

10. WILDLIFE

Introduction

The findings of the environmental impact assessment for wildlife for the Mackenzie Gas Project (see EIS Volume 5, Section 10) were based on the following components (see Section 1, Introduction, of this document):

- anchor fields
- gathering pipelines and associated facilities
- NGL and gas pipeline corridor
- infrastructure
- NGTL NWML Dickins Lake Section

The two NGTL pipeline sections, Dickins Lake Section and Vardie River Section, are located in northwestern Alberta. The Dickins Lake assessment was included in the EIS. This EIS supplemental information includes:

- new information for the Vardie River Section
- an impact assessment for northwestern Alberta based on the new information
- a combined project effects assessment that includes the Mackenzie Gas Project and NGTL's Dickins Lake and Vardie River sections

The assessment is based on previously submitted information in the EIS (see Volume 5, Section 10) as well as additional modelling of effects using updated information about vegetation along the Vardie River Section.

See under EIS Summary for a summary of the EIS findings for wildlife.

EIS Summary

Potential effects from the Mackenzie Gas Project on wildlife (see EIS Volume 5, Section 10) were related primarily to:

- reduced habitat from direct habitat loss
- barriers to wildlife movement
- increased mortality from human-wildlife conflicts

The magnitude of effects on habitat availability for wildlife was low, but moderate when sensory disturbance was an important factor. Some effects extended into the far future because of the length of time it takes for vegetation, particularly lichen, to recover and for habitat use to be restored. No significant effects from the Mackenzie Gas Project on habitat availability, movement or mortality were predicted.

Effects were assessed on the following key indicators (KIs):

- habitat availability
- wildlife movements
- wildlife mortality

Study Area

To predict and evaluate potential environmental effects on wildlife for the Vardie River Section, two study areas were designed for wildlife VCs:

- a local study area (LSA) encompassing a 1-km-wide strip centred on the pipeline
- a regional study area (RSA) encompassing a 60-km-wide strip centred on the pipeline

Baseline

Methods

No wildlife-specific fieldwork was completed for the Vardie River Section. However, new vegetation data was used to complete the habitat modelling.

Baseline Conditions

Wildlife baseline conditions along the Vardie River Section are expected to be similar to those along the Dickins Lake Section.

Wildlife Valued Components

The following VCs were used for the assessment on the Vardie River Section:

- woodland caribou
- moose
- marten
- lynx
- beaver
- lesser scaup
- peregrine falcon
- lesser yellowlegs
- boreal chickadee

Wildlife VCs were selected for assessment from a list of candidate species that had one or a combination of the following:

- regulatory status designation
- economic or public profile value to northern communities
- particular ecological importance

For information sources used in the selection process, see EIS Volume 3, Section 10. Species with a regulatory status designation are those that the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has ranked as sensitive to disturbance. They also include species listed under the federal *Species at Risk Act* (SARA), and for species in Alberta, under *Alberta Wild Species at Risk* (ASRD 2000) and *The General Status of Alberta Wild Species 2000* (AENV 2000).

The suite of selected VCs represents a diversity of species, habitats and ecosystems, following recent recommendations for using a suite of indicators as a conservation tool (Carignan and Villard 2002; Roberge and Angelstam 2004). Endemic and unique species were considered under the selection process.

Several other wildlife species occur in the study area but were not included as VCs because:

- they have low potential to be affected by the project because of marginal range in the project area, e.g., grizzly bear, wood bison and trumpeter swan
- mitigation measures designed to protect their habitat or populations would be developed for another VC already selected. For example, protection of the wide-ranging woodland caribou and Canada lynx would also mitigate potential effects on species such as wolverine. Key habitat requirements and biology of some birds were similar to other selected species, e.g., white-winged scoters, or they were considered unlikely to be affected at a biologically meaningful level, e.g., American tree sparrow.

Effects on Habitat Availability

Effect Pathways

Potential effects of construction, operations and decommissioning and abandonment on habitat availability in the Vardie River Section include:

- sensory disturbance
- vegetation clearing
- altered human and predator access

The effect pathway diagram for habitat availability (see Figure 10-1) is the same as that in EIS Volume 5, Section 10. It shows the key and intermediate pathways by which wildlife habitat availability could be affected along the Dickins Lake and Vardie River sections.

