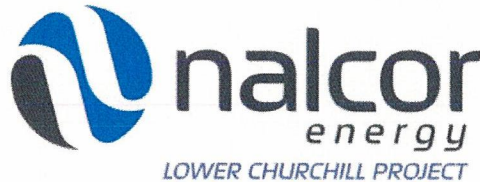


Nalcor Energy – Lower Churchill Project



LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN

Nalcor Doc. No. LCP-PT-MD-0000-EV-PL-0005-01

Comments:	Total # of Pages: (Including Cover): 19
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B4	26 June 2014	Issue for Use	<i>Jackie Wells</i> J. Wells	<i>M. Organ</i> M. Organ	<i>R. Power</i> R. Power
Status / Revision	Date	Reason for Issue	Prepared by	Functional Manager Approval	Project Manager (Generation + Island Link) Approval

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LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	1

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LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	2

TABLE OF CONTENTS

	PAGE
1 PURPOSE.....	3
2 SCOPE	3
3 DEFINITIONS	4
4 ABBREVIATIONS AND ACRONYMS	4
5 INTERNAL REFERENCES.....	6
6 PROJECT DESCRIPTION	6
6.1 Muskrat Falls Generation	6
6.2 Labrador Transmission Asset (LTA)	7
7 EXISTING INFORMATION	8
8 REGULATORY COMPLIANCE.....	9
9 ENVIRONMENTAL EFFECTS MANAGEMENT.....	10
10 ENVIRONMENTAL EFFECTS MONITORING	12
10.1 Program Protocols.....	13
10.1.1 Baseline Data Collection.....	13
10.1.2 Data Collection during Construction	13
10.1.3 Data Collection During Operations	16
11 EXTERNAL REFERENCES	17
 Figure 6-1 Muskrat Falls Generating Facility	 7
Figure 6-2 Labrador Transmission Asset.....	8

LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	3

1 PURPOSE

The purpose of this Caribou Protection and Environmental Effects Monitoring Plan (CPEEMP) is to demonstrate how any adverse environmental effects of the Project on caribou will be mitigated, and sets out a program for monitoring the effectiveness of the mitigation measures.

To comply with regulatory requirements and commitments made in the Lower Churchill Hydroelectric Generation Project's (the Project) Environmental Impact Statement (EIS), the EEMP approach includes consideration of:

- Mitigation objectives – performance objectives with respect to any 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 ensure 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 Project's CPEEMP builds on existing information and commitments made in the EIS (Nalcor 2009), and conditions of permits and licenses.

2 SCOPE

This plan addresses the required aspects of migratory caribou protection and effects monitoring for the design, construction, and operation phases of the Lower Churchill Project (LCP) including Muskrat Falls Generation and the Labrador Transmission Assets (described in Section 6.0).

The sedentary populations of woodland caribou in the province are considered Threatened under Schedule 1 of the *Species at Risk Act (SARA)*, and occur in the lower Churchill River watershed. Sedentary herds that occur in the vicinity of the Project include the Red Wine Mountains (RWM) herd and the Mealy Mountains Herd (MMH), which includes the Joir River Herd (JRH) subpopulation (Bergerud et al. 2008). Of greatest concern is the RWM herd, which has a historical range that overlaps with the Project. The RWM herd was considered stable in

LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	4

the 1980s but declined dramatically to 151 animals in 1997 (Schaefer et al. 1999) with a further decrease to 97 animals by 2001 (Chubbs et al. 2001; Schmelzer et al. 2004). The JRH and MMH occur outside the physical footprint of the Project. The sedentary populations of woodland caribou (i.e., the RWM herd) with respect to environmental protection and effects monitoring are discussed in the LCP Species at Risk Protection and Environmental Effects Monitoring Plan (LCP-PT-MD-0000-EV-PL-0004-01).

The focus of this plan is the migratory caribou that may overlap with the Project footprint (i.e., the George River Herd).

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 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 Management System: Part of an organization's management system used to develop and implement its environmental policy and manage its environmental aspects.

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.

Integrated Project Delivery Team: The integration of the Nalcor Energy and SNC Lavalin Inc. Environmental and Regulatory Compliance Teams.

