Nalcor Energy – Lower Churchill Project

2013-2015 Avifauna Report

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Inter-Departmental / Discipline Approval (where required)

Department	Department Manager Approval	Date
	n/a	

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1 PURPOSE

The purpose of this 2013-2015 Avifauna Report is to provide an update to Newfoundland and Labrador Department of Environment and Climate Change– Wildlife Division (ENCC) on monitioring activities and associated environmental effects monitoring conducted for the Lower Churchill Hydroelectric Generation Project (including Muskrat Falls Generation and Labrador Transmission Asset [LTA]) and the Labrador-Island Transmission Link (L-ITL) for the years 2013-2015. This is to comply with commitments made in Protection and Environmental Effects Monitoring Plans (PEEMPs) and Impacts Mitigation and Monitoring Plans (IMMPs) for both Generation and Transmission. These reports include:

- Lower Churchill Project (LCP) Avifauna Protection and Environmental Effects Monitoring Plan
- L-ITL Avifauna Protection and Environmental Effects Monitoring Plan
- LCP Species at Risk Protection and Environmental Effects Monitoring Plan
- LCP Species at Risk Impacts Mitigation and Monitoring Plan
- Labrador-Island Transmission Link Species at Risk Impacts Mitigation and Monitoring Plan

The same commitment was made throughout each of the above plans – a report will be submitted to ENCC summarizing the monitoring activities and any associated environmental effects monitoring conducted for the Project related to species at risk in Newfoundland and Labrador. This report includes all data collected as part of these monitoring programs.

2 SCOPE

As stated above, monitoring activities and environmental effects monitoring conducted for the Project related to species at risk and avifauna, in general are included in this report.

3 DEFINITIONS

LCP	Lower Churchill Project
L-ITL	Labrador-Island Transmission Link
LTA	Labrador Transmission Asset
NL	Newfoundland and Labrador
ENCC	Newfoundland and Labrador Department of Environment and Climate Change – Wildlife Division
PEEMP	Protection and Environmental Effects Monitoring Plan

4 REFERENCE DOCUMENTS

ILK-AM-CD-6220-EV-RP-0001-01	Annual Report on the Implementation of the Avifauna Management Plan - Torrent River Harlequin Duck
ILK-AM-CD-0000-EV-RP-0004-01	2015 Annual Report on the Implementation of the Avifauna Management Plan - Newfoundland
ILK-AM-CD-6220-EV-RP-0002-01	Annual Report on the Implementation of the Avifauna Management Plan – Island Raptor Survey
LCP-SC-CD-0000-EV-RP-0001-01	Lower Churchill Hydroelectric Development Project Annual Report 2013 – Avifauna Management
LCP-SC-CD-0000-EV-RP-0045-01	Nalcor Energy Lower Churchill Project, Environmental Effects Monitoring Program – 2014 Avifauna, Avifauna Field Surveys in the Lower Churchill River Valley
LCP-SC-CD-0000-EV-RP-0047-01	Nalcor Energy Lower Churchill Project, Mitigation Program – 2014 Avifauna Management Plan - Annual Report on the Implementation of the 2014 Avifauna Management Plan
LCP-SC-CD-0000-EV-RP-0060-01	Nalcor Energy Lower Churchill Project, Environmental Effects Monitoring Program – 2015 Avifauna, 2015 Avifauna EEMP Surveys
LCP-SC-CD-0000-EV-RP-0062-01	2015 Annual Report on the Implementation of the Avifauna Management Plan - Labrador

5 PROJECT DESCRIPTION

5.1 MUSKRAT FALLS GENERATION

The Muskrat Falls Generation Project will include the following sub-components, which are broken down under the five (5) 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);
- A north roller compacted concrete overflow dam;
- A south rock fill dam;
- River diversion during construction via the spillway;
- Five (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:
- Four (4) intakes with gates and trash racks;
- Four (4) turbine/generator units at approximately 206 MW each with associated ancillary electrical/mechanical and protection/control equipment;
- Five (5) power transformers (includes 1 spare), located on the draft tube deck of the powerhouse; and
- Two (2) overhead cranes each rated at 450 Tonnes

Figure 5-1 Muskrat Falls Generating Facility

5.2 LABRADOR TRANSMISSION ASSET (LTA)

LTA consists of the ac transmission line system form Churchill Falls to Muskrat Falls (see Figure 5-2), 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; and
- 735 kV Transmission Line at Churchill Falls interconnecting the existing and the new Churchill Falls switchyards

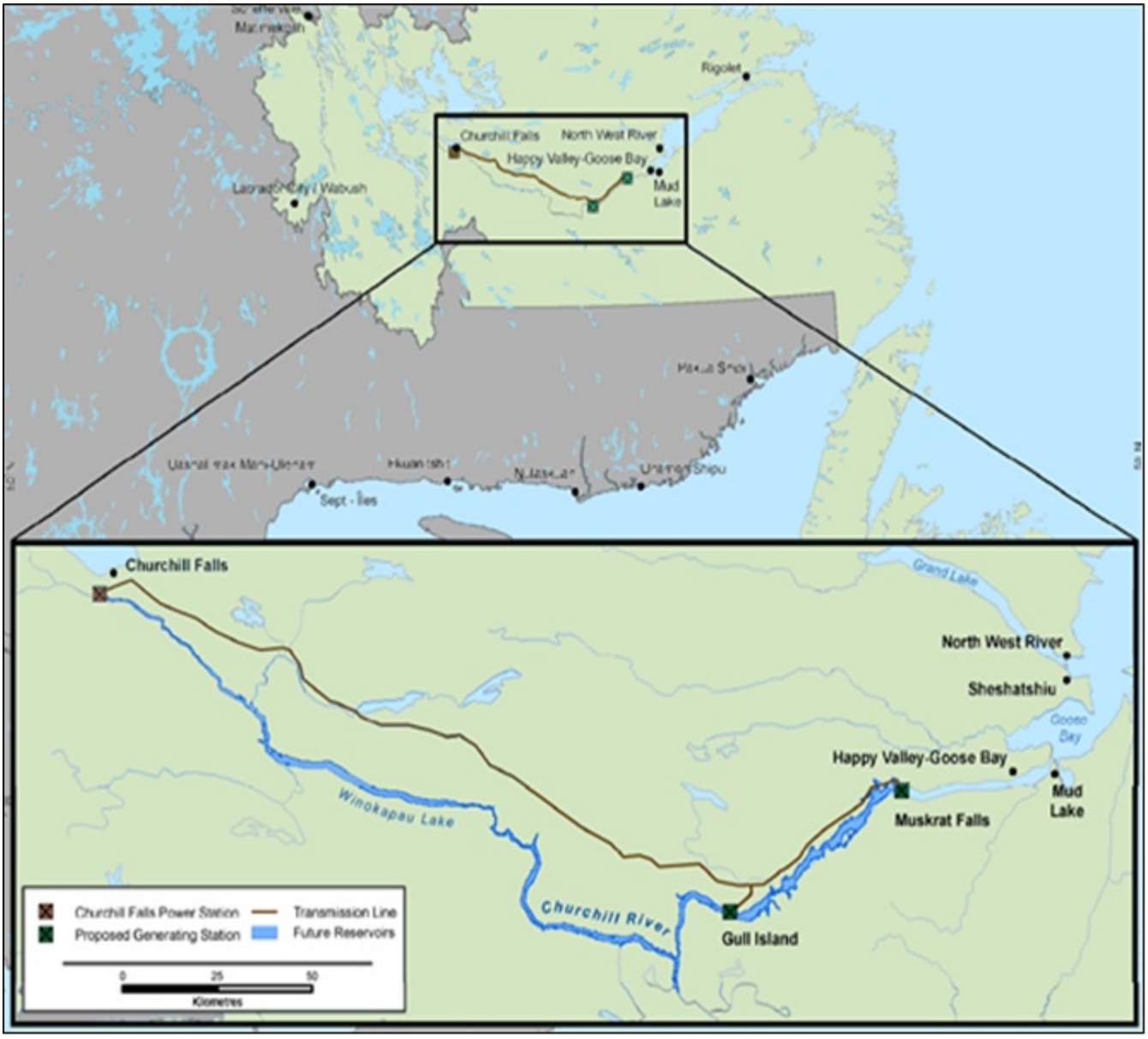

Figure 5-2 Labrador Transmission Asset

5.3 LABRADOR-ISLAND TRANSMISSION LINK (L-ITL)

The Labrador –Island Transmission Link consists of the Construction and Operations of a ± 350 kilovolt (kV) High Voltage direct current (HVdc) electricity transmission system from Central Labrador to the Avalon Peninsula on the Island of Newfoundland (the Island) (Figure 5-3).

The transmission system will include the following key components:

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

Figure 5-3 Labrador-Island Transmission Link

6 REPORTING

Monitoring reports included in this 2013-2015 Avifauna Report include:

2013

- Lower Churchill Hydroelectric Development Project Annual Report 2013 – Avifauna Management

2014

- Lower Churchill Project, Mitigation Program – 2014 Avifauna Management Plan - Annual Report on the Implementation of the 2014 Avifauna Management Plan
- Lower Churchill Project, Environmental Effects Monitoring Program – 2014 Avifauna, Avifauna Field Surveys in the Lower Churchill River Valley
- Annual Report on the Implementation of the Avifauna Management Plan – Torrent River Harlequin Duck Survey (2014)

2015

- 2015 Annual Report on the Implementation of the Avifauna Management Plan - Labrador
- 2015 Annual Report on the Implementation of the Avifauna Management Plan – Newfoundland
- Nalcor Energy Lower Churchill Project, Environmental Effects Monitoring Program – 2015 Avifauna, 2015 Avifauna EEMP Surveys
- Annual Report on the Implementation of the Avifauna Management Plan – Island Raptor Survey

Each of these reports have been included in the Attahment section of this report, in their entirety.

7 ATTACHMENTS

ATTACHMENT 7.1

Lower Churchill Hydroelectric Development Project Annual Report 2013 – Avifauna Management

Lower Churchill Hydroelectric Development Project
Annual Report 2013 – Avifauna Management

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Appendices A, B, C, E, F, H, I, J have been removed as they are not relevant to this report.

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Executive Summary – Avifauna Management

As with any construction/landscape development project, there is potential that vegetation clearing activity may result in disturbances to wildlife. Of particular concern to the Lower Churchill Hydroelectric Development Project were the possible effects associated with the construction phase on breeding avifauna in the area. The lower Churchill River valley has both migratory and resident avifauna species, which are managed under federal and/or provincial legislation. These avifauna can be grouped as: landbirds; waterfowl, waterbirds, and shorebirds; and raptors. Most of these species are managed under the Migratory Birds Convention Act. Raptors are managed under provincial legislation. Species designated at risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), or listed under the federal Species at Risk Act (SARA) and/or the Newfoundland and Labrador Endangered Species Act (NLESA) were also considered. To limit the risk of disturbance to breeding avifauna (i.e., incidental take), Nalcor Energy developed and then implemented an Avifauna Management Plan with Stassinu Stantec Limited Partnership (Stassinu Stantec) providing the technical expertise. The Avifauna Management Plan has mitigation measures divided into three levels of protection: 1) General Mitigation Measures; 2) Awareness Mitigation Measures; and 3) Directed Surveys. The work described in this Avifauna report addresses the directed surveys to identify active breeding avifauna sites within or adjacent to the vegetation clearing footprint of 2013.

The directed surveys involved four components: Ground Surveys; Aerial Surveys; Reporting of Breeding Avifauna by Ground Crews; and Active Nests Site Procedures. Ground surveys for active avifauna nests were completed less than seven days prior to cutting of an area. A team of 4 to 10 observers surveyed areas of interest sufficiently to achieve 100% coverage. Two aerial surveys were completed on July 18, 2013 and July 26, 2013 that targeted tree-nesting raptors. Active and potentially active breeding avifauna were identified by the observation of a nest and/or by behavioral cues. When an active or potentially active nest was identified, a setback buffer was established around the nest to limit disturbance to the breeding birds. The setback buffers remained active until an ornithologist from Stassinu Stantec returned to the area to confirm fledging according to breeding period for the identified species. Stassinu Stantec provided a daily update to The Lower Churchill Project Team during field activities.

The 2013 ground surveys involved 101 person days from June 28, 2013 to July 26, 2013. A total area of 3.72 km^2 was surveyed in the area of interest. As a result of the surveys, 17 setback buffers [1 raptor (i.e., Merlin) and 6 landbirds (i.e., Black-backed Woodpecker, White-crowned Sparrow, Dark-eyed Junco, Black-throated Green Warbler, Northern Waterthrush, and Tree Swallow)] were established in advance of the vegetation clearing footprint during the breeding period. No species at risk were identified during the ground surveys. A species of conservation interest, the Yellow-bellied Sapsucker, was observed; however, there was no evidence of breeding behavior.

The aerial survey examined approximately 421 km^2 during 4 hours of flight by helicopter on July 18, 2013 and 244 km^2 during 2.5 hours of flight by helicopter on July 26, 2013. One inactive Bald Eagle nest and 43 Osprey nests (56% active and 44% inactive) were observed on July 18, 2013. On July 26, 2013, 2 inactive Red-tailed Hawk and 1 active Osprey nests were observed. No species at risk were observed during the aerial surveys. Three observations of breeding avifauna were reported by Project personnel not affiliated with Stassinu Stantec and included: 1) tree swallow nest reported by an archaeology crew which had a setback buffer established; 2) an inactive nest identified in a rock outcrop in a quarry, and 3) a family group of Osprey with recently fledged young was observed foraging near Muskrat Falls and a non-harassment policy was applied.

With such a large scale project and the numerous contracted crews involved, cooperation and communication are important aspects of the implementation of this Avifauna Management Plan. Early dialogue between the Lower Churchill Project Team, clearing subcontractors and Stassinu Stantec assisted greatly with understanding the schedule of Project activities and complying with the commitments of Nalcor Energy to mitigate incidental take through the implementation of the Avifauna Management Plan. The 2013 season involved much start up activity particularly for new contractors on site. The level of the avifauna survey requirement was less than anticipated; however, various protocols were tested and incorporated for future construction seasons.

1.0 INTRODUCTION

The lower Churchill River valley has both migratory and resident avifauna species, which are managed either under federal and/or provincial legislations. At the federal level the legislation involved is the Migratory Birds Convention Act (MBCA) and the Species at Risk Act (SARA), while at the provincial level it involves the Newfoundland and Labrador Wild Life Act (NLWLA) and the Newfoundland and Labrador Endangered Species Act (NLESA).

The MBCA was designed to protect and conserve migratory birds, both as populations and individual birds, and their nests located on all lands, regardless of ownership, in Canada (Government of Canada 1994a). Further the Migratory Birds Regulations (MBR) prohibit the disturbance, destruction, or taking of a nest (known as incidental take), nest shelter, eider duck shelter or duck box of a migratory bird, or the possession of a live migratory bird, or a carcass, skin, nest or egg of a migratory bird (Government of Canada 1994b). Permits for these activities are not issued by the Canadian Wildlife Service (CWS) or Environment Canada (Joint Review Panel 2011). The SARA was established to provide wildlife species additional protection against extirpation, extinction or endangerment (Government of Canada 2002). The NLESA protects wildlife species, subspecies or populations within the province that are considered endangered, threatened or vulnerable based on recommendations from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or the provincial Species Status Advisory Committee (SSAC) (Government of Newfoundland and Labrador 2004). There are special provisions within the Act to permit activities (section 19.1). Non-migratory species such as raptors and upland game birds are protected under the NLWLA (Government of Newfoundland and Labrador 1990) and associated Newfoundland and Labrador Wild Life Act Regulations (Government of Newfoundland and Labrador 2001). Further, direction is provided under the NL Mineral Exploration Standards Regulations stating that no clearing activity may occur within 800m of a known bald eagle, osprey or other raptor nest during the nesting season (May 15th to July 31st). If an active raptor nest is encountered during clearing activities the clearing must stop immediately (Government of Newfoundland and Labrador 2007).

The avifauna species within the lower Churchill River valley and protected by the acts described above can be classified as: landbirds (passerines and upland gamebirds); waterfowl, waterbirds, shorebirds, and, raptors (LGL Ltd. 2008, Minaskuat Inc. 2008a). There are also species at risk that have been documented within the lower Churchill River valley (Minaskuat Inc. 2008a) including: Olive-sided Flycatcher (*Contopus cooperi*), Common Nighthawk (*Chordeiles minor*), Rusty Blackbird (*Euphagus carolinus*), Harlequin Duck (*Histrionicus histrionicus*), and Gray-cheeked Thrush (*Catharus minimus*).

As with any vegetation clearing associated with construction/landscape development, there is potential for this activity to result in disturbances to avifauna present within the Project footprint. Nalcor Energy (Nalcor) implemented the Avifauna Management Plan (AMP) by contracting Stassinu Stantec Limited Partnership (Stassinu Stantec) as a best management approach to

address the risk of incidental take during vegetation clearing associated with the Lower Churchill Hydroelectric Development Project (the Project). This report documents the results of the directed surveys for the Project which identified potential avifauna breeding activity within areas scheduled for vegetation clearing in 2013.