The pathway not applicable to the Vardie River Section was local change in vegetation health because of exposure to air emissions.

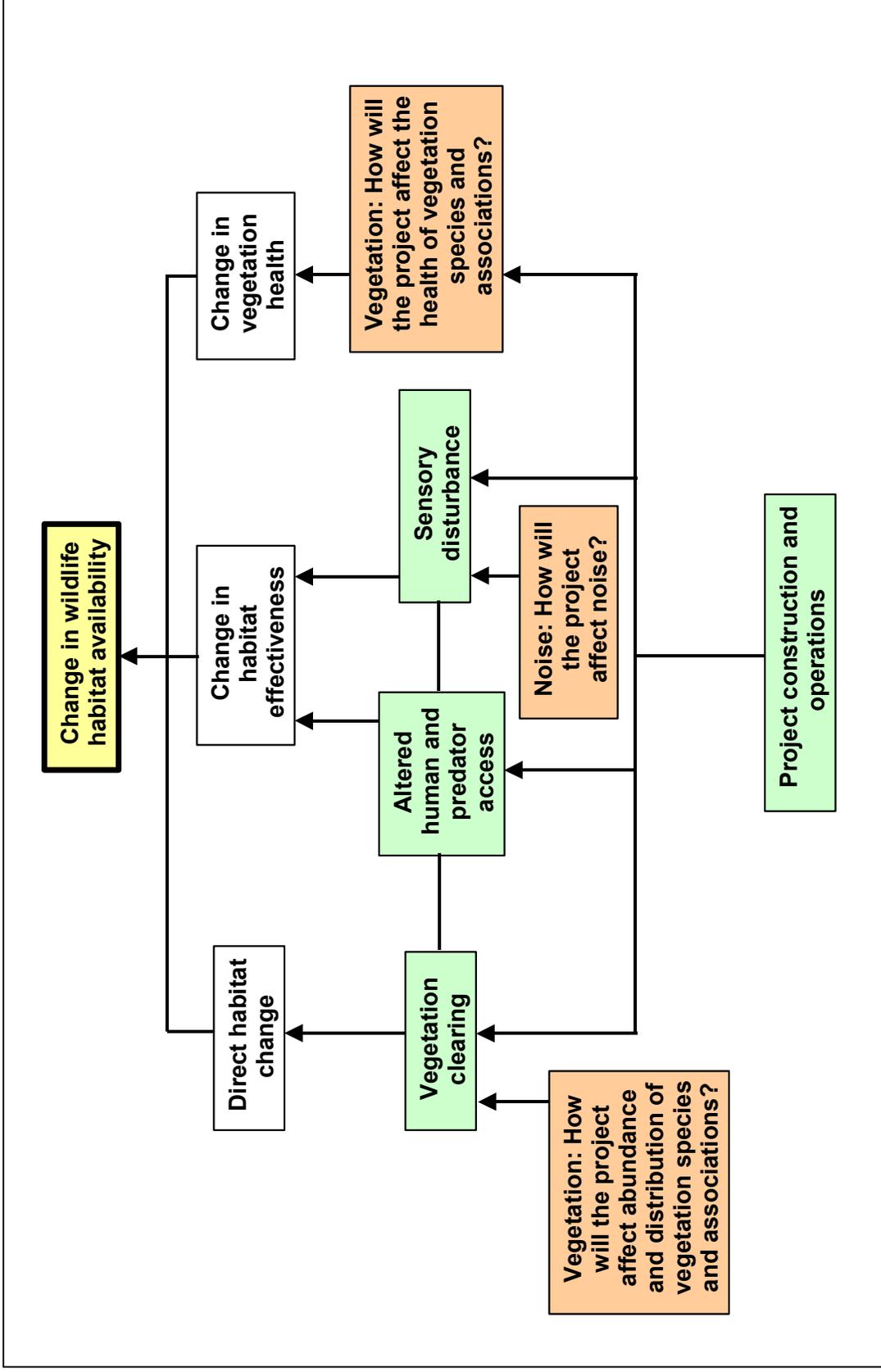


Figure 10-1: Terrestrial Mammal Effect Pathways – Habitat Availability

Effect Attributes

The attributes of the effects on wildlife habitat availability were rated for direction, magnitude, geographic extent and duration (see Table 10-1).

