

Nalcor Energy – Lower Churchill Project



LCP AVIFAUNA PROTECTION AND ENVIRONMENTAL EFFECTS MONITORING PLAN

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Inter-Departmental / Discipline Approval (where required)

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1 PURPOSE

The purpose of this Avifauna Protection and Environmental Effects Monitoring Plan (APEEMP) is to demonstrate how any negative environmental effects on Avifauna 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 (the Project) Environmental Impact Statement (EIS), the EEMP approach includes consideration of:

- Mitigation objectives – performance objectives in respect of each negative 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.

LCP’s APEEMP builds on existing information (e.g., the Avifauna Management Plan (AMP) [Stantec 2012]), commitments made in the EIS (Nalcor 2009), and conditions of permits and licenses for the Project).

2 SCOPE

This plan addresses the required aspects of avifauna protection and effects monitoring for the design, construction, and operation phases of Muskrat Falls Generation Project and Labrador Transmission Assets (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 implementation to prevent, minimize, mitigate, or compensate for adverse environmental effects and to enhance positive effects.

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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
CWS	Canadian Wildlife Service
EA	Environmental Assessment
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
EMS	Environmental Management System
ERC	Environment and Regulatory Compliance
HSE	Health Safety and Environment
HVac	High voltage alternating current
IPD	Integrated Project Delivery
LCP	Lower Churchill Project
NE	Nalcor Energy
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
RP	Rehabilitation Plan
SARA	Species at Risk Act

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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-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-EV-PL-0011-01	LCP Generation and LTA Environmental Protection Plan
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
LCP-PT-MD-0000-EV-PL-0003-01	LCP Avifauna Management Plan
LCP-PT-MD-0000-EV-PL-0007-01	LCP Species at Risk

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;

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- A south rock fill dam;
- 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

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6.2 LABRADOR TRANSMISSION ASSET (LTA)

LTA consists of the ac transmission line system from Churchill Falls to Muskrat Falls (see Figure 6-2), specifically:

- Churchill Falls switchyard extension;
- 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).

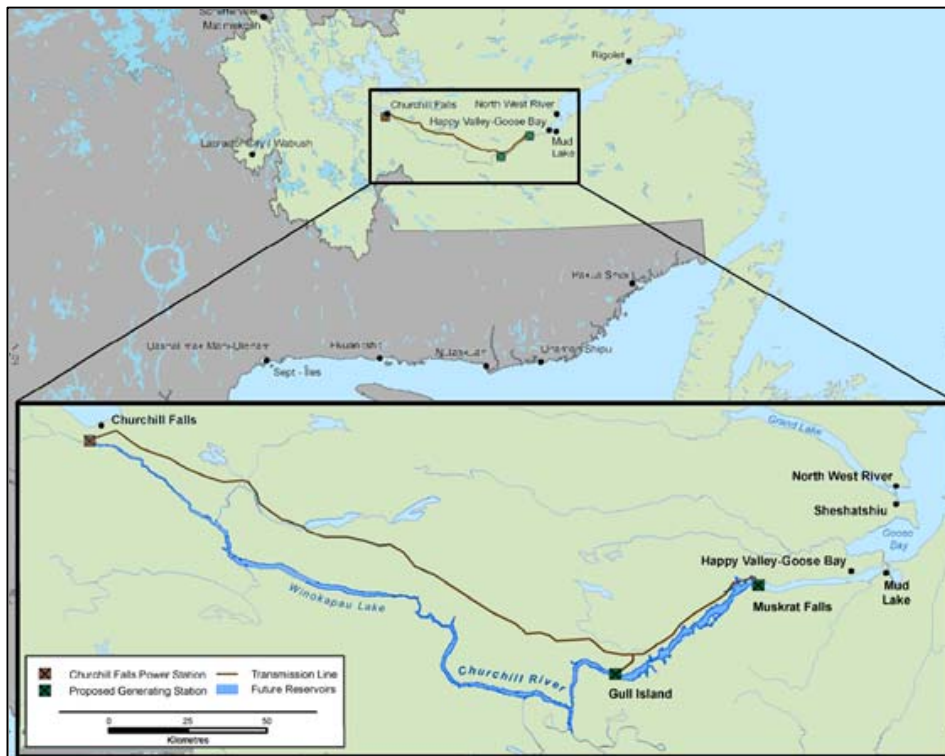


Figure 6-2 Labrador Transmission Asset

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7 EXISTING INFORMATION

As outlined in the 2012 Avifauna Management Plan (AMP) (Stantec 2012), there are both migratory and year-round resident species within the lower Churchill River valley. The majority of migratory species, which are protected under federal and/or provincial legislation, can be grouped into three categories: songbirds; waterfowl; and raptors.

Species of special concern are those with protection designations under federal (Species at Risk Act [SARA]) or provincial (Newfoundland and Labrador *Endangered Species Act [NLESA]*) legislation and include Rusty Blackbird, Olive-sided Flycatcher, Common Nighthawk, Harlequin Duck, and the provincially listed Gray-cheeked Thrush.

Existing information regarding these groups and species is summarized from data compiled for Nalcor's EIS for the Project, which was based on a literature review, Project-specific baseline surveys, other ongoing annual bird surveys conducted in the lower Churchill River region, and other sources (Nalcor 2009).

7.1 WATERFOWL

Waterfowl occupy the lower Churchill River and associated water bodies and tributaries, either seasonally or periodically during migration. Breeding waterfowl in central Labrador include an early-nesting group (dabbling ducks and geese) and a late-nesting group (sea ducks and diving ducks). While the lower Churchill River is relatively unproductive for waterfowl because of the large extent of sandy shoreline and sediments, some wetlands adjacent to the river are relatively productive and fulfill seasonal life cycle requirements for waterfowl (e.g., staging and brood rearing).

Canada Goose are representative of the early-nesting waterfowl group. Canada Goose nest widely within the lower Churchill River watershed in relatively low numbers, both along the main branch of the lower Churchill River and in upland areas, where they use peatlands, ponds and lakes along the upper reaches of tributaries of the lower Churchill River (LGL Limited 2008). Areas of open water in spring (ashkui) are of particular importance for this species and other migrating waterfowl that rely on open water areas for staging, while awaiting the thaw of interior wetlands at higher elevations and latitudes. Geese arrive in the area in early May (Chaulk and Turner 2007) and depart in September through October (LGL Limited 2008).

Surf Scoter are representative of the late-nesting waterfowl group and are widespread in Labrador. Classified as a sea duck, Surf Scoter is a migratory waterfowl species that winters in coastal areas and breeds on shallow lakes in the boreal forest. Despite declines elsewhere in

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their range (Canadian Wildlife Service (CWS) 2007a), Surf Scoter are increasing in northeastern Canada (CWS 2007b). The only known concentration of breeding birds in eastern North America is in northern Quebec and central Labrador (Savard et al. 1998), and includes the lower Churchill River watershed. The lower Churchill River is highly suitable for spring staging by Surf Scoter due to the large volume of moving water and recessed nature of the Lake Melville ecoregion. This estuary and various locations along the river are some of the first open water areas (ashkui) in central Labrador.

