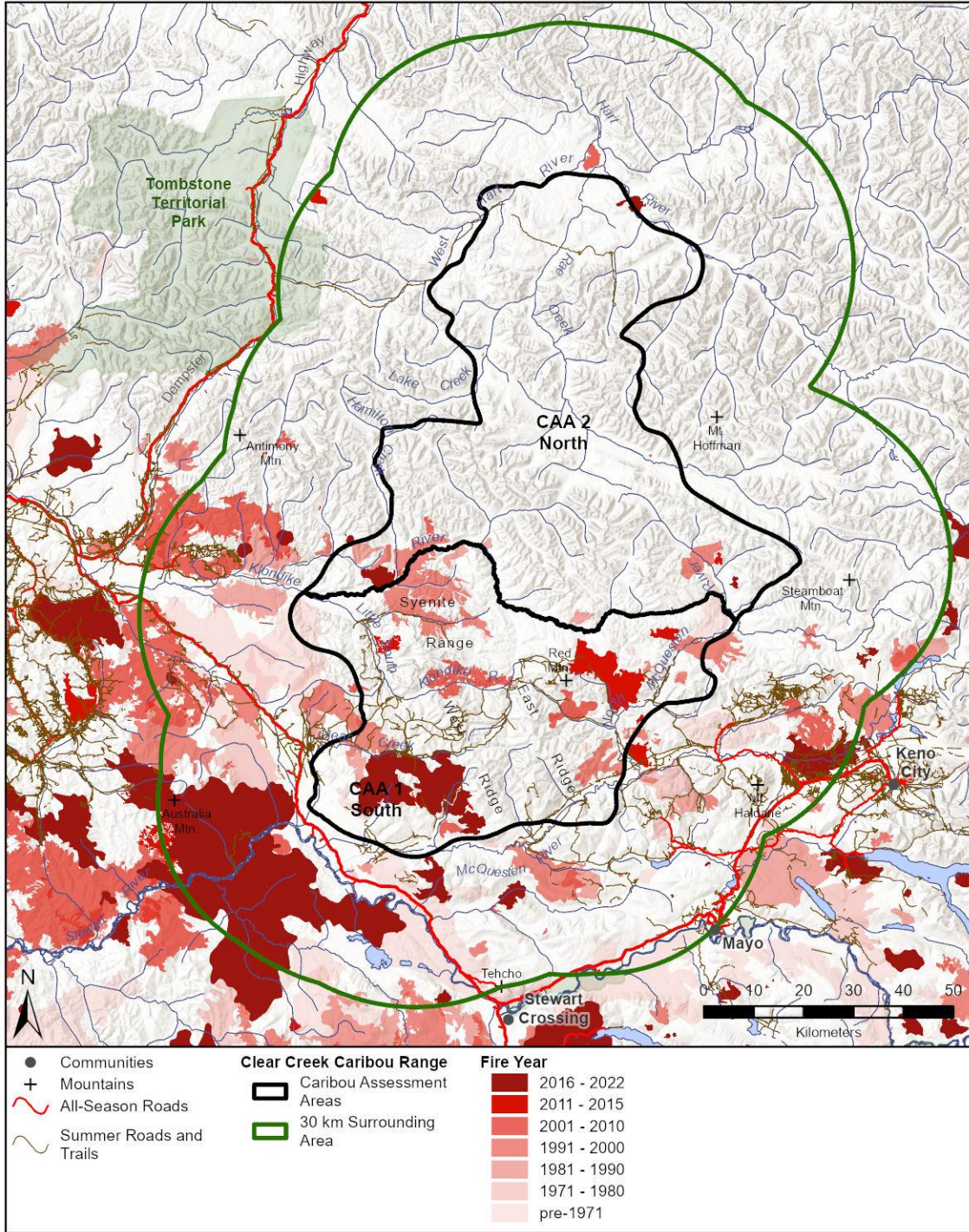


Figure 15. Areas burned by recorded fires in the Clear Creek Caribou Range from 1951 to 2022.

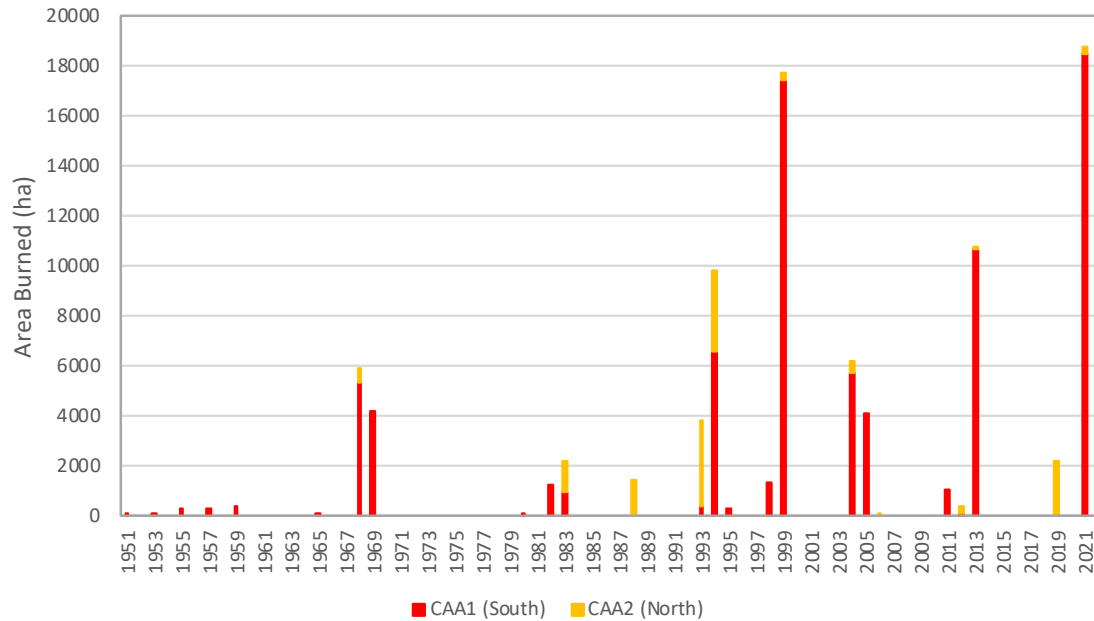


Figure 16. Total area burned by recorded fires each year from 1951 to 2022 in the Clear Creek Caribou Range.

3.8 Clear Creek Caribou

3.8.1 Population Condition

3.8.1.1 Population size and trend

Population size of the Clear Creek Caribou Herd was estimated at 900 caribou in 2001 and 792 in 2018 (O'Donoghue et al. 2001, Russell et al. 2023, Table 18). Issues with calculating a correction for sightability for the 2001 survey meant that it was not possible to statistically assess whether population size had changed between the two surveys. However, based on results available from the two surveys, Russell et al. (2023) suggested that it is likely that the Clear Creek Caribou Herd is either stable or decreasing slightly, and very unlikely that the population is increasing. Low calf recruitment (see below) suggests that the population is likely declining.

Table 18. Population estimates for the Clear Creek Caribou Herd.

Date	Survey Method	Population Estimate	95% Confidence Interval
March 1991	Stratified Random Block	900	-
October 2018	Mark-Resight	792	767-820

3.8.1.2 Calf recruitment

Calf recruitment has been chronically low for fall rut surveys conducted after 2003, with values below the level indicating population stability during six of eight surveys conducted between 2007 and 2020 (Figure 17, O'Donoghue 2020). Of the four most recent surveys, calf recruitment was sufficient to suggest population stability during only 2018, and the second lowest calf recruitment of all 12 surveys conducted since 1997 (11.7 calves/100 cows) was observed during the most recent survey in 2020. Calf recruitment was lowest in 2009 (2.9 calves/100 cows). Low calf recruitment that year and in 2001 were likely due to late spring weather conditions (O'Donoghue 2001, 2009).

Late winter calf recruitment based on a population survey in March 2001 was also low at 11 calves/100 cows and may have been due to a late wet spring in 2000 (O'Donoghue et al. 2001).

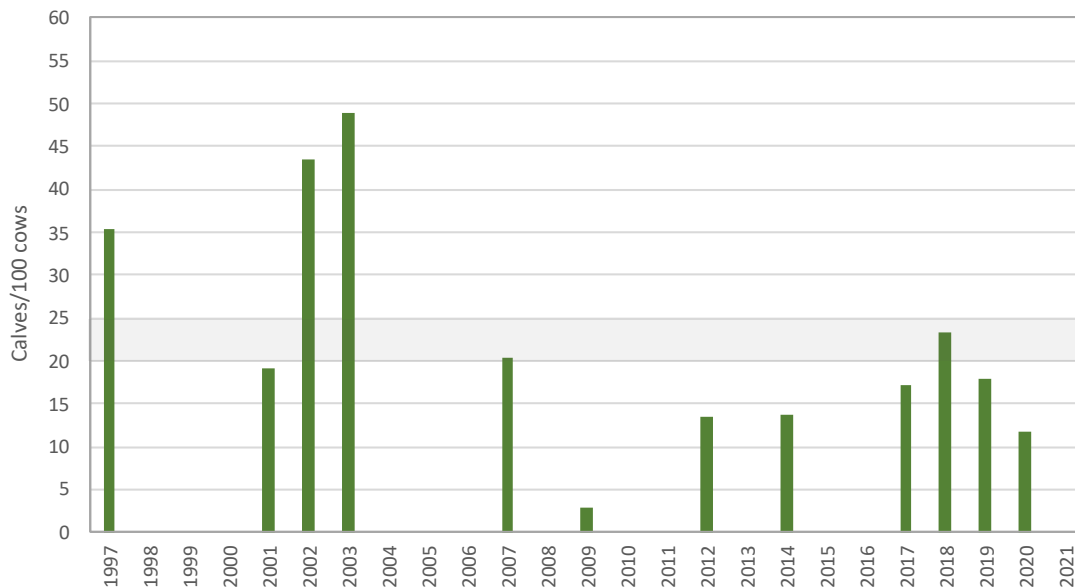


Figure 17. Calf recruitment (number of calves per 100 cows) observed during fall rut surveys conducted in late September to early October for the Clear Creek Caribou Herd from 1997 to 2021. Shaded area indicates range of ratio (20-25 calves/100 cows) for stable population growth (Environment Yukon 2016a).

Consistently low calf recruitment from 2017 to 2020 occurred while bull/100 cows ratios were very high (Figure 17, Figure 18). Although the high bulls/100 cows ratios may be the result of variation in timing of rutting group formation (O'Donoghue 2020), if the high ratios do represent the population condition, then there should be a sufficient number of bulls to ensure that all cows have the opportunity to breed. High bulls/100 cows ratios, and a 97% pregnancy rate for 35 adult female caribou captured during collaring sessions for the 2017 to 2019 satellite-collared caribou study (Yukon Fish and Wildlife Branch, unpubl. data), suggest that low

calf recruitment is likely the result of post-natal calf mortality rather than low adult female pregnancy rates.

Poor calf recruitment has been associated with high levels of industrial activities. For boreal caribou in Canada, EC (2011) found a negative relationship between calf recruitment and total habitat disturbance (fire + human-caused habitat disturbance). Two contributing factors were linear human-caused disturbances, which had a highly significant negative influence on calf survival, and the proportion of the caribou total range that consisted of large undisturbed patches, which positively influenced calf recruitment (EC 2011). A further analysis of boreal caribou ranges in Canada found that of the total habitat disturbance on caribou ranges, human-caused habitat disturbance had a three to four times greater negative impact on calf survival than fire (Johnson et al. 2020).

3.8.1.3 Adult mortality

There is currently no information available about causes and rates of adult mortality other than licensed hunter harvest (see Section 3.8.1.5). Issues with malfunctioning collars during the 2017-2019 GPS collared caribou study made it difficult to reliably determine mortality rates and causes (K. Russell, pers. comm.). Adult mortality rate and causes will be important to determine in order to identify management tools for addressing the likely declining population trend.

3.8.1.4 Bull:cow ratios

Bulls/100 cows ratios were higher than the 30 bulls/100 cows recommended by *Science-based Guidelines for Management of Northern Mountain Caribou in Yukon* (Environment Yukon 2016a) for 10 of 12 fall rut surveys conducted from 1997 to 2021 (Figure 18). However, sex ratios equal to or above 50 bulls/100 cows, the Yukon average for lightly hunted populations, were observed during only five surveys. The low bulls/100 cows ratio in 2007 may have been due to caribou rutting earlier or later than usual, or caribou rutting in areas that were different from those they used historically (O'Donoghue 2007).

Bulls/100 cows ratios were very high for three of four of the most recent surveys (Figure 18). The higher bulls/100 cows ratios from 2017 to 2020 correspond to a time period with relatively low bull harvest (see below). O'Donoghue (2020) suggested that the high ratios likely reflected variation in timing of rutting group formation in relation to survey timing, rather than actual variation in the bulls/100 cows ratio.

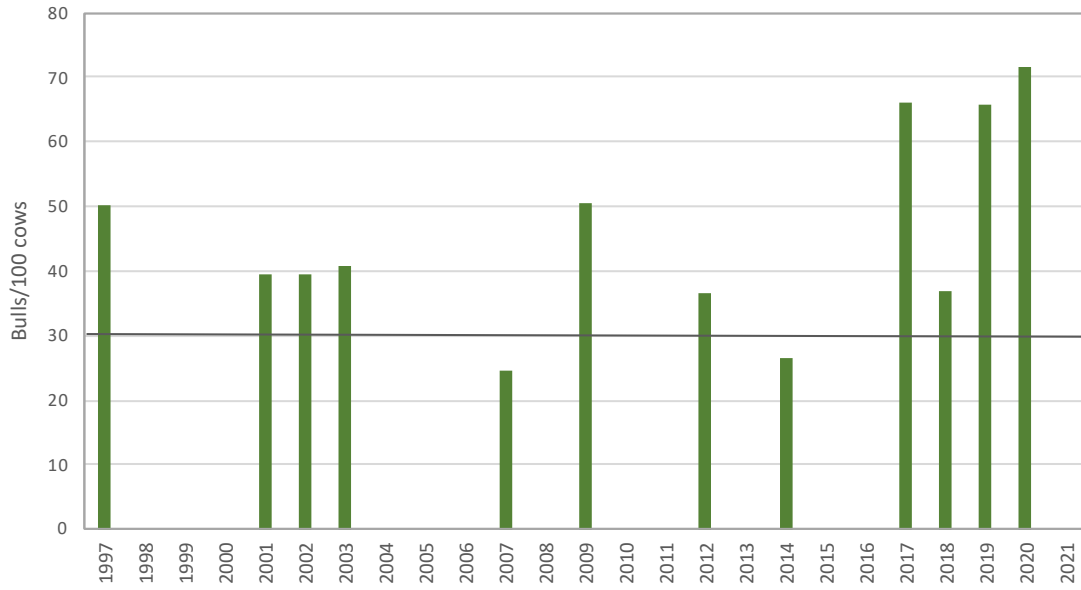


Figure 18. Number of bulls per 100 cows observed during fall rut surveys conducted in late September to early October for the Clear Creek Caribou Herd from 1997 to 2021. Black horizontal line indicates the minimum value (30 bulls/100 cows) to ensure that all females have an opportunity to reproduce (Environment Yukon 2016a).

3.8.1.5 Licensed harvest

Total licensed harvest ranged from four to 18 bulls per year from 1995 to 2021 (Figure 19). During most years, the majority of bulls were harvested from the road-accessible southern portion of the range in Game Management Areas (GMAs) 253 and 256, primarily by resident hunters. Only two bulls were harvested by non-residents guided by outfitters from 1995 to 2021: 1 in 2012 in GMA252, and 1 in 2021 in GMA255. Total harvest peaked at 18 in 2012 then gradually declined to a low of four in 2021. A reduction in harvest in GMA253 influenced the overall reduction in harvest since 2012. The reduction in harvest corresponded to caribou shifting their use of rutting ranges away from traditional rutting areas in CAA1 (South), which now have higher levels of road access and resource use, to rutting range in CAA2 (North), north of the Klondike and North McQuesten rivers (see Section 3.8.2.1). It is unlikely that Covid19 pandemic restrictions resulted in reduced resident harvest effort and levels in 2020 and 2021 since there were no travel restrictions for resident hunters during the hunting seasons those two years.

Due to the length of time between the population surveys conducted in 2001 and 2018, it is difficult to determine what population trend was throughout the 17-year time period to assess whether annual harvests exceeded recommended maximums. Using the current population estimate of 792, annual harvest exceeded the recommended harvest rate of 2% (16 bulls) in 2 out of 11 years from 2011 to 2021 assuming a stable population, and exceeded the recommended harvest rate of 1% (8 bulls) in 6 out of 11 years from 2011 to 2021 assuming a declining or unknown population trend.

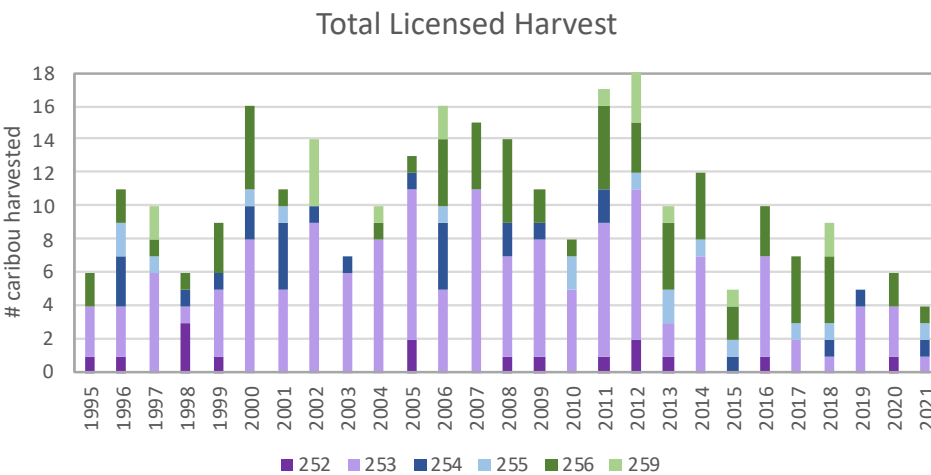
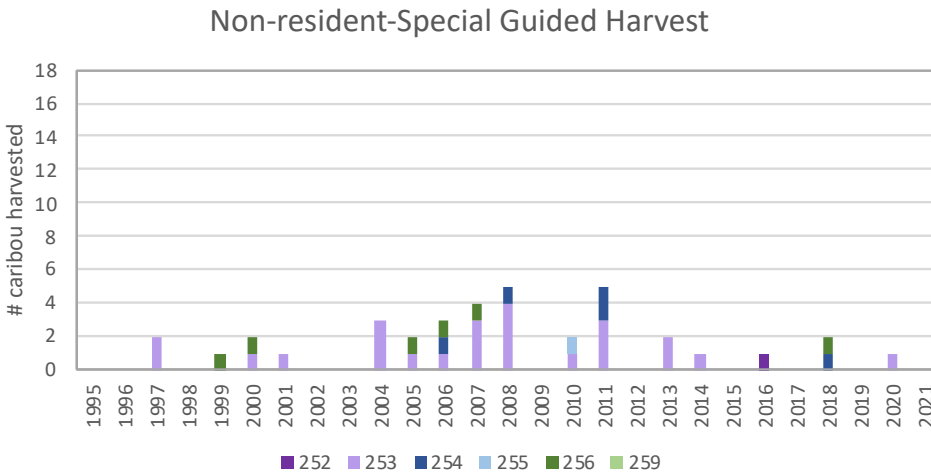
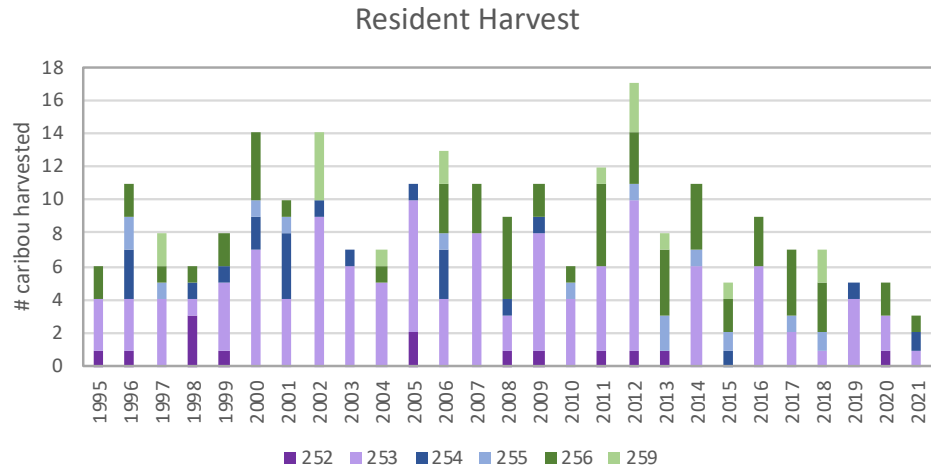


Figure 19. Licensed harvest of Clear Creek Caribou bulls from 1995 to 2021. Total licensed harvest includes 1 non-resident harvest in 2012 in General Management Area (GMA) 252, and 1 non-resident harvest in 2021 in GMA255.

3.8.1.6 Population limiting factors

Although there is no information on population limiting factors specifically for the Clear Creek Caribou Herd, wolves are the primary predator of caribou in other Northern Mountain Caribou ranges in Yukon (Farnell and McDonald 1988, Hayes et al. 2003). Bear and wolverine (*Gulo gulo*) predation have also contributed to adult and calf mortality in other areas (McNay 2009, Cichowski 2015). Although predation is the main direct cause of caribou mortalities in Canada, habitat disturbance from industrial activities and fire leading to changes in predator/prey relationships is the ultimate cause of population declines (Festa-Bianchet et al. 2011).

3.8.2 Seasonal Movements and Habitat Use

Seasonal movements and habitat use patterns of Clear Creek Caribou are summarized in Section 1.2.2. The following section focusses on shifts in seasonal ranges between the VHF radio-collared caribou study (1997-2001) and the GPS satellite-collared caribou study (2017-2019).

3.8.2.1 Seasonal Range Shifts

Overall, collared caribou during both 1997-2001 and 2017-2019 studies primarily used high elevations during the snow-free season, and lower elevations during winter (O'Donoghue et al. 2001, O'Donoghue 2002, Potié 2022). However, distribution of caribou during calving, summer, rut and winter seasons differed between the two studies (Potié 2022).

During calving, VHF radio-collared caribou from 1997 to 2001 were widely distributed throughout the West Ridge, East Ridge, and Red Mountain portions of their range south of the Klondike River, and to a lesser extent in the mountain range north of the Klondike River and west of North McQuesten River (Figure 20, Potié 2022). Although some GPS satellite-collared caribou still used the southern part of that area, GPS satellite-collared caribou use was more focussed in the mountain range north of the Klondike River and west of North McQuesten River.

Similar to calving, VHF radio-collared caribou also used areas in CAA1 (South) during summer, but locations were more concentrated on West Ridge, East Ridge and Red Mountain than during calving (Figure 21). Some VHF radio-collared caribou also used the mountain range north of the Klondike River. GPS satellite-collared caribou locations were more concentrated in the mountain range north of the Klondike River, although another area of concentration was located on Red Mountain and some caribou used West Ridge, East Ridge and the Syenite Range.

During the fall rut, VHF radio-collared caribou were found primarily on West Ridge, East Ridge, Red Mountain and the southern portion of the mountain block north of the Klondike River and west of North McQuesten River, while GPS satellite-collared caribou used primarily the central portion of the mountain block north of the Klondike River with a smaller concentration on East Ridge (Figure 22).

VHF radio-collared caribou during winter were widely distributed in low elevation areas in the southern portion of the Clear Creek Caribou Range, primarily in the Clear Creek, Little South Klondike River and Klondike River drainages while GPS locations were concentrated in the area northwest of Red Mountain (Figure 23). Although the recent concentrated use area was

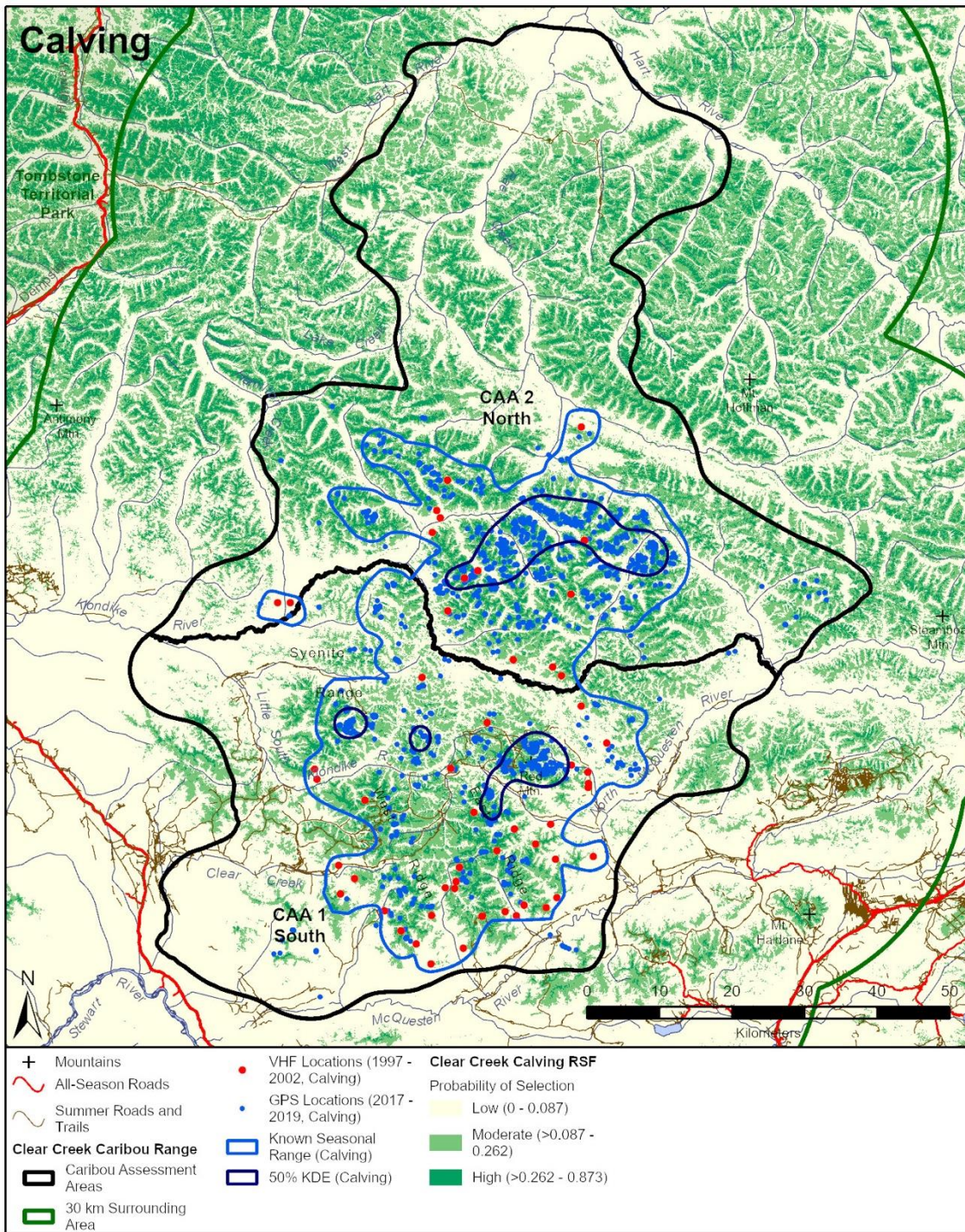


Figure 20. Recent concentrated use (50% GPS KDE), historical use (VHF locations) and predicted habitat value (probability of selection by caribou) for Clear Creek Caribou during calving. RSF = Resource Selection Function. KDE = Kernel Density Estimate based on GPS locations (2017-2019).

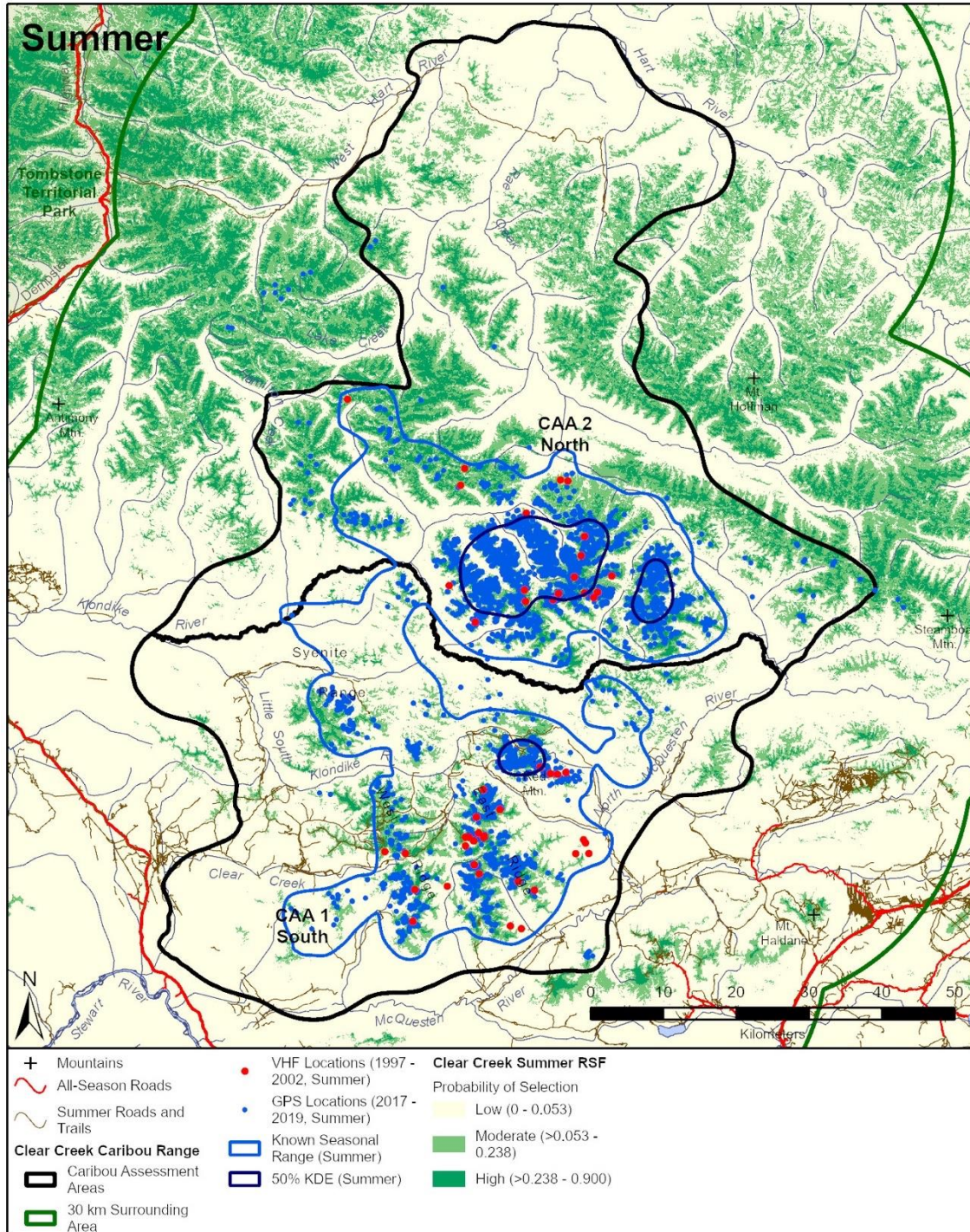


Figure 21. Recent concentrated use (50% GPS KDE), historical use (VHF locations) and predicted habitat value (probability of selection by caribou) for Clear Creek Caribou during summer. RSF = Resource Selection Function. KDE = Kernel Density Estimate based on GPS locations (2017-2019).

