

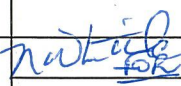
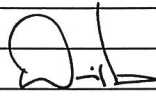

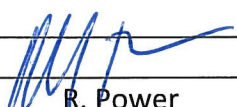
## Nalcor Energy – Lower Churchill Project



### L-ITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN

Nalcor Doc. No. ILK-PT-MD-0000-EV-PL-0004-01

Comments:	Total # of Pages: (Including Cover): 20
-----------	---

B3		Issued for Use	 J. Wells	 D. Haley	 D. Green	 B. Power
Status / Revision	Date	Reason for Issue	Prepared by	Functional Manager Approval	Quality Manager	General Project Manager (Generation + Island Link) Approval

#### CONFIDENTIALITY NOTE:

This document contains intellectual property of the Nalcor Energy – Lower Churchill Project and shall not be copied, used or distributed in whole or in part without the prior written consent from the Nalcor Energy – Lower Churchill Project.

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	2

**Inter-Departmental / Discipline Approval (where required)**

Department	Department Manager Approval	Date
	Name	
	Name	
	Name	
	Name	

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	3

## TABLE OF CONTENTS

	PAGE
<b>1 PURPOSE.....</b>	<b>4</b>
<b>2 SCOPE .....</b>	<b>4</b>
<b>3 DEFINITIONS.....</b>	<b>4</b>
<b>4 ABBREVIATIONS &amp; ACRONYMS .....</b>	<b>5</b>
<b>5 REFERENCE DOCUMENTS .....</b>	<b>6</b>
<b>6 LABRADOR-ISLAND TRANSMISSION LINK PROJECT DESCRIPTION .....</b>	<b>6</b>
<b>7 EXISTING INFORMATION .....</b>	<b>8</b>
<b>8 REGULATORY COMPLIANCE.....</b>	<b>10</b>
<b>9 CONSTRUCTION EFFECTS .....</b>	<b>11</b>
9.1 Habitat Alteration/Loss .....	11
9.2 Likely Residual Predicted Project Effects .....	14
9.3 Determination of Significance .....	15
<b>10 ENVIRONMENTAL EFFECTS MANAGEMENT .....</b>	<b>15</b>
10.1 Mitigation Measures .....	15
10.2 Monitoring.....	18
10.3 Reporting .....	18
10.4 Contingency Plan .....	19
<b>11 REFERENCES .....</b>	<b>19</b>

FIGURE	PAGE
Figure 6-1 Labrador-Island Transmission Link (Nalcor, 2012) .....	8

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	4

## 1 PURPOSE

The purpose of this Labrador-Island Transmission Link (L-ITL) (the Project) Caribou Protection and Environmental Effects Monitoring Plan (CPEEMP) is to demonstrate how any adverse environmental effects will be mitigated, and to set out a program for monitoring the effectiveness of mitigation measures. To comply with regulatory requirements and commitments made in the L-ITL Environmental Impact Statement (EIS), the L-ITL's CPEEMP approach includes consideration of:

- Mitigation objectives – performance objectives in respect of each adverse environmental effect;
- Mitigation – measures planned to achieve the mitigation objectives;
- Metrics and targets – specific, quantifiable, relevant and time constrained;
- Follow-up or Monitoring Programs – how the Project will include follow-up or monitoring surveys to confirm that mitigation strategies are meeting the mitigation objectives; and
- Contingency – plan to be implemented should monitoring reveal that mitigation measures have not been successful.

The L-ITL's CPEEMP relates to island caribou, presented in this plan as Woodland caribou (*Rangifer caribou*). This CPEEMP builds on existing information and commitments made in the EIS (Nalcor 2012a), and conditions of permits and licenses for the Project.

## 2 SCOPE

This plan addresses the required aspects of caribou protection and effects monitoring for the design, construction, and operation phases of the Project for the Labrador-Island Transmission Link (described in Section 6.0).

## 3 DEFINITIONS

**Environmental Assessment:** An evaluation of a project's potential environmental risks and effects before it is carried out and identification of ways to improve project design and

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	5

implementation to prevent, minimize, mitigate, or compensate for adverse environmental effects and to enhance positive effects.

**Environmental Management:** The management of human interactions with the environment (air, water and land and all species that occupy these habitats including humans).

**Environmental Protection Plan:** Document outlining the specific mitigation measures, contingency plans and emergency response procedures to be implemented during the construction or operations of a facility.

**Environmental Effects Monitoring:** Monitoring of overall Project effects to confirm the predictions of EA and to fulfill EA commitments.

**Environmental Compliance Monitoring:** Monitoring of Project activities to confirm compliance with regulatory requirements and commitments made through the EA process.