2.0 STUDY AREA

2.1 Project Setting

2.1.1 CONTRACTOR STRUCTURE

Due to the large scale of the Project, Stassinu Stantec works in cooperation with several other contractors over the five year duration of the construction phase of the Project. SNC-Lavalin Inc. (SLI) is the Engineering Procurement Construction Management (EPCM) contractor, under the direction of Nalcor, who oversee the sub-contractors. Johnson's Construction Ltd was awarded the reservoir clearing contract with a sub-contractor responsible for the clearing of the transmission lines.

Stassinu Stantec (a partnership between Stassinu Services Inc. and Stantec Consulting Ltd.) has been awarded a multi-year contract to provide avifauna mitigation services during the construction phase of the Project. The Project Manager, Diane Ingraham, oversees project deadlines, budgets and Health, Safety, and Environment and Quality (HSEQ) requirements to assure that they are met. The Project Manager is the main communicator between Nalcor and SLI. The Technical Lead, Perry Trimper, provides advice for avifauna and monitoring techniques within the Project context. The Assistant Project Manager, Wayne Tucker, is responsible for managing the field teams and the field assistants. The Field Team Leads are responsible for conducting ground and aerial avifauna surveys and are aided by field assistants. Barry Keough assists with logistics related to the project management from the Stassinu Stantec office in Goose Bay. Mary Ann Aylward is responsible for field logistics out of the Stassinu Stantec office in Goose Bay. Caroline Hong is the Office Safety & Environmental Coordinator (OSEC) dealing locally with HSEQ issues in coordination with Stantec's National Health and Safety Coordinator, Doug Schaefer.

Stassinu Stantec conducts its work through a Quality Assurance and Quality Control system. Stassinu Stantec has a HSEQ framework in place so that work is conducted in a safe manner and meets quality requirements. Appendices A - E contain copies of Stassinu Stantec's HSE Risk Management Strategy (RMS) 1 and 2 forms and describing the pre-mobilization HSEQ/orientation, daily routine and incident reports of 2013. Prior to commencement of any work, Stassinu Stantec prepared the 2013 Avifauna Management - Health and Safety Execution Plan. Lower Churchill Project, Newfoundland and Labrador LCP-SC-CD-0000-HS-PL-0001-01.

2.1.2 2013 AVIFAUNA MANAGEMENT PLAN (AMP)

The AMP has mitigation measures divided into three levels of protection: General Mitigation Measures; Awareness Mitigation Measures; and Directed Surveys. Stassinu Stantec's main role is to conduct the directed surveys which include both ground and aerial surveys to detect breeding avifauna in areas scheduled for vegetation clearing. Outside of the directed surveys, Stassinu Stantec provides consultation for any issues that may arise concerning avifauna. Further, Stassinu Stantec assists Nalcor in liaising with Environment Canada and the Newfoundland and Labrador Wildlife Division as required.

In 2013, there were three areas that involved the AMP within the area to be cleared for the Project footprint: Muskrat Falls main site - Generation Project Area; Reservoir Clearing; and High Voltage AC (HVac) Transmission Line (Figure 2-1).

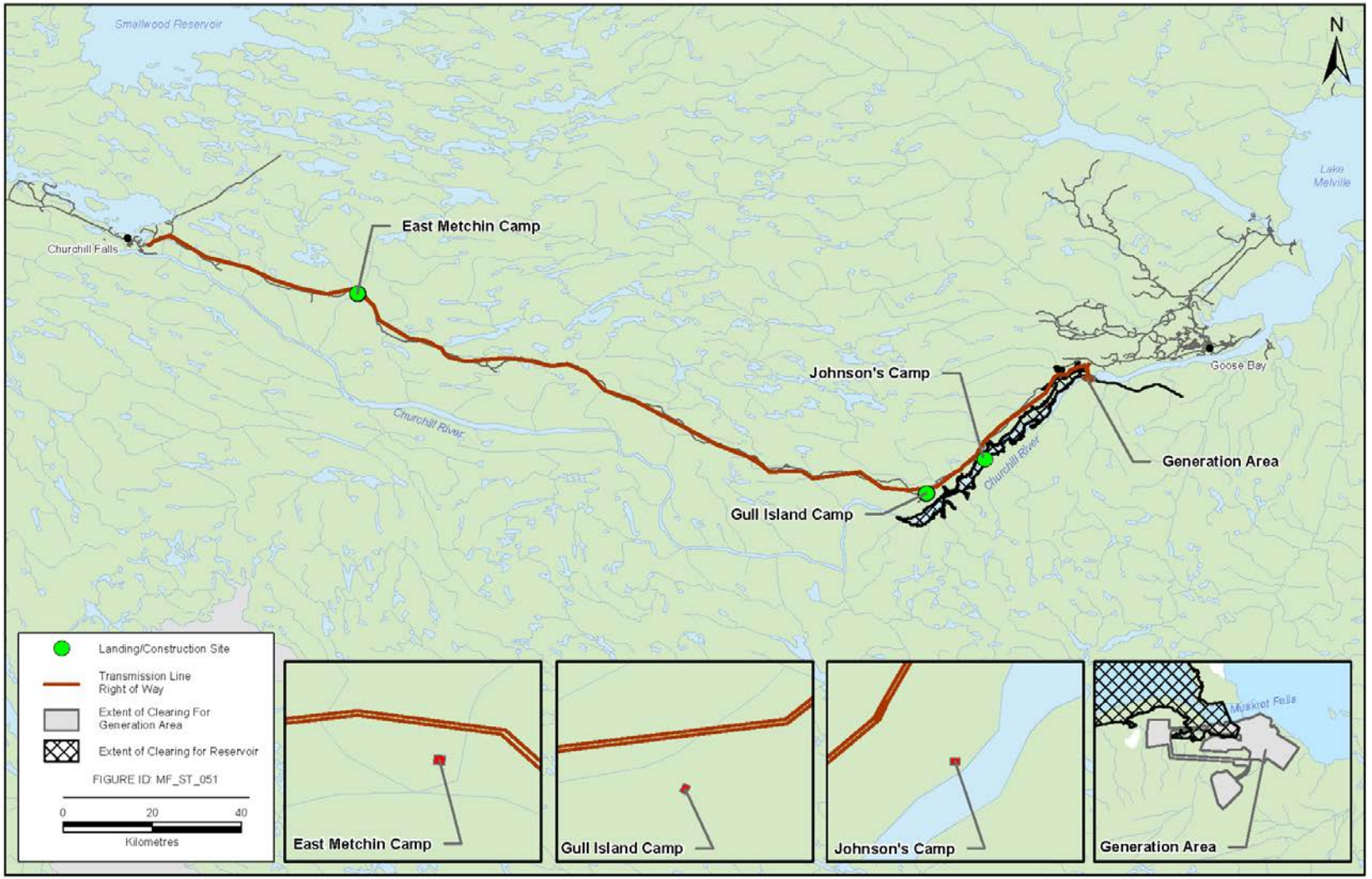

Figure 2-1 Study Area Overview: Muskrat Falls to Churchill Falls

2.2 Ecological Setting

The area of the 2013 Project footprint is located within the Lake Melville, Michikamau and Mecatina River Ecoregion (Figure 2-2). The Lake Melville Ecoregion is classified as High Boreal Forest, the Michikamau Ecoregion is Mid Subarctic Forest and finally the Mecatina River is Low Subarctic Forest (Government of Newfoundland and Labrador 2008a, 2008b, 2008c; Lopoukhine et al. 1978).

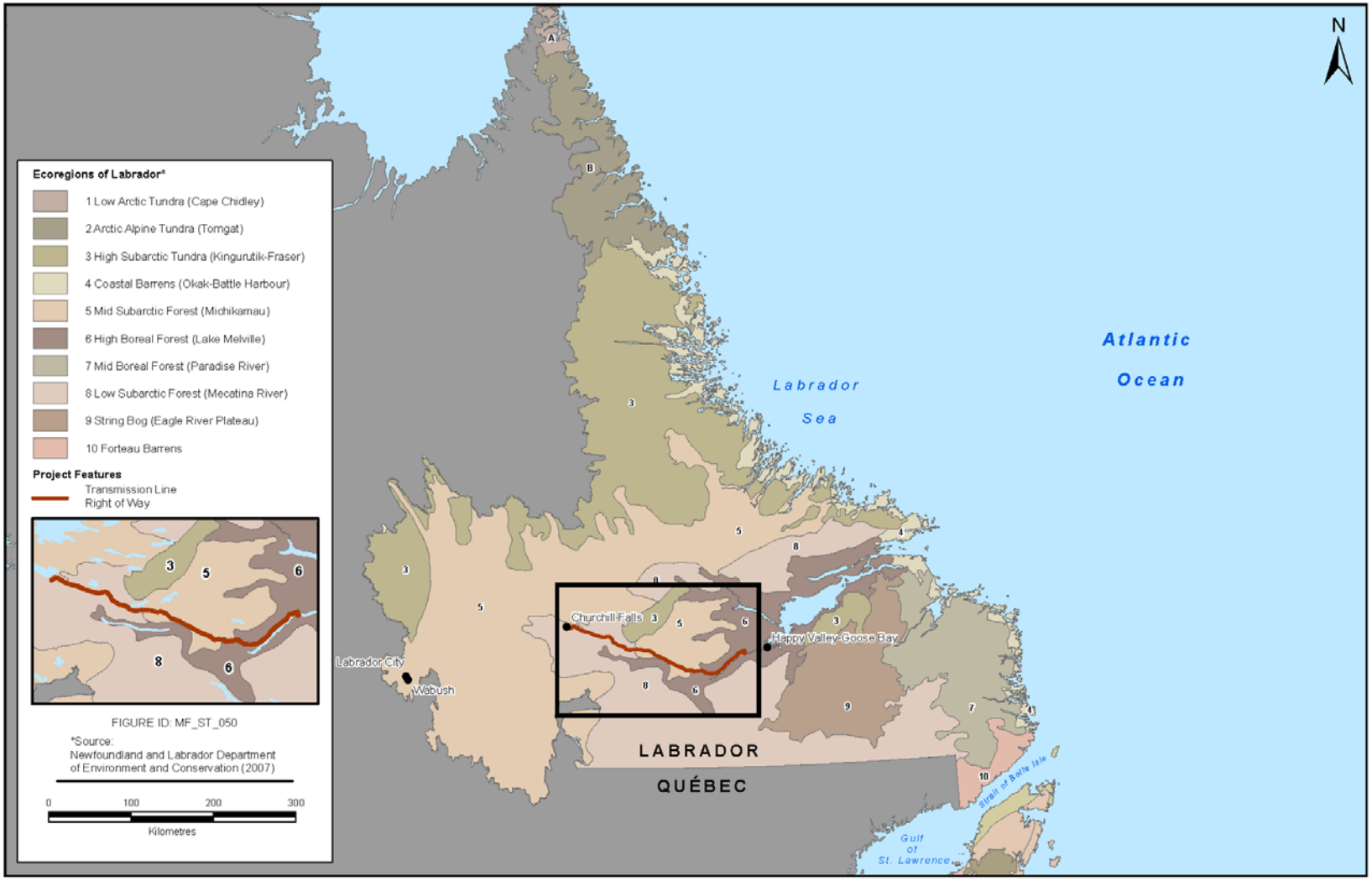

Figure 2-2 Map of Ecoregions of Labrador

High Boreal Forest is relatively productive, and is the most densely forested ecoregion in Labrador. The formation and movements of the Churchill River has created river terraces within bluffs of up to 500m above sea level. Where alluvial conditions exist on lower slopes, forests are composed of balsam fir (*Abies balsamea*), black spruce (*Picea mariana*), white birch (*Betula papyrifera*), and trembling aspen (*Populus tremuloides*). Black spruce and lichen (predominately *Cladina* spp.) are usually found on lower terraces. The black spruce dominated forests of the dryer upper terraces are interspersed with string bogs or fens. Black spruce and balsam fir are common on upper terraces with shallow soils. Forest fires are common in upland areas and river terraces resulting in a dominance of black spruce and lichen (predominately *Cladina* spp.). Slopes where fires have occurred usually regenerate as white birch and trembling aspen. Plateau bogs, dominated by *Sphagnum* spp., occur in coastal areas near Lake Melville.

Low Subarctic Forest is predominately open black spruce with balsam fir and white spruce (*Picea glauca*) occurring on moist, well drained slopes within rolling hills. Dry sandy sites, generally on terraces and at higher elevation, are open black spruce lichen (predominantly *Cladina* spp.) woodland with Labrador Tea (*Rhododendron groenlandicum*), dwarf birch (*Betula glandulosa*) and blueberry (*Vaccinium angustifolium*). Black spruce also predominate lower wet areas with *Sphagnum* spp. understory where larch (*Larix laricina*) can be present in riparian areas. Hill tops are generally bedrock outcrops and drumlins occur throughout the area.

Mid Subarctic Forest is dominated by black spruce. In dryer areas, open black spruce lichen (predominately *Cladina* spp.) are common. White spruce occurs in well drained slopes in the northern section of this ecoregion. In wet low-lying areas, black spruce is the most dominant tree species with Sphagnum spp. understory where larch (*Larix laricina*), jack pine (*Pinus banksiana*) and trembling aspen can occur in riparian areas. Eskers and drumlins occur in this forest.

Smaller scale detail regarding ecotypes is available in an Ecological Land Classification (ELC) of the Lower Churchill River Valley (Minaskuat Inc. 2008b). The ELC habitat type data are used in this report to calculate the composition of the habitat surveyed in 2013.

2.3 Avifauna and their associated Breeding Habitats and Period

Based on baseline surveys in support of the Project by LGL Ltd. (2008) and Minaskuat Inc. (2008a), Landbirds were the dominant group of avifauna observed in the lower Churchill River valley (Tables 2.1 and 2.2). This diverse group of species includes members of the flycatcher, corvid, thrush, warbler, finch and sparrow families that occupy the full range of available terrestrial habitats from riparian areas to burns to mature forest (Table 2.3). The different habitat types can have varying breeding avifauna richness, abundance and density (Figure 2-3). Avifauna nesting preferences are believed to be associated with habitat availability as well as habitat complexity that can determine the potential of nesting areas (Minaskuat Inc. 2008a). The Species at Risk, Species of Conservation Concern, and Species of Interest that occur in the Lower Churchill River Valley are described in detail in Table 2.4. The breeding period for all species in the lower Churchill River valley vary in relation to habitat preferences and other behavior (Figures 2-4 – 2-6).

Table 2.1 Habitat Types used to Classify Point Count Sites during Baseline Surveys in 2006-2007

Habitat Types	Habitat Description
RI – Riparian	Shoreline vegetation typically dominated by alders, willows, gale, grasses, and sedges
WE- Wetland	Wet meadows with standing water in floodplain; alder beds away from the river edge; fens/bogs (*Sphagnum spp.*) in higher areas
SW – Spruce Wet	Canopy > 90% black spruce; ground moist and typically dominated by feather moss
SD – Spruce Dry	Canopy > 90% black spruce; ground dry and typically dominated by reindeer lichen
WH – White Spruce	Coniferous or mixed wood forest including large (>40cm dbh) mature white spruce
FS – Spruce Fir	Canopy < 10% deciduous, and 10% each fir and black spruce (usually fir dominant) deciduous
MF – Mixed (fir dominant)	Canopy 10-49%; fir dominant
MS – Mixed (spruce dominant)	Canopy 10-49%; black spruce dominant
HA – Hardwood	Canopy > 50% deciduous
BU – Burn	Recent (<20 years) burn, with or without regenerating vegetation
Source: Minaskuat Inc. 2008	

Table 2.2 Most Abundant Breeding Songbirds & Habitat Preference from Baseline Surveys, 2006-2007

Habitat Type	Most Abundant Breeding Songbirds
Riparian	Yellow Warbler, Northern Waterthrush, Cedar Waxwing, Alder Flycatcher, Magnolia Warbler, Lincoln's Sparrow, White-throated Sparrow
Wetland	Lincoln's Sparrow, Northern Waterthrush, White-throated Sparrow, Wilson's Warbler, Swamp Sparrow, Yellow Warbler
Dry Spruce	Dark-eyed Junco, Ruby-crowned Kinglet, Yellow-rumped Warbler, Boreal Chickadee, White-throated Sparrow, Fox Sparrow
Wet Spruce	Dark-eyed Junco, Ruby-crowned Kinglet, Yellow-rumped Warbler, Swainson's Thrush, Boreal Chickadee, Tennessee Warbler
White Spruce	Tennessee Warbler, Magnolia Warbler, Yellow-rumped Warbler, Swainson's Thrush, Ruby-crowned Kinglet, Black-throated Green Warbler, White-throated Sparrow
Fir/Spruce	Swainson's Thrush, Ruby-crowned Kinglet, Tennessee Warbler, Dark-eyed Junco, Yellow-rumped Warbler, White-throated Sparrow
Mixed Fir	Black-throated Green Warbler, Tennessee Warbler, Swainson's Thrush, Boreal

