Environment and Climate Change Canada
Environnement et Changement climatique Canada

2020 IMMINENT THREAT ASSESSMENT FOR WOOD BISON

(Bison bison athabascae)

Canada

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INTRODUCTION

In response to concerns about threats to the Ronald Lake Bison Herd, Environment and Climate Change Canada (ECCC) initiated an analysis to determine whether Wood Bison (*Bison bison athabascae*), as a species[1], faces imminent threats to its survival or recovery. This analysis is referred to herein as the imminent threat assessment.

Under section 80(2) of the Species at Risk Act (SARA), the competent Minister must make a recommendation to the Governor in Council for an emergency order if he or she is of the opinion that the species faces imminent threats to its survival or recovery. An imminent threat is one that would render the survival or recovery of the species impossible or highly unlikely, and which cannot be eliminated without immediate intervention.[2]

The Minister responsible for the Parks Canada Agency is a competent Minister for Wood Bison under SARA where the species occurs on Parks Canada Agency lands. The Minister of Environment and Climate Change Canada is the competent Minister for the species outside of Parks Canada Agency lands and is leading the development of Wood Bison recovery.

The imminent threat assessment is based on the best information available up to July 2019 on the biology of Wood Bison and associated threats, as summarized in a detailed Species and Threats Summary, as well as Cultural Importance Summaries prepared by ten Indigenous groups. These documents are foundational to the development of the imminent threat assessment, and

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[1] Wood Bison are recognized as a subspecies of American Bison (*Bison bison*); however, to be consistent with terminology in the Species at Risk Act (SARA), the term "species" is used herein when referring to Wood Bison. Under SARA, the term "species" can also represent subspecies.

[2] For context, see previous threat assessments posted on the public registry: Western Chorus Frog (https://wildlife-species.canada.ca/species-risk-registry/document/default_e.cfm?documentID=2789) and Southern Mountain Caribou (http://registrelep-sararegistry.gc.ca/virtual_sara/files/ImminentThreatAnalysisSmc-v00-2018Jun-Eng.pdf).

provide the source and reference material used to develop the imminent threat assessment (see References). The Species and Threats Summary includes information provided by Indigenous communities, the Government of Alberta and the Parks Canada Agency, as well as publicly available documents, which includes the Report of the Joint Review Panel for the Teck Resources Limited, Frontier Oil Sands Mine Project (released in July 2019). Officials from Alberta and Parks Canada Agency reviewed drafts of the Species and Threats Summary, and their comments were considered when preparing the final document.

IMMINENT THREAT ASSESSMENT CRITERIA

To help inform the Minister's opinion as to whether imminent threats to the survival or recovery of Wood Bison exist, the following four questions were considered (following a previous imminent threat assessment completed for Southern Mountain Caribou):

1. Is the species facing threats?
2. Are the threats likely to occur?
3. a) Will the effect of the threats make the survival of the species highly unlikely or impossible, and/or

   b) Will the effect of the threats make achieving the recovery objectives of the species highly unlikely or impossible?
4. Do the threats require immediate intervention?

If each of these four questions is answered in the affirmative (including either 3a or 3b), it is the view of the ECCC that imminent threats to Wood Bison may exist. These questions are referred to below as the "imminent threat questions".

IMMINENT THREAT ASSESSMENT FOCUS

ECCC undertook a broad and comprehensive evaluation of imminent threat for Wood Bison. Because of the nature of the threats to Wood Bison and the

population and distribution objectives outlined in the recovery strategy, the imminent threat assessment considers the species as a whole, as well as individual herds, when responding to the imminent threat questions. The assessment of whether Wood Bison is facing threats (questions 1 and 2), and whether the threats will jeopardize survival of the species (question 3a), considers Wood Bison herds broadly and the species as a whole. In contrast, the assessment of whether the threats jeopardize recovery of the species, and require immediate intervention (questions 3b and 4), considers specific herds, in line with the recovery objectives for Wood Bison in Canada. A scoping analysis was conducted to identify which herds warranted detailed analysis when assessing threats to recovery (see below).

The recovery of a species is dependent on achieving the population and distribution objectives outlined in a recovery strategy. The short-term population and distribution objectives for Wood Bison (which are relevant for the imminent threat assessment) are to maintain the disease-free status, population size, and range of *all* disease-free Wood Bison herds within the original range of Wood Bison in Canada[3]. Thus, a change in the disease status, population size, or range of *any* disease-free herd can jeopardize achieving the recovery objectives for Wood Bison in Canada.

When assessing imminent threat to recovery, ECCC conducted an initial scoping analysis to identify which disease-free herds are facing threats that pose immediate conservation concerns, and thus warrant more detailed analysis. Based on this initial assessment, no immediate conservation concerns were identified for disease-free Wood Bison herds in the Yukon Territory, Northwest Territories or British Columbia, as well as for the Hay Zama herd in Alberta. Most

[3] "Diseased Bison" means herds of Wood Bison where either or both of bovine brucellosis and/or tuberculosis are known to be present.

are currently considered stable or increasing, and/or measures are in place to address threats, where necessary. As a result, these herds were not considered further in the assessment. However, two herds – the Ronald Lake and Wabasca herds in northeastern Alberta, both on the periphery of Wood Buffalo National Park – were found to be subject to particular stresses or threats that could affect the recovery objectives for Wood Bison in Canada. Consequently, the assessment of imminent threat to Wood Bison recovery focuses on these two herds (see Box 1 and Box 2 for background information on these herds).

Box 1

The Ronald Lake Wood Bison Herd

The Ronald Lake bison herd is naturally established. The herd's range extends into Wood Buffalo National Park, in proximity to the Delta herd in the southern part of the park, where bovine tuberculosis and brucellosis are prevalent. Indigenous knowledge holders indicate the herd has been present since "time immemorial" and thus existed prior to the introduction of Plains Bison and cattle diseases to Wood Buffalo National Park. Despite its proximity to the Delta herd, the Ronald Lake herd has not tested positive for either disease and is genetically different enough to suggest limited contact with Wood Buffalo National Park herds, especially in recent generations. Maintaining the herd's genetics is important for Wood Bison recovery, as it contributes to the long-term viability of the species and resilience to future environmental change. The herd is also the last disease-free bison herd that can be harvested by many Indigenous peoples, including the Athabasca Chipewyan First Nation, Mikisew Cree First Nation, Fort Chipewyan Métis, Fort McKay First Nation, Fort McKay Métis Nation, Fort McMurray #468 First Nation, and Fort McMurray Métis Local Council 1935. The Ronald Lake herd is relatively small, numbering 174 individuals in 2018. The herd is protected from non-Indigenous harvest under the Alberta Wildlife Regulations.