7.2 SONGBIRDS

The forest songbirds species most commonly observed during breeding bird surveys conducted in the lower Churchill River valley include Ruby Crowned Kinglet, Dark-eyed Junco, Swainson’s Thrush, Tennessee Warbler, White-throated Sparrow, Yellow Warbler, Boreal Chickadee and Black-throated Green Warbler (Minaskuat Inc. 2008a). All forest songbirds have habitat preferences, but most are flexible in their requirements, having optimal success in certain forest types, while managing to survive and reproduce in other habitat types even if at lower productivity levels or reduced densities.

Wetland songbird species are more restricted in their choice of habitat. Most wetland species have little or no ability to adapt to forested habitat. The species that exemplify this limited adaptability are the migratory sparrows of wetland and riparian habitats; specifically, Swamp Sparrow, Song Sparrow, Lincoln’s Sparrow and Savannah Sparrow. This group of Wetland Sparrows is more susceptible to alteration or loss of habitat than are other songbirds because they are dependent on the limited wetland and riparian habitat. Primary habitat for these Wetland Sparrows is marshes and adjacent riparian areas that provide for foraging, protection and resting (food, shelter and nesting habitat). Secondary habitat is bogs and fens which provide the required resources, but tend to support lower productivity and population densities than marshes. Both primary and secondary habitat are limited in the lower Churchill River valley.

7.3 RAPTORS

Raptors are often described according to their breeding habitat, such as tree-nesting (e.g., Osprey, Bald Eagle, Red-tailed Hawk, Great Horned Owl and Northern Goshawk) and cliff-nesting (Golden Eagle, Merlin, Red-tailed hawk and Great Horned Owl). Large raptors known to occur in the Lower Churchill River watershed include Osprey, Golden Eagle, Bald Eagle, Red-

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tailed Hawk and Rough-legged Hawk. The primarily fish-eating Osprey is at the top of the food chain, and therefore, like other raptors is a reflection of the status of lower trophic levels.

The Osprey have been the subject of a long term study in the lower Churchill River watershed through annual population monitoring and behavioral investigations associated with the military training at 5 Wing Goose Bay from 1991 to 2007. Osprey in Labrador are at the northern extent of their international range (Poole 1989), and there is seasonal pressure to establish territories as soon as ashkui or open water for foraging is available. In central Labrador, Ospreys arrive in May, have median hatch dates of early July and median fledging dates of early September (Jacques Whitford 1995).

Osprey nests in Labrador are typically found within 3 km (mean 435 m) of a water body, commonly on islands in streams, or along the shore of smaller tributaries where trees are taller than the surrounding forest canopy (Jacques Whitford 1995) and provide easy access to productive feeding areas. Most Osprey nests in the lower Churchill River watershed have been documented (Minaskuat Inc. 2008b).

Ospreys also nest on large rocks or artificial nesting platforms on transmission line poles in Labrador (Jacques Whitford 1998, 1999). Osprey's acceptance of artificial nesting sites, which tend to be more stable than natural nesting sites, creates new nesting opportunities. The Osprey's preference for fish as a primary food source leads to an ecological risk in relation to the hydroelectric generation project, that is, possible methylmercury accumulation.

7.4 SPECIES OF SPECIAL CONCERN

Avian species of special conservation concern that have been confirmed in the lower Churchill River watershed include the federally and provincially listed species Rusty Blackbird, Olive-sided Flycatcher, Common Nighthawk, Harlequin Duck, and the provincially listed Gray-cheeked Thrush. Small numbers of observations of these species have been made by the forest songbird study team in the Churchill River valley and in Happy Valley-Goose Bay (Common Nighthawk, Olive-sided Flycatcher), or during the long-running annual survey along the Happy Valley Breeding Bird Survey route (Gray-cheeked Thrush, Rusty Blackbird).

Harlequin Duck is a migratory species with the Labrador population representing the core of its eastern breeding distribution. The Eastern population of the Harlequin Duck is protected under SARA as a Species of Special Concern. Over the last decade, population numbers have slowly rebounded with a strong recovery across much of Eastern Canada (SARA 2012, Internet site). Aerial surveys and ground-based studies within the lower Churchill River watershed, most notably at Fig River, have provided data on the Harlequin Duck. The lower Churchill River

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watershed is an important breeding area for Harlequin Duck in Labrador. Harlequin Duck nest in the upper reaches of many of the tributaries of the lower Churchill River; however, breeding density overall is low, approximately one pair for each 4 km of river.

The Common Nighthawk’s Threatened provincial designation reflects a rapid and severe population decline across its range. Its distribution extends into central and southern Labrador (Godfrey 1986; NatureServe 2007, Internet site). In the boreal ecoregion, the Common Nighthawk prefers open forest habitat in the form of rocky barrens or forests regenerating from fire or clear-cuts (Poulin et al. 1996, Internet site). It has been observed by the forest songbird study team in the Churchill River Valley and in Happy Valley-Goose Bay. The Common Nighthawk is present on its breeding grounds from late May to August (NatureServe 2007, Internet site).

The Olive-sided Flycatcher is provincially designated Threatened. The northeastern range of the Olive-sided Flycatcher extends into Labrador, as far as the lower Churchill River watershed (Godfrey 1986; Dunn and Alderfer 2007; NatureServe 2007, Internet site). This species is most often associated with open areas containing perching locations (COSEWIC 2007). These open areas include forest openings including near wetlands and human-made openings like clearcuts (COSEWIC 2007). As a late spring and early fall migrant, the flycatcher is often present on its breeding grounds from late May or early June to mid-August (Altman and Sallabanks 2000, Internet site).

The Rusty Blackbird is provincially designated Vulnerable. It occurs across most of Labrador except the far north (Godfrey 1986; NatureServe 2007, Internet site), and is generally uncommon. Primary habitat for Rusty Blackbird was is riparian and wetlands habitat that are limited in the lower Churchill River valley. Nesting habitat for the Rusty Blackbird is typically conifers along the edge of a bog or other wetland.

The Gray-cheeked Thrush is provincially designated as Vulnerable. Its range extends across much of Labrador and includes the lower Churchill River watershed (Todd 1963; Godfrey 1986; Lowther et al. 2001, Internet site). Although records from within this area are limited to fewer than five documented reports each from Happy Valley-Goose Bay and North West River (Dalley et al. 2005), this likely reflects a general lack of documentation of songbirds, rather than an accurate inventory regarding the abundance of Gray-cheeked Thrush. This species was not recorded on the Happy Valley Breeding Bird Survey route (Sauer et al. 2007).

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8 REGULATORY COMPLIANCE

As discussed within the AMP (Stantec 2012), the Migratory Birds Convention Act (MBCA) was designed to protect and conserve migratory birds, both as populations and individual birds, and their nests (internet site: Government of Canada 1994a). In Canada, the MBCA and associated Migratory Birds Regulations (internet site: Government of Canada 1994b) are administered through Environment Canada by the Canadian Wildlife Service (CWS) (internet site: Government of Canada 1994a). Coverage of the MBCA includes songbirds (e.g., warblers, thrushes, and sparrows, waterfowl (e.g., ducks, loons and geese), and seabirds (e.g., gulls and terns) but does not include grouse, ptarmigan, hawks, eagles, owls, blackbirds or jays (Environment Canada 1991).