4 ABBREVIATIONS AND ACRONYMS

CEAA	Canadian Environmental Assessment Act
COSEWIC	Committee on the Status of Endangered Wildlife in Canada

LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	5

EA	Environmental Assessment
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
EMS	Environmental Management System
ERC	Environment and Regulatory Compliance
GRH	George River Herd
HSE	Health Safety and Environment
HVac	High voltage alternating current
HVdc	High voltage direct current
IBA	Impacts and Benefits Agreement
IPD	Integrated Project Delivery
JRH	Joir River Herd
LTA	Labrador Transmission Asset
LCP	Lower Churchill Project
MMH	Mealy Mountain Herd
NE	Nalcor Energy
NLESA	Newfoundland and Labrador Endangered Species Act
NLDEC	Newfoundland and Labrador Department of Environment and Conservation
OSEM	On-Site Environmental Monitor
PEEMP	Protection and Environmental Effects Monitoring Plan
RCP	Regulatory Compliance Plan
RWM	Red Wine Mountain
RP	Rehabilitation Plan
SARA	Species at Risk Act

LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	6

5 INTERNAL REFERENCES

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-0001-01	Environmental Impact Statement and Supporting Documentation for the Lower Churchill Hydroelectric Generation Project
LCP-PT-ED-0000-EA-SY-0002-01	Environmental Impact Statement and Supporting Documentation for the Labrador-Island Transmission Link
LCP-PT-ED-0000-EV-RG-0001-01	Lower Churchill Project Permit Registry
LCP-PT-MD-0000-SM-ST-0001-01	Post Environmental Assessment Release
LCP-PT-MD-0000-RT-PL-0001-01	Regulatory Compliance Plan
LCP-PT-ED-000-EN-PH-0031-01	Design Philosophy for Environmental Rehabilitation
LCP-PT-ED-0000-EN-PH-0007-01	Design Philosophy for Environmental Mitigation
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-IM-PL-0003-01	Information Management Plan
LCP-PT-MD-0000-CO-PL-0001-01	Communications and Stakeholder Relations Plan
LCP-PT-MD-0000-EV-PL-0002-01	LCP Integrated Environmental Management Plan

6 PROJECT DESCRIPTION

6.1 MUSKRAT FALLS GENERATION

The Muskrat Falls Generation Project will include the following sub-components which are broken down under the five principal areas of the development:

- 22 km of access roads, including upgrading and new construction, and temporary bridges;
- A 1,500 person accommodations complex (for the construction period); and
- A north roller compacted concrete overflow dam;
- A south rockfill dam;

LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	7

- River diversion during construction via the spillway;
- 5 vertical gate spillway;
- Reservoir preparation and reservoir clearing;
- Replacement fish and of terrestrial habitat;
- North spur stabilization works;
- A close coupled intake and powerhouse, including:
- 4 intakes with gates and trash racks;
- 4 turbine/generator units at approximately 206 MW each with associated ancillary electrical/mechanical and protection/control equipment;
- 5 power transformers (includes 1 spare), located on the draft tube deck of the powerhouse; and
- 2 overhead cranes each rated at 450 Tonnes



Figure 6-1 Muskrat Falls Generating Facility

6.2 LABRADOR TRANSMISSION ASSET (LTA)

LTA consists in the AC transmission line system from Churchill Falls to Muskrat Falls, specifically:

- Churchill Falls switchyard extension;

LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN

Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	8

- Muskrat Falls switchyard;
- Transmission lines from Muskrat Falls to Churchill Falls: double-circuit 315 kV ac, 3 phase lines, double bundle conductor, Single circuit galvanized lattice steel guyed suspension and rigid angle towers; 247 km long;
- 735 kV Transmission Line at Churchill Falls interconnecting the existing and the new Churchill Falls switchyards; and
- Labrador Fibre Project (Nalcor's participation in Aliant led initiative).