Table 10-1: Definitions of Effect Attributes on Wildlife

Attribute	Definition
Direction	
Adverse	Impact ¹ will cause an adverse change in a measurable parameter ² relative to baseline conditions or trends
Neutral	Impact will cause no change in a measurable parameter relative to baseline conditions or trends
Positive	Impact will cause a positive change in a measurable parameter relative to baseline conditions or trends
Magnitude	
No effect	No change in the VC
Low	An individual or group within a population ³ found in a localized area, such as in the LSAs or RSAs, might be affected
Moderate	A part of a regional population within the LSAs or RSAs might be affected, changing the abundance or distribution of the VC and affecting opportunities for hunting, trapping or viewing wildlife as currently practiced
High	An entire population within the LSAs or RSAs might be affected, changing abundance or distribution to such an extent that the population would not likely return to its previous level resulting in reduced population viability and unsustainable harvest compared with current practice
Geographic Extent	
Local	Terrestrial: The effect on the VC is measurable within the LSA Marine: The effect will be limited to within about 10 km of the proposed activity
Regional	Terrestrial: The effect on the VC is measurable within the RSA Marine: The effect will extent beyond 10 km of the proposed activity to the Canadian Beaufort Sea region
Beyond regional	Terrestrial: The effect on the VC is measurable beyond the RSA
Duration	
Short term	Effect is limited to less than one year
Medium term	Effect lasts for more than one year, but less than four years, e.g., many effects that occur throughout construction
Long term	Effect lasts longer than four years, but VC will recover not more than 30 years after project decommissioning
Far future	Effect extends more than 30 years after decommissioning, e.g., loss of habitat that cannot be restored
<p>NOTES:</p> <p>LSA = local study area RSA = regional study area</p> <p>1 Impacts include vegetation clearing, sensory disturbance, air emissions, physical barriers, attraction to facilities and rights-of-way and altered human and predator access</p> <p>2 Parameters measured in the effects assessment include habitat availability, wildlife movements and wildlife mortality</p> <p>3 Population is defined as a group of individuals of the same species occupying a particular geographic area. A population can be separated from other populations of the same species by unfavourable habitat or by behaviour. Individuals within populations interact with each other more often than individuals between populations</p>	

For an assessment of effects by pathway for the Dickins Lake and Vardie River sections, see Table 10-2. The magnitude of effects on habitat availability for wildlife will be low. Some effects extend into the far future because of the length of time it takes for vegetation, particularly lichen, to recover and for habitat use to be restored.

Woodland Caribou

There is no evidence that food and cover are in short supply for woodland caribou, although habitat along the pipeline right-of-way will change and caribou might be displaced. While food and cover might not be limiting factors, habitat fragmentation and the effect it has on the amount of available habitat for caribou necessitates a conservation plan. Woodland caribou might also be displaced from habitat by noise during construction. No additional impact is expected from noise during operations. Although the existing right-of-way will be widened, it will not result in increased access. The largest potential effect will be of low magnitude and far future in duration.

Model predictions indicate that about 1 ha of effective woodland caribou winter foraging habitat will be removed in the RSA during construction. Less than this will be affected during operations (see Table 10-3).

Moose

Moose might be displaced from habitat by construction noise and activity. Effects on moose habitat during operations should be less than during construction because:

- fewer people will be working along the right-of-way
- the shrub communities cleared during construction will regenerate and provide forage for moose

Upgrades to access roads and rights-of-way could increase hunting pressure, particularly in remote riparian areas used by moose in winter. The largest potential effect will be of low magnitude and long term in duration.

Model predictions indicate that about 0.5 ha of effective moose winter foraging habitat will be removed in the RSA during construction. Less than this will be affected during operations (see Table 10-4).