SARA was established to provide wildlife species additional protection against extirpation, extinction or endangerment (internet site: Government of Canada 2002). This includes protection from human activity. Under the *SARA*, there are three schedules, species officially protected are listed on Schedule 1, where species are classified under the following designations (three of which mirror the provincial definitions):

- Extirpated: a wildlife species that no longer exists in the wild in Canada, but exists elsewhere;
- Endangered: a wildlife species that is facing imminent extirpation or extinction;
- Threatened: a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction; and
- Special Concern: a wildlife species that has characteristics which make it particularly sensitive to human activities or natural events.

Schedule 1 of *SARA* is the official list of wildlife species at risk. Once a species is listed, the measures to protect and recover a listed wildlife species are implemented. Species that were designated at risk by the COSEWIC prior to the existence of the *SARA* require reassessment before being placed on Schedule 1. These species are listed on Schedule 2 if they were previously assessed by COSEWIC as endangered or threatened, and on Schedule 3 if they were previously assessed by COSEWIC as special concern. Both Schedules 2 and 3 are not provided with legal protection under the *SARA*.

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SARA provides protection to listed migratory bird species and aquatic species everywhere in Canada but all other species are only afforded these protections on federal lands or through a specific order.

Provincially, wildlife species at risk are managed under *NLESA*, designed to complement federal *SARA* legislation. The *NLESA* protects wildlife species, subspecies or populations within the province that are considered extirpated, endangered, threatened or vulnerable based on recommendations from COSEWIC or the provincial Species Status Advisory Committee (SSAC) (internet site: Government of Newfoundland and Labrador 2004). Under *NLESA* it is prohibited to disturb, harass, injure or kill any individual of a listed species, disturb or destroy the residence of listed species, or be in possession of individuals of a listed species (internet site: Government of Newfoundland and Labrador 2004). There are currently 14 bird species listed under *NLESA* (NLDEC 2012).

To comply with federal and provincial legislation and regulations LCP has, or will:

- Identify avian related sensitivities (e.g., nests, concentration areas) through focused, habitat based avian surveys, including for listed species;
- Designed and employed appropriate best management mitigation to avoid disturbance and mortality of birds, including listed species;
- Conduct monitoring or follow-up, as appropriate, to determine success of the mitigation; and,
- If required, address contingency plans if the mitigation is found to be unsuccessful.

The intent of the APEEMP would be to allow LCP to evaluate, and to respond appropriately to the findings of, the Project effects during construction and operations on:

- Disturbance to birds, including listed species, and their residences (i.e., nests, shelters); and
- Mortality of birds, including listed species.

In addition, the 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 Environmental Assessment Panel and consequently submitted by Nalcor Energy, and the

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submissions made by Nalcor Energy 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:

- (xviii) harlequin ducks
- (xix) raptors

Submission of this EEMP satisfies the condition/requirement in NL Reg. 18/12 that Nalcor Energy 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:

- (xviii) harlequin ducks
- (xix) raptors

9 ENVIRONMENTAL EFFECTS MANAGEMENT

The protection and environmental effects monitoring plans (i.e., mitigation measures outlined in the AMP [Stantec 2012]) executed to ensure regulatory compliance of the above discussed acts and regulations include:

Level 1 Protection

Avoid disturbance and / or the clearing of sensitive wildlife areas during all clearing;

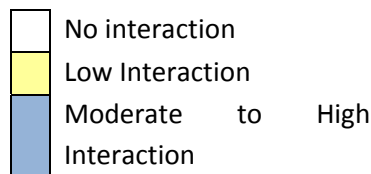
- Implement no harvesting policy and other harassment of wildlife, and no possession of firearms or pets by Project personnel;
- Implement environmental awareness training and conduct regular briefings for all personnel;
- Oversee environmental protection plans (EPP) using environmental monitors;
- Use existing roads, quarries, existing right-of-way corridors for construction of transmission lines, and other disturbed areas, where possible;

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- Restrict public access to temporary roads and work areas;
- Equipment and vehicles shall yield the right-of-way to wildlife and adhere to construction site speed limits. Speed limits associated with Project access roads vary from 10 – 60 km/hr, and are set as per the regulatory requirements set by the Department of Transportation and Works. LCP enforces speed limits on all Project roads;
- Locate construction roads within the reservoirs, where possible;
- Rehabilitate work areas and access roads no longer required in accordance with the EPP to encourage re-formation of natural conditions;
- Undertake blasting in accordance with permits and standard procedures;
- Schedule activities related to transmission line construction around sensitive periods or areas (see Table 9.1);
- Create conditions for establishing formation of hardwood forest at selected locations; and,
- Encourage the formation of riparian marsh wetland.

Figure 9-1 Sensitive Life History Stages for Avifauna

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Early Nesting Waterfowl												
Late Nesting Waterfowl												
Forest Avifauna												
Raptors												



*Table taken from Environmental Impact Statement, Lower Churchill Hydroelectric Generation Project.

Level 2 Protection

Nests could be located in trees or shrubs or on the ground. An active nest can be identified by:

- the presence of birds or eggs in a nest

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- adult birds carrying food or nesting materials to a specific location
- adult birds defending territory, through singing, screeching or diving

When one or more of these indicators are noted, measures will be undertaken to identify if the potential location of the nest is in the disturbance footprint or within a recommended setback buffer.

If a potentially active nest has been identified during pre-construction surveys, the setback buffer is based on the recommended nest setback guidelines recommended by Environment Canada (M. Gahbauer, pers. comm.) or the Government of Newfoundland and Labrador for species of management concern (NLDEC 2012). Setback distance for nests of species not of management concern is 30 m for passerine nests and 100 m for waterfowl/waterbird nests. Any adjustments to the recommended setback buffers need to be discussed with the appropriate regulatory body.

In forested and non-forested habitats, painted lath with flagging or other suitable marking should be used to mark the buffers with appropriate direction and bearing recorded in the field notes. If an occupied nest is discovered on or adjacent to the disturbance footprint during construction, activities within a minimum of 30 m from the nest should not occur until the Environmental Inspector has been notified by the Construction Manager. Once the Environmental Inspector is notified, a wildlife monitor will be dispatched to the site (if not already present) to identify the nest or bird species and determine the appropriate mitigation in consultation with the Construction Manager and Chief Inspector. If a nest is found adjacent to a trail, vehicles will be allowed to continue using the trail but will be prohibited from stopping within the recommended setback buffer.

Level 3 Protection

Additional avifauna mitigation measures include ground surveys to identify breeding migratory bird species including species at risk within areas that will be disturbed. A qualified avian biologist will lead the program that includes conducting ground searches for avifauna nests during the time period 1 May to 31 July.

These surveys will be designed to occur <7 days prior to the clearing activity. The survey techniques will vary according to the configuration of the area of interest but will be based on 100% coverage of the affected area during the breeding season, a census technique (census referring to area not individuals). Active nests will be identified and locations and mitigation

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measures communicated to the OSEMs. In addition, OSEMs are directed to continue to watch for signs of active nests while working during the breeding period.

The ground survey team will be instructed in the identification of nests that may be readily visible or well concealed. The survey team will be aware of behavioral cues that suggest the presence of an active nest, even if it cannot be seen. These cues include singing males, pairs observed together (including courtship and copulation), adult birds repeatedly carrying nest materials or foods to a specific location, aggressive defense of a location (against other birds or people), or the presence of recently fledged birds (often with some tufts of down feathers remaining, or begging persistently for food).