Habitat Type	Most Abundant Breeding Songbirds
	Chickadee, Yellow-rumped Warbler, Ruby-crowned Kinglet
Mixed Spruce	Dark-eyed Junco, Ruby-crowned Kinglet, Swainson's Thrush, Tennessee Warbler, Black-throated Green Warbler, Boreal Chickadee, Yellow-rumped Warbler
Hardwood	White-throated Sparrow, Tennessee Warbler, Black-throated Green Warbler, Least Flycatcher, Swainson's Thrush, Northern Waterthrush, Orange-crowned Warbler
Burn	White-throated Sparrow, Dark-eyed Junco, Hermit Thrush, Boreal Chickadee, Swainson's Thrush, Yellow-bellied Flycatcher, American Robin
Source: Minaskuat Inc. 2008	

Table 2.3 Species Observed and Associated Breeding Habitat during Baseline Surveys, 2006-2007

Common Name[1]	Scientific Name[1]	Associated Breeding Habitat [2]
Common Loon	*Gavia immer*	Wetlands (Evers et al. 2010)
Canada Goose	*Branta Canadensis*	Wetlands near treeless and forested areas (Mowbray et al. 2002)
American Black Duck	*Anas rubripes*	Wetlands (Longcore et al. 2000)
Green-winged Teal	*Anas crecca*	Wetlands (Johnson 1995)
Northern Shoveler	*Anas clypeata*	Wetlands (Dubowy 1996)
Wood Duck	*Aix sponsa*	Riparian and Wetlands (Hepp and Bellrose 1995)
Common Merganser	*Mergus merganser*	Riparian near Coniferous and Mixed Forests (Malory and Metz 1999)
Red-breasted Merganser	*Mergus serrator*	Wetlands (Titman 1999)
Common Goldeneye	*Bucephala clangula*	Wetlands and Riparian near Mature Forests (Eadie et al. 1995)
Lesser Scaup	*Aythya affinis*	Wetlands (Austin et al. 1998)
Ruffed Grouse	*Bonasa umbellus*	Deciduous and Mixed Forests (Rusch et al. 2000)
Red-tailed Hawk	*Buteo jamaicensis*	Mixed Forests with elevated nest/perch sites (Preston and Beane 2009)
Sharp-shinned Hawk	*Accipiter striatus*	Mixed Forests (Bildstein and Meyer 2000)
Merlin	*Falco columbarius*	Open Coniferous, Deciduous, and Mixed Forests near Riparian/Wetlands (Warkentin et al. 2005)
Bald Eagle	*Haliaeetus leucocephalus*	Coniferous, Deciduous, and Mixed Forests near large water bodies (Buehler 2000)
Osprey	*Pandion haliaetus*	Open Coniferous Forests near Riparian and Wetlands or artificial structures such as towers for electrical lines (Poole et al. 2002)
Herring Gull	*Larus argentatus*	Rock or Sandy Areas on Islands (Pierotti and

Common Name[1]	Scientific Name[1]	Associated Breeding Habitat [2]
		Good 1994)
Common Tern	*Sterna hirundo*	Sandy, Gravel, Shell, or Cobble Areas on Islands (Nisbet 2002)
Semipalmated Plover	*Charadrius semipalmatus*	Beaches and Grassy Borders In Riparian Areas (Nol and Blanken 1999)
Greater Yellowlegs	*Tringa melanoleuca*	Wetlands with wooded islands and Coniferous Forests (Elphick and Tibbitts 1998)
Solitary Sandpiper	*Tringa solitaria*	Wetlands in mainly Coniferous Forests (Moskoff 2011)
Spotted Sandpiper	*Actitis macularius*	Riparian Areas (Reed et al. 2013)
Least Sandpiper	*Calidris minutilla*	Wetlands (Nebel and Cooper 2008)
Wilson's Snipe	*Gallinago delicata*	Wetlands (Mueller 1999)
Short-billed Dowitcher	*Limnodromus griseus*	Wetlands interspersed with coniferous stands (Jehl et al. 2001)
Sora	*Porzana carolina*	Wetlands (Melvin and Gibbs 2012)
Great Horned Owl	*Bubo virginianus*	Open Mixed Forests and Wetlands (Houston et al. 1998)
Belted Kingfisher	*Megaceryle alcyon*	Near water bodies with vertical nest exposures for nest burrows (Kelly and Bridge 2009)
Common Nighthawk*	*Chordeiles minor*	Open areas such as disturbed areas, open forests, rock outcrops, and flat gravel areas (Brigham et al. 2011)
Mourning Dove	*Zenaida macroura*	Open Forest and Edges as well as Riparian Areas (Otis et al. 2008)
Black-backed Woodpecker	*Picoides arcticus*	Coniferous Forests (Dixon and Saab 2000)
American Three-toed Woodpecker	*Picoides dorsalis*	Coniferous Forests (Leonard Jr. 2001)
Downy Woodpecker	*Picoides pubescens*	Open Deciduous Forests near Riparian Areas (Jackson and Ouellet 2002)
Hairy Woodpecker	*Picoides villosus*	Mixed, Coniferous, and Deciduous Forests (Jackson et al. 2002)
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Deciduous and Mixed Forests usually near Riparian Areas (Walters et al. 2002)
Northern Flicker	*Colaptes auratus*	Open Coniferous, Deciduous, and Mixed Forests, Snags in Disturbed Areas (burns and cutovers) and wetlands (Wiebe and Moore 2008)
Least Flycatcher	*Empidonax minimus*	Deciduous and Mixed Forests, may occasionally occur in disturbed areas (burns), wetlands, and shrubby fields (Tarof and Briskie 2008)
Alder Flycatcher	*Empidonax alnorum*	Shrubby Wetlands (Lowther 1999)
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Coniferous and Mixed Forests as well as Wetlands

Common Name[1]	Scientific Name[1]	Associated Breeding Habitat [2]
		(Gross and Lowther 2011)
Olive-sided Flycatcher*	*Contopus cooperi*	Open Coniferous Forests and near forests openings or disturbed areas (anthropogenic and natural) (Altman and Sallabanks 2012)
Tree Swallow	*Tachycineta bicolor*	Wetlands and Riparian Areas with standing dead trees (Winkler et al. 2011)
Bank Swallow	*Riparia riparia*	Vertical banks along Riparian Areas and Wetlands as well as artificial structures such as sand and gravel quarries, and road cuts (Garrison 1999)
Red-eyed Vireo	*Vireo olivaceus*	Deciduous and Mixed Forests (Cimprich et al. 2000)
Philadelphia Vireo	*Vireo philadelphicus*	Deciduous and Mixed Forests as well as Forest Edges with shrubby understory (Moskoff and Robinson 2011)
Northern Shrike	*Lanius excubitor*	Riparian Areas in open areas and forest edges (Cade and Atkinson 2002)
Gray Jay	*Perisoreus canadensis*	Coniferous and Mixed Forests (Strickland and Ouellet 2011)
American Crow	*Corvus brachyrhynchos*	Open Areas in Edge Habitats such as Riparian Areas and anthropogenic structures (Verbeek and Caffrey 2002)
Common Raven	*Corvus corax*	Mixed, Coniferous, and Deciduous Forests (Boarman and Heinrich 1999)
Black-capped Chickadee	*Poecile atricapillus*	Mixed and Deciduous Forests, Riparian, and disturbed areas with some residual forest (Foote et al. 2010)
Boreal Chickadee	*Poecile hudsonicus*	Coniferous Forests (Ficken et al. 1996)
Red-breasted Nuthatch	*Sitta canadensis*	Coniferous Forests or Mixed Forests with slightly more coniferous than deciduous species (Ghalambor and Martin 1999)
Brown Creeper	*Certhia americana*	Coniferous and Mixed Forests (Hejl et al. 2002)
Winter Wren	*Troglodytes hiemalis*	Coniferous, Deciduous, and Mixed Forests, and Riparian (Hejl et al. 2002)
Ruby-crowned Kinglet	*Regulus calendula*	Coniferous and Mixed Forests (Swanson et al. 2008)
Golden-crowned Kinglet	*Regulus satrapa*	Coniferous, Mixed, and Deciduous Forests with possibility of breeding in open or closed, edges, or near water (Swanson et al. 2012)
Grey-cheeked Thrush*	*Catharus minimus*	Coniferous Forests (Lowther et al. 2001)
Swainson's Thrush	*Catharus ustulatus*	Coniferous Forests (Mack and Yong 2000)
Hermit Thrush	*Catharus guttatus*	Coniferous, Deciduous and Mixed Forests (Dellinger et al. 2012)

Common Name[1]	Scientific Name[1]	Associated Breeding Habitat [2]
American Robin	*Turdus migratorius*	Open Mixed Forests and Disturbed Areas (Sallabanks and James, 1999)
Bohemian Waxwing	*Bombycilla garrulus*	Open Coniferous, Mixed Forests, Disturbed areas (burns) and near Riparian Areas and Wetlands (Witmer 2002)
Cedar Waxwing	*Bombycilla cedrorum*	Riparian Areas and Open Coniferous, Deciduous, and Mixed Forests (Witmer et al. 1997)
American Pipit	*Anthus rubescens*	Wetlands and Riparian (Hendricks and Verbeek 2012)
Black-and-white Warbler	*Mniotilta varia*	Mixed and Deciduous Forests (Kricher 1995)
Tennessee Warbler	*Oreothlypis peregrina*	Deciduous, Mixed, and Coniferous Forests (Rimmer and Mcfarland 2012)
Orange-crowned Warbler	*Oreothlypis celata*	Open Deciduous Forests, Mixed and Coniferous Forest Edges (Gilbert et al. 2010)
Nashville Warbler	*Oreothlypis ruficapilla*	Open Deciduous and Mixed Forests (Lowther and Williams 2011)
Yellow Warbler	*Setophaga petechial*	Wet Deciduous Riparian Areas and Disturbed Areas (Lowther et al. 1999)
Palm Warbler	*Setophaga palmarum*	Wetlands and Open Coniferous Forests (Wilson 1996)
Magnolia Warbler	*Setophaga magnolia*	Coniferous and Mixed Forests (Dunn and Hall 2010)
Yellow-rumped Warbler	*Setophaga coronate*	Mature Coniferous and Mixed Forests (Hunt and Flaspohler 1998)
Blackpoll Warbler	*Setophaga striata*	Coniferous and Mixed Forests (DeLuca et al. 2013)
Cape May Warbler	*Setophaga tigrina*	Coniferous Forests (Baltz and Latta 1998)
Black-throated Green Warbler	*Setophaga virens*	Coniferous, Mixed, and Deciduous Forests (Morse and Poole 2005).
Wilson's Warbler	*Cardellina pusilla*	Riparian (Ammon and Gilbert 1999)
American Redstart	*Setophaga ruticilla*	Riparian and Mixed Forests (Sherry and Holmes 1997)
Northern Waterthrush	*Parkesia noveboracensis*	Riparian (Eaton 1995)
Common Yellowthroat	*Geothlypis trichas*	Wetlands and Riparian Areas (Guzy and Ritchison 1999)
Rusty Blackbird*	*Euphagus carolinus*	Wet Coniferous and Mixed Forests, Riparian and Wetlands (Avery 2013)
Savannah Sparrow	*Passerculus sandwichensis*	Wetlands and Riparian Areas (Wheelwright and Rising 2008)
Song Sparrow	*Melospiza melodia*	Coniferous, Mixed, and Deciduous Forests and Riparian Areas (Arcese et al. 2002)

Common Name[1]	Scientific Name[1]	Associated Breeding Habitat [2]
Lincoln's Sparrow	*Melospiza lincolnii*	Wetlands and Riparian (Ammon 1995)
Swamp Sparrow	*Melospiza georgiana*	Wetlands and Riparian (Mowbray 1997)
White-throated Sparrow	*Zonotrichia albicollis*	Open Coniferous and Mixed Forests (Falls and Kopachena 2010)
White-crowned Sparrow	*Zonotrichia leucophrys*	Coniferous Forests and Riparian Areas (Chilton et al. 1995)
Fox Sparrow	*Passerella iliaca*	Coniferous and Mixed Forests (Weckstein et al. 2002)
Dark-eyed Junco	*Junco hyemalis*	Coniferous Forests (Nolan et al. 2002)
Pine Siskin	*Spinus pinus*	Coniferous Forests (Dawson 1997)
Common Redpoll	*Acanthis flammea*	Coniferous Forests (Knox and Lowther 2000)
Purple Finch	*Haemorhous purpureus*	Coniferous Forests, Mixed Forests, and Riparian Areas (Wootton 1996)
White-winged Crossbill	*Loxia leucoptera*	Coniferous Forests (Benkman 2012)
Pine Grosbeak	*Pinacola enucleator*	Coniferous Forests (Adkisson 1999)
Species at Risk* (COSEWIC)		
Sources: [1] Minaskuat Inc. 2008; [2] Birds of North America Online		

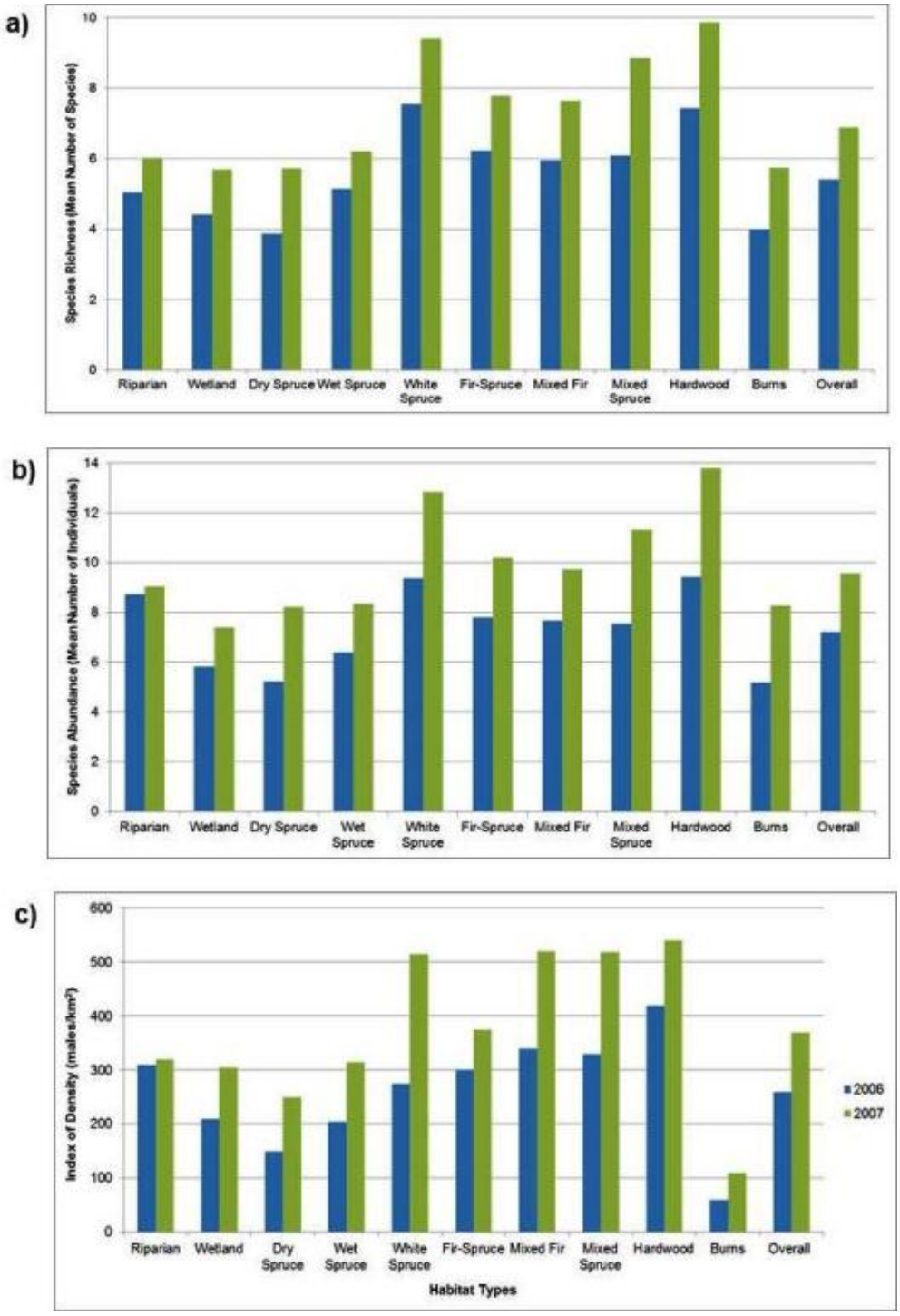

Figure 2-3 Avifauna Richness, Abundance and Density from Baseline Surveys, 2006-2007

Table 2.4 Avifauna Species at Risk, Species of Conservation, and Species of Interest in the Lower Churchill River Valley.

