WILDLIFE

Fort McKay
Specific Assessment

Fort McKay
Industry Relations Corporation

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Contents

6.0 WILDLIFE 1

6.1 Fort McKay Key Concerns Related to Wildlife 1
6.2 Fort McKay Specific Assessment Approach for Wildlife 1

6.2.1 Introduction 1
6.2.2 Information Sources 4
6.2.3 Data and Information Limitations 4
6.2.4 Wildlife Study Areas 5
6.2.5 Stressors on Wildlife Habitat and Populations 6
6.2.6 Wildlife Indicators 7
6.2.7 Wildlife Assessment Criteria 7
6.2.8 Fort McKay's Healing the Earth Strategy 11

6.3 Moose 12

6.3.1 Pre-Development Large Game CSE 12
6.3.2 Forty Township Study Area (FTSA) 15
6.3.3 Moose Habitat Assessment 15
6.3.4 Moose Population Assessment 22
6.3.5 Moose Population 22

6.4 Beaver 24

6.4.1 Pre-Development Fur Bearers CSE Area 24
6.4.2 Forty Township Study Area (FTSA) 24
6.4.3 Beaver Habitat Impact Assessment 24

6.5 Canada Lynx 33

6.5.1 Pre-Development Fur Bearers CSE Area 33
6.5.2 Forty Township Study Area (FTSA) 34
6.5.3 Canada Lynx Habitat Impact Assessment 34

6.6 Fisher/Marten 43

6.6.1 Pre-Development Fur Bearers CSE 43
6.6.2 Pre-Development FTSA 44
6.6.3 Fisher/Marten Habitat Impact Assessment 44

6.7 Conclusions and Significance Assessment 53
6.8 Shell's Proposed Mitigation and Monitoring 55
6.9 Fort McKay's Recommendations 56
6.10 References 57

Figures

Figure 6-1: Moose Habitat Suitability in the Large Game Culturally Significant Ecosystem Area 13
Figure 6-2: Moose Density Estimates From Surveys Conducted in Fort McKay's Traditional Lands..... 22
Figure 6-3: Moose Population Estimates for WMU 531 with 30% Error Bars..... 23
Figure 6-4: Beaver Habitat Suitability in the Furbearer Culturally Significant Ecosystem Area 25
Figure 6-5: Canada Lynx Habitat Suitability in the Furbearer Culturally Sensitive Ecosystem Area 35
Figure 6-6: Fisher/Marten Habitat Suitability in the Furbearer Culturally Sensitive Ecosystem Area 45

Tables

Table 6-1: Wildlife Impact Ranking Table 9
Table 6-2: Status Level, Environmental Consequence and Conditions with Expected Actions 11
Table 6-3: Habitat Suitability Classes for Moose within the Intense, Moderate and Low Use areas of the Culturally Significant Ecosystems..... 12
Table 6-4: Changes in Moose Habitat within the Intense Use CSE for Each Development Case Compared to Pre-Development Scenario 15
Table 6-5: Changes in Moose Habitat within the Moderate Use CSE Area for Each Development Case Compared to Pre-Development Scenario 17
Table 6-6: Changes in Moose Habitat within the Low Use CSE for Each Development Case compare to Pre-Development Scenario..... 18
Table 6-7: Changes in Moose Habitat within the FTSA for Each Development Case Compared to Pre-Development Scenario 20
Table 6-8: Wildlife Habitat Assessment Environmental Consequences for Moose by Study Areas and Development Scenario and Case 21
Table 6-9: Moose Populations Estimates of Wildlife Management Units (WMU) Located in the Oil Sands Region 23
Table 6-10: Habitat Suitability Classes for Beaver within the Intense, Moderate and Low Use Culturally Significant Ecosystems 24
Table 6-11: Changes in Beaver Habitat within the Intense Use CSE Area for Each Development Case Compared to Pre-Development Scenario 27
Table 6-12: Changes in Beaver Habitat within the Moderate Use CSE Area for Each Development Case compared to Pre-Development Scenario 28
Table 6-13: Changes in Beaver Habitat within the Low Use CSE for Each Development Case compared to Pre-Development Scenario 30

Table 6-14: Changes in Beaver Habitat within the FTSA for Each Development Case compared to Pre-Development Scenario 31
Table 6-15: Wildlife Habitat Assessment Environmental Consequences for Beaver by Study Areas and Development Scenario and Case 33
Table 6-16: Habitat Suitability Classes for Canada Lynx within the Intense, Moderate and Low Use areas of the Culturally Significant Ecosystems 33
Table 6-17: Changes in Canada Lynx Habitat within the Intense Use CSE Area for Each Development Case Compared to Pre-Development Scenario 34
Table 6-18: Changes in Canada Lynx Habitat within the Moderate Use CSE for Each Development Case compared to Pre-Development Scenario 38
Table 6-19: Changes in Canada Lynx Habitat within the Low Use CSE Area for Each Development Case compared to Pre-Development Scenario 40
Table 6-20: Changes in Canada Lynx Habitat within the FTSA for Each Development Case compared to Pre-Development Scenario 41
Table 6-21: Wildlife Habitat Assessment Environmental Consequences for Canada Lynx by Study Areas and Development Scenario and Case 43
Table 6-22: Habitat Suitability Classes for Fisher and Marten within the Intense, Moderate and Low Use areas of the Culturally Significant Ecosystems 43
Table 6-23: Changes in Fisher and Marten Habitat within the Intense Use CSE Area for Each Development Case Compared to Pre-Development Scenario 44
Table 6-24: Changes in Fisher and Marten Habitat within the Moderate Use CSE for Each Development Case Compared to Pre-Development Scenario 48
Table 6-25: Changes in Fisher and Marten Habitat within the Low Use CSE for Each Development Case Compared to Pre-Development Scenario 50
Table 6-26: Changes in Fisher and Marten Habitat within the FTSA for Each Development Case Compared to Pre-Development Scenario 51
Table 6-27: Wildlife Habitat Assessment Environmental Consequences for Fisher/Marten by Study Areas and Development Scenario and Case 53
Table 6-28: Wildlife Habitat Assessment Environmental Consequences by Study Areas and Development Scenario and Case 54

6.0 Wildlife

6.1 Fort McKay Key Concerns Related to Wildlife

Wildlife is an integral part of the Fort McKay's culture. Since the start of industrial development (late 1960s), the Community of Fort McKay has observed the transformation of some of their Traditional Lands from boreal forest and wetlands into oil sands open pit mines, in-situ operations, and associated infrastructure. The environmental impact assessments (EIAs) prepared by oil sands operators and proponents repeatedly claim that these developments will have little impact on wildlife populations and their habitats because reclamation will return the land to a productive state. However, there is a substantial time lag (in many cases decades) between the initial disturbance and the completion of wildlife habitat reclamation, and for that period of time the wildlife populations and habitats that sustain them are unavailable to Fort McKay. Additionally, Fort McKay community members remain skeptical of future reclamation success and whether reclamation will result in the restoration of key boreal forest habitats that support their traditional uses. Furthermore, the community believes that development already has negatively affected certain wildlife populations.

Fort McKay community members are also concerned about the effect of industrial pollution on wildlife health and the quality of wild meat. This concern has deterred some community members from hunting near development areas. Other members of the community have indicated that they no longer eat moose because of concerns that the moose have been affected by pollution. Fort McKay community members have also noted that with the increasing number of oil sands workers in the area the moose have become habituated to people and are no longer wary of traffic or hunters (Fort McKay IRC 2010a).

Wildlife species are an integral component of many activities that help define the Fort McKay community's cultural values (Fort McKay IRC 2010a). Wildlife species are important as a food source but also as part of the Fort McKay's traditional economy (e.g., furbearer pelts). Moose hides continue to be used for the making of ropes, gloves, and moccasins.

The moose and beaver are considered Cultural Keystone species for the Community of Fort McKay (Garibaldi 2006). Canada lynx, fisher, and marten are furbearers are vital to the Fort McKay's traditional economy.

6.2 Fort McKay Specific Assessment Approach for Wildlife

6.2.1 Introduction

Fort McKay is not convinced that environmental impact assessments (EIAs) completed within their traditional land use (TLU) area have adequately reflected

changes to the land and the negative effects of these changes. There is frustration that observations made by Fort McKay members who spend many hours in the bush (e.g., hunters and trappers) are not taken seriously and are not incorporated into the EIAs. There is also concern that EIA's often base conclusions solely on habitat suitability index (HSI) models or other computer models, rather than on the empirical field data.

A major concern is that EIAs frequently conclude that impacts to wildlife habitat will be negligible because it is assumed that reclamation will reestablish lost habitat for wildlife species. Because impacts are assumed to be negligible on a local scale (i.e., local study area), it is viewed as unnecessary to complete an adequate cumulative effects assessment on impacts to wildlife habitat and populations on a regional scale (i.e., regional study area). However, such conclusions depend upon the ability of proponents to reclaim the land and to do so such that key wildlife habitats are reestablished. See ***Section 10 – Reclamation*** for a detailed analysis and discussion of reclamation issues.

To help address some of these issues the Fort McKay Specific Assessment (FMSA) approach includes the following:

- The computer models used are resource selection function (RSF) models provided by Shell Canada Limited (Shell) and used in the EIA (Shell 2007), which incorporate wildlife observations into the models. Thus, these RSF models are intrinsically linked to the empirical baseline data. The one exception to this is the habitat model used to assess impacts to beaver habitat because an RSF model was not available for this species.

- The wildlife assessment considers impacts to land used by Fort McKay for traditional activities. Specifically, Culturally Sensitive Ecosystems (CSE) that identify areas of Intense, Moderate and Low traditional use for a variety of key resources (e.g., large game, furbearers) (Fort McKay First Nations 1994, McKillop 2002)[1]. This provides an indication of how proposed developments may affect Fort McKay's opportunities to conduct hunting, trapping and other traditional activities.

- Effects are measured against pre-development wildlife habitat levels to assess the cumulative effects of development on Fort McKay's Traditional Lands and from the perspective of the Community, who view the time period prior to oil sands development as an appropriate baseline for assessment.

[1] The Culturally Significant Ecosystems were developed by McKillop (2002) from spatial data analysis of data from the Fort McKay traditional use and occupancy study "There is Still Survival Out There" (Fort McKay First Nations, 1994). Note that this analysis was based on one data set and should not be considered a comprehensive mapping or analysis of Fort McKay's traditional use and occupancy. Substantial, additional traditional use data have been collected since the 1994 study. The Culturally Significant Ecosystems do, however, provide a general spatial picture of Fort McKay's use of the land and are helpful in assessing effects from the perspective of the community. These maps should not be considered as a definition of the Community's value of the land.

- In the development scenarios, wildlife impacts are based on full (operational) development, not post-reclamation. This was done because it remains unknown whether reclamation will successfully restore key wildlife habitat. Furthermore, the current pace of reclamation suggests that any land developed will likely be lost to traditional land use for at least one and up to several generations and this will likely contribute to a significant effects on Fort McKay's culture as well as loss of traditional environmental knowledge (TEK) related to wildlife.
- Resource selection function model (RSF) results are estimations of the quality and quantity of habitat available to wildlife species. These estimations should be correlated with wildlife populations (e.g., lots of high quality habitat should be positively correlated to healthy wildlife populations). Similarly, changes in available habitat are expected to be correlated with changes in wildlife populations. In this wildlife assessment, changes in moose population densities and changes in quantity of high quality moose habitat are assessed to determine if the RSF model results are correlated with actual moose population levels.

Impacts to wildlife habitat and moose population are assessed in the context of the following development scenarios:

- ***Pre-Development Scenario*** – this is prior to oil sands development. Depending on data availability the actual date of the Pre-Development Scenario varies from 1954 to 1965.
- ***Current Scenario*** – this is what you would see if you looked at the ground, water, air right now. Depending on data availability the actual date of the Current Scenario varies from 2003 to 2008.
- ***Base Case*** – this is existing and approved (but not yet developed) projects.
- ***Application Case*** – this is the Shell's Pierre River Mine and Jackpine Mine Expansion project(s) plus the Base Case.
- ***Planned Development Case*** – this scenario includes additional planned developments.

The developments and disturbances for the Base Case, Application Case and Planned Development Cases are the same are those used by Shell in the EIA (Shell 2007).

The Pre-Development and Current Scenarios were not included in the EIA and are specific to this Fort McKay assessment. For the wildlife assessment RSF and HSI modeling was not available for the Current Scenario; hence, Base Case was used as a surrogate for Current Scenario with regard to habitat. This is a conservative assumption since the Base Case will have more disturbance than the Current Scenario. Current data were, however, available for moose populations, so the Current Scenario was assessed for moose population.

6.2.2 Information Sources

Information for this Fort McKay Specific Wildlife Assessment was obtained from several sources that are listed below:

- Data and modeling requested from Shell and provided by Shell and Golder Associates Ltd. (Golder 2009);
- Data from the Shell EIA (Shell 2007) and other EIAs from the region;
- Published literature on environmental assessment methods;
- Literature on environmental parameters;
- Reports completed on wildlife in the oil sands region (e.g., CEMA);
- Information provided by Alberta Sustainable Resource Development (ASRD); and
- Information provided by the Community of Fort McKay.

6.2.3 Data and Information Limitations

This assessment is based on the results of RSF models and other habitat models and population data collected in the oil sands region.

6.2.3.1 Habitat Model Data

Habitat models developed by Shell (2007) were used to assess impacts to wildlife habitat within the TLU. The advantage of RSF models is that they can be validated using empirical data. Thus, the usefulness or validity of any given RSF model can be assessed by its ability to predict the location of wildlife species on the landscape (Boyce et al. 2002).

None of the three RSF models assessed (moose, Canada lynx, and fisher/marten) performed well. The validation results indicate that the moose RSF model performed especially poorly with an average Spearman Rank correlation of 0.23. Spearman Rank correlation is a statistical test to determine if the correlation between variables is statically significant. The lynx RSF model performed the best with an average Spearman Rank correlation of 0.65, and the fisher/marten RSF model had an average Spearman Rank correlation of 0.43 (Shell 2006; Appendix 5-4). None of these average Spearman Rank correlations were significant, which indicates that the models were unable to predict the location of wildlife on the landscape better than random chance. Shell indicated that the poor results of their RSF models were likely due to wildlife selecting habitat at a finer scale (e.g., stand age) than the vegetation data used in the model. We caution users of this report that this suggests that these RSF models need to be refined to improve their ability to predict wildlife impacts.

Beaver habitat was assessed using a model designed by Shell specifically for the Pierre River Mine and Jackpine River Expansion Project (Golder 2009). Empirical data from the local study area (LSA) and the regional study area (RSA) were used to create the model. The beaver habitat model was not validated with empirical data and thus, it remains unknown how well this model predicts presence or absence of beaver.