When avian species at risk are in an area under construction/development the NLDEC-WD will be contacted to determine if appropriate mitigations can be put into place or if activity in the area must be halted. Questions regarding migratory birds will be addressed to Environment Canada's Canadian Wildlife Service. For most situations, buffers surrounding Project activities, in addition to clearing activities have been identified, to ensure the effect on nest success is mitigated. These buffers and mitigation activities include:

- A visual survey of the immediate area of a blast site within one hour prior to a blast and operations will be curtailed if wildlife (e.g., Harlequin Duck) is observed within 500 m. Environmental personnel and OSEMs will conduct a pre-blast survey for species of risk;
- Only essential vehicular activity shall be permitted;
- Crews will cease work if there is a disturbance at a nest until activity at the nest has returned to normal; work will not commence again until approved by the OSEM;
- Helicopters are to respect a minimum altitude when moving through specific locations along the Churchill River that are known as spring and fall staging areas for Harlequin Duck. Helicopters moving through these locations (typically during May or September) will maintain a minimum altitude of 500 m from Harlequin Duck;
- For known Rusty Blackbird nests, a minimum 75 m buffer of natural vegetation will be maintained to increase likelihood of successful fledging;
- For known Harlequin Duck nesting areas, a 100 m buffer of natural vegetation will be maintained along the river's edge during their breeding, nesting and staging times (May through September). A 30 m buffer will be maintained outside the sensitive nesting season. Clearing and construction within these buffers during this time will not occur unless otherwise authorized; and

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- For active nests of other species at risk, a 30 m buffer of natural vegetation will be maintained during May through July until the young have fledged and the nest is inactive.

Buffer zones for other bird species not indicated in this document are outlined in the Avifauna Management Plan and will be respected.

10 ENVIRONMENTAL EFFECTS MONITORING

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

10.1 SURVEY PROTOCOLS

LCP has committed to conduct baseline, follow-up and monitoring surveys for the above groups to determine their current state, apply the appropriate mitigation, 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 in sections 10.1.1 to 10.1.4. 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

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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. Table 10-1 presents a summary of the avifauna protection and environmental effects monitoring plan.

10.1.1 Raptor Nest Survey

Survey Type	Raptor Nest Survey
Location	Lower Churchill River, Labrador
Protocol Details	<p>Nest surveys are to be conducted early in the breeding season with the goal of documenting activity prior to potential nesting failures and prior to full “leaf out”, thereby allowing better viewing of potential nest sites within deciduous vegetation. Survey flights should be planned in accordance with applicable Safe Work Practices and LCP Standard Operating Procedures. All occupants should be able to communicate freely using headsets with a live microphone.</p> <p>Survey methodology was adapted from recommended guidelines described in current British Columbia Resources Information Standards Committee (RISC) standards for raptor surveys.</p> <p>For flight paths flown along the transmission line, each flight will follow two predetermined linear transect lines approximately 250 m apart on each side of the proposed transmission line right-of-way (ROW). For this survey, a 100 m overall ROW clearing width was assumed (50 m on each side of the transmission line centerline). Transect coordinates should be provided to the aircraft pilot prior to survey initiation and uploaded to the onboard global positioning system (GPS) unit for navigation purposes. Transects should be flown at a minimum height of 50 m above the canopy or tree tops and a maximum of 100 m above the canopy or tree tops. Flight speed can vary from 50 to 80 km/hr. Two qualified avian biologists experienced in conducting aerial surveys plus the pilot will make up the survey crew. Each biologist will act as an observer and will survey approximately 250 m on their side of the aircraft for 100% coverage of the area flown. Suitable habitat (i.e., the shoreline of lakes, ponds, rivers, creeks and other water bodies) will be preferentially searched to a distance of at least 800 m from the transmission line when encountered along transects. Flight paths will be tracked using a handheld GPS unit. When a nest is observed, the pilot will be instructed to maintain a minimum distance of 200 m and to maneuver the aircraft in a way that distributes rotor downwash away from the nest to minimize potential for</p>

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damage to nest structure and stability.

For flight paths flown along the lower Churchill River in the area to be cleared for the reservoir construction, two qualified avian biologists will accompany the pilot. One specialist, seated in the front, will act as navigator and spotter and will identify birds if his/her duties permit. The other specialist will be seated in the back acting as primary spotter and species identifier. The general flight path will be predetermined, but the actual flight path will be refined during the flight based on the direction of the navigator.

While searching for stick nests, close attention will be paid to sign including individual raptors and white wash. When a previously unidentified nest is located, the crew will obtain a Universal Transverse Mercator (UTM) position (Zone 09/NAD 83) and digital photographs of the nest site. Additional data recorded at a new nest site includes the nesting species (if known), adult presence and behavior, nest status (occupied or unoccupied), number of young (if possible to see into the nest from the helicopter), nest tree type, nest location in tree, and general habitat information. Any nests previously identified during previously conducted surveys for the Project will also be assessed for nesting activity. Nest site characteristics will be recorded with a GPS unit. A second GPS unit, hard copy data sheets, and a digital voice recorder will be on board all flights to facilitate back-up data recording.

The location of alternate nest sites suitable for the placement of artificial nesting platforms will also be identified and recorded with a GPS unit where an occupied nest is identified. For the transmission line survey the proposed location will be beyond 800 m from the transmission line centreline, and for the reservoir survey the identified location will be above the identified full supply level.

The location of incidental wildlife encountered during survey flights will also be recorded and geo-referenced.

If an occupied nest is found where clearing is required, avoidance and appropriate buffers will be implemented. If alternative approaches are required, LCP will consult with NL Department of Environment and Conservation and Environment Canada as appropriate and implement appropriate mitigation.

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10.1.2 Pre-Clearing Nest Search

Survey Type	Pre-clearing nest search
Location	Lower Churchill River, Labrador
Protocol Details	<p>The purpose of a pre-clearing nest search is to locate all occupied migratory bird nests within and around (i.e., within 30 m for passerines and 100 m for waterfowl / waterbirds) an area proposed for Project clearing. This mitigation will reduce bird mortality by avoiding potential destruction of bird nests, nestlings, or attending adults when clearing is unavoidably scheduled within the migratory bird restricted activity period (RAP), and thus will meet requirements of the federal <i>Migratory Birds Convention Act</i> (MBCA) and <i>Migratory Birds Regulations, Species at Risk Act, 2002</i> (SARA) and the Newfoundland and Labrador <i>Endangered Species Act</i>. The RAP in the Project area in Labrador is typically from May 1 to July 31. Surveys will be conducted as close to the scheduled clearing date as possible, with seven days being the maximum time between the survey date and clearing activity.</p> <p>The survey will be conducted by two qualified avian survey team members (or the number appropriate to evaluate the area to be cleared within seven days) using a widely accepted ground search protocol such as meander surveys to document migratory bird nests. While searching for nests, close attention will be paid to individual birds exhibiting nesting behaviour such as birds flushing from the ground at close proximity to the observer, carrying nesting material, carrying food, sitting on nests, alarm calling or displaying territorial (i.e., agitated) behaviour. Evidence of breeding will require setback distances that vary from 30 m for passerine nests to 100 m for waterfowl / waterbird nests.</p> <p>Upon discovery of an occupied nest, the species will be documented when possible, the nest location will be geo-referenced with a global positioning system (GPS), and photographs will be taken. Time spent at the nest will be minimized to avoid prolonged disturbance to the nest and surrounding area. From this information, the location of the nest can be determined and appropriate mitigation measures can be developed.</p> <p>Although the purpose of the survey is to identify any occupied nests within the Project area to be cleared, any provincially and federally listed bird species observed will be recorded using a GPS unit.</p> <p>The location of incidental wildlife encountered during the survey will also be recorded and geo-referenced.</p> <p><i>If an occupied nest is found where clearing is required, avoidance and appropriate</i></p>

