GOULD ENVIRONMENTAL

Report on:

Dover Commercial Project (ERCB Application 1673682)
Wildlife Assessment

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Appendix I – RSA and LSA Maps

1.0 INTRODUCTION

The Community of Fort McKay (Fort McKay) retained Gould Environmental Ltd. to review the wildlife components of the Dover Operating Corporation (Dover) application for the Dover Commercial Project (Application #1673682) and complete a report for submission to the Energy Resources Conservation Board (ERCB). Documents reviewed included the Dover environmental impact assessment (EIA) (Dover 2010), Dover responses to the three rounds of supplemental information request (SIRs) (Dover 2011, Dover 2012a, and Dover 2012b), Dover's responses to Fort McKay, government guidelines, wildlife status reports, and scientific literature.

This report examines project effects on key indicator resources (KIRs) and identifies federal and provincial wildlife Species at Risk and Cultural Keystone species (Garibaldi 2006) that should have been assessed. We also describe areas where Dover has failed to meet the published Terms of Reference (TOR) and subsequent SIRs (AENV 2010, Dover 2011, Dover 2012a, Dover 2012b). For example, since completion of the wildlife assessment there have been changes to provincial and federal wildlife status designations that were not addressed in the EIA or with supplemental information. A more detailed discussion on woodland caribou (caribou) is included because of recent changes to Alberta's environmental assessment guidelines and recent linkage of the provincial caribou policy and federal caribou recovery strategy (GOA 2013).

However, the most concerning aspect of Dover's EIA is the projected declines of moose and caribou to extirpation and the reliance on a wolf kill program as mitigation for project impacts to these species.

1.1 Dover Project Overview

Dover is proposing to develop the Dover project approximately 50 km west of Fort McKay and within 1.5 km of the Fort McKay First Nation (FMFN) Indian Reserve (IR) 174b (Figure 1). The project is within a culturally important area of Fort McKay's traditional territory. The area is used for hunting and trapping of wildlife and the quality, quantity, and composition of wildlife is very important.

Hunting and trapping of wildlife is an integral component of the way of life for some residents of the RSA. As such, the abundance and health of wildlife are a primary concern. (Section 4.1.7, Wildlife Assessment, Dover 2010).

The project is within the West Side Athabasca River (WSAR) caribou range and the Red Earth caribou range (Environment Canada 2012) (Figure 2). The WSAR, East Side Athabasca River (ESAR), Red Earth, and Richardson caribou ranges overlap with the Fort McKay Traditional Territory. IR174a and IR174b are located within the Red Earth caribou range (Figure 2).

The project includes two processing facilities, well sites, aboveground pipelines and associated infrastructure. The project direct disturbance will be 7,872 ha within

43,500 ha of Dover leases and has a planned life of 65 years. To assess project effects Dover used individual indicator species to cover a range of species groups that included carnivores, ungulates, birds, and amphibians. Wildlife Key Indicator Resources (KIRs) selected by Dover for assessment were woodland caribou, moose, fisher, Canada warbler, rusty blackbird, yellow rail, and Canadian toad. The project area is also home to Canada lynx, black bear, beaver and other wildlife of cultural importance to Fort McKay. All of these species were detected by Dover in the project area during baseline wildlife surveys. Dover's local study area (LSA) and regional study area (RSA) map are included as Appendix I.

During operations the project will have an adverse effect on the wildlife. Dover indicates that impacts from operations will be mitigated in the long-term (>65 years) primarily by reclamation (fisher, Canadian toad and Canada warbler) and a speculative wolf kill program (moose and caribou). According to Dover's EIA, the project will have adverse effect even after reclamation on rusty blackbird and yellow rail (both are listed SARA Schedule 1).

The Terms of Reference issued by Alberta Environment and Sustainable Resource Development (AESRD) required Dover to describe the wildlife resources within the region of the project, which included amphibians, reptiles, birds, and mammals (AENV 2010). Wildlife species listed as "at Risk, May be at Risk and Sensitive" by AESRD, Schedule 1 of the federal *Species at Risk Act (SARA),* and listed as "at risk" by Committee on Endangered Wildlife in Canada (COSEWIC) in the region needed to be described (AENV 2010). Dover collected wildlife data in and around the local study area (LSA) from 2008 to 2010 using various wildlife survey methods that included the following:

- Ungulate aerial surveys (2008, 2009, 2010)
- Winter track counts (2008, 2009, 2010)
- Photographic bait stations (2010)
- Beaver aerial surveys (2008)
- Yellow rail survey (2010)
- Marsh bird survey (2010)
- Songbird point counts (2008, 2010)
- Owl call-playback survey (2010)
- Bat survey (2008,2009, 2010)
- Amphibian call (2008, 2009, 2010)

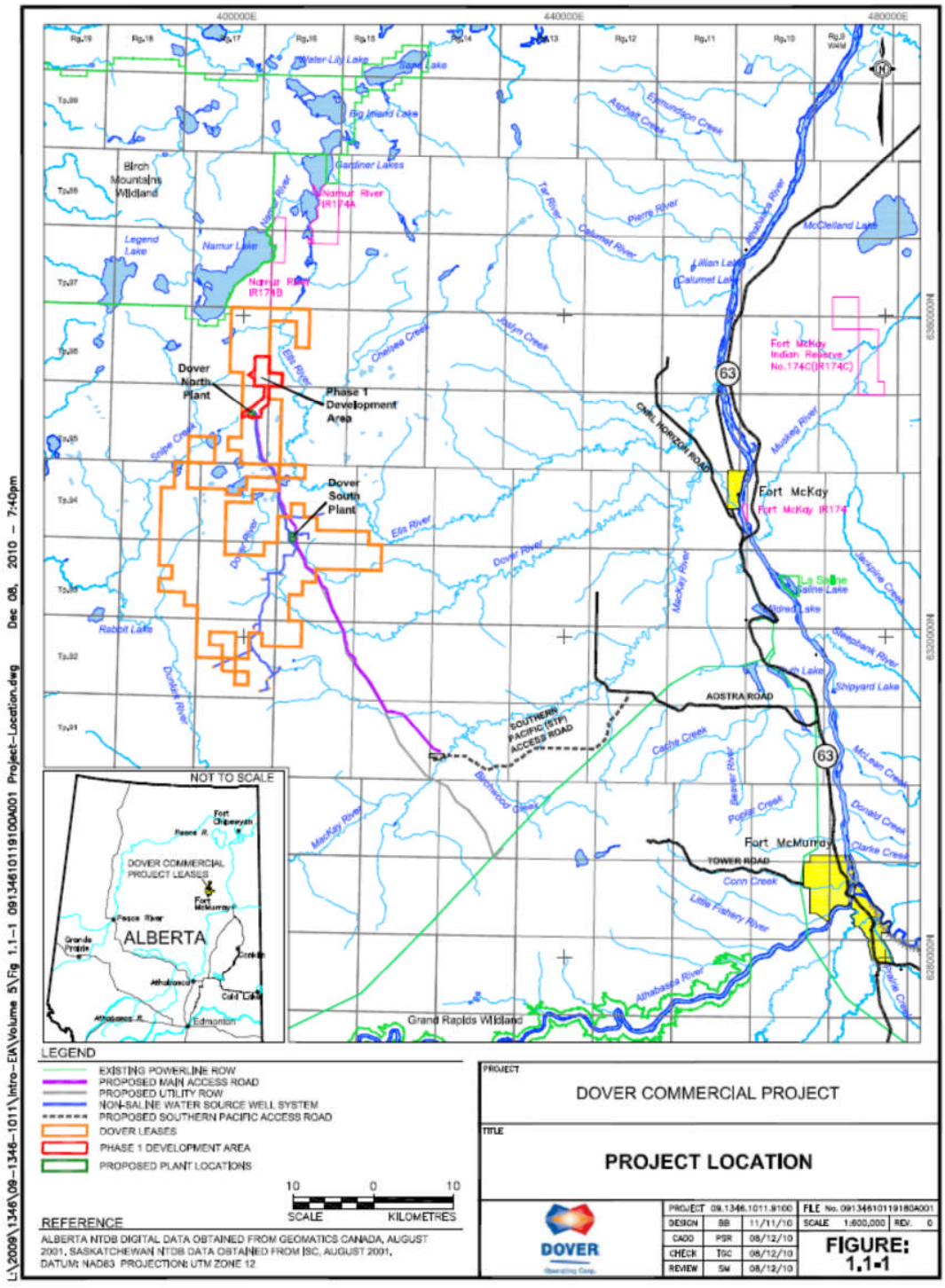

Figure 1: Location of Dover project, Fort McKay, IR174a, and IR174b. Source Dover (2010)