Species	Ranking
Olive-sided Flycatcher (*Contopus cooperi*)	SAR: *Threatened* (NLDEC 2013; COSEWIC 2013); SOCC with NatureServ/AC CDC rank of S2S3
Gray-cheeked Thrush (*Catharus minimus*)	SAR: *Vulnerable* in Newfoundland and Labrador (NLDEC 2013)
Rusty Blackbird (*Euphagus carolinus*)	SAR: *Vulnerable* (NLDEC 2013) and *Special Concern* (COSEWIC 2013); SOCC with NatureServ/AC CDC rank of S3S4B
Common Nighthawk (*Chordeiles minor*)	SAR: *Threatened* (COSEWIC 2007); SOCC with NatureServ/AC CDC rank of S1S2B;
Bufflehead (*Bucephala albeola*)	SOCC with NatureServ/AC CDC rank of S1S2?; small breeding population in Labrador due to being at northern edge of their range;
White-winged Scoter (*Melanitta deglandi*)	Confirmed breeding in western Labrador in 2012; previously not thought to breed in Labrador
Lesser Scaup (*Aythya affinis*)	SOCC with NatureServ/AC CDC rank of S3S4B
Black Scoter (*Melanitta americana*)	SOCC with NatureServ/AC CDC rank of S2S3B, S3M
Hooded Merganser (*Lophodytes cucullatus*)	SOCC with NatureServ/AC CDC rank of S2B; small breeding population in Labrador due to being at northern edge of their range
Red-eyed Vireo (*Vireo olivaceus*)	SOCC with NatureServ/ AC CDC rank of S2B; small breeding population in Labrador due to being at northern edge of their range
Cedar Waxwing (*Bombycilla cedrorum*)	SOCC with NatureServ/AC CDC rank of S2B; small breeding population in Labrador due to being at northern edge of their range
Short-billed Dowitcher (*Limnodromus griseus*)	SOCC with NatureServ/AC CDC rank of S3S4B
Belted Kingfisher (*Megaceryle alcyon*)	SOCC with NatureServ/AC CDC rank of S3B
Alder Flycatcher (*Empidonax alnorum*)	SOCC with NatureServ/AC CDC rank of S3B
American Kestrel (*Falco sparverius*)	SOCC with NatureServ/AC CDC rank of S1S2B
Northern Shrike (*Lanius excubitor*)	SOCC with NatureServ/AC CDC rank of S3B
Lesser Yellowlegs (*Tringa flavipes)*	SOCC with NatureServ/ AC CDC rank of S2N; Confirmed breeding in the Study Area during 2012 field surveys; previously not thought to breed in Labrador
Nashville Warbler (*Oreothlypis ruficapilla)*	SOCC with NatureServ/AC CDC rank of S1B
Golden-crowned Kinglet (*Regulus satrapa)*	SOCC with NatureServ/AC CDC rank of S1B
Orange-crowned Warbler (*Oreothlypis celata*)	SOCC with NatureServ/AC CDC rank of S3B
Palm Warbler (*Dendroica palmarum*)	SOCC with NatureServ/AC CDC rank of S3B

Species	Ranking
Swamp Sparrow (*Melospiza georgiana*)	SOCC with NatureServ/AC CDC rank of S3B
Winter Wren (*Troglodytes hiemalis*)	SOCC with NatureServ/AC CDC rank of S2B;
Yellow-bellied Sapsucker (*Sphyrapicus varius*)	Species of Interest based on deficient data (The Species Status Advisory Committee 2010 & E. Herdman, pers. comm 16 July 2013)
***Status ranks are described in Appendix F**	

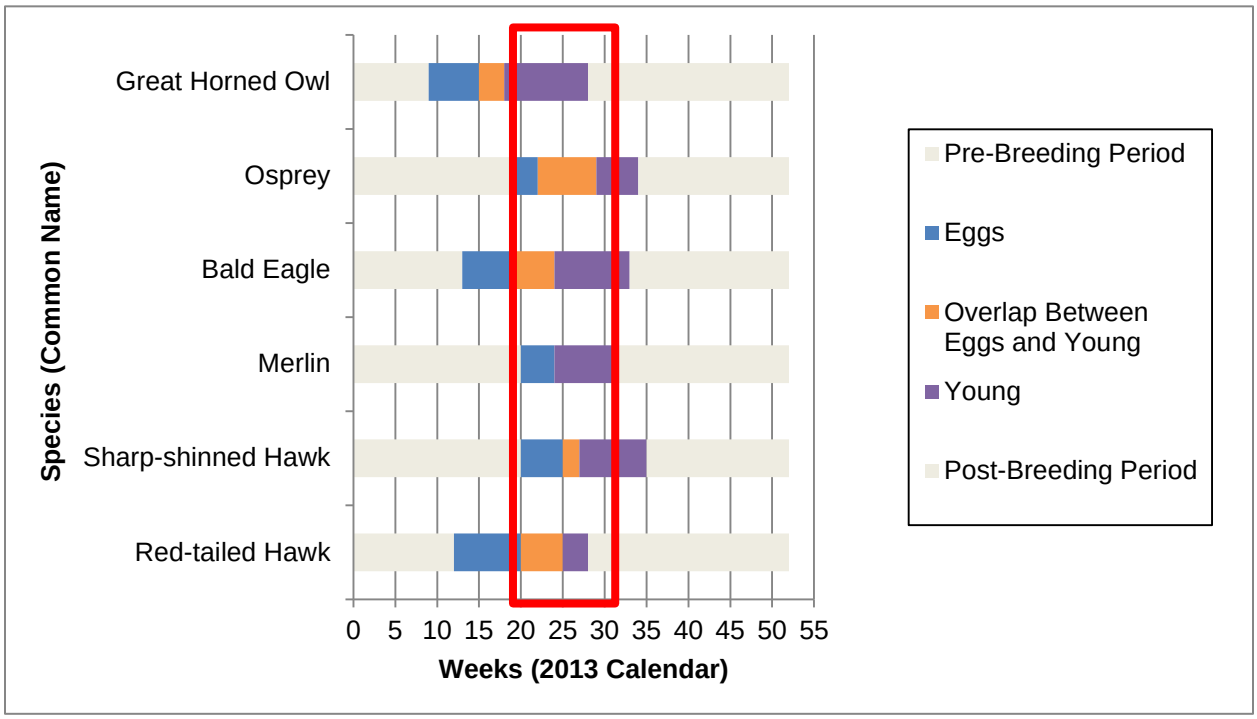

Figure 2-4 Breeding Period for Raptor Species Observed during Baseline Surveys, 2006-2007

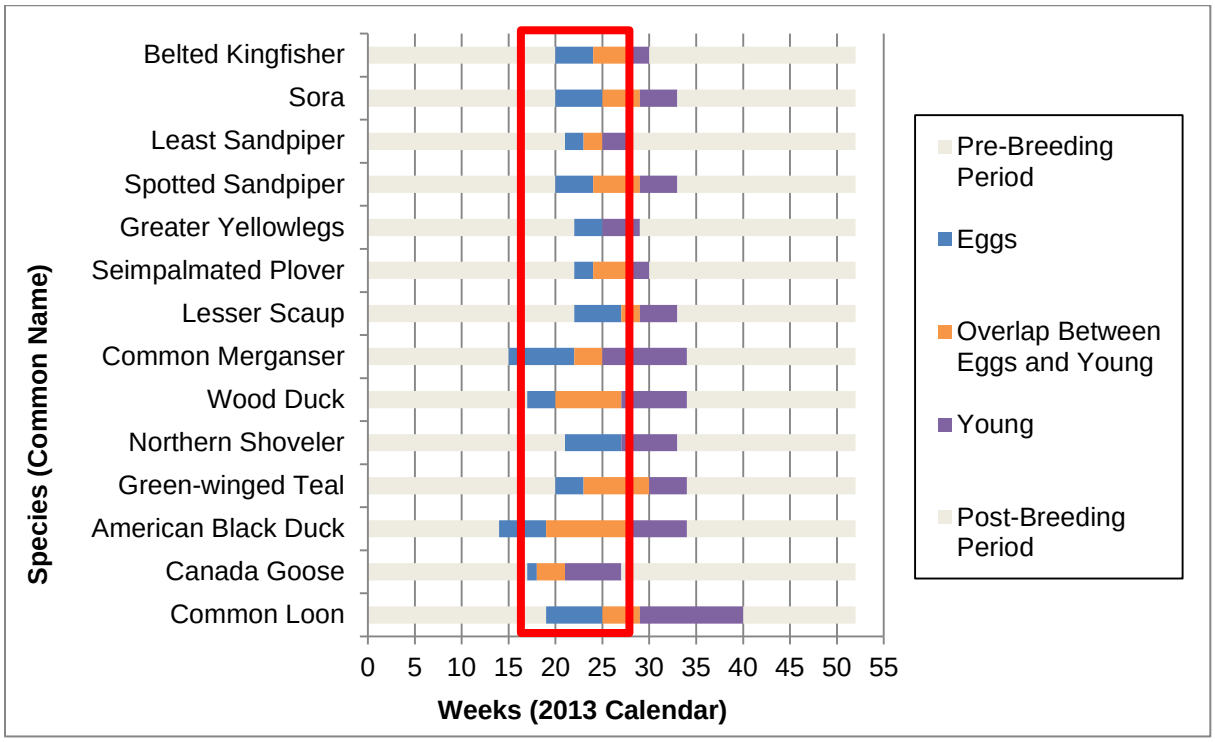

Figure 2-5 Breeding Period for Waterfowl, Waterbirds, and Shorebirds Species Observed during Baseline Surveys, 2006-2007

Figure 2-6 Breeding Period for Landbird Species Observed during Baseline Surveys, 2006-2007

3.0 METHODS

3.1 Study Team

Stassinu Stantec assembled a Study Team that involved experienced ornithologists and/or local Labrador residents to maximize efficiency. For each field survey associated with the implementation of the AMP, Stassinu Stantec ensured that each team was comprised of at least one Team Lead and supported by other experienced field support.

3.2 Field Methodology

Field surveys were conducted in the following locations during 2013 (Figure 2-1):

- Construction camp locations at Gull Island, East Metchin, Edwards's Island and staging locations and associated access roads (Ground and Aerial Surveys) in association with the reservoir;
- Archaeological sites (7) on the North Spur (Ground Surveys) in association with the Muskrat Falls main site (generation project area);
- The interconnecting right-of-way for the transmission line between Muskrat Falls and Churchill Falls (Ground and Aerial Surveys); and
- Throughout the Muskrat Falls Reservoir (Aerial Surveys).

All activities were carried out within the areas to be cleared of vegetation by the clearing sub-contractors during the breeding season of May 1st – July 31st to comply with the Migratory Bird Conservation Act for the Lower Churchill River valley (Environment Canada 1991). There were specialized techniques for each of the mitigation measures that were implemented.

3.2.1 Ground Surveys

Surveys involving ground nest searches were conducted less than seven days prior to forest clearing between June 28, 2013 and July 26, 2013. The Survey Team varied in number (from 4 to 10 observers) depending on habitat type, configuration of the area of interest and distance. Teams walked slowly in parallel at 6 - 20m spacing (depending on vegetation cover). The team lead would follow the Camp location boundary or the Right-of-Way (RoW) boundary track files in a GPS as provided by Nalcor or the sub-contractor with other team members spaced appropriately to achieve 100% coverage. Open habitats such as open black spruce-lichen habitat afforded wider spacing between team members than mixed wood forest for example. One team member would be placed on the outside of the RoW boundary to examine a 30m buffer to the block to be cut was also surveyed for active nests. Observers scanned from ground-level, tree cavities, and to the top of the canopy for nests or indications of nesting

activity. More complex or dense habitats required a slower pace. If an additional survey swath was required, the entire Survey Team would reorient in the opposite direction to survey the remaining area to ensure 100% coverage of the area of interest. The survey track files were recorded using a GPS unit.

In accordance with guidelines for bird breeding surveys outlined by Environment Canada - Canadian Wildlife Service, nest searches were only conducted in appropriate weather conditions (i.e., were not conducted in fog, steady drizzle, or prolonged rain) (Environment Canada 2011). Surveys were suspended under steady rain or when wind speed was Beaufort 4 or higher (> 20km/h), as under these conditions it may be difficult for observers to hear the soft alarm calls that often identify nest locations and there is an increased risk of mortality for eggs or nestlings if exposed to these conditions during inclement weather.

Active and potentially active nesting areas were identified using criteria in the AMP (Stantec Consulting Ltd. 2013). A variety of avifauna nests may be encountered and various species use a variety of nest forms such as open cup nests in trees, domed nests on the ground, burrows in banks, cavities in trees or snags, stick nests in tree tops, scrapes on wetland edges, and floating nests in sheltered wetland areas with further description provided in the AMP (Stantec Consulting Ltd. 2013). All nests, nest sites, and habitat descriptions were based on the Maritimes Bird Breeding Atlas Nest Record Card (Environment Canada 2006). Behavioural cues were the most important indicator of an active nest because nests are typically well concealed. These cues vary from auditory signs (i.e., singing males and calling males and females), observed pairs (e.g., alarm calls, courting, or copulation), distraction displays (i.e., broken wing display), adults repeatedly carrying nesting materials or food to the same location, adult birds defending territory through singing, screeching, or diving, or the presence of recently fledged birds which may be persistently begging for food. When one or more of these indicators were noted, the Survey Team attempted to identify the potential location of the nest without causing further disturbance and would designate an appropriate setback buffer. Further detail is provided below in Section 3.2.4 Active Nest Procedures.

3.2.2 Aerial Surveys

Aerial surveys for breeding raptors were completed at the areas proposed for vegetation clearing in 2013 between July 18th and July 26th, 2013. The first survey covered the transmission line footprint and an adjacent 800m buffer from Muskrat Falls west to Churchill Falls. A 206L Bell helicopter was used with the pilot and navigator situated in front, and two forward and lateral facing observers in the back (one of the rear observers also recorded observations as a back-up). The second aerial survey also involved a 206L helicopter and Survey Team configuration and examined the reservoir area with an adjacent 800m buffer.

Each survey day started with a review of standard safety procedures with the pilot in addition to the RMS 2 daily review. Weather conditions, start and end times, survey team personnel, type of aircraft, GPS waypoints and track files as well as any notes on raptor or other wildlife

observations were recorded. Raptor nests were identified as active or inactive based on the condition of nest; presence of aggressive adults; and/or the presence of eggs or nestlings.

3.2.3 Reporting Of Breeding Avifauna by Ground Crews

Through the other two levels of protection within the mitigation measures of the AMP, General Mitigation Measures and Awareness Mitigation Measures, observations of breeding avifauna were also reported by Project environmental monitors or other personnel. Stassinu Stantec was available for consultation (primarily the Technical Lead but also Field Team Leads) with regards to whether a setback buffer was required, the size of the setback buffer to be established, if necessary based on species identified, and the duration of the setback buffer (if established) based on the nesting phase (i.e., eggs versus young).

3.2.4 Active Nest Procedures

When an active or potentially active nest was identified, coordinates for that location were recorded using a hand-held GPS with a setback buffer established (Figure 3-1). The sizes of setback buffers for the various species included:

- 30m for landbird species;
- 75m for Rusty Blackbird;
- 100m for waterfowl/waterbirds/shorebirds species; and
- 800m for raptor species when excluding clearing activity.

To avoid detection by predators or other threats, setback buffers for ground nesting species were indicated by flagging at the buffer limit from the nest at each cardinal direction (North, East, South, and West) as well as the anticipated direction the clearing contractor would be approaching the nest. The flagging convention used was agreed upon in consultation with Nalcor and the clearing sub-contractors prior to the commencement of the field surveys. The area surveyed, location of active nests and recommended mitigation measures were communicated by the Stassinu Stantec Project Manager to the Lower Churchill Project team daily.

To reduce the potential for nest abandonment or failure, recommended buffers were timed to persist until after the fledging period. Data provided from the Maritime Bird Breeding Atlas (Erskine 1992) was used to describe the breeding periods for central Labrador. In using data from the Maritimes for Labrador the timing of the breeding period may be later since it is at higher latitude and the timing may vary yearly due to local environmental conditions (Gienapp et al. 2010). Snow melt, temperature variations, and forest fires are examples of influential local condition. However, the phenology (i.e., the duration of the nesting stage for the eggs and the young) of the species remains similar. Depending on the nesting stage (i.e., eggs or young)

observed during the nest search, the timing of any follow-up nest checks was determined using the breeding period identified in Figures 2-4 – 2-6. Nests were checked by approaching and departing from different directions to reduce the possibility of nest predation. The setback buffers remained in place until the field team confirmed that the nest was no longer active based on confirmation or suspicion (past fledging windows) that the young having fledged. When buffers were removed, Stassinu Stantec notified Nalcor of the change in status and updated a shared file inventory web site of areas searched and status of active nests.

Figure 3-1 Decision Framework for an Active Nest

4.0 RESULTS

In 2013, Stassinu Stantec commenced surveys in support of the AMP during June prior to the onset of vegetation clearing. However, delays in start-up by clearing contractors and the presence of forest fires within the Project footprint resulted in extensive periods of the breeding season when no vegetation clearing could occur, and therefore no AMP surveys were required.