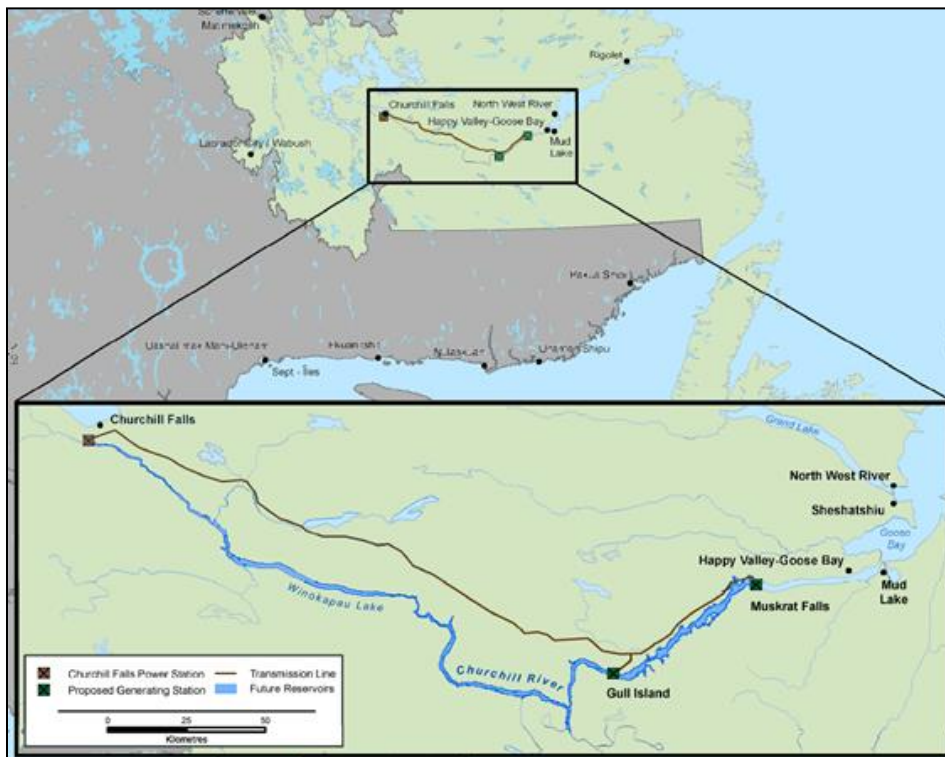


Figure 6-2 Labrador Transmission Asset

7 EXISTING INFORMATION

As described in Nalcor (2009) woodland caribou (*Rangifer caribou*) is the most abundant ungulate in Labrador, and once was an important hunting resource for residents and prey for wildlife. Caribou within Labrador are classified as one of three ecotypes: (i) sedentary, (ii) migratory, or (iii) montane (Bergerud et al. 2008; Boulet et al. 2005; Thomas and Gray 2002). Currently, the province recognizes the George River Herd (GRH) as a migratory ecotype.

LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	9

Sedentary caribou are the forest dwelling ecotype that undergoes a seasonal dispersion (rather than migration) during calving (Bergerud et al. 2008).

The migratory GRH is the largest herd in the province and one of the largest in Canada, however it was most recently estimated at approximately 27,600 animals – a significant decrease from the 2010 census which indicated 74,000 animals (NLDEC 2012, internet site). The herd was estimated at 428,000 to 451,000 caribou in June 1993 (Bergerud et al. 2008), while other surveys in the same year estimated between 540,000 and 750,000 caribou (Courturier et al. 1996; Russel et al. 1996). The continued decline of the GRH has prompted the Provincial Government to initiate an immediate ban on all caribou hunting in Labrador for conservation purposes for a period of five years (NLDEC 2013). The GRH winter range is known to overlap with the Project footprint.

Existing information regarding caribou is summarized from data compiled for Nalcor's EIS for the Lower Churchill Hydroelectric Generation Project, which was based on a literature review, existing reports and research conducted in the lower Churchill River region, and other sources (Nalcor 2009).

8 REGULATORY COMPLIANCE

The GRH is currently not listed under the Newfoundland and Labrador Endangered Species Act, 2004 (NLESA) or the federal SARA.

The intent of the CPEEMP is to 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.