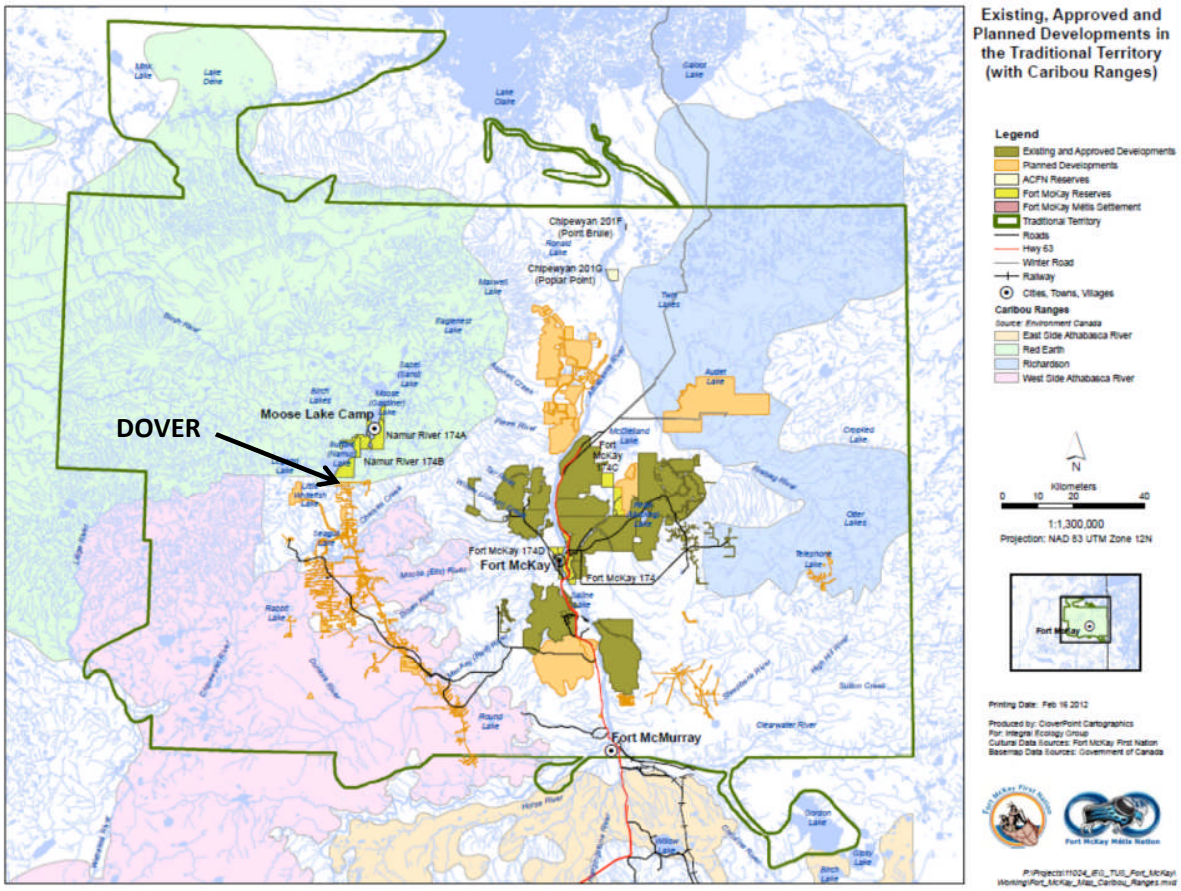

Figure 2: Fort McKay Traditional Territory and caribou Ranges with approximate location of proposed Dover project.

2.0 ALBERTA GOVERNMENT CARIBOU POLICY

The Government of Alberta (GOA) has made strong statements supporting caribou conservation. A woodland caribou policy for Alberta was released in June 2011 (GOA 2011). GOA has stated that it is committed to achieving naturally sustaining woodland caribou populations in the province. It acknowledged that immediate action is required to ensure that there are long-term naturally thriving woodland caribou populations. The GOA states the "*The implementation of this policy reflects our social license and obligation to effectively conserve and manage our natural resources*." GOA indicates that the conservation will be a shared government, public and private sector responsibility that will be led be government. Priorities identified by GOA include:

- Maintaining caribou habitat is the immediate priority.
- Restoring disturbed habitat is a critical component of caribou habitat management.
- Prudent management of the land base and associated development will be required to reduce the impact on and facilitate the restoration of caribou habitat.
- Effective management of wildlife populations (e.g., predators and other prey species) will be required.

The GOA states that caribou conservation will consider provincial and federal legislative requirements, First Nation rights and traditional uses, social/economic impacts; and stakeholder interests. The GOA is also considering conservation tools such as legislated and non-legislated designated areas, deferrals of development activities, conservation offsets, caribou habitat restoration, and predator and prey management (GOA 2011).

GOA updated their guide to preparing environmental impact assessment reports to include caribou conservation (GOA 2013). GOA (2013) states that

"Proponents must describe how they will meet A Woodland Caribou Policy for Alberta and the Federal Recovery Strategy for the Woodland Caribou, Boreal Population (Rangifer tarandus caribou) in Canada".

Proponents are required to describe a project's influence on caribou habitat and habitat recovery efforts. The GOA goal is to achieve and maintain at least 65% of each caribou range as undisturbed habitat. Proponents must also implement a 500 meter buffer around all disturbances (GOA 2013). The project will not meet these GOA requirements and impact both the Red Earth and WSAR caribou ranges.

The federal recovery strategy provides strategies required to address threats to caribou and achieve population objectives (e.g., stabilize populations) (Environment Canada 2012). The following management strategies are taken directly from the federal recovery strategy authored by Environment Canada (2012). Each of these management strategies has been assign an "urgent" priority:

- *Protect key areas for boreal caribou through appropriate habitat management and protection mechanisms (e.g. legislated protected areas, no development zones, mixed use zones, and conservation agreements).*
- *Undertake coordinated actions to reclaim boreal caribou habitat through restoration efforts (e.g. restore industrial landscape features such as roads, old seismic lines, pipelines, cut-lines, temporary roads, cleared areas; reconnect fragmented ranges).*
- *Where ranges are highly disturbed, identify areas that will be prioritized for boreal caribou recovery and targeted for early habitat reclamation. Incorporate management guidelines and actions into permitting conditions for activities identified as affecting boreal caribou or their habitat.*
- *Encourage stewardship of boreal caribou habitat among industries, interest groups, and Aboriginal communities and organizations.*

The GOA has linked provincial and federal caribou policies through their requirement for EIAs in caribou ranges such thatthe provincial and federal caribou ranges are now the same. This is a major shift in the scope of environmental impact assessment.

3.0 IMPACT ASSESSMENT

3.1 Baseline

3.1.1 Caribou

Woodland caribou are listed as "Threatened" both federally and provincially. There are less than 3000 woodland caribou in Alberta divided into 16 caribou populations across the province (ASRD and ACA 2010) (Figure 3). Thirteen of these populations have sufficient monitoring data to demonstrate that 10 populations are in decline.

The proposed Dover project is located within the WSAR caribou (primarily) and Red Earth caribou ranges. The WSAR range is 15,010 km^2 and has an estimated population of 300 caribou (ASRD and ACA 2010). Environment Canada estimated that approximately 69% of the critical habitat has been disturbed in the WSAR. Environment Canada (2012) found that 62 % of critical habitat in the Red Earth range has been disturbed. Since approximately 2001 female caribou populations have been declining in the WSAR. Figure 4 shows the percent change in female caribou from the mid-1990s to 2009.

Dover conducted several wildlife surveys to collect baseline information between March 2008 and October 2010 that provided data on caribou and moose. These wildlife surveys included the following:

- Ungulate aerial surveys (2008, 2009, 2010)
- Winter track counts (2008, 2009, 2010)
- Photographic bait stations (2010)

The results of these surveys were as follows (Section 4.2.3.1, Wildlife Assessment; Dover 2010);

- Thirty-seven woodland caribou were observed during the aerial surveys in and around the LSA.
- Minimum caribou density was 0.023 caribou/km^2.
- Caribou cow: calf ratio was 100:63, indicating good recruitment (juveniles surviving and being added to the population);
- Minimum moose density was 0.038 moose/km^2 and track density was 0.08 tracks/km-day, both of which are among the lowest reported in the Oil Sands Region;
- No deer were found during any surveys;
- Wolf track density was 0.03 tracks/km-day, which is among the lowest reported for the Oil Sands Region; and

- Coyotes were present but rare (photographed twice at bait stations, observed once during ungulate aerial surveys, but not recorded during winter track surveys).

Dover reported, with three years of data, that moose, wolf, and coyote populations are low in the LSA and that no deer were observed during wildlife surveys. This finding supports Latham *et al.* (2011) who concluded that increased wolf density may be a result of deer presence. Thus, we would not expect to find high numbers of wolves in areas where deer are absent. Dover also found a high density of caribou and a high cow: calf ratio in the LSA. Dover concluded that collectively, these findings suggest that the Project LSA may serve as a spatial refuge from the higher predation pressure that is found elsewhere in the WSAR caribou range (Section 4.2.3.1, Wildlife Assessment; Dover 2010). This is a reasonable conclusion well supported by the data collected by Dover.

Development in the LSA, a caribou refuge, will negatively impact this rare species. Caribou occur naturally in low densities and were likely never abundant. It is hypothesized that their sparse density provides a mechanism to avoid predators, primarily wolves. This predator avoidance is a key feature of woodland caribou biology. To further avoid predators, caribou inhabit areas that do not support other ungulates preyed upon by wolves such as deer. It is widely accepted that increasing predator populations are detrimental to caribou populations. Habitat alteration and loss causes caribou decline, in part by increasing predator populations with the proximate cause of caribou decline being predation (ASRD and ACA 2010 and Festa-Bianchet *et al*. 2011). However, increased predation is facilitated by loss of refuge habitat for the caribou.

There is a strong linear relationship between caribou recruitment (e.g., juvenile caribou surviving and joining the breeding population) and the level of habitat disturbance (natural and man-made) (Environment Canada 2008). Research in Alberta (Sorensen et al. 2008), Saskatchewan (Rettie and Messier 1998), Ontario (Vors et al. 2007), and Quebec (Courtois et al. 2007) has shown that caribou populations are declining or at risk of extirpation where industrial activities (forestry, mining, oil and gas) have altered caribou habitat.

Industrial activity can increase caribou predation is through two main mechanisms. Firstly, industrial development removes older forest habitat promoting new vegetation. This new vegetation provides abundant food for moose and deer (Reittie and Messier 1998; Seip 1992). This improves moose and deer survival and increases their population. Increased deer and moose populations can attract and support higher populations of predators (e.g., wolves). Simply having more predators in an area increases the chances of caribou being encountered and preyed upon. A second contributing factor from industrial development is the construction of new roads and seismic lines. These linear features provide movement corridors for highly mobile predators such as wolves and easier movement into caribou ranges.