4.1 Ground Surveys

Stassinu Stantec conducted ground surveys at three construction camp/staging areas and their access roads (Figures 4-1 – 4-3), seven archaeological sites (Figure 4-4), and eastern sections of the transmission line right-of-way for a total area of 3.72 km^2 (Tables 4.1 and 4.2). Black Spruce Lichen Woodland occurred in 56% of the area surveyed (Table 4.3). Coniferous (Black spruce/Feathermoss, Black Spruce Sphagnum, and Fir-White Spruce) habitats accounted for 21% of the ground survey area. Hardwood, Mixedwood, and riparian habitats combined represented 15% of the area surveyed. Wetlands and non-forested (gravel, anthropogenic/disturbed, water and unvegetated) habitats covered lesser amounts. Setback buffers were established at 17 locations for six different species: Merlin, Black-backed Woodpecker, White-crowned Sparrow, Dark-eyed Junco, Black-throated Green Warbler, Northern Waterthrush, and Tree Swallow (Figures 4-1 – 4-3). Thirty two avifauna species (including those confirmed nesting) were observed during these ground surveys (Table 4.4). No avifauna species currently recommended by COSEWIC or listed with the NLESA or SARA was detected during these surveys. However, a species of interest, the Yellow-bellied Sapsucker, was observed north of the Lower Brook Area.

In 2013 there were instances where other Project personnel identified nests and advised the environmental monitors – who in turn contacted Nalcor, SLI and Stassinu Stantec. The first involved the discovery of a Tree Swallow nest by an archaeology team conducting test pitting. A Stassinu Stantec team lead established a setback buffer (30m) around the nest after identifying the species. A stick nest was found by construction workers on a rock face of a quarry on August 13, 2013. The environmental monitor checked on the nest for three days but no bird activity was observed. Stassinu Stantec advised that the nest would be considered inactive and no buffer was applied. Another instance involved a small group of Osprey observed fishing near the North Spur working area. These birds were observed on several occasions in late August and were considered by Stassinu Stantec to be a family group containing at least one fledgling. A setback buffer was not implemented but personnel were reminded of Nalcor's non-harassment policy from the General Mitigation Measures of the AMP. Stassinu Stantec's Discipline Lead advised that before activities such as blasting occurred, the Environmental Monitor should survey to ensure the Osprey were not in the vicinity, otherwise the activity was to be delayed.

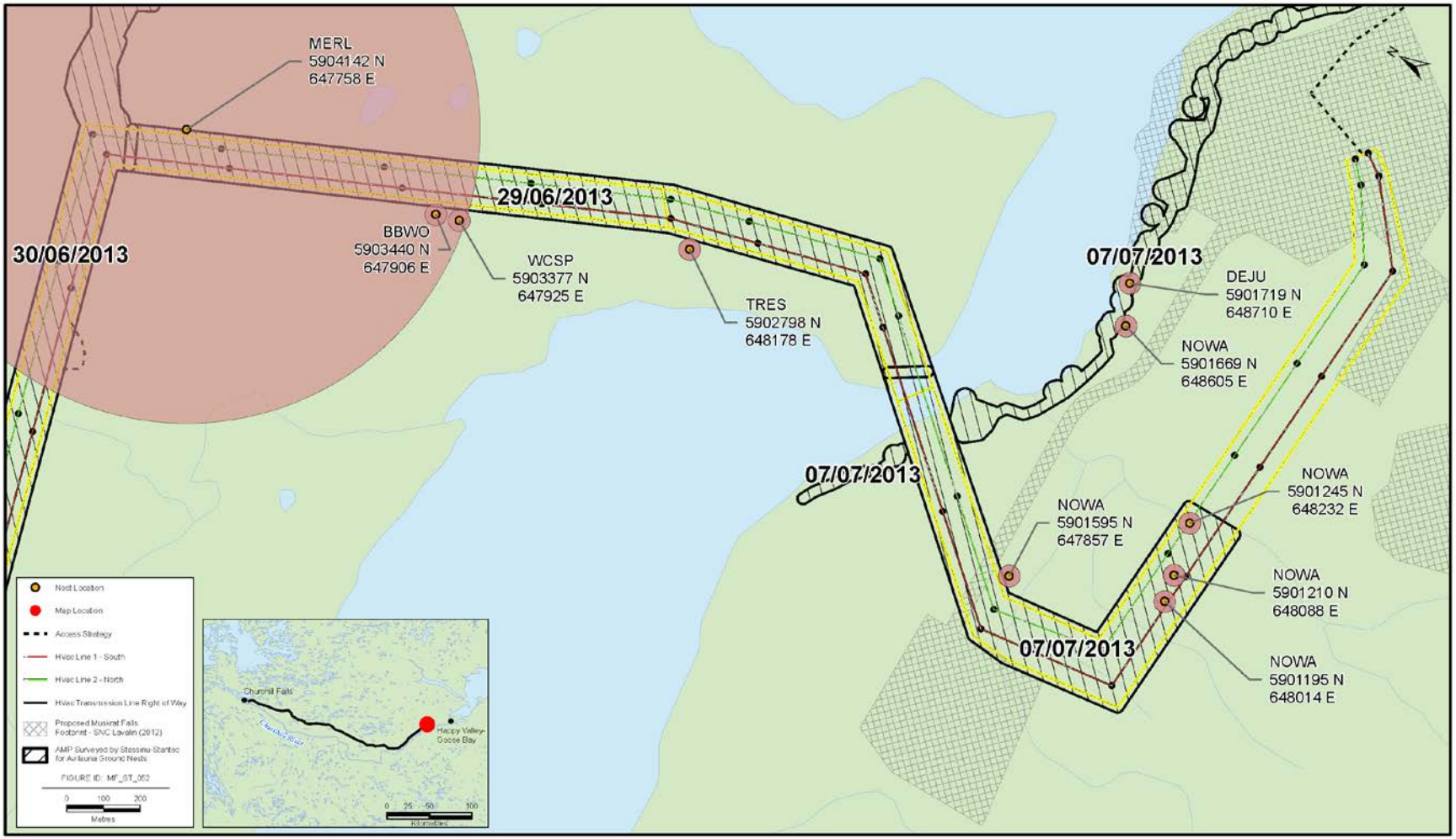

Figure 4-1 Ground Survey Results and Setback Buffers

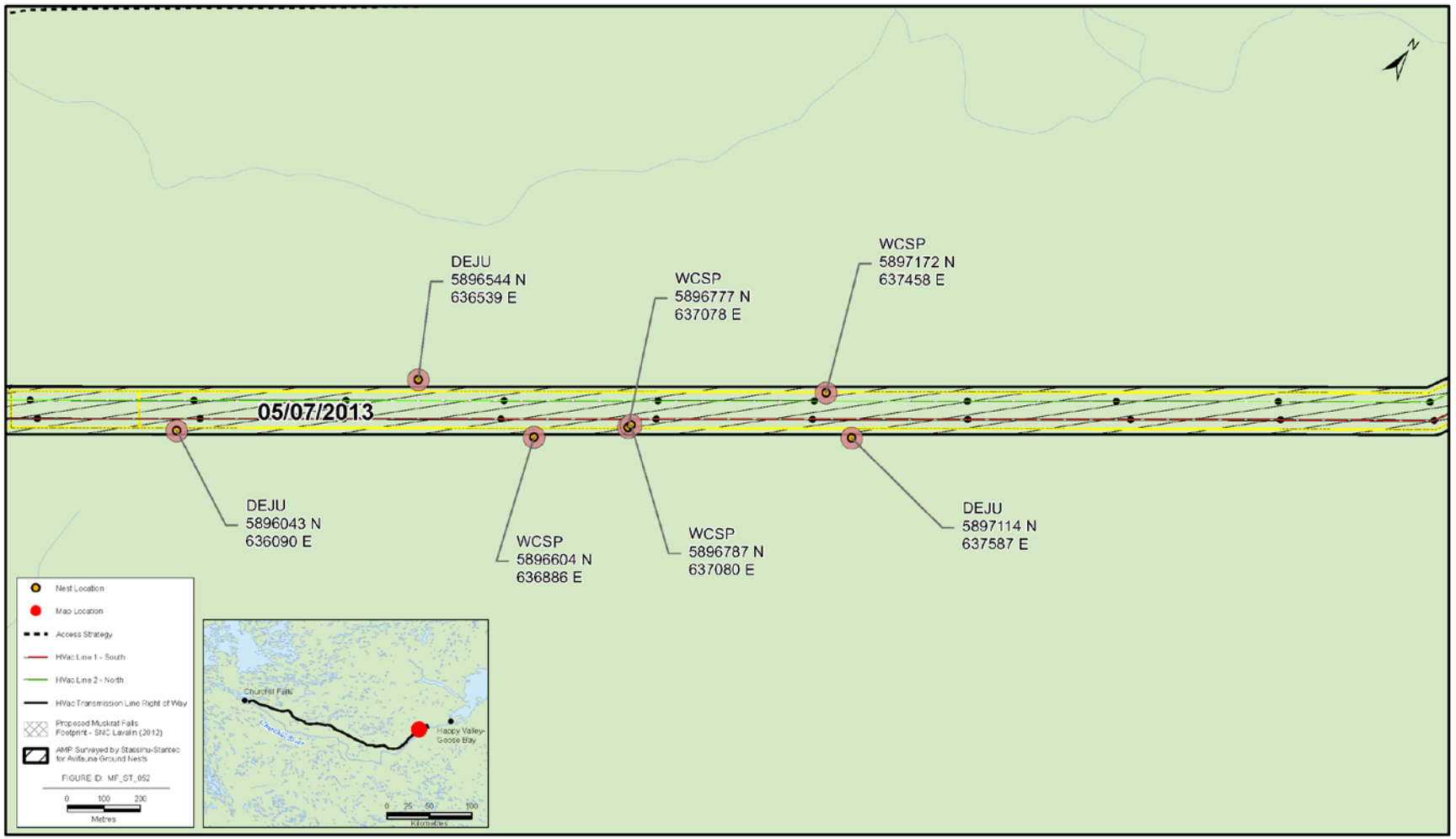

Figure 4-2 Ground Survey Results and Setback Buffers (Continued)

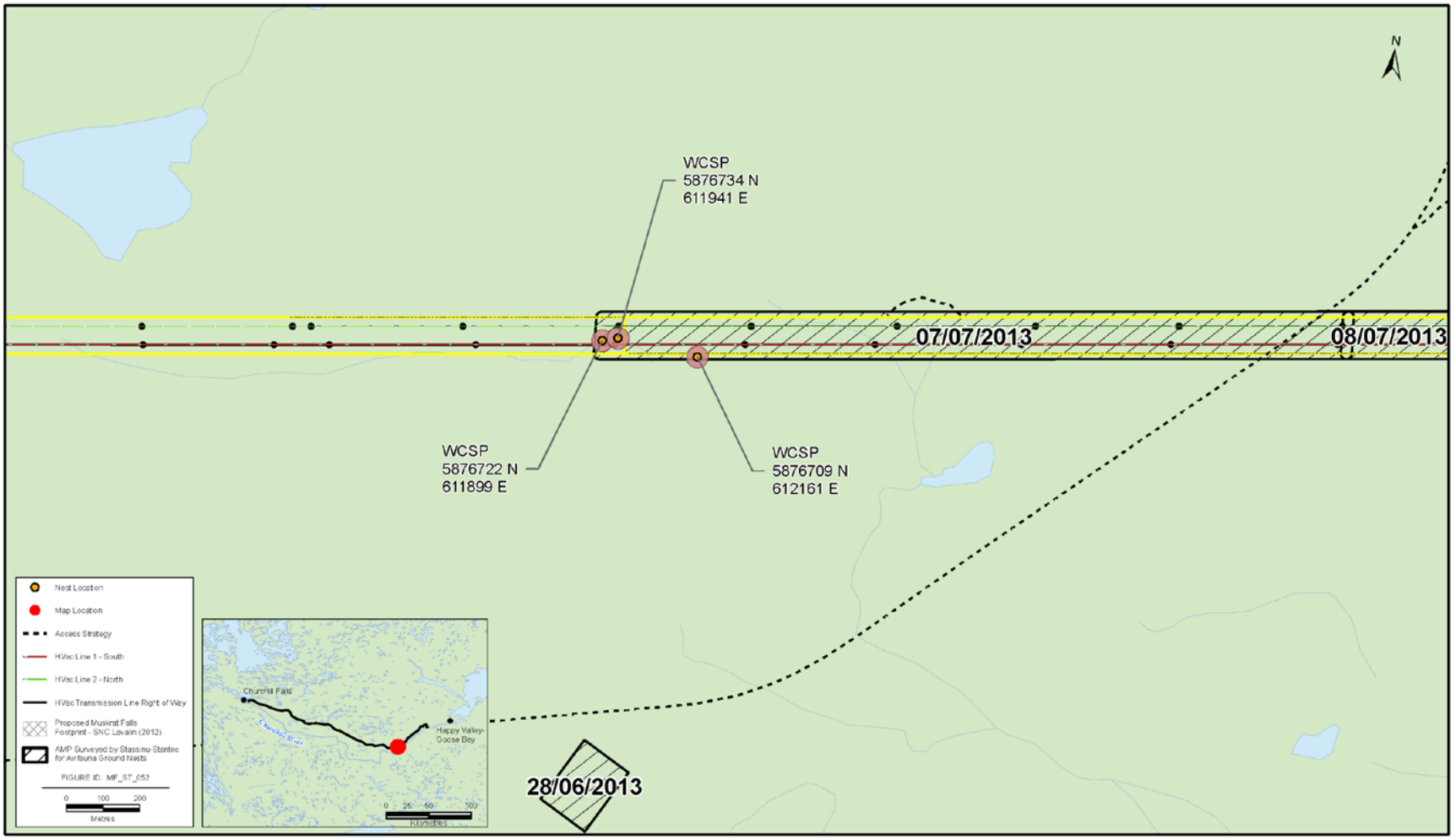

Figure 4-3 Ground Survey Results and Setback Buffers (Continued)

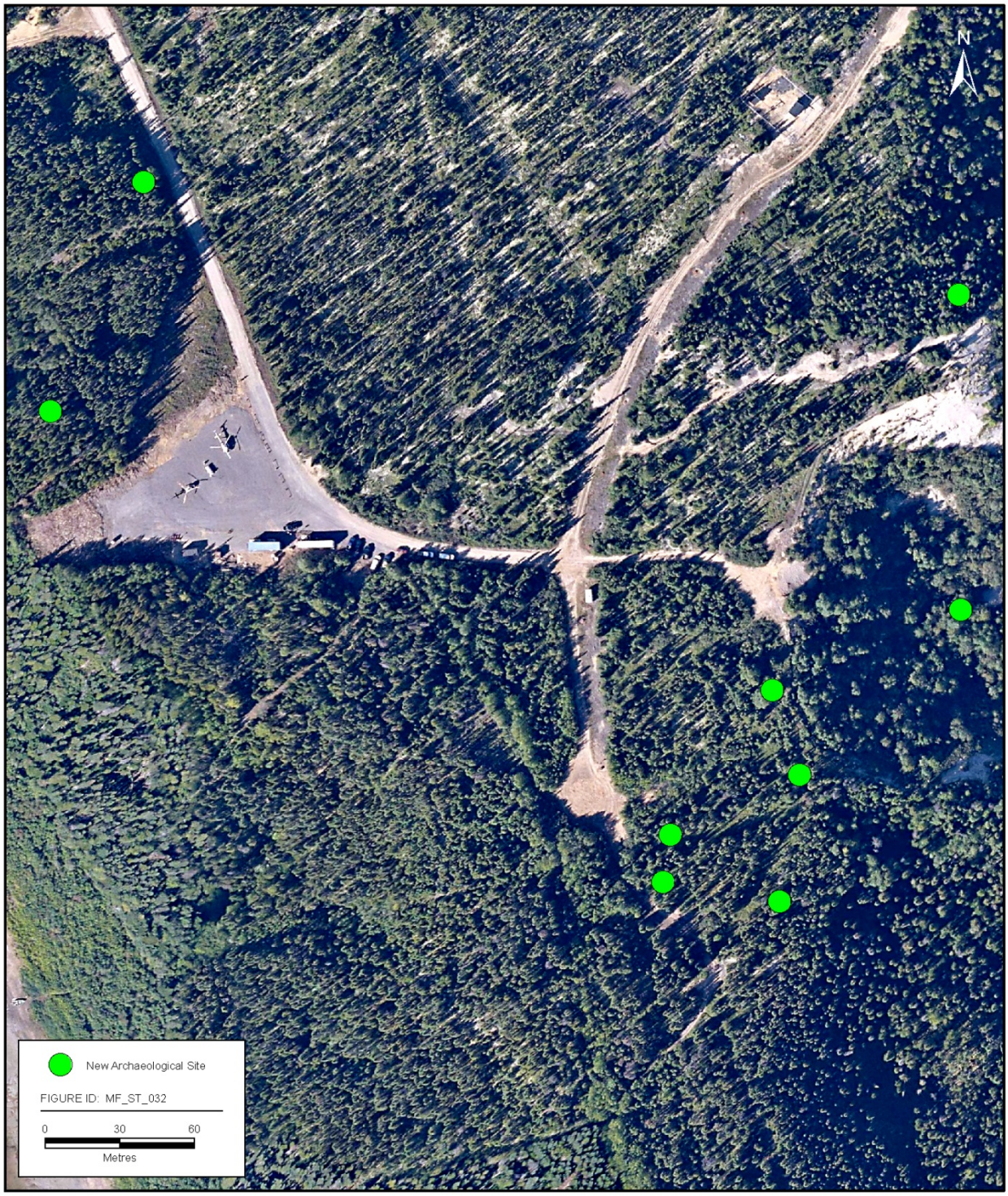

Figure 4-4 Location of Archaeological Sites Surveyed Before Vegetation Clearing

Table 4.1 Area Covered During 2013 Ground Surveys

Area Surveyed	Total Area Surveyed (km^2)
Camps (East Metchin, Gull Island, and) Johnson's	0.09
Transmission Line	3.63
Total Area Surveyed	3.72
The area for the archaeological sites that were surveyed was minimal, therefore only point locations are presented in Figure 4-2	

Table 4.2 Ground and Aerial Nest Survey Effort during June and July, 2013

Date	Type of Survey	# Field Personnel	Total Person Days
28-Jun-13	Ground	6	6
29-Jun-13	Ground	8	8
30-Jun-13	Ground	5	5
1-Jul-13	Ground	6	6
2-Jul-13	Ground	10	10
3-Jul-13	Ground	4	4
4-Jul-13	Ground	11	11
5-Jul-13	Ground	11	11
6-Jul-13	Ground	11	11
7-Jul-13	Ground	4	4
8-Jul-13	Ground	5	5
18-Jul-13	Aerial	3 plus pilot	4
24-Jul-13	Ground	6	6
25-Jul-13	Ground	6	6
26-Jul-13	ground / aerial	1/3 plus pilot	¼
TOTAL PERSON DAYS FOR GROUND SURVEYS			**101**

Table 4.3 Ecological Land Classification (ELC) Habitat Types Covered During Ground Surveys

ELC Habitat Types	Area Surveyed (km²)	Percentage of Area Surveyed
Black Spruce/Feathermoss Forest	0.60	17
Black Spruce/Lichen Woodland	2.02	56
Black Spruce/Sphagnum Woodland	0.011	0.3
Fir-White Spruce Forest	0.14	4
Hardwood Forest	0.13	4
Mixedwood Forest	0.38	10
Riparian	0.035	1
Spruce-Fir/Feathermoss Forest	0	0
Black Spruce on Bedrock Outcropping	0	0
Gravel Bar	0.0081	0.2
Anthropogenic/Disturbed	0.053	1.4
Water	0.078	2
Wetland	0.14	4
Non-forested	0.0019	0.05
TOTAL	**3.60**	**100**
0.12 km² of the total ground survey area was not included in the available ELC habitat type data.		