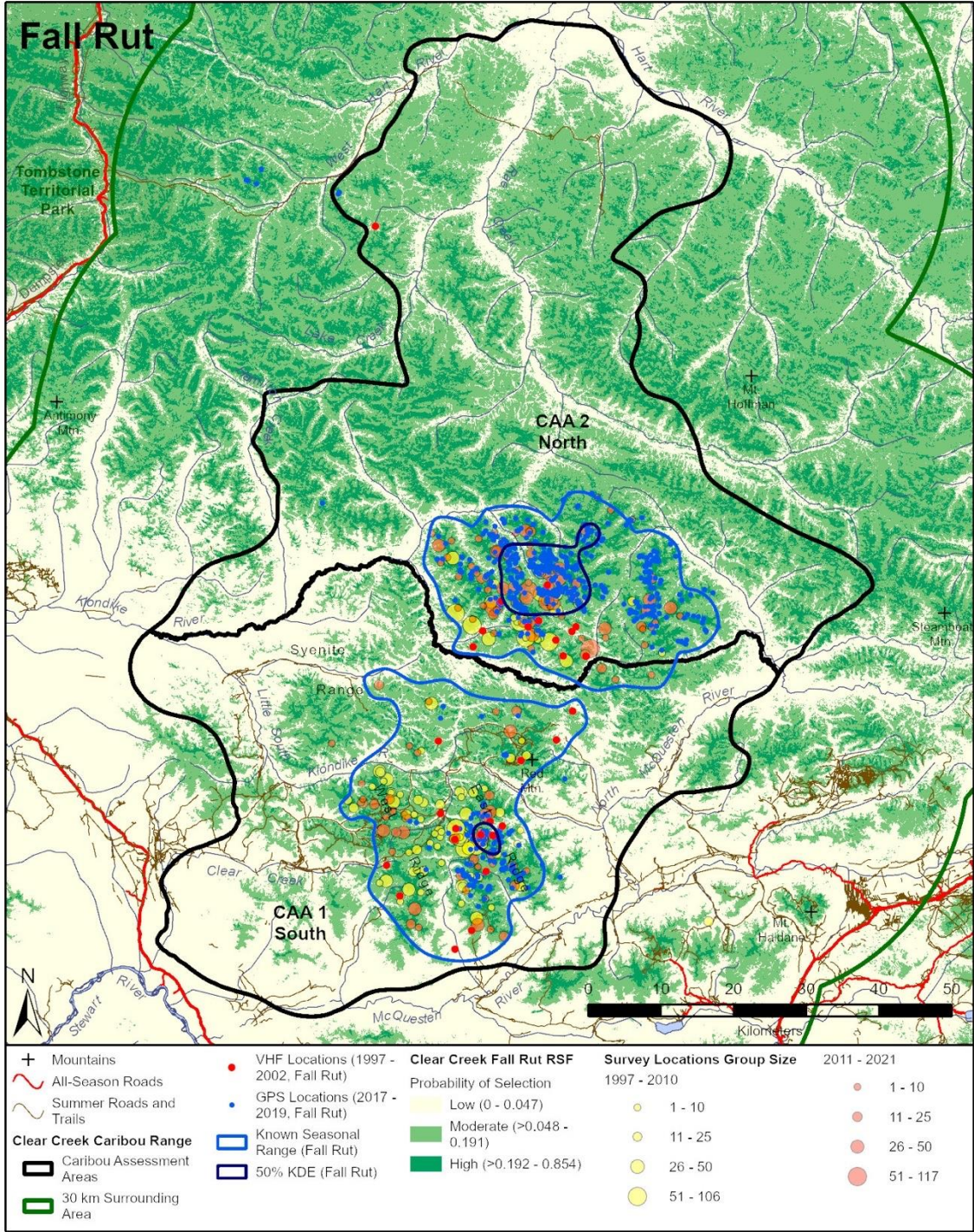


Figure 22 Recent concentrated use (50% GPS KDE), historical use (VHF locations) and predicted habitat value (probability of selection by caribou) for Clear Creek Caribou during fall rut. RSF = Resource Selection Function. KDE = Kernel Density Estimate based on GPS locations (2017-2019).

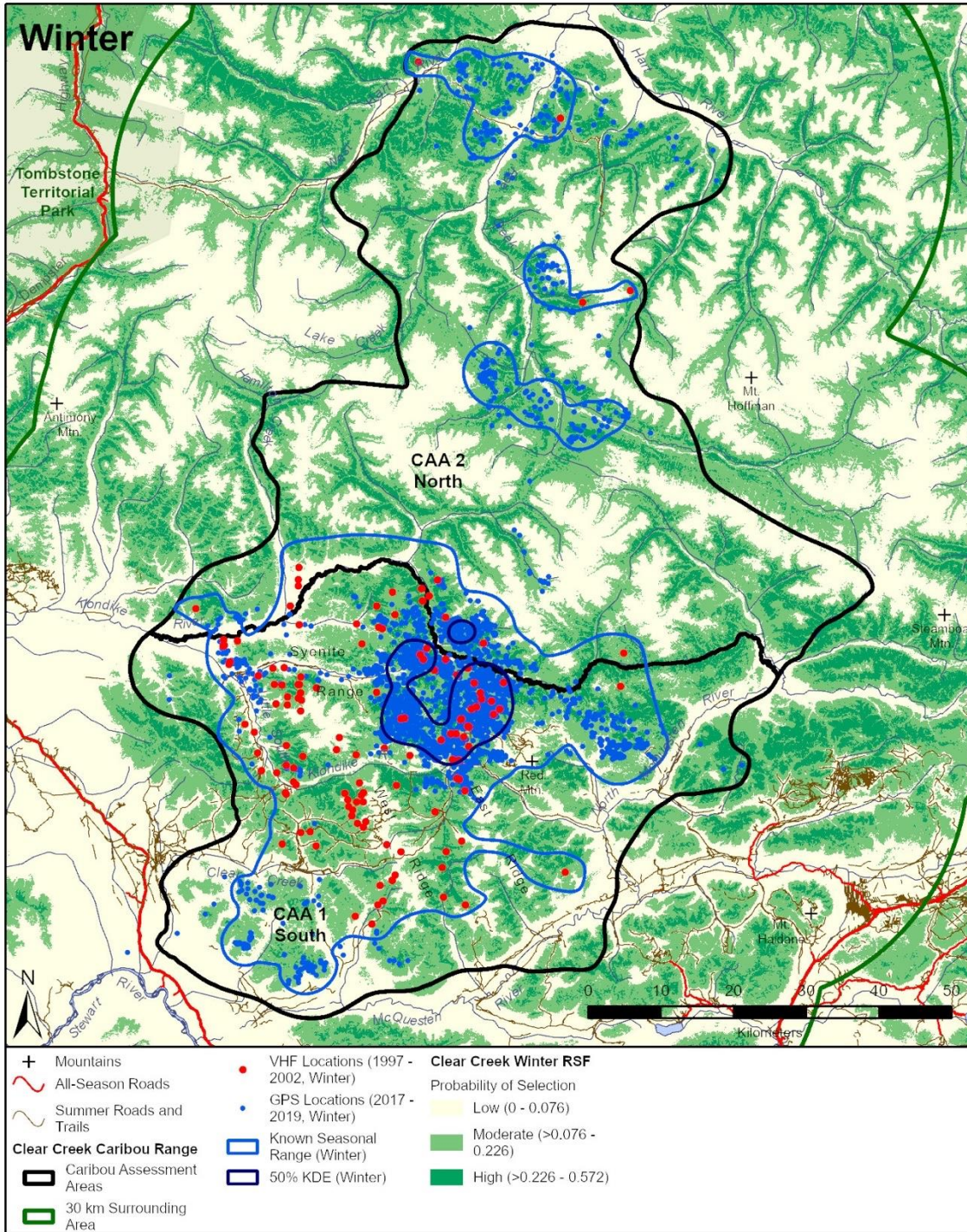


Figure 23. Recent concentrated use (50% GPS KDE), historical use (VHF locations) and predicted habitat value (probability of selection by caribou) for Clear Creek Caribou during winter. RSF = Resource Selection Function. KDE = Kernel Density Estimate based on GPS locations (2017-2019).

also previously used by VHF radio-collared caribou, there was only limited use of the southern portion of the Clear Creek Caribou Range by GPS satellite-collared caribou, despite availability of moderate and high predicted habitat value (Figure 23). Both VHF and GPS satellite-collared caribou were found in the northern portion of the range during winter, but to a much lesser extent than in the southern portion.

Overall, caribou use of CAA1 (South) has decreased during the snow-free seasons with the greatest decrease during the fall rut, but has only slightly decreased during winter (Figure 24). The greater shift during the snow-free seasons corresponds to the period of greater human activity in CAA1 (South), while caribou use of CAA1 (South) only slightly decreased during winter, when human activity is low. Although the proportion of collared caribou locations in CAA1 (South) during winter has not changed much between the VHF and GPS studies, caribou distribution has shifted from the southwestern portion of CAA1 (South) to the northern portion just northwest of Red Mountain (Figure 23). Continued high use of CAA1 (South) by caribou during winter highlights the importance of this area to the Clear Creek Caribou Herd.

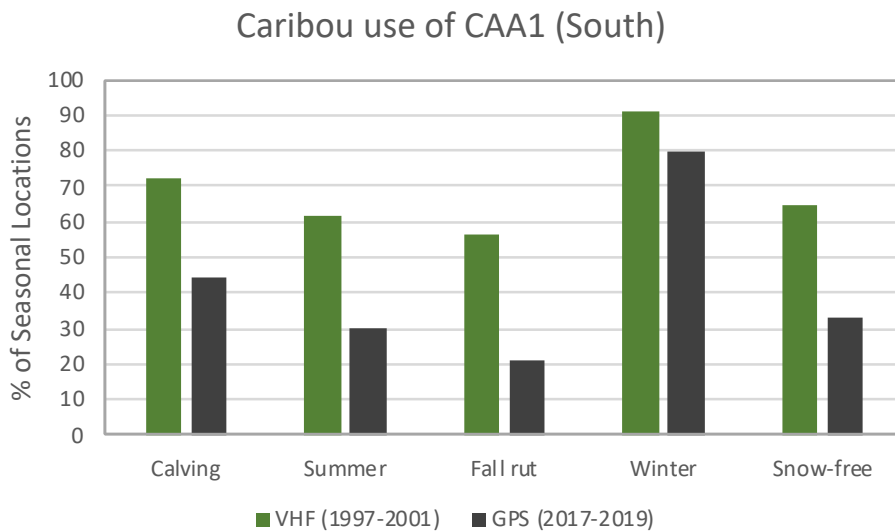


Figure 24. Percent of seasonal use locations in Caribou Assessment Area 1 (South) by caribou collared with VHF (previous) and GPS (recent) collars.

The shift in seasonal ranges is also evident in recent areas of concentrated use (50% KDEs for GPS collar locations, which represent the most concentrated 50% of the GPS locations). As little as 8% and no more than 20% of calving, summer, fall rut and winter locations from the previous VHF collar study occur within the recent concentrated use areas (Table 19).

Table 19. Comparison of previous caribou seasonal use (VHF locations) to seasonal recent concentrated use areas (50% KDEs).

Caribou Assessment Area	% of seasonal VHF locations in seasonal recent concentrated use areas (50% KDEs) ¹				
	Calving	Summer	Fall Rut	Winter	Snow-free
CAA1 (South)	0	2.0	10.0	20.0	11.5
CAA2 (North)	7.8	14.0	3.3	0	12.2
Total	7.8	16.0	13.3	20.0	23.7

¹ Ex. For calving, only 7.8% of the VHF calving season locations occurred in the recent concentrated use area (50% KDEs) for the calving season (see Figures 20-23)

3.8.3 Potential Winter and Snow-free Season Ranges

Bioclimate zones were used to estimate potential winter and snow-free season ranges based on caribou using primarily high elevations during the snow-free season and lower elevations during winter. CAA1 (South) contains mostly potential winter range while CAA2 (North) contains more potential summer range than potential winter range (Table 20, Figure 25). In CAA2 (North), much of the potential winter range is located in the Rae Creek drainage.

Table 20. Area of potential summer and winter range in the Clear Creek Caribou Range.

Caribou Assessment Area	Potential Range	Area (ha)	% of CAA/Total Range
CAA1 (South)	Summer	73 296	22.6
	Winter	251 658	77.4
CAA2 (North)	Summer	250 430	58.1
	Winter	180 315	41.9
Total	Summer	323 726	42.8
	Winter	431 974	57.2

3.8.4 Health

Baseline information on Clear Creek Caribou health is available from sampling conducted during collaring sessions for the 2017-2019 satellite-collared caribou study. When monitored over time, some of these results can be indicative of changes to caribou health. Some animals tested positive for exposure to Bovine parainfluenza virus 3, Bovine herpesvirus – 1, California serogroup viruses, *Neospora caninum*, and Tularemia, but not to the other pathogens that were tested). This exposure is considered normal for Northern Mountain Caribou herds in Yukon. Exposure to pathogens does not indicate animals are infected, rather that they have come into contact with these organisms at some point. In addition, *Besnoitia* was present in 7 of 39 animals captured, winter ticks (*Dermacentor albipictus*) were not found on any of the caribou captured, and cortisol levels were determined (Yukon Fish and Wildlife Branch, unpubl. data). Additional health information will also be available from the 2023/24

winter collaring sessions. There is no information on trace minerals and heavy metals for Clear Creek Caribou.

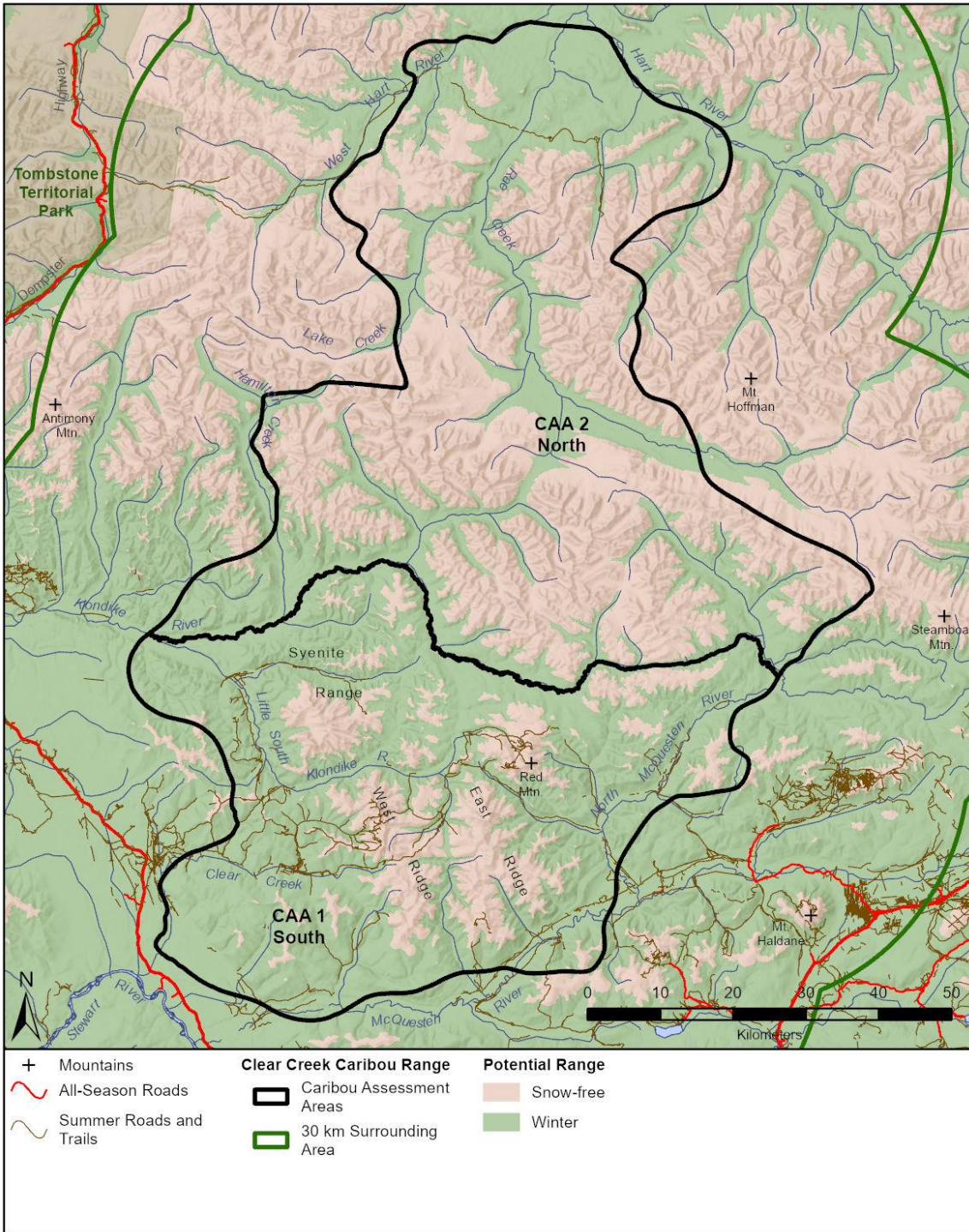


Figure 25. Potential winter and snow-free season ranges in the Clear Creek Caribou Range.

Table 21. Testing for exposure of Clear Creek Caribou to pathogens, based on blood samples from caribou captured during the 2017 to 2019 satellite-collared caribou study.

Agent	Type	Sample size	# positive	# suspicious
Bovine respiratory syncytial virus	Virus	26	0	0
Bovine parainfluenza virus 3	Virus	26	3	1
Bovine herpesvirus - 1	Virus	26	6	12
Bovine viral diarrhea virus 1	Virus	26	0	0
Bovine coronavirus	Virus	26	0	0
California serogroup viruses	Virus	21	15	0
<i>Neospora caninum</i>	Protozoan	28	4	0
Leptispora spp. (screening for 7 subspecies)	Bacterium	28	0	0
<i>Erysipelothrix rhusiopathiae</i>	Bacteria	26	0	0
Tularemia	Bacteria	21	1	0

Some potential future concerns include:

- winter ticks;
- *Erysipelothrix rhusiopathiae* (bacterium);
- chronic wasting disease (CWD); and,
- trace mineral and heavy metal levels.

Winter ticks are typically external parasites of moose, but have recently also been detected on boreal caribou in northeastern BC, and boreal caribou and northern mountain caribou in the Northwest Territories (NWT) (Carlsson et al. 2015, Bondo et al. 2019, Larter et al. 2019). Impacts can result in mild to severe hair loss, causing weakness through loss of blood and irritation, and in extremely severe cases can result in death (Samuel 2007, GNWT 2017, Jones et al. 2019). Warmer, shorter winters resulting in higher adult female tick survival dropping off animals in March and April lead to increased ticks on animals the following winter (Samuel 2007). Although winter ticks have not yet been found on Clear Creek Caribou, they are well-established in the southern Yukon (Environment Yukon 2013)

Erysipelothrix rhusiopathiae is a bacterium that has been associated with die-offs of muskoxen in the Canadian Arctic, and with boreal caribou mortalities in northeastern BC (Kutz et al. 2015, Forde et al. 2016). Exposure to *E. rhusiopathiae* has also been detected in boreal caribou and northern mountain caribou in the NWT (Carlsson et al. 2015, Larter et al. 2019).

Chronic wasting disease (CWD) is an infectious, degenerative, and fatal brain disease of the deer family (deer, moose, caribou); it is a prion (protein) that contaminates soil and can persist for many years (Government of Yukon 2013). Although CWD has not been detected in Yukon, infections are present in free-ranging species in Alberta, and the first infections in deer in BC were confirmed in February 2024 in southeastern BC. The disease could spread by bringing in deer species, or potentially contaminated plant material (e.g. hay) or soil (e.g. on vehicles following off-road use) from CWD-affected areas. There is no cure for CWD, and management actions involving culls to eradicate other potential cases are generally ineffective (Government of Yukon 2013). CWD was first detected in Europe in free-ranging reindeer in Norway in 2016, which led to the removal of all individuals from a population of about 2000 (Mysterud et al.

2019, 2024). Although the origin of the CWD strain in reindeer in Norway is still unclear, it differs from CWD found in North America, which suggests that it did not spread into Europe from North America (Mysterud et al. 2024).

Although spread of diseases and parasites can be difficult to contain in free-roaming wildlife species, preventing spread into an area is the best tool for reducing risk.

3.9 Other Wildlife

Moose densities in the southwestern and southeastern portions of the Clear Creek Caribou range are near the low end of the range of typical densities in Yukon (100-250 moose/1000 km² of moose habitat) at 122 and 153 moose/1000 km² of moose habitat respectively (O'Donoghue et al. 2019; O'Donoghue and Czetwertynski 2023). Moose in both areas appear to be declining (O'Donoghue et al. 2019, O'Donoghue and Czetwertynski 2023). Information on moose densities and population trend in CAA2 (North), and in the Syenite Range area in CAA1 (South) are not available.

Moose primarily forage on shrubs during winter and are often associated with riparian habitats and burns. In the western portion of the Clear Creek Caribou Range, moose selected habitats that were close to moderate-aged burns (11-25 years) and riparian areas (Morrison and Wong 2013). Recent large burns in the southwestern portion of the range (2021) and in the 30-km Surrounding Area just southwest of the range (2019) will result in increased habitat for moose in the next few years.

Although wolves, grizzly bears and black bears are present in the Clear Creek Caribou Range, information specific to the area in and around the range is limited. Grizzly bear densities in the general area are estimated to be about 14-15 bears/1000 km², which is about the average density of grizzly bears in Yukon (Government of Yukon 2022b).

3.10 Climate Change

In Yukon, changes in climate have already been observed including increases in average annual and winter temperatures over the last 50 years, and an increase in precipitation from 1996 to 2015, especially during summer and winter (Table 22, Perrin and Jolkowski 2022). Other changes include: winter conditions starting later and spring conditions starting sooner; a decrease in number of snow cover days; increases in rate of permafrost thaws, rain on snow events, unseasonal thaws, and early snow melt events; and, increased frequency and severity of fire (Table 22, Perrin and Jolkowski 2022). As a result, changes to vegetation are already occurring including: treeline expanding to higher elevations, infilling of trees and shrubs where they already occur, increased productivity (greening) except in areas where water, nutrients or disturbance are limiting factors, and vegetation community shifts following permafrost thaw.

Temperature and precipitation are predicted to continue to increase in Yukon over the next 50 years (Table 22, Perrin and Jolkowski 2022). Other predicted changes include increases in: fluctuations in precipitation, extreme weather events (including rain in winter), frost-free days, and length of shoulder seasons. Evapotranspiration is also predicted to increase, which could lead to drought stress for vegetation in areas where increased precipitation is unable to

Table 22. Summary of selected climate change indicators and key findings for Yukon's climate (summarized from Perrin and Jolkowski 2022).

Factor	Observed Change		Predicted Change	
	Change	Confidence	Change	Confidence
Temperature	<ul style="list-style-type: none"> Annual average temperature has increased by 2°C over the past 50 years 	Very high	<ul style="list-style-type: none"> Annual temperatures are predicted to increase an additional 0.7 - 3.7°C over the next 50 years 	Medium
	<ul style="list-style-type: none"> Temperature has increased at more than double the global rate and is increasing faster than in southern Canada. 			
	<ul style="list-style-type: none"> Winters are warming faster than other seasons with an increase of 4°C over the past 50 years, primarily due to decreased frequency and severity of extreme cold events (i.e. below -40°C) 	High	<ul style="list-style-type: none"> 	
	<ul style="list-style-type: none"> Higher elevations are warming faster 			
Precipitation	<ul style="list-style-type: none"> Annual precipitation increased by about 3% from 1996-2015 	Low ¹	<ul style="list-style-type: none"> Precipitation is predicted to increase 4-17% over the next 50 years 	Medium
	<ul style="list-style-type: none"> Summers and winters have experienced the largest increase in precipitation (19% and 12% respectively) from 1996-2015 		<ul style="list-style-type: none"> Fluctuations in precipitation are predicted to increase 	
Extreme weather events	<ul style="list-style-type: none"> 		<ul style="list-style-type: none"> Extreme weather events are predicted to increase, including rain in winter 	Medium
Evapo-transpiration	<ul style="list-style-type: none"> 		<ul style="list-style-type: none"> Evapotranspiration is predicted to increase. 	High
Season length	<ul style="list-style-type: none"> Winter is arriving later and spring is arriving sooner 	High	<ul style="list-style-type: none"> Frost-free days and length of shoulder season are predicted to increase. 	High
Permafrost	<ul style="list-style-type: none"> Permafrost rates of thaw are increasing² 	High	<ul style="list-style-type: none"> 	
River and lake ice	<ul style="list-style-type: none"> The open-water period has increased and the period of ice coverage has decreased. 	High	<ul style="list-style-type: none"> 	
Snow cover	<ul style="list-style-type: none"> Spring snow cover days are declining Rain on snow events are increasing Unseasonal thaws are increasing Early snow melt events are increasing 	High	<ul style="list-style-type: none"> 	
Fire	<ul style="list-style-type: none"> Fire frequency and severity has increased in some areas of the Yukon. 	Medium	<ul style="list-style-type: none"> Conditions following fire could lead to shifts in vegetation composition. 	Medium
Vegetation	<ul style="list-style-type: none"> Treeline and shrubs are expanding rapidly through moving to higher latitudes and elevations and infilling within current range 	High	<ul style="list-style-type: none"> Drought stress is predicted to occur in areas where increase in precipitation is insufficient to compensate for increasing evapotranspiration. 	Medium
	<ul style="list-style-type: none"> Permafrost thaw can lead to shifts in vegetation community type and composition. 			
	<ul style="list-style-type: none"> Higher productivity of vegetation (greening) is observed in some regions but not in other regions where water and other nutrients or landscape disturbance are limiting factors (browning) 	Medium	<ul style="list-style-type: none"> Warming temperatures, changes to precipitation and longer shoulder seasons are expected to facilitate range expansion of new species. 	

¹ Data for precipitation is highly variable and therefore confidence in the historical trend is lower

² Permafrost thaw has potentially serious implications for mine dams and tailing ponds that are dependent on permafrost berms

compensate for increased evapotranspiration. As a result of climate change, new vegetation species are predicted to expand their ranges into Yukon.

Climate change could affect caribou through changes in frequency and severity of natural disturbances, changes in vegetation composition and abundance, changes in distribution of other ungulates, increased incidence of icing, and increased incidence of parasites and diseases (Vors and Boyce 2009, Mallory and Boyce 2018). Increased fire and other natural disturbance frequency and severity can result in increased early seral habitat favoured by other ungulates, vegetation community shifts (Baltzer et al. 2021), and destruction of lichens, which can take decades to recover (Russell and Johnson 2019). Lichen abundance could decline due to increased competition from other vegetation, while increased icing events could make lichens unavailable to caribou during winter. Icing or frequent freeze/thaw events could also benefit wolves if the crust can support wolves but not caribou. Longer, warmer summers could result in increased productivity of summer forage, increased duration of harassment by biting insects, and a reduction in snow-patch refuge areas. For some parasites, ranges may expand northward and/or life cycles could be shortened. Overall, effects of climate change on caribou will vary depending on local conditions; however, in the short term, human-caused habitat disturbances are more of a threat than climate change (Mallory and Boyce 2018).

4 Assessment

4.1 Total Habitat Disturbance (*Direct + Indirect*) - Current Situation

The majority of both fire disturbance and human-caused disturbance within the range is located in CAA1 (South) (Figures 26-29, Tables 23-24). Currently, the primary resource use activities in the Clear Creek Caribou Range are placer mining and quartz exploration, both of which occur during the snow-free season. Therefore, human disturbance due to habitat alteration combined with sensory disturbance from human activities (based on ZOIs) currently have a greater impact on caribou during the snow-free season than during winter (Tables 23-24).

Total habitat disturbance currently affects about 40% of the Known Snow-free Range and Recent Snow-free Concentrated Use area in CAA1 (South) based on Narrower ZOIs, and 67-76% based on Wider ZOIs (Table 23). Impacts on high value Predicted Summer Habitat Value and Potential Summer Range are slightly less at about 30% and 60% for Narrower and Wider ZOIs respectively. Impacts across the whole range are lower overall since both fire and human habitat disturbance are low in CAA2, which is the larger of the two CAAs.