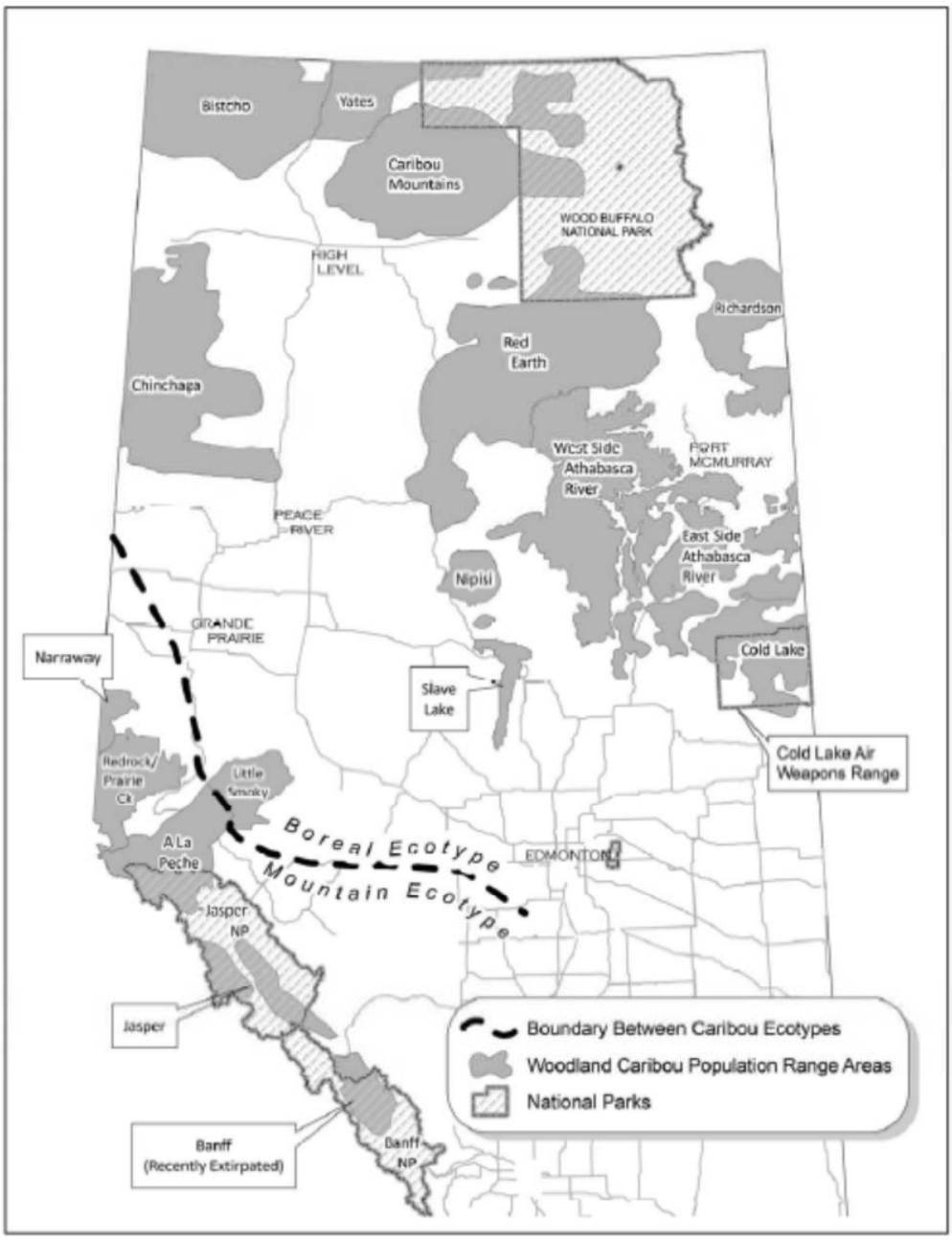

Figure 3: Caribou population ranges and names in Alberta (Source Figure 2, ASRD and ACA 2010)

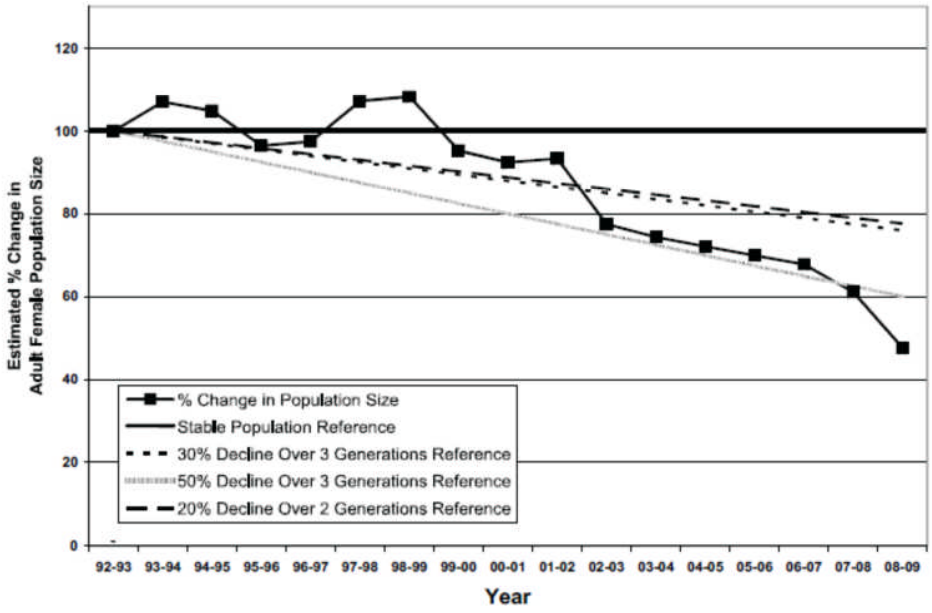

Figure 4: Population trend of female caribou in WSAR (Source: ASRD and ACA 2010).

3.1.2 Moose

Wildlife aerial surveys detected 101 moose in the LSA. Moose were also detected during winter track counts and using cameras. Moose densities were low in the LSA (see above).

The Dover project areas (LSA and RSA) are located within WMU 531. WMU 531 overlaps with the western portion of the Fort McKay Traditional Territory and includes the community of Fort McKay, Indian Reserves (IR) 174a, IR 174b, and Buffalo and Moose lakes. Since the early 1990s, the Alberta Government has completed three aerial moose surveys (1993/94, 2001, and 2009) in WMU 531. Since 1993/1994 the estimated moose populations has declined from a density of 0.10 moose/km^2 (1,900 moose) to 0.04 moose/km^2 (662 moose) (Figure 5). This decline is statistically significant (Morgan and Powell 2009). The moose densities observed by Dover (0.038 moose/km^2) during its 2008-2010 surveys are virtually identical to the 2009 aerial surveys.

In a study completed south of the Dover LSA, Latham *et al.* (2011) found that the prey species of wolves has changed since the mid-1990s. In the 1990s, moose were the most common prey of wolves; by 2008, white-tailed deer and beaver represent the most common species eaten by wolves. Thus, the decline in moose population cannot be attributed to wolf predation. The increase of beaver predation is a concern to Fort McKay because the beaver is a cultural keystone species.

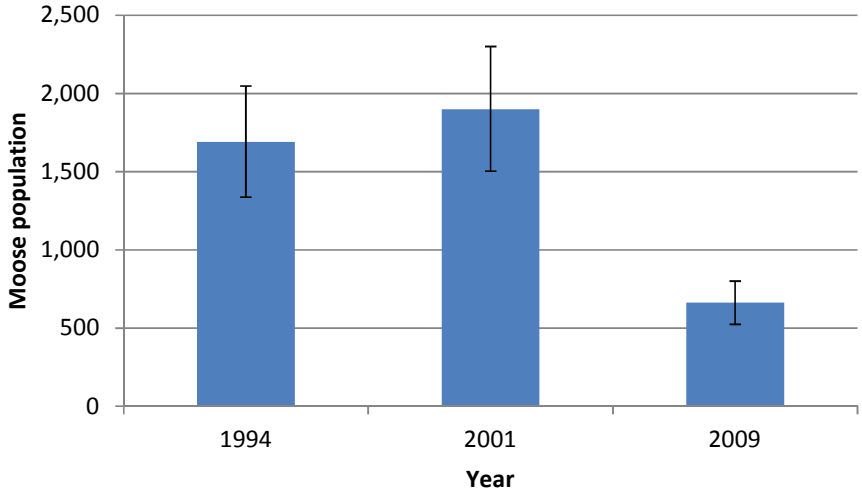

Figure 5: Moose populations observed during AESRD standardized surveys in WMU 531 in 1994, 2001, and 2009.

3.1.3 Fisher

The northern portion of the Dover project area is within a high use area for fur bearer harvesting with the rest being within a moderate use area (Section 1.2.3, Terrestrial Resource Introduction, Dover 2010). During winter track wildlife surveys to collect baseline data Dover observed a combined fisher and marten tracks at a density of 0.57 tracks/km-day. Dover reported that this density was similar to track densities for other studies done in the region. Dover also observed 11 marten and five fishers at photographic bait stations (Wildlife Baseline, Dover 2010).

3.2 Application Case

3.2.1 Caribou

Dover completed a population viability assessment (PVA) to predict future regional populations of caribou for the Application Case (Figure 6). The PVA predicted that unless current caribou population trends are changed there is a high chance that caribou will be extirpated from the RSA in the next 30 years. Dover's prediction appears to be consistent with the prediction of several other studies that have studied caribou populations (see CEMA [2009], Athabasca Landscape Team [2009], Schneider *et al.* [2010], ASRD and ACA [2010]).

Direct effects of the project for caribou habitat loss in the LSA are predicted to be "moderate" for direct effects (site clearing) and "high" for indirect effects (fragmentation and sensory disturbance) with a "net effect" for caribou habitat loss to be "high" in a negative direction. Impacts to this species' habitat are "irreversible" and should be considered adverse (see Table 4.3-4 in Dover 2010).

The Dover computer models predicted that if a wolf kill program is initiated caribou populations will increase by approximately 80% in the next 30 years across the region. (Figure 6; Section 3.3.2.2; Wildlife Habitat Modelling; Appendix 5-1, Dover 2010). Dover states that aspects of the Project will have 'some' negative effects on woodland caribou abundance (Section 4.3.1.1). "*However, this assessment assumes that a regional predator management program will be put in place as an integral component of the mitigation plan*" (Section 4.6.3.1, Wildlife Assessment, Dover 2010).