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	<i>buffers will be implemented. If alternative approaches are required, LCP will consult with NL Department of Environment and Conservation and Environment Canada as appropriate and implement appropriate mitigation.</i>
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10.1.3 Point Count Breeding Bird Surveys

Survey Type	Point Count Breeding Bird Surveys
Location	Lower Churchill River, Labrador
Protocol Details	<p>Point count breeding bird surveys will be conducted in selected habitat types both outside and within the Project area to measure presence and relative abundance of breeding birds. Point locations will be determined <i>a priori</i> and will be distributed to target wetland and other habitat types preferred by at risk bird species. Survey locations will be a minimum of 100 m from a road or 50 m from other linear disturbances (e.g., a cutline or trail), and a minimum of 250 m apart.</p> <p>Nest search surveys will be conducted no more than 7 days ahead of clearing activities, this time period may extend (i.e., 10 days) later in the season, as it is unlikely that any species in the area will begin to establish nests after early July. By limiting the time between nest searches and clearing activities to fewer than 7 days, the likelihood of incidental take is limited.</p> <p>Habitat selections will be based on efforts from the baseline studies, where key habitats for species at risk were determined, as well as Project areas predicted to most likely be affected.</p> <p>An Ecological Land Classification (ELC) of the project area was completed along the lower Churchill River valley (Minaskuat 2008). Thirteen ecotypes were combined into habitat types based on similar characteristics, as presented in Table 2.1 of the AMP. This ELC habitat classification system will be used to select habitats to survey.</p> <p>Representative habitats will be sampled to determine effect of the Project on species diversity. These transects will be both within and outside of the Project zone of influence. In addition, safety concerns, such as logistics of travelling, and accessing, remote locations at dawn are necessary factors that will be considered for determining sampling transect locations.</p> <p>Surveys will be conducted by two qualified avian survey team members using a standard point count method, including appropriate weather and time of day, consistent with that of the North American breeding bird survey (Ralph 1993). Surveys</p>

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will be conducted between 0600h and 1000h during the breeding season, between May 1 and July 31. Point count surveys identify birds through song (visual) or call (auditory).

Using binoculars, two team members will conduct each survey by remaining still (occasionally rotating) for 10 minutes at the point location and recording all bird species observed within 300 metres of the point location. Both visual and auditory observations are identified. Data collection follows a presence-absence study design and each species is recorded only upon the first observation at each point location. For each bird observed, the following information is recorded in accordance with the stated methodology: species name, sex, and location of bird in relation to observer (i.e., individual located within a 50 m, individual located between 50 and 100 m, individual located beyond 100 m, species flying through the survey area below the forest canopy, and species flying through the survey area above the canopy). The movements and behaviour of the individual will be noted. Weather data including temperature, sky condition (cloud cover) and wind conditions (Beaufort wind scale) will be recorded at the beginning of each point count. The UTM coordinates for each plot will be recorded using a hand-held global positioning (GPS) unit.

The location of incidental wildlife encountered during the breeding bird surveys will also be recorded and geo-referenced.

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10.1.4 Waterfowl-Ashkui Survey

Survey Type	Waterfowl-Ashkui Survey
Location	Lower Churchill River, Labrador
Protocol Details	<p>A qualified avian biologist will be included in the aerial survey to monitor ice conditions to identify open water areas (ashkui) suitable as habitat for waterfowl such as Surf Scoter.</p> <p>Following identification and documentation (e.g., size) of ashkui locations during the ice monitoring survey, two aerial waterfowl surveys will be conducted during the breeding season in late May to early June. The goal of each survey is to document waterfowl species, abundance (number of each species), and activity (nesting/breeding, staging, foraging) at the ashkui sites. Surveys will be flown by helicopter approximately 50 to 100 m above ground at a speed of 50 to 100 km/h. Speed and altitude will vary at the discretion of the biologists and pilot to facilitate identification of waterfowl species, avoid disturbing the waterfowl and maintain safe flying conditions. Survey flights should be planned in accordance with applicable Safe Work Practices and LCP Standard Operating Procedures. All surveyors should be able to communicate freely using headsets with a live microphone.</p> <p>The flight path will follow the shoreline of the Lower Churchill River, with focus on ashkui identified during the survey to monitor ice conditions. The general flight path will be predetermined, but the actual flight path will be refined during the flight based on the direction of the navigator. The flight path will be tracked using a handheld GPS unit. When the helicopter approaches an ashkui, the flight path will follow the edge of the open water.</p> <p>Two qualified avian biologists will accompany the pilot. The biologist seated in the front will primarily act as navigator and spotter as duties permit. The other biologist will be seated in the back, acting as primary spotter and recorder. Waterfowl are generally counted within 200 m of the helicopter, beyond which distance accuracy of detection and identification decrease. When waterfowl are observed, the biologists will record the species, sex, and group size.</p> <p>All observations during spring will be placed in one of the following categories which enable inferences to be made about the breeding population (after Dzubin 1969):</p> <ul style="list-style-type: none"> • Pair: A male and female in close association. Each pair represents one breeding pair. • Lone drake: Single isolated drake. Each lone drake is considered to have a

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nesting hen and is thus considered a breeding pair.

- Grouped drakes: Two to four drakes in close association. The drakes in these smaller groups are considered to have been paired on territory, such that they each represent a breeding pair.

Other groups: Large groups or groups containing five or more drakes. These groups are generally comprised of individuals not dispersed into breeding territories and are considered migrants that are not counted towards the local population.

Observations will also include notes on behavior of the birds noted (e.g., feeding, courting).

The location of incidental wildlife encountered during survey flights will also be recorded and geo-referenced.