Box 2

The Wabasca Wood Bison Herd

The origins of the Wabasca bison herd are unknown. The herd occurs adjacent to the southwestern border of Wood Buffalo National Park in relative close proximity to the park's Garden River herd, where bovine tuberculosis and brucellosis are prevalent. The herd has not tested positive for either disease and is genetically different from Wood Buffalo National Park animals, suggesting limited contact with the Wood Bison National Park herds. The herd is small, numbering approximately 16 individuals in 2019. Harvest of the herd is not regulated. The herd is important for a number of Indigenous peoples.

RESPONSES TO IMMINENT THREAT ASSESSMENT QUESTIONS

Question 1: Is the species facing threats?

Yes, Wood Bison as a species currently faces a number of threats. The greatest threat to Wood Bison recovery is the presence of two introduced, cattle-derived diseases (bovine tuberculosis and brucellosis) in bison herds in and around Wood Buffalo National Park (see Box 3). The distribution of diseased and disease-free herds is shown in Figure 1. Although bison populations in Wood Buffalo National Park persist in the presence of these diseases, the management actions taken by jurisdictions neighboring Wood Buffalo National Park to control disease spread to livestock, ranched bison and disease-free Wood Bison herds greatly limits Wood Bison recovery. For example, a bison control zone has been established in the Northwest Territories to protect the Mackenzie herd (Figure 1), while surveillance activities have been undertaken in Alberta west of Wood Buffalo National Park to protect the Hay Zama herd. Any wild bison detected in the bison control zone or surveillance areas are removed. The implementation of these control measures reduces the area that can be effectively occupied by bison and restricts expansion of existing herds, in particular in Alberta.

Box 3

Bovine tuberculosis and brucellosis in Wood Bison

In the 1920s, approximately 6,600 Plains Bison were introduced to Wood Buffalo National Park, likely carrying with them two cattle diseases (bovine tuberculosis and brucellosis) that have since infected Wood Bison within the park as well as the neighboring Wentzel Lake and Slave River Lowland herds (Figure 1). Plains Bison and Wood Bison also interbred, transferring Plains Bison genes to the Wood Bison population. The three diseased Wood Bison herds in and around Wood Buffalo National Park today contain approximately half (~4,200) of all Canadian Wood Bison. The remaining nine free-ranging herds of Wood Bison in Canada are thought to be disease-free, although two herds – Wabasca and Ronald Lake – are proximate to diseased bison in the park. The presence of these diseases on the landscape is a major driver of management actions taken for Wood Bison today, and is considered a threat to the recovery of the species. The risk of disease transfer to disease-free bison herds outside and in close proximity to Wood Buffalo National Park is considered high.

The role of disease in regulating bison populations in and around Wood Buffalo National Park remains unclear, as the interactive effects of disease, habitat and predation on bison at the individual and population level are complex and poorly understood. Infected bison can be negatively impacted by these diseases, which can cause increased mortality, reduced fecundity and increased susceptibility to predation. Overall bison mortality attributed to these diseases is low, with advanced tuberculosis causing an estimated 4–6% annual mortality of bison in Wood Buffalo National Park. However, studies have shown that bison that tested positive for both diseases had lower winter survival and reproductive rates than bison that tested positive for one or neither disease. Although the effects of disease can be detrimental to bison, diseased Wood Bison populations have persisted in Wood Buffalo National Park, and population growth rates of diseased herds are considered similar to non-diseased herds, suggesting that population level effects may be minimal. However, the overall effects of disease on long-term population trends in Wood Buffalo National Park remain unclear.