The four habitat models used for this assessment either performed poorly or were not validated. However, Fort McKay believes that using computer models to assess quality and quantity of wildlife habitat is still a reasonable approach. RSF models are the best habitat models currently available because they can be easily validated using empirical data, but better RSF models need to be developed for the species considered in this assessment.

6.2.3.2 Population Data

Historic moose population and density data from 1993 to 2001 was used to assess moose population trends. These data were obtained from a CEMA report prepared by Westworth (2002) and from the Shell EIA, Wildlife and Wildlife Habitat Environmental Setting Report – Appendix V (Shell 2007). Unfortunately, the oldest data available were collected in the 1976 and do not represent pre-development moose populations.

Moose density data presented in EIAs are typically collected using helicopters flying evenly spaced transacts. Such surveys do not have confidences limits that would allow the determination of statistically significant changes in moose populations. These data have been analyzed but these limitations are acknowledged in any conclusions.

Alberta Sustainable Resource Development (ASRD) occasionally collected moose population data in the oil sands region from 1993 to 2009. Current data is lacking but this issue has been partially resolved by the Fort McKay Country Foods Availability Study. This program provided funding from oil sands operators to ASRD to fly moose surveys in Wildlife Management Unit (WMU) 531 in early 2009. ASRD population data do have confidence limits and thus, it is possible to use these data to assess population changes.

6.2.4 Wildlife Study Areas

Two wildlife study areas were used for this wildlife assessment: the Traditional Land Use (TLU) area as described in McKillop (2002) and a forty-township study area (FTSA). These study areas are shown on the habitat modeling results (Figure 6-1 and Figure 6-4 to Figure 6-6), which are presented later in this section. These are the same as Figures 5.1-1 to 5.1-4 in Golder (2009).

6.2.4.1 Traditional Land Use Area

The TLU area contains CSE that have been identified based on spatial data analysis of a Fort McKay traditional use and occupancy study (Fort McKay First Nations 1994, McKillop 2002). In this wildlife assessment the CSEs for Large Game (Figure 6-1) and Fur Bearer are used for assessment (Figure 6-4 to Figure 6-6). These CSEs are divided into three different levels of use by the Fort McKay Community: Intense, Moderate, and Low and are described in McKillop (2002).

The Large Game and Fur Bearer CSE areas cover over 3,900,000 hectares (ha; Golder 2009). The Large Game CSE has an Intense Use area of 1,018,146 ha, a Moderate Use area of 1,723,226 ha, and a Low Use area of 1,235,628 ha (Golder 2009).

The Fur Bearers CSE has an Intense Use area of approximately 1,000,000 hectares, a Moderate Use area of 1,700,000 ha, and a Low Use area of 1,100,000 ha (Golder 2009).

6.2.4.2 Forty Township Study Area (FTSA)

The second study area is a rectangular parcel of land that is forty townships in area (forty township study area [FTSA]). This study area includes Shell's two proposed projects, the Community of Fort McKay and land that is in close proximity to the Community. See ***Section 7.3 - Vegetation*** for further discussion on the rationale for selecting the FTSA.

Within the FTSA, approximately 85% of the Large Game CSE area is used "intensely" by the community while the remaining 15% is "moderately" used. Approximately 55% of the Fur Bearer CSE is used "intensely" by the community, while 45% is "moderately" used. The FTSA is 379,641 ha in area. The FTSA does not overlap with the areas of "low" use by the Fort McKay Community.

6.2.5 Stressors on Wildlife Habitat and Populations

There are several activities associated with oil sands development that might stress wildlife habitat and populations. Potential impacts from oil sands development include the following activities:

- Vehicle collisions with wildlife;
- Removal of wildlife habitat;
- Changes in surface water hydrology that alter wildlife habitat;
- Changes in water quality that affect wildlife health (e.g., ingestion by drinking) and vegetation health;

- Sensory disturbances that repel wildlife and affects wildlife communication (e.g., amphibian and songbird breeding calls); and
- Barriers to wildlife movement (e.g., pipelines rights-of-way (RoW), traffic and aboveground pipelines).

6.2.6 Wildlife Indicators

Access to healthy wildlife populations and habitats are key to Fort McKay community members being able to maintain their way of life and culture. To determine impacts to wildlife, this assessment focuses on selected key wildlife species, as follows:

- moose [cultural keystone species[2] and large game animal] habitat change and population/density change were assessed;
- beaver (cultural keystone species[2] and furbearer) habitat change was assessed;
- lynx (furbearer) habitat change was assessed; and
- fisher and marten (furbearers) habitat change was assessed.

To assess impacts to these wildlife species the changes in their available habitat were measured using the RSF models (moose, Canada lynx, fisher/marten) or other habitat models (beaver). Habitat change for moose was measured within the CSEs for Large Game (Figure 6-1) using the three levels of land use (Intense, Moderate, or Low Use). Habitat change for beaver, Canada lynx, and fisher/marten was measured within the CSE's for Furbearers (Figure 6-2 to Figure 6-4), again using the three levels of land use (Intense, Moderate, Low). Habitat change within the FTSA was measured without any distinction of level of cultural use.

Population changes to moose were assessed by analyzing data obtained from reports completed by Shell (2007) and Westworth (2002). Additional moose population data was obtained from ASRD (ARSD 2009).

6.2.7 Wildlife Assessment Criteria

A common way of determining if environmental effects are adverse is to compare the quality of the existing environment with the predicted quality of the environment once the project is in place, using various variables or indicators. For this assessment the effects on wildlife from the various assessment cases/scenarios described above (i.e., Current Scenario/Base Case, Application Case, Planned Development Case) are compared against the environment prior to oil sands development (i.e., Pre-Development Scenario).

[2] Moose and beaver have been defined by the Community of Fort McKay as cultural keystone species (Garibaldi 2006).

The criteria used to describe and assess effects on wildlife are listed below:

- Duration and Frequency;
- Reversibility;
- Environmental Consequence;
- Magnitude; and
- Geographic Extent.

6.2.7.1 Duration and Frequency

The Canadian Environmental Assessment Agency (CEAA 1994) states that long-term and frequent adverse environmental effects might be significant and that future adverse environmental effects should also be taken into account. For this assessment it is assumed that oil sands development will be ongoing and continue for a long time (i.e., over 20 years) in the Fort McKay's Traditional Lands.

6.2.7.2 Reversibility

Reversible adverse environmental effects may be less significant than adverse environmental effects that are irreversible (CEAA 1994). However, it is difficult to know whether the adverse environmental effects of a project will be irreversible or not. For example, there is uncertainty regarding the reclamation of many ecological communities in the oil sands region. For this assessment it is assumed that impacts are reversible but take many years (i.e., greater than 20 years).

6.2.7.3 Magnitude

Magnitude refers to the severity of the adverse environmental effects. Magnitude is measured by criteria similar to that used in other EIAs (e.g., Shell 2007). For this assessment Magnitude is determined by measuring the change in habitat class (e.g., moderate-high and high) quantity from Pre-Development to the Planned Development Case. In this assessment the moderate-high and high are combined to determine the total change to wildlife habitat.

6.2.7.4 Geographic Extent

The adverse environmental effects are considered regional in geographic extent because they extend beyond any individual project (e.g., Pierre River Mine) but not beyond the Fort McKay's Traditional Lands and FTSA.

6.2.7.5 Impact Ranking

Impact ranking descriptions are presented in Table 6-1. For this assessment the criteria with variable results are Magnitude (e.g., amount of habitat change). For the

Table 6-1: Wildlife Impact Ranking Table

Criterion	Rating	Numerical Score	Description
Direction	Positive	Na	The ultimate long-term trend of the effect is positive
	Neutral	Na	The ultimate long-term trend of the effect is neutral
	Negative	Na	The ultimate long-term trend of the effect is adverse
Magnitude	Negligible	0	<1% change on the measurement end point
	Low	+5	<10% change in the measurement end point
	Moderate	+10	10 to 20% change in the measurement end point
	High	+15	>20% change in the measurement end point
Geographic Extent	Local	0	Effects restricted to the LSA
	Regional	+1	Effects extends beyond the LSA into the FTSA
	Beyond Regional	+2	Effects extended beyond the FTSA
Frequency	Low	0	Effect occurs only once
	Medium	+1	Effect occurs intermittently
	High	+2	Effect occurs continuously
Duration	Short-term	0	Effect is limited to <3 years
	Medium-term	+2	Effect occurs 3 to 20 years
	Long-term	+3	Effect extends for one to several generations beyond the life of the Project (>20 years)
Reversibility	Irreversible	+3	Effect is not reversible over time
	Reversible	-3	Effect is reversible over time

Notes:
Direction: describes the ultimate long-term trend of the effect (positive, negative or neutral).
Magnitude: describes the intensity, or severity of an effect. Definitions of magnitude are unique to the characteristics of the measured parameter or variable.
Geographical Extent: The area within which an effect of a defined magnitude occurs.
Frequency: the number of times during a project or a specific project phase that an effect may occur.
Duration: considers the length of time over which an environmental impact occurs and affects the Community of Fort McKay. It considers all phases of the Project(s) including construction, operations, reclamation and closure. It also considers the time for the environmental component to recover from the disturbance.
Reversibility: the likelihood that a measurable parameter will recover from an effect, including through active management techniques such as reclamation.

Source: adapted from the Introduction to EIA, Jackpine Mine Expansion and Pierre River Mine Project (Shell 2007).

purposes of this assessment Direction (negative), Duration (long term), Frequency (continuous), and Reversibility (reversible) are the same for all of the wildlife indicators and not presented in the assessment conclusions.

6.2.7.6 Environmental Consequence

The most common method of determining whether the adverse environmental effects of a project are significant is to use environmental standards, guidelines, thresholds or objectives. For wildlife assessment, no habitat level guidelines or objectives (i.e., quantity of habitat) were available. As well, no habitat or thresholds for either habitat or populations levels have yet been developed for wildlife in the oil sands region.

As per the Shell EIA (2007), the environmental significance (consequence) rating combines the results of the numerical score assigned to each of the impact criteria with the exception of direction, into one rating. Direction is measured as positive, negative or neutral and is not assigned a score. The rating for the component being assessed is then place in one of four categories that describe the environmental significance (consequence) as follows:

- **Negligible**—0 to 5 (a **green** situation): generally associated with effects that are of negligible magnitude; or effects of low magnitude, local in extent and reversible.
- **Low**—6 to 10 (a **green** situation): associated with effects of low magnitude that is reversible.
- **Moderate**—11 to 15 (a **yellow** situation): associated with effects of moderate magnitude that are irreversible; or effects of low magnitude, that are local extent, irreversible and far future in duration; or effects of low magnitude, regional extent, irreversible, far future in duration.
- **High**—>15 (a **red** situation); associated with effects of moderate magnitude, local in extent, far future in duration and irreversible; moderate magnitude, regional in extent, far future duration, irreversible and of medium frequency; high magnitude, local in extent, irreversible or partially reversible and long-term or far future in duration; high magnitude and regional in extent.

Environmental consequences are further detailed in the Table 6-2. Each colour rating (situation) is associated with specific actions for regulators and operators to address and mitigate the potential environmental effects.

Table 6-2: Status Level, Environmental Consequence and Conditions with Expected Actions

Situation	Environmental Consequence and Conditions	Recommended Action
Green (significant adverse effect unlikely)	• Environmental Consequence – negligible or low • Populations appear to be stable[1]	• No additional mitigation and monitoring needed beyond what is already in oil sands Approval Conditions • Regional thresholds/land use management plans required
Yellow (potentially significant adverse effect and/or more information needed)	• Environmental Consequence – moderate • Wildlife populations data is insufficient to determine populations[1]	• Oil sands companies continue operation under their Approval Conditions • Wildlife population surveys to be completed within 2 years • Regional thresholds/land use management plans and sufficient protected areas required
Red (significant adverse effect)	• Environmental Consequence – High • Evidence that wildlife populations are in decline[1]	• ASRD reduces allowable harvest levels of wildlife species (e.g., moose) • Regional thresholds/land use management plans and sufficient protected areas required immediately. • Oil sands operators immediately develop plan to alter operations to minimize impacts to wildlife species (e.g., reduce habitat destruction and increase rate of reclamation) • Wildlife surveys are scheduled within a year

[1] Moose were only species assessed with population data in this assessment.

6.2.8 Fort McKay's Healing the Earth Strategy

Fort McKay's Healing the Earth Strategy (HTES; Fort McKay IRC 2010b) has four tenets (***retain***, ***reclaim***, ***improve*** and ***offset***) that the Community supports with regard to addressing environmental issues. Each of these tenets is important for maintaining healthy wildlife populations within Fort McKay's Traditional Lands. The four tenets and their implications to wildlife are summarized below:

- ***Retain*** – retaining and protecting key natural areas and resources within areas designated for industrial development. By maintaining these areas it will help retain important habitat (e.g., movement corridors) and maintain healthy and viable wildlife populations.

- ***Reclaim*** – Reclaiming disturbed areas so that landscape function supports the habitat for populations of culturally important plants and wildlife to support traditional land uses.
- ***Improve*** – improving current practices (e.g., construction, operations, reclamation) to minimize environmental impacts on wildlife. Example of improvement may include reducing project footprints to maintain habitat or reducing traffic to minimize wildlife/vehicle collisions.
- ***Offset*** – setting aside and/or enhancing existing natural areas as offsets to areas disturbed or lost through industrial development. Large amounts of wildlife habitat will be destroyed because of oil sands development. Offsets would provide protected habitat to ensure the maintenance of viable wildlife populations that can colonize and repopulate reclaimed areas.

6.3 Moose

6.3.1 Pre-Development Large Game CSE

The Fort McKay's traditional Large Game Culturally Significant Ecosystems (CSE) is 3,977,000 ha in area. The Pre-Development Scenario indicates that the moderate-high and high suitability classes (best moose habitat) comprise 61% of the total Large Game CSE (Table 6-3). The best moose habitat is concentrated near the Athabasca River Valley and in the northeast portion and northwest corner of the Large Game CSE (Figure 6-1). Unsuitable habitat (Nil) made up 3% of the lands used by the Fort McKay for large game harvesting.