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Table 10-1 Summary of Species at Risk and Other Relevant Avifauna Survey Techniques

Avian Group	Survey Type	Survey Objective	Location	Timing (From Avifauna Management Plan)	Frequency	Contingency (e.g., If Active Nest Is Identified During Pre-Clearance Survey)
Pre-Construction						
RAPTORS (Golden Eagle, Bald Eagle, Red-tailed Hawk, Rough-legged Hawk, Osprey)	Aerial Helicopter Survey (Pre-clearing)	<ul style="list-style-type: none"> to identify occupied and unoccupied raptor nests by species, as feasible, prior to clearing activity in any given area within the Project during the nesting season (May 1 to July 31); to identify suitable locations above full supply level (FSL) or at least 800 m from the transmission line ROW to install artificial nesting platforms to mitigate the loss of Osprey or Bald Eagle nests due to clearing activity to note incidental observations of all wildlife, including sign (whitewash, tracks, partial nests, etc.) 	<ul style="list-style-type: none"> areas within the Project area scheduled to be cleared that were not already cleared between August and April flight paths will be on predetermined transects along the lower Churchill River and other watercourses, shorelines, rocky outcrops or ledges, and along the transmission line right-of-way, plus an 800 m buffer of the Project area (i.e., to identify nests potentially exposed to sensory disturbance); suitable platform locations (e.g., with consideration for access and stability) will be identified in the vicinity of occupied Osprey or Bald Eagle nests that will be lost due to clearing activity 	<ul style="list-style-type: none"> late May to early June if clearing was not concluded as scheduled following the nest survey in a given year, a second survey will be necessary if clearing is again scheduled during the nesting season of a subsequent year 	<ul style="list-style-type: none"> one survey for the reservoir and transmission lines (these could be concurrent depending on the clearing schedule) 	<ul style="list-style-type: none"> if an occupied nest is identified during pre-construction surveys: clearing schedule in that area will be adjusted to accommodate fledging of the young for the particular species/nest identified; clearing will not be conducted within 800 metres of the nest until the young have fledged; and, an artificial nest platform will be installed at a suitable location identified to replace the occupied Osprey or Bald Eagle nest that will be disturbed results of the aerial survey for tree-nesting raptors will be provided to the NLDEC

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Avian Group	Survey Type	Survey Objective	Location	Timing (From Avifauna Management Plan)	Frequency	Contingency (e.g., If Active Nest Is Identified During Pre-Clearance Survey)
WATERFOWL (ashkui users) (focus on Surf Scoter)	Aerial Helicopter Survey	<ul style="list-style-type: none"> to identify the location and size of each of the ashkui to identify waterfowl species, abundance (number of each species), and species activity/use (i.e., behaviour) of the ashkui to note incidental observations of all wildlife, including sign (whitewash, tracks, partial nests, etc.) 	<ul style="list-style-type: none"> flight paths will be along predetermined transects along the lower Churchill River to the upstream extent of the FSL, with focus on ashkui (early open water typically at the mouths of tributaries to the Churchill River) areas identified during the ice monitoring survey where open water areas are encountered, the flight path is to follow the edge of open water areas where appropriate survey area to include 100% of the ashkui within the extent of the FSL 	<ul style="list-style-type: none"> late May through early June (survey dates to be coordinated as per the findings of the ice monitoring survey) 	<ul style="list-style-type: none"> two surveys following the initial ice monitoring survey, within the identified time period; the first survey one week after the ice monitoring survey, and the second survey two weeks after the first, as appropriate, depending on ice conditions 	<ul style="list-style-type: none"> results of the ashkui aerial survey will be provided to the NLDEC and Environment Canada

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Avian Group	Survey Type	Survey Objective	Location	Timing (From Avifauna Management Plan)	Frequency	Contingency (e.g., If Active Nest Is Identified During Pre-Clearance Survey)
<p>WETLAND and RIPARIAN (wetland sparrows, Rusty Blackbird)</p> <p>SPECIES at RISK (Rusty Blackbird, Olive-sided Flycatcher, Common Nighthawk, Harlequin Duck, Gray-cheeked Thrush)</p> <p>Forest Species (passerines, Ruffed Grouse)</p>	<p>Ground Point Count/Breeding Bird Survey (species presence, abundance, breeding activity)</p>	<ul style="list-style-type: none"> to determine species presence, abundance and distribution for species at risk in habitat/areas of high potential, within the Project area and outside the Project area (i.e., within 800 m of the Project area as a control) to note incidental observations of all wildlife, including sign (whitewash, tracks, partial nests, etc.) 	<ul style="list-style-type: none"> preferred habitat types within the Project area and outside the Project area (i.e., beyond 800 m of disturbance area) will be sampled to allow comparison between pre- and post-clearing 	<ul style="list-style-type: none"> 1 May to 15 June (during the breeding season) 	<ul style="list-style-type: none"> two point counts in each of the seven (7) affected habitat types identified in Table 3-2 of the Avifauna Management Plan (Stantec 2012) within the area to be cleared and the control area 	<ul style="list-style-type: none"> results of the habitat based breeding bird survey will be provided to the NLDEC and Environment Canada
<p>RAPTOR (Osprey)</p>	<p>Ground Mercury Level Baseline</p>	<ul style="list-style-type: none"> to collect baseline data on mercury levels in Osprey and their prey to note incidental observations of all wildlife, including sign (whitewash, tracks, partial nests, etc.) 	<ul style="list-style-type: none"> identified occupied Osprey nests along the lower Churchill River and fish samples from within the FSL extent on the lower Churchill River 	<ul style="list-style-type: none"> late May to early July (timing to be determined after the aerial nest surveys) 	<ul style="list-style-type: none"> one survey to collect samples 	<ul style="list-style-type: none"> results of the baseline mercury levels will be provided to the NLDEC and Environment Canada

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Avian Group	Survey Type	Survey Objective	Location	Timing (From Avifauna Management Plan)	Frequency	Contingency (e.g., If Active Nest Is Identified During Pre-Clearance Survey)
During Construction						
RAPTORS (Golden Eagle, Bald Eagle, Red-tailed Hawk, Rough-Legged Hawk, Osprey)	Aerial Helicopter Survey	<ul style="list-style-type: none"> to document the presence and breeding activity of large raptors within the Project area and within 800 m of the Project area to document the use of artificial nest platforms to note incidental observations of all wildlife, including sign (whitewash, tracks, partial nests, etc.) 	<ul style="list-style-type: none"> flight paths will be predetermined transects along the lower Churchill River shorelines, watercourses, rocky outcrops or ledges, and along the transmission line right-of-way in areas that have not been cleared in the Project area plus an 800 m buffer of the Project area (i.e., to identify nests potentially exposed to sensory disturbance) will include erected artificial nest platforms 	<ul style="list-style-type: none"> late May to early June 	<ul style="list-style-type: none"> one survey to be conducted one year after construction start and repeated in the year of construction completion 	<ul style="list-style-type: none"> results of the baseline mercury levels will be provided to the NLDEC

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Avian Group	Survey Type	Survey Objective	Location	Timing (From Avifauna Management Plan)	Frequency	Contingency (e.g., If Active Nest Is Identified During Pre-Clearance Survey)
<p>WETLAND and RIPARIAN (wetland sparrows, Rusty Blackbird)</p> <p>SPECIES at RISK (Rusty Blackbird, Olive-sided Flycatcher, Common Nighthawk, Harlequin Duck, Gray-cheeked Thrush)</p> <p>Forest Species (passerines, Ruffed Grouse)</p>	<p>Ground Point Count/Breeding Bird Survey (species presence, abundance, breeding activity)</p>	<ul style="list-style-type: none"> to determine species presence, abundance and distribution for species at risk in habitat/areas of high potential, within the Project area and outside the Project area (i.e., within 800 m of the Project area as a control) to note incidental observations of all wildlife, including sign (whitewash, tracks, partial nests, etc.) 	<ul style="list-style-type: none"> preferred habitat types within the Project area and outside the Project area (i.e., beyond 800 m of disturbance area) will be sampled prior to flooding to allow comparison between pre- and post-clearing 	<ul style="list-style-type: none"> 1 May to 15 June (during the breeding season) 	<ul style="list-style-type: none"> two point counts in each of the seven (7) affected habitat types identified in Table 3-2 of the Avifauna Management Plan (Stantec 2012) within each of the cleared areas (prior to flooding) and the control area 	<ul style="list-style-type: none"> results of the habitat based breeding bird survey will be provided to the NLDEC and Environment Canada