NL Reg. 18/12, also referred to as the *Lower Churchill Hydroelectric Generation Project Undertaking Order* releases the Project from environmental assessment and sets conditions for this release that LCP must meet. The release of the Project from environmental assessment under section 3 is subject to the following conditions:

- a) Nalcor Energy shall abide by all commitments made by it in the Environmental Impact Statement dated February 2009, and all the Environmental Impact Statement Additional Information Requests made by the Lower Churchill Hydroelectric Generation Project

LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	10

Environmental Assessment Panel and consequently submitted by the LCP, and the submissions made by the LCP during the panel hearings and, subsequent to the hearings, to the panel, unless one or more of the commitments, or a part of a commitment is specifically waived by the minister;

- e) Nalcor Energy shall prepare and abide by the requirements of environmental effects monitoring plans for all phases of the project, and those plans shall be submitted to and approved by the Minister of Environment and Conservation or the appropriate minister of the Crown before the commencement of an activity which is associated with or may affect one or more of the following matters:

(xv) caribou

Submission of this CPEEMP satisfies the condition/requirement in NL Reg. 18/12 that the LCP prepare and submit to the Minister of Environment and Conservation or the appropriate minister of the Crown, an environmental effects monitoring plan for all phases of the project, before the commencement of an activity which is associated with or may affect the following matters:

(xv) caribou

9 ENVIRONMENTAL EFFECTS MANAGEMENT

The effects management measures (i.e., mitigation measures outlined in the EIS [Nalcor 2009] and the Generation and LTA Environmental Protection Plan and the commitments made during the Information Request responses and the hearing) for the GRH are presented below:

- All site personnel shall receive training to recognize any endangered, threatened or vulnerable species of plant or animal and its habitat prior to the start of clearing and any other site activities;
- The footprint of the Project will be minimized to the extent possible and kept within existing areas of disturbance whenever possible.
- Construction activities shall be scheduled considering any sensitive areas of wildlife habitat and critical periods in wildlife cycles, and considering additional mitigation measures that may be required. Annual timing of migration, and calving in the vicinity of the site shall be considered at all times;
- Personal pets shall not be brought to the construction site;

LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	11

- Buffer zones shall be implemented to protect wildlife at the site, see Section 10.18 (of the Generation and Labrador Transmission Assets (LTA) EPP) for the buffer zones for helicopter traffic at the site;
- Personnel are prohibited from fishing and hunting within the project footprint during the construction phase;
- Antifreeze will not be used as a method of pest control;
- Under no circumstances are wildlife to be fed and all measures shall be taken to avoid inadvertent feeding;
- Wildlife shall not be chased, caught, diverted, followed or otherwise harassed by project participants;
- All wildlife sightings and nuisance wildlife shall be reported to the On-Site Environmental Monitor (OSEM);
- The Forestry Branch shall be contacted and updated with regards to nuisance wildlife and wildlife encounters;
- Equipment and vehicles shall yield the right-of-way to wildlife and adhere to construction site speed limits;
- Environmental awareness training, with regular briefings, shall be implemented for all personnel;
- There will be three access roads associated with Project activities at Muskrat Falls (i.e., at Edwards Brook, the North Spur, and the South Side access road to the main construction site). These roads will be closely monitored during periods of snow cover and should caribou approach within 3 km, breaks at 500 m intervals will be created in snow berms to facilitate movement across them.
- Garbage control measures will be used to prevent bears, wolves, and other animals from accessing garbage and prevent attraction of animals to garbage storage areas;
- Firearms shall not be permitted on site, with exception of approved bear monitors;
- 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, LCP will contact NLDEC-WD immediately;
- Scheduling of activities should be limited and adaptable during calving and post-calving periods (May 1 to July 1) as well as during sensitive periods in the winter;
- When caribou (based on collar data or observational data) occupy an area under construction/development, LCP will contact the Wildlife Division to determine if

LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	12

appropriate mitigation can be put into place or if activities must be suspended at that location;