Total habitat disturbance based on winter ranges/habitats almost entirely consists of fire disturbance and makes up about 26% of the Known Winter Range, Potential Winter Range, and low and moderate valued Predicted Winter Habitat in CAA1 (South) (Table 24). Total habitat disturbance on the Recent Winter Concentrated Use area in CAA1 (South) is much lower at about 6%, again consisting entirely of fire disturbance. Most caribou winter use is in CAA1 (South).

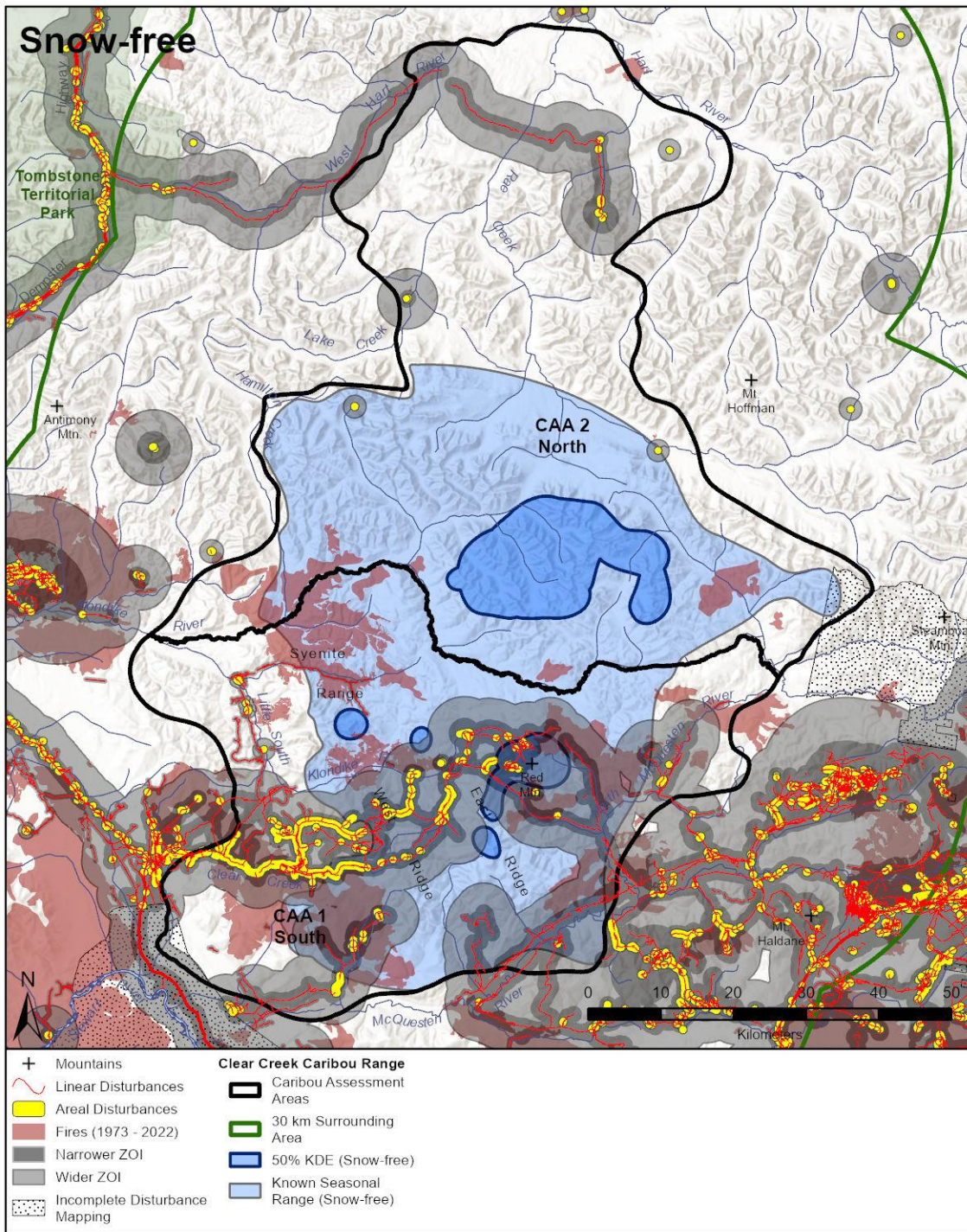


Figure 26. Total **current** (2022) habitat disturbance due to human activities (linear disturbances, areal disturbances, zones of influence [ZOIs]) and fire ≤ 50 years in relation to areas of recent concentrations of Clear Creek Caribou (50% GPS KDE) during the **snow-free season** (calving, summer, fall rut). KDE = Kernel Density Estimate based on GPS locations (2017-2019). Incomplete Disturbance Mapping = portions of the map that may not include all habitat disturbances due to human activities.

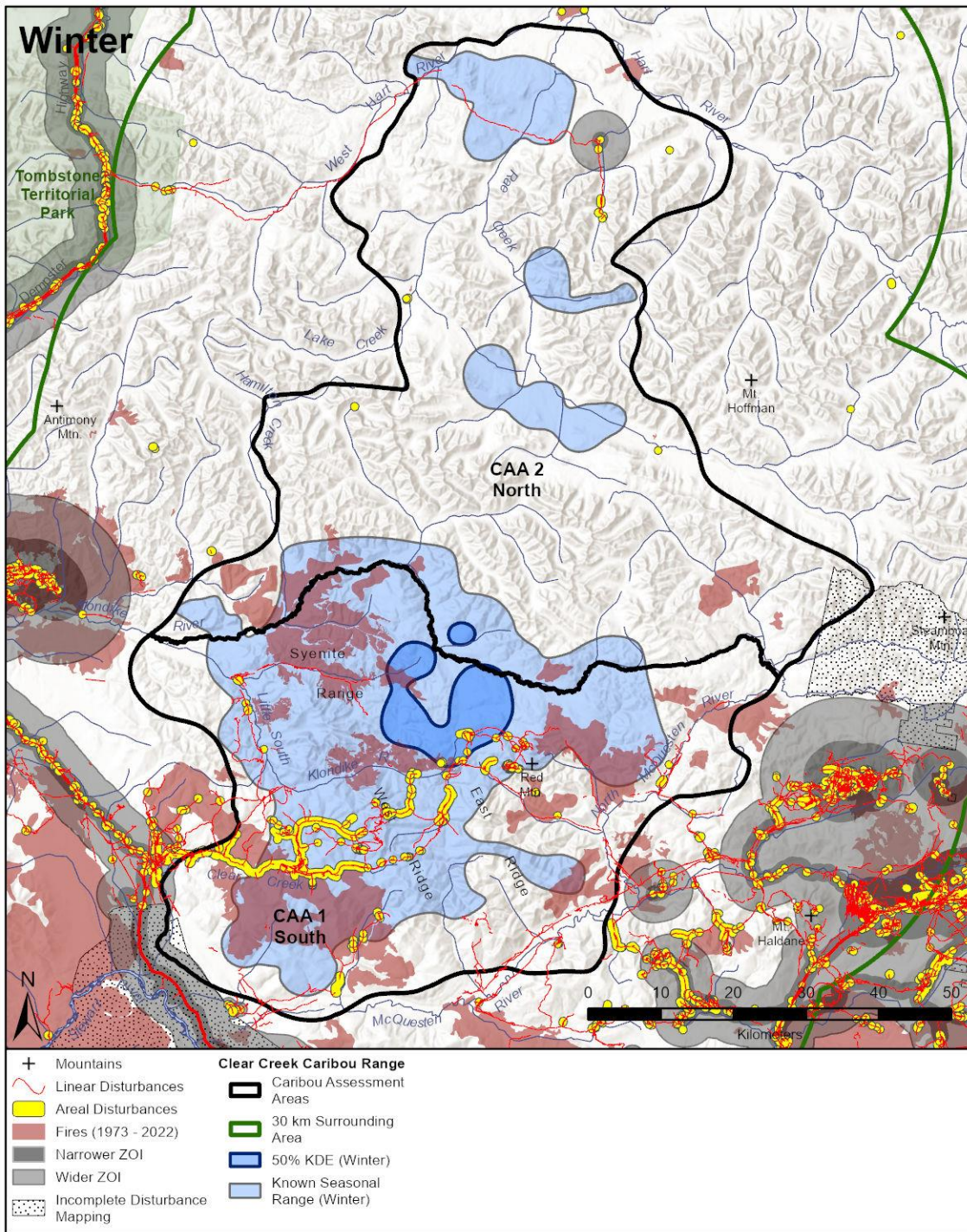


Figure 27. Total **current** (2022) habitat disturbance due to human activities (linear disturbances, areal disturbances, zones of influence [ZOIs]) and fire ≤ 50 years in relation to areas of recent concentrations of Clear Creek Caribou (50% GPS KDE) during **winter**. KDE = Kernel Density Estimate based on GPS locations (2017-2019). Incomplete Disturbance Mapping = portions of the map that may not include all habitat disturbances due to human activities.

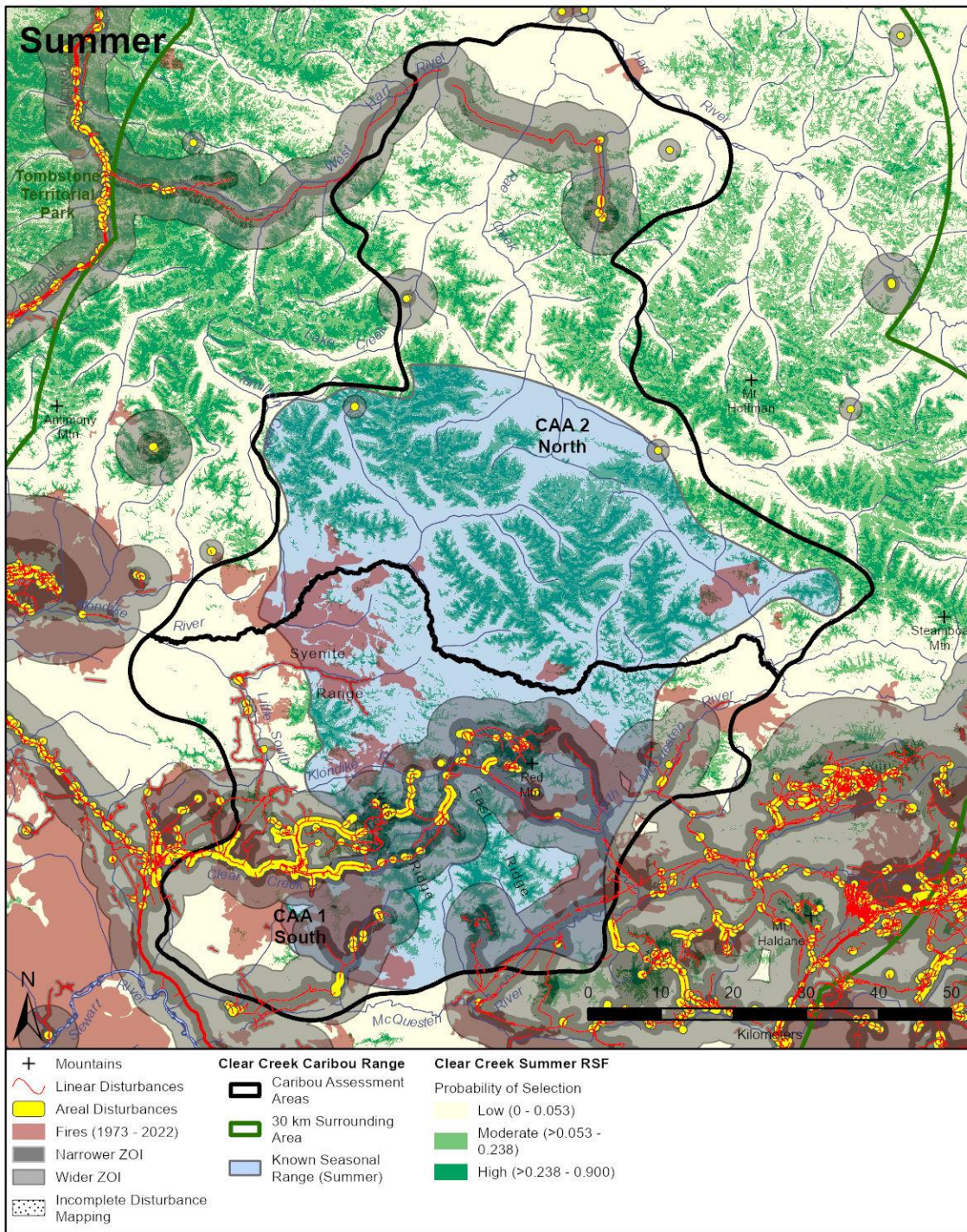


Figure 28. Total **current** (2022) habitat disturbance due to human activities (linear disturbances, areal disturbances, zones of influence [ZOIs]) and fire ≤ 50 years in relation to predicted habitat value (probability of selection by caribou) for Clear Creek Caribou during the **summer** season. RSF = Resource Selection Function. Incomplete Disturbance Mapping = portions of the map that may not include all habitat disturbances due to human activities.

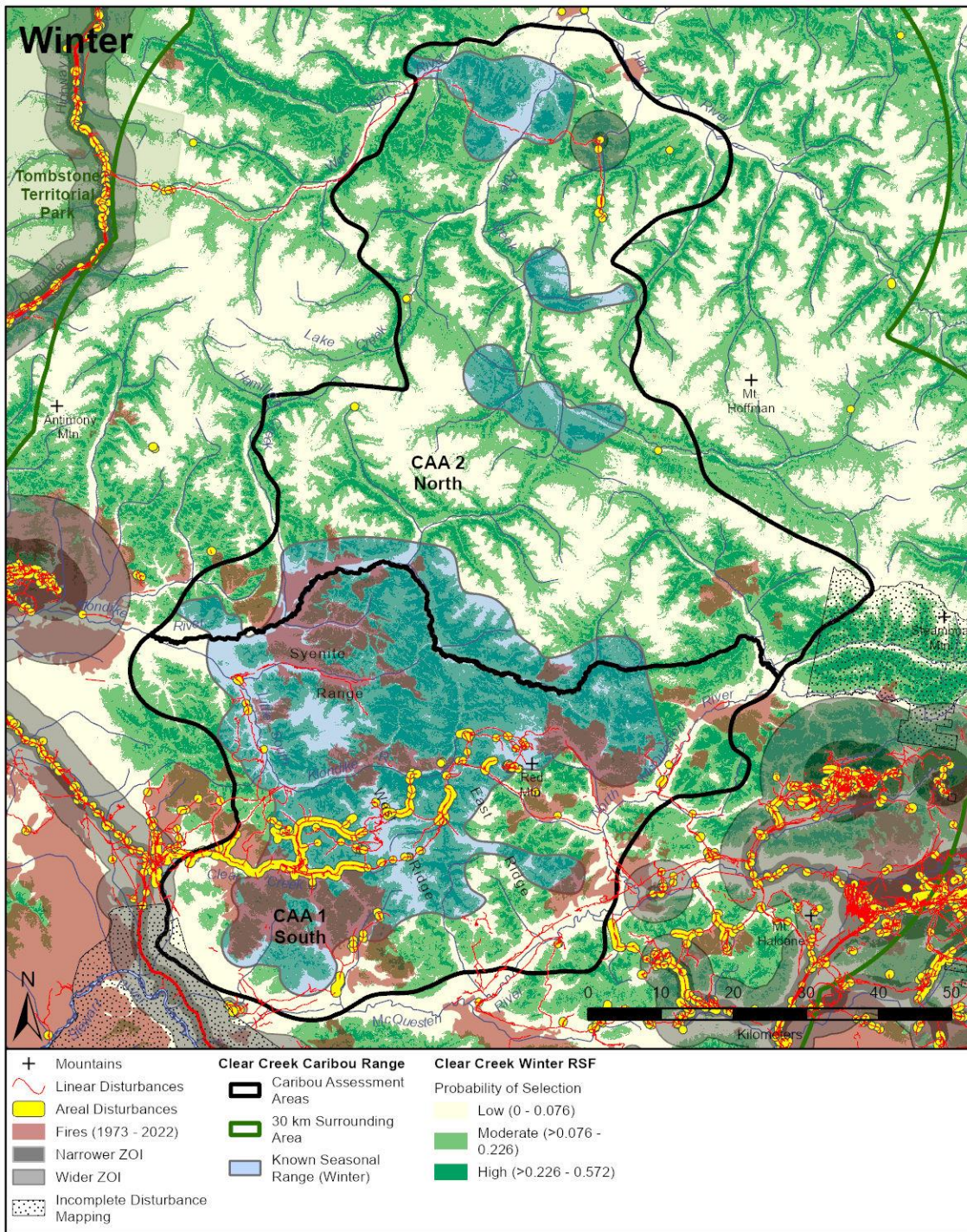


Figure 29. Total **current** (2022) habitat disturbance due human activities (linear disturbances, areal disturbances, zones of influence [ZOIs]) and fire ≤ 50 years in relation to predicted habitat value (probability of selection by caribou) for Clear Creek Caribou during **winter**. RSF = Resource Selection Function. Incomplete Disturbance Mapping = portions of the map that may not include all habitat disturbances due to human activities.).

Table 23. Area **currently** affected by direct human-caused habitat disturbance, fires ≤50 years and indirect human-caused habitat disturbance in the Clear Creek Caribou Range during the **snow-free/summer** season for known seasonal range, recent concentrated use area, predicted habitat value, and potential range. Direct human-caused habitat disturbance represents the physical disturbance to the land. Indirect human-caused disturbance, based on Zones of Influence (ZOIs), takes into account caribou avoidance or decreased use of areas close to human development and activities, or increased risk of mortality associated with features within the development footprint, and is calculated only for seasons when human activities are taking place.

Caribou Assessment Area	Predicted Habitat Value	Linear Features (km)	Direct Human-caused Habitat Disturbance (ha)	% of Total Area					Total Area (ha)
				Fires ≤50 years	Indirect Human-caused Habitat Disturbance (ZOI) ^{1,2}		Indirect Total Habitat Disturbance (Fires ≤50 years + ZOI)		
					Narrower ZOI	Wider ZOI	Narrower ZOI	Wider ZOI	
Known Snow-free Range									
CAA1 (South)		351	494	24.8	20.9	57.6	41.5	67.4	199 959
CAA2 (North)		0	1	4.4	0.0	0.6	4.4	5.0	203 830
Total (CAA1+CAA2)		351	495	14.5	10.4	28.8	22.8	35.9	403 789
Recent Concentrated Use Area Snow-free (50% KDE)									
CAA1 (South)		38	28	10.0	30.9	75.1	38.2	75.8	10 521
CAA2 (North)		0	0	0.0	0.0	0.0	0.0	0.0	35 076
Total (CAA1+CAA2)		38	28	2.3	7.1	17.3	8.8	17.5	45 598
Predicted Habitat Value Summer (RSF)									
CAA1 (South)	Low	567	-	25.4	22.3	54.3	42.7	64.8	266 819
	Moderate	92	-	8.5	21.0	57.0	28.8	59.9	43 308
	High	50	-	3.0	24.5	60.8	27.4	61.7	14 835
CAA2 (North)	Low	48	-	4.4	3.7	14.3	8.1	18.7	259 014
	Moderate	0	-	1.0	0.7	8.6	1.7	9.6	116 412
	High	0	-	0.4	0.3	3.4	0.7	3.8	55 320
Total (CAA1+CAA2)	Low	615	-	15.0	13.1	34.6	25.7	42.1	525 833
	Moderate	92	-	3.0	6.2	21.7	9.1	23.2	159 720
	High	50	-	1.0	5.4	15.6	6.3	16.1	70 155
Potential Range Summer									
CAA1 (South)		152	118	7.9	19.8	56.4	27.1	59.5	73 303
CAA2 (North)		1	1	0.8	0.6	8.1	1.4	8.9	250 430
Total (CAA1+CAA2)		153	119	2.4	5.0	19.1	7.2	20.4	323 734
Total Range (Using Snow-free + All Year ZOIs)									
CAA1 (South)		708	1 455	22.1	22.3	54.9	40.2	64.0	324 963
CAA2 (North)		48	57	3.0	2.4	11.3	5.4	14.3	430 746
Total (CAA1+CAA2)		756	1 512	11.2	11.0	30.1	20.4	35.7	755 709

¹ Includes area of direct human habitat disturbance + ZOI; uses All Year ZOIs

² In the Clear Creek Caribou Range, because the main human activities are placer mining and quartz mineral exploration, which are conducted primarily during the snow-free season, ZOIs are applied for those activities only during the snow-free season.

Table 24. Area **currently** affected by direct human-caused habitat disturbance, fires ≤50 years, and indirect human-caused habitat disturbance in the Clear Creek Caribou Range during **winter** for known seasonal range, recent concentrated use area, predicted habitat value, and potential range. Direct human-caused habitat disturbance represents the physical disturbance to the land. Indirect human-caused disturbance, based on Zones of Influence (ZOIs), takes into account caribou avoidance or decreased use of areas close to human development and activities, or increased risk of mortality associated with features within the development footprint, and is calculated only for seasons when human activities are taking place.

Caribou Assessment Area	Predicted Habitat Value	Linear Features (km)	Direct Human-caused Habitat Disturbance (ha)	% of Total Area					Total Area (ha)
				Fires ≤50 years	Indirect Human-caused Habitat Disturbance (ZOI) ^{1,2}		Indirect Total Habitat Disturbance (Fires ≤50 years + ZOI)		
					Narrower ZOI	Wider ZOI	Narrower ZOI	Wider ZOI	
Known Winter Range									
CAA1 (South)		428	1 059	26.5	0.0	0.0	26.5	26.5	191 798
CAA2 (North)		23	22	6.1	0.0	0.0	6.1	6.1	75 537
Total (CAA1+CAA2)		451	1 081	20.7	0.0	0.0	20.7	20.7	267 335
Recent Concentrated Use Area Winter (50% KDE)									
CAA1 (South)		20	26	5.7	0.0	0.0	5.7	5.7	17 224
CAA2 (North)		0	0	0.0	0.0	0.0	0.0	0.0	1 013
Total (CAA1+CAA2)		20	26	5.4	0.0	0.0	5.4	5.4	18 237
Predicted Habitat Value Winter (RSF)									
CAA1 (South)	Low	631	-	28.1	0.0	1.8	28.1	29.9	120 410
	Moderate	76	-	24.5	0.0	0.0	24.5	24.5	152 703
	High	1	-	1.2	0.0	0.0	1.2	1.2	51 849
CAA2 (North)	Low	39	-	3.2	0.1	0.2	3.3	3.4	166 033
	Moderate	9	-	3.7	0.1	1.5	3.9	5.2	196 091
	High	0	-	0.2	0.1	2.9	0.3	3.1	68 622
Total (CAA1+CAA2)	Low	670	-	13.7	0.0	0.9	13.7	14.5	286 443
	Moderate	85	-	12.8	0.1	0.8	12.9	13.7	348 795
	High	1	-	0.6	0.0	1.6	0.7	2.3	120 471
Potential Range Winter									
CAA1 (South)		557	1 257	26.2	0.0	0.9	26.2	27.1	251 660
CAA2 (North)		47	56	6.0	0.2	2.4	6.2	8.4	180 315
Total (CAA1+CAA2)		604	1 313	17.8	0.1	1.5	17.9	19.3	431 975
Total Range (Using All Year ZOIs)									
CAA1 (South)		708	1 455	22.1	0.0	0.7	22.1	22.8	324 963
CAA2 (North)		48	57	3.0	0.1	1.2	3.1	4.2	430 746
Total (CAA1+CAA2)		756	1 512	11.2	0.0	1.0	11.2	12.2	755 709

¹ Includes area of direct human habitat disturbance + ZOI; uses All Year ZOIs

² In the Clear Creek Caribou Range, because the main current human activities are placer mining and quartz mineral exploration, which are conducted primarily during the snow-free season, ZOIs are applied for those activities only during the snow-free season. Placer mining can start as early as late winter but is not included in the calculations in this table because activities are not conducted throughout the whole winter. Therefore, the area included in winter ZOIs is very low or nil, and underestimates actual indirect winter disturbance. Direct (physical) habitat disturbance from the development footprint is present year-round.

Although ZOIs address some of the impacts of sensory disturbance caused by ground-based human activities, they do not necessarily capture effects of the physical presence of human-caused habitat disturbance and associated linear features, nor sensory disturbance from ground-based or air-based activities that do not result in physical disturbance to the land. Human activities and fires that convert mature forests to early successional habitats that are used by moose can affect caribou by supporting higher densities of moose, leading to increased predator numbers and increased predation risk to caribou (COSEWIC 2014). Linear features allow predators such as wolves faster travel speeds and facilitated access through forested areas and into higher elevations, resulting in increased predator efficiency, which in turn results in increased predation risk to caribou (James 1999, James and Stuart-Smith 2000, Latham et al. 2011, Dickie et al. 2016). Sensory disturbance caused by repeated helicopter traffic at or around active quartz exploration programs, or use of off-road vehicles beyond roads and trails, may not cause significant physical disturbance to the ground, and therefore are not addressed by ZOIs (M. O'Donoghue, pers. comm.)

Human activities are currently largely absent from the Clear Creek Caribou Range during winter resulting in minimal or no areas included in ZOIs. However, altered habitats that potentially support more moose forage, and linear features that increase predator efficiency affect caribou during winter. Also, for this assessment the Clear Creek Road has been classified as active during just the snow-free season even though it may open as early as March in some years. Therefore, current overall impacts of direct and indirect disturbance due to human activities on the Clear Creek Caribou Herd during winter are higher than what is suggested by assessing only ZOIs.

4.2 Total Habitat Disturbance - Potential Future Situation

4.2.1 Potential Future Human Habitat Disturbance Footprint

The two scenarios for potential future human-caused habitat disturbance in 25 years are based on the addition of two potential mines (Figure 30), upgrade of already existing roads to an all-season access road, and an increase in placer activity based on the observed average annual rate of increase in placer claims from 2010 to 2022 (see Section 2.5.4). In the Moderate scenario, the Red Mountain mine is active and 25% of the current claim area is disturbed, and in the High scenario both mines are active and 50% of the current claim areas is disturbed. Future locations of placer mining could not be predicted; instead, the area disturbed by placer mining was calculated using the recent annual rate of increase in placer claims for the Moderate scenario and twice the recent annual rate of increase for the High scenario, then estimating adjustments for overlapping ZOIs based on current degree of ZOI overlap. The predicted area covered by future placer mining was only considered for the snow-free/summer season since placer mining is only active during the snow-free/summer season, and was applied to CAA1 (South) since that is where current activity is occurring and where it predicted to occur in the future.

4.2.2 Potential Future Fire Disturbance

Potential future fire disturbance is based on the predicted probability of fire disturbance in 25 years (Figure 31) combined with existing fires that are still ≤ 50 years old in 25 years.

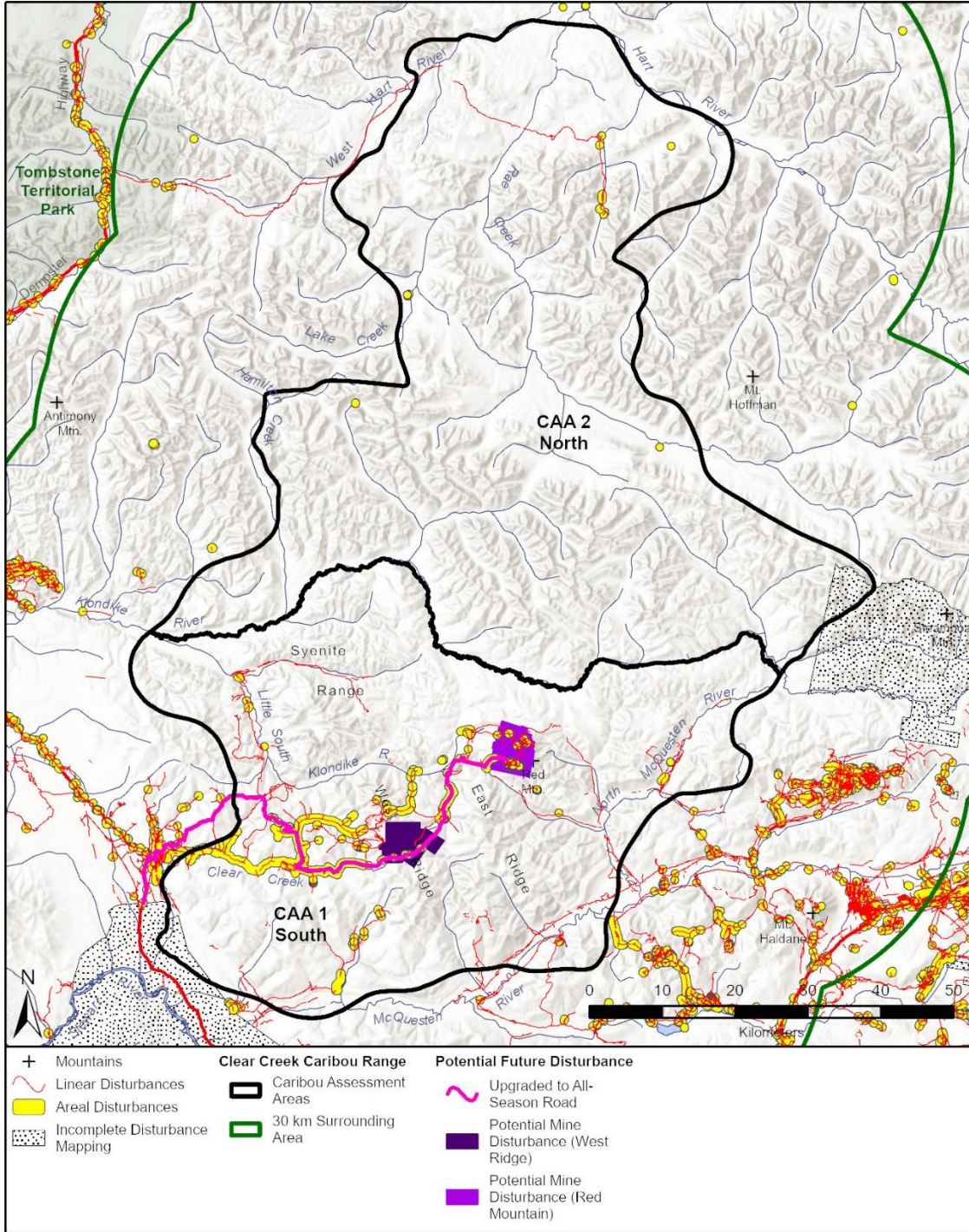


Figure 30. Potential future habitat disturbance footprint in 25 years (2047) due to human activities in the Clear Creek Caribou Range, showing locations of potential mines at Red Mountain (Moderate and High Future Scenarios) and West Ridge (High Future Scenario only) and associated upgrades to existing roads. Predicted increase in placer mining disturbance is aspatial and not represented on the map. Incomplete Disturbance Mapping = portions of the map that may not include all habitat disturbances due to human activities.