**Island Caribou:** For this plan, this refers to the Woodland caribou herd located in insular Newfoundland.

## 4 ABBREVIATIONS & ACRONYMS

<b>CEAA</b>	Canadian Environmental Assessment Act
<b>COSEWIC</b>	Committee on the Status of Endangered Wildlife in Canada
<b>CWS</b>	Canadian Wildlife Service
<b>EA</b>	Environmental Assessment
<b>EEMP</b>	Environmental Effects Monitoring Plan
<b>EIS</b>	Environmental Impact Statement
<b>EMP</b>	Environmental Management Plan
<b>EPP</b>	Environmental Protection Plan
<b>ERC</b>	Environment and Regulatory Compliance
<b>HSE</b>	Health Safety and Environment
<b>IBA</b>	Impacts and Benefits Agreement
<b>IPD</b>	Integrated Project Delivery
<b>LCP</b>	Lower Churchill Project
<b>L-ITL</b>	Labrador-Island Transmission Link
<b>NE</b>	Nalcor Energy
<b>NL</b>	Newfoundland and Labrador
<b>NLDEC</b>	Newfoundland and Labrador Department of Environment and Conservation
<b>NLDEC-WD</b>	Newfoundland and Labrador Department of Environment and Conservation – Wildlife Division

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	6

<b>PEEMP</b>	Protection and Environmental Effects Monitoring Plan
<b>RCP</b>	Regulatory Compliance Plan
<b>SARA</b>	Species at Risk Act

## 5 REFERENCE DOCUMENTS

LCP-PT-MD-0000-PM-PL-0001-01	LCP Project Execution Plan
LCP-PT-MD-0000-PM-CH-0001-01	LCP Project Charter
LCP-PT-MD-0000-EA-PL-0001-01	LCP Generation Environmental Assessment Commitment Management Plan
LCP-PT-ED-0000-EA-SY-0002-01	Environmental Impact Statement and Supporting Documentation for the Labrador-Island Transmission Link
LCP-PT-MD-0000-SM-ST-0001-01	Post Environmental Assessment Release
LCP-PT-MD-0000-EV-PL-0009-01	LCP HVdc Overland Transmission and HVdc Specialties Environmental Protection Plan
LCP-PT-MD-0000-RT-PL-0001-01	Regulatory Compliance Plan
LCP-PT-MD-0000-HS-PL-0001-01	Health and Safety Plan
LCP-PT-MD-0000-HS-PL-0004-01.	LCP Emergency Response Plan
LCP-PT-MD-0000-EV-PY-0001-01	LCP No Harvesting Policy
ILK-PT-MD-0000-EV-PL-0001-01	L-ITL Endangered Species Act Impacts Mitigation and Monitoring Plan

## 6 LABRADOR-ISLAND TRANSMISSION LINK PROJECT DESCRIPTION

As described in the L-ITL EIS, the Project consists of the Construction and Operations of a  $\pm 350$  kilovolt (kV) High Voltage direct current (HVdc) electricity transmission system from Central Labrador to the Avalon Peninsula on the Island of Newfoundland (the Island) (Figure 6-1).

The transmission system will include the following key components:

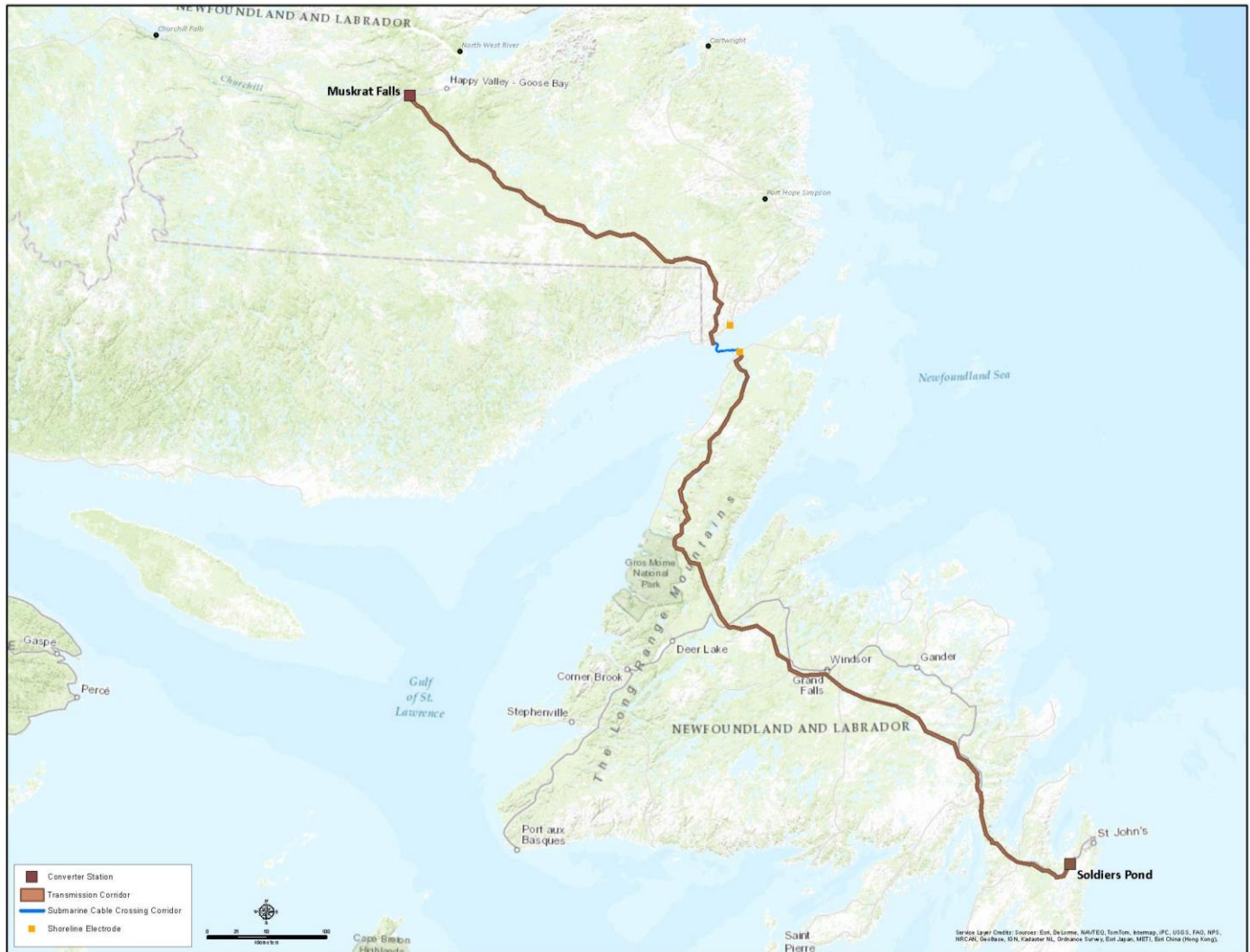
- An alternating current (ac) to direct current (dc) converter station at Muskrat Falls;

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	7

- Approximately 400 km overhead HVdc transmission line from Muskrat Falls to Forteau Point;
- A 60 m wide right of way (ROW);
- Three, approximately 35 km long, submarine cables across the Strait of Belle Isle (SOBI) (i.e., between Forteau Point and Shoal Cove), with associated onshore infrastructure (transition compounds and land cables at both cable landings);
- Approximately 700 km of overhead HVdc transmission line from Shoal Cove to the Avalon Peninsula;
- A dc to ac converter station at Soldiers Pond;
- Shoreline electrodes at L'Anse au Diable and Dowden's Point,
- An overhead, wood pole electrode line
  - Near Forteau Point and L'Anse au Diable; and
  - Between Soldiers Pond and Dowden's Point.



LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	8



**Figure 6-1** Labrador-Island Transmission Link (Nalcor, 2012)

## 7 EXISTING INFORMATION

Woodland caribou (referred to as island caribou from this point forward) on the island portion of Newfoundland and Labrador are labelled sedentary (NLDEC 2009a, internet site); however, several herds undergo seasonal migrations, which is further complicated by observations of only some individuals within a herd undergoing these migrations (Saunders 2011, pers. comm.).



LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	9

Island caribou are part of the Boreal Population, and belong to the sedentary ecotype (NLDEC 2009, internet site), although some herds have traditionally exhibited behaviours similar to migratory caribou herds (Dyke 2011, pers. comm.). Caribou are distributed over much of the Island in differing densities, although certain areas receive higher use than others. On the Island, caribou are distributed over the Northern Peninsula, and Central and Eastern Newfoundland, as well as parts of the Avalon Peninsula. The approximate population of Woodland caribou on the island is 34,000 with a density of 30 caribou/100 km<sup>2</sup>, considerably higher than in Labrador (three caribou/100 km<sup>2</sup>) (NLDEC 2009a, internet site).

Although results from recent surveys indicate that the declines may have slowed in certain parts of the Island (e.g., Middle Ridge (Mahoney and Soulliere 2011; NLDEC 2010, internet site) and the south coast (NLDEC 2011, internet site; Mahoney and Soulliere 2011)), it also indicates that one of the largest issues facing caribou populations in Newfoundland is poor calf survival (Trindade et al. 2010), and hence poor recruitment rates. (Nalcor 2012a)

### **Habitat Association**

Although woodland caribou in Newfoundland are considered sedentary (NLDEC 2009, internet site), they undergo seasonal dispersions (Bergerud et al. 2008) as well as exhibiting migratory behaviour, at least historically, between calving and wintering areas (Dyke 2011, pers. comm.).