Table 6-3: Habitat Suitability Classes for Moose within the Intense, Moderate and Low Use areas of the Culturally Significant Ecosystems

Habitat Suitability Class	Intense Use CSE		Moderate Use CSE		Low Use CSE		All CSE	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	6,925	1	30,860	2	29,986	2	67,776	2
Nil	34,021	3	40,281	2	27,843	2	102,152	3
Low	157,372	15	425,190	25	336,503	27	919,132	23
Moderate-low	110,169	11	377,401	22	263,004	21	750,628	19
Moderate	89,950	9	322,056	19	228,451	18	640,503	16
Moderate-high	183,868	18	299,912	17	195,708	16	679,539	17
High	435,840	43	227,526	13	154,133	12	817,567	21
Total	1,018,146	100	1,723,226	100	1,235,628	98	3,977,298	100

[1] Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Pre-Development Scenario

Planned Development Case

LEGEND

- WILDLIFE MANAGEMENT UNIT 531
- FORT MCKAY 40 TOWNSHIP BLOCK
- TERRESTRIAL LOCAL STUDY AREA
- INDIAN RESERVE
- PROVINCIAL BORDER
- OPEN WATER
- PUBLIC ROADWAY
- RAILROAD

DISTURBED

- DISTURBANCE AREA
- LINEAR DISTURBANCE

CULTURALLY SIGNIFICANT ECOSYSTEM (CSE) AREA

- INTENSE USE CSE (50% UTILIZATION DISTRIBUTION)
- MODERATE USE CSE (75% UTILIZATION DISTRIBUTION)
- LOW USE CSE (95% UTILIZATION DISTRIBUTION)

HABITAT SUITABILITY

- HIGH
- MODERATE HIGH
- MODERATE
- MODERATE LOW
- LOW
- NIL
- CLOUD - NO DATA

50 0 50

SCALE 1:1,400,000 KILOMETRES

REFERENCE

Alberta digital data obtained from AltaLIS Ltd. (September 2004), IHS Energy Ltd. (August 2006), used under license.
Projection: UTM Zone 12 Datum: NAD 83

PROJECT

JACKPINE MINE EXPANSION &
PIERRE RIVER MINE PROJECT

TITLE

MOOSE HABITAT SUITABILITY IN THE LARGE GAME CULTURALLY SIGNIFICANT ECOSYSTEM AREA

PROJECT No.08-1346-0006.5722			SCALE AS SHOWN	REV. 0
DESIGN	BDW	13 Jan. 2009		
GIS	BW	16 Oct. 2009		
CHECK				
REVIEW				

FIGURE 6-1

\\CLIENT\S$\HELL\08-1346-0006\mapping\mxd\5722\R5F_HSI\Fort_Mckay_rsa_hsi_moose_wmu531.mxd

6.3.2 Forty Township Study Area (FTSA)

The FTSA is 379,641 ha. Prior to development, high and moderate-high habitat suitability classes for moose combined represented 79% or 300,730 ha of this area. Prior to industrial development the FTSA had 9,851 ha (3%) of habitat that was considered unsuitable (Nil) moose habitat.

6.3.3 Moose Habitat Assessment

6.3.3.1 Intense Use CSE Area

The changes to the moose habitat within the Intense Use CSE Area are presented in Table 6-4.

Table 6-4: Changes in Moose Habitat within the Intense Use CSE for Each Development Case Compared to Pre-Development Scenario

Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	6,925	1	0	-	0	-	0	-
Nil	34,021	3	168,817	+396	191,638	+463	240,169	+606
Low	157,372	15	156,314	-1	155,900	-1	154,667	-2
Moderate-low	110,169	11	110,440	0	109,707	0	108,363	-2
Moderate	89,950	9	84,088	-7	83,425	-7	78,617	-13
Moderate-high	183,868	18	160,062	-13	157,617	-14	143,423	-22
High	435,840	43	338,424	-22	319,859	-27	292,907	-33
Total	1,018,146	100	1,018,146		1,018,146		1,018,146	

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Pre-Development

The high and moderate-high habitat suitability classes combined represent approximately 61% (619,708 ha) of the original Intense Use CSE Area (Pre-Development). Habitat unsuitable for moose (Nil) represents approximately 3% (34,021 ha) of the Intense Use CSE Area.

Base Case

The Base Case shows a reduction in the amount of high and moderate-high habitat suitability classes to 498,486 ha within the Intense Use CSE Area. This represents a loss of 20% of the highest quality moose habitat (high and moderate-high habitat suitability class). The Base Case includes 168,817 ha of habitat unsuitable (Nil) for moose. This represents 17% of the Intense Use CSE Area.

Application Case

The Application Case shows the high and moderate-high habitat suitability classes reduced to 477,476 ha within the Intense Use CSE Area. This represents a loss of 23% of the best quality moose habitat (high and moderate-high habitat suitability class) from this area. The Application Case includes 191,638 ha of unsuitable habitat (Nil) for moose. This represents 19% of the in the Intense Use CSE Area.

Statement of Significance

The cumulative decrease in moose habitat in the Intense Use CSE Area from Pre-Development to Application Case is a high magnitude (23%), regional, continuous frequency, long-term, and reversible (15+1+2+3-3). Habitat considered unsuitable (Nil) for moose increases to over 19% of the Intense Use CSE Area. The adverse effect is considered high significance (18). This is considered a **red** situation.

Planned Development Case

The Planned Development Case shows the high and moderate-high habitat suitability classes reduced to 436,330 ha within the Intense Use CSE Area. This represents a loss of 30% of the best quality moose habitat (high and moderate-high habitat suitability class) from this area. The Planned Development Case includes 240,169 ha of unsuitable habitat for moose. This represents 24% of the Intense Use CSE Area.

Statement of Significance

The cumulative decrease in moose habitat in the Intense Use CSE Area from Pre-Development to Planned Development Case is a high magnitude (30%), regional, continuous frequency, long-term, and reversible (15+1+2+3-3). Habitat considered unsuitable (Nil) for moose increases to over 23% of the Intense Use CSE Area. The adverse effect is considered high significance (18). This is considered a **red** situation.

6.3.3.2 Moderate Use CSE Area

The changes to the moose habitat within the Moderate Use CSE Area are presented in Table 6-5.

Table 6-5: Changes in Moose Habitat within the Moderate Use CSE Area for Each Development Case Compared to Pre-Development Scenario

Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	30,860	2	0	-	0	-	0	-
Nil	40,281	2	43,160	+7	43,435	+8	58,929	+46
Low	425,190	25	433,176	+2	433,175	+2	432,895	+2
Moderate-low	377,401	22	390,139	+3	390,139	+3	385,859	+2
Moderate	322,056	19	328,474	+2	328,473	+2	323,495	0
Moderate-high	299,912	17	303,793	+1	303,790	+1	299,465	0
High	227,526	13	224,485	-1	224,303	-1	222,584	-2
Total	1,723,226	100	1,723,226		1,723,226		1,723,226	

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Pre-Development Scenario

The best moose habitat (high and moderate-high habitat suitability classes) represents 31% (527,438 ha) of the Moderate Use CSE Area in the Pre-Development Scenario. The Moderate Use CSE Area had 2% (40,281 ha) habitat that was considered unsuitable (Nil) as moose habitat prior to any oil sands development.

Base Case

The Base Case indicates that the amount of high and moderate-high habitat suitability classes increased to 528,278 ha in the Moderate Use CSE Area. This represents a gain of less than 1% in the amount of the best moose habitat (high and moderate-high habitat suitability class).

Application Case

The Application Case indicates that the amount of high and moderate-high habitat suitability classes increased to 528,093 ha in the Moderate Use CSE Area. This represents a gain of less than 1% in the amount of the best moose habitat (high and moderate-high habitat suitability class).

Statement of Significance

The cumulative decrease in moose habitat in the Moderate Use CSE Area from Pre-Development to Application Case is a low magnitude (>1%), regional, continuous

frequency, long-term, and reversible (5+1+2+3-3). Habitat considered unsuitable (Nil) for moose increases to 3% of the Moderate Use CSE Area. The adverse effect is considered low significance (8). This is considered a **green** situation.

Planned Development Case

The Planned Development Case predicts that the amount of high and moderate-high habitat suitability classes reduced to 522,049 ha in the Moderate Use CSE Area. This represents a loss of 1% in the amount of the best moose habitat (high and moderate-high habitat suitability class). The Planned Development Case predicts that the Moderate Use CSE Area will have 58,929 ha (3%) of habitat that was considered unsuitable (Nil) as moose habitat.

Statement of Significance

The cumulative decrease in moose habitat in the Moderate Use CSE Area from Pre-Development to Planned Development Case is a low magnitude (>1%), regional, continuous frequency, long-term, and reversible (5+1+2+3-3). Habitat considered unsuitable (Nil) for moose increased to 3% of the Moderate Use CSE Area. The adverse effect is considered low significance (8). This is considered a **green** situation.

6.3.3.3 Low Use CSE Area

The changes to the moose habitat within the Low Use CSE Area are presented in Table 6-6.

Table 6-6: Changes in Moose Habitat within the Low Use CSE for Each Development Case compare to Pre-Development Scenario

Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	29,986	2	0	-	0	-	0	-
Nil	27,843	2	27,778	0	27,779	0	29,192	+5
Low	336,503	27	355,723	+6	355,723	+6	356,564	+6
Moderate-low	263,004	21	271,202	+3	271,201	+3	271,233	3
Moderate	228,451	18	230,273	+1	230,273	+1	228,965	0
Moderate-high	195,708	16	196,368	0	196,368	0	195,836	0
High	154,133	12	154,284	0	154,284	0	153,837	0
Total	1,235,628	100	1,235,628		1,235,628		1,235,627	

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Pre-Development Scenario

The best moose habitat (high and moderate-high habitat suitability classes) represents 28% or 349,841 ha of the Low Use CSE area of the Large Game CSE. The Low Use CSE Area had 2% (27,843 ha) habitat that was considered unsuitable (Nil) as moose habitat.

Base Case

The Base Case indicates that the amount of high and moderate-high habitat suitability classes slightly increased by less than 1% in the Low Use CSE Area. The Low Use CSE Area had 27,778 ha (2%) of habitat that was considered unsuitable (Nil) for moose.

Application Case

The Application Case indicates that the amount of high and moderate-high habitat suitability classes slightly increased by less than 1% in the Low Use CSE Area. The Low Use CSE Area had 27,779 ha (2%) of habitat that was considered unsuitable (Nil) for moose.

Statement of Significance

The cumulative change in moose habitat in the Moderate Use CSE Area from Pre-Development to Application Case is a negligible magnitude (<1%), regional, continuous frequency, long-term, and reversible (0+1+2+3-3). Habitat considered unsuitable (Nil) for moose increase to 2% of the Moderate Use CSE Area. The adverse effect is considered negligible significance (3). This is considered a **green** situation.

Planned Development Case

The Planned Development Case indicates that the amount of high and moderate-high habitat suitability classes slightly decreased by less than 1% in the Low Use CSE Area. The Low Use CSE Area had 29,192 ha (2%) of habitat that was considered unsuitable (Nil) for moose.

Statement of Significance

The cumulative decrease in moose habitat in the Moderate Use CSE Area from Pre-Development to Planned Development Case is a negligible magnitude (<1%), regional, continuous frequency, long-term, and reversible (0+1+2+3-3). Habitat considered unsuitable (Nil) for moose increased to 2% of the Moderate Use CSE Area. The adverse effect is considered negligible significance (3). This is considered a **green** situation.

6.3.3.4 Forty Township Study Area (FTSA)

The FTSA is 379,641 ha. This area is comprised of approximately 85% Intense Use CSE and the remaining 15% use area is Moderate Use. The area of each habitat suitability class for each development case and scenario is presented in Table 6-7.

Table 6-7: Changes in Moose Habitat within the FTSA for Each Development Case Compared to Pre-Development Scenario

Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	67	0.02	0	-	0	-	0	-
Nil	9,851	3	95,260	+867	118,262	+1,101	126,047	+1,180
Low	24,565	6	23,237	-5	22,824	-7	22,902	-7
Moderate-low	21,030	6	17,321	-18	16,588	-21	16,534	-21
Moderate	23,390	6	18,665	-20	18,002	-23	17,498	-25
Moderate-high	61,355	16	48,166	-21	45,719	-25	43,897	-28
High	239,382	63	176,992	-26	158,246	-34	152,763	-36
Total	379,640	100.00	379,641		379,641		379,641	

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Pre-Development Scenario

Prior to development high and moderate-high habitat suitability classes for moose combined represent 79% or 300,737 ha of this area. Prior to industrial development the FTSA had 9,851 ha (3%) of habitat that was considered unsuitable (Nil) moose habitat.

Base Case

The high and moderate-high habitat suitability classes for moose represented 59% or 225,158 ha of the FTSA in the Base Case. This represents a reduction of 25% of habitat since oil sands development started. The area considered unsuitable moose increased to 95,260 ha. This represents 25% of the FTSA.

Application Case

The high and moderate-high habitat suitability classes for moose represented 203,965 ha of the FTSA in the Application Case. This represents a reduction of 32%

since the Pre-Development Scenario. The percentage of area considered unsuitable to moose increased to 118,262. This represents 31% of the FTSA.

Statement of Significance

The cumulative decrease in moose habitat in the FTSA from Pre-Development to Application Case is a high magnitude (>20%), regional, continuous frequency, long-term, and reversible (15+1+2+3-3). Habitat considered unsuitable (Nil) for moose increase to 32% of the FTSA. The adverse effect is considered high significance (18). This is considered a **red** situation.

Planned Development Case

The high and moderate-high habitat suitability classes for moose represent 52% or 196,660 ha of the FTSA. This represents a reduction of 35% since Pre-Development. The FTSA is predicted to have 126,047 ha of habitat that was considered unsuitable (Nil) for moose. This represents 33% of the FTSA.

Statement of Significance

The cumulative decrease in moose habitat in the FTSA from Pre-Development to Planned Development Case is a high magnitude (>20%), regional, continuous frequency, long-term, and reversible (15+1+2+3-3). Habitat considered unsuitable (Nil) for moose increased to 33% of the FTSA. The adverse effect is considered high significance (18). This is considered a **red** situation.

A summary of the changes to moose habitat and the environmental consequences for each study area and development scenario is presented in Table 6-8.

Table 6-8: Wildlife Habitat Assessment Environmental Consequences for Moose by Study Areas and Development Scenario and Case

Study Area	Pre-Development	Net Change: Base Case to Pre-Development		Net Change: Application Case to Pre-Development		Net Change: Planned Development Case to Pre-Development	
		%	Environmental Consequence	%	Environmental Consequence	%	Environmental Consequence
Intense Use CSE	Negligible	-20	Moderate	-23	High	-30	High
Moderate Use CSE	Negligible	+0	Negligible	+0	Negligible	-1	Low
Low Use CSE	Negligible	+0	Negligible	+0	Negligible	-0	Negligible
FTSA	Negligible	-25	High	-32	High	-35	High

6.3.4 Moose Population Assessment

Habitat models estimate the amount and quality of habitat that are available for wildlife. These models represent predictions of available habitat but are rarely validated with wildlife population estimates. Based on the amount of moose habitat predicted to be lost in the oil sands region is a reasonable hypothesis that moose population should be decreasing. To determine if moose populations are decreasing, moose density and moose population data was assessed.