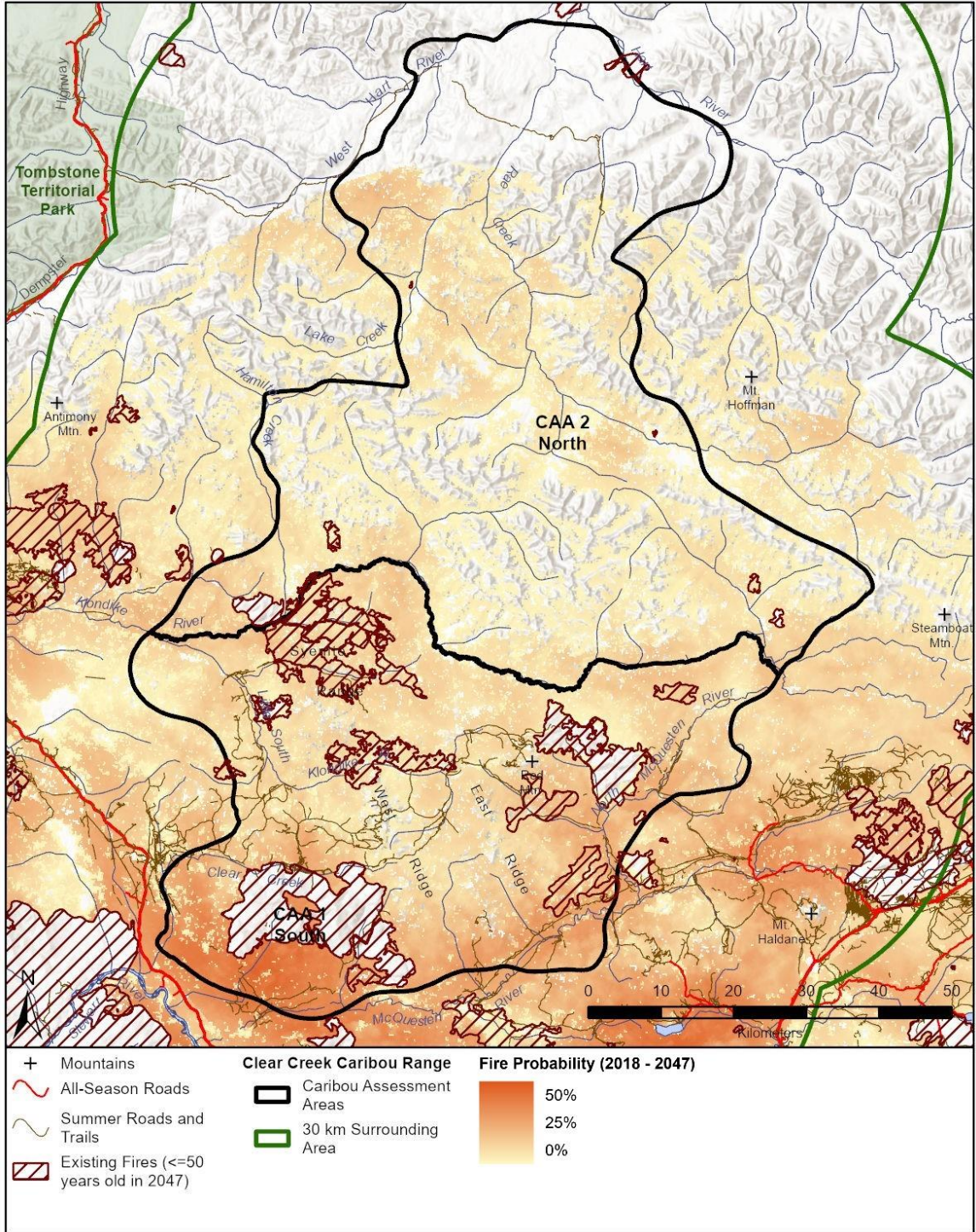


Figure 31. Probability of future fire disturbance in 25 years (2047) in the Clear Creek Caribou Range. Areas with no colour indicate Zero (0) probability. Based on the AECOM (2021) fire probability model and removing fires that occurred from 2019 to 2022 (after 2018, the final year of fire data used in the model). The modelled area did not cover the northernmost portion of the Clear Creek Caribou Range.

4.2.3 Potential Future Total Habitat Disturbance

Potential future habitat disturbance was assessed in two ways: one for winter season based on only spatial information (i.e. excluding calculated predicted increases in placer mining since placer mining activities do not occur during winter), and one for the snow-free/summer season that includes the aspatial predicted increases in placer mining.

The **greatest increases** of predicted future habitat disturbance are on the winter season ranges/habitats in CAA1 (South) (Figures 32-35, Tables 25-26). Currently, there is minimal sensory disturbance due to human activities during winter in both CAA1 (South) and CAA2 (North). Depending on whether the Moderate or High future scenario is considered, quartz mine development including an all-season road in CAA1 (South) increases the area indirectly affected by human-caused disturbances in the Known Winter Range and the Recent Winter Concentrated Use Area (50% KDE) from 0 to about 9-15% using Narrower ZOIs, and from 0 to about 30-59% using Wider ZOIs (Table 25). A similar pattern is seen with moderate and high value Predicted Winter Habitat and Potential Winter Range in CAA1, except that the increases are not as high.

The **greatest total area** of predicted future habitat disturbance is on the snow-free/summer ranges/habitats in CAA1 (South), with potential future mine development and placer mining adding onto already currently high levels of human-caused habitat disturbance (Table 26).

Depending on whether the Moderate or High future scenario is considered, predicted increased placer mining and quartz mine development including an all-season road in CAA1 (South) increases the area affected by human-caused disturbances in the Known Snow-free Range, the high value Predicted Summer Habitat, and Potential Summer Range from 20-25% to about 25-40% using Narrower ZOIs, and from about 55-60% to about 65-90% using the Wider ZOIs. Impacts are even higher for the portion of the Recent Snow-free Concentrated Use Area (50% KDE) in CAA1 (South), but there are no current or predicted impacts on the Recent Snow-free Concentrated Use Area (50% KDE) in CAA2 (North).

There are almost no predicted increases in human-caused disturbances in CAA2 (North) because neither the Moderate nor High Future scenarios included any additional human-caused or fire disturbances in CAA2 (North). Fire disturbance and total habitat disturbance in CAA2 (North) are predicted to decrease in some cases due to some of the fires that are currently ≤ 50 years in age, maturing out of that age class (Table 25, Table 26).

For Predicted Habitat Value, habitat value was based on biophysical attributes such as vegetation cover, current forest age, snow conditions, and human-caused habitat disturbance (McClelland and Finnegan 2022). Because Predicted Habitat Value is based on current suitability of a habitat to support caribou, some high-quality habitats that are currently impacted by disturbances and therefore not currently suitable for caribou may have a lower habitat value than if the habitat was not affected by disturbance. In areas where current suitability, and consequently habitat value, is lower due to human-caused habitat disturbance and not because the overall capacity of the land is not suitable for caribou, the impacts on these already affected habitats may not be taken into account since they would be currently predicted to be low value habitats. Therefore, assessing impacts on moderate and high value habitats could potentially underestimate total impacts on caribou habitat if areas of good quality habitat are assigned low predicted habitat suitability due to the current condition of those areas.

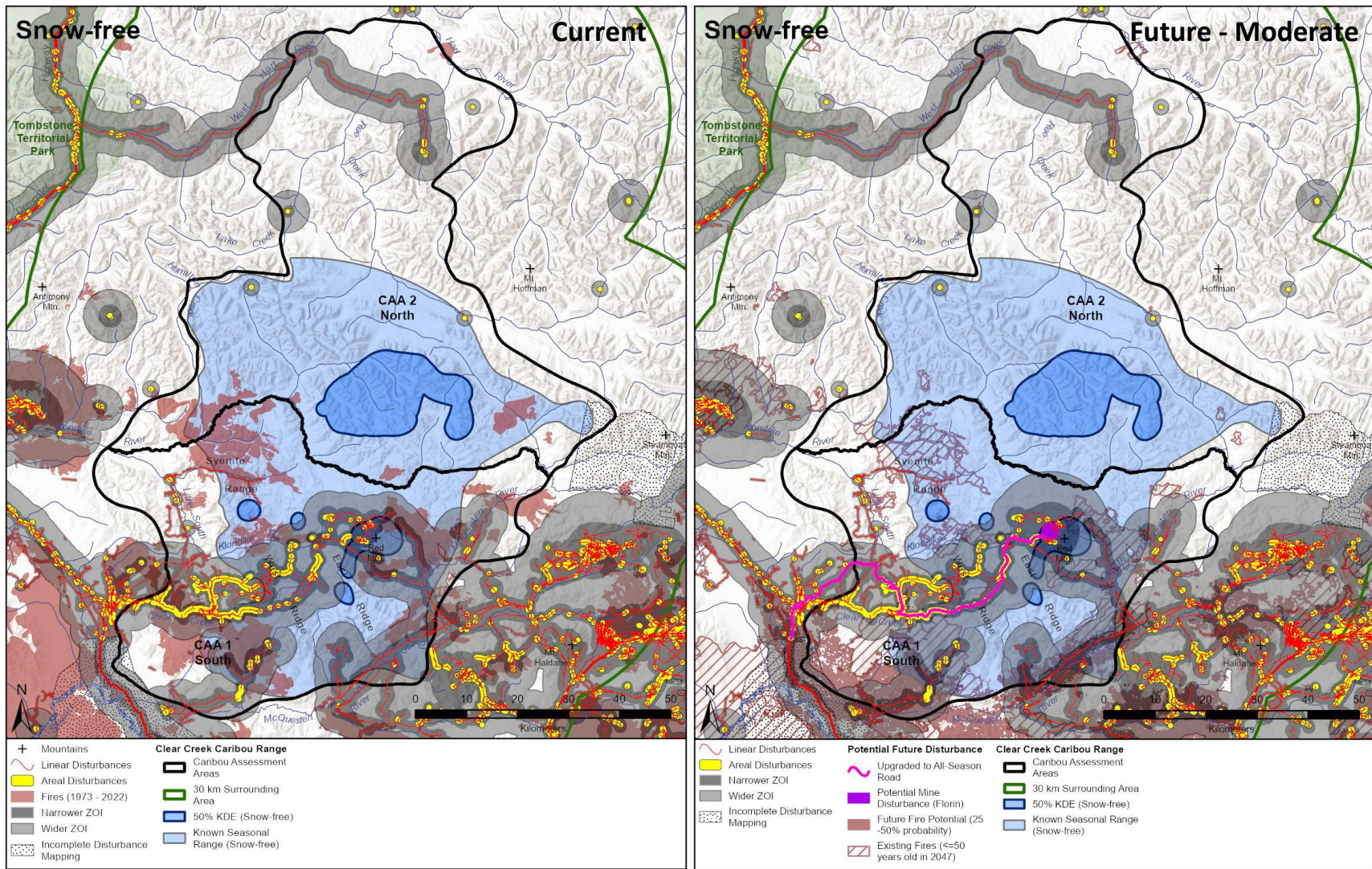


Figure 32. Current habitat disturbance (left) and potential future habitat disturbance in 25 years (2047) (right) due to human activities (linear disturbances, areal disturbances, zones of influence [ZOIs]) and fire ≤ 50 years in relation to areas of recent concentrations of Clear Creek Caribou (50% GPS KDE) during the **snow-free season** (calving, summer, fall rut), for the **Moderate Future Disturbance scenario**. Predicted increase in placer mining disturbance is aspatial and not represented on the map. KDE = Kernel Density Estimate based on GPS locations (2017-2019). Incomplete Disturbance Mapping = portions of the map that may not include all habitat disturbances due to human activities.

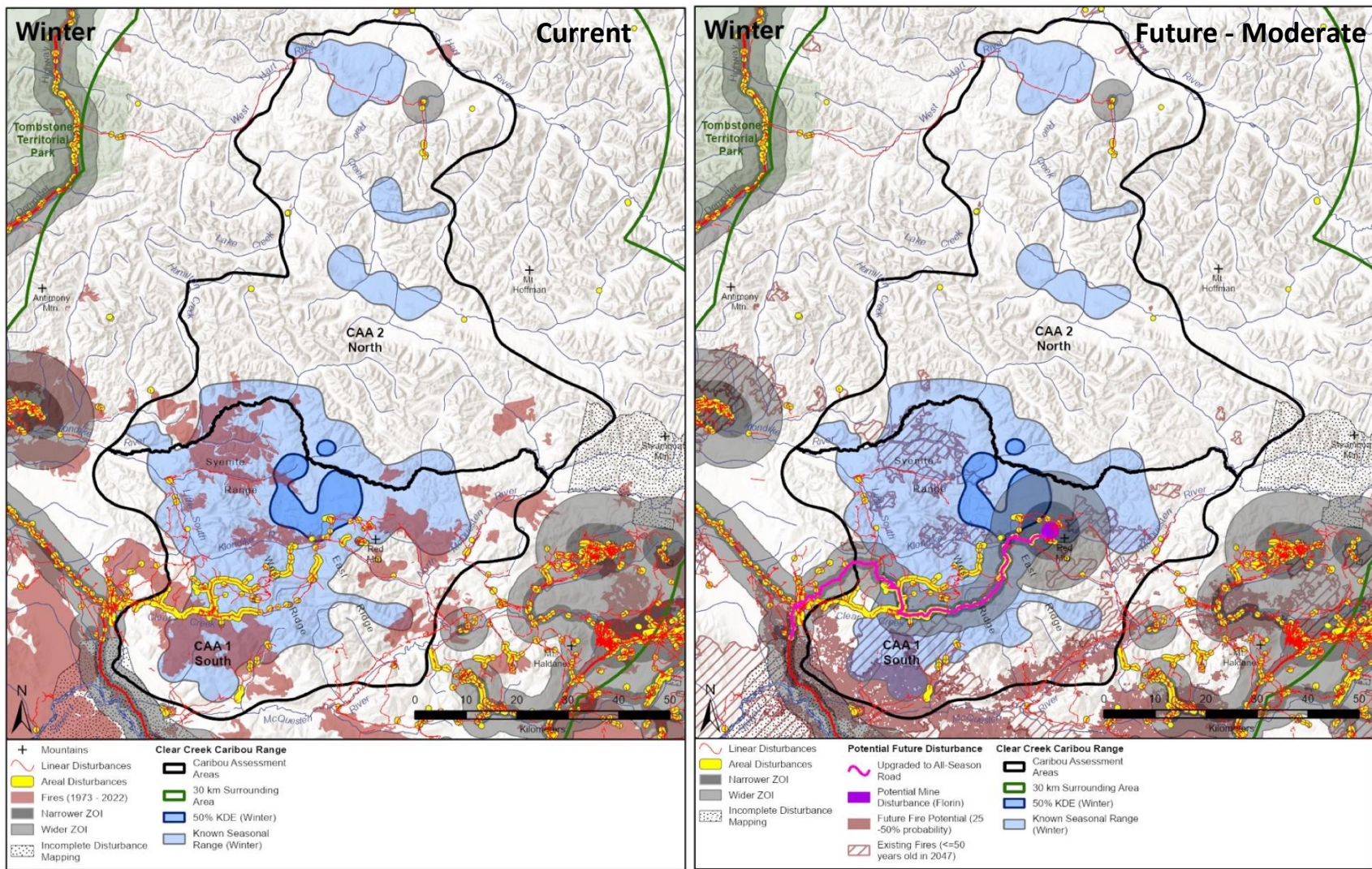


Figure 33. Current habitat disturbance (left) and potential future habitat disturbance in 25 years (2047) (right) due to human activities (linear disturbances, areal disturbances, zones of influence [ZOIs]) and fire ≤50 years in relation to areas of recent concentrations of Clear Creek Caribou (50% GPS KDE) during **winter**, for the **Moderate Future Disturbance scenario**. Predicted increase in placer mining disturbance is aspatial and not represented on the map. KDE = Kernel Density Estimate based on GPS locations (2017-2019). Incomplete Disturbance Mapping = portions of the map that may not include all habitat disturbances due to human activities.

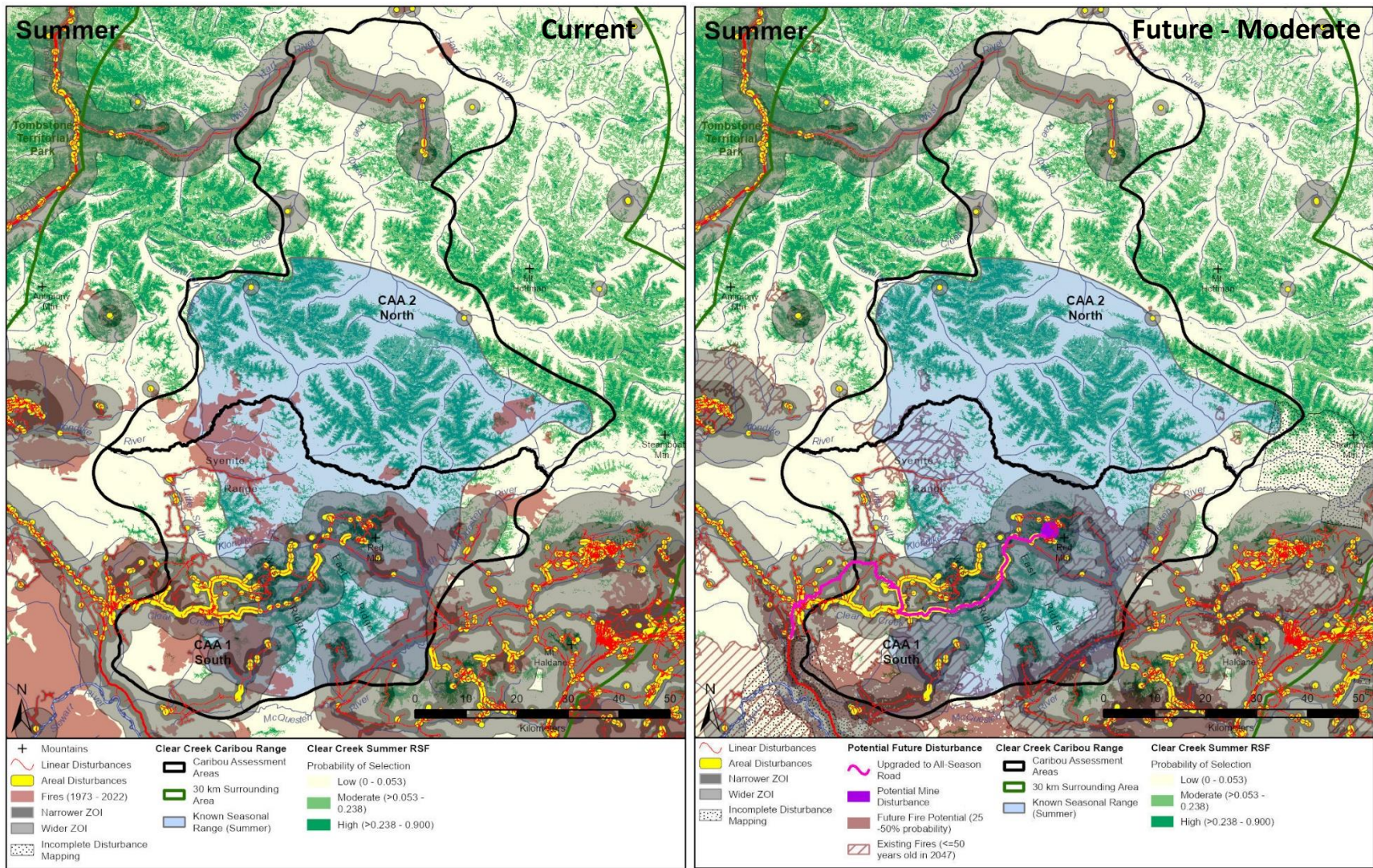


Figure 34. Current habitat disturbance (left) and potential future habitat disturbance in 25 years (2047) (right) due to human activities (linear disturbances, areal disturbances, zones of influence [ZOIs]) and fire ≤ 50 years in relation to predicted habitat value (probability of selection by caribou) for Clear Creek Caribou during the **snow-free season** (calving, summer, fall rut), for the **Moderate Future Disturbance scenario**. Predicted increase in placer mining disturbance is aspatial and not represented on the map. RSF = Resource Selection Function. Incomplete Disturbance Mapping = portions of the map that may not include all habitat disturbances due to human activities.

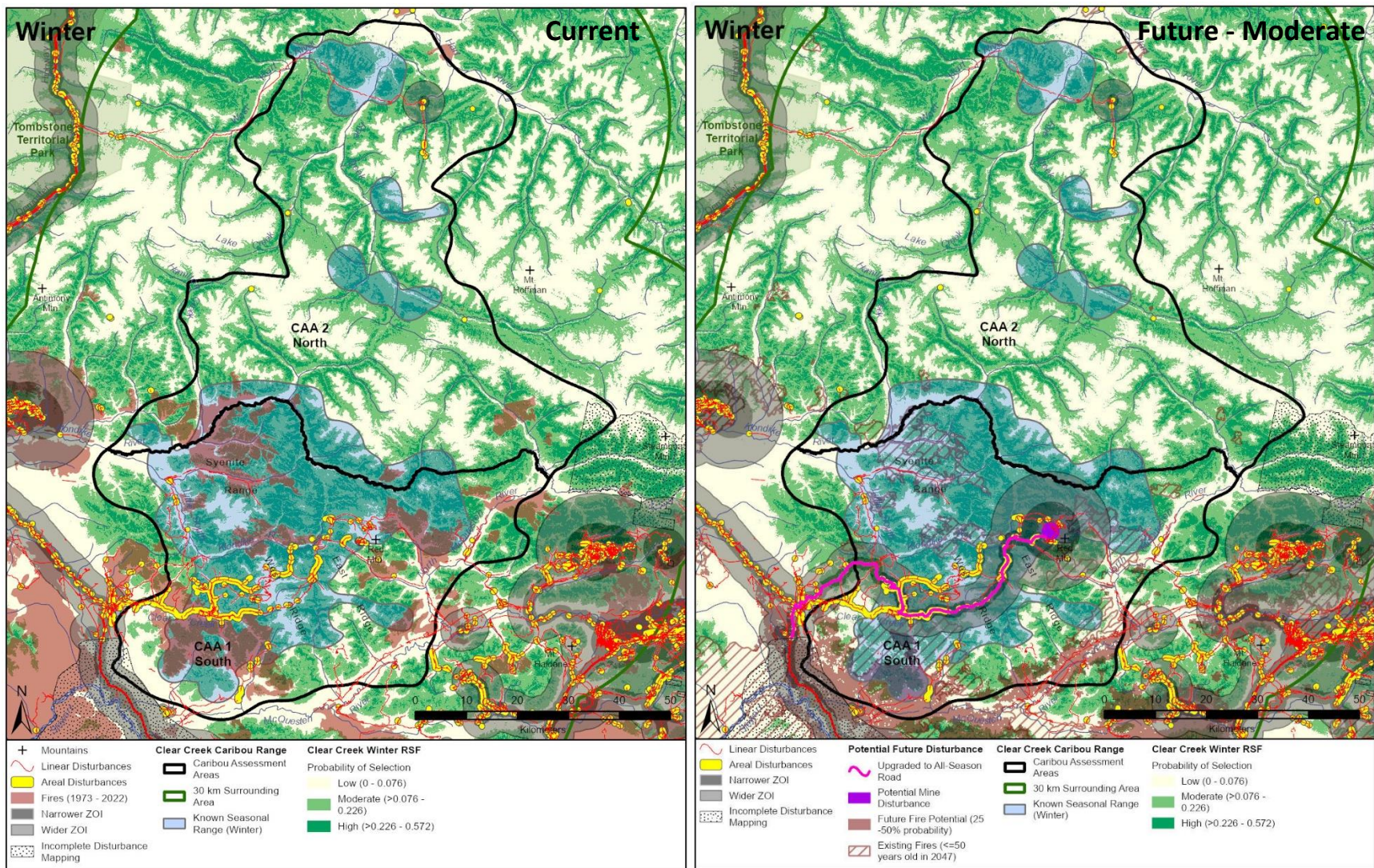


Figure 35. Current habitat disturbance (left) and potential future habitat disturbance in 25 years (2047) (right) due to human activities (linear disturbances, areal disturbances, zones of influence [ZOIs]) and fire ≤ 50 years in relation to predicted habitat value (probability of selection by caribou) for Clear Creek Caribou during **winter**, for the **Moderate Future Disturbance scenario**. Predicted increase in placer mining disturbance is aspatial and not represented on the map. RSF = Resource Selection Function. Incomplete Disturbance Mapping = portions of the map that may not include all habitat disturbances due to human activities.

Table 25. Area affected by fires ≤50 years and indirect human-caused habitat disturbance in the Clear Creek Caribou Range during the **winter** season for known seasonal range, recent concentrated use areas, predicted habitat value, and potential range for the current (Curr) situation (2022), and for predicted moderate (Mod) and High (High) scenarios for 25 years in the future (2047).

Caribou Assessment Area	Predicted Habitat Value	% of Total Area															Total Area (ha)
		Fires ≤50 years						Indirect Human-caused Habitat Disturbance (ZOI) ¹			Indirect Total Habitat Disturbance (Fires ≤50 years + ZOI)						
		Narrower ZOI			Wider ZOI			Narrower ZOI			Wider ZOI						
		Curr	Future Scenario		Curr	Future Scenario		Curr	Future Scenario		Curr	Future Scenario		Curr	Future Scenario		
Known Winter Range																	
CAA1 (South)		26.5	29.4		0	9.2	15.1	0	30.4	42.1	26.5	37.4	43.2	26.5	54.3	63.7	191 798
CAA2 (North)		6.1	1.2		0	0	0	0	1.7	2.9	6.1	1.2	1.2	6.1	2.9	4.1	75 537
Total (CAA1+CAA2)		20.7	21.4		0	6.6	10.8	0	22.3	31.1	20.7	27.2	31.3	20.7	39.8	46.9	267 335
Recent Concentrated Use Area Winter (50% KDE)																	
CAA1 (South)		5.7	5.7		0	10.2	14.0	0	54.7	58.6	5.7	15.2	19.0	5.7	58.8	62.7	17 224
CAA2 (North)		0	0		0	0	0	0	4.8	11.5	0	0	4.8	0	4.8	11.5	1 013
Total (CAA1+CAA2)		5.4	5.4		0	9.6	13.3	0	51.9	56.0	5.4	14.3	17.9	5.4	55.8	59.8	18 237
Predicted Habitat Value Winter (RSF)																	
CAA1 (South)	Low	28.1	43.0		0.0	6.6	10.5	1.8	20.4	27.4	28.1	48.4	52.1	29.9	57.0	62.7	120 410
	Moderate	24.5	29.5		0.0	7.4	11.3	0.0	27.4	36.7	24.5	36.3	40.0	24.5	51.5	59.0	152 703
	High	1.2	3.9		0.0	3.3	6.3	0.0	24.1	33.8	1.2	7.2	10.2	1.2	27.9	37.5	51 849
CAA2 (North)	Low	3.2	0.9		0.1	0.1	0.1	0.2	0.4	0.4	3.3	1.0	1.0	3.4	1.3	1.3	166 033
	Moderate	3.7	1.0		0.1	0.1	0.1	1.5	2.0	2.2	3.9	1.2	1.2	5.2	3.0	3.3	196 091
	High	0.2	0.1		0.1	0.1	0.1	2.9	3.0	3.5	0.3	0.1	0.1	3.1	3.1	3.5	68 622
Total (CAA1+CAA2)	Low	13.7	18.6		0.0	2.8	4.4	0.9	8.8	11.8	13.7	20.9	22.5	14.5	24.7	27.1	286 443
	Moderate	12.8	13.5		0.1	3.3	5.0	0.8	13.1	17.3	12.9	16.5	18.2	13.7	24.3	27.7	348 795
	High	0.6	1.7		0.0	1.4	2.7	1.6	12.1	16.5	0.7	3.2	4.5	2.3	13.8	18.1	120 471
Potential Range Winter																	
CAA1 (South)		26.2	36.6		0.0	4.9	6.3	0.9	21.9	27.3	26.2	40.7	41.9	27.1	52.7	56.6	251 660
CAA2 (North)		6.0	1.8		0.2	0.2	0.2	2.4	3.2	3.6	6.2	2.0	2.0	8.4	5.0	5.5	180 315
Total (CAA1+CAA2)		17.8	22.1		0.1	2.9	3.7	1.5	14.1	17.4	17.9	24.5	25.3	19.3	32.8	35.3	431 975
Total Range (Using All Year ZOIs)																	
CAA1 (South)		22.1	30.4		0.0	6.4	10.2	0.7	24.3	32.8	22.1	36.1	39.7	22.8	49.8	56.9	324 963
CAA2 (North)		3.0	0.8		0.1	0.1	0.1	1.2	1.5	1.7	3.1	0.9	0.9	4.2	2.4	2.6	430 746
Total (CAA1+CAA2)		11.2	13.6		0.0	2.8	4.4	1.0	11.3	15.1	11.2	16.1	17.6	12.2	22.7	25.9	755 709

¹ Includes area of human habitat disturbance + ZOI; Uses All Year ZOIs

² In the Clear Creek Caribou Range, because the main current human activities are placer mining and quartz mineral exploration, which are conducted primarily during the snow-free season, ZOIs are applied for those activities only during the snow-free season and therefore the area included in winter ZOIs is very low or nil due to the absence of human activities during the winter season. Direct (physical) habitat disturbance from the development footprint is present year-round.