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Avian Group	Survey Type	Survey Objective	Location	Timing (From Avifauna Management Plan)	Frequency	Contingency (e.g., If Active Nest Is Identified During Pre-Clearance Survey)
<p>WETLAND and RIPARIAN (wetland sparrows, Rusty Blackbird)</p> <p>SPECIES at RISK (Rusty Blackbird, Olive-sided Flycatcher, Common Nighthawk, Harlequin Duck, Gray-cheeked Thrush)</p> <p>Forest Species (passerines, Ruffed Grouse)</p>	<p>Ground Nest Search (pre-clearing nest search)</p>	<ul style="list-style-type: none"> to identify occupied nests of avian at risk species in potential habitat within the Project area to be cleared during the nesting season (May 1 to July 31) to note incidental observations of all wildlife, including sign (whitewash, tracks, partial nests, etc.) 	<ul style="list-style-type: none"> areas within the Project area scheduled to be cleared in a given year that were not already cleared between August and April survey area to include a 100 m buffer outside the Project area to be cleared 	<ul style="list-style-type: none"> 1 May to 31 July, <7 days prior to the clearing activity; if clearing was not conducted as scheduled following the nest survey in a given year, a second survey will be necessary if clearing is again scheduled during the nesting season 	<ul style="list-style-type: none"> meandering survey in the area to be cleared 	<ul style="list-style-type: none"> if an occupied nest is identified during pre-construction surveys: clearing schedule in that area will be adjusted to accommodate fledging of the young for the particular species/nest identified; clearing will not be conducted within 30 m of a passerine nest or 100 m of a waterfowl/waterbird nest until the young have fledged nest location will not be marked, as this could increase the risk of predation the boundary of the buffer will be marked to identify the extent of the allowable clearing at that location results of the ground nest search for will be provided to the NLDEC and Environment Canada

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Avian Group	Survey Type	Survey Objective	Location	Timing (From Avifauna Management Plan)	Frequency	Contingency (e.g., If Active Nest Is Identified During Pre-Clearance Survey)
Post-Construction						
RAPTORS (Golden Eagle, Bald Eagle, Red-tailed Hawk, Rough-Legged Hawk, Osprey)	Aerial Helicopter Survey	<ul style="list-style-type: none"> to document the presence and breeding activity of large raptors within the Project area and within 800 m of the Project disturbed area to document the use of artificial nest platforms to note incidental observations of all wildlife, including sign (whitewash, tracks, partial nests, etc.) 	<ul style="list-style-type: none"> flight paths will be predetermined transects along the reservoir shorelines, watercourses, rocky outcrops or ledges, and along the transmission line right-of-way in the Project area and will include erected artificial nest platforms 	<ul style="list-style-type: none"> late May to early June 	<ul style="list-style-type: none"> five years post-flooding; one survey 	<ul style="list-style-type: none"> results of the aerial raptor nest survey will be provided to the NLDEC
WATERFOWL (ashkui users) (Surf Scoter)	Aerial Helicopter Survey	<ul style="list-style-type: none"> to identify location and size of each of the ashkui, and document use by late breeding waterfowl as staging, breeding and foraging habitat to note incidental observations of all wildlife, including sign (whitewash, tracks, partial nests, etc.) 	<ul style="list-style-type: none"> flight paths will be predetermined transects along the reservoir shorelines, with focus on the ashkui identified during the ice monitoring survey where open water areas are encountered, the flight path is to follow the edge of open water areas where appropriate survey area to include 100% of the ashkui within the extent of the FSL 	<ul style="list-style-type: none"> late May to early June 	<ul style="list-style-type: none"> five years post-flooding; two surveys following the initial ice monitoring survey the first survey one week after the ice monitoring survey, and the second survey two weeks after the first, as appropriate, depending on ice conditions 	<ul style="list-style-type: none"> results of the ashkui helicopter survey will be provided to the NLDEC and Environment Canada

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Avian Group	Survey Type	Survey Objective	Location	Timing (From Avifauna Management Plan)	Frequency	Contingency (e.g., If Active Nest Is Identified During Pre-Clearance Survey)
<p>WETLAND and RIPARIAN (wetland sparrows, Rusty Blackbird)</p> <p>SPECIES at RISK (Rusty Blackbird, Olive-sided Flycatcher, Common Nighthawk, Harlequin Duck, Gray-cheeked Thrush)</p> <p>Forest Species (passerines, Ruffed Grouse)</p>	<p>Ground Point Count/Breeding Bird Survey (species presence, abundance, breeding activity)</p>	<ul style="list-style-type: none"> to document post-construction avian species use of habitat types within the Project area, including cleared habitat types, control habitat types and created wetland habitat (naturally 'encouraged' and engineered) to determine species abundance and species use of the habitat types within the Project area to evaluate the success of the wetland habitat created through the Wetland Compensation Plan to note incidental observations of all wildlife, including sign (whitewash, tracks, partial nests, etc.) 	<ul style="list-style-type: none"> preferred habitat types within the Project area and outside the Project area (i.e., beyond 800 m of disturbance area) will be sampled following flooding to allow comparison between pre- and post-reservoir conditions this would include the wetland and riparian habitat created through the Wetland Compensation Plan (and control wetland previously surveyed outside the Project area) 	<ul style="list-style-type: none"> 1 May to 31 July (during the breeding season) 	<ul style="list-style-type: none"> five years post-flooding; one survey 	<ul style="list-style-type: none"> results of the ground based breeding bird survey will be provided to the NLDEC and Environment Canada

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Avian Group	Survey Type	Survey Objective	Location	Timing (From Avifauna Management Plan)	Frequency	Contingency (e.g., If Active Nest Is Identified During Pre-Clearance Survey)
RAPTOR (Osprey)	Ground Mercury Level	<ul style="list-style-type: none"> to evaluate mercury levels in Osprey likely exposed to fish from the reservoir to allow comparison with mercury levels in Osprey and their prey following five years of reservoir presence to note incidental observations of all wildlife, including sign (whitewash, tracks, partial nests, etc.) 	<ul style="list-style-type: none"> identified occupied Osprey nests along the lower Churchill River and fish samples from within the FSL extent on the lower Churchill River 	<ul style="list-style-type: none"> late May to early July (timing to be determined after the aerial nest surveys) 	<ul style="list-style-type: none"> five years post-flooding; one survey 	<ul style="list-style-type: none"> results of the Osprey mercury level follow-up program will be provided to the NLDEC and Environment Canada

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10.2 REPORTING

A compilation of daily reports will be submitted to NLDEC-WD on a weekly basis. This report will provide a synopsis of completed activities, any new mapping or data plots, photographs as well as a weekly look-ahead. Any alteration to habitat, monitoring updates and changes in activities, timeline or schedule will also be communicated to NLDEC-WD.

A yearly report will be submitted to NLDEC-WD that summarizes the monitoring activities described in this APEEMP and any associated environmental effects monitoring conducted for the Project related to species at risk in Labrador. The yearly report will include all data collected as part of monitoring programs.