6.3.4.1 Moose Density

Moose density data from several EIAs and studies were compiled in Shell (2007) and Westworth 2002 (Figure 6-2). Densities of moose from studies completed within Fort McKay's Traditional Lands from 1973 to 2007 were plotted. The studies had moose density varying from 0.01 moose/km^2 to 0.52 moose/km^2. The data show a slight trend of declining moose density (r=0.13).

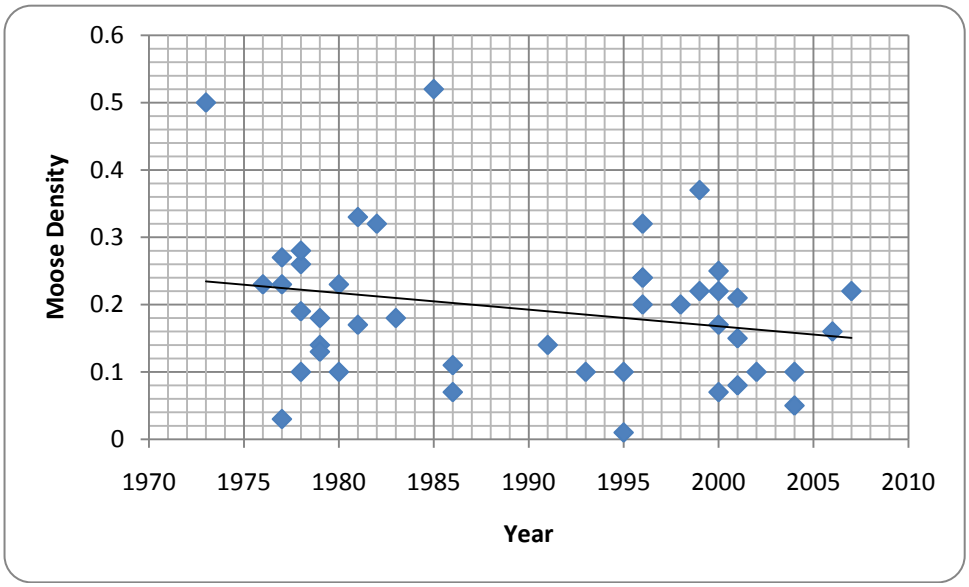


Figure 6-2: Moose Density Estimates From Surveys Conducted in Fort McKay's Traditional Lands

6.3.5 Moose Population

6.3.5.1 Population Size

Moose populations were surveyed during the winter of 1993/1994 as part of the Northern Moose Management Program (Westworth 2002). Additional surveys were flown in most Wildlife Management Units (WMUs) in the 1990s and in 2001 (Table 6-9). In early 2009, moose surveys were flown by ASRD in WMU 531. WMU 531 is located in the northwest portion of the Fort McKay TLU and is approximately

17,000 km^2 in area. The error on the population estimates presented in Table 6-9 is as high as ± 30% (Westworth 2002).

Table 6-9: Moose Populations Estimates of Wildlife Management Units (WMU) Located in the Oil Sands Region

WMU	1993/ 1994	1998	1999	2001	2003	2008	2009
518	1,252	1,471					
519	663	1,410			1136	1089	
529	477						157
530	2,142		1479[(a)]				
531	1,691			1,900			662
532	517						

[(a)] South half only

Sources: Westworth 2002 and ASRD 2009

Moose populations throughout the oil sands region do not significantly change from the early 1990s to 2001. However, in 2009 there is a significant reduction in moose density in WMU 531. Surveys in 1993 and 2001 estimated the moose populations to be more than 1,600 animals. The 2009 survey estimated the moose population to be 662 ± 141. Based on maximum error estimates stated in Westworth (2002), there has been a significant reduction in moose populations between 2001 and 2009 (Figure 6-3).

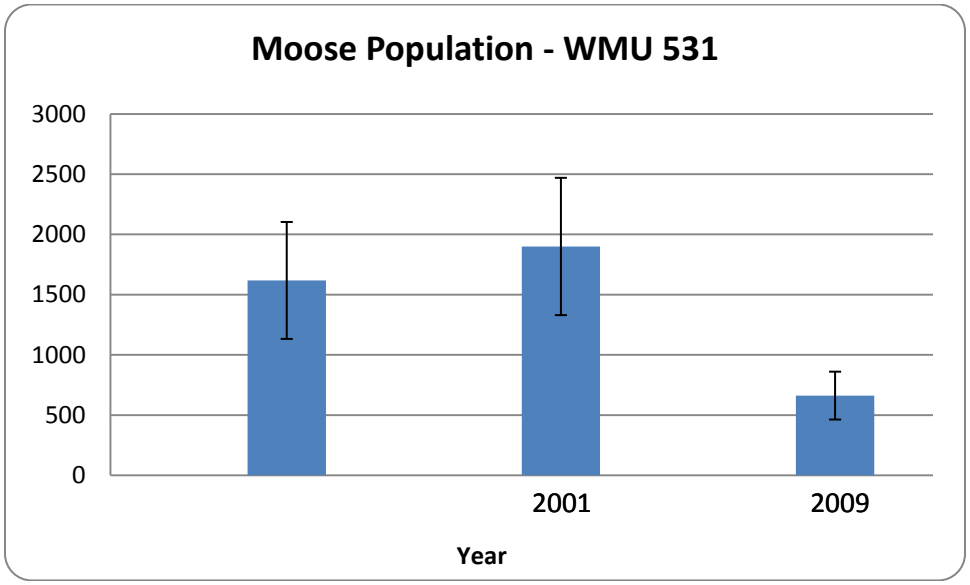


Figure 6-3: Moose Population Estimates for WMU 531 with 30% Error Bars

6.4 Beaver

6.4.1 Pre-Development Fur Bearers CSE Area

The Fort McKay's traditional Fur Bearers Culturally Significant Ecosystems (CSE) Area is 3,770,877 ha. The Pre-Development Scenario indicates that high suitability class (best beaver habitat) comprises 27% of the total Fur Bearer CSE Area (Table 6-10). The best beaver habitat is relatively evenly distributed throughout this area (Figure 6-4). Unsuitable habitat (Nil) represents 60% of the Fort McKay Fur Bearers CSE Area. Unsuitable habit appears to be most concentrated adjacent to and within the Athabasca River Valley (Figure 6-4).

Table 6-10: Habitat Suitability Classes for Beaver within the Intense, Moderate and Low Use Culturally Significant Ecosystems

Habitat Suitability Class	Intense Use CSE		Moderate Use CSE		Low Use CSE		All CSE	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[(a)]	16,460	2	37,352	2	11,910	1	65,722	2
Nil	601,248	60	1,010,515	60	666,247	62	2,278,010	60
Low	109,044	11	194,132	11	115,905	11	419,081	11
High	274,032	27	449,406	27	284,626	26	1,008,064	27
Total	1,000,784	100	1,691,405	100	1,078,688	100	3,770,877	100

[(a)] Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

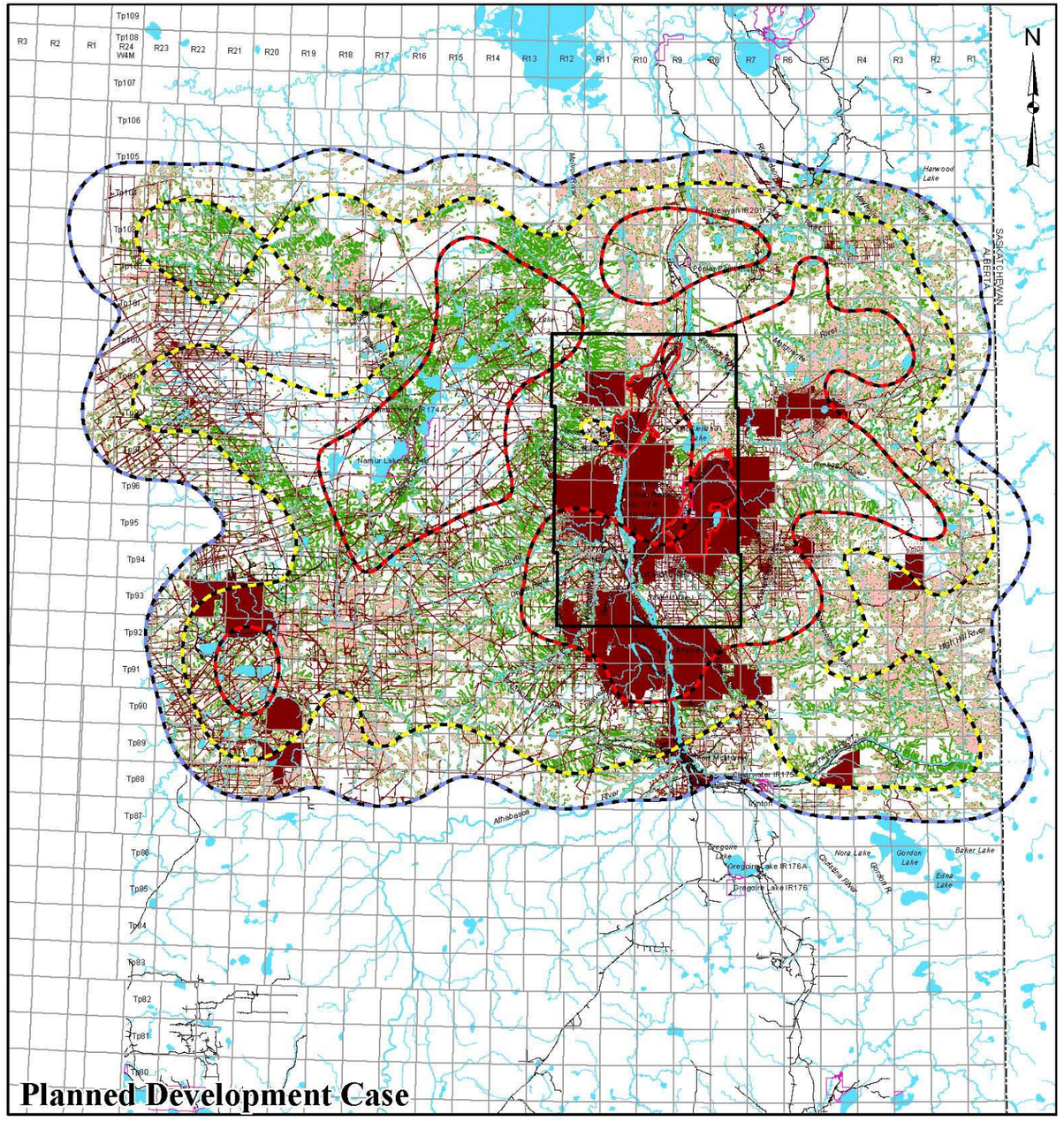
6.4.2 Forty Township Study Area (FTSA)

The FTSA is 379,641 ha. Prior to development high habitat suitability class for beaver combined represent 22% or 85,316 ha of this area. Prior to industrial development the FTSA had 255,870 ha (67%) of habitat that was considered unsuitable (Nil) beaver habitat.

6.4.3 Beaver Habitat Impact Assessment

6.4.3.1 Intense Use CSE Area

The changes to the beaver habitat within the Intense Use CSE Area are presented in Table 6-11 on Page 27.



LEGEND

- FORT MCKAY 40 TOWNSHIP BLOCK
- TERRESTRIAL LOCAL STUDY AREA
- INDIAN RESERVE
- PROVINCIAL BORDER
- OPEN WATER
- PUBLIC ROADWAY
- RAILROAD

DISTURBED

- DISTURBANCE AREA
- LINEAR DISTURBANCE

CULTURALLY SIGNIFICANT ECOSYSTEM (CSE) AREA

- INTENSE USE CSE (50% UTILIZATION DISTRIBUTION)
- MODERATE USE CSE (75% UTILIZATION DISTRIBUTION)
- LOW USE CSE (95% UTILIZATION DISTRIBUTION)

HABITAT SUITABILITY

- HIGH
- LOW
- NIL
- CLOUD - NO DATA

50 0 50
SCALE 1:1,400,000 KILOMETRES

REFERENCE

Alberta digital data obtained from AltaLIS Ltd. (September 2004), IHS Energy Ltd. (August 2006), used under license.
Projection: UTM Zone 12 Datum: NAD 83

PROJECT
JACKPINE MINE EXPANSION &
PIERRE RIVER MINE PROJECT

TITLE
BEAVER HABITAT SUITABILITY IN THE UTILIZATION DISTRIBUTION OF FUR BEARER CULTURALLY SIGNIFICANT ECOSYSTEM AREA

PROJECT No. 08-1346-0006.5722			SCALE AS SHOWN	REV. 0
DESIGN	BDW	13 Jan. 2009		
GIS	JH	06 Mar. 2009		
CHECK	AR	06 Mar. 2009		
REVIEW	WS	06 Mar. 2009		

FIGURE 6-4

\\CLIENTS\SHELL\08-1346-0006\mapping\mxd\5722\IHS\FortMckay_rsa_hsi_beaver.mxd

Table 6-11: Changes in Beaver Habitat within the Intense Use CSE Area for Each Development Case Compared to Pre-Development Scenario

Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	16,460	2	0	-	0	-	0	-
Nil	601,248	60	699,924	+16	704,784	+17	724,631	+21
Low	109,044	11	90,278	-17	87,899	-19	79,893	-27
High	274,032	27	210,582	-23	208,101	-24	196,260	-28
Total	1,000,784	100	1,000,784		1,000,784		1,000,784	

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Pre-Development Scenario

The high quality habitat suitability class represents approximately 27% (274,032 ha) of the original CSE Area (Pre-Development). Habitat unsuitable for beaver (Nil) represents approximately 60% (601,248 ha) of the Intense Use CSE Area.

Base Case

The Base Case shows a reduction in the amount of high quality suitability class to 210,582 ha within the Intense Use CSE Area. This represents a loss of approximately 23% of the highest quality beaver habitat from the Intense Use CSE Area. The Base Case includes 699,924 ha of habitat unsuitable for beaver in the Intense Use CSE area. This represents 70% of the Intense Use CSE Area.

Application Case

The Application Case predicts that the high habitat suitability class reduced to 208,101 ha within the Intense Use CSE Area. This represents a loss of approximately 24% of the best quality beaver habitat (high habitat suitability class) from this area. The Application Case predicts 704,784 ha of habitat unsuitable for beaver in the Intense Use CSE area. This represents 70% of the Intense Use CSE Area.

Statement of Significance

The cumulative decrease in beaver habitat in the Intense Use CSE Area from Pre-Development to Application Case is a high magnitude (>20%), regional, continuous frequency, long-term, and reversible (15+1+2+3-3). Habitat considered unsuitable (Nil) for beaver increase to 70% of the Intense Use CSE Area. The adverse effect is considered high significance (18). This is considered a **red** situation.