Table 10-2: Effects on Habitat Availability

Pathway	Phase When Impact Occurs	Effect Attribute ¹			
		Direction	Magnitude	Geographic Extent	Duration
Vegetation clearing	Construction	Adverse	Low	Local	Medium term: d, e Long term: b, f ² Far future: a, c, f ³
	Operations	Adverse	Low	Local	Long term: b, d, e, f Far future: a, c
	Decommissioning and abandonment	Adverse: a, c, d, e Adverse – Positive: b, f ⁴	Low	Local	Short term: d, e Long term: b, f Far future: a, c
Sensory disturbance	Construction	Adverse	Low	Local	Medium term
	Operations	Adverse	Low	Local	Long term
	Decommissioning and abandonment	Adverse	Low	Local	Short term: e Medium term: a, b, c, d, f
Altered human and predator access	Construction	Adverse	Low	Local	Long term
	Operations	Adverse	Low	Local	Long term
	Decommissioning and abandonment	Adverse	Low	Local	Short term: f Long term: a, b, c, d, e
Change in vegetation health	Construction	Adverse	Low	Local	Medium: a, b, d, e Long term: c, f
	Operations	Adverse	Low	Local	Long term: b, c, d, e, f Far future: a
	Decommissioning and abandonment	Adverse	Low	Local	Medium term: a, b, c, d, e Long term: f

NOTES:

- VC species included in the assessment: woodland caribou, moose, marten, lynx, beaver, lesser scaup, peregrine falcon, lesser yellowlegs and boreal chickadee
- 1 The effect attribute descriptor applies to all VC species unless otherwise indicated. Species codes are:
a: woodland caribou
b: moose
c: marten
d: lynx
e: beaver
f: birds
- 2 All bird VC species except lesser yellowlegs and boreal chickadee
- 3 Only bird VC species lesser yellowlegs and boreal chickadee
- 4 Initially adverse, then positive during later stages of operations and decommissioning

Table 10-3: Change in Woodland Caribou Habitat

Habitat Value	Winter Foraging	
	Habitat Change – Construction (ha)	Habitat Change – Operations (ha)
Very high	-0.3	-0.3
High	<0.1	<0.1
Moderate	-0.2	-0.2
Effective	-0.5	-0.5
NOTES: Effective habitat is the sum of very high, high and moderate habitat values		

Table 10-4: Change in Moose Habitat

Habitat Value	Winter Foraging	
	Habitat Change – Construction (ha)	Habitat Change – Operations (ha)
Very high	<-0.1	0
High	<-0.1	0
Moderate	-0.4	-0.4
Effective	-0.4	+0.4
NOTES: Effective habitat is the sum of very high, high and moderate habitat values		

Marten

Marten might temporarily leave areas near construction work sites. However, once people stop or limit their use of an area, marten will readily use suitable habitat that is next to rights-of-way. Edge habitat beside rights-of-way might support abundant small mammals, providing important prey for marten. The largest potential effect is of low magnitude and far future in duration.

Model predictions indicate that 0.6% (0.3 ha) of effective marten habitat will be removed in the RSA during construction, and less than this will be affected during operations (see Table 10-5).

Table 10-5: Change in Marten Habitat

Habitat Value	Winter Foraging	
	Habitat Change – Construction (ha)	Habitat Change – Operations (ha)
High	0	0
Moderate	-0.3	<-0.1
Effective	-0.3	<-0.1

Lynx

The pipeline corridor (existing right-of-way) is good lynx and hare habitat. Lynx might be displaced by construction noise and activity, but are likely to return to areas next to the right-of-way once human activity is reduced. The right-of-way is a corridor for trappers, predators and animals that compete with lynx for space and food. The largest potential effect is of low magnitude and long term in duration.

Model predictions indicate that about 0.4 ha of effective lynx foraging habitat will be removed in the RSA during construction, and less than this will be affected during operations, or less than 0.1 ha (see Table 10-6).