Table 26. Area affected by fires ≤50 years and indirect human-caused habitat disturbance in the Clear Creek Caribou Range during the **snow-free/summer** season for known seasonal range, recent concentrated use areas, and potential range for the current (Curr) situation (2022), and for predicted moderate (Mod) and High (High) scenarios for 25 years in the future (2047). (Includes predicted aspatial increases in placer mining.)

Caribou Assessment Area	Predicted Habitat Value	% of Total Area															Total Area (ha)
		Fires ≤50 years						Indirect Human-caused Habitat Disturbance (ZOI) ^{1,2}			Indirect Total Habitat Disturbance (Fires ≤50 years + ZOI)						
		Narrower ZOI			Wider ZOI			Narrower ZOI			Wider ZOI						
		Curr	Future Scenario		Curr	Future Scenario		Curr	Future Scenario		Curr	Future Scenario		Curr	Future Scenario		
Known Snow-free Range																	
CAA1 (South)		24.8	30.4	20.9	25.2	33.4	57.6	65.3	78.2	41.5	48.5	56.7	67.4	75.1	87.8		199 959
CAA2 (North)		4.4	0.9	0.0	0.0	0.0	0.6	1.2	1.6	4.4	1.0	1.0	5.0	2.1	2.6		203 830
Total (CAA1+CAA2)		14.5	15.5	10.4	12.5	16.5	28.8	33.0	39.5	22.8	24.5	28.5	35.9	38.3	44.8		403 789
Recent Concentrated Use Area Snow-free (50% KDE)																	
CAA1 (South)		10.0	10.0	30.9	48.7	58.8	75.1	86.2	100.0	38.2	51.5	60.1	75.8	86.9	100.0		10 521
CAA2 (North)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		35 077
Total (CAA1+CAA2)		2.3	2.3	7.1	11.2	13.6	17.3	19.9	24.4	8.8	11.9	13.9	17.5	20.1	24.6		45 598
Predicted Habitat Value Summer (RSF)																	
CAA1 (South)	Low	25.4	35.2	22.3	26.7	34.4	54.3	60.7	70.5	42.7	53.7	61.3	64.8	73.4	83.1		266 819
	Moderate	8.5	10.0	21.0	26.3	36.7	57.0	64.6	80.2	28.8	35.1	45.4	59.9	67.9	83.5		43 308
	High	3.0	3.9	24.5	28.0	40.0	60.8	69.2	90.4	27.4	31.5	43.6	61.7	70.3	91.5		14 835
CAA2 (North)	Low	4.4	1.3	3.7	3.7	3.7	14.3	14.8	15.1	8.1	4.9	4.9	18.7	16.0	16.4		259 014
	Moderate	1.0	0.2	0.7	0.7	0.7	8.6	8.6	8.6	1.7	0.9	0.9	9.6	8.8	8.8		116 412
	High	0.4	0.0	0.3	0.3	0.3	3.4	3.4	3.4	0.7	0.3	0.3	3.8	3.5	3.5		55 320
Total (CAA1+CAA2)	Low	15.0	18.5	13.1	15.4	19.3	34.6	38.1	43.2	25.7	29.7	33.5	42.1	45.2	50.2		525 833
	Moderate	3.0	2.9	6.2	7.6	10.5	21.7	23.8	28.0	9.1	10.2	13.0	23.2	24.8	29.1		159 720
	High	1.0	0.8	5.4	6.1	8.7	15.6	17.4	21.8	6.3	6.9	9.5	16.1	17.6	22.1		70 155
Potential Range Summer																	
CAA1 (South)		7.9	9.2	19.8	24.6	35.0	56.4	63.8	80.0	27.1	32.8	43.1	59.5	67.3	83.5		73 303
CAA2 (North)		0.8	0.1	0.6	0.6	0.6	8.1	8.1	8.2	1.4	0.7	0.7	8.9	8.3	8.3		250 430
Total (CAA1+CAA2)		2.4	2.2	5.0	6.0	8.4	19.1	20.8	24.4	7.2	8.0	10.3	20.4	21.6	25.3		323 734
Total Range (Using Snow-free + All Year ZOIs)																	
CAA1 (South)		22.1	30.4	22.3	26.7	35.0	54.9	61.6	72.7	40.2	50.2	58.4	64.0	72.5	83.6		324 963
CAA2 (North)		3.0	0.8	2.4	2.4	2.4	11.3	11.6	11.8	5.4	3.3	3.3	14.3	12.5	12.7		430 746
Total (CAA1+CAA2)		11.2	13.6	11.0	12.9	16.4	30.1	33.1	38.0	20.4	23.4	27.0	35.7	38.3	43.2		755 709

¹ Includes area of human habitat disturbance + ZOI; Uses Snow-free + All Year ZOIs

² In the Clear Creek Caribou Range, because the main human activities are placer mining and quartz mineral exploration, which are conducted primarily during the snow-free season, ZOIs are applied for those activities only during the snow-free season.

4.3 Clear Creek Caribou Population

The Clear Creek Caribou Herd is currently estimated at 792 caribou. Data from population surveys in 2001 and 2018 suggest that the population is stable or slightly declining (Russell et al. 2023), while persistently low calf recruitment data suggest that the population is declining. Recent bull:cow ratios are above the rate recommended for all females to have the opportunity to reproduce. Bull harvest rate has declined since the early 2010s and the most recent harvests are lower than the maximum harvest rate recommended for populations with declining or unknown trends. There is no information available on adult mortality rates or causes or population limiting factors, and limited information on caribou health.

4.4 Assessment of Risk Factors

Table 27 summarizes risk factors and relative risks to the Clear Creek Caribou Herd. Overall, the current risks to the Clear Creek Caribou Herd and Range are relatively high and are predicted to increase in the future. There is also a lack of information on the Clear Creek Caribou Herd and Range limiting factors that would aid in identifying effective tools for managing the population. Significant risks include: current and predicted future industrial activities and associated roads, land use uncertainty, lack of protections for Clear Creek Caribou range/habitat, a likely declining population trend, and lack of information on population limiting factors.

Table 27. Assessment of current and potential future factors and risks affecting the Clear Creek Caribou Herd.

Factor	Current Situation	Potential Future Situation (in 25 years: 2047)	Risk Assessment
Land Management			
First Nations' Lands	<ul style="list-style-type: none"> • All of the Clear Creek Caribou Range lies within the Traditional Territory of the First Nation of Na-Cho Nyäk Dun • The western 40% of the Clear Creek Caribou Range also lies within the Traditional Territory of the Tr'ondëk Hwëch'in, which is in an area of overlap with the Traditional Territory of the First Nation of Na-Cho Nyäk Dun • About 4% of the range is First Nation Category A or B Settlement Lands 	<ul style="list-style-type: none"> • No changes are expected. 	<ul style="list-style-type: none"> • There are no concerns regarding First Nations' Lands. <p>Risk Assessment: Low Concern</p>
Other Lands	<ul style="list-style-type: none"> • There are no private title land parcels other than First Nation Settlement Lands 	<ul style="list-style-type: none"> • No changes are expected. 	<ul style="list-style-type: none"> • There are no concerns regarding other lands. <p>Risk Assessment: Low Concern</p>
Land and resource tenure	<ul style="list-style-type: none"> • Active quartz claims cover: <ul style="list-style-type: none"> ○ Total Range: 11.2% (84 467 ha) ○ CAA1: 24.1% (78 264 ha) ○ CAA2: 1.4% (6 202 ha) • Active placer claims/leases cover: <ul style="list-style-type: none"> ○ Total Range: 1.7% (12 700 ha) ○ CAA1: 3.9% (12 700 ha) ○ CAA2: 0% (0 ha) 	<ul style="list-style-type: none"> • Area covered by quartz and placer claims/leases is expected to continue or expand. 	<ul style="list-style-type: none"> • The area currently covered by quartz and placer claims/leases overlaps areas historically used by caribou during all seasons. Concentrated caribou use has shifted to other parts of their range. • Continued/expanded exploration and resource extraction activities could result in displacement of caribou away from traditionally used portions of their range and into areas with potentially higher mortality risk. <p>Risk Assessment: High Concern</p>

Factor	Current Situation	Potential Future Situation (in 25 years: 2047)	Risk Assessment
<p>Land use planning</p>	<ul style="list-style-type: none"> • The portion of the Peel Watershed Planning Region that overlaps the Clear Creek Caribou Range is designated as Wilderness Area, where new land-use dispositions and new surface access are not allowed until at least 2030. • Of the 22% of the Clear Creek Caribou Range that overlaps the Dawson Planning Region, 61% is proposed in the draft plan to be zoned as low industrial resource use (Wehtr'e), 28% is proposed for moderate (Brewery Creek) or high industrial resource use (Clear Creek), and 11% is proposed as a Special Management Area (Tintina Trench) with very low industrial resource use. • In the Dawson Planning Region, the proposed low industrial use zone (Wehtr'e) is used by caribou during all seasons, and the other three zones are used primarily during winter although the high (Clear Creek) and moderate (Brewery Creek) industrial use zones have also been used by caribou during calving and summer. • Land use planning in the Northern Tutchone Planning Region, which overlaps almost half the Clear Creek Caribou Range and the majority of the area used by Clear Creek Caribou, has not yet started. 	<ul style="list-style-type: none"> • The Wilderness Area designation in the Peel Watershed Region is an interim, not a permanent protection and level of protection will be reviewed periodically and could be potentially changed to higher or lower protection. • Management direction and zoning in the draft Dawson land use plan has not yet been finalized and could potentially change in the portion of the planning region that overlaps the Clear Creek Caribou Range. • It is not known when the land use planning process will start for the Northern Tutchone Planning Region. 	<ul style="list-style-type: none"> • The portion of the Clear Creek Caribou Range in the Peel Watershed Planning Region has the lowest amount of use by Clear Creek Caribou (mostly during winter) of the three planning regions and therefore the Wilderness Area designation may provide only limited benefits for the Clear Creek Caribou Herd. Also, the Wilderness Area designation is an interim protection and could potentially be downgraded to lower protections during periodic reviews. • In the Dawson Planning Region part of the Clear Creek Caribou Range, draft zoning provides for moderate and high levels of industrial resource use in portions of the range. If the draft plan is revised to allow for higher levels of industrial resource use in any of the zones, risks to the Clear Creek Caribou Herd will increase. • Land use uncertainty due to lack of a land use plan in the Northern Tutchone Region, where most caribou use occurs and where most of the industrial resource use occurs, could lead to erosion of habitat and range quality for caribou if resource exploration and extraction activities continue or expand. • Since the Clear Creek Caribou Range overlaps portions of three planning regions with planning processes conducted during different time periods, a coordinated land use planning effort across the whole range is not possible, which could result in higher overall impacts to Clear Creek Caribou and their habitat if risks to caribou in each planning region are not considered within the context of cumulative effects of land use across the whole caribou range. <p>Risk Assessment: High Concern</p>

Factor	Current Situation	Potential Future Situation (in 25 years: 2047)	Risk Assessment
Land withdrawals	<ul style="list-style-type: none"> Mineral and oil and gas land withdrawals for new dispositions in the Peel Watershed Planning Region portion of the Clear Creek Caribou Range are in place until January 1, 2030. The mineral land withdrawal for new dispositions in the proposed low industrial resource use zone (Wehtr'e) in the Dawson Planning Region is set to expire in December 2024. 	<ul style="list-style-type: none"> Future status of mineral and oil and gas land withdrawals for new dispositions in the Peel Watershed Planning Region portion of the Clear Creek Caribou Range will depend on the Wilderness Area review process. It is currently uncertain whether there will be any mineral or oil and gas land withdrawals for new dispositions in the Dawson or Northern Tutchone Planning Regions. 	<ul style="list-style-type: none"> The current mineral and oil and gas land withdrawals for new dispositions in the Peel Watershed Planning Region portion of the Clear Creek Caribou Range are interim and could potentially be removed through the Wilderness Area review process. The remainder of the Clear Creek Caribou Range is open for new dispositions for mineral or oil and gas exploration <p>Risk Assessment: Moderate Concern</p>
Access Restrictions	<ul style="list-style-type: none"> In the West Hart River Land Management Unit (LMU) of the Peel Watershed Planning Region portion of the Clear Creek Caribou Range, off-road vehicle (ORV) use is restricted to only the portion of the Hart River Trail specified in the Regulation, except for authorized activities (see Appendix 4) or as authorized in a trail management plan. In the remainder of the Clear Creek Caribou Range, the Yukon-wide ORV restriction applies to all areas above 1400 m, which restricts ORV use to existing trails, except for authorized activities (see Appendix 4) or as authorized in a trail management plan. 	<ul style="list-style-type: none"> The Yukon-wide >1400 m ORV restriction is expected to continue in the future for all of the Clear Creek Caribou Herd Range Future status of the West Hart River LMU ORV restriction will likely depend on Wilderness Area status, which is subject to periodic reviews. 	<ul style="list-style-type: none"> The >1400 m ORV restriction does not eliminate ORV use above 1400 m; ORV use is allowed on existing trails, and ORV use beyond trails is permitted for authorized activities (including resource exploration activities) or as authorized in a trail management plan. The West Hart River LMU ORV restriction allows ORV use only on the portion of the Hart River Trail specified in the Regulation, but allows use beyond trails for authorized activities (including resource exploration activities) or as authorized in a trail management plan. Sensory disturbance to caribou from ORV use on specified trails or by authorized use beyond trails could result in displacement of caribou away from traditionally used portions of their range and into areas with potentially higher mortality risk. <p>Risk Assessment: Moderate Concern</p>
Protected or conservation areas (Territorial Park, Habitat Protection Area, Wilderness Area or similar)	<ul style="list-style-type: none"> There are no designated protected areas in the Clear Creek Caribou Range. All of the portion of the Clear Creek Caribou Range in the Peel Watershed Planning Region is designated as a Wilderness Area. A small portion of the western part of the range (2.5% of total annual range) in the Dawson Planning Region is proposed as a Special Management Area. 	<ul style="list-style-type: none"> The Wilderness Area designation in the Peel Watershed Region is an interim, not a permanent protection and level of protection will be reviewed periodically and could be potentially changed to higher or lower protection. Except for the proposed Special Management Area in the Dawson Planning Region in the western portion of the Clear Creek Caribou Range, there are no plans in the near future to designate protected or conservation areas in the remainder of the range. 	<ul style="list-style-type: none"> All areas of the Clear Creek Caribou Range outside of the designated Wilderness Area and the proposed Special Management Area are potentially available for mineral exploration and development and other land uses, which are expected to continue and likely expand in the future. Long-term integrity of much of the range is therefore reliant on the assessment, approval and management of land uses on a project-by-project basis. <p>Risk Assessment: High Concern</p>

Factor	Current Situation	Potential Future Situation (in 25 years: 2047)	Risk Assessment
Human and Natural Disturbance			
Total area burned by wildfires ≤50 years old	<ul style="list-style-type: none"> • Total area burned by wildfires ≤50 years old <ul style="list-style-type: none"> ○ Total Range: 11% ○ CAA1: 22% ○ CAA2: 3% 	<ul style="list-style-type: none"> • Moderate and High Future Scenarios: <ul style="list-style-type: none"> ○ Although the spatial location of fires cannot be predicted, for the future scenarios, fire is predicted to occur in moderate to high fire risk areas, primarily at low elevations in CAA1, to approximate future fire disturbance. ○ older historical fires age out of the ≤50 years old age class, especially in CAA2 • Total net area burned by wildfires ≤50 years old <ul style="list-style-type: none"> ○ Total Range: 14% ○ CAA1: 30% ○ CAA2: 1% 	<ul style="list-style-type: none"> • Total net area burned by wildfires is predicted to increase by about 40% (from 22% to 30%) in CAA1, but decrease by about 67% (from 3% to 1%) in CAA2 (corresponding to no new predicted fires and maturing of older burned areas to +50 years in age in CAA2). • Climate change could result in higher increases in area burned by wildfires in the future • Conversion of forests to early seral habitats by fire could lead to increased habitat for moose and potentially altered predator/prey dynamics and higher predation risk to caribou. <p>Risk Assessment: Moderate Concern</p>
Level of human activity	<ul style="list-style-type: none"> • Human activities are conducted primarily: <ul style="list-style-type: none"> ○ during the snow-free/summer season; ○ in CAA1 (South); and, ○ in areas associated with roads and trails. • Human activities are currently generally not conducted during winter, however, the main Clear Creek road may open as early as March in some years. 	<ul style="list-style-type: none"> • Future placer activity is predicted to increase and continue to be conducted during the snow-free/summer season in CAA1 (South). • The future Moderate scenario predicts an operating quartz mine at Red Mountain with access roads upgraded to all-season roads. • The future High scenario predicts operating quartz mines at Red Mountain and West Ridge with access roads upgraded to all-season roads. 	<ul style="list-style-type: none"> • Clear Creek Caribou have already shifted their seasonal range use away from areas with higher levels of access, human activities and habitat disturbance, especially during summer. • The greatest predicted future change in seasonal human activities will be the addition of human activities during the winter season, from the current condition of no human activity during winter. • The addition of winter human activities to the Clear Creek Caribou Range could result in sensory disturbance to caribou during the winter season, which could lead to displacement of caribou away from traditionally used portions of their winter range and into areas with potentially higher mortality risk. • Predicted increase in placer activity will also result in increased human activities during the snow-free/summer season, which could result in additional habitat disturbance and sensory disturbance to caribou. <p>Risk Assessment: High Concern</p>

Factor	Current Situation	Potential Future Situation (in 25 years: 2047)	Risk Assessment
Access (amount of road and trail access)	<ul style="list-style-type: none"> • Length of all linear features: <ul style="list-style-type: none"> ○ Total Range: 764 km ○ CAA1: 716 km ○ CAA2: 48 km • Density of all linear features: <ul style="list-style-type: none"> ○ Total Range: 0.10 km/km² ○ CAA1: 0.22 km/km² ○ CAA2: 0.01 km/km² • Most linear features in the Clear Creek Caribou Range are located in CAA1 (South) and are used for human activities primarily during the snow-free/summer season 	<ul style="list-style-type: none"> • Total length and density of linear features will likely increase in the future associated with increased placer and quartz mining activities. • Access roads to the Red Mountain and West Ridge quartz claims will be upgraded to all-season roads if the Red Mountain (Moderate Scenario) or both mines (High Scenario) are developed. 	<ul style="list-style-type: none"> • Access levels in CAA1 (South) are already high. • Clear Creek Caribou have already shifted their seasonal range use away from areas with higher levels of access, human activities and habitat disturbance, especially during snow-free/summer seasons. • Increased access due to an increase in linear features in the Clear Creek Caribou Range could result in increased direct and indirect effects of human activities on caribou, and increased predation risk due to increased predator travel rates and efficiency during both the snow-free/summer and winter seasons. <p>Risk Assessment: High Concern</p>
Total direct human development footprint	<ul style="list-style-type: none"> • Total direct footprint of human-caused habitat disturbance (excluding linear features): <ul style="list-style-type: none"> ○ Total Range: 0.20% (1 512 ha) ○ CAA1: 0.45% (1 455 ha) ○ CAA2: 0.01% (57 ha) 	<ul style="list-style-type: none"> • Direct human development footprint is predicted to increase in the future due to quartz and placer mining development. • Other human-caused habitat disturbances (e.g. forest harvesting, agriculture) are not expected to contribute significantly to the direct human development footprint. 	<ul style="list-style-type: none"> • Although the total direct human-caused habitat disturbance is currently low (<1% of Total Range), the spatial relationship to caribou habitat is also important to consider. Most of the direct human development footprint is located in areas that were previously used more extensively by caribou in both summer and winter, in what was previously the main part of the Clear Creek Caribou Range. <p>Risk Assessment: Moderate Concern</p>

Factor	Current Situation	Potential Future Situation (in 25 years: 2047)	Risk Assessment																					
<p>Total human development ZOI (direct footprint + indirect effects)</p>	<ul style="list-style-type: none"> Total human development currently has a greater impact during snow-free/summer months than during winter because human activities associated with quartz mineral exploration and placer mining occur primarily during snow-free/summer months, with the greatest impact in CAA1. SNOW-FREE season ZOIs* <ul style="list-style-type: none"> Total Range: 11 - 30% CAA1: 22 - 55% CAA2: 2 - 11% WINTER season ZOIs* <ul style="list-style-type: none"> Total Range: 0 - 1.0% CAA1: 0 - 0.7% CAA2: 0.1 - 1.2% <p>* the range in % values represents the range between Narrower and Wider ZOIs</p>	<ul style="list-style-type: none"> Moderate Future Scenario: <ul style="list-style-type: none"> operating quartz mine in Red Mountain claims area placer mining predicted increase of 9.49% per year (based on rate of increase from 2010 to 2022) and adjusted for overlapping ZOIs High Future Scenario: <ul style="list-style-type: none"> operating quartz mines in Red Mountain and West Ridge claims areas placer mining predicted increase of 18.98% per year (based on 2 X rate of increase from 2010 to 2022) and adjusted for overlapping ZOIs Impacts of total human development is predicted to increase during the snow-free season, and substantially increase during the winter season, with the greatest impact in CAA1. <table border="0" data-bbox="848 716 1354 743"> <tr> <td>FUTURE SCENARIO:</td> <td>Moderate</td> <td>High</td> </tr> </table> <ul style="list-style-type: none"> SNOW-FREE season ZOIs* <table border="0" data-bbox="848 781 1354 865"> <tr> <td>Total Range:</td> <td>13 - 33%</td> <td>16 - 38%</td> </tr> <tr> <td>CAA1:</td> <td>27 - 62%</td> <td>35 - 73%</td> </tr> <tr> <td>CAA2:</td> <td>2 - 12%</td> <td>2 - 12%</td> </tr> </table> WINTER season ZOIs* <table border="0" data-bbox="848 902 1354 987"> <tr> <td>Total Range:</td> <td>3 - 11%</td> <td>4 - 15%</td> </tr> <tr> <td>CAA1:</td> <td>6 - 24%</td> <td>10 - 33%</td> </tr> <tr> <td>CAA2:</td> <td>0.1 - 1.5%</td> <td>0.1 - 1.7%</td> </tr> </table> <p>* the range in % values represents the range between Narrower and Wider ZOIs</p>	FUTURE SCENARIO:	Moderate	High	Total Range:	13 - 33%	16 - 38%	CAA1:	27 - 62%	35 - 73%	CAA2:	2 - 12%	2 - 12%	Total Range:	3 - 11%	4 - 15%	CAA1:	6 - 24%	10 - 33%	CAA2:	0.1 - 1.5%	0.1 - 1.7%	<ul style="list-style-type: none"> The greatest increase in predicted future human development ZOI will be during the winter season. Either one (Moderate Scenario) or two (High Scenario) operating mines will change from a current "no impact" situation, to up to 33% of CAA1 impacted by future human activities/habitat disturbance during winter. Future human development ZOI is predicted to impact up to 56% of the Winter Recent Concentrated Use Area (50% KDE). The greatest total area of predicted future human development ZOI will be during the snow-free season where already high current impacts (up to 55% in CAA1) are predicted to increase (up to 73% in CAA1). The addition of winter human activities/habitat disturbance to the Clear Creek Caribou Range could result in sensory disturbance to caribou during the winter season, which could lead to displacement of caribou away from traditionally used portions of their winter range into areas with potentially higher mortality risk. Predicted increase in placer activity and upgrading and use of seasonal roads to all-season roads to support new operating mines, will also result in increased human activities/habitat disturbance during the snow-free/summer season, which could result in additional sensory disturbance to caribou. Caribou have already shifted seasonal range use away from areas with high levels of human activities/habitat disturbance, especially during the snow-free season. <p>Risk Assessment: High Concern</p>
FUTURE SCENARIO:	Moderate	High																						
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Factor	Current Situation	Potential Future Situation (in 25 years: 2047)	Risk Assessment																											
Total habitat disturbance (fires ≤50 years old + human development ZOI)	<ul style="list-style-type: none"> • Total habitat disturbance (fires ≤50 years old + human development ZOI) currently has a greater impact during snow-free/summer months than during winter because human activities associated with quartz mineral exploration and placer mining occur primarily during snow-free/summer months, with the greatest impact in CAA1. • SNOW-FREE season ZOIs* <ul style="list-style-type: none"> ○ Total Range: 20 - 36% ○ CAA1: 40 - 64% ○ CAA2: 5 - 14% • WINTER season ZOIs* <ul style="list-style-type: none"> ○ Total Range: 11 - 12% ○ CAA1: 22 - 23% ○ CAA2: 3 - 4% * the range in % values represents the range between Narrower and Wider ZOIs 	<ul style="list-style-type: none"> • Moderate Future Scenario: <ul style="list-style-type: none"> ○ operating quartz mine in Red Mountain claims area ○ placer mining predicted increase of 9.49% per year (based on rate of increase from 2010 to 2022) and adjusted for overlapping ZOIs • High Future Scenario: <ul style="list-style-type: none"> ○ operating quartz mines in Red Mountain and West Ridge claims areas ○ placer mining predicted increase of 18.98% per year (based on 2 X rate of increase from 2010 to 2022) and adjusted for overlapping ZOIs • Moderate and High Future Scenarios: <ul style="list-style-type: none"> ○ Although the spatial location of fires cannot be predicted, for the future scenarios, fire is predicted to occur in moderate to high fire risk areas (which are primarily located at low elevations in CAA1) to approximate future fire disturbance. ○ older historical fires age out of the ≤50 years old age class, especially in CAA2 • Impacts of total habitat disturbance (fires + human development ZOI) is predicted to increase during the snow-free season, and substantially increase during the winter season, with the greatest impact in CAA1. <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">FUTURE SCENARIO:</td> <td style="width: 35%; text-align: center;">Moderate</td> <td style="width: 35%; text-align: center;">High</td> </tr> <tr> <td>• SNOW-FREE season ZOIs*</td> <td></td> <td></td> </tr> <tr> <td>○ Total Range:</td> <td style="text-align: center;">23 - 38%</td> <td style="text-align: center;">27 - 43%</td> </tr> <tr> <td>○ CAA1:</td> <td style="text-align: center;">50 - 73%</td> <td style="text-align: center;">58 - 84%</td> </tr> <tr> <td>○ CAA2:</td> <td style="text-align: center;">3 - 13%</td> <td style="text-align: center;">3 - 13%</td> </tr> <tr> <td>• WINTER season ZOIs*</td> <td></td> <td></td> </tr> <tr> <td>○ Total Range:</td> <td style="text-align: center;">16 - 23%</td> <td style="text-align: center;">18 - 26%</td> </tr> <tr> <td>○ CAA1:</td> <td style="text-align: center;">36 - 50%</td> <td style="text-align: center;">40 - 57%</td> </tr> <tr> <td>○ CAA2:</td> <td style="text-align: center;">1 - 2%</td> <td style="text-align: center;">1 - 3%</td> </tr> </table> * the range in % values represents the range between Narrower and Wider ZOIs 	FUTURE SCENARIO:	Moderate	High	• SNOW-FREE season ZOIs*			○ Total Range:	23 - 38%	27 - 43%	○ CAA1:	50 - 73%	58 - 84%	○ CAA2:	3 - 13%	3 - 13%	• WINTER season ZOIs*			○ Total Range:	16 - 23%	18 - 26%	○ CAA1:	36 - 50%	40 - 57%	○ CAA2:	1 - 2%	1 - 3%	<ul style="list-style-type: none"> • Total habitat disturbance is predicted to increase in the future, primarily due to increases in human activities/habitat disturbance in CAA1 (South). • The greatest increase in predicted future total habitat disturbance will be during the winter season corresponding to upgrading summer-use roads to all-season roads, and new disturbance from one (Moderate Scenario) or two (High Scenario) new operating mines. • The greatest total area of predicted future total habitat disturbance will be during the snow-free season where already high current impacts (up to 64% in CAA1) are predicted to increase (up to 84% in CAA1). • Increased sensory and habitat disturbance to caribou could lead to displacement of caribou away from traditionally used portions of their seasonal ranges and into areas with potentially higher mortality risk. • Caribou have already shifted seasonal range use away from areas with high levels of human activities/habitat disturbance, especially during the snow-free season. Risk Assessment: High Concern
FUTURE SCENARIO:	Moderate	High																												
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Factor	Current Situation	Potential Future Situation (in 25 years: 2047)	Risk Assessment
Winter range/habitat condition	<ul style="list-style-type: none"> • Total habitat disturbance (fires ≤50 years old + human development ZOI) on winter range/habitat (using winter season ZOIs) currently is primarily due to fire (see Table 23), is located primarily in CAA1 (South), and is at low to moderate levels depending on the approach used for describing range/habitat: • Known winter range: <ul style="list-style-type: none"> ○ Total Range: 21% ○ CAA1: 27% ○ CAA2: 6% • Winter Recent Concentrated Use Area (50% KDE): <ul style="list-style-type: none"> ○ Total Range: 5% ○ CAA1: 6% ○ CAA2: 0% • Potential winter range: <ul style="list-style-type: none"> ○ Total Range: 18 - 19% ○ CAA1: 26 - 27% ○ CAA2: 6 - 8% • Winter Moderate+High Predicted Habitat Value (RSF): <ul style="list-style-type: none"> ○ Total Range: 10 - 11% ○ CAA1: 19% ○ CAA2: 3 - 5% <p>* the range in % values represents the range between Narrower and Wider ZOIs; single % values represent situations where human-caused disturbance is not occurring during winter</p>	<ul style="list-style-type: none"> • Predicted increases in total disturbance (fires ≤50 years old + human development ZOI) on winter range/habitat (using winter season ZOIs) in the future are largely due to year-round activities associated with one (Moderate Scenario) or two (High Scenario) new operating mines in CAA1 (South). • Total disturbance in CAA1 (South) is currently low to moderate and is predicted to increase to moderate to high levels in 25 years. • Total disturbance in CAA2 (North) is currently low and is predicted to either stay at the same level or decrease in 25 years because no new human disturbances or fires are predicted in CAA2 (North), and because much of the current area burned ages out of the ≤50 years old age class by 2047. <p>FUTURE SCENARIO: Moderate High</p> <ul style="list-style-type: none"> • Known Winter Range <ul style="list-style-type: none"> ○ Total Range: 27 - 40% 31 - 47% ○ CAA1: 37 - 54% 43 - 64% ○ CAA2: 1 - 3% 1 - 4% • Winter Recent Concentrated Use Area (50% KDE): <ul style="list-style-type: none"> ○ Total Range: 14 - 56% 18 - 60% ○ CAA1: 15 - 59% 19 - 63% ○ CAA2: 0 - 5% 0 - 12% • Potential winter range <ul style="list-style-type: none"> ○ Total Range: 25 - 33% 25 - 35% ○ CAA1: 41 - 53% 42 - 57% ○ CAA2: 2 - 5% 2 - 6% • Winter Moderate+High Predicted Habitat Value (RSF): <ul style="list-style-type: none"> ○ Total Range: 13 - 22% 15 - 25% ○ CAA1: 29 - 46% 32 - 54% ○ CAA2: 1 - 3% 1 - 3% <p>* the range in % values represents the range between Narrower and Wider ZOIs</p>	<ul style="list-style-type: none"> • Although less than half (44%) of the Moderate+High Value Predicted Winter Habitat (RSF) is located in CAA1 (South), the majority of known winter caribou use is in CAA1, as represented by the Known Winter Range (72% in CAA1) and Winter Recent Concentrated Use Area (50% KDE) (94% in CAA1). • Total habitat disturbance (fires ≤50 years old + human development ZOI) in CAA1 (South) is currently at a moderate level in the Known Winter Range (primarily due to fire, and low levels of human activities during winter), and low in the Winter Recent Concentrated Use Area (50% KDE). • Total habitat disturbance (fires ≤50 years old + human development ZOI) is predicted to increase substantially in the Known Winter Range and the Winter Recent Concentrated Use Area (50% KDE), primarily corresponding to increased human activities (year-round operating mine(s)) during winter. • Caribou have already shifted seasonal range use away from areas with high levels of human activities/habitat disturbance, especially during the snow-free season. The addition of one or two operating mine(s) will likely lead to further shifts in caribou winter range use and to displacement of caribou away from higher quality habitats/ranges and into areas of potentially higher mortality risk. <p>Risk Assessment: High Concern</p>