Planned Development Case

The Planned Development Case shows the high habitat suitability class reduced to 196,260 ha within the Intense Use CSE Area. This represents a loss of approximately 28% of the best quality beaver habitat (high and moderate-high habitat suitability class) from this area. The Planned Development Case includes 724,631 ha of habitat unsuitable for beaver in the Intense Use CSE Area. This represents 72% of the Intense Use CSE Area.

Statement of Significance

The cumulative decrease in beaver habitat in the Intense Use CSE Area from Pre-Development to Planned Development Case is a high magnitude (>20%), regional, continuous frequency, long-term, and reversible (15+1+2+3-3). Habitat considered unsuitable (Nil) for beaver increase to 72% of the Intense Use CSE Area. The adverse effect is considered high significance (18). This is considered a **red** situation.

6.4.3.2 Moderate Use CSE Area

The changes to the beaver habitat within the Moderate Use CSE Area are presented in Table 6-12.

Table 6-12: Changes in Beaver Habitat within the Moderate Use CSE Area for Each Development Case compared to Pre-Development Scenario

Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	37,352	2	0	-	0	-	0	-
Nil	1,010,515	60	1,146,521	+13	1,150,364	+14	1,171,386	+16
Low	194,132	11	171,695	-12	170,199	-12	163,242	-16
High	449,406	27	373,189	-17	370,842	-17	356,776	-21
Total	1,691,405	100	1,691,405		1,691,405		1,691,405	0.00

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Pre-Development Scenario

The best beaver habitat (high habitat suitability classes) represents 27% (449,406 ha) of the Moderate Use CSE Area in the Pre-Development Scenario. The Moderate Use CSE Area had 60% (1,010,515 ha) habitat that was considered unsuitable (Nil) for beaver.

Base Case

The Base Case indicates that the amount of high habitat suitability class decreased to 373,189 ha in the Moderate Use CSE Area. This represents a loss of approximately 17% in the amount of the best beaver habitat (high habitat suitability class). The Base Case predicts that the Moderate Use CSE Area has 1,146,521 ha of habitat that was considered unsuitable (Nil) for beaver. This represents 68% of the area.

Application Case

The Application Case indicates that the amount of high habitat suitability class decreased to 370,842 ha in the Moderate Use CSE Area. This represents a loss of approximately 17% of the best beaver habitat. The Application Case predicts that the Moderate Use CSE Area has 1,150,364 ha of habitat that was considered unsuitable (Nil) for beaver. This represents 68% of the area.

Statement of Significance

The cumulative decrease in beaver habitat in the Moderate Use CSE Area from Pre-Development to Application Case is a moderate magnitude (17%), regional, continuous frequency, long-term, and reversible (10+1+2+3-3). Habitat considered unsuitable (Nil) for beaver increase to 69% of the Moderate Use CSE Area. The adverse effect is considered moderate significance (13). This is considered a **yellow** situation.

Planned Development Case

The Planned Development Case predicts that the amount of high habitat suitability class reduced to 356,776 ha in the Moderate Use CSE Area. This represents a loss of approximately 21% in the amount of the best beaver habitat. The Planned Development Case predicts that the Moderate Use CSE Area will have 1,171,386 ha of habitat considered unsuitable (Nil) for beaver. This represents 69% of the area.

Statement of Significance

The cumulative decrease in beaver habitat in the Moderate Use CSE Area from Pre-Development to Planned Development Case is a high magnitude (>20%), regional, continuous frequency, long-term, and reversible (15+1+2+3-3). Habitat considered unsuitable (Nil) for beaver increase to 69% of the moderate Use CSE Area. The adverse effect is considered high significance (18). This is considered a **red** situation.

6.4.3.3 Low Use CSE Area

The changes to the beaver habitat within the Low Use CSE Area are presented in Table 6-13.

Table 6-13: Changes in Beaver Habitat within the Low Use CSE for Each Development Case compared to Pre-Development Scenario

Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	11,910	1	0	-	0	-	0	-
Nil	666,247	62	709,642	+7	709,643	+7	716,628	+8
Low	115,905	11	111,258	-4	111,258	-5	108,952	-7
High	284,626	26	257,788	-9	257,786	-9	253,109	-11
Total	1,078,688	100	1,078,688		1,078,687		1,078,689	

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Pre-Development Scenario

The best beaver habitat (high habitat suitability class) represents 26% or 284,626 ha of the Low Use CSE Area for Fur Bearers. The Low Use Area had 62% (666,247 ha) habitat that was considered unsuitable (Nil) for beaver.

Base Case

The Base Case indicates that the amount of high habitat suitability class decreased by 9% to 257,788 ha in the Low Use CSE Area. The Low Use CSE Area has 709,642 ha of habitat considered unsuitable (Nil) for beaver. This represents 66% of the area.

Application Case

The Application Case indicates that the amount of high habitat suitability class was 9% lower the Pre-Development Scenario (same as Base Case) in the Low Use CSE Area. The Low Use CSE Area is predicted to have 709,643 ha of habitat considered unsuitable (Nil) for beaver. This represents 66% of the area.

Statement of Significance

The cumulative decrease in beaver habitat in the Low Use CSE Area from Pre-Development to Application Case is a low magnitude (9%), regional, continuous frequency, long-term, and reversible (5+1+2+3-3). Habitat considered unsuitable (Nil) for beaver increase to 66% of the Intense Use CSE Area. The adverse effect is considered low significance (8). This is considered a **green** situation.

Planned Development Case

The Planned Development Case indicates that the amount of high habitat suitability class decreased by 11% to 253,109 ha in the Low Use CSE Area. The Low Use CSE Area is predicted to have 716,628 ha of habitat considered unsuitable (Nil) for beaver. This represents 66% of the area.

Statement of Significance

The cumulative decrease in beaver habitat in the Low Use CSE Area from Pre-Development to Planned Development Case is a moderate magnitude (>11%), regional, continuous frequency, long-term, and reversible (10+1+2+3-3). Habitat considered unsuitable (Nil) for beaver increase to 66% of the Intense Use CSE Area. The adverse effect is considered moderate significance (13). This is considered a **yellow** situation.

6.4.3.4 Forty Township Study Area (FTSA)

The FTSA is 379,641 ha in area. This area is comprised of 55% Intense Use CSE and the remaining 45% of the area is Moderate Use CSE. The area of each habitat suitability class of each development case and scenario is presented in Table 6-14.

Table 6-14: Changes in Beaver Habitat within the FTSA for Each Development Case compared to Pre-Development Scenario

Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	67	0	0	-	0	-	0	-
Nil	255,870	67	284,802	+11	293,478	+15	300,242	+17
Low	38,388	10	26,591	-31	22,714	-41	20,830	-46
High	85,316	22	68,248	-20	63,449	-26	58,568	-31
Total	379,641	100	379,641		379,641		379,640	

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Pre-Development Scenario

Prior to development high habitat suitability class for beaver represent approximately 22% or 85,316 ha of this area. Prior to industrial development the FTSA had 255,870 ha (67%) of habitat that was considered unsuitable (Nil) for beaver.

Base Case

The high habitat suitability class for beaver has an area of 68,248 ha in the Base Case. This represents a drop of approximately 20% from the Pre-Development Scenario. There are 284,802 ha of habitat considered unsuitable for beaver. This represents 75% of the FTSA.

Application Case

The high habitat suitability class for beaver represents 63,449 ha of the FTSA in the Application Case. This represents a drop of approximately 26% from the Pre-Development Scenario. The percentage of area considered unsuitable for beaver is 293,478 ha. This represents 77% of the FTSA.

Statement of Significance

The cumulative decrease in beaver habitat in the FTSA from Pre-Development to Application Case is a high magnitude (>20%), regional, continuous frequency, long-term, and reversible (15+1+2+3-3). Habitat considered unsuitable (Nil) for beaver increase to 79% of the FTSA. The adverse effect is considered high significance (18). This is considered a **red** situation.

Planned Development Case

The high habitat suitability class for beaver represents 58,568 ha of the FTSA. This represents a drop of approximately 31% from the Pre-Development Scenario. The FTSA had 300,242 ha of habitat that was considered unsuitable (Nil) as beaver habitat in the Planned Development Case. This represents 79% of the FTSA.

Statement of Significance

The cumulative decrease in beaver habitat in the FTSA from Pre-Development to Planned Development Case is a high magnitude (>20%), regional, continuous frequency, long-term, and reversible (15+1+2+3-3). Habitat considered unsuitable (Nil) for beaver increase to 79% of the FTSA. The adverse effect is considered high significance (18). This is considered a **red** situation.

A summary of the changes to beaver habitat and the environmental consequences for each study area and development scenario is presented in Table 6-15.

Table 6-15: Wildlife Habitat Assessment Environmental Consequences for Beaver by Study Areas and Development Scenario and Case

Study Area	Pre-Development	Net Change: Base Case to Pre-Development		Net Change: Application Case to Pre-Development		Net Change: Planned Development Case to Pre-Development	
		%	Environmental Consequence	%	Environmental Consequence	%	Environmental Consequence
Intense Use CSE	Negligible	-23	High	-24	High	-28	High
Moderate Use CSE	Negligible	-17	Moderate	-17	Moderate	-21	High
Low Use CSE	Negligible	-9	Low	-9	Low	-11	Moderate
FTSA	Negligible	-20	High	-26	High	-31	High

6.5 Canada Lynx

6.5.1 Pre-Development Fur Bearers CSE Area

The Fort McKay's traditional Fur Bearers Culturally Significant Ecosystems (CSE) for Canada lynx is 3,811,242 ha in area. The Pre-Development Scenario indicates that the moderate-high and high suitability classes (best Canada lynx habitat) comprise 37% of the total Fur Bearers CSE (Table 6-16). The best Canada lynx habitat is concentrated near the Athabasca River Valley and in the northeast portion and northwest corner of the Fur Bearer CSE (Figure 6-5). Unsuitable habitat (Nil) made up 2% of the lands used by the Fort McKay for Fur Bearer based activities.

Table 6-16: Habitat Suitability Classes for Canada Lynx within the Intense, Moderate and Low Use areas of the Culturally Significant Ecosystems

Habitat Suitability Class	Intense Use CSE		Moderate Use CSE		Low Use CSE		All CSE	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	16,460	2	37,352	2	11,910	1	65,727	2
Nil	42,575	4	31,950	2	18,377	2	92,910	2
Low	243,870	24	356,276	21	316,301	28	916,520	24
Moderate-low	99,296	10	341,329	20	285,841	26	726,522	19
Moderate	64,331	6	351,005	21	189,144	17	604,524	16
Moderate-high	169,877	17	278,754	16	159,079	14	607,757	16
High	364,375	36	294,739	17	138,401	12	797,580	21
Total	1,000,784	100	1,691,405	100	1,119,053	1	3,811,540	100

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

6.5.2 Forty Township Study Area (FTSA)

The FTSA is 379,641 ha. Prior to development high and moderate-high habitat suitability classes for Canada lynx combined represent 88% or 332,147 ha of this area. Prior to industrial development the FTSA had 9,851 ha (3%) of habitat that was considered unsuitable (Nil) for Canada lynx.

6.5.3 Canada Lynx Habitat Impact Assessment

6.5.3.1 Intense Use CSE Area

The changes to the Canada lynx habitat within the Intense Use CSE Area are presented in Table 6-17.

Table 6-17: Changes in Canada Lynx Habitat within the Intense Use CSE Area for Each Development Case Compared to Pre-Development Scenario

Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	16,460	2	0	-	0	-	0	-
Nil	42,575	4	124,489	+185	137,593	+223	177,220	+316
Low	243,870	24	250,352	+3	250,352	+3	250,371	+3
Moderate-low	99,296	10	102,473	+3	102,460	+3	101,861	+3
Moderate	64,331	6	66,431	+3	66,217	+3	64,713	+1
Moderate-high	169,877	17	152,376	-10	150,913	-11	138,710	-18
High	364,375	36	304,663	-16	293,248	-20	267,910	-26
Total	1,000,784	100	1,000,784		1,000,784		1,000,784	

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Pre-Development Scenario

The high and moderate-high habitat suitability classes combined represent approximately 53% of the Pre-Development Canada Lynx CSE Area that is Intense Use. Habitat unsuitable for Canada lynx (Nil) represents approximately 4% of this area.

Pre-Development Scenario

Planned Development Case

LEGEND

- FORT MCKAY 40 TOWNSHIP BLOCK
- TERRESTRIAL LOCAL STUDY AREA
- INDIAN RESERVE
- PROVINCIAL BORDER
- OPEN WATER
- PUBLIC ROADWAY
- RAILROAD

DISTURBED

- DISTURBANCE AREA
- LINEAR DISTURBANCE

CULTURALLY SIGNIFICANT ECOSYSTEM (CSE) AREA

- INTENSE USE CSE (50% UTILIZATION DISTRIBUTION)
- MODERATE USE CSE (75% UTILIZATION DISTRIBUTION)
- LOW USE CSE (95% UTILIZATION DISTRIBUTION)

HABITAT SUITABILITY

- HIGH
- MODERATE HIGH
- MODERATE
- MODERATE LOW
- LOW
- NIL
- CLOUD - NO DATA

50 0 50

SCALE 1:1,400,000 KILOMETRES

REFERENCE

Alberta digital data obtained from AltaLIS Ltd. (September 2004), IHS Energy Ltd. (August 2006), used under license.
Projection: UTM Zone 12 Datum: NAD 83

PROJECT

JACKPINE MINE EXPANSION &
PIERRE RIVER MINE PROJECT

TITLE

CANADA LYNX HABITAT SUITABILITY IN THE FUR BEARER CULTURALLY SIGNIFICANT ECOSYSTEM AREA

PROJECT No.08-1346-0006.5722			SCALE AS SHOWN	REV. 0
DESIGN	BDW	13 Jan. 2009		
GIS	JH	06 Mar. 2009		
CHECK	AR	06 Mar. 2009		
REVIEW	WS	06 Mar. 2009		

FIGURE 6-5

\\CLIENTS\CH2LL\08-1346-0006\mapping\mxd\5722\RSFFort_Mckay_rsa_hsi_lynx.mxd

Base Case

The Base Case indicates a reduction in the amount of high and moderate-high habitat suitability classes (best Canada lynx habitat) to 457,039 ha within the Intense Use CSE Area. This represents a loss of approximately 14% of the highest quality Canada lynx habitat (high and moderate-high habitat suitability class) from this area. The Base Case includes 124,489 ha of habitat unsuitable for Canada lynx in the Intense Use CSE Area. This represents 12% of the area.