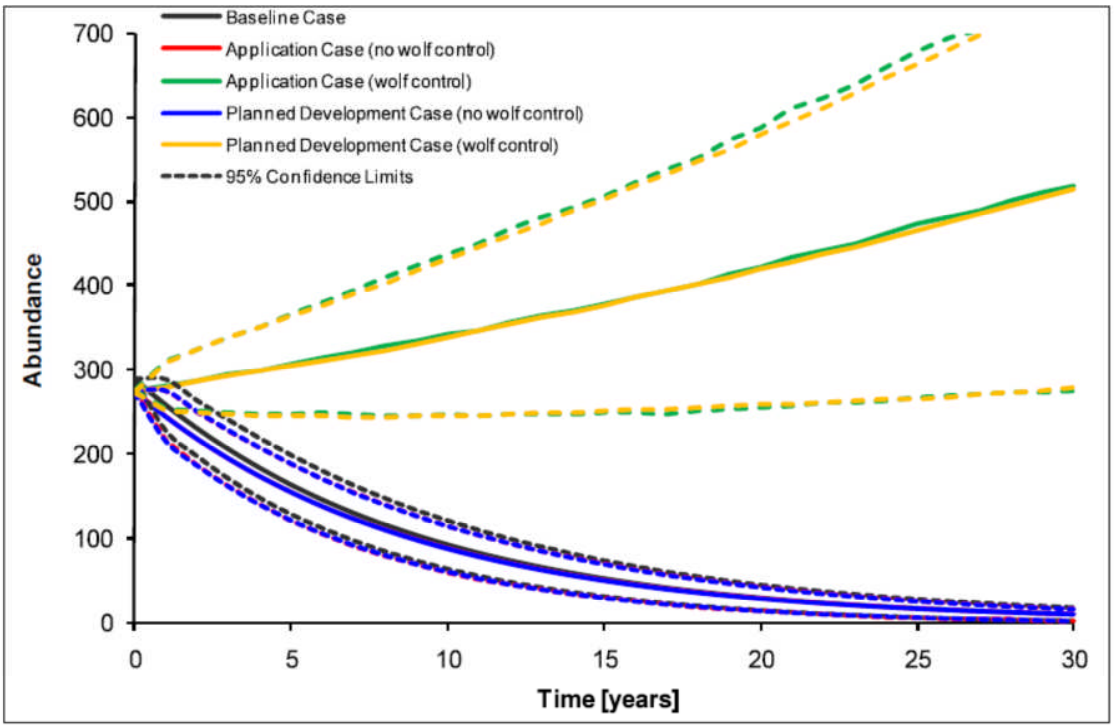

Figure 6: Result of the population viability assessment (PVA) completed by Dover on caribou population for Application Case and Planned Development Case contrast wolf control and no wolf control. (Source Figure 22; Wildlife Habitat Modelling; Appendix 5-1; Dover 2010).

Direct effects observed regionally are oil and gas wells in the WSAR caribou range that increased from less than 1000 wells prior to 1993 to greater than 2,600 by year 2000 (Latham et al. 2010). During this time period caribou numbers began to decline steadily. Prior to industrial development (e.g., oil and gas wells) in the WSAR range, caribou populations were stable. Environment Canada (2012) estimates that 69% of caribou habitat in the WSAR range has been disturbed.

Coinciding with development, Latham *et al*. (2011) found that since the mid-1990's to 2008 the density of white-tailed deer increased 17.5 fold in the southern portion of the WSAR range. White-tailed deer are Alberta's most common ungulate and have been expanding their range further northward (AESRD, 2013). Their preferred habitat is forest clearings and edges, and they adapt well to agricultural landscapes. Development within the oil sands region facilitates White-tailed deer range

expansion and population increase. White-tailed deer are the major host of the meningeal worm, *Pneumostrongylus tenuis* (Wasel *et al.*, 2003). This nematode parasite has been expanding its range as white-tailed deer expand and has now reached eastern Saskatchewan (Wasel *et al.*, 2003). Although White-tailed deer are able to live with this parasite, it is fatal in a number other ungulates, including moose and caribou.

Latham *et al*. (2011) also documented an increase in wolf densities from the mid-1990s to 2008 in these areas with high numbers of white-tailed deer, wolf densities increased from 6 wolves per 1,000 km^2 to 11.5 wolves per 1,000 km^2. This exceeds a density of 6.5 wolves per 1000 km^2 believed to be detrimental to caribou populations (Bergerud and Elliott 1986 in Latham *et al.* 2011).

Indirect effects also contribute to caribou range contraction. This occurs when forestry, oil and gas exploration, and mining activities occurs in caribou habitat (McLoughlin *et al*. 2003 in Festa-Bianchet *et al.* 2010). Caribou respond to these activities by altering habitat use and avoiding these activities. Avoidance can be over a distance of several kilometres (Festa-Bianchet *et al*. 2011). A study in Norway showed a 92% decrease in Reindeer (European name for caribou) density within 4 km of infrastructure development (Nellemann et al. 2003 in Festa-Bianchet et. al. 2011). Vors *et al.* (2007) showed that caribou do not use areas within 13 km of recent cutover and were extirpated for about 20 years within 50 km of cutovers. The likely ultimate cause of the extirpation was a result of a changed predator-prey balance.

3.2.2 Moose

For the Application Case, as with caribou, Dover indicates that if current population trends are not reversed, then moose are predicted to decline to extirpation (Section 3.4, Wildlife Habitat Modelling, Appendix 5-1, Dover 2010). Dover predicts that moose populations in the RSA will decline from approximately 1,300 moose to 200 moose in about 30 years and be near extirpation (Figure 7). The predicted decline in moose by 85% at the regional scale is described as “moderate” and “negative” for moose abundance (Section 4.3.1.1, Wildlife Assessment, Dover 2010). However, Dover predicts that if wolf control is conducted moose will steadily increase by approximately 70% in 30 years (Section 3.3.1.2, Wildlife Modelling; Appendix 5-1, Dover 2010).

Direct effects (site clearing) of the project on moose habitat loss are predicted to be “high” and “moderate” in the LSA. For indirect effects (fragmentation and sensory disturbance) the “net effect” for moose habitat loss to be “low” in a negative direction (Table 4.3-3, Wildlife Assessment, Dover 2010). However, these impacts should be considered adverse because of the high level of habitat loss due to habitat clearing. As with caribou, Dover indicates that aspects of the project will have negative effects on moose but that a regional wolf kill program conducted by AESRD is an “integral component” of their mitigation plan.

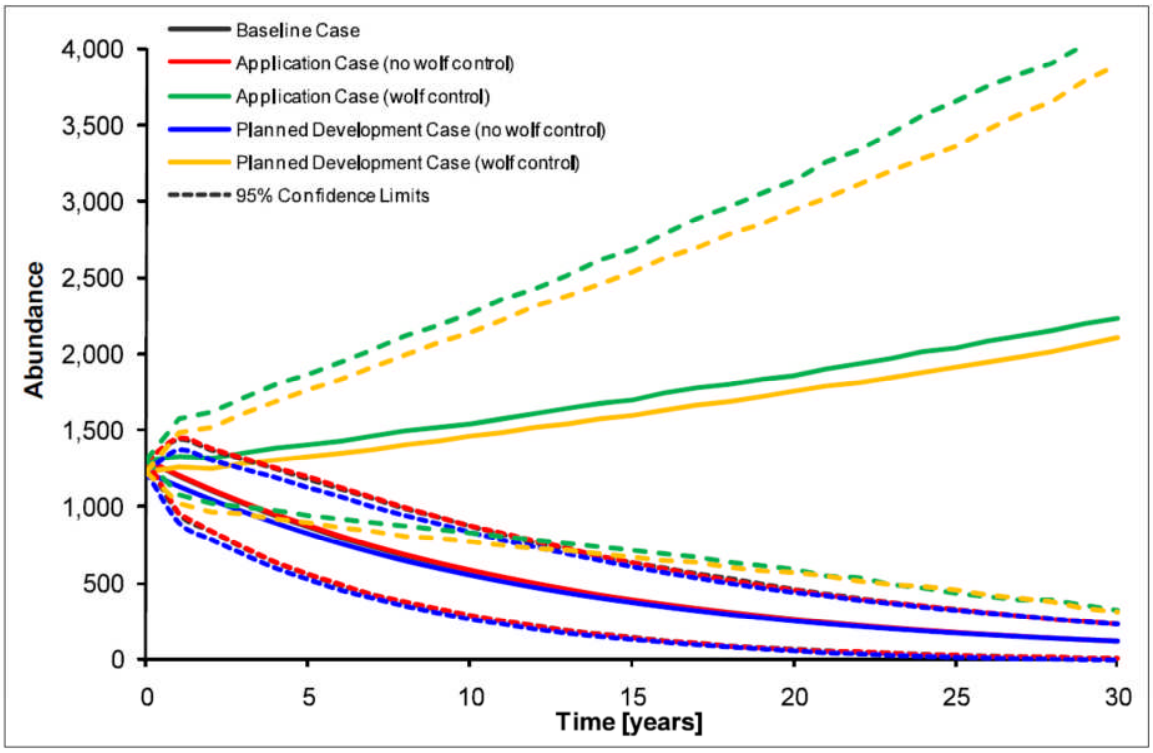

Figure 7: Result of the population viability assessment (PVA) completed by Dover on moose population for Application Case and Planned Development Case contrast wolf control and no wolf control. (Source Figure 23; Wildlife Habitat Modelling; Appendix 5-1, Dover 2010).

3.2.3 Fisher

For the Application Case during operations direct habitat loss is predicted to be "negligible" at the LSA and regional scale. Indirect impacts (sensory disturbance and fragmentation) are predicted to be "high" in LSA and "low" for the RSA. The net effect of fisher habitat loss is considered to be "high", but net effect of project on fisher abundance is predicted to be negligible. Barriers to movement are predicted to be "low" in the LSA and "negligible" in the RSA (Wildlife Assessment, Dover 2010). Dover says that effects were considered reversible after reclamation. However, all impacts are long-term and should be considered adverse.

3.3 Planned Development Case

3.3.1 Caribou

For the Planned Development Case, Dover predicts that the caribou population will decline to extirpation (Figure 6). Population projections are the same as Application Case above. The regional study area (RSA) for the Planned Development includes Fort McKay's Moose Lake Reserves.

Schneider *et al.* (2010) predicted that the WSAR (most of LSA is located in this range), the A La Peche, and the Richardson range would have a population of caribou greater than 10 animals in 60 years if current population trends continue. Schneider *et al.* (2010) concluded that with immediate action caribou populations can recover. Similar population trends were forecast by many others (Athabasca Landscape Team 2009, ASRD and ACA 2010). In a broader study, modeling completed for the Terrestrial Ecosystem Management Framework (TEMF) in 2008 found that caribou (fisher, moose, and black bear) habitat indicators were below or at the lower limit of their natural range of variation (NRV). The TEMF report indicated that aggressive steps needed to be taken immediately to preserve those indicators in the Regional Municipality of Wood Buffalo (RMWB) and recommended wildlife populations be maintained within 10% of the lower limit of NRV.