Newfoundland caribou primarily select reindeer lichens (both terrestrial (*Cladina* spp.) (Mayor et al. 2009) and arboreal (Bergerud 1972)) and evergreen shrubs during winter (Bergerud 1972). Access to arboreal lichens, abundant on trees adjacent to forest edges, is particularly important when snow is deepest (Fortin et al. 2008; Bergerud 1972). Coniferous forest landscapes in particular have been identified as a source of arboreal lichens (Fortin et al. 2008; O'Brien et al. 2006; Schaefer 1996; Schaefer and Pruitt 1991).

Terrestrial lichens are also used during winter (Mayor et al. 2009; Fortin et al. 2008; Mayor et al. 2007; Courtois et al. 2004). However, Courtois et al. (2008) found that the presence of terrestrial lichens was less important as caribou selected closed conifer stands without terrestrial lichens and open conifer stands with or without terrestrial lichens. Shallow snow offers a reduced predation risk by allowing increased mobility, and thus ice-covered habitats (e.g., wetlands, lakes, rivers) would provide visibility and mobility advantages (Bergerud et al. 2008; Fortin et al. 2008; Myrsetrud and Ostbye 1999).

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	10

Adult island caribou in western Newfoundland were found to select rock and heath barrens, and virgin and mature forest stands considerably more than other habitats during winter (Mahoney and Virgil 2003). Bogs, early climax stands, and ponds and lakes were intermediate in their selection value, while recently harvested stands and disturbed sites were used much less in winter than other habitats (Mahoney and Virgil 2003). Of the intermediate habitats, early climax forests stands were more valuable during winter (Mahoney and Virgil 2003).

Areas that support alternative prey tend to be avoided as they may increase the risk of predation (Fortin et al. 2008; Seip 1992). In Newfoundland, black bear (*Ursus americanus*) has been considered the principal large predator and moose the alternative prey species (Mahoney and Virgil 2003). Black bears preferentially forage in regenerating stands and prey on the calves of ungulates (Mahoney and Virgil 2003). Fortin et al. (2008) confirmed that island caribou avoided early successional forests, including recently burned and harvested forests.

During spring, island caribou feed preferentially on broad-leaved evergreen and deciduous shrubs and sedges, and on deciduous shrubs, reindeer lichens and fungi in summer (Bergerud 1972). Woodland caribou exhibit a preference for mature coniferous forests during summer (Chubbs et al. 1993) with or without the presence of terrestrial lichens (Courtois et al. 2008). Bergerud (1971) noted that few caribou were observed in Newfoundland during summer as they were generally under trees during the day to escape harassment by flies.

As with woodland caribou elsewhere, female caribou seek birth sites with low predation risk (Bergerud et al. 2008; Bergerud and Page 1987). Adult caribou in western Newfoundland selected rock and heath barrens, and virgin and mature forest stands significantly more than other habitats during the calving/post-calving period (Mahoney and Virgil 2003). Hardwood and softwood scrub were also preferred (Mahoney and Virgil 2003). Bogs, early climax stands and ponds and lakes were intermediate in their selection value, while recently harvested stands and disturbed sites were used significantly less than other habitats during this period (Mahoney and Virgil 2003). Of the intermediate habitats, bog habitat was more important during summer and fall (Mahoney and Virgil 2003). Open water is also important as it can be used for escape from predators (Bergerud et al. 2008; Bergerud et al. 1990; Bergerud 1985).

## 8 REGULATORY COMPLIANCE

Woodland caribou on the island are not currently listed under the Newfoundland and Labrador Endangered Species Act, 2004 (NLESA) or the federal SARA. The intent of this L-ITL CPEEMP is to

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	11

allow the LCP to evaluate and mitigate to the extent practical, the Project effects during construction and operations on:

- Disturbance to caribou and their habitat, including habitat loss or altered and increased access; and
- Mortality of caribou

The NLR 87/13, also referred to as the Labrador-Island Transmission Link Undertaking Release Order under the Environmental Protection Act releases the Project from environmental assessment and sets conditions for this release under section 4 that Nalcor Energy must meet. The release of the Labrador-Island Transmission Link from environmental assessment is subject to the following terms and conditions as stated in section 4:

- (a) Nalcor Energy shall adhere to all mitigation, monitoring and commitments stated in the Environmental Impact Statement submitted April 12, 2012 and the additional Environmental Impact Statement information submitted December 10, 2012;
- (f) the proponent shall prepare environmental effects monitoring plans, EEMs, in consultation with the applicable government divisions, and submit them to the Minister of Environment and Conservation for approval before the start of any site specific construction;
- (g) the environmental effects monitoring plans referred to in paragraph (f) shall address the following project valued ecosystem components, VECs, and will be developed to monitor effects as a result of the project and to ensure that any changes to existing baseline as a result of project effects are documented and mitigated:
  - (ii) island caribou

Submission of this EEMP satisfies the condition/requirement in NL Reg 87/13 (f) and (g) under Section 4.