Table 10-6: Change in Lynx Habitat

Habitat Value	Winter Foraging	
	Habitat Change – Construction (ha)	Habitat Change – Operations (ha)
High	<-0.1	<-0.1
Moderate	-0.3	<-0.1
Effective	-0.3	<-0.1

Beaver

Beaver are not usually disturbed by human activity but some site-specific effects could occur during construction. The largest potential effect is of low magnitude and long term in duration.

Birds

Direct habitat loss and habitat alteration are not likely to reduce the use of the Vardie River Section by the bird VCs, i.e., lesser scaup, peregrine falcon, lesser yellowlegs and boreal chickadee. Vegetation clearing and disturbance from human activities could reduce habitat availability for only a few birds near project facilities. The loss of available habitat will not affect bird populations because habitat in the pipeline corridor is similar to habitat that is widespread in the RSA.

Construction will occur during winter when bird VCs, except boreal chickadee, are absent from the area.

Analysis and Significance

Effects of the pipeline corridor on habitat availability are predicted to be low magnitude, local in extent and limited to the duration of the project, except for far-future effects on caribou and marten because of the length of time required for mature vegetation communities to develop (see Table 10-7). Potential effects on bird habitat availability will be low in magnitude, local in extent, and occur mostly during construction and decommissioning. Developments on the Vardie River Section are expected to have no significant effects on habitat availability.

Prediction Confidence

The confidence in predictions on habitat alteration is based on:

- the strength of baseline measurements and existing information
- knowledge on how wildlife responds to habitat change

The approach to establishing the baseline for this EIS for the Dickins Lake and Vardie River sections was to measure:

- the distribution of habitat types, each of which is composed of several vegetation types
- the use of those habitat types by the selected VCs

Baseline field studies for the Dickins Lake Section (see EIS Volume 3, Section 10), combined with existing information in reports and publications provides a high level of confidence in predicting habitat use by mammals in the Vardie River Section.

Effects on Wildlife Movement

Effect Pathways

The project has the potential to affect wildlife movements through several pathways (see Figure 10-2). The nonapplicable pathway for the Vardie River Section is altered human and predator access by road.

The project will not affect bird movements, so no effect pathways are considered applicable and the assessment of potential effects on bird movements is not addressed further.

Table 10-7: Effects on VC Habitat Availability

Valued Component	Phase When Impact Occurs	Effect Attribute				Significant
		Direction	Maximum Magnitude	Maximum Geographic Extent	Maximum Duration	
Woodland Caribou	Construction	Adverse	Low	Local	Far future	No
	Operations	Adverse	Low	Local	Far future	No
	Decommissioning and abandonment	Adverse	Low	Local	Far future	No
Moose	Construction	Adverse	Low	Local	Medium term	No
	Operations	Adverse	Low	Local	Long term	No
	Decommissioning and abandonment	Positive	Low	Local	Long term	No
Marten	Construction	Adverse	Low	Local	Far future	No
	Operations	Adverse	Low	Local	Far future	No
	Decommissioning and abandonment	Adverse	Low	Local	Far future	No
Lynx	Construction	Adverse	Low	Local	Long term	No
	Operations	Adverse	Low	Local	Long term	No
	Decommissioning and abandonment	Adverse	Low	Local	Long term	No
Beaver	Construction	Adverse	Low	Local	Medium term	No
	Operations	Adverse	Low	Local	Long term	No
	Decommissioning and abandonment	Adverse	Low	Local	Long term	No
Birds	Construction	Adverse	Low	Local	Long term	No
	Operations	Adverse	Low	Local	Long term	No
	Decommissioning and abandonment	Positive	Low	Local	Long term	No

Effect Attributes

For definitions of the effect attributes used to describe wildlife movement, see Table 10-1, shown previously.

Analysis and Significance

For terrestrial wildlife VCs, effects of the Vardie River Section will be low magnitude and restricted to the local area (see Table 10-8). Effects on wildlife movement will be low magnitude, local and will not extend beyond the life of the project. Developments on the Vardie River Section are expected to have no significant effects on wildlife movement.