- Maintain higher flight altitudes (300 agl or higher) During critical and sensitive periods helicopter flights will maintain flight altitudes of 300 agl whenever possible. If caribou are startled, ascend to a higher flight path or veer away.
- If necessary, access control measures will be applied in certain areas associated with facilities and/or ongoing activities to prevent disturbance of individual caribou:
 - the reservoir preparation approach will be mostly river based, thereby reducing the need for access from the TLH to a single road at Edwards Brook;
 - existing access points will be used;
 - signage in the Project area will be used to deter access; and
 - site security will be in place during construction at the South Side Access Road and other Project locations to restrict public access.
- When Project construction ends, all roads not essential to long-term maintenance must be decommissioned, and habitat must be restored and access shall be restricted;
- If necessary, access control measures will be applied in certain areas associated with facilities and/or ongoing activities to prevent disturbance of individual caribou.

Throughout the construction of the Project, LCP will maintain communications with the provincial Wildlife Division, and other stakeholders and officials regarding the movements of the GRH sightings in the Project area.

10 ENVIRONMENTAL EFFECTS MONITORING

This CPEEMP contains both:

Follow-up Programs – studies or surveys designed and completed to confirm the predictions of the environmental assessment (EA) and to determine the effectiveness of any measure taken to mitigate the adverse environmental effects of the Project; and

Monitoring Programs – studies or surveys designed and completed to determine whether the Project is implemented as proposed, and that mitigation and compensation measures to minimize the Project's environmental effects are implemented. Compliance Monitoring is all environmental monitoring of a proponent's activities to ensure compliance with

LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	13

regulatory requirements and other environmental commitments made through the environmental impact assessment process, including conditions of EA release.

10.1 PROGRAM PROTOCOLS

The Project has committed to conduct follow-up and monitoring programs to evaluate the effectiveness of the effects management plans, and to determine if expansion or reduction or deletion of the indicated programs is appropriate (with justification). This would apply to the following, as appropriate:

- Baseline data collection (i.e., data collected prior to construction);
- Data collection during construction; and
- Data collection during operations.

Protocols for the various surveys are discussed below. Data collection includes metrics that are species specific, as appropriate, quantifiable, repeatable, relevant and time constrained. The goal would be to collect meaningful data in a focused, defensible, repeatable approach, within a timeline that is reasonable, to ensure that the mitigation is appropriate. Where it is determined that the mitigation is not appropriate, a contingency plan would be presented that LCP could incorporate as per their adaptive management approach.

10.1.1 Baseline Data Collection

Baseline Data Collection refers to the determination of the presence of caribou where Project activities are taking place. This is integral to data collection during construction and is considered the initial part of that process.

10.1.2 Data Collection during Construction

During construction, telemetry collar data will be used to examine mortality rates of collared caribou within buffers around the Project footprint, if data on caribou mortality are available. When collars cease to move and indicate a mortality event, the cause of the mortality may be determined when collars are retrieved. This will provide information on the effects of predation on caribou without collaring predators, depending on data availability. Broader analyses of herd demographics such as age class and sex distributions, recruitment rates and rates of population change may be derived from provincial ungulate aerial surveys. When available, data on the demographics of the GRH will be examined and discussed to provide a broader context for the ecology of the herd.

LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	14

As described in the SAR PEEMP, a winter aerial survey will be conducted for the presence of RWM caribou (uncollared) near Project activities. Observations of GRH will be noted if observed during these surveys.

During the calving and post-calving (May 1 – July 1) if caribou approach the Project, it is proposed there shall be a progressive level of heightened awareness by Project personnel and increased interaction with the Wildlife Division. Project personnel shall follow the mitigation measures outlined in Section 9.0 of this CPEEMP.

The following describes specific potential interaction scenarios and the associated mitigation:

Scenario 1 – Caribou within 20 km of Project activities (based on satellite telemetry or other reports)

- OSEM will conduct weekly visual surveys of 10 km radius around each activity from road-accessible vantage points for caribou or signs of caribou (i.e., winter craters, tracks or scat). If present, wildlife observations will be included in the weekly environmental report to be sent to NLDEC-WD in Corner Brook (whenever Project activities are ongoing), and such information will be presented during environmental awareness training and regular briefings for all personnel.