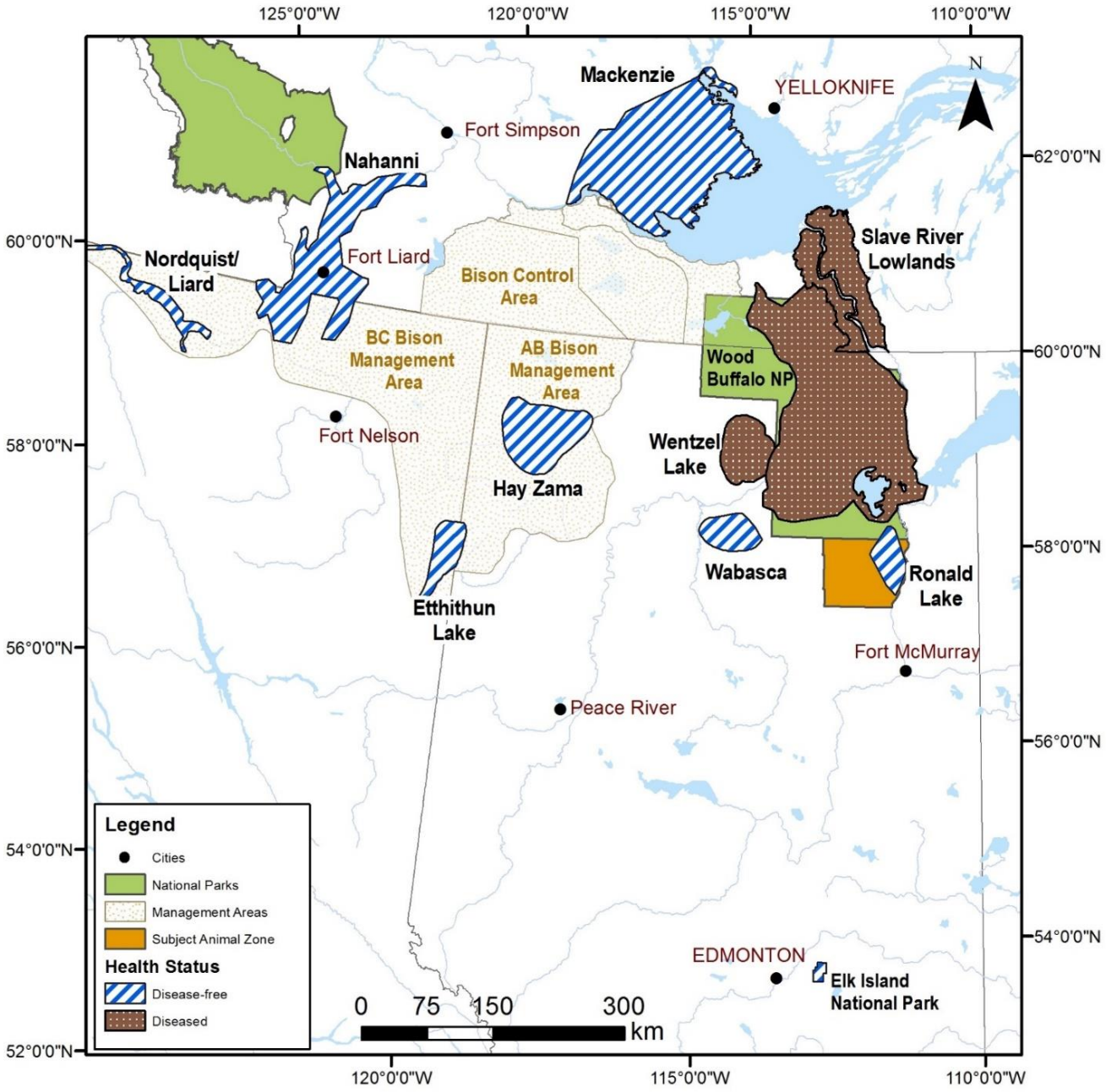

Figure 1. The distribution of diseased and disease-free Wood Bison herds in northwestern Canada, and location of management or control areas. Adapted from: ECCC 2018. Recovery Strategy for the Wood Bison (*Bison bison athabascae*) in Canada. *Species at Risk Act* Recovery Strategy Series.

Other disease management actions that can limit recovery include herd removal, as occurred for the captive Hook Lake herd in the Northwest Territories, which was eradicated following discovery of bovine tuberculosis in the herd.

In addition to the presence of disease and associated disease management actions, Wood Bison face a number of other threats across their range. These include, but are not limited to industrial development (e.g., oil sands mining; see Box 4), forest harvest, hydro-electric development (and concomitant long-term drying of wetlands and incursion of weeds), unregulated or illegal harvest, anthrax outbreaks, collisions with vehicles, and hybridization with Plains Bison and loss of genetic diversity. Many of these threats affect herds in and around Wood Buffalo National Park, although other herds can be exposed to specific threats, depending on their location and surrounding land use.

While resource development activities (oil and gas exploration/extraction and forest harvesting) have been listed as individual threats, many Indigenous communities have raised concerns that the cumulative impact of these activities over time remains unknown. These activities can impact bison through habitat loss, disturbance of individuals, diminished water and air quality and increased predation and hunting pressure from easier access to these areas.

Question 2: Are the threats likely to occur?

Yes, threats to Wood Bison are likely to occur or are ongoing. While many Wood Bison herds are subject to some type and level of threat, the greatest threat occurs for herds that reside in close proximity to diseased herds in and around Wood Buffalo National Park, given the potential for exposure to bovine tuberculosis and brucellosis.

Box 4

Teck Resources Ltd. Frontier Oil Sands Mine Project (Teck Project)*

Teck Resources Limited has proposed an oil sands mine project in northeastern Alberta, approximately 110 km north of Fort McMurray. This project covers approximately 29,000 ha of boreal forest comprised of wetlands and upland forests, including old-growth forests. If approved, the Project would operate for approximately 41 years. The footprint of the proposed Project overlaps with the southern portion of the Ronald Lake bison herd range, and will affect up to 24% of the herd's total range (both directly and indirectly), based on an analysis of satellite telemetry data, which is supported by Indigenous traditional knowledge.

The Project underwent an environmental assessment by a Canada/Alberta Joint Review Panel (JRP) established under the *Canadian Environmental Assessment Act, 2012* and Alberta's *Responsible Energy Development Act.* On July 25, 2019, the JRP submitted its report to the Minister of Environment and Climate Change. The JRP concluded that the Frontier Project is likely to cause significant adverse environmental effects in a number of areas, including on the Ronald Lake bison herd because of habitat loss and disease transmission. When evaluating the evidence provided by multiple parties, including ECCC, Indigenous groups and Teck, the JRP noted that there is an existing risk of disease transmission to the Ronald Lake bison herd from diseased bison in the Delta herd in Wood Buffalo National Park. The JRP also acknowledged that there is uncertainty regarding the degree to which the Project would increase the risk of disease transmission. However, the JRP could not rule out that the Project would not increase the current risk of disease transmission and, following a precautionary approach, concluded that the Project was likely to have a significant adverse effect on Ronald Lake bison.

The Panel, in its role as the Alberta Energy Regulator, determined the Project is in the public interest and approved the provincial authorizations required for the Project to proceed. The Panel made 44 recommendations in its report directed at Canada and or Alberta, including that the federal government complete the imminent threat analysis for Wood Bison, so that the findings can further inform federal decisions related to the Frontier project.

*On February 25, 2020 - the Minister of Environment and Climate Change terminated the environmental assessment process for the Teck Frontier Oil Sands Mine Project at the request of the proponent.

Disease-free herds in close proximity to Wood Buffalo National Park (e.g., the Ronald Lake, Wabasca and Hay Zama herds in Alberta, and the Mackenzie herd in the Northwest Territories; see Figure 1) are at risk of contacting diseased bison that disperse from infected herds in and around Wood Buffalo National Park. Management actions that target identification and removal of bison from control or surveillance zones outside Wood Buffalo National Park are ongoing for the Mackenzie and Hay Zama herds, given the continuous nature of the disease threat. The Ronald Lake and Wabasca herds have only recently been classified as disease-free, and management actions have not been implemented for these herds to mitigate risk of disease transmission.

In addition to risk of disease transmission, Wood Bison are subject to ongoing threats from anthropogenic activities and disturbances. These threats vary across bison ranges. Forestry and oil and gas activity is known to occur in or near a number of ranges. Hydroelectric development continues to affect bison habitat in and around the Peace-Athabasca Delta in Wood Buffalo National Park. Oil sands development is also encroaching on the Ronald Lake bison herd, which has been subjected to high levels of disturbance in recent years (see Figure 2), including oil and gas exploration, forestry and (until March 2016) unregulated harvest. This herd will be subjected to additional disturbance if the Teck Frontier Project is approved and built or if industrial activities occur elsewhere in its range (e.g., in the Canadian Natural Upgrading Ltd. [CNUL] lease immediately north of the Teck Frontier Project footprint; Figure 2). A large portion of the herd's range overlaps an area zoned for multiple land uses including oil sands exploration and development, forestry, recreation, gravel extraction, hunting and trapping. As a result, additional anthropogenic disturbances are likely to occur in the herd's range.