## 9 CONSTRUCTION EFFECTS

### 9.1 HABITAT ALTERATION/LOSS

As per Nalcor (2012a), a regional analysis was completed, with respect to direct (i.e., habitat alteration/loss) and indirect (e.g., reduced habitat suitability resulting from disturbance) effects of the Project on caribou habitat. This was completed by delineating the Regional Study Area

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	12

(RSA) for the environmental assessment as the total Occupancy Area (i.e., 100% kernels) of woodland caribou on the island, as provided by the NLDEC-WD.

The regional analysis was conducted using year round (overall) caribou kernels to determine if there were any regional impacts to caribou resulting from the Project. Caribou information was regionally grouped (i.e., Northern Peninsula and Central and Eastern Newfoundland) based on group interactions or geographical barriers. Based on Nalcor (2012 b), the effects of the Project (e.g., habitat fragmentation) are not likely to affect caribou populations on a regional scale (see Table 9-1 and 9-2). The use of the 500 m wide buffer for the environmental assessment of the Project was appropriate as per Dyer et al. (2001).

**Table 9-1** Year round (and seasonal) caribou occurrence in the Northern Peninsula Region – Assessment Area of 60 m right-of-way + 500 m buffer (258 km<sup>2</sup>)

Dataset	100% Kernel			66% Kernel		
	Total in Region (km <sup>2</sup> )	Total in Assessment Area (km <sup>2</sup> )	% in Assessment Area	Total in Region (km <sup>2</sup> )	Total in Assessment Area (km <sup>2</sup> )	% in Assessment Area
<b>Winter</b>						
1979-2011	10,319	145	1.4	2,111	61	2.9
2005-2011	9,806	149	1.5	1,978	58	2.9
<b>Spring</b>						
1979-2011	8,808	142	1.6	1,867	61	3.3
2005-2011	8,582	144	1.7	1,588	52	4.0
<b>Summer</b>						
1979-2011	7,914	122	1.5	1,738	37	2.1
2005-2011	6,734	121	1.8	1,562	38	2.4
<b>Fall</b>						
1979-2011	8,685	153	1.8	2,051	37	1.8
2005-2011	8,188	153	1.9	1,713	34	2.0
<b>Year Round</b>						
1979-2011	11,888	145	1.2	3,237	84	2.6
2005-2011	11,835	144	1.2	3,063	86	2.8

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	13

**Table 9-2** Year round (and seasonal) caribou occurrence in the Central and Eastern Newfoundland Region – Assessment Area of 60 m right-of-way + 500 m buffer (348 km<sup>2</sup>)

Dataset	100% Kernel			66% Kernel		
	Total in Region (km <sup>2</sup> )	Total in Assessment Area (km <sup>2</sup> )	% in Assessment Area	Total in Region (km <sup>2</sup> )	Total in Assessment Area (km <sup>2</sup> )	% in Assessment Area
<b>Winter</b>						
1979-2011	36,378	120	0.3	5,765	14	0.2
2005-2011	33,523	119	0.4	5,172	14	0.3
<b>Spring</b>						
1979-2011	35,845	148	0.4	6,251	26	0.4
2005-2011	29,989	132	0.4	4,435	26	0.6
<b>Summer</b>						
1979-2011	34,024	144	0.4	5,407	39	0.7
2005-2011	33,393	115	0.3	5,262	40	0.7
<b>Fall</b>						
1979-2011	31,426	118	0.4	5,560	20	0.3
2005-2011	24,817	113	0.5	4,264	18	0.4
<b>Year Round</b>						
1979-2011	44,720	157	0.4	9,812	43	0.4
2005-2011	40,871	132	0.3	7,835	46	0.6

Based on the information provided in Nalcor's response to Information Request WD-4 (i.e., limited overlap of the Project right-of-way with the sensitive period (i.e., winter and calving) habitat, and the information provided in this response, the effects of the Project (e.g., habitat fragmentation) are not likely to affect caribou populations on a regional scale (see Table 12.3.7-1 in Nalcor 2012). The use of the 500 m wide buffer for the environmental assessment of the Project was appropriate as per Dyer et al. (2001) and Environment Canada (2012), and was conservative and precautionary because it was the 2 km wide corridor that was buffered and not just the 60 meter right-of-way.