Application Case

The Application Case indicates a reduction in the amount of high and moderate-high habitat suitability classes (best Canada lynx habitat) to 444,161 ha within the Intense Use CSE Area. This represents a loss of approximately 17% of the highest quality Canada lynx habitat from this area. The Application Case includes 137,593 ha of habitat unsuitable for Canada lynx in the Intense Use CSE Area. This represents 14% of the area.

Statement of Significance

The cumulative decrease in Canada lynx habitat in the Intense Use CSE Area from Pre-Development to Planned Development Case is a moderate magnitude (17%), regional, continuous frequency, long-term, and reversible (10+1+2+3-3). Habitat considered unsuitable (Nil) for Canada lynx increase to 18% of the Intense Use CSE Area. The adverse effect is considered moderate significance (13). This is considered a **yellow** situation.

Planned Development Case

The Planned Development Case shows the high and moderate-high habitat suitability classes reduced to 406,620 ha within the Intense Use CSE Area. This represents a loss of approximately 24% of the best quality Canada lynx habitat from this area. The Planned Development Case includes 267,910 ha of habitat unsuitable for Canada lynx in the Intense Use CSE Area. This represents 18% of the area.

Statement of Significance

The cumulative decrease in Canada lynx habitat in the Intense Use CSE Area from Pre-Development to Planned Development Case is a high magnitude (>20%), regional, continuous frequency, long-term, and reversible (15+1+2+3-3). Habitat considered unsuitable (Nil) for Canada lynx increase to 18% of the Intense Use CSE Area. The adverse effect is considered high significance (18). This is considered a **red** situation.

6.5.3.2 Moderate Use CSE Area

The changes to the Canada lynx habitat within the Moderate Use CSE Area are presented in Table 6-18.

Table 6-18: Changes in Canada Lynx Habitat within the Moderate Use CSE for Each Development Case compared to Pre-Development Scenario

Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	37,352	2	0	-	0	-	0	-
Nil	31,950	2	85,218	+167	95,113	+198	116,131	+263
Low	356,276	21	379,388	+6	379,388	+6	379,698	+77
Moderate-low	341,329	20	349,561	+2	349,561	+2	347,539	+2
Moderate	351,005	21	355,197	+1	355,197	+1	348,711	-1
Moderate-high	278,754	16	272,445	-2	272,415	-2	262,438	-5
High	294,739	17	249,595	-15	239,730	-19	236,889	-20
Total	1,691,405	100	1,691,405		1,691,405		1,691,405	

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Pre-Development Scenario

The best Canada lynx habitat (high and moderate-high habitat suitability classes) represents 34% (573,493 ha) of the Moderate Use CSE Area in the Pre-Development Scenario. The Moderate Use Area had 2% (31,950 ha) habitat that was considered unsuitable (Nil) as Canada lynx habitat prior to any oil sands development.

Base Case

The Base Case indicates that the amount of high and moderate-high habitat suitability classes changed to 250,040 ha in the Moderate Use CSE Area. This represents a loss of approximately 9% of the best Canada lynx habitat in this area. Habitat considered unsuitable (Nil) for Canada lynx comprised 85,218 ha (5%) of the Moderate Use CSE Area.

Application Case

The Application Case indicates that the amount of high and moderate-high habitat suitability classes decreased to 512,145 ha in the Moderate Use CSE Area. This represents a loss of approximately 11% in the amount of the best Canada lynx

habitat (high and moderate-high habitat suitability class). Habitat considered unsuitable (Nil) for Canada lynx habitat comprised 95,113 ha (6%) of the Moderate Use CSE Area.

Statement of Significance

The cumulative decrease in Canada lynx habitat in the Moderate Use CSE Area from Pre-Development to Application Case is a moderate magnitude (11%), regional, continuous frequency, long-term, and reversible (10+1+2+3-3). Habitat considered unsuitable (Nil) for Canada lynx increase to 6% of the Moderate Use CSE Area. The adverse effect is considered high significance (13). This is considered a **yellow** situation.

Planned Development Case

The Planned Development Case predicts that the amount of high and moderate-high habitat suitability classes reduced to 499,327 ha in the Moderate Use CSE Area. This represents a loss of approximately 13% in the amount of the best Canada lynx habitat (high and moderate-high habitat suitability class) since Pre-Development. The Planned Development Case predicts that the Moderate Use CSE area will have 116,131 ha (10% of area) of unsuitable (Nil) habitat for Canada lynx.

Statement of Significance

The cumulative decrease in Canada lynx habitat in the Moderate Use CSE Area from Pre-Development to Planned Development Case is a moderate magnitude (10-20%), regional, continuous frequency, long-term, and reversible (10+1+2+3-3). Habitat considered unsuitable (Nil) for Canada lynx increase to 10% of the Moderate Use CSE Area. The adverse effect is considered high significance (13). This is considered a **yellow** situation.

6.5.3.3 Low Use CSE Area

The changes to the Canada lynx habitat within the Low Use CSE Area are presented in Table 6-19.

Pre-Development Scenario

The best Canada lynx habitat (high and moderate-high habitat suitability classes) represents 27% or 297,480 ha of the Low Use CSE Area for Fur Bearers. The Low Use CSE Area had 2% (18,377 ha) habitat that was considered unsuitable (Nil) for Canada lynx.

Base Case

The Base Case indicates that the amount of high and moderate-high habitat suitability classes slightly increased to 298,220 ha (<1%) in the Low Use CSE Area.

The Low Use CSE Area has 19,293 ha (2%) of habitat considered unsuitable (Nil) for Canada lynx.

Table 6-19: Changes in Canada Lynx Habitat within the Low Use CSE Area for Each Development Case compared to Pre-Development Scenario

Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	11,910	1	0	-	0	-	0	-
Nil	18,377	2	19,293	+5	19,293	+5	23,716	+29
Low	316,301	28	322,983	+2	322,983	+2	323,760	+2
Moderate-low	285,841	26	289,047	+1	289,047	+1	287,227	0
Moderate	189,144	17	189,511	0	189,511	0	188,673	0
Moderate-high	159,079	14	159,492	0	159,492	0	158,596	0
High	138,401	12	138,728	0	138,728	0	137,082	-1
Total	1,119,053	100	1,119,053		1,119,053		1,119,053	

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Application Case

The Application Case indicates that the amount of high and moderate-high habitat suitability classes remained the same as the Base Case. There was no increase in the amount of habitat from the Base Case that was considered unsuitable (Nil) for Canada lynx.

Statement of Significance

The cumulative decrease in Canada lynx habitat in the Low Use CSE Area from Pre-Development to Application Case is a negligible magnitude (<1%), regional, continuous frequency, long-term, and reversible (0+1+2+3-3). Habitat considered unsuitable (Nil) for Canada lynx increase to 2% of the Low Use CSE Area. The adverse effect is considered negligible significance (3). This is considered a **green** situation.

Planned Development Case

The Planned Development Case indicates that the amount of high and moderate-high habitat suitability classes slightly decreased to 295,678 ha (1% loss) in the Low Use CSE Area. The Low Use CSE Area is predicted to have 23,716 ha (2% of CSE Area) of habitat considered unsuitable (Nil) for Canada lynx.

Statement of Significance

The cumulative decrease in Canada lynx habitat in the Low Use CSE Area from Pre-Development to Planned Development Case is a negligible magnitude (<1%), regional, continuous frequency, long-term, and reversible (0+1+2+3-3). Habitat considered unsuitable (Nil) for Canada lynx increase to 2% of the Low Use CSE Area. The adverse effect is considered negligible significance (3). This is considered a **green** situation.

6.5.3.4 Forty Township Study Area (FTSA)

The FTSA is 379,641 ha. This area is comprised of 55% Intense Use CSE Area and the remaining 45% use area is considered Moderate Use by the Fort McKay community. The changes to the Canada lynx habitat within the FTSA are presented in Table 6-20.

Pre-Development Scenario

Prior to development high and moderate-high habitat suitability classes for Canada lynx combined, represent approximately 88% or 332,147 ha of the FTSA. Prior to oil sands development the FTSA had 9,851 ha (3%) of habitat that was considered unsuitable (Nil) for Canada lynx.

Table 6-20: Changes in Canada Lynx Habitat within the FTSA for Each Development Case compared to Pre-Development Scenario

Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	67	0	0	-	0	-	0	-
Nil	9,851	3	95,260	+867	118,259	+1,100	126,046	+1180
Low	20,330	5	20,208	-1	20,208	-1	20,319	0
Moderate-low	6,373	2	6,368	0	6,355	0	6,355	0
Moderate	10,872	3	10,736	-1	10,522	3	10,426	-4
Moderate-high	63,837	17	52,346	-18	50,852	-20	49,163	-23
High	268,310	71	194,724	-27	173,445	-35	167,331	-38
Total	379,640	100	379,642		379,641		379,640	

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Base Case

The high and moderate-high habitat suitability classes for Canada lynx represent 247,070 ha of the FTSA in the Base Case. This represents a reduction of approximately 26% since oil sands development started. The area of habitat considered unsuitable for Canada lynx increased to 95,260 ha (25% of area).

Application Case

The high and moderate-high habitat suitability classes for Canada lynx are predicted to have an area of 224,297 ha in the FTSA for the Application Case. This represents a reduction of 32% in the best Canada lynx habitat since Pre-Development. The area considered to be unsuitable Canada lynx habitat increased to 118,259 ha (31% of area).

Statement of Significance

The cumulative decrease in Canada lynx habitat in the FTSA from Pre-Development to Application Case is a high magnitude (>20%), regional, continuous frequency, long-term, and reversible (15+1+2+3-3). Habitat considered unsuitable (Nil) for Canada lynx increase to 33% of the FTSA. The adverse effect is considered high significance (18). This is considered a **red** situation.

Planned Development Case

The high and moderate-high habitat suitability classes for Canada lynx are predicted to have an area of 216,494 ha in the FTSA for the Planned Development Case. This represents a reduction of 35% in the best Canada lynx habitat since Pre-Development. The area considered unsuitable Canada lynx habitat increased to 126,046 ha (33% of area).

Statement of Significance

The cumulative decrease in Canada lynx habitat in the FTSA from Pre-Development to Planned Development Case is a high magnitude (>20%), regional, continuous frequency, long-term, and reversible (15+1+2+3-3). Habitat considered unsuitable (Nil) for Canada lynx increase to 33% of the FTSA. The adverse effect is considered high significance (18). This is considered a **red** situation.

A summary of the changes to Canada lynx habitat and the environmental consequences for each study area and development scenario is presented in Table 6-21.

Table 6-21: Wildlife Habitat Assessment Environmental Consequences for Canada Lynx by Study Areas and Development Scenario and Case

Study Area	Pre-Development	Net Change: Base Case to Pre-Development		Net Change: Application Case to Pre-Development		Net Change: Planned Development Case to Pre-Development	
		%	Environmental Consequence	%	Environmental Consequence	%	Environmental Consequence
Intense Use CSE	Negligible	-14	Moderate	-17	Moderate	-24	High
Moderate Use CSE	Negligible	-9	Low	-10	Moderate	-13	Moderate
Low Use CSE	Negligible	+0	Negligible	+0	Negligible	-1	Low
FTSA	Negligible	-26	High	-33	High	-35	High

6.6 Fisher/Marten

6.6.1 Pre-Development Fur Bearers CSE

The Fort McKay's traditional Fur Bearers Culturally Significant Ecosystems (CSE) for fisher and marten is 3,811,242 ha in area. The pre-development scenario indicates that the moderate-high and high suitability class (best fisher and marten habitat) comprises 25% of the total Fur Bearers CSE (Table 6-22). The best fisher and marten habitat is concentrated near the Athabasca River Valley and in the northeast portion and northwest corner of the Fur Bearer CSE (Figure 6-6). Unsuitable habitat (Nil) made up 2% of the lands used by the Fort McKay for fur bearers based activities in the Pre-development Scenario.

Table 6-22: Habitat Suitability Classes for Fisher and Marten within the Intense, Moderate and Low Use areas of the Culturally Significant Ecosystems

Habitat Suitability Class	Intense Use CSE		Moderate Use CSE		Low Use CSE		All CSE	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	16,460	2	37,352	2	11,910	1	65,722	2
Nil	42,575	4	31,950	2	18,377	2	92,910	2
Low	415,212	41	771,033	46	656,063	59	1,842,308	48
Moderate-low	69,261	7	348,898	21	205,546	18	623,705	16
Moderate	37,431	4	141,394	8	69,446	6	248,271	7
Moderate-high	103,989	10	133,879	8	64,725	6	302,593	8
High	315,856	32	226,899	13	92,986	8	635,741	17
Total	1,000,784	100	1,691,405	100	1,119,053	100	3,811,250	100

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

6.6.2 Pre-Development FTSA

The FTSA is 379,640 ha in area. Prior to development high and moderate-high habitat suitability classes for fisher and marten combined represent 67% or 254,168 ha of this area. Prior to industrial development the FTSA had 9,851 ha (3%) of habitat that was considered unsuitable (Nil) fisher and marten habitat.

6.6.3 Fisher/Marten Habitat Impact Assessment

6.6.3.1 Intense Use CSE Area

The changes to the fisher and marten habitat within the Intense Use CSE Area are presented in Table 6-23.