Table 4.4 Avifauna Species Observed during Ground Surveys in the 2013 Program

Common name	Scientific name
Ruffed Grouse	*Bonasa umbellus*
Spruce Grouse	*Falcipennis Canadensis*
Willow Ptarmigan	*Lagopus lagopus*
Merlin	*Falco columbarius*
Greater Yellowlegs	*Tringa melanoleuca*
Black-backed Woodpecker	*Picoides arcticus*
Unidentified Woodpecker sp.	*Picoides Sp.*
Yellow-bellied Sapsucker	*Sphyrapicus varius*
Northern Flicker	*Colaptes auratus*
Alder Flycatcher	*Empidonax alnorum*
Yellow-bellied Flycatcher	*Empidonax flaviventris*
Unidentified Flycatcher sp.	*Empidonax Sp.*

Common name	Scientific name
Tree Swallow	*Tachycineta bicolor*
Gray Jay	*Perisoreus Canadensis*
American Crow	*Corvus brachyrhynchos*
Boreal Chickadee	*Poecile hudsonicus*
Red-breasted Nuthatch	*Sitta Canadensis*
Winter Wren	*Troglodytes hiemalis*
Ruby-crowned Kinglet	*Regulus calendula*
Swainson's Thrush	*Catharus ustulatus*
American Robin	*Turdus migratorius*
Tennessee Warbler	*Oreothlypis peregrine*
Yellow Warbler	*Setophaga petechial*
Yellow-rumped Warbler	*Setophaga coronate*
Blackpoll Warbler	*Setophaga striata*
Black-throated Green Warbler	*Setophaga virens*
Northern Waterthrush	*Parkesia noveboracensis*
Lincoln's Sparrow	*Melospiza lincolnii*
White-crowned Sparrow	*Zonotrichia leucophrys*
White-throated Sparrow	*Zonotrichia albicollis*
Fox Sparrow	*Passerella iliaca*
Dark-eyed Junco	*Junco hyemalis*
Pine Siskin	*Spinus pinus*
White-winged Crossbill	*Loxia leucoptera*

4.2 Aerial Surveys

The aerial survey of the proposed transmission line from Muskrat Falls to Churchill on July 18th was four hours in duration and covered an area of 421km^2. Survey conditions were favourable with light winds and good visibility. Three raptor species were detected (Figures 4-5 – 4-7). There were four observations of Red-tailed Hawk in flight but no nests were detected. An inactive Bald Eagle nest was detected. A total of 43 Osprey nests were observed predominantly along the existing transmission line between Churchill Falls and Goose Bay. Twenty-four nests (56%) were active and 19 nests (44%) were inactive. No avifauna species recommended under COSEWIC or listed by the NLESA or SARA was detected during these surveys.

The July 26th survey covered 244km^2 within the reservoir and was 2.5 hours in duration. It was conducted under favourable conditions although small flare ups from a fire the previous week (that interrupted the survey) were noted. Two inactive Red-tailed Hawk nests and one active

Osprey nest were recorded at this time. No avifauna species recommended by COSEWIC or listed with the NLESA or SARA was detected during these surveys. Incidental avifauna observations included Bank Swallow nest cavities in a sandy bank along the Churchill River outside of the active area and an unidentified tern species in flight along a river bank.

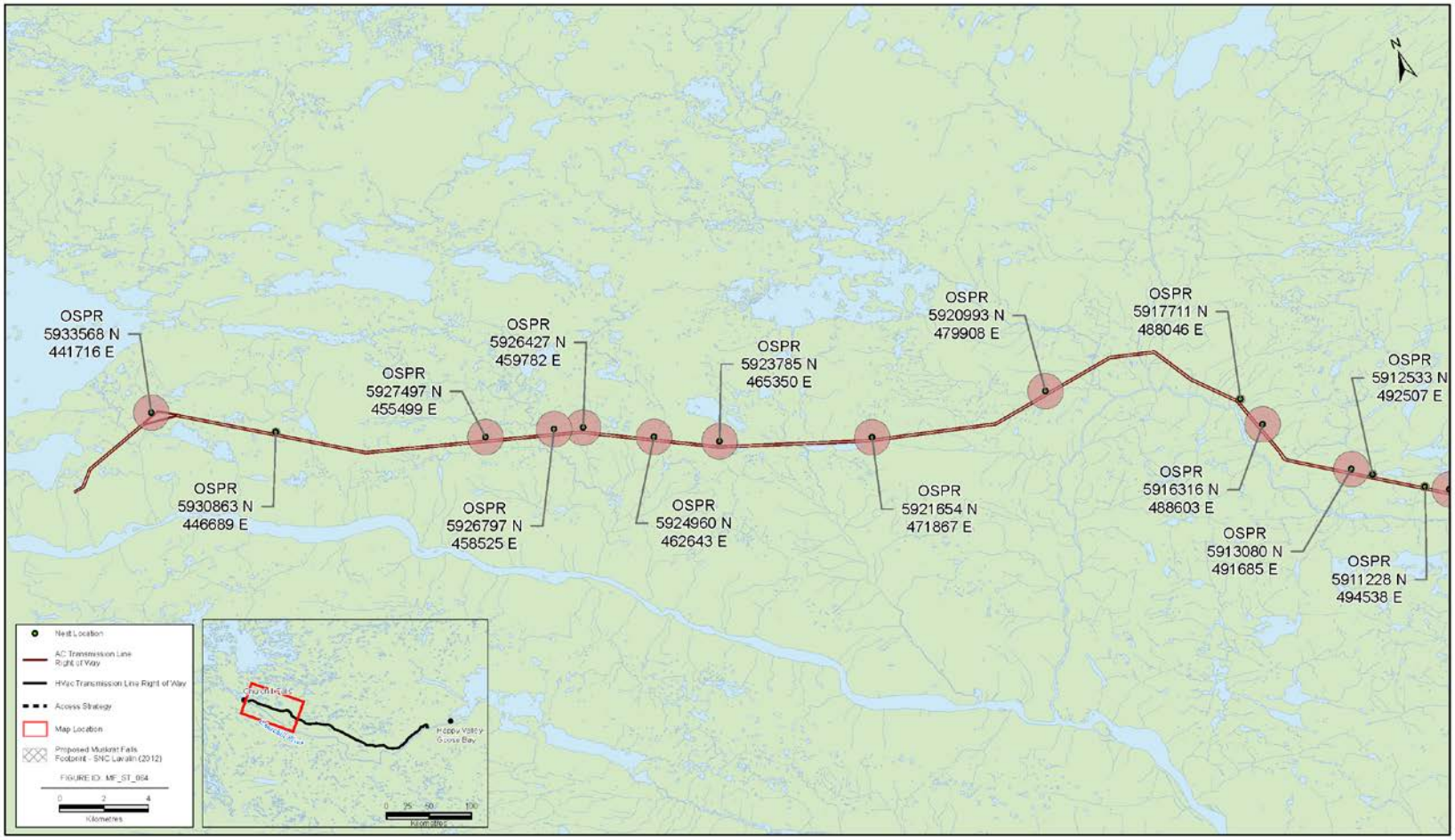

Figure 4-5 Aerial Survey Results and Setback Buffers

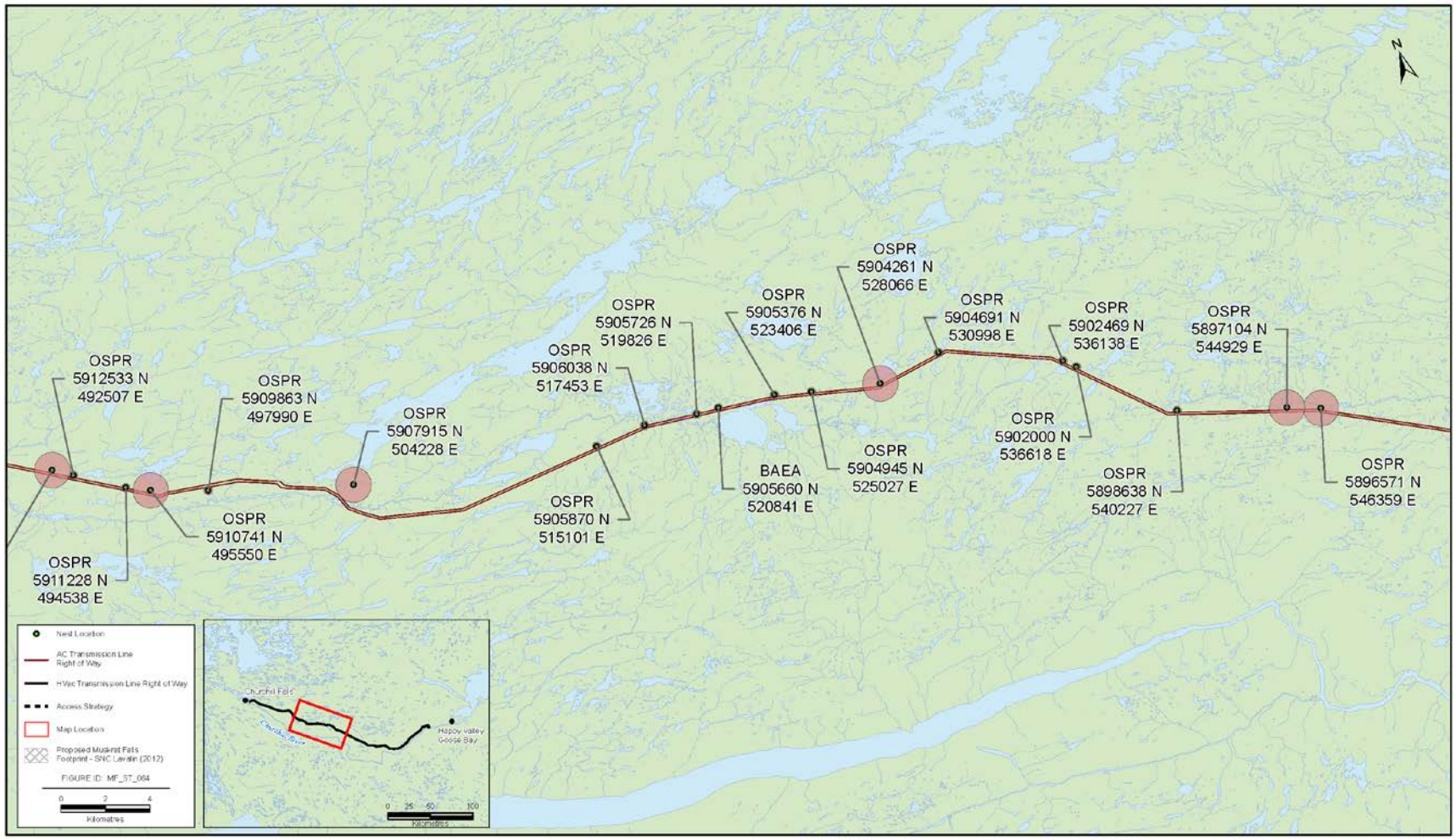

Figure 4-6 Aerial Survey Results and Setback Buffers (Continued)

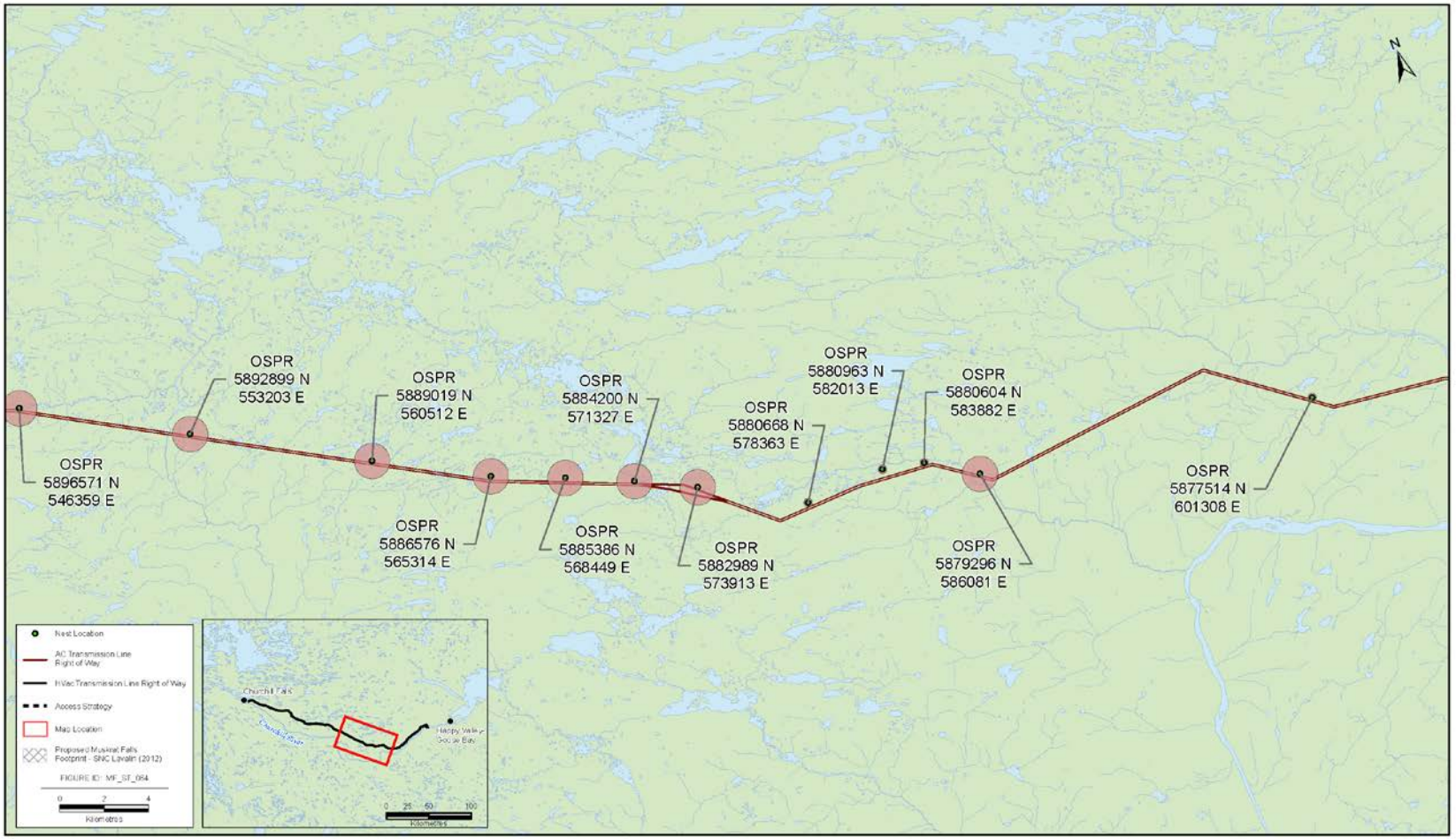

Figure 4-7 Aerial Survey Results and Setback Buffers (Continued)

5.0 DISCUSSION

Forests vary in terms of adequate habitat requirements (i.e., temporal and spatial) for different vertebrate (including avifauna) species at different periods in their life cycle (Law and Dickman 1998). The number of potential nesting areas encountered can vary by habitat type (Gregory et al. 1991) and according to the requirements of avifauna species requirements and availability of these habitats on the landscape (McGarigal and McComb 1992). In the 2006-2007 avifauna baseline surveys, a higher breeding bird density was found in riparian, mixed wood, and hardwood areas compared to coniferous areas (Minaskuat Inc. 2008b). Black spruce lichen exhibited the lowest avifauna density as a result of the lower complexity of stand structure reducing potential breeding areas (Minaskuat Inc. 2008b). The areas surveyed in 2013 were primarily black spruce lichen woodland, followed by coniferous habitats, mixed wood, hardwood, riparian and non-forested areas. These areas were surveyed as they were the areas to be cleared by the clearing sub-contractors. There was no biological rationale for the selection of these sites over other habitats. The species observed in the various habitats were those expected to be there, and as expected, a lower number of nests were observed.