The analyses of the additional buffer widths (i.e., 1,000 m and 2,000 m buffers) also indicate that effects on caribou habitat may be of low magnitude. However, the quantification of habitat within 1,000 m and 2,000 m buffers is considered an unrealistic overestimation because the effects of the Project would result in only partial habitat avoidance, and any effects that far from the right-of-way would likely be greatly reduced. For example, Dyer et al. (2001) found that although use within 100 m of a road ranged from 4% in late winter to 34% in summer, use

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	14

of areas 250 to 500 m from roads ranged from 32% in summer to 58% in calving season. Therefore, quantifying all habitat within 500 m of the right-of-way as potentially affected is precautionary and appropriate (Nalcor 2012b).

## 9.2 LIKELY RESIDUAL PREDICTED PROJECT EFFECTS

The likely residual environmental effects of Project Construction on Caribou are as follows:

- Adverse, because there will habitat alteration and/or loss, temporary sensory disturbances, potential for direct or indirect mortality (vehicle collision, or increased predation/hunting), the possibility of reduced forage availability or access and the potential for changes in migration or movement routes;
- Of low magnitude for as habitat alteration and/or loss is expected to affect less than 5% of Caribou or Primary Core area (Newfoundland);
- Limited to the Regional Study Area (RSA), because although the effects to habitat are within the Local Study Area (LSA), sensory disturbance and avoidance could extend beyond the LSA; and
- Of medium-term to far future duration because although many Construction-related effects (e.g, sensory disturbance) are expected to be limited to the Construction period, habitat alteration/loss and avoidance along the ROW is expected to continue through the life of the Project.

There is a high degree of confidence that the level of effect will not be greater than predicted given the extent of baseline information on island caribou in the province and their habitat, Project information, the understanding of interactions between Caribou and similar types of disturbances throughout their range, and Nalcor's commitment to appropriate mitigation.

The likely residual environmental effects of Operation and Maintenance on Caribou will be adverse. In Newfoundland, the magnitude will be low as less than 5% of Primary Core area (Newfoundland) are affected. Effects will be Regional, because many effects due to Operations and Maintenance, such as habitat alteration and sensory disturbance, can extend beyond the LSA. Although Operations and Maintenance activities may be infrequent and of short duration, they will continue over the life of the Project. Although there are effects likely to result from the Operations and Maintenance of the Project, Caribou populations are no likely to be affected on a regional scale.

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	15

### 9.3 DETERMINATION OF SIGNIFICANCE

Significant environmental effects are those that are considered to be of sufficient magnitude, duration and geographic extent to cause a change in caribou that will alter its status or integrity beyond an acceptable level relative to baseline. Maintenance of sustainable populations will allow for the continued ecological, cultural and economic role of Caribou into the future. A likely significant adverse residual environmental effect of the Project on Caribou is one that would cause a population decline, such that viability or recovery of that population is threatened.

The effects of the Project relative to baseline are not likely to affect the viability or recovery of woodland caribou populations in Newfoundland. Therefore, the Project is not likely to result in significant adverse environmental effects on Caribou.

## 10 ENVIRONMENTAL EFFECTS MANAGEMENT

The effects management plans (i.e., mitigation measures outlined in the EIS [Nalcor 2012] and the LCP HVdc Overland Transmission and HVdc Specialties Environmental Protection Plan (EPP) (LCP, 2013) and the commitments made by the LCP in the EIS ensure regulatory compliance of the above discussed regulations.

### 10.1 MITIGATION MEASURES

Mitigation measures relating to vegetation, as well as measures directly related to Caribou include:

- Where access roads and trails require the installation of permanent watercourse crossing structures (e.g., bridges, culverts), the protection of riparian shoreline(s) will include regular inspection and maintenance of those structures;
- Biodegradable lubricants and hydraulic fluids will be used where practical, when working near waterbodies;
- Vegetation buffer zones, established at environmentally sensitive areas during construction, will be maintained. Only danger trees will be removed from these areas;
- Upon completion of Construction, all disturbed areas (e.g., exposed mineral soils) and construction staging areas not required for Operations and Maintenance or access will



LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	16

be regraded to re-establish drainage patterns, blend with the natural terrain and allowed to revegetate naturally. Temporary access will be assessed to determine if it will be needed; where access is to be decommissioned, the disturbed area will be returned to a comparable land use capability, depending on the condition of the road or trail;