The Dover project and leases are located in the RMWB. The TEMF modeling demonstrated that the density of linear features (e.g., pipeline rights-of-way, seismic lines, etc.) is a primary driver of declines in these wildlife indicators. TEMF predicts that this trend will continue unless changes to land use are made in the oil sands regions. TEMF recommendations included establishing protected zones representing 20% to 40% of the RMWB, aggressive management of off-highway vehicle access, and improving and accelerating reclamation of the land. To date, the TEMF recommendations and Alberta's caribou policy have not been addressed in land use management for the oils sands region, and as a result, it is likely that caribou and other wildlife indicators will decline if development continues (CEMA 2008).

The Lower Athabasca Regional Plan (2012) contemplates the creation of new conservation areas covering approximately 16% of the Lower Athabasca Region, and the development of a biodiversity framework and landscape management plan in future. It is not yet known how these initiatives will coordinate with the Caribou strategy and whether they will have any effect on predicted declines of wildlife populations.

3.3.2 Moose

As with caribou and the Application Case predictions for moose, Dover indicates that for the Planned Development Case moose will decline to near extirpation (Figure 7). According to Dover, a wolf kill program will lead to an increase in the regional moose population (Figure 7). Without a wolf kill program project effects at the regional scale are described as "moderate" and "negative" for moose abundance (Section 4.3.1.1, Wildlife Assessment, Dover 2010).

Dover's predictions are similar to the modeling results completed for the Lower Athabasca Regional Plan (LARP). In the development of the LARP, the GOA used ALCES simulation modeling to evaluate planning options in the Lower Athabasca Region. The area is larger than the TEMF (RMWB) study area. Moose and fisher habitat quality were used as terrestrial wildlife indicators to assess the impacts of

development if it continued at the current rate (Baseline). Baseline assumes that foot print intensity, public policies, and market forces remain unchanged from present. The simulations measured changes from NRV. NRV provides an estimation of the between year variation of an indicator (e.g., habitat quality) without industrial activity. The computer simulations of the Baseline found that moose and fisher habitat quality declined rapidly. Moose and fisher were 30% below RNV at year 0 (2009) of the simulation into the future. Within 20 years fisher and moose habitat quality was at least 60% below the NRV. Figure 8 shows change from NRV in three different footprint reclamation rate scenarios. Fisher habitat was affected most heavily by the loss of old growth forest. Moose habitat was most affected by an increased human footprint. The increased footprint provides more access for hunters and trappers (ALCES Group 2009).

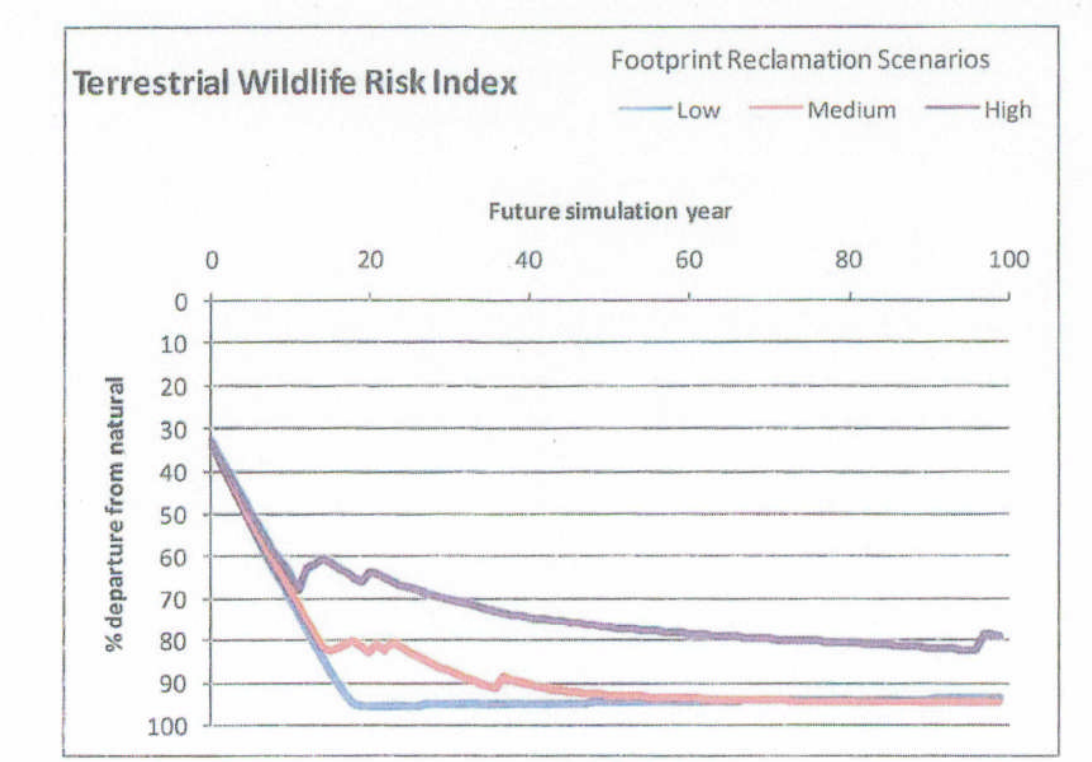

Figure 8: Simulated future response of terrestrial indicators (moose and fisher habitat) under three scenarios (low, medium, and high) of reclamation rates. High rates of reclamation reduce rate of decline.

3.3.3 Fisher

For the Planned Development Case the environmental consequence of the project on fisher abundance was negative and "moderate". The net impacts to fisher habitat were predicted to negative and "moderate". Impacts to fisher movement were predicted to be negative and "low". The net overall effects to fisher were predicted to be "moderate" (Table 4.6.-3, Wildlife Assessment, Dover 2010). Project effects

should be considered adverse because all impacts to fisher are considered to be long-term. However, much more severe and adverse effects to fisher habitat were predicted by the ALCES modeling for LARP; it predicted that within 20 years fisher habitat quality was at least 60% below the NRV (see above).

4.0 MITIGATION

Dover is required to discuss mitigation measures to minimize impacts to wildlife and wildlife habitat. "*The main mitigation for wildlife is the reclamation of disturbed areas resulting from the Project*", according to Dover (Terrestrial Resources Introduction, Section 1.5, Dover 2010). Although reclamation will benefit all wildlife, it will take a long time (e.g., >65 years, life of project). This is significant because reclamation of wildlife habitat will not be completed before the extirpation of caribou (Figure 6). In the short-term Dover indicated that a wolf kill program is required to mitigate project effects. This single mitigation is predicted to have dramatic effects on the caribou and moose populations (Figures 6 and 7). However, Dover has not provided a "level of confidence" in the EIA regarding the effectiveness and likelihood of success of wolf kill mitigation. Dover has indicated their support for this mitigation and as previously mentioned relies on it:

"Dover OPCO is supportive of a deer and wolf population management program and will work with ASRD and other industry to develop a plan for this. Dover OPCO is of the view that this type of regional mitigation strategy is the responsibility of ASRD with industry support."

Based on Dover's impact analyses the implementation of a wolf kill program by GOA is essential to maintaining caribou and moose populations. This is further emphasized by Dover's planned project mitigation for caribou. To mitigate project impacts to caribou, Dover states that "*Dover OPCO proposes to implement an on-site mitigation strategy consistent with industry best practices (BCC 2001)*". Further along in the same section of the wildlife assessment Dover acknowledges that their mitigation is inadequate (e.g., BCC 2001 Guidelines). They state *"The current approach to caribou management in caribou ranges relies on the application of the best management practices … However, their application has not prevented on-going declines in caribou populations."* (Section 4.2.3.2; Wildlife Assessment; Dover 2010; see Schneider *et al*. 2010). Dover acknowledged that the basis of their proposed mitigation (BCC 2001) has been ineffective in other areas yet they used it as a basis for their mitigation plan. Dover's conclusion about the lack of effectiveness of their proposed mitigation is supported by caribou population trend data for the population within the oil sands region (ASRD and ACA 2010) and Schneider (2010)[1]

In a review of the Dover wildlife assessment, the Fort McKay challenged Dover on this proposed mitigation. The Fort McKay stated in a request submitted to Dover "*Dover has proposed mitigation to maintain wildlife movement based on dated Alberta caribou Committee guidelines from 2001. These guidelines have not been effective in maintaining caribou populations. Fort McKay requests that Dover develop an effective mitigation plan for barriers to wildlife movement."* Dover responded to the Fort

[1] At p. 1610: "We chose to omit industrial best practices from our analysis of recovery strategies because their effects on caribou population dynamics have not been quantified. What we do know is that after 30 years of caribou management involving industry guidelines, best practices, and various restrictions on activities, Alberta's woodland caribou are now closer to extirpation than they ever have been (Hervieux et al., 1996; Environment Canada, 2008)".

McKay request with the following response "*Dover OPCO will be developing monitoring and mitigation programs in consultation with ESRD as conditions of the approval for the Project.*" Dover did not adequately respond to the Fort McKay request and provide an effective mitigation plan.

The AESRD requested clarification on Dover's mitigation plan for moose and caribou in the first round of the supplementary information request (SIR1). AESRD wrote this request:

> *"Dover states that the assessment of moose and woodland caribou assumes that a regional predator management program will be put in place as an integral component of the mitigation plan. As stated in the Draft woodland caribou Policy Framework for Alberta, the provincially recognized priorities for caribou management may include predator and alternate prey management. This plan, however, will be overseen by the provincial government and will require industry support.*
>
> *a) Discuss whether Dover would consider becoming the industry lead to support the management of caribou at a regional scale, and explain why they would or would not undertake this."*

The response from Dover was "*Dover OPCO has no authority to manage wildlife in Alberta. ASRD has the authority to develop plans and management strategies for wildlife. Dover OPCO will participate in regional multi-stakeholder initiatives for management of caribou."* (SIR 1 183, Dover 2011).

In Round 2 of the SIRs, AESRD clarified SIR 1 183 and, again, asked Dover if they would consider being an industry lead in support of caribou management. Dover indicated that they were "*supportive of a deer and wolf population management program and would be willing to lead from an industry standpoint*" (SIR 2 42, Dover 2012).