Factor	Current Situation	Potential Future Situation (in 25 years: 2047)	Risk Assessment
Snow-free/ Summer range/habitat condition	<ul style="list-style-type: none"> • Total habitat disturbance (fires ≤50 years old + human development ZOI) on snow-free/summer range/habitat (using snow-free/summer season ZOIs) currently is due to human development and fire (see Table 24), is located primarily in CAA1 (South), and is at high levels in CAA1 (South): • Known Snow-free range: <ul style="list-style-type: none"> ○ Total Range: 23 - 36% ○ CAA1: 42 - 67% ○ CAA2: 4 - 5% • Snow-free Recent Concentrated Use Area (50% KDE): <ul style="list-style-type: none"> ○ Total Range: 9 - 18% ○ CAA1: 38 - 76% ○ CAA2: 0% • Potential summer range: <ul style="list-style-type: none"> ○ Total Range: 7 - 20% ○ CAA1: 27 - 60% ○ CAA2: 1 - 9% • Summer Moderate+High Predicted Habitat Value (RSF): <ul style="list-style-type: none"> ○ Total Range: 8 - 21% ○ CAA1: 28 - 60% ○ CAA2: 1 - 8% * the range in % values represents the range between Narrower and Wider ZOIs; single % values represent situations where human-caused disturbance is not occurring during the snow-free/ summer season 	<ul style="list-style-type: none"> • Predicted increases in total disturbance (fires ≤50 years old + human development ZOI) on snow-free/summer range/habitat (using snow-free/ summer season ZOIs) in the future correspond to increased human development including upgrading seasonal road to all-season roads to support one (Moderate Scenario) or two (High Scenario) new operating mines in CAA1 (South), with increased fire also contributing in some cases in CAA1 (South). • Total disturbance in CAA1 (South) is currently high and is predicted to increase to higher levels in 25 years. • Total disturbance in CAA2 (North) is currently low and is predicted to either stay at the same level or decrease in 25 years because no new human disturbances or fires are predicted in CAA2 (North), and because much of the current area burned ages out of the ≤50 years old age class by 2047. FUTURE SCENARIO: Moderate High • Known Snow-free Range <ul style="list-style-type: none"> ○ Total Range: 25 - 38% 29 - 45% ○ CAA1: 49 - 75% 57 - 88% ○ CAA2: 1 - 2% 1 - 3% • Snow-free Recent Concentrated Use Area (50% KDE): <ul style="list-style-type: none"> ○ Total Range: 12 - 20% 14 - 25% ○ CAA1: 52 - 87% 60 - 100% ○ CAA2: 0% 0% • Potential summer range <ul style="list-style-type: none"> ○ Total Range: 8 - 22% 10 - 25% ○ CAA1: 33 - 67% 43 - 84% ○ CAA2: 1 - 8% 1 - 8% • Summer Moderate+High Predicted Habitat Value (RSF): <ul style="list-style-type: none"> ○ Total Range: 9 - 23% 12 - 27% ○ CAA1: 34 - 69% 45 - 86% ○ CAA2: 1 - 7% 1 - 7% * the range in % values represents the range between Narrower and Wider ZOIs; single % values represent situations where human-caused disturbance is not occurring during the snow-free/ summer season 	<ul style="list-style-type: none"> • Total habitat disturbance (fires ≤50 years old + human development ZOI) in CAA1 (South) is currently high and predicted to further increase in all four approaches for describing habitat/range: the Known Snow-free Range; the Winter Recent Concentrated Use Area (50% KDE); the Potential Summer Range, and the Summer Moderate+High Predicted Habitat Value (RSF). • Caribou have already shifted seasonal range use away from areas with high levels of human activities/habitat disturbance, especially during the snow-free season. The addition of one or two operating mine(s) and increased placer activity could lead to further shifts in caribou snow-free/summer range use and to displacement of caribou away from higher quality habitats/ranges and into areas of potentially higher mortality risk. Risk Assessment: High Concern

Factor	Current Situation	Potential Future Situation (in 25 years: 2047)	Risk Assessment
Clear Creek Caribou Population			
Population size and trend	<ul style="list-style-type: none"> The Clear Creek Caribou Herd is currently estimated at 792 caribou (95% Confidence Interval = 767-820) based on a mark-resight survey in October 2018. Although it is not possible to statistically determine population trend between the 2001 and 2018 surveys, based on information from the two surveys the population is likely stable or slightly decreasing, and unlikely to be increasing. Recent calf recruitment data (see below) suggests that the population is likely declining. 	<ul style="list-style-type: none"> Future population size and trend is difficult to predict, but a current likely declining population trend (based on two lines of evidence: 1) population survey data suggesting that the population may be stable or slightly declining, and 2) persistently low calf recruitment suggesting that the population has been declining) suggests that the population may continue to decline in the future if factors contributing to the declining trend are not identified and addressed. 	<ul style="list-style-type: none"> The 2018 population estimate is now more than 5 years old and may no longer represent the current population size. Survey data suggest that the Clear Creek Caribou Herd is likely stable or slightly decreasing, and calf recruitment data suggests that the population is declining. Factors contributing to persistently low calf recruitment will need to be identified and addressed to reverse the likely declining population trend. <p>Risk Assessment: High Concern</p>
Calf recruitment	<ul style="list-style-type: none"> Calf recruitment levels during 6 of the 8 surveys conducted since 2007 were below the recommended 20-25 calves/100 cows for population stability and the other two surveys were between 20-25 calves/100 cows. Of the four most recent surveys, calf recruitment during only the 2018 survey was sufficient to suggest population stability Calf recruitment of 12 calves/100 cows during the most recent survey in 2020 was the second lowest of the 12 calf recruitment surveys conducted since surveys began in 1997 	<ul style="list-style-type: none"> Although future calf recruitment is difficult to predict, low calf recruitment at levels insufficient to suggest population stability is expected to continue if factors contributing to persistently low calf recruitment are not identified and addressed, especially if human development increases and displaces caribou into areas with potentially higher mortality risk. Calf recruitment could decrease if predation risk increases. 	<ul style="list-style-type: none"> Calf recruitment has been persistently low since the mid 2000s and will likely continue to be low, especially if human development increases and displaces caribou into areas with potentially higher mortality risk. Factors contributing to persistently low calf recruitment will need to be identified and addressed to reverse the likely declining population trend. <p>Risk Assessment: High Concern</p>
Bull:cow ratios	<ul style="list-style-type: none"> Bulls/100 cows ratios during the four most recent surveys (2017-2020) were higher than the 30 bulls/100 cows recommended to ensure all females have the opportunity to reproduce 	<ul style="list-style-type: none"> Although future bull:cow ratios are difficult to predict, they may stay high if the range shift by caribou away from the roaded area during the rut/hunting season continues (see Harvest below) 	<ul style="list-style-type: none"> High bull:cow ratios may continue if the range shift by caribou away from the roaded area during the rut/hunting season continues (see Harvest below). <p>Risk Assessment: Low Concern</p>
Adult mortality	<ul style="list-style-type: none"> Currently there is insufficient information available to assess adult mortality rates and causes. 	<ul style="list-style-type: none"> Although future adult mortality is difficult to predict, adult mortality rates could increase if human development increases and displaces caribou into areas with potentially higher mortality risk. Adult mortality rates could also increase if predation risk increases. 	<ul style="list-style-type: none"> Current low calf recruitment is likely insufficient to offset adult mortality, especially if adult mortality rate is high. The lack of information on adult mortality rates and causes will hinder identifying management tools for addressing the likely declining population trend, since major limiting factors of the Clear Creek Caribou Herd have not been determined. <p>Risk Assessment: Moderate Concern</p>

Factor	Current Situation	Potential Future Situation (in 25 years: 2047)	Risk Assessment
Harvest	<ul style="list-style-type: none"> Licensed hunter harvest declined from a peak of 18 in 2012 to 4 in 2021, and averaged 6 bulls/year during the most recent 5 years of data (2017 to 2021). Most of the licensed hunter harvest occurs in the road-accessible portion of CAA1 (South) 	<ul style="list-style-type: none"> Licensed hunter harvest may continue at a low level if the range shift by caribou away from the roaded area during the rut/hunting season continues. 	<ul style="list-style-type: none"> Using the 2018 total population estimate of 792, licensed hunter harvest has been at or below the "up to 1% of total population size" rate recommended for caribou populations with declining or unknown trends for four of the five most recent years of data (2017-2021). Low levels of licensed harvest may continue if the range shift by caribou away from the roaded area during the rut/hunting season continues. <p>Risk Assessment: Low Concern</p>
Other human-caused mortality	<ul style="list-style-type: none"> There is no information about human-caused mortalities other than licensed hunter harvest for the Clear Creek Caribou Herd. 	<ul style="list-style-type: none"> Upgrading the road to the Red Mountain and West Ridge mineral claims areas to an all-season road to support potentially one (Moderate Scenario) or two (High Scenario) mines could result in caribou mortalities due to vehicle strikes. 	<ul style="list-style-type: none"> Currently, other human-caused mortality is not a concern for Clear Creek Caribou, but increased traffic from year-round use on all-season roads associated with potentially one or two new mines in the future will increase risk of mortality due to vehicle strikes. Risk of mortality due to vehicle strikes will depend on factors such as level of traffic, speeds and caribou seasonal use, but risks could be reduced by implementing restrictions on traffic, speeds, etc. <p>Risk Assessment: Low Concern</p>
Predator/prey dynamics	<ul style="list-style-type: none"> There is no information available on wolf or black bear population sizes or trends for the Clear Creek Caribou Range. Grizzly bear densities in the Clear Creek Caribou Range area are estimated at 14-15 bears/km², which is about the Yukon average. Information on moose density is only available for the southwestern and southeastern portions of the Clear Creek Caribou range, where they are near the low end of the range of typical densities in Yukon (100-250 moose/1000 km² of moose habitat) at 122 and 153 moose/1000 km² of moose habitat respectively. Moose populations in the southern portion of the range appear to be declining. 	<ul style="list-style-type: none"> Although moose in and around the southern portion of the Clear Creek Caribou Range appear to be declining, several recent large fires in the range and 30 km Surrounding Area will likely provide good habitat for moose in the future, which could lead to increased moose numbers. Future trends in wolf and bear numbers and population trends are difficult to predict, but wolf numbers are likely to increase if moose numbers increase. 	<ul style="list-style-type: none"> Wolves are typically the main predator of caribou, but grizzly and black bear predation may also be substantial on some ranges, especially on calves. Potential increases in moose numbers resulting from increased moose habitat following fire could lead to higher predation risk for caribou. An increase in linear features in the Clear Creek Caribou Range associated with increased industrial activity could result in higher predation risk to caribou due to increased predator travel rates and efficiency. The lack of information specific to the Clear Creek Caribou Herd and Range on major limiting factors of and the role of predation on the population, will hinder identifying management tools for addressing the likely declining population trend. <p>Risk Assessment: Moderate Concern</p>

Factor	Current Situation	Potential Future Situation (in 25 years: 2047)	Risk Assessment
Health	<ul style="list-style-type: none"> • Baseline information on health of Clear Creek Caribou is collected from caribou captured during collaring sessions. • Some potential concerns include: <ul style="list-style-type: none"> ○ winter ticks ○ <i>Erysipelothrix rhusiopathiae</i> (bacterium) ○ chronic wasting disease (CWD) ○ trace mineral and heavy metal levels 	<ul style="list-style-type: none"> • Diseases and parasites could potentially spread into the Clear Creek Caribou Range as a result of: <ul style="list-style-type: none"> ○ warming climate conditions ○ contact with infected animals from other areas ○ transfer of contaminated biological sources (e.g. infected animals or portions of, vegetation such as hay) or soil (e.g. on vehicles following off-road use) from infected areas 	<ul style="list-style-type: none"> • Winter ticks have been detected on northern mountain caribou in the NWT, and on boreal caribou in the NWT, northeastern BC, and the southern Yukon. • <i>E. rhusiopathiae</i> has been associated with boreal caribou mortalities in northeastern BC, and exposure to <i>E. rhusiopathiae</i> has been detected in northern mountain caribou and boreal caribou in the NWT. • CWD is currently present in free-ranging species in Alberta and was recently detected (February 2024) in southeastern BC. It is a fatal brain disease of the deer family and is difficult to eradicate even with culls of entire populations. • Current risk to health of Clear Creek Caribou by these factors is likely low, but future risk is likely higher as potential for spread increases. If infected, impacts of CWD on the Clear Creek Caribou Herd will be substantial. <p>• Risk Assessment: Moderate Concern</p>
Climate Change	<ul style="list-style-type: none"> • In Yukon, average annual and winter temperatures, and precipitation (especially during winter and summer) have increased over the last 50 years. • This has already resulted in shorter winters, fewer snow cover days during spring, increased frequency and severity of fire in some areas, and increases in rain on snow events, unseasonal thaws, and early snow melt events. • Observed changes to vegetation include treeline shifting upwards in elevation, shrub expansion, increased productivity of vegetation in some areas, and shifts in community type and composition due to permafrost thaw. 	<ul style="list-style-type: none"> • Temperature and precipitation are predicted to continue to increase in Yukon over the next 50 years. • Other predicted changes include increases in: fluctuations in precipitation, extreme weather events (including rain in winter), frost-free days, and length of shoulder season. • Evapotranspiration is also predicted to increase, and increased precipitation may not be able to compensate for increased evapotranspiration, leading to increased fire risk. • As a result of climate change, new vegetation species are predicted to expand their ranges into Yukon. 	<ul style="list-style-type: none"> • Increased fire and other natural disturbance frequency and severity can result in increased early seral habitat favoured by other ungulates, and destruction of lichens (which can take decades to recover). • Lichen abundance could decline due to increased competition from other vegetation, while increased icing could make lichens unavailable to caribou during winter. • Icing or frequent freeze/thaw events could also benefit wolves if the crust can support wolves but not caribou. • Longer, warmer summers could result in increased productivity of summer forage, increased duration of harassment by biting insects, and a reduction in snow-patch refuge areas. • For some parasites, ranges may expand northward and/or life cycles could be shortened. • Overall, effects of climate change on caribou will vary depending on local conditions; however, in the short term, human-caused habitat disturbances are more of a threat than climate change. <p>• Risk Assessment: Moderate Concern</p>

5 Management Recommendations

5.1 Population Recommendations

Key considerations for population management for the Clear Creek Caribou Herd are listed in Table 28.

Table 28. Key considerations for population management for the Clear Creek Caribou Herd.

Key Considerations	
Factor	Current Situation
Population Size and Trend	<ul style="list-style-type: none"> the 2018 population estimate is now more than 5 years old and may no longer represent the current population size. based on calf recruitment and limited information from population estimates, the Clear Creek Caribou Herd is likely declining
Population Dynamics and Limiting Factors	<ul style="list-style-type: none"> calf recruitment has been persistently low since the mid 2000s but factors contributing to persistently low recruitment have not been identified the most recent bull:cow ratios are higher than the minimum level recommended to ensure all females have the opportunity to reproduce there is insufficient information available to assess adult mortality rates and causes, and primary limiting factors there is no range-specific information on predator densities and population trends moose populations in the southern portion of the range are near the low end of the range of typical densities in Yukon and appear to be declining
Harvest	<ul style="list-style-type: none"> the average licensed harvest rate for the five most recent years of data (2017-2021) is below the recommended upper level for caribou populations with declining or unknown trends
Health	<ul style="list-style-type: none"> baseline information on health of Clear Creek Caribou does not suggest any current significant threats
Climate Change	<ul style="list-style-type: none"> in Yukon, climate change has already resulted in increased average annual and winter temperatures, increased precipitation, and changes to fire frequency and severity, vegetation and snow conditions
Factor	Predicted Future Situation
Population Size and Trend	<ul style="list-style-type: none"> a current likely declining population trend suggests that the population may continue to decline in the future if factors contributing to the declining trend are not identified and addressed
Population Dynamics and Limiting Factors	<ul style="list-style-type: none"> although future calf recruitment is difficult to predict, low calf recruitment at levels insufficient for population stability is expected to continue if contributing factors are not identified and addressed, especially if human development increases and displaces caribou into areas with potentially higher mortality risk. bull:cow ratios sufficient to ensure all females have the opportunity to reproduce may continue if the range shift by caribou away from the roaded area during the rut/hunting season continues although future adult mortality is difficult to predict, adult mortality rates could increase if human development increases and displaces caribou into areas with potentially higher mortality risk. calf recruitment could decrease and adult mortality increase if predation risk increases several recent large fires in the range and 30 km Surrounding Area will likely provide good habitat for moose in the future, which could lead to increased moose numbers, and a subsequent increase in wolf numbers, leading to increased predation risk for caribou an increase in linear corridors could result in increased predation risk due to increased predator travel rates and efficiency during both the snow-free/summer and winter seasons.
Harvest	<ul style="list-style-type: none"> licensed hunter harvest may continue at a low level if the range shift by caribou away from the roaded area during the rut/hunting season continues
Health	<ul style="list-style-type: none"> several potential health threats could spread into the Clear Creek Caribou Range in the future; if infected, impacts of Chronic Wasting Disease on the Clear Creek Caribou Herd will be substantial
Climate Change	<ul style="list-style-type: none"> increasing temperature and precipitation trends are expected to continue, as are increased evapotranspiration and icing events, changes to the fire regime, and changes to plant and animal distributions.

The overall population goal for the Clear Creek Caribou Herd is to maintain the population at the current or higher population size and with a stable or increasing population trend (Table 29). Currently, the Clear Creek Caribou Herd is likely declining, but primary limiting factors still need to be identified that will aid in determining management tools that will be needed to address the decline, and an updated population estimate will aid in confirming whether the declining trend has continued. Calf recruitment monitoring is also recommended on an annual basis, as an indicator of population trend between population estimates, until it averages at least 20-25 calves/100 cows over a 5-year period (see Section 6). Maintaining a harvest rate of bulls that is not above 1% of the total population size is recommended for populations with declining or unknown trends.

Table 29. Population management recommendations for the Clear Creek Caribou Herd.

Population Management:	
GOAL: <i>Maintain the Clear Creek Caribou Herd at or above the recent estimated population size of about 800 caribou, and at a stable or increasing population trend.</i>	
Objectives	Strategies
1. Determine current population size and trend.	<ul style="list-style-type: none"> • Conduct a population survey in September 2024. • Continue monitoring fall calf recruitment annually until calf recruitment averages at least 20-25 calves/100 cows over a 5-year period.
2. Determine the primary limiting factors for the Clear Creek Caribou Herd.	<ul style="list-style-type: none"> • Prioritize determining rates and causes of adult mortality of the recently collared caribou (2023/2024). • Continue monitoring bulls/100 cows ratios as an indicator of whether there are sufficient bulls to ensure that cows have an opportunity to reproduce (i.e. 30 bulls/100 cows). • Continue testing all female caribou captured during collaring sessions for pregnancy. • Continue assessing health of all caribou captured during capture sessions. • Assess options for managing primary limiting factors if the declining population trend continues.
3. Maintain a harvest rate consistent with caribou populations with declining or unknown trends, until a stable or increasing population trend is confirmed.	<ul style="list-style-type: none"> • Maintain licensed harvest at or below the recommended harvest rate of up to 1% of the total population size for caribou populations with declining or unknown trends. • When population trend changes to stable or increasing, if population size is below the goal of at least 800 caribou, continue a licensed harvest rate of up to 1% of the total population size until the population size goal is achieved and then implement the appropriate harvest rate associated with either stable or increasing populations.
4. Prevent fatal and contagious diseases and parasites from spreading into the Clear Creek Caribou Range.	<ul style="list-style-type: none"> • Increase public awareness of the threats, consequences and methods of potential spread of diseases and parasites with potentially significant impacts on the Clear Creek Caribou Herd, especially Chronic Wasting Disease. • Follow and promote Yukon Government guidelines for preventing spread of Chronic Wasting Disease and other significant diseases and parasites.

Although caribou health is currently likely not an issue, some significant diseases and parasites could spread into the Clear Creek Caribou Range in the future. Management recommendations focus on increasing public awareness of significant health risks and following and promoting Yukon guidelines for preventing spread.

5.2 Range/Habitat Recommendations

Key considerations for range/habitat management for the Clear Creek Caribou Herd are listed in Table 30.

The overall range/habitat goal for the Clear Creek Caribou Range is to maintain the range in a condition that will support a minimum of about 800 caribou and that will allow caribou to use historical ranges (Table 31). The focus of range/habitat management is to implement interim measures to contain industrial activities and access within the existing footprint/network until further land use planning that takes into account cumulative impacts across the total range is completed, and further information is collected on impacts of industrial activities on caribou. Most known use by caribou during all seasons is in the Northern Tutchone Planning Region where land use planning has not yet started, and where the most significant impacts of industrial activities and access on caribou will likely occur.

Caribou range/habitat management requires management at the landscape scale. Protecting small pockets of habitat within a matrix of disturbed range will not provide conditions needed for maintaining a sustainable population. The priority of range/habitat management is on maintaining large patch sizes and as much intact range as possible to allow caribou to fully use their historical range and to switch seasonal range use areas if environmental changes affect portions of their seasonal ranges.

Table 30. Key considerations for range and habitat management for Clear Creek Caribou.

Key Considerations	
Factor	Current Situation
Land Protections and Land Use Certainty	<ul style="list-style-type: none"> the northern portion of the Clear Creek Caribou Range in the Peel Watershed is zoned as Wilderness Area and is covered by land withdrawals for new oil and gas, and mineral dispositions until 2030. The Wilderness Area designation is subject to periodic review and could be changed to designations with either higher or lower protections currently there are no protected areas or formal land protections for caribou in the Clear Creek Caribou Range in the Northern Tutchone and Dawson Planning Region portions of the range other than the territory-wide Off-Road Vehicle (ORV) management areas in areas over 1400 m in elevation currently there are uncertainties with respect to land use priorities in the Dawson Planning Region portion of the range where land use planning is ongoing, and especially in the Northern Tutchone Planning Region portion of the range where land use planning has not yet started most of the area used by caribou in the Dawson Planning Region portion of the range is located in two proposed zones, one that is currently proposed for high levels of industrial activities and the other for low levels of industrial activities since the Clear Creek Caribou Range overlaps portions of three planning regions with planning processes conducted during different time periods, a coordinated land use planning effort across the whole range is not possible, which could result in higher overall impacts to Clear Creek Caribou and their habitat if risks to caribou in each planning region are not considered within the context of cumulative effects of land use across the whole caribou range
Access and Industrial Activities	<ul style="list-style-type: none"> most roaded access and industrial activities in the Clear Creek Caribou Range are located in Caribou Assessment Area 1 (CAA1) in the Northern Tutchone Planning Region most industrial activities in the Clear Creek Caribou Range are associated with placer mining and quartz mineral exploration and are conducted during the snow-free season. considering Zones of Influence (ZOIs), direct and indirect impacts of human-caused disturbance during the snow-free season are at high levels in CAA1 and low levels in CAA2 based on ZOIs, direct and indirect impacts of human-caused disturbance during winter are currently at low levels in CAA1 and CAA2
Natural Disturbance	<ul style="list-style-type: none"> currently, area burned by fires ≤ 50 years old is at moderate levels in CAA1 and very low levels in CAA2
Caribou Range Use	<ul style="list-style-type: none"> based on aerial survey and collared caribou locations, virtually all of the known caribou use during the fall rut is in the Northern Tutchone Planning Region portion of the range, and most caribou use during calving and summer seasons is also in the Northern Tutchone Planning Region portion of the range, with most of the rest of the use in the Dawson Planning Region portion of the range based on aerial survey and collared caribou locations, most of the known caribou use during winter is in the Northern Tutchone Planning Region portion of the range, with some use in the Dawson and Peel Watershed Planning Region portions. caribou use during snow-free seasons has already shifted away from areas with higher levels of roaded access and snow-free season human activities in CAA1 caribou use during winter has shifted away from some portions of their range with higher levels of roaded access in CAA1, but not to the same extent as during the snow-free season almost all of the Winter Recent Concentrated Use Area is located in CAA1, just northwest of Red Mountain
Factor	Predicted Future Situation
Access and Industrial Activities	<ul style="list-style-type: none"> placer mining is predicted to increase in CAA1 one or two operating quartz mines are predicted in CAA1 based on ZOIs, direct and indirect impacts of human-caused disturbance during the snow-free season are predicted to increase to higher levels in CAA1 and remain at low levels in CAA2 based on ZOIs, direct and indirect impacts of human-caused disturbance during winter are predicted to remain low in CAA2, but increase to high levels in CAA1
Natural Disturbance	<ul style="list-style-type: none"> area burned by fires ≤ 50 years old is predicted to increase to moderate-high levels in CAA1 and remain at very low levels in CAA2

Table 31. Range/habitat management recommendations for the Clear Creek Caribou Range.

Range/Habitat Management:	
GOAL: Maintain the Clear Creek Caribou Range in a condition that will support a minimum of about 800 caribou and that will allow caribou to continue to use historical ranges.	
Objectives	Strategies
1. Address cumulative effects of habitat disturbance across the whole Clear Creek Caribou Range.	<ul style="list-style-type: none"> • Ensure land use planning in the two Planning Regions without finalized land use plans addresses cumulative impacts within the entire Clear Creek Caribou Range when developing land use objectives, zoning and management direction for the portion of the Clear Creek Caribou Range that is included in each of the two individual Planning Regions.
2. Maintain large, intact portions of the Clear Creek Caribou Range in a condition relatively undisturbed by human development and activities.	<ul style="list-style-type: none"> • Allow no new surface access or new industrial activities in Caribou Assessment Area 2 (CAA2), especially in the area represented by the Known Fall Rut Range. • Allow no new surface access or new oil and gas or mineral dispositions in the Northern Tutchone Planning Region portion of the Clear Creek Caribou Range until a land use plan is completed. • Investigate interim or formal options for protecting the area in and around the Known Fall Rut Range in CAA2.
3. Maintain high value intact winter range in a condition relatively undisturbed by human development and activities, and fire.	<ul style="list-style-type: none"> • Allow no new surface access or new industrial activities in the Winter Recent Concentrated Use Area. • Suppress fires within the Known Winter Range with a priority on the Winter Recent Concentrated Use Area. • Investigate interim or formal options for protecting the area in and around the Winter Recent Concentrated Use Area.
4. Assess the impacts of habitat disturbance and human activities on Clear Creek Caribou.	<ul style="list-style-type: none"> • Use the sample of recently collared caribou (2023/2024) to conduct a more detailed assessment of the effects of habitat disturbance and human activities on displacement of Clear Creek Caribou and the potential for increased mortality risk. • During the assessment, intensively track human activities and habitat disturbance (e.g. assess the feasibility of using drones to monitor human activities in CAA1 during the snow-free period, and use drones if feasible). • Expand the existing land withdrawals for new oil and gas, and mineral dispositions to the entire Clear Creek Caribou Range until final results of the study are available. • Assess the use of linear features by caribou, predators, and other ungulates (e.g. remote cameras). • Monitor fire disturbance in the Clear Creek Caribou Range and 30 km Surrounding Area annually. • Monitor changes in surface disturbance in the Clear Creek Caribou Range and 30 km Surrounding Area as Government of Yukon's surface disturbance mapping updates become available.
5. Implement interim measures to contain access within the existing road and trail network, until land use planning is completed.	<ul style="list-style-type: none"> • Encourage industrial activities to use existing linear features such as roads and trails as much as possible rather than building new ones. • Identify potential linear features for restoration. • Limit road and trail access to the existing network until a land use plan is completed in the Northern Tutchone Planning Region

6 Implementation and Monitoring

This range assessment is intended to be a living document that will be reviewed when major changes in the level of human land use occur, when land use planning is finalized, or when risks to the Clear Creek Caribou Herd increase as a result of human land use and/or natural factors. It is intended to be used by land and resource managers and decision-makers and to support other processes such as land use planning by identifying management concerns and providing recommendations to consider.

Recommended ongoing or periodic monitoring of the Clear Creek Caribou Herd and Range is summarized in Table 32. Increased monitoring of the Clear Creek Caribou Herd was also identified as a key caribou-related item in the *Community-Based Work Plan for the First Nation of Na-Cho Nyäk Dun Traditional Territory 2014–2019*.

Table 32. Suggested monitoring for the Clear Creek Caribou Herd and Range.