- Nalcor will decommission those access roads and trails used during construction that are not required for the Operations and Maintenance activities;
- Disturbances related to inspection, maintenance and vegetation management will, for the most part, be contained within the existing ROW, already cleared during Construction;
- Access control measures (e.g., signage, gates) to address OHV use of access roads and trails required for Project Operations and Maintenance will be examined and discussed with NLDEC Wildlife Division, and applied as applicable and will be described in the EPP;
- Nalcor will use non-residual herbicides (i.e., Tordon 101 with Sylgard 309 as a surfactant) and mechanical methods for vegetation removal, where practical. The requirements of the applicable regulations will be met or exceeded. All herbicide applications will be conducted by qualified, trained personnel in a careful manner, following the manufacturers' instructions and as per the Pesticides Control Regulations 1996 (plus amendments) under the Environmental Protection Act SNL 2002;
- Ground travel for maintenance of the transmission line will be restricted to existing approved travel routes, which will be used and maintained in accordance with the applicable regulations;
- Transmission line maintenance and repair personnel will adhere to appropriate speed limits applicable to the size and class of the access roads to reduce the potential for vehicle-wildlife collisions;
- Nalcor will implement a policy of no wildlife harvesting during working hours, no feeding, and no possession of firearms or pets by transmission line maintenance and repair personnel;
- Only essential vehicular activity, including helicopter flights, will be permitted along the transmission line corridor to minimize disturbance to wildlife;
- Nalcor will avoid conducting non-essential activity in Primary Core area in Newfoundland during the sensitive calving and post-calving season, to the extent feasible;

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	17

- Effective scheduling and logistics for maintenance work will be completed to minimize the number of vehicle trips per maintenance task, and any inspections, maintenance and / or repairs will be completed as quickly and efficiently as safety allows;
- Spill kit and trained personnel will be present on-site at all times, allowing for prompt containment of hazardous products;
- Well maintained equipment with quality mufflers will be used and equipment maintenance schedules will be followed;
- Engine idling will be minimized and environmental awareness training with key maintenance and repair personnel will be conducted on this topic;
- Prior to blasting, the OSEM will conduct a visual survey. If caribou are within 3 km of the site, blasting will be delayed until caribou have left the area;
  - Methods to encourage caribou to leave the area may be implemented in consultation with NLDEC-WD;
  - Note, if LCP can demonstrate the planned blasting activity will not likely result in a behavioural response by caribou, the 3 km radius may be reduced
- As some Project activities (e.g., grubbing, vehicle and heavy equipment use, tower erection, conductor strining) would not be audible beyond a short distance, if caribou are observed within 500 m of such an activity, the OSEM will determine if the activity will be delayed or curtailed; and
- Caribou will be permitted to cross work areas, and access roads with traffic yielding to the animals when crossing a road;
  - If human-mediated caribou mortality occurs, the LCP will contact NLDEC-WD immediately;
  - Garbage control measures will be used to prevent bears, and other animals from accessing garbage and prevent attraction of animals to garbage storage areas; and
  - The Project footprint will be minimized to the extent possible, including access and other disturbances on the landscape being kept within existing areas of disturbance where possible. Where it was possible the Project was designed to minimize the creation of new access; for example, the transmission line follows existing transmission lines in several areas on the island.

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	18

## 10.2 MONITORING

The caribou behaviour that is most likely to be influenced by the Project is changes in movement and usage patterns resulting from project activities and increased access in remote caribou core areas. Movement and usage patterns will be monitored through the use of GPS telemetry collars. Visual monitoring, via aerial surveys, will also be conducted annually to validate the collar data and provide information on group size and composition which will enable the results of the telemetry data to be generalized to the herd level.

Changes in movement patterns and usage will be monitored by comparing caribou telemetry baseline patterns and usage to those observed during construction and post construction. Monitoring will focus on caribou movement and usage within caribou core areas in select areas with limited access. Two areas will be selected through an exploratory analysis of existing telemetry data and in consultation with NLDEC-WD to focus the monitoring program. LCP will commit to providing funding for deployment and maintenance of 40 GPS telemetry collars. Twenty GPS telemetry collars will be deployed and maintained in each of the two study sites by NLDEC-WD staff using their standard operating procedures. Additionally, to study and monitor group size and composition, visual monitoring will be conducted annually via aerial surveys of the same two study areas. The appropriate number, timing and location of aerial surveys will be determined through an exploratory analysis of existing telemetry data and in consultation with NLDEC-WD. Group size and composition will enable the results of the telemetry data to be generalized to the herd level.

## 10.3 REPORTING

A report will be submitted to NLDEC-WD bi-annually that will provide an update on the monitoring program described in Section 10.2, and an annual report which will present the results of the monitoring program described in Section 10.2.

Observations of caribou reported by the OSEM during construction will be compiled and included in the bi-annual reports submitted to the NLDEC – WD. This report will include observations and/or interactions of island caribou. Results will be used to inform Project construction activities where possible.