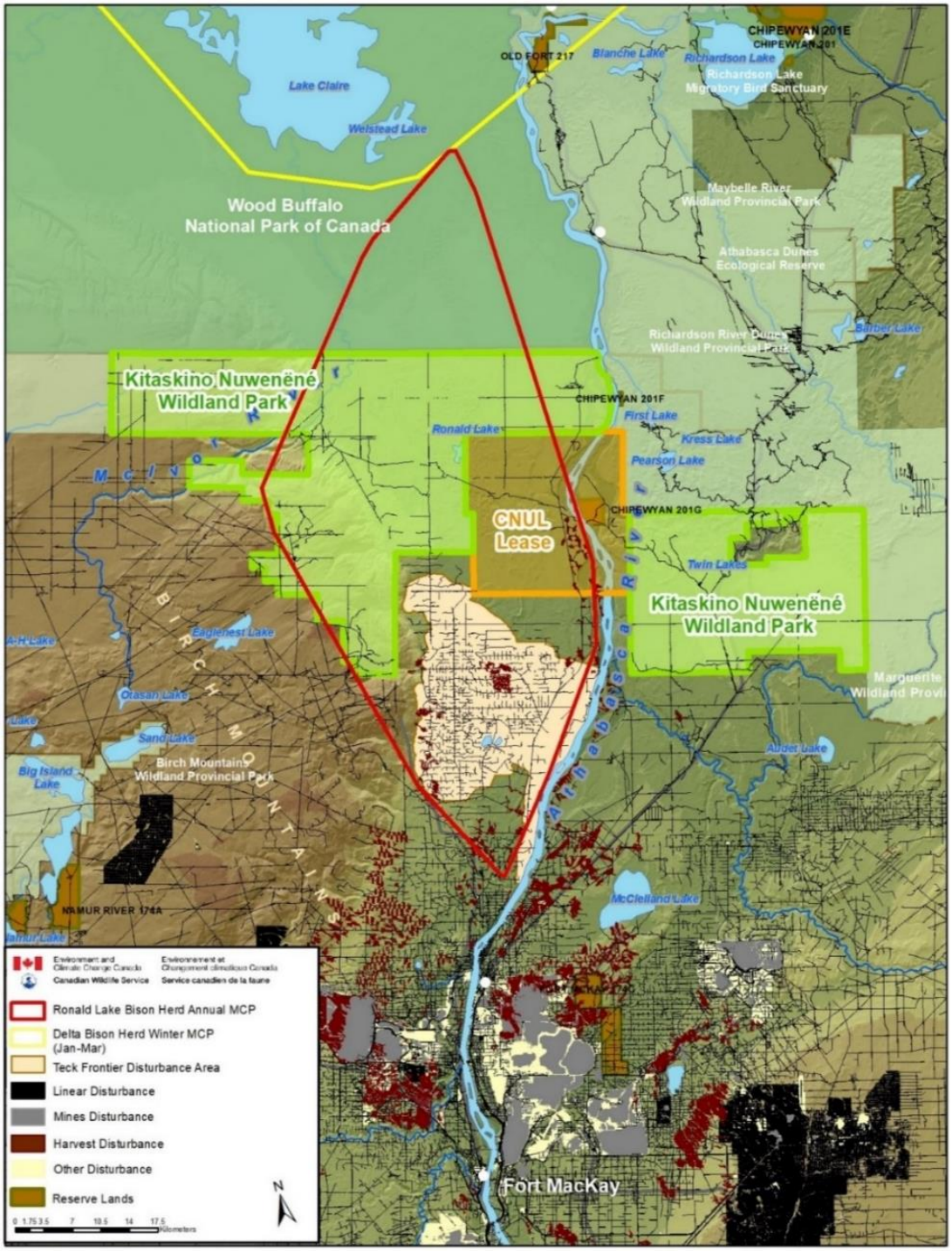

Figure 2. Ranges of the Ronald Lake and Delta Wood Bison herds (based on minimum convex polygons, or MCPs), surrounding regional disturbances, and location of the proposed Teck Frontier Oil Sands Mine and adjacent Canadian Natural Upgrading Ltd. (CNUL) lease. MCPs were generated from data provided by the Parks Canada Agency and the Government of Alberta. Footprint data are from the Alberta Biodiversity Monitoring Institute (www.abmi.ca).

In addition to resource development, hunting can affect a number of herds. Although hunting is regulated for most harvested herds, hunting of the Wabasca bison herd is not regulated, largely because the herd has long been considered diseased. As a result, animals from this herd are not considered wildlife under the Alberta *Wildlife Act*, and are thus not afforded any protection. Bison from the Wabasca bison herd can be harvested at any time and in any number. Recent surveys detected a minimum of 16 animals in the herd; therefore, unregulated harvest could lead to extirpation of the herd, which is now considered disease-free. Because of its small size, the herd is also at risk of extirpation due to stochastic events, such as anthrax outbreaks, drowning, and harsh winters, or other factors such as predation, the extent of which is unknown. These threats could occur at any time, but are difficult to predict.

Question 3a: Will the effect of the threats make the survival of the species highly unlikely or impossible?

No, the effects of the threats will not make survival of Wood Bison, as a species, highly unlikely or impossible, particularly in the near-term, given the overall population size of the species, occurrence of distinct subgroups, and management actions that are being taken or contemplated to mitigate threats to some herds.

A species is considered more likely to survive if it is stable, resilient, widespread, and displays connectivity between subgroups or populations, and is also protected from anthropogenic effects (see Box 5). The more attributes a species possesses, the higher its likelihood of continued survival.

Box 5

Attributes that contribute to the survival of a species

Stability: stable or increasing population over a biologically relevant timeframe.

Resiliency: sufficiently large population to recover from periodic disturbances and avoid demographic and genetic collapse.

Widespread distribution (with population redundancy): there are multiple (sub) populations or locations available to withstand catastrophic events and facilitate rescue if necessary.

Connectivity: the distribution of the species in Canada is not severely fragmented.

Protection from anthropogenic threats: non-natural significant threats are mitigated.