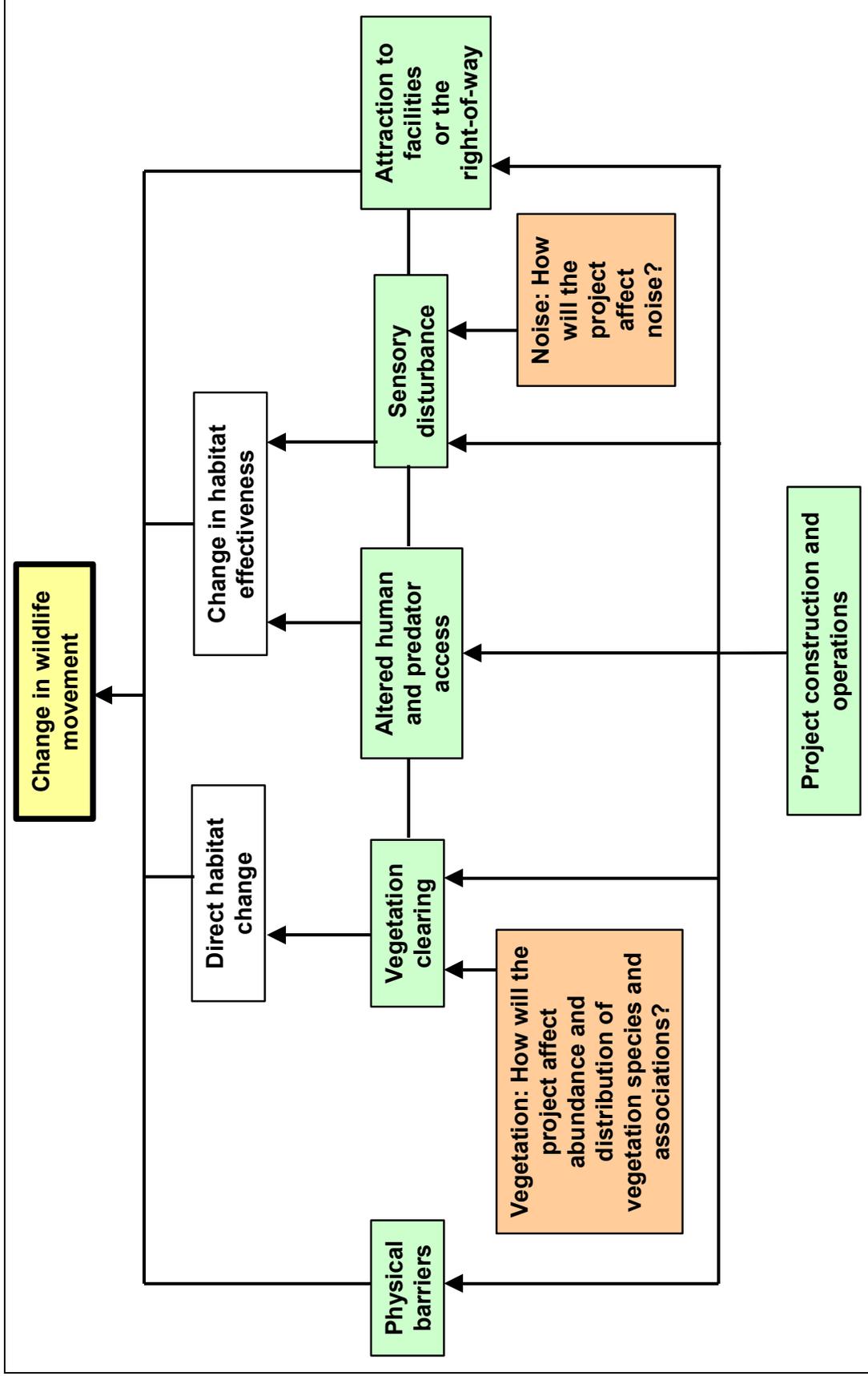


Figure 10-2: Terrestrial Mammal Effect Pathways – Wildlife Movement

Table 10-8: Effects on Terrestrial Wildlife Movements

Valued Component	Phase When Impact Occurs	Effects Attribute				
		Direction	Magnitude	Geographic Extent	Duration	Significant
Woodland caribou	Construction	Adverse	Low	Local	Medium term	No
	Operations	Adverse	Low	Local	Long term	No
	Decommissioning and abandonment	Adverse	Low	Local	Long term	No
Moose	Construction	Adverse	Low	Local	Medium term	No
	Operations	Adverse	Low	Local	Long term	No
	Decommissioning and abandonment	Adverse	Low	Local	Long term	No
Marten	Construction	Adverse	Low	Local	Medium term	No
	Operations	Adverse	Low	Local	Long term	No
	Decommissioning and abandonment	Adverse	Low	Local	Short term	No
Lynx	Construction	Adverse	Low	Local	Medium term	No
	Operations	Adverse	Low	Local	Long term	No
	Decommissioning and abandonment	Adverse	Low	Local	Short term	No
Beaver	Construction	Adverse	Low	Local	Short term	No
	Operations	Adverse	Low	Local	Medium term	No
	Decommissioning and abandonment	Adverse	Low	Local	Short term	No

Prediction Confidence

Movements of VCs in the study area are not well known. Predictions are largely based on wildlife habitat use and inferences about how animals might move between patches of preferred habitat. Wildlife responses to industrial activities have been well documented and were used to support the predictions. Therefore, confidence in predicting responses of wildlife movement to project activities is moderate.

Effects on Wildlife Mortality

Developments on the Vardie River Section have the potential to increase wildlife mortality and affect wildlife populations. The effect of increased mortality on terrestrial wildlife populations depends on several factors, including the:

- number of animals affected
- mortality rates from other human activities and from natural causes
- relative abundance of the affected populations
- resiliency of the population

Effect Pathways