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	19

#### 10.4 CONTINGENCY PLAN

At this time, contingency plans are not anticipated for island caribou and any changes to the LCP's procedures or mitigation plans would be addressed through the adaptive management approach, if and as appropriate.

### 11 REFERENCES

- Bergerud, A.T. 1972. Food Habits of Newfoundland Caribou. *Journal of Wildlife Management* 36: 913 - 923.
- Bergerud, A.T., S.N. Luttich and L. Camps. 2008. *The Return Of Caribou to Ungava*. McGill-Queens University Press, Montreal, QC and Kingston, ON.
- Courtois, R., L. Bernatchez, J.-P. Ouellet and L. Breton. 2004. Significance of Caribou (*Rangifer tarandus*) Ecotypes from a Molecular Genetics Viewpoint. *Conservation Genetics* 4: 393 - 404.
- Courtois, R., A. Gingras, D. Fortin, A. Sebbane, B. Rochette and L. Breton. 2008. Demographic and Behavioural Response of Woodland Caribou to Forest Harvesting. *Canadian Journal of Forest Resources* 38: 2837 - 2849.
- Fortin, D., R. Courtois, P. Etcheverry, C. Dussault and A. Gingras. 2008. Winter selection of landscapes by woodland caribou: behavioural response to geographical gradients in habitat attributes. *Journal of Applied Ecology* 45: 1392-1400.
- Mahoney, S.P. and J.A. Virgil. 2003. Habitat Selection and Demography of a Nonmigratory Woodland Caribou Population in Newfoundland. *Canadian Journal of Zoology* 81: 321-334.
- Mayor et al. 2007 - Mayor, S.J., J.A. Schaefer, D.C. Schnieder and S.P. Mahoney. 2007. Spectrum of Selection: New Approaches to Detecting the Scale-dependent Response to Habitat. *Ecology* 88(7): 1634-1640.
- Mayor et al. 2009 - Mayor, S.J., J.A. Schaefer, D.C. Schnieder and S.P. Mahoney. 2009. The Spatial Structure of Habitat Selection: A Caribou's-Eye-View. *Acta Oecologica* 35: 253-260.
- Mysterud, A., and E. Østbye. 1999. Cover as a Habitat Element for Temperate Ungulates: Effects on Habitat Selection and Demography. *Wildlife Society Bulletin* 27:385–394.

LITL CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
ILK-PT-MD-0000-EV-PL-0004-01	B3	20

- Nalcor. 2012a. Labrador-Island Transmission Link. Environmental Impact Statement. April 2012. April. 2012.
- Nalcor. 2012b. Labrador- Island Transmission Link. Environmental Impact Statement. EIS Addendum. December 2012.
- NLDEC. 2009. Natural Balance: Woodland Caribou. Publication prepared for Canadian Environment Week May 31-June 6, 2009. Government of Newfoundland and Labrador, St. John's, NL. Available at: <http://www.env.gov.nl.ca/env/publications/wildlife/index.html>. Accessed: March 24, 2011.
- NLDEC. 2010. Update on 2010 Big Game Licence Quotas on Island. News Release, May 31, 2010. Government of Newfoundland and Labrador. St. John's, NL. Available at: <http://www.releases.gov.nl.ca/releases/2010/env/0531n01.htm>. Accessed: November 27, 2011.
- NLDEC. 2011b. Hunting and Trapping Guide 2011-2012. Government of Newfoundland and Labrador, St. John's, NL.
- O'Brien, D., M. Manseau, A. Fall and M.J. Fortin. 2006. Testing the importance of spatial configuration of winter habitat for woodland caribou: an application of graph theory. *Biological Conservation* 130: 70 - 83.
- Schaefer, J.A. 1996. Canopy, Snow and Lichens on Woodland Caribou Range in Southeastern Manitoba. *Rangifer Special Issue* 9: 239 - 244.
- Schaefer, J.A. and W.O. Pruitt. 1991. Fire and Woodland Caribou in Southeastern Manitoba. *Wildlife Monographs* 1: 39.
- Seip, D.R. 1992. Factors Limiting Woodland Caribou Populations and Their Interrelationships with Wolves and Moose in Southeastern British Columbia. *Canadian Journal of Zoology* 70: 1494-1503.
- Trindade, M., F. Norman, S.P. Mahoney, J. Weir, K. Lewis, T. Porter and S. Gullage. 2010. Proximate causes of caribou calf mortality in a declining population: implications for population recovery. Poster presentation at: Sustaining Caribou and their Landscapes – Knowledge to Action, The 13th North American Caribou Workshop, October 25-28, 2010. Winnipeg, Manitoba.