There are approximately 8,500 Wood Bison across 12 free-ranging populations widely distributed across western Canada. Overall, the population as a whole appears to be stable, although large population fluctuations can occur because of stochastic events (such as flooding, anthrax outbreaks, etc.). Even in the presence of such events, and the fragmented distribution of herds, Wood Bison are likely to survive as a species in the near-term, given the overall number of individuals and herds. However, the long-term survival of Wood Bison may be hindered by low genetic diversity in re-introduced herds.

The maintenance of genetic diversity within a species is considered critical for species viability and adaption to changing environmental conditions. Although low genetic diversity in re-introduced herds remains a concern, bison herds in and around Wood Buffalo National Park, although diseased, harbor important genetic diversity that is critical for the long-term survival of the species. These herds have remained viable in the presence of disease, and thus are likely to continue to contribute to the genetic diversity in Wood Bison and the continued survival of the species. Preliminary actions are also being discussed to identify, in

collaboration with Indigenous groups, long-term disease management options in the greater Wood Buffalo National Park area.

Question 3b: Will the effect of the threats make achieving the recovery objectives of the species highly unlikely or impossible?

Yes, the effects of several threats will make achieving the recovery objectives for Wood Bison highly unlikely or impossible. As indicted above, the recovery goals are based on the population and distribution objectives, which are to maintain the disease-free status, population size and range of all disease-free herds in Canada. These objectives can be considered a proxy for assessing recovery for the purposes of an imminent threat assessment.

The analysis conducted by ECCC indicated that two herds, the Ronald Lake bison herd and Wabasca bison herd, are subject to imminent threats that could affect their disease-free status, population size, or range, and for which mitigation measures or management actions have not yet been implemented. Specifically, ECCC finds that there are imminent threats to the disease-free status and range of the Ronald Lake bison herd, and population size of the Wabasca bison herd. Threats to these two herds thus could prevent attainment of the recovery objectives for Wood Bison in Canada. These threats are discussed in more detail below.

<u>Threats to the Ronald Lake Bison Herd</u>

i. Disease Transmission

The presence of bovine brucellosis and tuberculosis in Wood Buffalo National Park bison herds is the greatest threat to the Ronald Lake bison herd. Although the Ronald Lake bison herd is considered disease-free based on recent testing, the close proximity of the herd's range to the diseased Delta bison herd range in Wood Buffalo National Park (Figure 2) suggests there is a high risk of herd contact and disease transmission. Recent telemetry locations of Ronald Lake

bison have occurred within 12 km of historical and recent observations of bison in the Delta range during winter. The Ronald Lake bison herd is considerably closer to diseased bison herds in Wood Buffalo National Park than other disease-free herds (e.g., the Hay Zama herd in Alberta and the Mackenzie bison herd in the Northwest Territories) which are considered to be at risk of disease transmission. However, unlike these other herds, direct management actions have not been taken to reduce disease risk to the Ronald Lake bison herd.

The Ronald Lake bison herd has remained isolated from bison in the Delta herd for considerable time, given its distinct genetic characteristics and disease-free status. However, given the close proximity of the Ronald Lake and Delta bison herd ranges, it is unclear why the herds have not interacted. Bison can readily move long distances, and are known to travel between bison ranges in Wood Buffalo National Park. This suggests a high probability of future interaction between the herds.

A number of hypotheses have been proposed to explain the separation of herds and absence of disease in Ronald Lake bison, for which there are varying degrees of support. It is possible that a natural barrier, or limited habitat availability, blocks or prevents movements between the Ronald Lake and Delta bison herd ranges. However, there is currently limited evidence to support this hypothesis. Conversely, it is possible that, historically, the herd ranges were further apart (thereby minimizing opportunities for herd interaction) but have recently shifted, resulting in a relatively new risk of contact. There is evidence that the Ronald Lake bison herd's range has changed, potentially bringing the Ronald Lake bison herd in closer proximity to the diseased Delta bison herd. Indigenous knowledge indicates that, in recent decades, the southern boundary of the Ronald Lake bison herd's range has been pushed northward by encroaching oil sands development and other disturbances. Recent intensive disturbance in the herd's current range from exploration activities associated

with the Teck Frontier Project (see Figure 2), forestry activities, and hunting, has likely also displaced some bison and altered bison movements. Collectively, these pressures may have shifted the herd's range northward and increased the occurrence or distribution of Ronald Lake bison in Wood Buffalo National Park, resulting in an increased (and relatively new) risk of disease transmission. Available information indicates that, historically, Ronald Lake bison may have been absent from southern Wood Buffalo National Park during winter, or occurred infrequently. In contrast, recent telemetry data indicates that a substantial portion of collared Ronald Lake bison have occurred in southern Wood Buffalo National Park during winter. This suggests that the occurrence of Ronald Lake bison in southern Wood Buffalo National Park may have changed over time.

In addition to the distribution of the Ronald Lake bison herd, the distribution and movements of the Delta bison herd are also important in determining the risk of herd contact and disease transmission. Surveys by the Parks Canada Agency indicate that the number of Delta bison in southern Wood Buffalo National Park varies yearly, and can fluctuate greatly between years. In some years Delta animals may be absent from this area, but can quickly increase in abundance the following year. The factors affecting the distribution and movements of Delta bison are not known. Delta bison were relatively abundant in southern Wood Buffalo National Park in winter 2009, but have been largely absent from this area since. However, Delta bison have been present in southern Wood Buffalo National Park during 12 (or 75%) of 16 surveys conducted between 1991 and 2019, indicating they regularly occur within this area. As a result, although the risk of disease transmission may vary yearly (and be low in some years), depending on the location of the Delta herd, the risk is likely present in most years, and can increase quickly between years. Thus, the risk in any future year can be high.

Although there is uncertainty as to why the Ronald Lake bison herd has remained isolated from the Delta herd, the current close proximity of the herd ranges, lack of a barrier between the ranges, external pressures on the Ronald Lake bison herd range, and known movements of the Delta herd, collectively indicate there is an imminent (i.e., near-term) risk of herd contact and disease transmission. As outlined in a 2013 Government of Alberta report on managing disease risk in northern Alberta Wood Bison outside of Wood Buffalo National Park, the "proximity of the parent Wood Buffalo National Park disease reservoir puts all outlier herds at high risk of infection". As a result, measures have been taken to prevent disease spread to the Hay Zama bison herd. Similar measures have not been implemented for the Ronald Lake bison herd, which has only recently been classified as disease-free. Transfer of disease, in particular bovine tuberculosis, to Ronald Lake bison would likely readily occur if they came in contact with diseased animals. Tuberculosis is spread through contact with respiratory secretions from an infected animal, and thus can be readily transmitted between individuals.

ii. Industrial Development: Teck Frontier Project

The largest potential for disturbance within the Ronald Lake bison range is the proposed Teck Resources Limited, Frontier Project. The footprint of the proposed Teck Project overlaps with the southern range of the Ronald Lake Bison herd (Figure 2).