The AMP surveys were conducted later in the bird breeding season as was dictated by the vegetation clearing schedule. Generally, there is a decrease in breeding activity as the season progresses, especially in northern latitudes such as Labrador, where there is little opportunity for a second breeding period (Gienapp et al. 2010).

5.1 Limitations and Assumptions

As the vegetation of the survey area becomes dense, the likelihood of observing bird nests decreases; observers adjusted their pace and spacing as necessary to compensate for any reduction in visibility. Species with small nests were more likely to be overlooked, especially those that prefer nesting higher in the forest canopy. Due to the passive approach of this survey, cavity nests are also susceptible to being missed. Therefore, it was important that observers extended an effort to investigate potential nest cavities.

Following the guidelines provided by Environment Canada reduces the risk of nesting birds being disturbed by vegetation clearing. However, complete assurance of avoiding disturbances to nesting migratory birds is only achieved by limiting construction to outside the breeding season. Stassinu Stantec has developed its methods and continues to adjust techniques towards enhancing the detection of nesting birds. Trained biologists familiar with avifauna species in the area observe for various behavioural cues such as vocalizations (territorial calling or singing males) or various nesting behaviours (birds carrying nesting materials, defensive flight patterns, pairs observed). All field assistants also search for nests and other signs of active avifauna in the search area.

5.2 Conclusions and Future Considerations

The success of the 2013 AMP program relied on effective communication between the field teams and other contractors on-site, and co-operation between all parties so that commitments and schedule could be maintained. Important considerations when continuing with the AMP include:

- Ensuring adequate access to the areas of interest so that survey teams can be efficient. Issues pertaining to rough terrain and heavy equipment machinery can hinder access. Alternative methods such as use of helicopter or all-terrain vehicles could increase survey efficiency by decreasing the time needed to reach the survey area;
- Understanding the habitat being cleared (for species abundance, density, and diversity) and adjusting search techniques appropriately. For example larger field teams may be required for wider buffers to cover linear distance (e.g. transmission line right-of-way);
- Examining the timing of the clearing activities with respect to the avifauna breeding period. Surveys later in the season may not require subsequent/revisit;
- Compiling an adequate description and track files/GPS co-ordinates of the area to be surveyed. Description should include dimensions/width of area to be cleared;
- Communicating the proposed clearing schedule to ensure areas to be surveyed can be done so within a seven day period of clearing activities. The timing may be extended as the season progress as if the avifauna have not started nesting prior to mid-July, in it is unlikely to do so. Communication should include start location(s) and direction of clearing activities;
- Preparing a pamphlet style avifauna management field guide for construction, cutting crews and other field staff/training;
- Assessing procedures for appropriate personal protective equipment (PPE) for health and safety concerns during ground surveys; and,
- Establishing a map folio to inform all contractors and personnel of established setback buffers.

6.0 SUMMARY

During the 2013 directed surveys, field teams were able to survey areas in advance of clearing. No area was cleared without having been surveyed by the Stassinu Stantec field team. The setback buffers served to reduce the potential of incidental take for the breeding avifauna present in the clearing footprint. All established buffers were avoided by the construction crews on the ground until assessed and cleared by the field team. There were two instances of

evidence of avifauna breeding that was reported by ground crews. There was a third instance of a family group of Osprey fishing in a working area and the non-harassment policy was applied.

With such a large scale project and the numerous contracted crews involved, cooperation and communication were important aspects of the implementation of the AMP. Early dialogue between Stassinu Stantec, the Lower Churchill Project Team and clearing sub-contractors assisted greatly with understanding the schedule of the Project activities and complying with the commitments of Nalcor Energy to mitigate incidental take through the implementation of the AMP.

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APPENDIX D

Daily Routine

Daily Routine

All field team members signed in and out at the Stassinu Stantec office in Goose Bay each field day. The composition and objectives of each field team was relayed to the Project Manager daily. Handheld radios, SPOTs, and satellite phones were signed out each morning by Team Leads. These units were docked at end of the field day for re-charging. A "step back" form (issued by SLI), a safety toolbox meeting, and a vehicle inspection were completed each day and documented. Upon returning from the field the Team Leads provided a daily report to the Stassinu Stantec Project Manager each evening documenting the following:

- List of field teams and members for that day;
- GPS co-ordinates of survey start and end points;
- Distance (km) covered;
- Active nests with coordinates (UTM, NAD 83) and recommended location and duration of setback buffer according to nesting stage (i.e., incubating or fledging); and,
- Record of any Health and Safety related incidents.

The Project Manager then provided a daily update to Nalcor and SLI.

The Team Leads maintained daily a database (MS Excel) which included areas surveyed, and locations of any active nests with appropriate buffers that were established. Map products were updated every one or two days by Stassinu Stantec GIS and made available via an FTP link.

APPENDIX G

Flagging Protocol used to Delineate Setback Buffers at Active Avifauna Nests

Flagging Protocol used to Delineate Setback Buffers at Active Avifauna Nests

Setback Buffers (Distance)	Flagging Colours
Landbirds (30m)	Pink and White Striped
Rusty Blackbird (75m)	Pink and White Striped
Inactive Raptor Nest (200m)	Blue and Labeled “200m Nest Buffer”
Active Raptor Nest (800m)	Pink and Blue Striped and Labeled “800m Nest Buffer”
Flagging Colour Source: Great Western Forestry	

ATTACHMENT 7.2

Lower Churchill Project, Mitigation Program – 2014 Avifauna Management Plan - Annual Report on the Implementation of the 2014 Avifauna Management Plan

LCP Annual Report on the Implementation of the 2014 Avifauna Management Plan - Labrador

Prepared for:
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Interim Report

November 2, 2016

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Executive Summary

The 2014 Avifauna Management Plan (AMP) was implemented by Stassinu Stantec Limited Partnership (Stassinu Stantec) and represents a component of the mitigation plan being initiated by Nalcor Energy in conjunction with the Lower Churchill Project (the Project). The program is based on the requirements and commitments in the Lower Churchill Project Environmental Impact Statement. The objectives of the 2014 AMP were to (1) mitigate potential disturbances of incidental take on avifauna species in the Project area by implementing 3 levels of protection and (2) identify and monitor nest sites of migratory, non-migratory, and species of conservation concern within and adjacent to the Project area for scheduled vegetation clearing during the breeding season. This report summarizes the results of the directed surveys of the AMP mitigation measures from the 2014 field program, and represents the third year of implementation of the AMP.

The lower Churchill River valley has both migratory and resident avifauna species, which are protected either under federal and/or provincial legislations. These protected avifauna species can be classified as landbirds, waterfowl, waterbirds, and shorebirds. There are also species at risk that have been documented to occur within the Lower Churchill River valley.

Aerial and ground surveys were conducted between May 12 and August 10 and occurred less than 7 days prior to any vegetation clearing during the breeding season (May 1 – July 31) in the survey area.

Ninety-three setbacks were established for landbirds, waterbirds, waterfowl, and shorebirds and 72 setbacks for raptors. The level of effort was 14,900 field hours by up to five avifauna survey teams per day. Three setbacks established were species at risk, Common Nighthawk (*Chordeiles minor*), Rusty Blackbird (*Euphagus carolinus*) and Short-eared Owl (*Asio flammeus*). As a result of the implementation of the AMP, residual environmental effects on avifauna were mitigated.

1.0 2014 AVIFAUNA MANAGEMENT PLAN

The 2014 Avifauna Management Plan (AMP) was implemented by Stassinu Stantec Limited Partnership (Stassinu Stantec) and represents a component of the mitigation plan initiated by Nalcor Energy in conjunction with the Lower Churchill Project (the Project). The program is based on the requirements and commitments in the Lower Churchill Project Environmental Impact Statement (Nalcor 2009a and 2009b). The objectives of the 2014 AMP were:

- To mitigate potential disturbances of incidental take on avifauna species in the Project area by implementing three levels of protection
- To identify and monitor nest sites of migratory, non-migratory, and species of conservation concern within and adjacent to the Project area for scheduled vegetation clearing during the breeding season

This report summarizes the results of the directed surveys of the AMP mitigation measures from the 2014 field program, and represents the third year of implementation of the AMP.

1.1 Background

Nalcor Energy has implemented its AMP for a third year to mitigate potential disturbance to migratory and resident avifauna (i.e. incidental take) based on federal and provincial legislation. The AMP (Stassinu Stantec Consulting Ltd. 2013) has mitigation measures divided into three levels of protection:

- General Mitigation Measures: Mitigation measures employed in the Project design
- General Awareness Mitigation Measures: Awareness of the AMP mitigation measures and bird breeding cues for personnel on site
- Directed Surveys: Aerial and ground surveys to be conducted prior to any vegetation clearing during the sensitive breeding season

Avifauna in Newfoundland and Labrador are managed by both federal and provincial regulatory agencies. At the federal level, there is the *Migratory Birds Convention Act* (MBCA) and associated *Migratory Birds Regulations* (MBR) and the *Species at Risk Act* (SARA). Provincially, there is the Newfoundland and Labrador *Wild Life Act,* the *Newfoundland and Labrador Endangered Species Act* (NLESA), and the *Minerals Exploration Standards Regulations*.

The MBCA was designed to protect and conserve migratory birds, both as populations and individual birds, and their nests located on all land, regardless of ownership, in Canada (Government of Canada 1994a). In Canada, the MBCA and associated Migratory Birds Regulations (MBR) (Government of Canada 1994b) are administered through Environment Canada by the Canadian Wildlife Service (CWS) (Government of Canada 1994a). Coverage of the MBCA includes landbirds (e.g., warblers, thrushes, and sparrows), waterfowl (e.g., ducks, loons and geese), and waterbirds (e.g., gulls and terns) but does not include grouse, quail,

pheasants, ptarmigan, hawks, eagles, owls, falcons, cormorants, crows, jays, or kingfishers (Environment Canada 1991). Further, the MBR prohibit the disturbance, destruction, or taking of a nest (i.e., incidental take), nest shelter, eider duck shelter or duck box of a migratory bird, or the possession of a live migratory bird, or a carcass, skin, nest or egg of a migratory bird (Government of Canada 1994b). Permits for these activities cannot be issued by CWS or Environment Canada (Joint Review Panel 2011, pg. 140).

SARA was established to provide wildlife species additional protection against extirpation, extinction, or endangerment (Government of Canada 2002). Species at risk are classified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as extirpated, endangered, threatened, or of special concern depending on the level of risk. Like the MBCA, this affords protection at a federal level by prohibiting the killing, harming, harassment, capture or taking, or collection of a listed species, and the damage or destruction of a residence of a listed species (Government of Canada 2002).

The *Wild Life Act* (Government of Newfoundland and Labrador 1990a) and associated *Wild Life Act Regulations* (Government of Newfoundland and Labrador 1990b) are administered by the Newfoundland and Labrador Department of Environment and Conservation (NLDEC). This act offers protection to non-migratory species such as raptors, eagles, owls, crows, jays, grouse and ptarmigan. The Newfoundland and Labrador *Mineral Exploration Standards* prohibit vegetation clearing within 800 m of an active Osprey, eagle, and raptors during breeding season and 200 m outside of breeding season (Government of Newfoundland and Labrador 2007). These standards also state that any active nest encountered must halt clearing activities immediately (Government of Newfoundland and Labrador 2007).

The NLESA protects wildlife species, subspecies or populations within the province that are considered endangered, threatened, or vulnerable based on recommendations from COSEWIC or the provincial Species Status Advisory Committee (SSAC) (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 (Government of Newfoundland and Labrador 2004). There are currently 14 avifauna species listed under the NLESA (NLDEC 2012a).

The lower Churchill River valley has both migratory and resident avifauna species, which are protected either under federal and/or provincial legislations (Stassinu Stantec Consulting Ltd. 2013). There are also species at risk that have been documented within the Lower Churchill River valley (Stassinu Stantec Consulting Ltd. 2013).

1.2 Study Team

The study team for the ground surveys was composed of Stassinu Stantec field leads and field assistants (Appendix A). Aerial survey study teams included personnel from Stassinu Stantec and Universal Helicopters Newfoundland and Labrador Limited Partnership (UHNL) (Appendix A).

Prior to the start of the field component of the 2014 AMP, all personnel reviewed the Health, Safety, and Environment (HSEQ) Plan, and the Risk Management Strategy 1 (RMS 1) (Stassinu Stantec Limited Partnership 2014). A daily hazard assessment (RMS 2) was completed each morning.

2.0 METHODS

2.1 Project Setting

2.1.1 Study Area

The study area was determined by the vegetation clearing schedule for May 1 to July 31, 2014, encompassing three different areas: the reservoir, an HVac transmission line, and an HVdc transmission line (Figure 2-1). The reservoir covers an area of approximately 100 km^2. The HVac transmission line extends from Happy Valley-Goose Bay to Churchill Falls, an approximate distance of 245 km. The HVdc transmission line spans Happy Valley-Goose Bay to Forteau, a distance of approximately 400 km.

Due to the size of the study area and the availability of ecological data, habitats were described using three separate Ecological Land Classifications prepared for the Project. The lower Churchill River valley Project Area was classified using high resolution aerial photography, LiDAR, digital forestry data, terrain, soils, wildlife, and vegetation field sampling at a scale of 1:20,000 (Minaskuat 2008b; Nalcor 2009a). The interconnecting transmission line was characterized using publically available aerial photography, digital forestry data, digital elevation models, terrain, soils, wildlife, and vegetation field sampling at a scale of 1:50,000 (Minaskuat 2008b; Nalcor 2009a). Any missing areas were supplemented using Earth Observation for Sustainable Development (EOSD) forest cover maps at a scale of 1: 250,000 (Government of Canada 2014a).

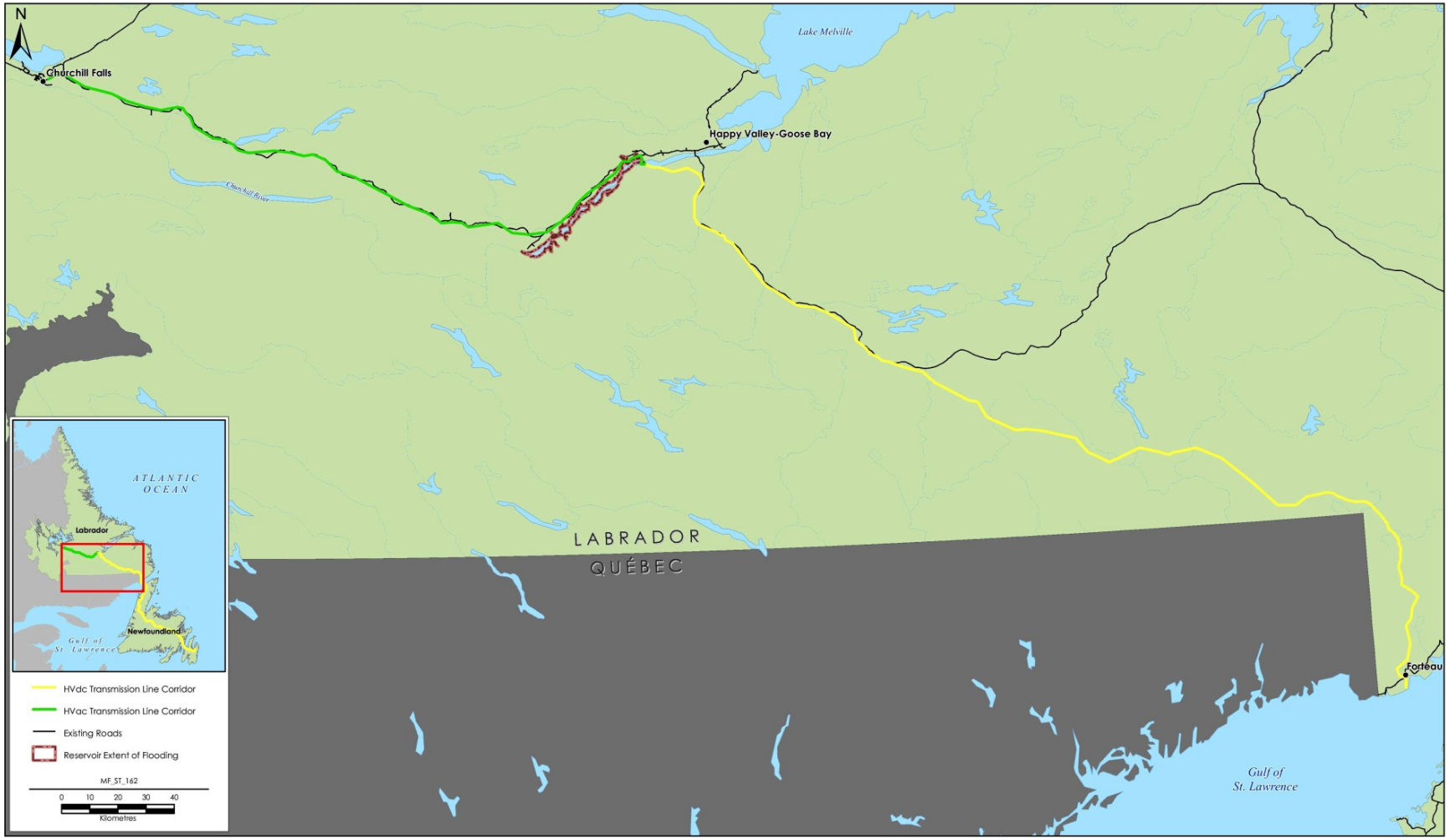

Figure 2-1 2014 AMP Survey Area

2.1.2 Ecological Setting

The reservoir area and the HVac Transmission line are located within the Lake Melville (High Boreal Forest) Ecoregion (NLDEC 2008a; Lopoukhine 1978). Forests on lower slopes are composed of balsam fir (*Abies balsamea*), black spruce (*Picea mariana*), white birch (*Betula papyrifera*), and trembling aspen (*Populus tremuloides*). The black spruce dominated forests of the dryer upper terraces are interspersed with string bogs or fens. Black spruce and balsam fir are common on upper terraces with shallow soils. Forest fires are common in upland areas and river terraces resulting in a dominance of black spruce and lichen (predominately *Cladina spp.*). Slopes where fires have occurred usually regenerate as white birch and trembling aspen.