The proposed project could have both direct and indirect effects on terrestrial wildlife mortality. All the effect pathways discussed in the EIS apply.

For project impacts that might affect terrestrial wildlife mortality, see Figure 10-3 and the discussion following. For mitigation measures for project effects identified for each VC, see EIS Volume 7, Environmental Management.

Analysis and Significance

The most important cause of mortality typically is from increased access for hunters and predators. The Vardie River Section will not create new access. Therefore, mortality from increased access as a result of constructing the Vardie River Section will be limited. All effects on wildlife mortality are predicted to be low magnitude (see Table 10-9). Developments on the Vardie River Section are predicted to have no significant effects on wildlife mortality. Widening the right-of-way will have no significant effects on bird mortality because construction will be in winter.

Table 10-9: Effects on Terrestrial Wildlife Mortality

Valued Component	Phase When Impact Occurs	Effect Attribute				
		Direction	Magnitude	Geographic Extent	Duration	Significant
Woodland caribou	Construction	Adverse	Low–moderate	Regional	Medium term	No
	Operations	Adverse	Low	Regional	Long term	No
	Decommissioning and abandonment	Adverse	Low	Regional	Long term	No
Moose	Construction	Adverse	Moderate	Regional	Medium term	No
	Operations	Adverse	Low–moderate	Regional	Long term	No
	Decommissioning and abandonment	Adverse	Low	Regional	Long term	No
Marten	Construction	Adverse	Low	Local	Medium term	No
	Operations	Adverse	Low	Local	Long term	No
	Decommissioning and abandonment	Adverse	Low	Local	Long term	No
Lynx	Construction	Adverse	Low	Local	Medium term	No
	Operations	Adverse	Low	Local	Long term	No
	Decommissioning and abandonment	Adverse	Low	Local	Long term	No
Beaver	Construction	Adverse	Low–moderate	Local	Medium term	No
	Operations	Adverse	Low	Local	Long term	No
	Decommissioning and abandonment	Adverse	Low	Local	Long term	No