Although there is an existing risk of disease transmission to the Ronald Lake bison herd, given its close proximity to the range of the diseased Delta herd, the Teck Frontier Project, if approved and built, may exacerbate this risk (see Box 4). Development of the Teck Frontier Project will result in the loss of up to 24% of the Ronald Lake bison herd's total range (based on the analysis of telemetry data), as well as up to 18% of the herd's preferred foraging habitat, based on

modeling completed by ECCC. The location of movement corridors and availability of foraging habitat indicate that at least some bison will be displaced northward from the mine, potentially increasing the number of Ronald Lake bison in Wood Buffalo National Park, and subsequent risk of contact with diseased Delta bison. Similarly, Indigenous knowledge holders report that Ronald Lake bison are vulnerable to disturbance and would not be able to tolerate further impacts within the herd's range. As development increases, they expect that the Ronald Lake bison herd will move north into Wood Buffalo National Park and/or be forced onto habitat that is marginal.

Although it is uncertain whether the Teck Frontier Project will exacerbate the existing risk of disease transmission, there is considerable evidence that the Ronald Lake bison herd is sensitive to disturbance and will likely move away from the mine if built. In addition, the Teck Frontier Project will result in significant habitat disturbance. Given this disturbance, the Joint Review Panel for the Teck Frontier Project could not rule out that the Project would not displace bison north towards the park and increase the risk of disease transmission. As a result, following a precautionary approach, the Panel concluded that the Project was likely to cause a significant adverse effect on the herd. ECCC concurs with this conclusion.

Range loss caused by the Teck Frontier Project will result in an additional threat to the recovery of Wood Bison in Canada. The population and distribution objectives for Wood Bison are to maintain the range of all disease-free populations of Wood Bison in Canada. Removal of up to 24% of the herd's range represents a substantial loss of range. Although Teck will progressively reclaim habitat, it is uncertain if reclaimed habitat will provide adequate forage for bison and thus support the herd. The high salinity levels in reclaimed oil sands wetlands can reduce the growth of sedge species (a preferred bison forage), requiring the input of nutrients to facilitate growth. It is unknown if natural growth

rates can be re-established in saline wetlands over the long-term. In addition, bison may not return to the mine footprint if they have not used the area for considerable time. As a result, it is uncertain if reclamation will mitigate range loss, and it is expected that bison will avoid the mine for the duration of mine operations and possibly longer if habitat is limiting.

iii. Other Resource Development Activities

The majority of the anthropogenic footprint within the Ronald Lake bison herd's range is associated with exploratory activities for the Teck Frontier and former Shell Pierre River Mine projects, as well as forestry cut blocks at the southern and eastern edges of the range. Although no other activities are known to be approved, it is possible that exploration activities could occur on the CNUL lease north of the Teck Frontier Project (Figure 2) to fulfill leaseholder obligations. Disturbance within this area will have an additive and detrimental effect on Ronald Lake bison, given the central location of the CNUL lease within the herd's range, and overlap with important habitat for the herd. The CNUL lease overlaps with 16% of the Ronald Lake bison herd's total range, and data gathered between 2013 and 2017 indicate that it is an area of high use by Ronald Lake bison. In addition, the CNUL lease contains a relatively high proportion of winter foraging habitat for the herd, which is key for survival of the herd. Fully developing both the Teck Frontier and the CNUL leases would functionally remove approximately 46% of the total range of the Ronald Lake bison herd, likely resulting in severe consequences to the survival of the herd.

New roads associated with oil exploration, forestry and resource development activities increase access to the herd, which can lead to increased levels of disturbance (e.g., noise, light), pollution, and increased hunting pressure from Indigenous peoples or the likelihood of poaching by non-Indigenous individuals. Linear disturbances can also facilitate wolf travel, and may increase wolf

predation on bison. Wolf predation on Ronald Lake bison is thought to be rare; however, it may have increased in recent years according to Indigenous knowledge, possibly in response to increased clearing, road access, and drill pads. In addition, because Ronald Lake bison use diverse and widespread habitats ranging from open meadows to mature forests to open ridges, they may be threatened by cumulative anthropogenic disturbances.

Upcoming forestry activities are restricted to the southern end of the herd's range, generally overlapping with the Teck Frontier footprint. According to Alberta Pacific's 2015 Forest Management Plan, the area is expected to be largely developed for oil sands operation in the next decade or two, and the timber harvested in the area will be mainly salvaged from those operations. Whether forestry activity will continue, or when it will continue, in the absence of oil sands development is not known.

Threats to the Wabasca Bison Herd

i. Unregulated Harvest

The largest single threat faced by the Wabasca bison herd is unregulated hunting. The herd is not protected under the Alberta *Wildlife Act,* so hunting is unregulated and anyone can hunt the herd without a license at any time. Although the overall hunting pressure on the local population is unknown, Indigenous peoples have expressed concern over non-Indigenous hunting, which they consider a threat to the herd, given the herd's small population size. Indigenous peoples do not routinely hunt these bison. The recent (2016) cessation of unrestricted non-Indigenous hunting on the Ronald Lake bison herd may have increased hunting pressure on the Wabasca herd. However, access to the herd is limited, and with so few animals remaining, this may not represent a financially viable option for outfitters.