Since the completion of the EIA, Environment Canada developed a recovery strategy for caribou (EC 2012) and the Alberta Government has developed a caribou policy. In addition, new "best management guidelines" were published by GOA (2011) and AESRD has developed new standards (Enhanced Approval Process) and guidelines for aboveground pipeline crossings (GOA 2013).

Alberta has not announced any plans or programs for implementation of its 2011 Caribou Policy. The Oil Sands Leadership Initiative (OSLI) is currently studying the *possible* development of a predator exclosure for caribou protection and caribou habitat restoration. OSLI is a collaborative network between ConocoPhillips Canada, Nexen Inc., Shell Canada, Statoil Canada, Suncor Energy Inc. and Total E&P Canada" (http://www.osli.ca/; accessed on March 22, 2013)

Schneider *et al.* (2010) ranked the WSAR caribou range as high on the likelihood of success for caribou conservation but immediate action is required. Proposed actions to conserve caribou populations are:

- Reducing Development

- Habitat Restoration
- Predator and Prey Management

These actions must occur concurrently for caribou recovery. Thus a predator exclosure should also be free of any development.

Dover states that the current state of knowledge on woodland caribou ecology suggests that a regional habitat enhancement plan, ungulate and predator monitoring and a predator management program are necessary to save woodland caribou in the RSA (Athabasca Landscape Team 2009; Schneider *et al*. 2010) (see Section 4.4.1.2, Wildlife Assessment, Dover 2010). Reducing development and a wolf kill program will provide almost immediate improvement to caribou recovery (e.g., Smokey River Herd) (ASRD and ACA). However, habitat restoration is still an "urgent" action because it is essential to provide ecological conditions that will eventually prevent the need for a continuing a wolf kill program.

Dover's caribou and moose mitigation relies entirely on a wolf kill program that is the responsibility of AESRD and thus not Dover's mitigation. Enquiries to AESRD indicate that a wolf kill program in the oil sands is not being planned in the near future. Dover has no control over the implementation of wolf kill and it should not be considered mitigation. A wolf kill program will likely not have public support (see Schneider *et al.* 2010). To gain public support for such a program, AESRD will likely need to show compelling evidence that all aspects of a caribou recovery strategy are being implemented (i.e., habitat restoration by industry) and a significant reduction in development.

5.0 OTHER WILDLIFE SPECIES AT RISK

The TOR requires that Dover describe Species at Risk that are found in the project LSA (Table 1). To assess project impacts to these vulnerable species five representative KIRs were selected. These species were woodland caribou, moose, fisher, Canada warbler, yellow rail, rusty blackbird, and Canadian toad. The following section summarizes impacts to Canada warbler, yellow rail, rusty blackbird and Canadian toad. Species at Risk that were not adequately assessed for project impacts by the Dover EIA or subsequent SIRs are identified below. Proper impact assessment and mitigation plan are necessary to evaluate whether or not a project will have an adverse effect on these vulnerable species. The beaver is also included because it is a Cultural Keystone species and CEMA Priority 2 wildlife species (Westworth 2002). Fort McKay asked Dover to include beaver in its assessment.

5.1 Canada Warbler

No Canada warblers were observed in the LSA during breeding bird surveys yet this species was reported in 10 other oil sands wildlife studies (Attachment E, Wildlife Baseline Report, Dover 2010). For the Application Case the direct effects of the project for Canada warbler habitat loss in the LSA was predicted to be "moderate" for direct effects (site clearing) and "high" for indirect effects (fragmentation and sensory disturbance) with a "net effect" for Canada warbler habitat loss to be "high" in a negative direction.

For the Planned Development Case the habitat loss for Canada warbler habitat loss in the RSA is predicted to be "moderate" in a negative direction.

This species has been observed in 10 other wildlife studies in the oil sands region but was not detected in the LSA. It is likely that Canada warblers do not inhabit the LSA. Because Canada warblers may not inhabit the LSA, this species should not have been selected as a KIR.

5.2 Yellow Rail

One yellow rail was observed during wildlife surveys. Direct effects of the project for yellow rail habitat loss in the LSA was predicted to be "moderate" for direct effects (site clearing) and "high" for indirect effects (fragmentation and sensory disturbance) with a "net effect" for yellow rail habitat loss to be "high" in a negative direction. Impacts to habitat for this species are considered "irreversible" (Table 4.3.4, Wildlife Assessment, Dover 2010).

For the Planned Development Case the habitat loss for yellow rail in the RSA is predicted to be "moderate" in a negative direction.

Predictions for this species should be interpreted with caution: results are difficult to verify because observations are infrequent. In addition, predicted impacts to this species habitat are "irreversible" and thus should be considered adverse.

5.3 Rusty Blackbird

No rusty blackbirds were observed during field surveys. Direct effects of the project for rusty blackbird habitat loss in the LSA was predicted to be "moderate" for direct effects (site clearing) and "high" for indirect effects (fragmentation and sensory disturbance) with a "net effect" for rusty blackbird habitat loss to be "high" in a negative direction.

For the Planned Development Case the habitat loss for rusty blackbird in the RSA is predicted to be "moderate" in a negative direction.

Predictions for this species should be interpreted with caution because results are difficult to verify due to infrequent observations. In addition, impacts to this species habitat are "irreversible" and should be considered adverse.

5.4 Canadian Toad

One Canadian toad was observed during field surveys. Direct effects of the project for Canadian toad habitat loss in the LSA was predicted to be "negligible" for direct effects (site clearing) and "low" for indirect effects (fragmentation and sensory disturbance) with a "net effect" for Canadian toad habitat loss to be "low" in a negative direction.

For the Planned Development Case the habitat loss for Canadian toad in the RSA is predicted to be "low" in a negative direction.

Predictions for this species should be interpreted with caution because results are difficult to verify due to infrequent observations.

5.5 Little Brown and Northern Myotis

Little brown myotis and northern myotis were listed as endangered by COSEWIC in February 2012. Further, the northern myotis is listed as "may be at risk" provincially. Dover captured 43 little-brown myotis (little brown bats) and 19 northern myotis (northern long-eared bats) were captured during mist netting. Potential project effects (e.g., disturbance and habitat loss) indicate that these endangered species should have been selected as KIRs.

5.6 Olive-sided Flycatcher

Olive-sided flycatcher was designated threatened by COSEWIC in November 2007 and subsequently listed SARA Status: Schedule 1, Threatened. Provincially the olive-sided flycatcher designation has been changed and it is now listed as "may be at risk". In Dover's EIA, this species is listed as secure at the provincial level (Table 1). Three olive-sided flycatchers were observed during surveys completed by Dover. Olive-sided flycatchers breed in semi-open areas coniferous and mixed wood forests near edges and openings and often near water. Tall trees and snags in open areas are used for singing and perching (FAN 2007). Dover did not select a KIR that would allow an adequate assessment of impacts to this threatened species.

5.7 Short-eared Owl

Short-eared owl was designated Special by COSEWIC in April 2008 and subsequently listed SARA Status: Schedule 1, Special Concern. This species breeds in open habitats. Short-eared owls hunt in these same areas during the day or night (FAN 2007). The owl surveys and other surveys used by Dover are not designed to detect presence of short-eared owls.

Table 1: Species and bird communities of Special Concern observed within the Local Study Area. Source (Wildlife Baseline, Table 24: Dover 2010).

Species[a]	National Status[b]	Provincial Status[c]
Mammals		
beaver	Not at Risk	Secure
black bear	Not at Risk	Secure
Canada lynx	Not at Risk	Sensitive
fisher	n/a	Sensitive
hoary bat	n/a	Sensitive
moose	n/a	Secure
northern long-eared bat	n/a	May Be at Risk
red bat	n/a	Sensitive
silver-haired bat	n/a	Sensitive
wolverine	Special Concern	May Be at Risk
woodland caribou	Threatened[d]	At Risk
Birds		
American bittern	n/a	Sensitive
American white pelican	n/a	Sensitive
barred owl	n/a	Sensitive
bay-breasted warbler	n/a	Sensitive
black-throated green warbler	n/a	Sensitive
brown creeper	n/a	Sensitive
Cape May warbler	n/a	Sensitive
common nighthawk	Threatened[d]	Sensitive
common yellowthroat	n/a	Sensitive
great grey owl	Not at Risk	Sensitive
least flycatcher	n/a	Sensitive
olive-sided flycatcher	Threatened[d]	Secure
pileated woodpecker	n/a	Sensitive
sandhill crane	Not At Risk	Sensitive
sora	n/a	Sensitive
yellow rail	Special Concern	Undetermined
Amphibians		
boreal toad	Special Concern[d]	Sensitive
Canadian toad	Not at Risk	May Be at Risk

(a) Italicized entries are ratified CEMA-SEWG wildlife indicators for long-term monitoring.

(b) Species at Risk Public Registry (2010, internet site).

(c) ASRD (2006, internet site).

(d) Listed on Schedule 1 of SARA (Species at Risk Public Registry 2010, internet site).

n/a = Not applicable.

5.8 Horned Grebe

Horned grebe was designated as Special Concern by COSEWIC in April 2009. Horned grebes breed in shallow ponds and marshes. Their nests are built in emergent vegetation at the edge of water bodies (FAN 2007). Dover did not complete adequate surveys to detect this species. In addition, Dover did not select a KIR that would provide an adequate assessment of impacts to this Species at Risk.

5.9 Common Nighthawk

Common nighthawk was designated as threatened by COSEWIC in April 2007 and subsequently listed under SARA: Schedule 1, Threatened. Ten common nighthawks were observed during baseline surveys. Common nighthawks nest in open areas near logs, boulders, grassy clumps, and shrubs. They use open areas for foraging near dusk and dawn (FAN 2007). This species occurs in the LSA, yet Dover did not select a KIR that would provide an adequate assessment of impacts to this threatened species.

5.10 Western Toad

Western toad was assessed by COSEWIC in November 2012 and is listed SARA: Schedule 1, Special Concern. In the most recent assessment, COSEWIC divided the population into calling and non-calling populations. Two western toads (boreal toad) were observed during baseline surveys. Dover did not select a KIR that would allow an adequate assessment of impacts to this Species at Risk. In addition, Dover did not discuss the likelihood of the presence of a non-calling population or attempt to survey for this population.