Factor	Source	Frequency
Caribou Population		
Population size/trend	<ul style="list-style-type: none"> population survey estimates 	<ul style="list-style-type: none"> every 5 years
Calf recruitment	<ul style="list-style-type: none"> fall rut surveys 	<ul style="list-style-type: none"> annually if calf recruitment averages < 20-25 calves/100 cows over a 5-year period, until calf recruitment averages at least 20-25 calves/100 cows over a 5-year period every two years if calf recruitment averages at least 20-25 calves/100 cows, until average calf recruitment over a 5-year period drops below 20-25 calves/100 cows
Bull:cow ratios	<ul style="list-style-type: none"> fall rut surveys 	<ul style="list-style-type: none"> annually if bull:cow ratios average < 30 bulls/100 cows over a 5-year period, until bull:cow ratios average >30 bulls/100 cows over a 5-year period every two years if bull:cow ratios average at least 30 bulls/100 cows over a 5-year period, until average bull:cow ratios over a 5-year period drops below 30 bulls/100 cows
Licensed harvest	<ul style="list-style-type: none"> Government of Yukon licensed harvest data 	<ul style="list-style-type: none"> annually
Adult mortality	<ul style="list-style-type: none"> current satellite-collared caribou study 	<ul style="list-style-type: none"> next 3-5 years
Limiting factors	<ul style="list-style-type: none"> current satellite-collared caribou study 	<ul style="list-style-type: none"> next 3-5 years
Caribou distribution	<ul style="list-style-type: none"> current satellite-collared caribou study 	<ul style="list-style-type: none"> next 3-5 years
Caribou Range		
Surface disturbance	<ul style="list-style-type: none"> Government of Yukon surface disturbance mapping 	<ul style="list-style-type: none"> as surface disturbance is updated
Fire	<ul style="list-style-type: none"> Government of Yukon wildfire database 	<ul style="list-style-type: none"> annually
Resource tenures	<ul style="list-style-type: none"> Government of Yukon resource tenure database 	<ul style="list-style-type: none"> annually
Resource activity	<ul style="list-style-type: none"> current satellite-collared caribou study 	<ul style="list-style-type: none"> next 3-5 years

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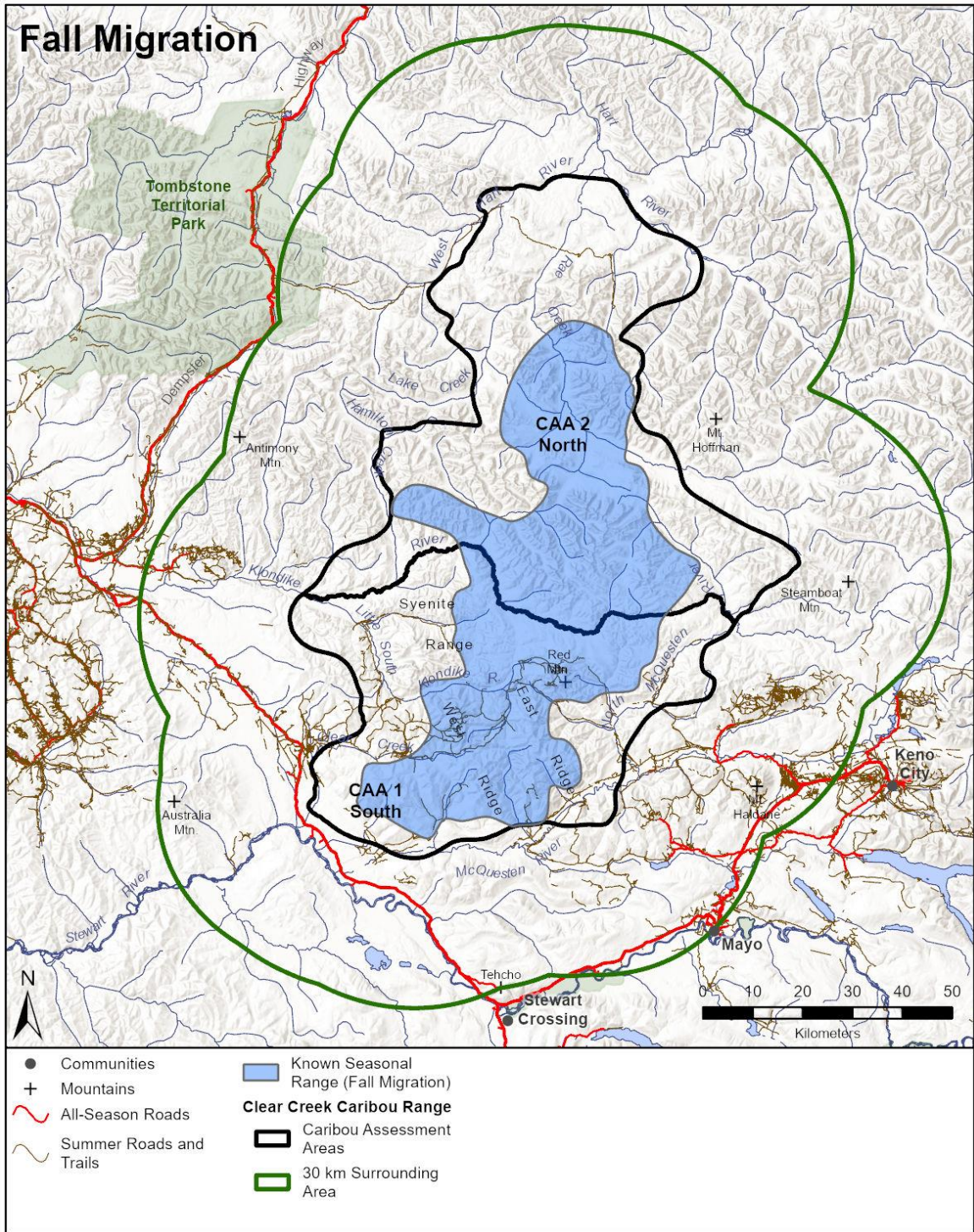


Figure A1-2. Known fall migration seasonal range of the Clear Creek caribou population.

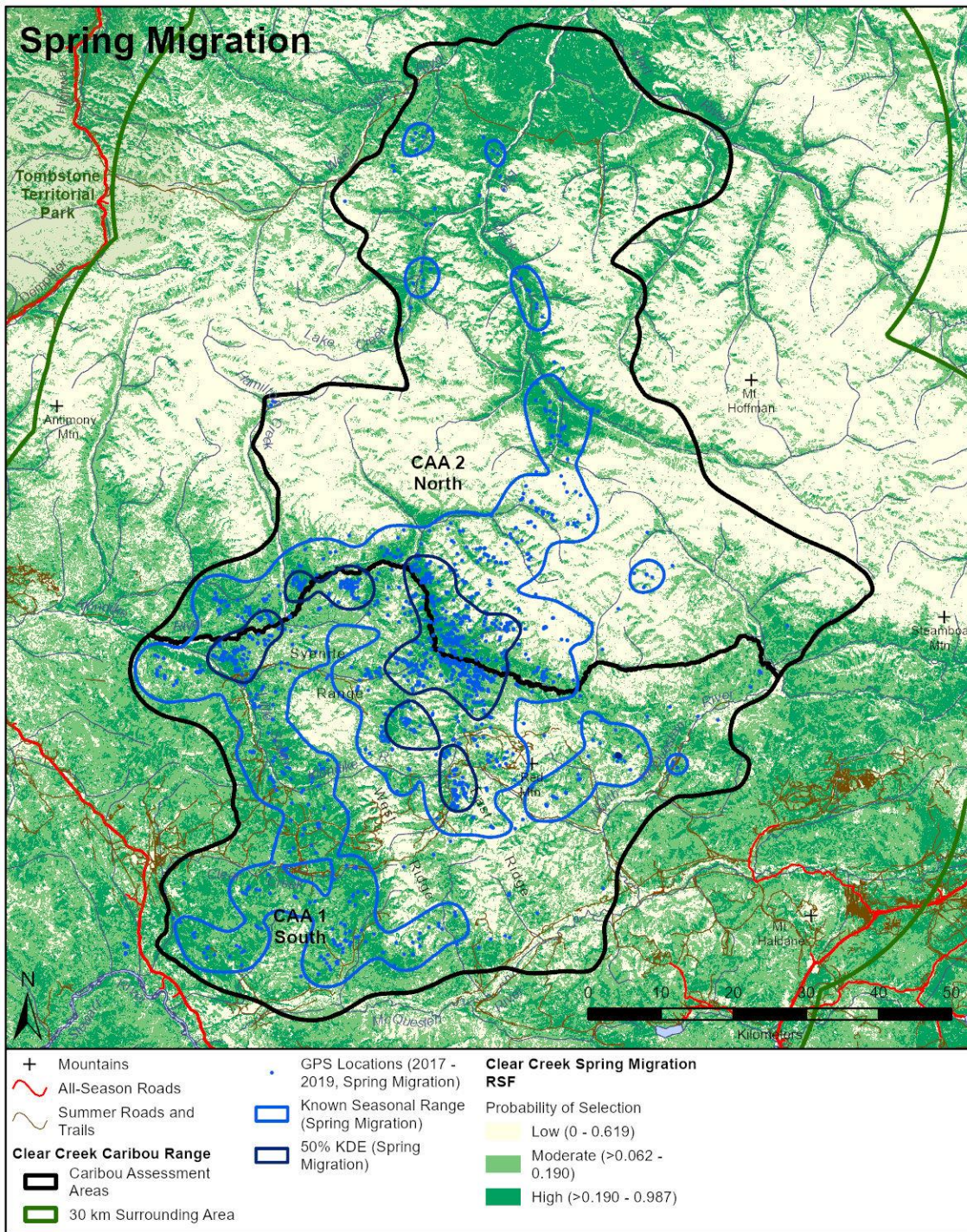


Figure A1-4. Recent concentrated use (50% GPS KDE), historical use (VHF locations) and predicted habitat value (probability of selection by caribou) for Clear Creek Caribou during spring migration. RSF = Resource Selection Function. KDE = Kernel Density Estimate based on GPS locations (2017-2019).

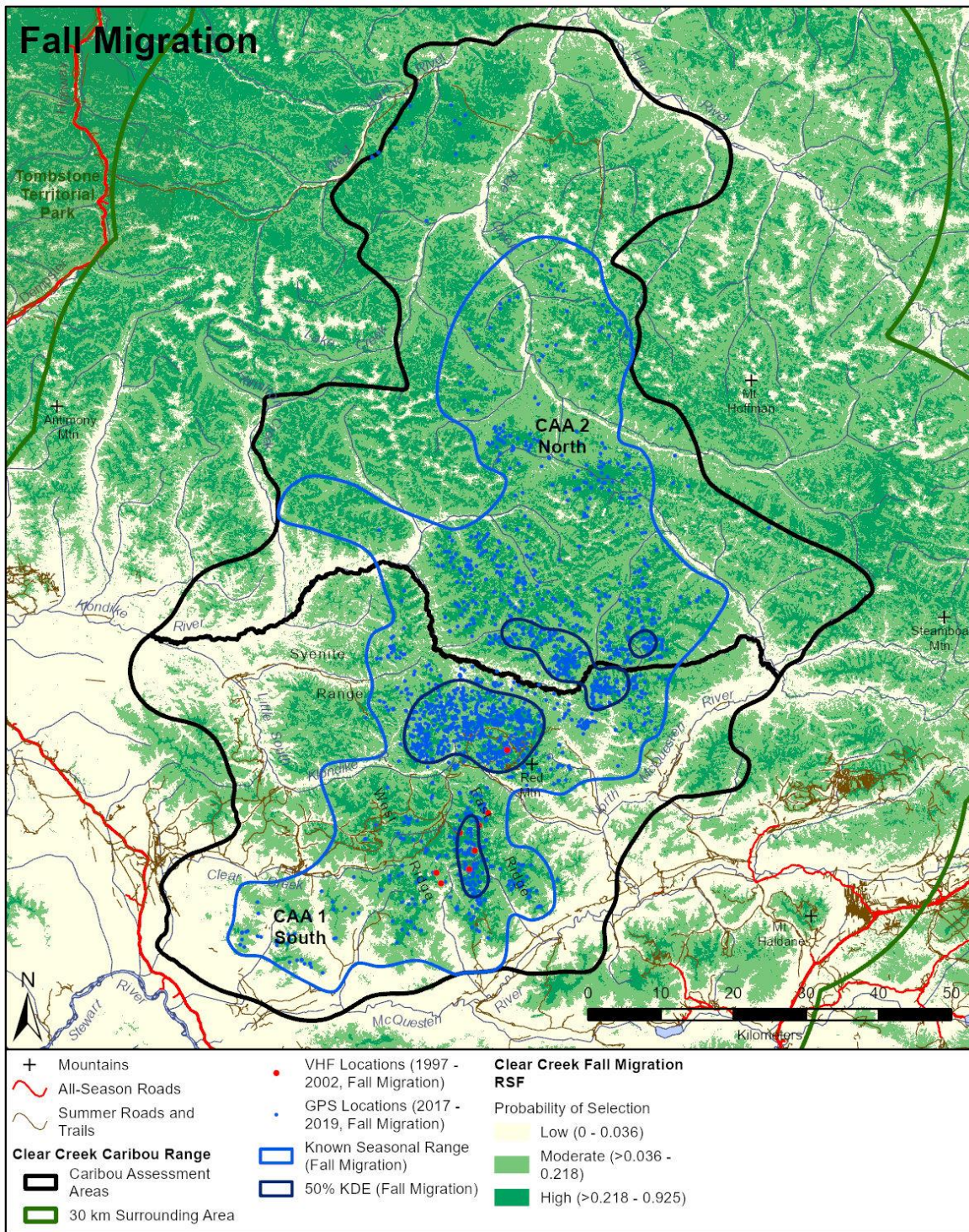


Figure A1-5. Recent concentrated use (50% GPS KDE), historical use (VHF locations) and predicted habitat value (probability of selection by caribou) for Clear Creek Caribou during fall migration. RSF = Resource Selection Function. KDE = Kernel Density Estimate based on GPS locations (2017-2019).

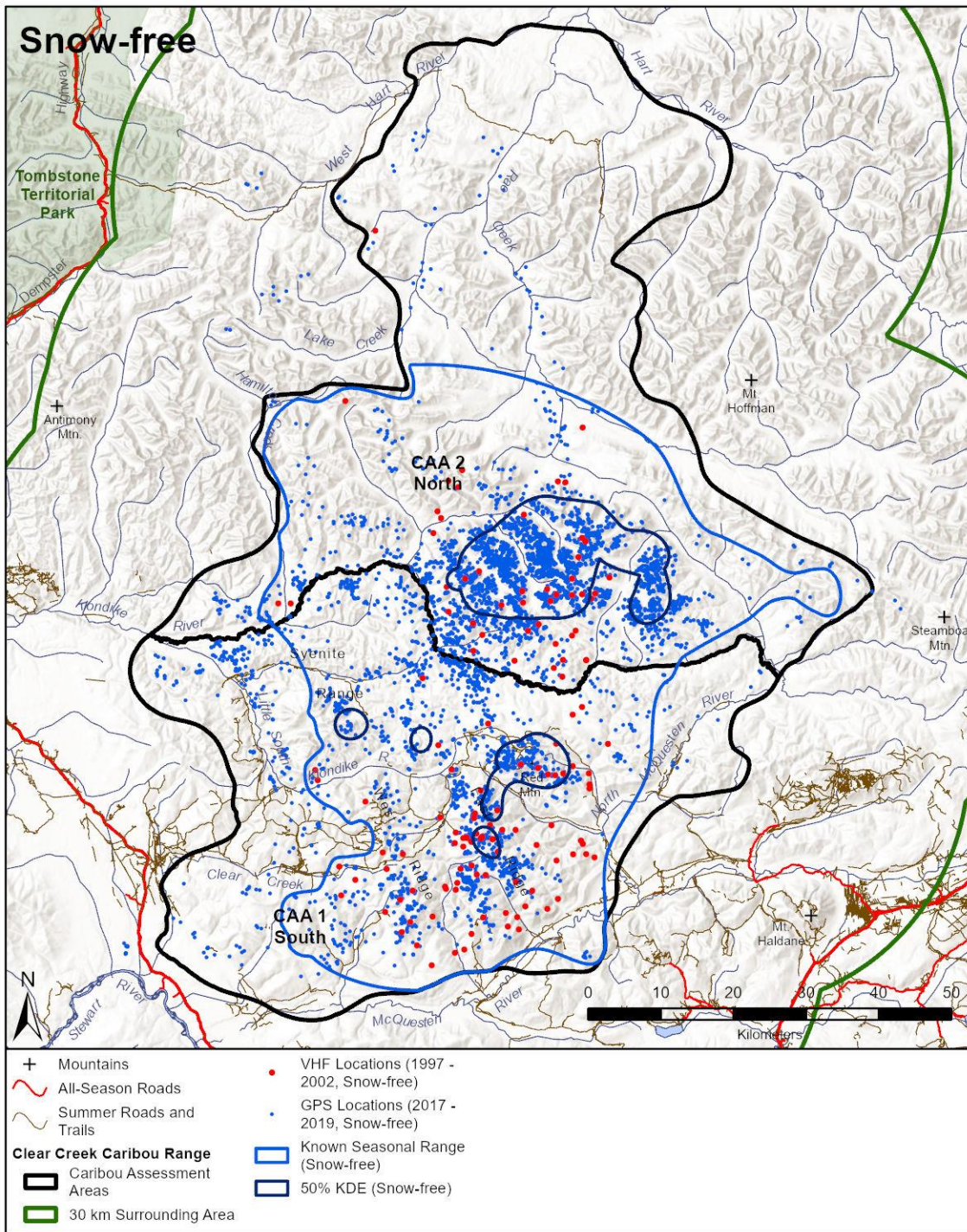


Figure A1-6. Recent concentrated use (50% GPS KDE), historical use (VHF locations) and predicted habitat value (probability of selection by caribou) for Clear Creek Caribou during the snow-free season. KDE = Kernel Density Estimate based on GPS locations (2017-2019). (RSF not available for the snow-free season).

Table A1-1. Proportion of known spring migration, fall migration and snow-free seasonal ranges in Caribou Assessment Areas in the Clear Creek Caribou Range.

Caribou Assessment Area (CAA)	Proportion of Known Seasonal Range		
	Spring Migration	Fall Migration	Snow-free
CAA1 (South)	64.5	47.4	49.5
CAA2 (North)	35.5	52.6	50.5
Total Area (ha)	239 653	326 936	403 780

Table A1-2. Bioclimate zones/subzones in known spring migration, fall migration and snow-free seasonal ranges in the Clear Creek Caribou Range.

Elevation	Bioclimate Zone/ Subzone	% of Known Seasonal Range ¹		
		Spring Migration	Fall Migration	Snow-free
Caribou Assessment Area 1 (South)				
Low	Boreal Low - Yukon Plateau North	1.4	0.1	0
	Boreal High	53.2	30.3	33.9
High	Boreal Subalpine	9.1	14.5	13.2
	Boreal Alpine Tundra	0.7	2.6	2.5
<i>CAA1 (South) - Total low elevation</i>		<i>(54.6)</i>	<i>(30.4)</i>	<i>(33.9)</i>
<i>CAA1 (South) - Total high elevation</i>		<i>(9.8)</i>	<i>(17.0)</i>	<i>(15.6)</i>
Caribou Assessment Area 2 (North)				
Low	Boreal High	15.0	9.0	13.9
	Subarctic Woodland	5.2	6.7	3.2
High	Boreal Subalpine	8.3	13.1	15.4
	Subarctic Subalpine	2.3	13.0	6.8
	Boreal Alpine Tundra	4.0	6.2	7.8
	Subarctic Alpine Tundra	0.8	4.5	3.4
<i>CAA2 (North) - Total low elevation</i>		<i>(20.2)</i>	<i>(15.7)</i>	<i>(17.1)</i>
<i>CAA2 (North) - Total high elevation</i>		<i>(15.3)</i>	<i>(36.9)</i>	<i>(33.4)</i>
Total (CAA1 + CAA2)				
<i>Range - Total low elevation</i>		<i>(74.8)</i>	<i>(46.0)</i>	<i>(51.0)</i>
<i>Range - Total high elevation</i>		<i>(25.2)</i>	<i>(54.0)</i>	<i>(49.0)</i>
Total Area (ha)		239 653	326 936	403 780

¹ Numbers in brackets are subtotals

Table A1-3. Planning Regions and Land Management Units (LMUs) in known spring migration, fall migration and snow-free seasonal ranges in the Clear Creek Caribou Range.

Land Management			% of Known Seasonal Range		
Planning Region	Unit (LMU)	Category ¹	Spring Migration	Fall Migration	Snow-free
Caribou Assessment Area 1 (South)					
Dawson	7) Wehtr'e (Antimony)	ISA1	16.5	2.6	7.8
	9) Clear Creek	ISA4	6.0	2.2	2.2
	10) Tintina Trench	SMA	5.0	0	0
Northern Tutchone	N/A	N/A	36.9	42.6	39.5
Caribou Assessment Area 2 (North)					
Peel Watershed	4) West Hart River	WA	8.2	22.6	11.6
	6) Hart River	WA	0	0	0.4
Dawson	7) Wehtr'e (Antimony)	ISA1	4.9	4.8	12.2
	8) Brewery Creek	ISA3	3.9	0	0.4
Northern Tutchone	N/A	N/A	18.5	25.1	25.9
Total Area of Known Seasonal Ranges					
Total Area (ha)			239 653	326 936	403 780

¹ ISA = Integrated Stewardship Area; N/A = Not applicable; SMA = Special Management Area; WA = Wilderness Area

Table A1-4. Total area burned by recorded fires less than 50 years old (1973-2022) in known spring migration, fall migration and snow-free seasonal ranges in the Clear Creek Caribou Range.

Fires ≤50 years (1973-2022)	Known Seasonal Range		
	Spring Migration	Fall Migration	Snow-free
Caribou Assessment Area 1 (South)			
Area burned (ha) ¹	42 678	33 278	49 585
% burned of annual/known seasonal range	27.6	21.5	24.8
% burned of vegetated fuel types in range ²	30.5	31.6	33.3
Total area (excluding water)	154 547	154 956	199 950
Caribou Assessment Area 2 (North)			
Area burned (ha) ¹	7 508	2 761	9 016
% burned of annual/known seasonal range	8.8	1.6	4.4
% burned of vegetated fuel types in range ²	14.3	2.9	9.9
Total area (excluding water)	85 106	171 980	203 830
Total (CAA1 + CAA2)			
Area burned (ha) ¹	50 186	36 039	58 601
% burned of annual/known seasonal range	20.9	11.0	14.5
% burned of vegetated fuel types in range ²	26.1	20.9	25.2
Total area (excluding water)	239 653	326 936	403 780

¹ Area burned represents the combined area burned since 1973. In some areas, more recent fires overlapped older fires; in these cases the area of overlap was attributed to the most recent fire to avoid double-counting the area burned.

² Vegetated fuels types include areas that can potentially burn (i.e. excludes rocky areas, water, etc.).

Table A1-5. Area covered by current (2022) resource use tenures and land use restrictions in known spring migration, fall migration and snow-free seasonal ranges in the Clear Creek Caribou Range.

Tenure/Land Use Restriction	Area (ha)		
	Known Seasonal Range		
	Spring Migration	Fall Migration	Snow-free
<i>Caribou Assessment Area 1 (South)</i>			
Quartz claim	27 448	56 321	61 846
Placer claim	6 961	6 831	6 758
Placer lease	78	602	602
Cutting permit	0	0	0
Mining withdrawal	39 565	8 665	31 959
Oil and gas withdrawal	0	0	0
ORVM restriction	4 785	20 259	23 288
Total area	154 547	154 956	199 950
<i>Caribou Assessment Area 2 (North)</i>			
Quartz claim	86	946	3 296
Placer claim	0	0	0
Placer lease	0	0	0
Cutting permit	0	0	0
Mining withdrawal	31 480	89 778	97 562
Oil and gas withdrawal	19 632	74 049	48 237
ORVM restriction	36 511	112 075	103 681
Total area	85 106	171 980	203 830
<i>Total (CAA1 + CAA2)</i>			
Quartz claim	27 534	57 267	65 142
Placer claim	6 961	6 831	6 758
Placer lease	78	602	602
Cutting permit	0	0	0
Mining withdrawal	71 045	98 443	129 521
Oil and gas withdrawal	19 632	74 049	48 237
ORVM restriction	41 296	132 334	126 969
Total area	239 653	326 936	403 780

Table A1-6. Area directly affected by human-caused habitat disturbances in the Clear Creek Caribou Range based on 2022 Yukon Surface Disturbance Mapping (satellite imagery from 2013-2019) in known spring migration, fall migration and snow-free seasonal ranges in the Clear Creek Caribou Range.

Areal Disturbance Type	Area affected by human-caused habitat disturbances (ha)		
	Known Seasonal Range		
	Spring Migration	Fall Migration	Snow-free
Caribou Assessment Area 1 (South)			
Airstrip	3.4	3.4	3.4
Clearing	8.4	6.1	5.7
Cul-de-sac/Turn Area	0.3	1.0	1.0
Pullout/Turn Area	0	1.5	1.5
Gravel Pit/Quarry	0.2	0.2	0.1
Drill Pad	2.4	2.4	2.5
Mining - Building	0	0	0
Mining - Camp	0.2	2.4	0.2
Mining - Unspecified	0.6	0.2	0.6
Placer Mining - Minor	6.8	14.6	14.6
Placer Mining - Significant	531.8	397.7	251.4
Quartz Mining - Minor	0	5.2	0.8
Other Camps	0.6	0.5	0.5
Unknown	0.1	0.1	0.1
Total Area Disturbed	554.9	435.2	282.5
Total Area CAA1	154 547	154 956	199 950
Caribou Assessment Area 2 (North)			
Airstrip	0	0	0
Mining - Building	0	0	0
Other Camps	0	0	0.8
Total Area Disturbed	0	0	0.8
Total Area CAA2	85 106	171 980	203 830
Total (CAA1 + CAA2)			
Airstrip	3.4	3.4	3.4
Clearing	8.4	6.1	5.7
Cul-de-sac/Turn Area	0.3	1.0	1.0
Pullout/Turn Area	0	1.5	1.5
Gravel Pit/Quarry	0.2	0.2	0.1
Drill Pad	2.4	2.4	2.5
Mining - Building	0	0	0
Mining - Camp	0.2	2.4	0.2
Mining - Unspecified	0.6	0.2	0.6
Placer Mining - Minor	6.8	14.6	14.6
Placer Mining - Significant	531.8	397.7	251.4
Quartz Mining - Minor	0	5.2	0.8
Other Camps	0.6	0.5	1.3
Unknown	0.1	0.1	0.1
Total Area Disturbed	554.9	435.2	283.3
Total Area CAA1+CAA2	239 653	326 936	403 780

9 Appendix 2. Area summaries for seasonal range/habitat approaches.

Table A2-1. Area summaries for seasonal range/habitat approaches for winter, calving, summer and fall rut seasons.

Caribou Assessment Area	Predicted Habitat Value	Winter				Calving				Summer				Fall Rut			
		Area (ha)	% Total Range	% CAA ¹	% Habitat/Range ²	Area (ha)	% Total Range	% CAA ¹	% Habitat/Range ²	Area (ha)	% Total Range	% CAA ¹	% Habitat/Range ²	Area (ha)	% Total Range	% CAA ¹	% Habitat/Range ²
Known Seasonal Range																	
CAA1 (South)		191 798	25.4	59.0	71.7	143 573	19.0	44.2	59.2	136 059	18.0	41.9	54.6	84 173	11.1	25.9	54.5
CAA2 (North)		75 537	10.0	17.5	28.3	99 125	13.1	23.0	40.8	112 966	14.9	26.2	45.4	70 164	9.3	16.3	45.5
Total (CAA1+CAA2)		267 335	35.4	35.4	100.0	242 697	32.1	32.1	100.0	249 025	33.0	33.0	100.0	154 337	20.4	20.4	100.0
Recent Concentrated Use Area (50% KDE)																	
CAA1 (South)		17 224	2.3	5.3	94.4	8 975	1.2	2.8	31.7	2 397	0.3	0.7	9.1	1 141	0.2	0.4	9.2
CAA2 (North)		1 013	0.1	0.2	5.6	19 323	2.6	4.5	68.3	23 893	3.2	5.5	90.9	11 193	1.5	2.6	90.8
Total (CAA1+CAA2)		18 237	2.4	2.4	100.0	28 298	3.7	3.7	100.0	26 290	3.5	3.5	100.0	12 334	1.6	1.6	100.0
Predicted Habitat Value (RSF)																	
CAA1 (South)	Low	120 410	15.9	37.1	42.0	218 151	28.9	67.1	50.7	266 819	35.3	82.1	50.7	181 691	24.0	55.9	60.1
	Moderate	152 703	20.2	47.0	43.8	87 937	11.6	27.1	35.6	43 308	5.7	13.3	27.1	113 322	15.0	34.9	33.0
	High	51 849	6.9	16.0	43.0	18 867	2.5	5.8	24.0	14 835	2.0	4.6	21.1	29 940	4.0	9.2	27.2
CAA2 (North)	Low	166 033	22.0	38.5	58.0	212 012	28.1	49.2	49.3	259 014	34.3	60.1	49.3	120 593	16.0	28.0	39.9
	Moderate	196 091	25.9	45.5	56.2	158 909	21.0	36.9	64.4	116 412	15.4	27.0	72.9	230 144	30.5	53.4	67.0
	High	68 622	9.1	15.9	57.0	59 825	7.9	13.9	76.0	55 320	7.3	12.8	78.9	80 009	10.6	18.6	72.8
Total (CAA1+CAA2)	Low	286 443	37.9	37.9	100.0	430 162	56.9	56.9	100.0	525 833	69.6	69.6	100.0	302 284	40.0	40.0	100.0
	Moderate	348 795	46.2	46.2	100.0	246 846	32.7	32.7	100.0	159 720	21.1	21.1	100.0	343 467	45.4	45.4	100.0
	High	120 471	15.9	15.9	100.0	78 691	10.4	10.4	100.0	70 155	9.3	9.3	100.0	109 949	14.5	14.5	100.0
Potential Range																	
CAA1 (South)		251 660	33.3	77.4	58.3					73 303	9.7	22.6	22.6				
CAA2 (North)		180 315	23.9	41.9	41.7					250 430	33.1	58.1	77.4				
Total (CAA1+CAA2)		431 975	57.2	57.2	100.0					323 734	42.8	42.8	100.0				
Total Range																	
CAA1 (South)		324 963	43.0	100.0	43.0	324 963	43.0	100.0	43.0	324 963	43.0	100.0	43.0	324 963	43.0	100.0	43.0
CAA2 (North)		430 746	57.0	100.0	57.0	430 746	57.0	100.0	57.0	430 746	57.0	100.0	57.0	430 746	57.0	100.0	57.0
Total (CAA1+CAA2)		755 709	100.0	100.0	100.0	755 709	100.0	100.0	100.0	755 709	100.0	100.0	100.0	755 709	100.0	100.0	100.0

¹ % of the CAA that is made up of the Range/Habitat (e.g. the Known Winter Range covers 59.0% of CAA1)

² % of the Range/Habitat that is in the CAA (e.g. 71.7% of the Total Known Winter Range is in CAA1; e.g. for Predicted Habitat Value, 42.0% of the all Winter Predicted LOW Value Habitat is in CAA1)

Table A2-2. Area summaries for seasonal range/habitat approaches for spring migration, fall migration and snow-free seasons.