The small population size of the Wabasca bison herd indicates that the loss of

even a few individuals from additional harvest (or other causes) could threaten the persistence of the herd. The disappearance of this herd would make achieving the recovery objectives of Wood Bison highly unlikely or impossible.

ii. Disease Transmission

The Wabasca bison herd occurs proximate to the diseased Garden River bison herd in Wood Buffalo National Park (Figure 1) and, according to a 2013 Government of Alberta report, may be at a high risk of contracting disease. Local Indigenous groups have indicated that bison move between the Wabasca and diseased Garden River bison herd in southwestern Wood Buffalo National Park; however, the absence of disease in the Wabasca bison herd suggests that contact between the herds has not occurred. Recent sightings of individuals in the Wabasca and Garden River bison herds have been separated by approximately 30-50 km (depending on survey year), which may be the reason they have thus far maintained herd separation. To date, the Wabasca bison herd range has experienced relatively little habitat disturbance, thus animals have likely not been displaced. This is likely to continue in the near-term, based on known resource development plans (see below). As a result, the risk of disease transmission in the near-term may not be high. However, this risk may change if future disturbance in the range pushes Wabasca bison closer to the Garden River bison herd range. Overall, there are uncertainties regarding the movements of both the Wabasca and Garden River bison herds (in particular males that can move long distances), and in the proximity of these herds. More information is required on the movements of both herds to understand the risk of disease transmission, and potential changes to risk that may occur as a result of resource development.

Other than disease itself, disease management actions may present a threat to the Wabasca bison herd. The Wabasca bison herd was estimated to consist of

30 to 40 Wood Bison in 2010, but between 2011 and 2014, a total of 15 animals were culled to test for disease. The impact of this cull on the herd is unknown, but may have contributed to the herd's decline.

The relative close proximity of Wabasca bison to livestock and ranched bison west of Wood Buffalo National Park also raises issues should the herd become diseased. If diseased, there would likely be strong pressure from ranchers to cull the herd to reduce disease transmission risk. In addition, since local Indigenous peoples may avoid consuming diseased bison, the spread of diseases to the Wabasca herd could also prevent local Indigenous peoples from practicing their asserted or established Aboriginal or Treaty Rights.

iii. Resource Development

The threat posed by anthropogenic disturbance related to natural resource development is low for the Wabasca bison herd compared to other herds. The range remains relatively undisturbed, as only ~1% has been directly impacted by anthropogenic disturbance. However, between 2010 and 2015, the length of linear features (i.e., roads, seismic lines) within the range almost doubled, from 182 km to 359 km, likely increasing the level of disturbance, pollution, and potentially predation.

Increased access and disturbance associated with forestry may represent a longer-term rather than near-term threat to Wabasca bison. A recent (December 2017) update to the Forest Management Plan for Forest Management Agreement 0200040, which estimates annual allowable cut from 2016 onwards for periods of 10 to 50 years, indicates that little forest harvest will occur in the Wabasca Operating Unit in the near-term (until approximately 2026, or year 10 of the operating period). This area overlaps the western portion of the Wabasca bison herd range. However, harvest is projected to occur in this area in the longer-term (year 10 to 50 of the operating period). This indicates that

forestry may have little impact on the Wabasca herd in the near-term (up to year 2026), but may be a concern over the longer term (after 2026). Although cut blocks may allow bison to access fresh grown grass in spring, Indigenous knowledge holders indicate that Wabasca bison avoid areas with greater human disturbance, which is consistent with behaviours observed in the Ronald Lake bison herd.

Oil and gas exploration is not anticipated in the near future. However, hydroelectric development has potentially impacted the Wabasca bison herd range. Indigenous knowledge indicates that since the early 1970s, the area has been dewatered and degraded as a result of the presence of hydroelectric dams. The effects of these changes on bison are unknown.

Question 4: Do the threats require immediate intervention (to ensure species survival or recovery)?

Yes, the threats identified for the Ronald Lake and Wabasca bison herds require immediate intervention to ensure they do not jeopardize achieving the recovery objectives for Wood Bison in Canada. In regards to the Ronald Lake bison herd, measures are not in place to address the existing risk of disease transmission to the herd or exacerbated risk caused by the Teck Frontier Project, if approved and built. Also, measures are not in place to address range loss for the herd if the Teck Frontier Project is built. In regards to the Wabasca bison herd, measures are not in place to address unregulated harvest. Collectively, disease transmission to the Ronald Lake bison herd, range loss for the Ronald lake bison herd, and reduction (or extirpation) of the Wabasca bison herd, will jeopardize achieving the recovery (population and distribution) objectives for Wood Bison in Canada, unless measures are implemented to address these threats. Additional information on why immediate intervention is required for each herd is provided below.

Ronald Lake Bison Herd

i. Disease Transmission

Available evidence indicates that there is an existing risk of disease transmission to the Ronald Lake bison herd. Although there is uncertainty as to why the Ronald Lake bison herd has remained isolated from diseased Delta bison, the current close proximity of the two herd ranges and absence of a natural barrier separating the herds indicates there is an imminent (near-term) risk of herd contact and disease transmission. This risk may be variable between years, depending on the location of the Delta bison herd, but has been present in most years based on systematic surveys of the Delta herd. In addition, the risk may have increased in recent years because of disturbance in the southern portion of the Ronald Lake bison herd's range, which may have pushed some bison northwards. Because of the risk of disease transmission from diseased bison herds in and around Wood Buffalo National Park to neighboring herds, the governments of Alberta and the Northwest Territories have implemented disease control or management programs for the Hay Zama and Mackenzie bison herds, respectively. However, no such program exists for the Ronald Lake bison herd, in part because it has only recently been classified as disease-free. Given its much closer proximity to diseased bison than the Hay Zama or Mackenzie bison herds, disease management measures are imperative, and immediate intervention is required to ensure the Ronald Lake bison herd remains disease free.

The extent and efficacy of measures underway or planned for implementation in the immediate future by ECCC, the Government of Alberta and the Parks Canada Agency are insufficient to address the threat of disease transmission to the Ronald Lake bison herd. While these parties are engaged in the planning of actions to address broad disease issues in and around Wood Buffalo National Park, no immediate and direct actions are pending for the Ronald Lake bison

herd. A suite of actions is likely required, both in WBNP and in Alberta, to mitigate the risk of disease transmission to the herd. These measures are required to address the existing risk of disease transmission, as well as an increased risk that may occur if the Teck Frontier Project is built.

ii. Industrial Development: Teck Frontier Project

Approval and subsequent construction of the Teck Frontier Project may exacerbate the existing risk of disease transmission to the Ronald Lake bison herd, and will result in substantial range loss. The effects of both threats will jeopardize achieving the population and distribution objectives for Wood Bison, and thus recovery of the species. As a result, immediate intervention would be required should the Teck Frontier Project be approved and built. Measures implemented to mitigate the existing risk of disease transmission for the Ronald Lake bison herd would be effective at addressing the increased risk of disease transmission caused by the Teck Frontier Project. However, because of uncertainties in the effectiveness of reclamation, additional measures would need to be implemented to address range loss.

iii. Other resource development projects

Other than the Teck Frontier Mine Project, there is currently no approved oil and gas exploration or production within the range of the Ronald Lake bison herd that is known to ECCC, and there are also no known future oil and gas activities that have been approved. However, there is potential for exploration activities to occur in the CNUL lease immediately north of the Teck Frontier Project during winter 2019/2020. It is currently unknown if this will occur. Forestry activity is planned to begin in 2021 in the most southern portion of the Ronald Lake bison herd; however, this may be dependent on the approval of the Teck Frontier Project, since the planned harvest is reliant on the reclamation of timber removed during construction of the mine. No immediate action is required to

address the potential threats associated with these activities at present. However, initiation of exploration activities in the CNUL lease during winter 2019/2020 would be highly detrimental to the Ronald Lake bison herd, given the importance of this area for bison. Immediate intervention would be required if such activities were to occur.