5.11 Beaver

The Fort McKay formally requested that Dover include beaver as a KIR in a Statement of Concern that was provided to Dover. Dover responded by stating

"*Beavers were included in the baseline data collection process for the Project. Fishers were included as the aquatic mammal in the KIR list (rather than beaver) due to their provincial status as sensitive, their ecological importance as a carnivore, and their traditional and economic importance. Fishers are considered to be potentially more sensitive to development activities and thus a more appropriate species on which to evaluate project impacts."* (Dover2012c).

Dover's response is incorrect. Fishers are not aquatic mammals. They inhabit upland and lowland forests, including coniferous, mixed, and deciduous forests and occur primarily in dense coniferous or mixed forests, including early successional forest with dense overhead cover. Fisher diet consists primarily of mammals (small rodents, shrews, squirrels, hares, muskrat, beaver, porcupine, raccoon, deer carrion); also birds, other small animals, carrion, and fruit (NatureServe 2013). It is appropriate to select fisher as a KIR; however, it is incorrect to suggest that a fisher is an aquatic mammal and can be used as a replacement for beaver.

Dover indicated that for federally listed species that were not selected as KIRs, project effects can be inferred through the effects to other Wildlife (presumably KIRs) or Terrestrial Vegetation, Wetlands and Forestry KIRs. (Section 4.2.2, Wildlife Assessment, Dover 2010). The Terrestrial Vegetation, Wetland and Forestry KIRs were riparian communities, old growth forests, and peatlands (Section 1.3-1, Terrestrial Assessment, Dover 2010). The vegetation, wetland, and forestry KIRs are inadequate to assess Species at Risk as they do not provide the habitat detail required to describe and assess impacts (e.g., critical habitat loss). Species at Risk such as olive-side flycatchers, which breed in semi-open areas of coniferous and mixed wood forests near edges and openings, often near water, and use tall trees and snags in open areas for singing and perching (FAN 2007). The olive-sided flycatcher would potentially be included in multiple Terrestrial KIRs such as "riparian communities" and "wetlands". To accurately assess impacts to olive-sided flycatchers, specific habitat models and not broad KIRs would be required. For the Jackpine Mine EIA, Shell developed habitat models for olive-sided flycatchers and other Species at Risk (Golder 2012).

In SIR Round 1-199, ESRD requested that Dover select an additional three to six KIRs (Dover 2011). Dover declined to do so. Dover's response to SIR I-199 was

> "*KIRs were selected carefully using appropriate selection criteria, including their ability to serve as an indicator of environmentally important effects that the Project may have. The relative importance of species listed under the federal Species at Risk Act (SARA) has recently increased based on feedback received from Environment Canada"* (Dover 2011).

Dover acknowledged the increased importance of SARA species yet they did not conduct supplemental surveys to quantify common nighthawk use of the LSA, assess impacts to olive-sided flycatcher and others, or even re-visit their existing data to assess impacts to Species at Risk that will likely become SARA listed (e.g., little brown myotis and northern myotis). It would have been minimal effort to review mist-net capture data to determine the presence of white-nosed syndrome (WNS) which has contributed to the "Endangered" listing of little brown myotis and northern myotis. To date, WNS has been recorded in four provinces and is expanding at an average rate range of 200-400 km/year, to date. It is believed that the entire Canadian population would likely be impacted within 11-22 years (http://www.cosewic.gc.ca/: accessed on March 8, 2013).

All Species at Risk should have been included as KIRs for assessment of project impacts. The Species at Risk Act (SARA) was developed to prevent wildlife species in Canada from disappearing, to provide for the recovery and management of wildlife species that are at risk (endangered, threatened, or special concern). Wildlife species are listed under SARA because there is concern about the species populations and habitat. SARA makes it an offence in sections 32 and 33 to:

> *Damage or destroy the residence of one or more individuals of a listed endangered or threatened species or of a listed extirpated species if a recovery strategy has recommended its reintroduction*. A residence is defined as "*a dwelling-place, such as a den, nest or other similar area or place that is occupied or habitually occupied by one*

> *or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating."*
> *www.registrelep.gc.ca/archives/Guide_e.cfm#13)*

Dover acknowledged the importance of SARA Schedule 1 listed species but did not assess impacts to all SARA Schedule 1 list species. The intent of the TOR requiring that Species at Risk being identified is so mitigation can be applied and critical habitat can be avoided through careful project planning. EIAs need to be dynamic documents that are frequently updated as new information becomes available (e.g., wildlife status changes). For example, Shell Canada has continually updated the Jackpine Mine EIA and expanded their work to include many SARA species such as the olive-sided flycatcher, common nighthawk, and short-eared owl (Golder 2012). Dover has not updated their 2010 EIA to include additional assessment on any Species at Risk. Moreover, Dover refused to expand the number of KIRs included in their EIA, despite being asked to do so by AESRD.

6.0 SUMMARY

Dover has predicted in their Application Case and their Planned Development Case that in the absence of a wolf kill program caribou will be extirpated from the RSA within 30 years. Moreover, caribou habitat loss in the LSA is predicted to be "moderate" for direct effects and "high" for indirect effects. Net effects of caribou habitat loss are "high", "negative", and "irreversible" (Dover 2010). Surprisingly, Dover has then predicted that this Project will have a "high positive" environmental consequence for woodland caribou, provided AESRD implements a wolf kill program (Table4.3-1, Wildlife Assessment, Dover 2010). If a wolf kill program does take place, any positive consequences to caribou populations would be independent of Dover's Project.

The Terms of Reference (TOR) state that Dover must "*discuss mitigation measures to minimize the potential impact of the Project on wildlife and wildlife habitat. Clearly identify those mitigation measures that will be implemented and provide the rational for their selection.*" Dover has stated that predator management is an "integral component" of their mitigation plan. However, a regional wolf kill program is speculative, independent of this Project, and will not be implemented by Dover.

There are many mitigation measures that Dover can implement (i.e., immediate habitat restoration). Dover stated that it would use mitigation guidelines developed by the Boreal Caribou Committee in 2001 that have since been shown to be clearly ineffective. Dover did not update or improve their mitigation plan to reduce impacts to caribou. Dover relies primarily on a wolf kill program that may or may not be undertaken and implemented by AESRD.

Caribou, wolves, moose, and First Nations have co-existed for many years, but in recent years things have changed causing a decline in caribou populations. Latham *et al.* (2011) completed an analysis that showed that wells in the WSAR caribou range increased from <1000 wells prior to 1993 to >2,600 by 2000. Environment Canada (2012) estimated that 69% of caribou habitat in the WSAR range has been disturbed. Contributing factors to habitat alteration are oil and gas development, forestry, and forest fires. Evidence supports that these habitat alterations have led to a change in the predator-prey balance (Festa-Bianchet *et al.,* 2010). Supporting this Latham *et al*. (2011) documented an increase in both wolf and white-tailed deer populations in the south part of the WSAR range. However, Dover's proposed Project is in the north part of the WSAR range and their wildlife surveys found no white-tailed deer, low wolf densities, , and high woodland caribou densities (Dover 2010). This suggests that the habitat alterations that have occurred in the southern portion of the WSAR range have not yet affected the northern porton. In addition, Dover observed a high cow: calf ration and indicated that the proposed Project area likely serves as an important refuge for caribou (Dover 2010). The data provided by Dover supports the importance of the Project area for conservation of caribou, moose, and other wildlife species.

Industrial development in the south portion of the WSAR range and south of the Dover project is strongly correlated with caribou population declines and increases

in white-tailed deer and wolf populations. It is reasonable to conclude that allowing additional development in the north portion of the WSAR will contribute to the range and population expansion of white-tailed deer from the south followed by a subsequent increase in wolf density. The Dover project will add industrial development to within 1.5 km of IR174a and IR174b. The change in wildlife composition and population that has been observed with oil and gas development in northern Alberta will occur on the Dover lease with development, and these impacts will likely extend to the Reserve lands and should be considered an adverse effect. If a wolf kill program is implemented in the region it will need to include the land surrounding Reserve lands and that should also be considered an adverse effect.

Since the completion of the Dover EIA there have being significant changes to wildlife status (provincial and federal), updated best management practices, caribou policies and recovery strategies, and EIA requirements. With regards to the changes in the status of wildlife species, COSEWIC listed little brown myotis and northern myotis as endangered, the western toad was divided into calling and non-calling populations, and provincially the olive-sided flycatcher is now designated as "may be at risk". Dover has had the opportunity to revisit data (i.e. bat mist net capture data) and, if required, conduct additional wildlife surveys (e.g., for common nighthawk) but has chosen not to do so.. AESRD requested an additional three to six KIRs in SIR Round 1. Again, Dover chose not to update their EIA and did not add KIRs as requested. The GOA updated best management practices including guidelines for aboveground pipeline crossings, which were not incorporated into Dover's mitigation plan.

Proponents are required to describe how they will address the requirements outlined in *A Woodland Caribou Policy for Alberta* and the *Recovery Strategy for the Woodland Caribou, Boreal population (Rangifer tarandus caribou) in Canada* (GOA 2013). Both of these documents identify conservation offsets, project deferrals, no development zones, and protected areas as possible management strategies. (GOA 2013). Dover has empirically shown that the LSA is a caribou refuge and is important in the recovery of this threatened species. Avoiding surface impacts in this area will assist in caribou recovery, meet government policy and management strategies, and benefit other wildlife species.

7.0 CONCLUSION

The ERCB is tasked with deciding whether the project is in the public interest, having regard to the environment, economic and social effects of the project. This project has adverse effects to the environment because of its negative impacts to the threatened woodland caribou and other wildlife "at risk". Moreover, the proponent's only mitigation to reduce negative impacts to caribou is a predator management program that would have to be approved and implemented by AESRD. Economic effects of this project are not assessed in this report. However, the negative effects of a wolf kill program on the Alberta economy should be contemplated because of the likely negative response of the public.. Finally, there are social implications to Fort McKay, whose community members use wildlife and have Reserve land within 1.5 km of the project which will be adversely affected. . Based on these concerns, this project should be deemed not in the public interest and therefore, should not be approved.