Scenario 2 – Caribou within 5 km of Project activities (based on satellite telemetry or other reports)

- OSEM to issue advisory to all Project personnel that all sightings of caribou to be reported immediately to the OSEM. The OSEM will then immediately notify all vehicle operators.
- OSEM will conduct daily visual surveys of 10 km radius around each activity from road-accessible vantage points for caribou or signs of caribou (i.e., winter craters, tracks or scat).
 - o If present, wildlife observations will be included in the weekly environmental report to be sent to NLDEC-WD in Corner Brook

Scenario 3 – Caribou present during sensitive time periods. If GRH Caribou are observed during the calving/post calving season (May 1 – July 1), the LCP will consult the NLDEC-WD to discuss appropriate mitigation considering the Project activity to reduce disturbance to caribou.

Scenario 4 – Blasting at the Main Site

LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	15

- 1) Prior to blasting, the OSEM will conduct a visual survey
- 2) If caribou are within 3 km of the site, blasting will be delayed until caribou have left the area
- 3) Methods to encourage caribou to leave the area may be implemented in consultation with NLDEC-WD
- 4) 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

Scenario 5 – Other Project activities (e.g., grubbing, grading and leveling, laydown and storage of equipment and material in existing areas, generators to support the activity, vehicle and heavy equipment use, handling and transfer of fuel and other hazardous material, waste disposal, sewage disposal and hazardous waste disposal, localized and low intensity blasting, tower erection and conductor stringing)

- 1) As these activities 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
- 2) Wildlife interactions will be included in the weekly environmental report to be sent to NLDEC-WD in Corner Brook

In addition, the LCP has agreed to support additional wildlife monitoring that will provide a measure of predator, moose and other indicators of the ecosystem that would influence caribou. These include:

- Furbearer transect replication completed in 2006 and previously throughout the lower Churchill River watershed;
- Aerial surveys for moose and other wildlife at seventeen 10.5 km² long term monitoring blocks throughout central Labrador that have been examined on several occasions since 1995 (e.g., Trimper et al. 1996, Minaskuat Inc. 2009).
- Any incidental observations of wildlife collected during LCP's baseline, follow up, or monitoring surveys will be made available to NLDEC-WD.
- Traffic data currently being recorded for the South Side Access Road will be provided to NLDEC-WD to support its research initiatives.
- LCP will collect traffic count data on the access road associated with the construction camp for reservoir clearing and ac transmission line clearing and will provide the data to NLDEC-WD to support its research initiatives.

LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	16

10.1.3 Data Collection During Operations

A final Follow-up and Monitoring Report will be generated that contains a section that compiles the information collected on Project interactions with Caribou as outlined above to address Follow-up (i.e., verification of EIS predictions) and a section to address Monitoring (i.e., regulatory compliance), as discussed in the following subsections.

10.1.3.1 Follow-up

The Follow-up portion of the Follow-up and Monitoring Report, within the CPEEMP, will include the collation of all data related to Project interactions with caribou collected during the construction period and the first five years of operations. The Follow-up portion of the report will present the pre-construction caribou baseline information, consider the data as a description of the effects collected on interactions with Caribou during the Project construction and operations time periods, and discuss the effects observed in relation to the effects predictions made in the EIS (i.e., no significant adverse residual effects on Caribou).

10.1.3.2 Monitoring

The Monitoring portion of the Follow-up and Monitoring Report will summarize the On-Site Environmental Monitors' observations and efforts related to the interactions of the Project components and activities with Caribou to show that the Project was implemented as proposed, and that mitigation measures to minimize the Project's adverse environmental effects on Caribou were implemented appropriately. This will include a subsection to address Compliance Monitoring, also undertaken by the On-Site Environmental Monitors to ensure Project compliance with regulatory requirements and other environmental commitments made in the EIS, the responses the LCP provided to the information requests, and conditions of EA release.

10.1.3.3 Contingency Plan

At this time, contingency plans are not anticipated for Caribou and any changes to the LCP procedures or mitigation plans would be addressed through the adaptive management approach, if and as appropriate. Any changes proposed by the LCP would be based on the findings of the Follow-up and Monitoring Programs.

LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	17

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LCP CARIBOU PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-EV-PL-0005-01	B4	18

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