Wabasca Bison Herd

i. Unregulated Harvest

The Wabasca bison herd is currently not protected from harvest. Given its small size, any additional mortality of individuals could have a significant adverse effect on the persistence of the herd, leading to herd extirpation. Immediate action is required to address the threat of unregulated harvest.

ii. Disease Transmission

The Wabasca bison herd's proximity to diseased herds suggests that there may be potential for future disease transmission. Indigenous knowledge holders have indicated that there is regular exchange of bison between the Wabasca bison herd and the diseased Garden River bison herd in southwest Wood Buffalo National Park; however, this is not supported by available data showing absence of disease in the Wabasca bison herd. The 30 to 50 km distance between individuals in the Wabasca and Garden River bison herds, coupled with little planned disturbance within the Wabasca bison herd's range, suggest that the risk of herd contact may be low in the near-term. However, there is little information on the movement of the herds, and predictions of disease transmission are uncertain. It is likely that the risk of disease transmission will increase in the longer-term based on plans for forest harvest in the Wabasca range after 2026. Transmission of disease to the herd could lead to lethal removal of the herd, given the risk it may pose to livestock.

Given that risk of disease transmission may be low in the near-term, immediate action is not considered necessary to mitigate disease risk. However, because of uncertainties in herd movements, studies should be considered to more accurately determine herd distribution and movement patterns to provide greater certainty of disease risk.

iii. Resource Development

Human disturbances related to hydroelectric generation and oil and gas exploration do not present imminent threats to the Wabasca bison herd since no associated activities are anticipated within the herd range in the near term. Forestry activities are not scheduled in the Wabasca Operating Unit until after 2026, based on best available information, and thus do not represent an imminent threat; however longer-term harvest plans suggest forestry represents a future threat. Forestry activities in the herd's range could increase stress on animals, leading to altered range and distribution of the herd due to avoidance, and potentially increased predation and hunting pressure due to easier access. Although immediate action is not required, future action may be necessary to protect the herd from disturbance and displacement.

SUMMARY OF IMMINENT THREAT ASSESSMENT CONCLUSIONS

Based on best available information, ECCC concludes that there is no imminent threat to the survival of Wood Bison in Canada. Sufficient numbers of individuals and local populations exist across the species' range to maintain the species in the event individual herds (such as the Ronald Lake or Wabasca bison herds) are lost or otherwise lose their viability. However, over the long-term, loss of herds could affect the genetic variability within the species, thereby affecting the resiliency of Wood Bison to adapt to environmental change.

In contrast to imminent threat to survival, the Department concludes that there is an imminent threat to the recovery of Wood Bison in Canada. Imminent threat

to recovery is based on whether the effect of threats make achieving the recovery objectives of the species highly unlikely or impossible, such that immediate intervention is required. The recovery objectives are to maintain the disease-free status, population size, and range of all disease-free Wood Bison herds within the original range of Wood Bison in Canada. There are several existing and proposed threats to the Ronald Lake and Wabasca herds that make achieving the recovery objectives of Wood Bison highly unlikely or impossible.

For the Ronald Lake bison herd, there is an existing risk of disease transmission because of its proximity to diseased bison in Wood Buffalo National Park. Immediate actions are required to prevent disease transmission, as done for other herds near WBNP. Construction of the Teck Frontier oil sands mine, if approved, will exacerbate this risk and thus also require intervention. The Teck Frontier Project will also remove up to 24% of the Ronald Lake bison herd's range, resulting in substantial range loss. These threats on their own or combined, make achieving the recovery objectives of Wood Bison impossible or highly unlikely. The overall imminent threat assessment conclusions for the Ronald Lake bison herd are summarized in Table 1.

For the Wabasca bison herd, unregulated harvest threatens the herd's persistence, given the small size of the herd, and requires immediate intervention to ensure the herd is not extirpated. Disease and resource development are not considered imminent threats, but could affect the herd in the longer-term. There is some uncertainty regarding the movements of the Wabasca herd and nearby diseased Delta herd, and studies are recommended to address this uncertainty to determine disease risk. The overall imminent threat assessment conclusions for the Wabasca herd are summarized in Table 2.

Table 1. Overall Conclusion – Ronald Lake Bison Herd

Imminent Threat Assessment Question	**Potential Imminent Threats Assessed**		
	Disease and disease management	Teck Frontier Project (if the Project is approved and built)	Other resource development projects
Is the species facing a threat?	Yes	Yes	Yes
Is the threat likely to occur?	Yes	Yes	Yes
Will the threat make achieving the recovery objectives unlikely or impossible?	Yes	Yes	Unknown: dependent on exploration activities in CNUL lease
Does the threat require immediate intervention?	Yes	Yes	Unknown: dependent on exploration activities in CNUL lease
Is there an Imminent Threat?	Yes	Yes	Unknown: dependent on exploration activities in CNUL lease

Table 2. Overall Conclusion – Wabasca Bison Herd

Imminent Threat Assessment Question	**Potential Imminent Threats Assessed**		
	Disease and disease management	Unregulated harvest	Resource development activities (forestry)
Is the species facing a threat?	Yes	Yes	Yes
Is the threat likely to occur?	No (near-term) Yes (long-term)	Yes	No (near-term) Yes (long-term)
Will the threat make achieving the recovery objectives unlikely or impossible?	No (near-term) Yes (long-term)	Yes	No (near-term) Yes (long-term)
Does the threat require immediate intervention?	No (but studies on herd movement recommended)	Yes	No (but studies on herd movement recommended)
Is there an Imminent Threat?	No	Yes	No

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