Caribou Assessment Area	Predicted Habitat Value	Spring Migration				Fall Migration				Snow-free			
		Area (ha)	% Total Range	% CAA	% Habitat/Range	Area (ha)	% Total Range	% CAA	% Habitat/Range	Area (ha)	% Total Range	% CAA	% Habitat/Range
Known Seasonal Range													
CAA1 (South)		154 547	20.5	47.6	64.5	154 956	20.5	47.7	47.4	199 950	26.5	61.5	49.5
CAA2 (North)		85 106	11.3	19.8	35.5	171 980	22.8	39.9	52.6	203 830	27.0	47.3	50.5
Total (CAA1+CAA2)		239 653	31.7	31.7	100.0	326 936	43.3	43.3	100.0	403 780	53.4	53.4	100.0
Recent Concentrated Use Area (50% KDE)													
CAA1 (South)		26 541	3.5	8.2	65.3	23 647	3.1	7.3	77.1	10 521	1.4	3.2	23.1
CAA2 (North)		14 127	1.9	3.3	34.7	7 027	0.9	1.6	22.9	35 077	4.6	8.1	76.9
Total (CAA1+CAA2)		40 669	5.4	5.4	100.0	30 674	4.1	4.1	100.0	45 598	6.0	6.0	100.0
Predicted Habitat Value (RSF)													
CAA1 (South)	Low	87 195	11.5	26.8	28.4	133 788	17.7	41.2	71.2				
	Moderate	155 313	20.6	47.8	56.7	142 061	18.8	43.7	37.5				
	High	82 447	10.9	25.4	47.2	49 106	6.5	15.1	26.0				
CAA2 (North)	Low	219 657	29.1	51.0	71.6	54 089	7.2	12.6	28.8				
	Moderate	118 804	15.7	27.6	43.3	236 646	31.3	54.9	62.5				
	High	92 285	12.2	21.4	52.8	140 010	18.5	32.5	74.0				
Total (CAA1+CAA2)	Low	306 851	40.6	40.6	100.0	187 877	24.9	24.9	100.0				
	Moderate	274 117	36.3	36.3	100.0	378 707	50.1	50.1	100.0				
	High	174 732	23.1	23.1	100.0	189 116	25.0	25.0	100.0				
Potential Range													
CAA1 (South)													
CAA2 (North)													
Total (CAA1+CAA2)													
Total Range													
CAA1 (South)		324 963	43.0	100.0	43.0	324 963	43.0	100.0	43.0	324 963	43.0	100.0	43.0
CAA2 (North)		430 746	57.0	100.0	57.0	430 746	57.0	100.0	57.0	430 746	57.0	100.0	57.0
Total (CAA1+CAA2)		755 709	100.0	100.0	100.0	755 709	100.0	100.0	100.0	755 709	100.0	100.0	100.0

¹ % of the CAA that is made up of the Range/Habitat (e.g. the Known Snow-free Range covers 61.5% of CAA1)

² % of the Range/Habitat that is in the CAA (e.g. 49.5% of the Total Known Snow-free Range is in CAA1; e.g. for Predicted Habitat Value, 28.4% of the all Spring Migration Predicted LOW Value Habitat is in CAA1)

10 Appendix 3. Calculations used for estimating potential future placer mining disturbance

Predictions for spatial location of new placer mining activity were not possible. Therefore, predicted area affected by placer mining by 2047 was estimated using aspatial calculations. To do this, predicted ADDITIONAL future placer had to be calculated since the aspatial calculations would be added to the spatially-explicit current surface disturbance, which includes the current area of placer disturbance. Placer mining occurs during snow-free months and therefore these calculations are applied only to the snow-free/summer season.

Step	Description
1. Calculate recent rate of increase of placer mining.	Estimates the rate of increase of potential future placer mining activity based on the change in the area occupied by placer claims from 2010 to 2022.
2. Calculate Predicted Total Future Placer disturbance ZOI.	Applies the estimated rate of increase to the current area of the merged placer disturbance ZOI.
3. Calculate Predicted Additional Future Placer Disturbance ZOI.	Subtracts the current placer disturbance ZOI from the predicted total future placer disturbance ZOI.
4. Estimate adjustments to Predicted Additional Future Placer Disturbance ZOI to correct for potential overlap between ZOIs of individual Predicted Additional Future Placer Disturbances.	Uses the ratio of the current merged placer ZOI to the sum of the current ZOI areas of individual placer disturbance polygons, to estimate and remove potential areas of overlap of ZOIs of individual predicted additional future placer disturbances.
5. Estimate additional adjustments to Adjusted Predicted Additional Future Placer Disturbance ZOI to correct for potential overlap between the Adjusted Predicted Future Additional Placer Disturbance ZOI and the ZOI for other area-based human-caused surface disturbances.	Uses the percent of the current merged placer disturbance ZOI that overlaps the current merged other area-based human-caused surface disturbance ZOI, to estimate and remove potential areas of overlap between Adjusted Predicted Additional Future Placer and other area-based human-caused disturbance ZOIs from the Adjusted Predicted Additional Future Placer Disturbance ZOI.
6. Add the Final Adjusted Predicted Additional Future Placer Disturbance ZOI area to spatially-explicit predicted future human-caused surface disturbance ZOI area for the snow-free/summer season.	Adds the aspatial Final Adjusted Predicted Additional Future Placer Disturbance ZOI area to the spatially-explicit predicted future human-caused surface disturbance ZOI to calculate the total predicted future human-caused disturbance ZOI. The Final Adjusted Predicted Additional Future Placer Disturbance is then added to the predicted future total disturbance (fire + spatial human-caused) to estimate area of total disturbance.

Step 1: Calculate recent rate of increase of placer mining.

This step estimates the rate of increase of potential future placer mining activity based on the recent change in the area occupied by placer claims in the Clear Creek Caribou Range from 2010 to 2022.

	Area of Placer Claims (ha) 2022	Area of Placer Claims (ha) 2010	Area of Placer Claims (ha) 2022 minus 2010	% change: (2022 minus 2010) divided by 2010	Annual rate of change: % change divided by 12 years
Clear Creek Caribou Range	12 098	5 657	6 441	113.86	9.49

	Future Scenario - Moderate	Future Scenario - High
Annual rate of increase	Current annual rate	2 X Current annual rate
Increase over 25 years	237.25%	474.5%

Step 2: Calculate Predicted Total Future Placer Disturbance ZOI.

This step applies the estimated rate of increase of placer activity to the current area of the merged placer disturbance ZOI.

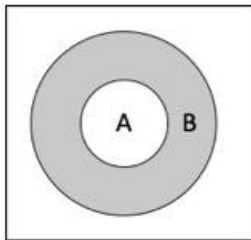
$$\text{Predicted Total Future Area Occupied by Placer ZOI (ha)} = \text{Current Placer ZOI (ha)} \times \text{Predicted increase over next 25 years (Moderate Scenario = 237.25\% (High Scenario = 474.5\%)}$$

Current Placer ZOI areas used in this calculation are based on GIS spatial data summaries listed in the table below.

Category	Current Narrower ZOI Placer Only – Merged (ha)			Current Wider ZOI Placer Only – Merged (ha)		
	CAA1 (South)	CAA2 (North)	Total Range (CAA1+CAA2)	CAA1 (South)	CAA2 (North)	Total Range (CAA1+CAA2)
Total Range - Snow-free	19 996	0	19 996	79 204	0	79 204
Known Snow-free Range	9 400	0	9 400	49 275	0	49 275
Recent Concentrated Use Area (50% KDE) - Snow-free	424	0	424	4 258	0	4 258
Predicted Habitat Value (Resource Selection Function) - Summer:						
Low	17 663	0	17 663	60 820	0	60 820
Moderate	1 873	0	1 873	13 576	0	13 576
High	456	0	456	4 805	0	4 805
Potential Range - Snow-free	2 497	0	2 497	21 986	0	21 986

Step 3: Calculate Predicted Additional Future Placer Disturbance ZOI.

Because the Predicted Total Future Area Occupied by the Placer ZOI (A+B) includes the area occupied by the current Placer ZOI (A), the area of the current Placer ZOI (A) needs to be subtracted from the total (A+B) to calculate the Predicted ADDITIONAL Future Placer ZOI (B) since this amount will be added to the spatial future total human-caused ZOI, which already includes the current Placer ZOI.



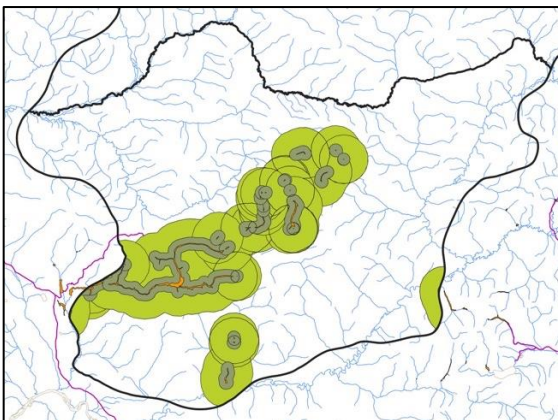
A = Current Placer

B = Additional Future Placer

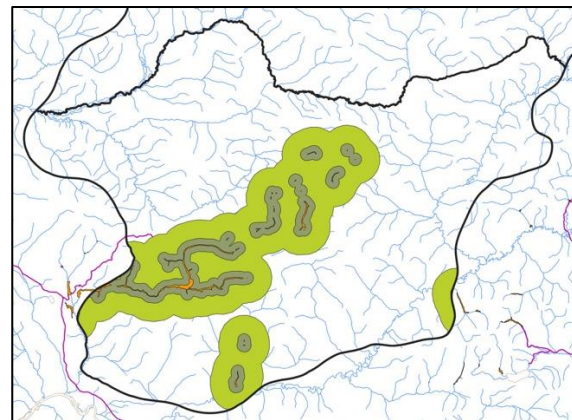
$$\text{Predicted Additional Future Placer Disturbance ZOI (ha)} = \text{Predicted Total Future Area Occupied by Placer ZOI (ha)} \text{ MINUS } \text{Current Placer ZOI (ha)}$$

Step 4. Estimate adjustments to Predicted Additional Future Placer Disturbance ZOI to correct for potential overlap between ZOIs of individual predicted additional future placer disturbances.

ZOIs of individual placer disturbance polygons may overlap depending on how close they are to each other and how large the ZOIs are (Figure A). The larger the ZOIs and/or the closer together the disturbances, the more the overlap. To avoid double-counting (or multiple-counting) the ZOI overlaps of individual disturbance polygons, the ZOIs of individual disturbance polygons are merged to create one or more contiguous ZOI polygons, the number of which will depend on the spatial configuration of the disturbances and the ZOI sizes (Figure B).



A) Overlapping ZOIs of current individual placer disturbance polygons
(Orange = placer surface disturbance; Grey = Narrower ZOI; Green = Wider ZOI)



B) Merged ZOIs of current placer disturbance
(Orange = placer surface disturbance; Grey = Narrower ZOI; Green = Wider ZOI)

Because the Predicted Additional Future Placer Disturbance ZOI area (ha) calculation is aspatial, an estimate of potential overlap for Predicted Additional Future Placer Disturbance ZOIs was calculated based on the overlap of current placer disturbance ZOIs in the Total Range, then applied to the Predicted Additional Future Placer Disturbance ZOI.

$$\text{Adjusted Predicted Additional Future Placer Disturbance ZOI (ha)} = \text{Predicted Additional Future Placer Disturbance ZOI (ha)} \times \frac{\text{Merged Current Placer ZOI for Total Range (ha)}}{\text{Sum of Current Placer ZOI areas for individual disturbance polygons for Total Range (ha)}}$$

The following table summarizes results for the Total Range (Snow-free) for area of Overlapping ZOIs (e.g. Figure A above) and area of Merged ZOIs (e.g. Figure B above) based on GIS spatial data summaries, and the ratio of the Merged ZOI to the Overlapping ZOI (i.e. the last term in the equation above) that were used in this analysis. Currently, there is no placer mining surface disturbance in CAA2 (North) and placer activity is not expected to occur in the future. Consequently, the ZOI areas associated with current placer surface disturbance areas are the same for CAA1 (South) and the Total Range, as are the Merged ZOI/Overlapping ZOI ratios. The Total Range Merged ZOI/Overlapping ZOI ratios were applied to all categories listed in Step 2.

Area	Current Narrower ZOI - Placer Only (ha)			Current Wider ZOI - Placer Only (ha)		
	Merged	Overlapping	Merged ÷ Overlapping	Merged	Overlapping	Merged ÷ Overlapping
Total Range (Snow-free)						
CAA1 (South)	19 996	43 184	0.4630	79 204	329 528	0.2404
CAA2 (North)	0	0	-	0	0	0
Total (CAA1+CAA2)	19 996	43 184	0.4630	79294	329 528	0.2404

Step 5. Estimate adjustments to the Adjusted Predicted Additional Future Placer Disturbance ZOI to correct for potential overlap between the Adjusted Predicted Future Additional Placer Disturbance ZOI and the ZOI for other area-based human-caused surface disturbances.

Again, because the Adjusted Predicted Additional Future Placer Disturbance ZOI area (ha) calculation is aspatial, an estimate of potential overlap between Adjusted Predicted Additional Future Placer Disturbance ZOIs and the ZOI for other area-based human-caused surface disturbances was calculated based on the overlap of the merged current placer disturbance ZOIs in CAA1 (South) with the merged ZOIs for other area-based human-caused surface disturbances in CAA1 (South), then applied to the Adjusted Predicted Additional Future Placer Disturbance ZOI. Data for only CAA1 (South) were used for the ratio because current placer surface disturbance is only located in CAA1 (South).

$$\text{Final Adjusted Predicted Additional Future Placer Disturbance ZOI (ha)} = \text{Adjusted Predicted Additional Future Placer Disturbance ZOI (ha)} \times \frac{\text{Area of overlap between Merged Current Placer ZOI and Merged Other Area-based Human-caused Surface Disturbance ZOI in CAA1 (South) (ha)}}{\text{Merged Current Placer ZOI for CAA1 (South) (ha)}}$$

The following table summarizes results for the area of Merged Current Placer ZOIs, the area of overlap between the Merged Current Placer ZOIs and the Merged Current Other Area-based Human-caused Surface Disturbance ZOIs in CAA1 (South), and the % of the Merged Current Placer ZOIs that is made up of the overlap, based on GIS spatial data summaries.

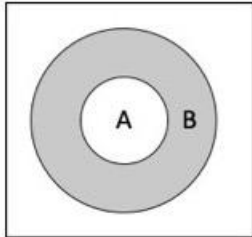
CAA1 (South) - Snow-free	Narrower ZOI (ha)	Wider ZOI (ha)
Overlap between Current Merged Placer ZOI and Current Other Area-based Human-caused Surface Disturbance ZOI	2 226	30 204
Current Merged Placer ZOI	19 996	79 204
% of Current Merged Placer ZOI that is made up of overlap with the Other Area-based Human-caused Surface Disturbance ZOI	11.132%	38.134%

The CAA1 (South) - Snow-free % overlap between the Current Merged Placer ZOI and the Other Area-based Human-caused Surface Disturbance ZOI was applied to all categories listed in Step 2.

Step 6. Add the Final Adjusted Predicted Additional Future Placer Disturbance ZOI area to spatially-explicit predicted future human-caused surface disturbance ZOI area for the snow-free/summer season.

The Final Adjusted Predicted Additional Future Placer Disturbance ZOI area was then added to the spatially-explicit predicted future human-caused surface disturbance ZOI to calculate the total predicted future human-caused disturbance ZOI. The Final Adjusted Predicted Additional Future Placer Disturbance is then added to the predicted future total disturbance (fire + spatial human-caused) to estimate area of total disturbance. By adding the additional placer disturbance to the spatial total human-caused and fire disturbance, the potential overlap between the spatial human-caused and fire disturbance has already been accounted for in that total, so the only potential overlap not accommodated for will be between potential future fire and potential future additional placer disturbance.

The tables on the next two pages provide examples of calculations for Total Range using Snow-free ZOIs for Steps 1-5 (first table) and Step 6 (second table). Calculations for all other categories listed in Step 2 were calculated in the same manner.



A = Current Placer

B = Additional Future Placer

Diagram Area ¹		A		A+B		A	B	B (Adjusted)			B (Final Adjusted)
Area	ZOI	Future Scenario	Current Placer ZOI (ha)	Rate of increase (9.49%/yr) over 25 years (=2.3725) (Moderate = rate) (High = 2 X rate)	RESULT = Predicted Total Future Area Occupied by Placer ZOI (includes area occupied by Current Placer ZOI) (ha)	Minus Current Placer ZOI (ha)	RESULT = Predicted Additional Placer Disturbance ZOI (ha)	Adjusting for overlapping ZOIs (Current Merged ZOI/ Current Overlapping ZOI area)	RESULT = Adjusted Predicted Additional Placer Disturbance ZOI	Adjusting for ZOI overlap with ZOI for other area-based human-caused surface disturbances	RESULT = Final Adjusted Predicted Additional Placer Disturbance ZOI (ha)
CAA1 (South)	Narrower	Moderate	19 996	2.375	47 441	19 996	27 445	0.4630	12 708	1 - 0.11132	11 293
		High	19 996	4.745	94 881	19 996	74 885	0.4630	34 675	1 - 0.11132	30 815
	Wider	Moderate	79 204	2.375	187 911	79 204	108 707	0.2404	26 128	1 - 0.38134	16 165
		High	79 204	4.745	375 823	79 204	296 619	0.2404	71 294	1 - 0.38134	44 107
CAA2 (North)	There is currently no placer activity in CAA2 (North) and placer activity is not expected in the future so all data here are zeros.										
Total Range	Narrower	Moderate	19 996	2.375	47 441	19 996	27 445	0.4630	12 708	1 - 0.11132	11 293
		High	19 996	4.745	94 881	19 996	74 885	0.4630	34 675	1 - 0.11132	30 815
	Wider	Moderate	79 204	2.375	187 911	79 204	108 707	0.2404	26 128	1 - 0.38134	16 165
		High	79 204	4.745	375 823	79 204	296 619	0.2404	71 294	1 - 0.38134	44 107

¹ B (Adjusted) and B (Final Adjusted) not shown on diagram

Clear Creek Caribou - Total Range - Using Snow-free ZOIs				
Future Scenario	Moderate	Moderate	High	High
ZOI	Narrower	Wider	Narrower	Wider
Predicted Future Human-Caused Disturbance ZOI				
<i>Final Adjusted Predicted Additional Placer Disturbance ZOI</i>				
CAA1 (South)	11 293	16 165	30 815	44 107
CAA2 (North)	0	0	0	0
Total Range	11 293	16 165	30 815	44 107
<i>Spatial Predicted Human-caused Disturbance ZOI</i>				
CAA1 (South)	75 504	183 905	82 762	192 268
CAA2 (North)	10 487	50 167	10 487	51 037
Total Range	85 991	234 072	93 248	243 304
<i>Total Human-caused Disturbance ZOI (Spatial Predicted Human-caused +Final Adjusted Additional Placer)</i>				
CAA1 (South)	86 798	200 069	113 577	236 374
CAA2 (North)	10 487	50 167	10 487	51 037
Total Range	97 284	250 237	124 063	287 411
Predicted Future Total Disturbance ZOI (Fire + Human-caused Disturbance)				
<i>Final Adjusted Predicted Additional Placer Disturbance ZOI</i>				
CAA1 (South)	11 293	16 165	30 815	44 107
CAA2 (North)	0	0	0	0
Total Range	11 293	16 165	30 815	44 107
<i>Spatial Total Disturbance ZOI (Fire + Predicted Human-caused Disturbance)</i>				
CAA1 (South)	151 772	219 576	158 851	227 454
CAA2 (North)	14 067	53 729	14 067	54 599
Total Range	165 839	273 305	172 917	282 053
<i>Total Disturbance ZOI (Fire + Spatial Predicted Human-caused + Final Adjusted Additional Placer)</i>				
CAA1 (South)	163 065	235 741	189 665	271 561
CAA2 (North)	14 067	53 729	14 067	54 599
Total Range	177 132	289 470	203 732	326 159

11 Appendix 4. Summary of land management direction/orders for lands within the Clear Creek Caribou Range.

Table A4-1. Summary of land management categories from the Peel Watershed and Dawson land use plans that occur within the Clear Creek Caribou Range (adapted from PWPC 2019 and DRPC 2022).

Planning Region	Category	Subcategory	Management Intent	Description
Peel Watershed	Conservation Area	Wilderness Area	Conservation	<ul style="list-style-type: none"> Interim withdrawal from any new industrial land use and surface access. Withdrawal status reviewed as part of formal, longer-term public Plan review conducted jointly by the Parties.
Dawson	Special Management Area	Special Management Area	Highest Conservation (Maintain ecological integrity and cultural values)	<ul style="list-style-type: none"> Recommended for permanent withdrawal from any new industrial land use and surface access Identified as a Special Management Area consistent with Chapter 10 of the FNFA, with requirement for a legal designation Requires the development of a management plan Recommended that lapsed tenure should not be renewed and no new mineral staking, or dispositions permitted.
		Integrated Stewardship Area	ISA 1	Lowest Development
	ISA 2		Low Development	<ul style="list-style-type: none"> High ecological and cultural values within a moderately sensitive biophysical setting. The priority in this area is to maintain ecological integrity and cultural resources and minimize land use impacts. Low threshold for development.
	ISA 3		Moderate Development	<ul style="list-style-type: none"> Moderate ecological and cultural values within a moderately sensitive biophysical setting. Conservative threshold for development.
	ISA 4	Highest Development	<ul style="list-style-type: none"> Lower ecological or heritage/cultural values within a moderately sensitive biophysical setting. High threshold for development. 	
	Caribou Stewardship Area	Overlay	Maintain ecological integrity and cultural values while allowing for low levels of carefully managed land use activities	<ul style="list-style-type: none"> Existing surface and subsurface rights (e.g. mineral, forestry, etc.) are recognized, including access. Recommend no new staking on an interim basis (specific to LMU). Surface access and surface disturbance thresholds equivalent to ISA 1 or 2 (specific to LMU) and under strict Special Management Direction

Table A4-2. Summary of special management direction/considerations with relevance to caribou for Land Management Units (LMUs) in the Peel Watershed and Dawson planning regions in the Clear Creek Caribou Range (adapted from PWPC 2019 and DRPC 2022).

Planning Region	LMU	Special management direction/considerations with relevance to caribou
Peel Watershed	West Hart River (LMU 4)	<ul style="list-style-type: none"> The Hart River Trail accesses the unit from the west. Use of this trail by off-road vehicles is allowed, subject to 4.3.1.1 of the Plan and other management plans.
	Hart River (LMU 6)	<ul style="list-style-type: none">
Dawson	Wehtr'e (Antimony) (LMU7)	<ul style="list-style-type: none"> Caribou Stewardship Area Industrial Land Use <ul style="list-style-type: none"> Mineral development is permitted within existing mineral tenure Industrial land use is permitted within ISA 1 cumulative effects thresholds Interim withdrawal of all other lands from placer and quartz mineral staking to be in place until the Access Management plan is completed or Regional Plan 10-year Review or until such a time that both Parties agree to remove. An access management plan/agreement to be jointly created by the Parties which should consider the following: <ul style="list-style-type: none"> New all season surface access: When new access is required, coordinated access routes for industrial activities should be encouraged to reduce linear footprint. The viewscape from the Dempster Highway should be maintained. The sensitivity of caribou to cumulative effects. See also Section 5.4.3.2.2 - Access Management Planning Recommendations (page 140) and Recommended Action 102 for additional guidance on Access Management Plans. In the absence of an access management Plan, Parties should jointly determine whether new surface access be permitted, with consideration of the above.
	Brewery Creek (LMU8)	<ul style="list-style-type: none"> Except for winter access, new surface access infrastructure off the Dempster Highway should be considered jointly by the Parties. Use of heap-leach mining practices in this area should take every precaution to not harm the surrounding aquatic environment.
	Clear Creek (LMU 9)	<ul style="list-style-type: none"> Industrial activities within caribou fall breeding (rut) habitat should be suspended during the key rutting period, (or as advised by a Regional Biologist) each year. Any access development (roads and trails) within caribou fall breeding (rut) habitat should be avoided.
	Tintina Trench (LMU 10)	<ul style="list-style-type: none"> Industrial Use: <ul style="list-style-type: none"> Industrial land use permitted within ISA 2 cumulative effects thresholds. Forestry and fuel wood harvest as guided by the Dawson Forest Resources Management Plan. Any industrial activity must consider the strong conservation value of this area, take into consideration the objectives, values, and rationale listed in this Plan and would require agreement of both Parties. The North Fork Hydro sites as identified in the THFA would be considered at the discretion of both Parties. Withdrawal of all lands from placer and quartz mineral staking. In the absence of a SMA management plan, surface access should be managed jointly by the Parties in consideration of sustainable development and cultural activities, including tourism, agriculture, and forestry.

Table A4-3. Summary of orders/regulations resulting from land use plans pertaining to lands within the Clear Creek Caribou Range.

Area/Category	Summary (adapted from order/regulation)
O.I.C. 2021/11: Off-Road Vehicle Management Area Regulation (January 28, 2021)	
All	<ul style="list-style-type: none"> the regulation does not apply to the extent to which a person is authorized to use an off-road vehicle in an off-road vehicle management area under a) the <i>Forest Resources Act</i>;; b) the <i>Land Use Regulation</i>;; c) the <i>Placer Mining Land Use Regulation</i>; or d) the <i>Quartz Mining Land Use Regulation</i>, or is authorized by an approved trail plan.
Alpine (>1400 m)	<ul style="list-style-type: none"> alpine off-road vehicle management area includes the area of territorial lands that falls within the area of Yukon located above 1400 m above sea level off-road vehicles may be used only on existing trails in the alpine off-road vehicle management area.
West Hart River LMU4	<ul style="list-style-type: none"> off-road vehicles may be used on the part of the Hart River Trail (as shown in Schedule 1 of the Off-Road Vehicle Management Area Regulation (2021)) located within the West Hart River LMU4 off-road vehicle management area
O.I.C. 2020/54: Order Prohibiting Entry on Certain Lands in Yukon (Peel Watershed Regional Land Use Plan) (March 31, 2020)	
Peel Watershed: West Hart River LMU4 Hart River LMU6	<ul style="list-style-type: none"> A person must not, at any time before January 1, 2030, enter onto LMU4, LMU6 for the purpose of locating a claim or prospecting for gold or other precious minerals or stones under the <i>Placer Mining Act</i>, except on a recorded claim by the owner or holder of the recorded claim. A person must not, at any time before January 1, 2030, enter onto LMU4, LMU6 for the purpose of locating a claim or prospecting or mining for minerals, under the <i>Quartz Mining Act</i>, except on a recorded claim by the owner or holder of the recorded claim.
M.O. 2020/09: Order Withdrawing from Disposition Certain Yukon Oil and Gas Lands (Peel Watershed Regional Land Use Plan) (March 31, 2020)	
Peel Watershed: West Hart River LMU4 Hart River LMU6	<ul style="list-style-type: none"> LMU4, LMU6 are withdrawn from disposition until January 1, 2030.
O.I.C. 2022/160: Order Prohibiting Entry on Certain Lands in Yukon (Recommended Dawson Regional Land Use Plan). (September 7, 2022)	
Dawson: Whetr'e (Antimony) LMU7 ^{1,2}	<ul style="list-style-type: none"> A person must not, at any time before December 1, 2023, enter onto lands (includes Whetr'e (Antimony) (LMU7)) for the purpose of locating a claim or prospecting for gold or other precious minerals or stones under the <i>Placer Mining Act</i>, except on a recorded claim by the owner or holder of the recorded claim, or on lands in respect of which a lease has been granted under section 92 of the <i>Placer Mining Act</i> where entry is by the lessee in accordance with the terms of the lease. A person must not, at any time before December 1, 2023, enter onto lands (includes Whetr'e (Antimony) (LMU7)) for the purpose of locating a claim or prospecting or mining for minerals, under the <i>Quartz Mining Act</i>, except on a recorded claim by the owner or holder of the recorded claim.
O.I.C. 2023/142: Order to Amend the Order Prohibiting Entry on Certain Lands in Yukon (Recommended Dawson Regional Land Use Plan) (Nov 23, 2023)	
Dawson: Whetr'e (Antimony) LMU	<ul style="list-style-type: none"> For O.I.C. 2022/160, replaces "December 1, 2023" with "December 1, 2024"

¹ In the previous two OICs (2021/46, 2021/80) most of the portion of Whetr'e (Antimony) (LMU7) that was south of the Klondike River, was not included in the orders.

² The portion of Tinatina Trench (LMU10) that lies within the Clear Creek Caribou Range is not included in the current Order, but was included in OIC 2021/80 (but not included in OIC 2021/46).