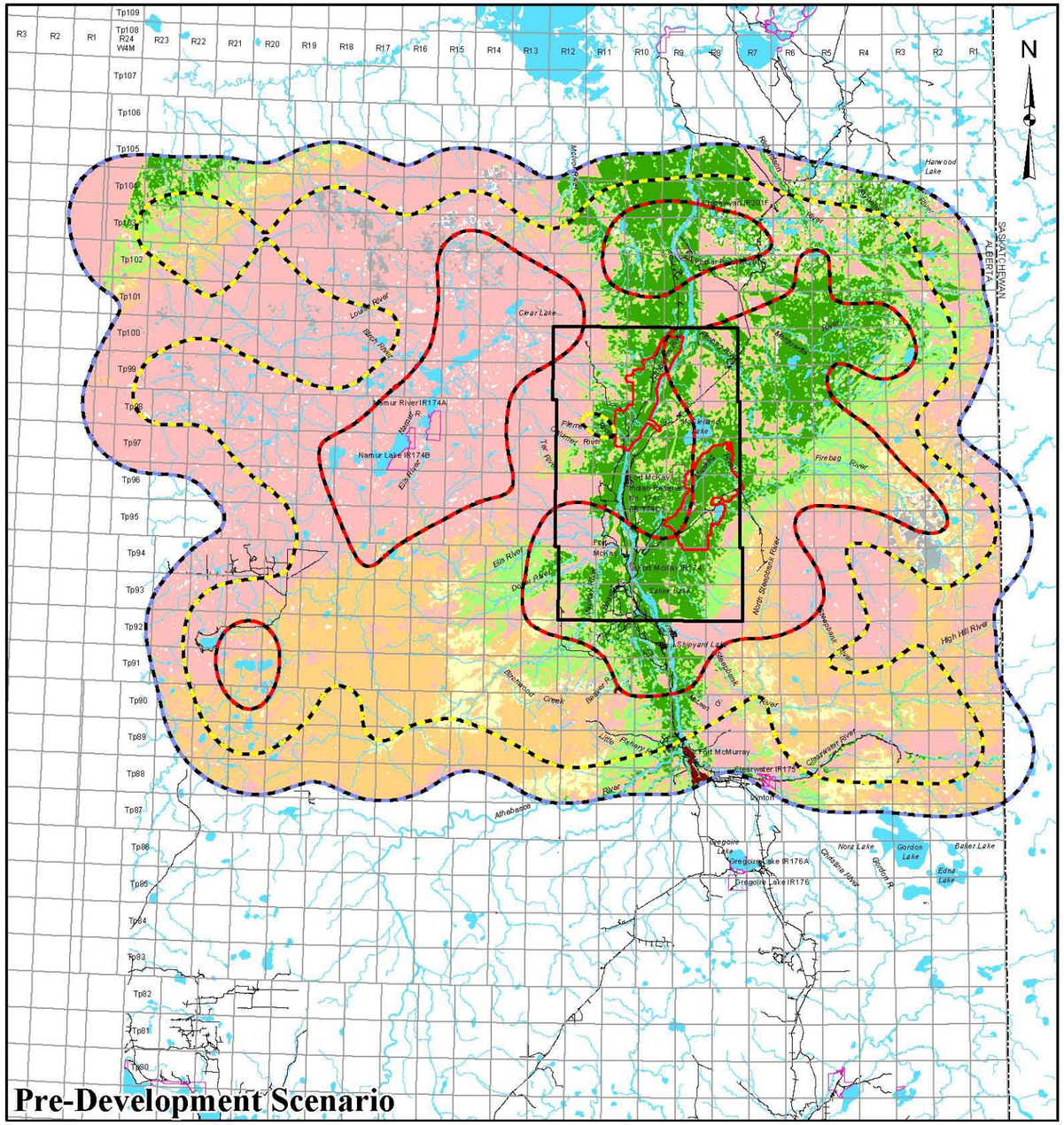
Table 6-23: Changes in Fisher and Marten Habitat within the Intense Use CSE Area for Each Development Case Compared to Pre-Development Scenario

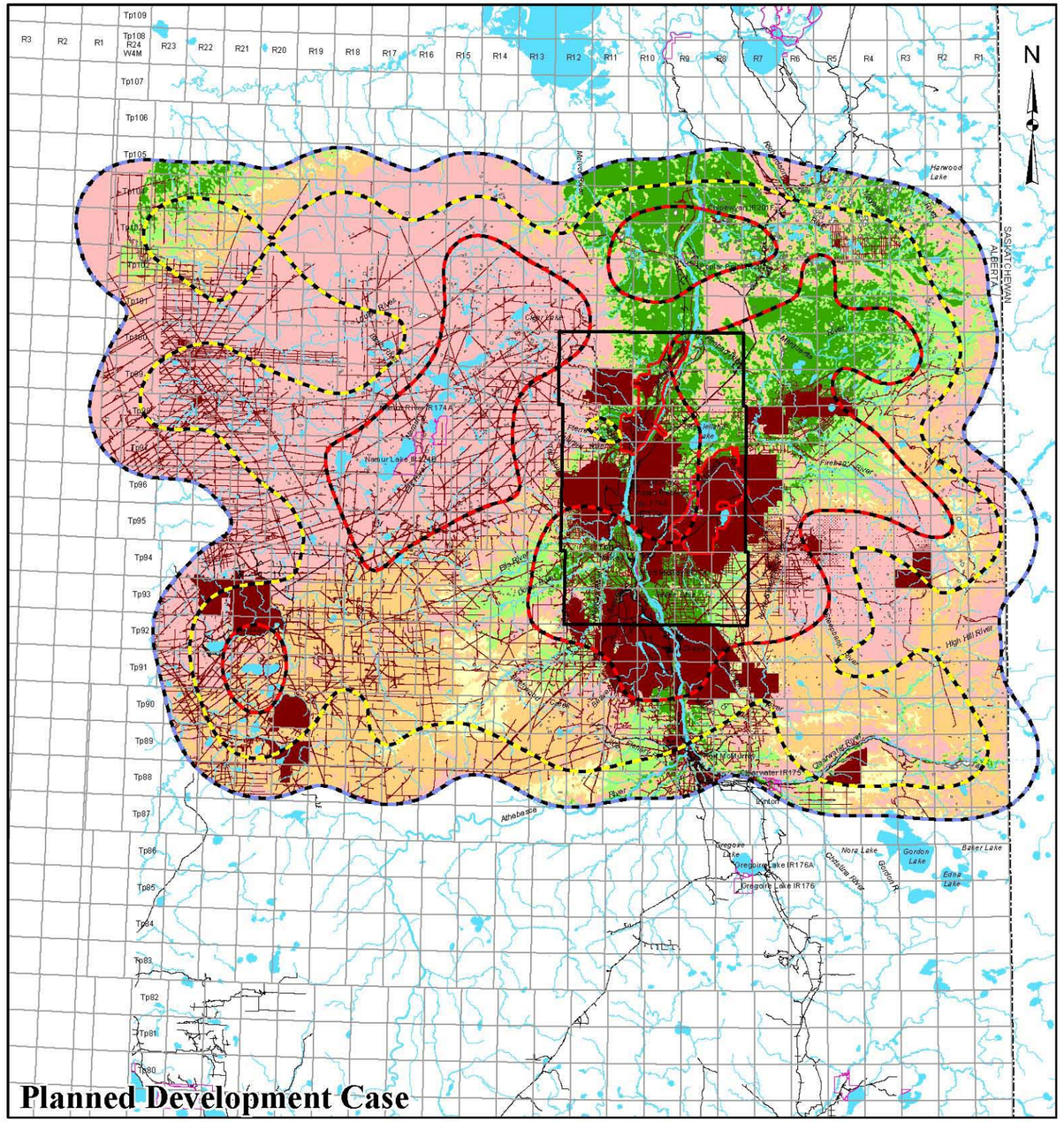
Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	16,460	2	0	-2	0	-2	0	-2
Nil	42,575	4	124,489	+292	137,593	+323	177,220	+416
Low	415,212	41	400,564	-4	398,365	-4	400,930	-3
Moderate-low	69,261	7	65,704	-5	65,486	-5	62,137	-10
Moderate	37,431	4	34,109	-9	33,943	-9	31,974	-15
Moderate-high	103,989	10	98,776	-5	98,187	-6	87,665	-16
High	315,856	32	277,142	-12	267,209	-15	240,857	-24
Total	1,000,784	100	1,000,784		1,000,784		1,000,784	

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Pre-Development Scenario

The high and moderate-high habitat suitability classes for fisher and marten represent approximately 42% (419,845 ha) of the Pre-Development Fur Bearer Intense Use CSE area. Habitat unsuitable for fisher and marten (Nil) represents approximately 4% of this area.





LEGEND

- FORT MCKAY 40 TOWNSHIP BLOCK
- TERRESTRIAL LOCAL STUDY AREA
- INDIAN RESERVE
- PROVINCIAL BORDER
- OPEN WATER
- PUBLIC ROADWAY
- RAILROAD

DISTURBED

- DISTURBANCE AREA
- LINEAR DISTURBANCE

CULTURALLY SIGNIFICANT ECOSYSTEM (CSE) AREA

- INTENSE USE CSE (50% UTILIZATION DISTRIBUTION)
- MODERATE USE CSE (75% UTILIZATION DISTRIBUTION)
- LOW USE CSE (95% UTILIZATION DISTRIBUTION)

HABITAT SUITABILITY

- HIGH
- MODERATE HIGH
- MODERATE
- MODERATE LOW
- LOW
- NIL
- CLOUD - NO DATA

50 0 50

SCALE 1:1,400,000 KILOMETRES

REFERENCE

Alberta digital data obtained from AltaLIS Ltd. (September 2004), IHS Energy Ltd. (August 2006), used under license.
Projection: UTM Zone 12 Datum: NAD 83

PROJECT

JACKPINE MINE EXPANSION &
PIERRE RIVER MINE PROJECT

TITLE

FISHER/MARTEN HABITAT SUITABILITY IN THE UTILIZATION DISTRIBUTION OF FUR BEARER CULTURALLY SIGNIFICANT ECOSYSTEM AREA

PROJECT No.08-1346-0006.5722			SCALE AS SHOWN	REV. 0
DESIGN	BDW	13 Jan. 2009		
GIS	JH	06 Mar. 2009		
CHECK	AR	06 Mar. 2009		
REVIEW	WS	06 Mar. 2009		

FIGURE 6-6

I:\CLIENTS\SHELL\08-1346-0006\mapping\mxd\6722RSFTort_Mckay_rsa_hsi_fisher.mxd

Base Case

The Base Case indicates a reduction in the amount of high and moderate-high habitat suitability classes (best fisher and marten habitat) to 375,918 ha within the Intense Use CSE Area. This represents a loss of approximately 10% of the highest quality fisher and marten habitat from this area. The Base Case includes 124,489 ha of habitat unsuitable for fisher and marten in the Intense Use CSE Area. This represents 8% of the Intense Use CSE Area.

Application Case

The Application Case indicates a reduction in the amount of high and moderate-high habitat suitability classes (best fisher and marten habitat) to 365,396 ha within the Intense Use CSE Area. This represents a loss of approximately 13% of the highest quality fisher and marten habitat from this area. The Application Case includes 137,593 ha of habitat unsuitable for fisher and marten in the Intense Use CSE Area. This represents 10% of the Intense Use CSE Area.

Statement of Significance

The cumulative decrease in fisher and marten habitat in the Intense Use CSE Area from Pre-Development to Application Case is a moderate magnitude (13%), regional, continuous frequency, long-term, and reversible (10+1+2+3-3). Habitat considered unsuitable (Nil) for fisher and marten increase to 13% of the Intense Use CSE Area. The adverse effect is considered high significance (13). This is considered a **yellow** situation.

Planned Development Case

The Planned Development Case shows the high and moderate-high habitat suitability classes reduced to 328,522 ha within the Intense Use CSE area. This represents a loss of approximately 22% of the best quality fisher and marten habitat from this area. The Planned Development Case includes 177,220 ha of habitat unsuitable for fisher and marten in the Intense Use CSE Area. This represents 13% of this area.

Statement of Significance

The cumulative decrease in fisher and marten habitat in the Intense Use CSE Area from Pre-Development to Planned Development Case is a high magnitude (>20%), regional, continuous frequency, long-term, and reversible (15+1+2+3-3). Habitat considered unsuitable (Nil) for fisher and marten increase to 13% of the Intense Use CSE Area. The adverse effect is considered high significance (18). This is considered a **red** situation.

6.6.3.2 Moderate Use CSE Area

The changes to the fisher and marten habitat within the Moderate Use CSE Area are presented in Table 6-24.

Table 6-24: Changes in Fisher and Marten Habitat within the Moderate Use CSE for Each Development Case Compared to Pre-Development Scenario

Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	37,352	2	0	-	0	-	0	-
Nil	31,950	2	85,218	+167	95,113	+198	116,131	+263
Low	771,033	46	797,428	+3	797,330	+3	808,971	+5
Moderate-low	348,898	21	344,569	-1	344,463	-1	332,423	-5
Moderate	141,394	8	138,459	-2	138,368	-2	131,266	-7
Moderate-high	133,879	8	134,214	0	133,679	0	126,756	-5
High	226,899	13	191,517	-16	182,452	-20	175,857	-23
Total	1,691,405	100	1,691,405		1,691,405		1,691,405	0.00

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Pre-Development Scenario

The best fisher and marten habitat (high and moderate-high habitat suitability classes) represents 21% (360,778 ha) of the Moderate Use CSE Area in the Pre-Development Scenario. The Moderate Use CSE Area had 2% (31,950 ha) habitat that was considered unsuitable (Nil) as fisher and marten habitat prior to any oil sands development.

Base Case

The Base Case indicates that the amount of high and moderate-high habitat suitability classes decreased to 325,731 ha in the Moderate Use CSE Area. This represents a loss of 10% of the best fisher and marten habitat in the Moderate Use CSE Area. Habitat considered unsuitable (Nil) for fisher and marten habitat increased to 85,218 ha. This represents 2% of the Moderate Use CSE Area.

Application Case

The Application Case indicates that the amount of high and moderate-high habitat suitability classes decreased to 316,131 ha in the Moderate Use CSE Area. This represents a loss of approximately 12% of the best fisher and marten habitat (high and moderate-high habitat suitability class). Habitat considered unsuitable (Nil) for

fisher and marten habitat is predicted to increase to 95,113 ha. This represents 4% of the Moderate Use CSE Area.

Statement of Significance

The cumulative decrease in fisher and marten habitat in the Moderate Use CSE Area from Pre-Development to Application Case is a moderate magnitude (12%), regional, continuous frequency, long-term, and reversible (10+1+2+3-3). Habitat considered unsuitable (Nil) for fisher and marten increase to 5% of the Moderate Use CSE Area. The adverse effect is considered moderate significance (13). This is considered a **yellow** situation.

Planned Development Case

The Planned Development Case predicts that the amount of high and moderate-high habitat suitability classes reduced to 302,613 ha in the Moderate Use CSE Area. This represents a loss of 16% of the best fisher and marten habitat since Pre-Development. The Planned Development Case predicts that the Moderate Use CSE area will have 116,131 ha of habitat that is unsuitable (Nil) for fisher and marten. This represents approximately 5% of the Moderate Use CSE Area.

Statement of Significance

The cumulative decrease in fisher and marten habitat in the Moderate Use CSE Area from Pre-Development to Planned Development Case is a moderate magnitude (16%), regional, continuous frequency, long-term, and reversible (10+1+2+3-3). Habitat considered unsuitable (Nil) for fisher and marten increase to 5% of the Moderate Use CSE Area. The adverse effect is considered moderate significance (13). This is considered a **yellow** situation.

6.6.3.3 Low Use CSE Area

The changes to the Fisher/Marten habitat within the Low Use CSE Area are presented in Table 6-25.

Pre-Development Scenario

The best fisher and marten habitat (high and moderate-high habitat suitability classes) represents 14% or 157,711 ha of the Low Use Zone of the CSE area for Fur Bearers. The Low Use CSE Area had 2% (18,377 ha) habitat that was considered unsuitable (Nil) as fisher and marten habitat.

Base Case

The Base Case indicates that the amount of high and moderate-high habitat suitability classes increased to 163,919 ha or by 4% in the Low Use CSE Area. The

habitat that was considered unsuitable (Nil) for fisher and marten increased to 19,293 ha. This represents 2% of the Low Use CSE Area.