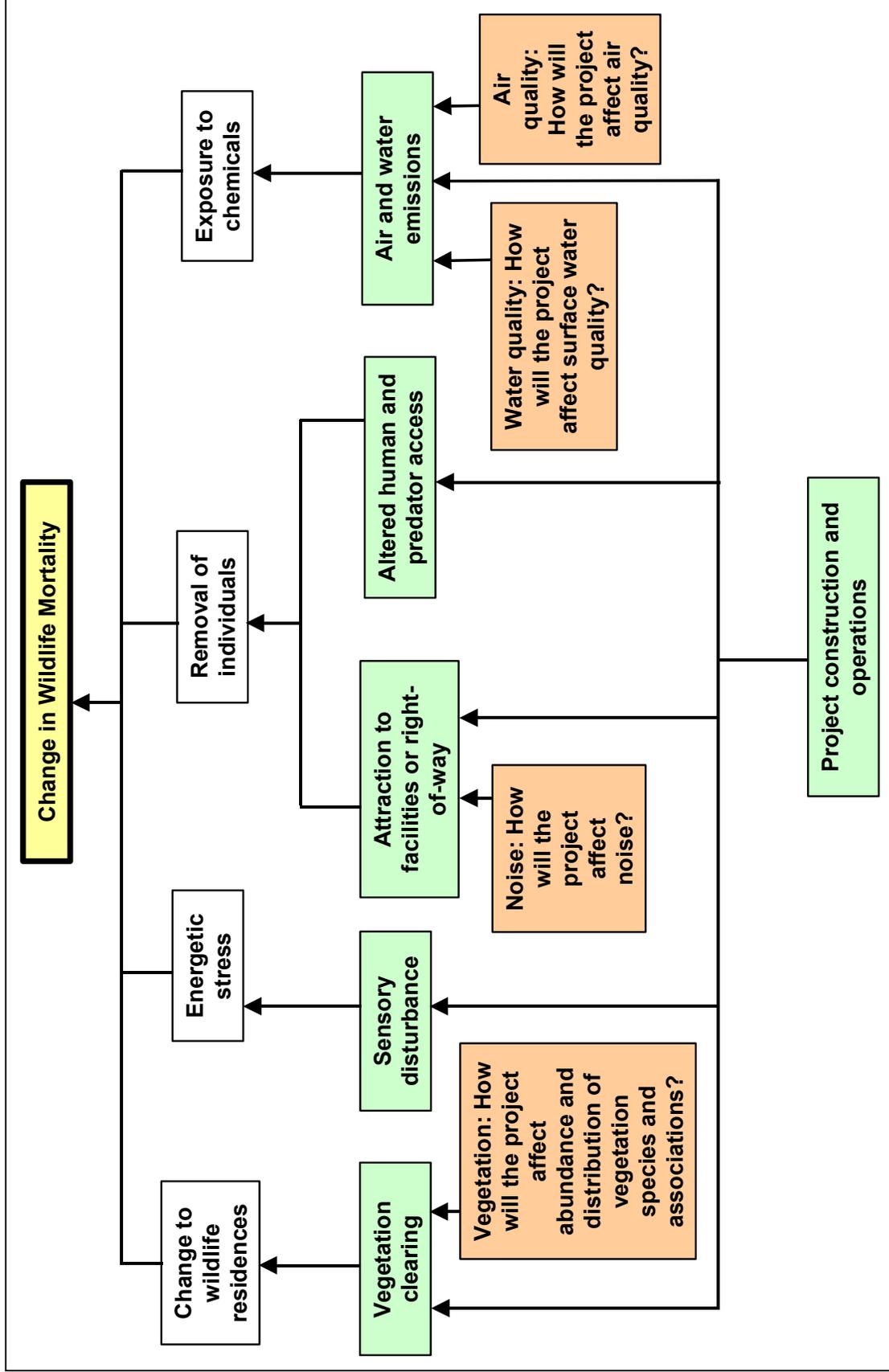


Figure 10-3: Terrestrial Wildlife Effect Pathways – Wildlife Mortality

Prediction Confidence

Because of the precautionary approach used to predict effects on wildlife of adding the Vardie River Section, there is a high degree of confidence in the assessment of significance of effects. The level of confidence is consistent with that in EIS Volume 5, Section 10.

Combined Project Effects

The EIS concluded that the Mackenzie Gas Project in combination with NGTL's Dickins Lake Section would produce no significant effects on:

- wildlife habitat availability
- wildlife movement
- wildlife mortality

This assessment for northwestern Alberta concludes that the Mackenzie Gas Project combined with NGTL's Dickins Lake and Vardie River sections will also produce no significant effects.