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11 EXTERNAL REFERENCES

- Altman, B. and R. Sallabanks. 2000. Olive-sided Flycatcher (*Contopus cooperi*). In: A. Poole (ed.). *The Birds of North America Online*. Cornell Lab of Ornithology; Ithaca, NY. Available at: <http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/502doi:bna.502>.
- Chaulk, K.G. and B. Turner. 2007. The timing of waterfowl arrival and dispersion during spring migration in Labrador. *Northeastern Naturalist* 14(3): 375-386.
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada) 2007. COSEWIC assessment and status report on the Olive-sided Flycatcher *Contopus cooperi* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 25 pp. (www.sararegistry.gc.ca/status/status_e.cfm).
- COSEWIC. 2013. *Database of Wildlife Species Assessed by COSEWIC*. Available at: http://www.cosewic.gc.ca/eng/sct1/searchform_e.cfm. Accessed on: April 5, 2013
- CWS (Canadian Wildlife Service). 2007a. *Population status of migratory game birds in Canada (and regulation proposals for overabundant species)*. CWS Migratory Birds Regulatory Report 22: 91 pp.
- CWS (Canadian Wildlife Service). 2007b. *Migratory Game Birds in Canada*.
- Dalley, K., K. Powell and D. Whitaker. 2005. *The Status of Gray-cheeked Thrush (Catharus minimus) in Newfoundland and Labrador*. Prepared for the Newfoundland and Labrador Species Status Advisory Committee. 19 pp.
- Dunn, J.L. and J. Alderfer (Eds). 2007. *Field Guide to the Birds of North America. Fifth Edition*. National Geographic Society, Washington, DC.
- Environment Canada. 1991. *Birds protected in Canada under the Migratory Birds Convention Act*. Occasional Paper Number 1. Canadian Wildlife Service. Available at: http://publications.gc.ca/collections/collection_2011/ec/CW69-1-1-1991.pdf. Accessed on: 12 April 2012.
- Gahbauer, M. Senior Wildlife Biologist, Stantec Consulting Ltd (pers. comm). Correspondence with Environment Canada in 2009.
- Godfrey, W.E. 1986. *Birds of Canada, Revised edition*. National Museum of Natural Sciences, Ottawa, Ontario.
- Government of Canada. 1994a. *Migratory Birds Convention Act*. Available at: <http://lawslois.justice.gc.ca/eng/acts/M-7.01/page-1.html>. Accessed on: 12 April 2012.

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Government of Canada. 1994b. *Migratory Birds Regulations*. Available at: http://lawslois.justice.gc.ca/eng/regulations/C.R.C.,_c._1035/page-1.html. Accessed on: 12 April 2012.

Government of Canada. 2002. *Species at Risk Act*. Available at: <http://laws-lois.justice.gc.ca/eng/acts/S-15.3/page-1.html>. Accessed on: 12 April 2012.

Government of Newfoundland and Labrador. 2004. *Endangered Species Act*. Available at: http://www.assembly.nl.ca/Legislation/sr/statutes/e10-1.htm#31_. Accessed on: 13 April 2012.

Joint Review Panel. 2011. *Lower Churchill Hydroelectric Generation Project Hearing Transcript, March 17, 2011*. Volume 13. Available at: <http://www.ceaa.gc.ca/050/documents/48784/48784E.pdf>. Accessed on: 12 April 2012.

LGL Limited. 2008. *Waterfowl in the Lower Churchill River Area*. Report prepared for Minaskuat Inc. and Newfoundland and Labrador Hydro, Lower Churchill Hydroelectric Generation Project. St. John's NL.

Lowther, P.E., C.C. Rimmer, B. Kessel, S.L. Johnson and W.G. Ellison. 2001. Gray-cheeked Thrush (*Catharus minimus*). In: A. Poole (ed.). *The Birds of North America Online*. Cornell Lab of Ornithology, Ithaca, NY. Available at: <http://bna.birds.cornell.edu/bnaproxy.birds.cornell.edu/bna/species/591doi:bna.591>.

Minaskuat Inc. 2008a. *Forest Songbird Surveys*. Prepared for the Lower Churchill Hydroelectric Generation Project.

Minaskuat Inc. 2008b. *Inventory of Osprey, Bald Eagle and Golden Eagle Nest Sites in the Lower Churchill River Valley*. Prepared for the Lower Churchill Hydroelectric Generation Project.

NatureServe. 2007. *NatureServe Explorer: An Online Encyclopedia of Life, Version 6.2*. NatureServe, Arlington, Virginia. Available at <http://www.natureserve.org/explorer>.

NLDEC (Newfoundland and Labrador Department of Environment and Conservation). 2012. *Species at Risk: Birds*. Available at: <http://www.env.gov.nl.ca/env/wildlife/endangeredspecies/birds.html>. Accessed on: 13 April 2012.

Poole, A.F. 1989. *Ospreys A Natural and Unnatural History*. Cambridge University Press, New York, NY. 246 pp.

Poulin, R. G., S. D. Grindal and R. M. Brigham. 1996. Common Nighthawk (*Chordeiles minor*). *The Birds of North America Online*. In: A. Poole (ed.). *The Birds of North America Online*. Cornell Lab of Ornithology, Ithaca, NY. Available at: <http://bna.birds.cornell.edu/bna/species/213doi:10.2173/bna.213>.

Sauer, J.R., J.E. Hines and J. Fallon. 2007. *The North American Breeding Bird Survey, Results and Analysis 1966-2006*. Version 10.13.2006. USGS Patuxent Wildlife Research Center, Laurel, MD.

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Savard, J.-P.L., D. Bordage and A. Reed. 1998. Surf scoter (*Melanitta perspicillata*). In: Poole, A. and F. Gill (eds.). *The Birds of North America*, No. 363. The Academy of Natural Sciences, Philadelphia PA, and the American Ornithologists' Union, Washington, DC.

Species at Risk Act Public Registry (SARA). 2012. *Harlequin Duck Eastern population Species Profile*. Available at: http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=22#ot12. Accessed on: April 5, 2013.

Stantec (Stantec Consulting Ltd.). 2012. *Avifauna Management Plan Muskrat Falls Construction*. Report prepared for Nalcor Energy, Lower Churchill Hydroelectric Generation Project. St. John's NL.

Todd, W.E. 1963. *Birds of the Labrador Peninsula and Adjacent Areas*. University of Toronto Press, Toronto, ON.

United Nations Environment Program (UNEP). 2002. *Global Mercury Assessment*. UNEP Chemicals.

Whitford, J. 1995. *1994 Raptor/Harlequin Duck Monitoring Program*. Jacques Whitford Environment Limited report prepared for PMO Goose Bay, National Defence Headquarters, Ottawa, ON. 60 pp. + Appendices.

Whitford, J. 1998. *1997 Raptor Monitoring Program*. Jacques Whitford Environment Limited report prepared for Goose Bay Office, National Defence Headquarters, Ottawa, ON. 25 pp. + Appendices.

Whitford, J. 1999. *Churchill River Power Project LHP 98-11 Osprey and Bald Eagle Study*. Jacques Whitford Environment Limited report prepared for Newfoundland and Labrador Hydro, St. John's, NL. 30 pp. + Appendices.