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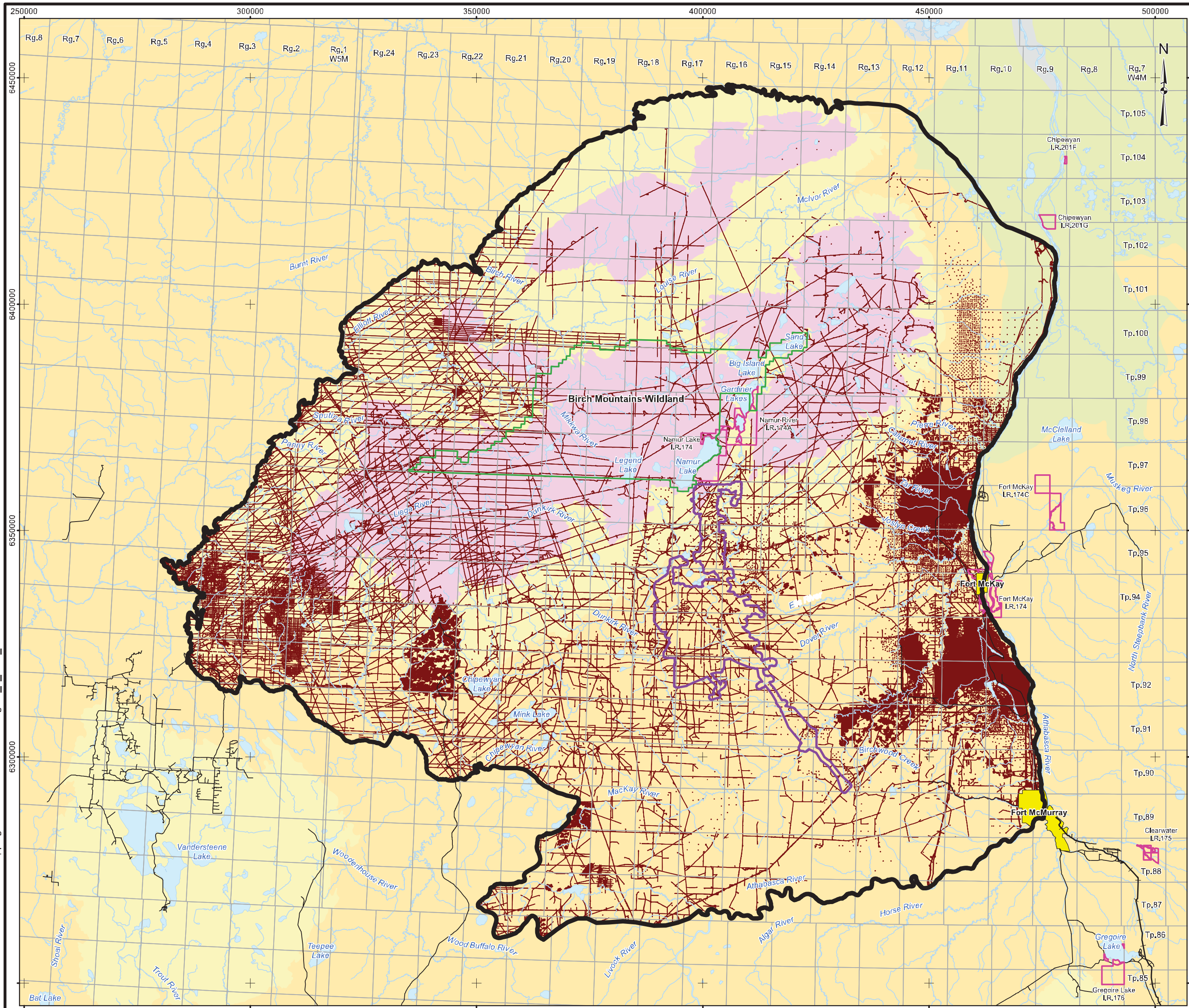
Appendix I
RSA and LSA Maps

I:\CLIENTS\AOSC\09-1346-1011\mapping\mxd\Volume5\Section1\Fig1-2_1_RSA_TerrestrialResources.mxd



LEGEND

- TERRESTRIAL REGIONAL STUDY AREA
- TERRESTRIAL LOCAL STUDY AREA
- COMMUNITY
- INDIAN RESERVE
- OPEN WATER
- WATERCOURSE
- ROAD
- RAILROAD

DISTURBED

- EXISTING AND APPROVED URBAN AND INDUSTRIAL DISTURBANCE
- EXISTING AND APPROVED URBAN AND INDUSTRIAL LINEAR DISTURBANCE

NATURAL SUBREGIONS

- ATHABASCA PLAINS
- CENTRAL MIXEDWOOD
- LOWER BOREAL HIGHLANDS
- PEACE-ATHABASCA DELTA
- UPPER BOREAL HIGHLANDS

REFERENCE

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20 0 20
SCALE 1:850,000 KILOMETRES

PROJECT
DOVER COMMERCIAL PROJECT

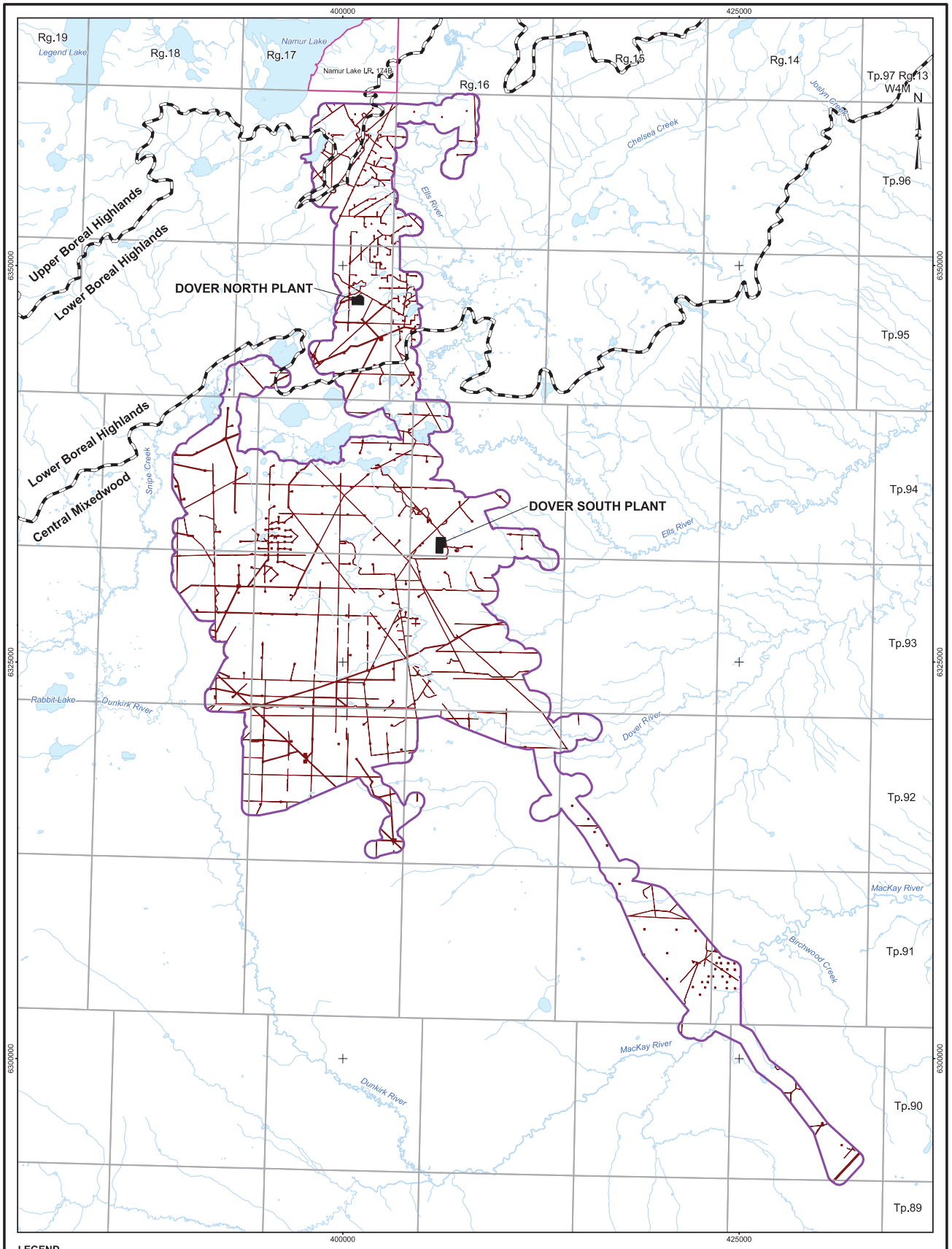
TITLE
TERRESTRIAL RESOURCES STUDY AREAS

DOVER Operating Corp.

PROJECT		09-1346-1011	FILE No.	
DESIGN	AD	08 Feb. 2010	SCALE AS SHOWN	REV. 0
GIS	JH	12 Nov. 2010		
CHECK	SM	10 Dec. 2010		
REVIEW	SM	10 Dec. 2010		

FIGURE: 1.2-1

I:\CLIENTS\AOSC\09-1346-1011\mapping\mxd\Volume5\Section1\Fig1-2_2_LSA_TerrestrialResources.mxd



LEGEND

- NATURAL SUBREGION
- TERRESTRIAL LOCAL STUDY AREA
- INDIAN RESERVE
- OPEN WATER
- WATERCOURSE

DISTURBED

- EXISTING AND APPROVED URBAN AND INDUSTRIAL DISTURBANCE
- EXISTING AND APPROVED URBAN AND INDUSTRIAL LINEAR DISTURBANCE

5 0 5

SCALE 1:225,000 KILOMETRES

REFERENCE

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DATUM: NAD83 PROJECTION: UTM ZONE 12

PROJECT

DOVER COMMERCIAL PROJECT

TITLE

TERRESTRIAL LOCAL STUDY AREA

DOVER Operating Corp.

PROJECT		09-1346-1011	FILE No.	
DESIGN	AD	12 Oct. 2010	SCALE AS SHOWN	REV. 0
GIS	JH	12 Nov. 2010	**FIGURE: 1.2-2**	
CHECK	SM	10 Dec. 2010		
REVIEW	SM	10 Dec. 2010		