Table 6-25: Changes in Fisher and Marten Habitat within the Low Use CSE for Each Development Case Compared to Pre-Development Scenario

Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	11,910	1	0	-	0	-	0	-
Nil	18,377	2	19,293	+5	19,293	+5	23,716	+29
Low	656,063	59	661,193	+1	661,193	+1	662,363	+1
Moderate-low	205,546	18	204,999	0	204,999	0	200,177	0
Moderate	69,446	6	69,650	0	69,650	0	69,500	0
Moderate-high	64,725	6	68,719	+6	68,719	+6	68,516	+6
High	92,986	8	95,200	+2	95,200	+2	94,780	+2
Total	1,119,053	100	1,119,053		1,119,053		1,119,053	

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Application Case

The Application Case indicates that the amount of high and moderate-high habitat suitability classes remained the same as the Base Case. There was no increase in the amount of habitat from the Base Case that was considered unsuitable (Nil) for fisher and marten.

Statement of Significance

The cumulative decrease in fisher and marten habitat in the Low Use CSE Area from Pre-Development to Application Case is a low magnitude (4%), regional, continuous frequency, long-term, and reversible (5+1+2+3-3). Habitat considered unsuitable (Nil) for fisher and marten represents 2% of the Low Use CSE Area. The adverse effect is considered low significance (8). This is considered a **green** situation.

Planned Development Case

The Planned Development Case indicates that the amount of high and moderate-high habitat suitability classes slightly increased to 163,296 or by approximately 4% in the Low Use CSE Area from the Pre-Development Scenario. The habitat that was considered unsuitable (Nil) for fisher and marten increased to 23,716 ha. This represents 2% of the Low Use CSE Area.

Statement of Significance

The cumulative decrease in fisher and marten habitat in the Low Use CSE Area from Pre-Development to Planned Development Case is a low magnitude (4%), regional, continuous frequency, long-term, and reversible (5+1+2+3-3). Habitat considered unsuitable (Nil) for fisher and marten represents 2% of the Low Use CSE Area. The adverse effect is considered low significance (8). This is considered a **green** situation.

6.6.3.4 Forty Township Study Area (FTSA)

The FTSA is 379,641 ha. This area is comprised of 55% Intense Use CSE Area for Fur Bearers and the remaining 45% use area is considered Moderate Use CSE Area by the Fort McKay. The changes to the fisher and marten habitat within the FTSA are presented in Table 6-26.

Table 6-26: Changes in Fisher and Marten Habitat within the FTSA for Each Development Case Compared to Pre-Development Scenario

Habitat Suitability Class	Pre-Development Scenario		Base Case		Application Case		Planned Development Case	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Clouds[1]	67	0	0	-	0	-	0	-
Nil	9,851	3	95,260	+867	118,259	+1,100	126,046	+1,180
Low	88,815	23	61,038	-31	58,742		66,392	-34
Moderate-low	14,959	4	12,978	-13	12,654	-15	11,423	-24
Moderate	11,780	3	11,131	-1	10,873	-8	9,966	-15
Moderate-high	45,371	12	40,449	-11	39,324	-13	35,479	-22
High	208,797	55	158,786	-24	139,788	-33	130,335	-38
Total	379,640	100	379,642		379,640		379,641	

[1]Habitat assessment in the Pre-Development Scenario is affected by the presence of clouds in the satellite imagery available for that time period.

Pre-Development Scenario

Prior to development high and moderate-high habitat suitability classes for fisher and marten combined represent approximately 67% or 254,168 ha of the FTSA. Prior to oil sands development the FTSA had 9,851 ha (3%) of habitat that was considered unsuitable (Nil) fisher and marten habitat.

Base Case

The high and moderate-high habitat suitability classes for fisher and marten represent 199,235 ha of the FTSA in the Base Case. This represents a reduction of approximately 22% since the Pre-Development Scenario. The area considered unsuitable fisher and marten increased to 95,260 ha. This represents 23% of the FTSA.

Application Case

The high and moderate-high habitat suitability classes for fisher and marten are predicted to have an area of 179,112 ha in the FTSA for the Application Case. This represents a reduction of 30% in the best fisher and marten habitat since the Pre-Development Scenario. The percentage of area considered unsuitable fisher and marten is 29% of the FTSA.

Statement of Significance

The cumulative decrease in fisher and marten habitat in the FTSA from Pre-Development to Application Case is a high magnitude (>20%), regional, continuous frequency, long-term, and reversible (15+1+2+3-3). Habitat considered unsuitable (Nil) for fisher and marten increase to 31% of the FTSA. The adverse effect is considered high significance (18). This is considered a **red** situation.

Planned Development Case

The high and moderate-high habitat suitability classes for fisher and marten are predicted to have an area of 165,814 ha in the FTSA for the Planned Development Case. This represents a reduction of 35% in the best fisher and marten habitat since the Pre-Development Scenario. The area of habitat considered unsuitable fisher and marten increased to 23,716 ha. This represents 31% of the FTSA.

Statement of Significance

The cumulative decrease in fisher and marten habitat in the FTSA from Pre-Development to Planned Development Case is a high magnitude (>20%), regional, continuous frequency, long-term, and reversible (15+1+2+3-3). Habitat considered unsuitable (Nil) for fisher and marten increase to 31% of the FTSA. The adverse effect is considered high significance (18). This is considered a **red** situation.

A summary of the changes to Canada lynx habitat and the environmental consequences for each study area and development scenario is presented in Table 6-27.

Table 6-27: Wildlife Habitat Assessment Environmental Consequences for Fisher/Marten by Study Areas and Development Scenario and Case

Study Area	Pre-Development	Net Change: Base Case to Pre-Development		Net Change: Application Case to Pre-Development		Net Change: Planned Development Case to Pre-Development	
		%	Environmental Consequence	%	Environmental Consequence	%	Environmental Consequence
Intense Use CSE	Negligible	-10	Moderate	-13	Moderate	-22	High
Moderate Use CSE	Negligible	-10	Low	-12	Moderate	-16	Moderate
Low Use CSE	Negligible	-4	Low	-4	Low	+1	Negligible
FTSA	Negligible	-22	High	-30	High	-35	High

6.7 Conclusions and Significance Assessment

Ecological Context

The environmental consequence of habitat change is high for all indicator wildlife species in the Intense Use CSE Area and in the FTSA (Table 6-28). Overall, most development disturbance occurs in the best wildlife habitat for moose, Canada lynx, and fisher and marten, which also overlaps with the Fort McKay's most important wildlife use areas. In addition, recent moose surveys have shown that moose populations have decreased in WMU 531. This evidence suggests that habitat loss from oil sands development is adversely affecting moose populations. In this assessment, sufficient population data for other wildlife species were not available and hence were not analyzed. However, if moose populations are being adversely affected by oil sand development, it is likely that other wildlife species populations are also being adversely affected. Both Canada lynx and fisher/marten have lost large amounts of high quality habitat. As a precautionary approach, it should be assumed that other wildlife species populations are being adversely affected until shown otherwise.

Probability of Occurrence

ASRD surveys have shown that there has been a moose population reduction in WMU 531, which is located in the northwest corner of Fort McKay's Traditional Lands. Further, moose densities appear to be declining in Fort McKay's Traditional Lands. Adverse effects on to moose habitat and moose populations have occurred.

Table 6-28: Wildlife Habitat Assessment Environmental Consequences by Study Areas and Development Scenario and Case

Wildlife Species and Study Area	Pre-Development	Net Change: Base Case to Pre-Development		Net Change: Application Case to Pre-Development		Net Change: Planned Development Case to Pre-Development	
		%	Environmental Consequence	%	Environmental Consequence	%	Environmental Consequence
Moose							
Intense Use CSE	Negligible	-20	Moderate	-23	High	-30	High
Moderate Use CSE	Negligible	+0	Negligible	+0	Negligible	-1	Low
Low Use CSE	Negligible	+0	Negligible	+0	Negligible	-0	Negligible
FTSA	Negligible	-25	High	-32	High	-35	High
Beaver							
Intense Use CSE	Negligible	-23	High	-24	High	-28	High
Moderate Use CSE	Negligible	-17	Moderate	-17	Moderate	-21	High
Low Use CSE	Negligible	-9	Low	-9	Low	-11	Moderate
FTSA	Negligible	-20	High	-26	High	-31	High
Canada lynx							
Intense Use CSE	Negligible	-14	Moderate	-17	Moderate	-24	High
Moderate Use CSE	Negligible	-9	Low	-10	Moderate	-13	Moderate
Low Use CSE	Negligible	+0	Negligible	+0	Negligible	-1	Low
FTSA	Negligible	-26	High	-33	High	-35	High
Fisher/Marten							
Intense Use CSE	Negligible	-10	Moderate	-13	Moderate	-22	High
Moderate Use CSE	Negligible	-10	Low	-12	Moderate	-16	Moderate
Low Use CSE	Negligible	-4	Low	-4	Low	+1	Negligible
FTSA	Negligible	-22	High	-30	High	-35	**High**

Uncertainty

The RSF and HSI computer models used to assess habitat loss did not perform well (i.e., moose, Canada lynx, and fisher/marten models) or were not validated (i.e., beaver model). Shell indicated that the poor results from their RSF models were likely a result of wildlife species selecting habitat at a finer scale and level of detail (e.g., stand age) than the vegetation data used in the model. These RSF models need to be refined to improve their ability to predict wildlife impacts.

The moose population and density data presented in this report are based on field observations using similar aerial survey methods. However, because these data do not have confidence limits it is not possible to say, with statistical confidence, that there has been a reduction in moose density. These data should be interpreted as a general trend only.

However, moose survey data from WMU 531 in the northwest portion of the Fort McKay's Traditional Lands do show a statistically significant reduction in moose populations. These results have enough scientific certainty to trigger specific management actions (e.g., reduction in moose harvest).

Environmental Consequence

The conclusions of this assessment are presented in Table 6-28. Conclusions are based on the changes in quantity of high quality wildlife habitat for the Development Cases compared to the Pre-Development Scenario.

There are high and negative environmental consequences to moose, beaver, Canada lynx, and fisher/marten habitat in the lands used most intensively by Fort McKay Community (Intense Use CSE Area). High and negative environmental consequences to moose, Canada lynx, and fisher/marten were also found in the FTSA.

The high and negative environmental consequent to moose and beaver habitat indicates a major threat to these Cultural Keystone Species. Further, moose populations have recently been found to be lower than in previous surveys in the northwest portion (WMU 531) of Fort McKay's Traditional Lands.

Land that is considered unsuitable for wildlife (Nil habitat suitability class) comprises a significant portion of the land and this proportion is increasing as more development occurs. In most cases it does not appear that unsuitable habitat is being reclaimed or progressing to habitat with a higher wildlife habitat value (e.g., low or moderate habitat values).

6.8 Shell's Proposed Mitigation and Monitoring

In the Jackpine Mine Expansion and Pierre River Mine Project application, Shell's primary mitigation is to reduce impacts to wildlife habitat is through reclamation to equivalent land capability. Shell has committed to a progressive reclamation plan to

speed up the reestablishment of lost wildlife habitat. Further, Shell is promising to reduce habitat destruction by leaving remaining forested areas undisturbed, maintaining a 250-metres wildlife corridor along the Athabasca River, and retaining treed buffers around or near watercourses (e.g., Muskeg River).

Shell has committed to wildlife monitoring that considers existing programs and being statistically defensible. Specific examples include wildlife monitoring of reclaimed areas and working with the Integrated Landscape Management Group at the University of Alberta on a regional wildlife movement study.

The above measures are acceptable to Fort McKay, however while reclamation is critical, Fort McKay does not consider it mitigation due to the length of time the land is disturbed and uncertainties associated with recreating wildlife habitat and the length of time it would take to re-colonize that habitat.

6.9 Fort McKay's Recommendations

The Fort McKay Specific Assessment has shown that a large amount of wildlife habitat has been removed from Fort McKay's Traditional Lands. The environmental consequence of habitat change is high for all indicator wildlife species in the Intense Use CSE Area and in the FTSA (Table 6-28). Overall, most development disturbance occurs in the best wildlife habitat for moose, Canada lynx, and fisher and marten, which also overlaps with the Fort McKay's most important wildlife use areas.

However, the populations of the wildlife species assessed in this study are poorly understood. There is evidence that there are negative environmental impacts on moose populations in the northwest portion of Fort McKay's Traditional Lands. Moose populations observed in 2009 aerial surveys completed by ASRD were less than those observed in aerial surveys completed in 2001 and 1993/1994. Further, density estimates for moose in Fort McKay's Traditional Lands appear to be decreasing since 1976. A precautionary approach regarding wildlife habitat loss and impacts to wildlife populations should be taken prior to further development and habitat loss in the oil sands region.

The highest wildlife habitat impacts are within the land used the most by the Community (Intense Use CSE). Not surprisingly, these areas typically have the highest quality wildlife habitat (Figure 6-1, Figure 6-4 and Figure 6-6). Unfortunately these areas also contain vast mineable oil resources that require habitat destruction for oil extraction.

All of Fort McKay's recommendations regarding wildlife address cumulative effects, which Shell's Projects contribute to. The following actions should be taken to further understand and address the impacts on wildlife populations:

- Immediate reduction of moose harvest levels allowed for non-Aboriginal hunters throughout the entire oil sands region until current moose populations are

known. Current moose populations are unknown in many of the remaining (unmined) wildlife management units in the oil sands region.

- Completion of moose surveys for all oil sands region WMUs within the next two years to determine the moose population. Once the population is known, an appropriate management plan and actions be taken in consultation with Fort McKay.
- Determination of the remaining population of Canada Lynx, marten, fisher, beaver and other wildlife populations. The population levels for these species are currently poorly understood. Once populations are determined, development of management and mitigation methods in consultation with Fort McKay.

The following recommendations will reduce this land-use conflict and impact to wildlife populations in Fort McKay's Traditional Lands:

- Establishment of conservation offsets, including protected areas, to preserve wildlife habitat and populations and provide opportunities for traditional land use in proximity to the Community of Fort McKay.
- Planning of oil sands development based upon wildlife habitat values and traditional land use. For example, preferentially allow oil development in land that is less valuable to Fort McKay and has lower wildlife habitat quality values.
- Limit approvals to developments that have the lowest environmental impacts on wildlife habitat. For example, in-situ developments with low emissions with effective wildlife mitigation (such as wildlife pipeline crossings) in low quality wildlife habitat.
- Acceleration of reclamation of disturbed areas in the mineable oil sands area. Additional development approval based upon reclamation performance and re-establishment of effective wildlife habitat. For example, approval of further development be contingent on the amount of moose habitat re-established in reclaimed areas or wildlife habitat protected with conservation offsets.

6.10 References

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