The HVdc Transmission line also traverses the Lake Melville (High Boreal Forest) Ecoregion, along with the Mecatina River (Low Subarctic Forest), Eagle River Plateau (String Bog) and Forteau Barrens Ecoregions (NLDEC 2008b; NLDEC 2008c; NLDEC 2008d; Lopoukhine 1978). The Mecatina River Ecoregion is characterized by rolling hills of open black spruce lichen woodland and black spruce *sphagnum spp.* forests along with string bogs and fens. Eskers, kames, and drumlins are common, evidence of past glacial activity. The Eagle River Plateau is dominated by string bogs and open water. The hummocks within the string bogs are vegetated with stunted black spruce and larch (*Larix laricina*) with Labrador tea (*Rhododendron groenlandicum*) and mosses. There are scattered balsam fir and white spruce (*Picea glauca*) uplands, and open black spruce lichen woodlands. The Forteau barrens on the coast have some wet tuckamore of black spruce. Uplands are mainly barrens with black spruce with some balsam fir, willow (*Salix spp.*), and ericaceous species as well as some areas of with heavy lichen cover.

Additional detail at a smaller scale regarding ecotypes within the Project footprint is available in an Ecological Land Classification of the Lower Churchill River valley (Minaskuat Inc. 2008b) and is summarized in the AMP (Stassinu Stantec Consulting Ltd. 2013).

Baseline avifauna studies completed for the Project have examined the presence of waterfowl/waterbirds species (Stassinu Stantec Consulting Ltd. 2013; LGL 2008), raptors (Stassinu Stantec Consulting Ltd. 2013; Minaskuat Inc. 2008a), and landbirds (Stassinu Stantec Consulting Ltd. 2013; Minaskuat Inc. 2008a). Landbirds were the dominant species group observed in the Lower Churchill River valley, and the most common observations included: Ruby-crowned Kinglet (*Regulus calendula*), Dark-eyed Junco (*Junco hyemalis*), Swainson's Thrush (*Catharus ustulatus*), Tennessee Warbler (*Oreothlypis peregrina*), White-throated Sparrow (*Zonotrichia albicollis*), Yellow Warbler (*Setophaga petechia*), Boreal Chickadee (*Poecile hudsonicus*), and Black-throated Green Warbler (*Setophaga virens*) (Minaskuat Inc. 2008b). Many of the avifauna species have specific habitat requirements that associate them with particular ecotypes which are described in more detail in the AMP (Stassinu Stantec Consulting Ltd. 2013).

Species at risk that occur within the lower Churchill River valley include Olive-sided flycatcher (*Contopus cooperi*), Common Nighthawk (*Chordeiles minor*), Rusty Blackbird (*Euphagus*

carolinus), Harlequin Duck (*Histrionicus histrionicus*), and Gray-Cheeked Thrush (*Catharus minimus*) (Minaskuat Inc. 2008a).

2.2 Field Surveys

Surveys were conducted less than 7 days prior to any vegetation clearing during the breeding season (May 1 – July 31) in the lower Churchill River valley (Environment Canada 1991, Government of Canada 2014b). Weather limitations for avifauna nest surveys include steady rain and/or a wind speed of Beaufort 4 or higher (> 20 km/h).

2.2.1 Ground Surveys

Avifauna survey teams conducted nest searches from May 12 to July 31, 2014 as per scheduled vegetation clearing. Avifauna survey teams consisted of five to ten observers spaced at 10 m intervals walking slowly along the transect at approximately 2-3 km/h. Depending on the number of active workfronts or size of requested survey area, sometimes teams would be as small as 3-4 individuals. If dense vegetation was encountered, the spacing and speed were reduced to approximately 5m and 1-2 km/h respectively. The survey team would begin surveys at the indicated start point at one of the farthest survey area boundaries, walk to the end point, pivot, and survey the return leg parallel to the first sweep, concluding the survey at a point parallel to the start point. These "sweeping" transects were conducted until 100 % of the survey area was covered. The survey area included the width of the RoW or reservoir area with an additional 30 m beyond the boundary to account for potential nests adjacent to the Project area (Figure 2-1).

Active and potentially active nesting areas were identified using either or both of the following two main indicators: 1) observation of a nest and 2) behavioral cues. Avifauna nests that could be encountered can have a variety of forms from open cup nests in trees, domed nests on the ground, burrows in banks, cavities in trees or snags, stick nests in tree tops, scrapes on wetland edges, and nests on floating vegetation mats in sheltered wetland areas (Stassinu Stantec Consulting Ltd. 2013). Behavioral cues are usually the most important indicator of an active nest as nests are typically well concealed. These cues can vary from singing males, observed pairs (alarm calls, courting, or copulation), flushing of an individual, alarm calls, adults repeatedly carrying nesting materials or food to the same location, aggressive defense behaviors (against other birds or people) near a location, or the presence of recently fledged birds (often with tufts of down feathers, may be persistently begging for food). Some shorebird species may exhibit a broken-wing display to lead a perceived threat away from an active nest.

2.2.2 Aerial Surveys

The reservoir area and the area within the north and south boundaries of both HVac and HVdc transmission lines were surveyed (100% coverage). An additional 800 m on each boundary for all three areas were surveyed to account for potential nests adjacent to the Project area (Figure 2-1). A Bell 206 Long Ranger equipped with rear bubble windows was used during the

aerial surveys. The aircraft maintained a height of approximately 100m above ground level and speed of 100 km/h during the surveys. All raptor and wildlife incidental observations were recorded and geo-referenced.

2.2.3 Active Nest Procedures

When an active or potentially active nest was identified using the indicators described above, a setback was established. Setbacks varied based on status of species: not of management concern (Government of Canada 2014b), raptors (NLDEC 2007) and species at risk (to be determined in consultation with Newfoundland and Labrador Wildlife Division; P. Trimper, pers. comm.). The set-backs established included:

- 30 m for landbirds
- 75 m for landbird species at risk
- 100 m for waterfowl/waterbird/shorebird species
- 800 m for raptor species when nest is active nests; 200 m when nest is inactive nests

To avoid detection by predators or other threats, setback buffers were indicated by flagging at the 30 m, 75 m, 100 m, or 800 m from the nest location in each cardinal direction (North, East, South, and West) as well as the direction from approaching clearing activities. Information collected for each setback included species, GPS coordinates for the nest or suspected nest site (UTM, NAD83), nesting stages, and a record of what behavioral cues initiated the setback. A complete list, with coordinates, is presented in Table C3 Appendix 3. The location and recommended mitigation measures were communicated to each contractor manager via daily reports from the avifauna team leads.

In a situation where clearing was re-routed around an active nest (*i.e.*, setback buffer), the field team surveyed the temporary route before it was cleared. If a nesting area was encountered by crews outside of the avifauna surveys in the area of proposed clearing, activities ceased within a minimum of 30 m of the area until the On-site Environmental Monitor (OSEM) has been notified by the Construction Manager. Once the OSEM was notified, a Stassinu Stantec avifauna field team would investigate to identify the species/nests and the appropriate mitigation. If a nest was found adjacent to an existing trail/road, vehicles would continue to use this area but would not be permitted to stop within the recommended setback.

The setbacks remained active until the nest was confirmed to be inactive by a Stassinu Stantec avifauna team. In order to avoid the potential for observer initiated nest abandonment or failure, the reassessment of an identified active nest only occurred after the estimated completion of the fledging period. The timing of the reassessment was determined using literature-based estimates (*i.e.*, breeding periods from the bird breeding atlas (Erksine 1992)) based on species-specific incubation and fledging periods (i.e., approximate number of days for incubation and/or fledging).

3.0 RESULTS

3.1 Survey Effort

Surveys were conducted based on scheduled vegetation clearing within the identified bird breeding period of the study area, from May 12 to August 10, 2014. A total of 165 setbacks were established with a level of effort of approximately 14,900 field hours, equivalent to 1497 field person days. Ground surveys covered a total area of approximately 28 km^2 (HVac: ~15 km^2; HVdc: ~8 km^2; Reservoir ~4 km^2), while aerial surveys covered 1357 km^2 (HVac: ~393 km^2; HVdc: ~746 km^2; Reservoir: ~253 km^2).

Table 3.1 Summary of 2014 AMP Survey Effort

Date	Survey Type	Total Field Person Days	Number of Setbacks
May	Ground	299	5
	Aerial	0	0
June	Ground	582	47
	Aerial	6	67
July	Ground	609	46
	Aerial	1	0
August	Aerial	1	0
TOTALS		**1497**	**165**

3.2 Nest Surveys

The most common setbacks established during ground surveys across all three survey areas were for landbird species, followed by waterfowl/waterbirds/shorebirds and raptors (Table 3.2). The results of the aerial surveys indicated that the largest concentration of raptor setbacks was established in the HVac transmission line area with 13% of the survey area having active raptors nests, while the HVdc transmission line had 4% (Table 3.3). The majority of setbacks were established in black spruce dominated forests across all three survey areas (Table 3.4-3.6). Black spruce forests were also the most prevalent ELC habitats surveyed (Table 3.4-3.6). Generally, the more structurally complex mixedwood forests provide a greater variety of suitable breeding habitats compared to homogenous forests such as coniferous dominated forests, resulting in higher avifauna breeding abundance. The number of potential nesting areas encountered can vary by habitat type (Gregory et al. 1991). The requirements and attractiveness of habitats will vary by avifauna species requirements and availability on the landscape (McGarigal and McComb 1992).

Appendix C has a more detailed summary of both aerial and ground surveys which includes a full species list of setbacks established and daily results.

Table 3.2 Summary of Setbacks Established during Ground Surveys, May 12-August 10 2014

Survey Area	Species / Species Group	Setback Size	# of Setbacks Established	Proportion of Area Surveyed (%)
HVac	Landbirds	30 m	43	0.39
	Species at Risk (Rusty Blackbird)	75 m	1	0.022
	Species at Risk	800 m	0	0
	Waterfowl/ Waterbirds/ Shorebirds	100 m	9	0.72
	Inactive Raptor nests	200 m	0	0
	Raptors	800 m	4	4.33
Reservoir	Landbirds	30 m	20	0.18
	Species at Risk (Common Nighthawk)	75 m	1	0.057
	Species at Risk	800 m	0	0
	Waterfowl/ Waterbirds/ Shorebirds	100 m	0	0
	Inactive Raptor nests	200 m	0	0
	Raptors	800 m	0	0
HVdc	Landbirds	30 m	18	0.17
	Species at Risk	75 m	0	0
	Species at Risk	800 m	0	0
	Waterfowl/ Waterbirds/ Shorebirds	100 m	1	0.093
	Inactive Raptor nests	200 m	0	0
	Raptors (Short-eared Owl)	800 m	1	0.75

Table 3.3 Summary of Setbacks Established during Aerial Surveys, May 12-August 10 2014

	Species / Species Group	Setback Size	# of Setbacks Established	Proportion of Area Surveyed (%)
HVac	Inactive Raptor nests	200 m	12	0.36
	Raptors	800 m	27	13.06
Reservoir	Inactive Raptor nests	200 m	2	0.10
	Raptors	800 m	0	0
HVdc	Species at Risk	800 m	1	0.26
	Inactive Raptor nests	200 m	10	0.17
	Raptors	800 m	15	4.20

Table 3.4 Area Surveyed and Nests Identified during HVac Transmission Line Surveys

ELC Habitat*	Total Number of Setbacks		Total Area Surveyed (km^2)		Setback Density (# setbacks/km2)	
	Ground	Aerial	Ground	Aerial	Ground	Aerial
Black Spruce Feathermoss Forest[1]	4	6	2.43	73.33	1.64	0.082
Black Spruce Lichen Forest[1]	28	20	7.21	176.87	3.88	0.11
Black Spruce on Bedrock Outcropping[1]	3	8	1.13	25.66	2.64	0.31
Black Spruce Sphagnum Woodland[1]	0	0	0.13	4.64	0	0
Fir-White Spruce Forest[1]	0	0	0.0052	1.55	0	0
Spruce-Fir Feathermoss Forest[1]	0	0	0.016	1.44	0	0
Conifer Forest[2]	0	0	0	0.145	0	0
Open Conifer Forest[2]	1	0	0.018	0.023	54.85	0
Coniferous Dense[3]	0	0	0.21	1.90	0	0
Coniferous Open[3]	2	0	0.40	9.49	4.93	0
Coniferous Sparse[3]	2	0	0.23	8.46	8.54	0
Hardwood Forest[1]	0	0	0.28	8.11	0	0

ELC Habitat*	Total Number of Setbacks		Total Area Surveyed (km²)		Setback Density (# setbacks/km2)	
	Ground	Aerial	Ground	Aerial	Ground	Aerial
Hardwood Forest[2]	0	0	0	2E-06	0	0
Broadleaf Dense[3]	0	0	0	0.14	0	0
Mixedwood Forest[1]	1	0	0.68	13.69	1.46	0
Mixedwood Forest[2]	0	0	0.0017	0	0	0
Mixedwood Dense[3]	0	0	0	0.082	0	0
Riparian Thicket[1]	0	0	0.098	3.53	0	0
Conifer Scrub[2]	0	0	0	0.004	0	0
Shrub Low[3]	0	0	0.058	5.081	0	0
Wetland-Shrub[3]	0	0	0	0.20	0	0
Fen[1]	0	0	0	0.46	0	0
Bryoids[3]	1	1	0.32	6.82	3.10	0.15
Bog[1]	0	0	0	0.029	0	0
Marsh[1]	0	0	0	0.12	0	0
Wetland[1]	14	4	1.24	30.44	11.29	0.13
Wetland[2]	0	0	0	3E-06	0	0
Anthropogenic[1]	0	0	0.51	0.99	0	0
Gravel Bar[1]	0	0	0.017	0.26	0	0
Unvegetated[1]	0	0	0	0.063	0	0
Exposed Earth/Anthro/Cutblock[2]	0	0	0.0033	0	0	0
Exposed/Barren Land[3]	1	0	0.025	2.28	40.57	0
Open Water[1]	0	0	0.22	11.94	0	0
Open Water[2]	0	0	0	0.00012	0	0
Water[3]	0	0	0	1.89	0	0
River[1]	0	0	0.014	3.05	0	0
Snow/Ice[3]	0	0	0	0.019	0	0
Shadow[3]	0	0	0.0044	0.74	0	0

*** 1- HVac transmission line/Churchill ELC (Minaskuat Inc. 2008b)**
2 – HVdc Transmission Line (Minaskuat Inc. 2008b)
3- EOSD (Government of Canada 2014a)
Notes: Habitats described in detailed in Minaskuat Inc. 2008b and summarized in Stassinu Stantec Consulting Ltd. 2013

Table 3.5 Area Surveyed and Nests Identified during Reservoir Surveys

ELC Habitat*	Total Number of Setbacks		Total Area Surveyed (km^2)		Setback Density (# setbacks/km2)	
	Ground	Aerial	Ground	Aerial	Ground	Aerial
Black Spruce Feathermoss Forest[1]	7	0	0.95	57.46	7.33	0
Black Spruce Lichen Forest[1]	8	0	1.83	58.92	4.37	0
Black Spruce on Bedrock Outcropping[1]	0	0	0.12	0.021	0	0
Black Spruce Sphagnum Woodland[1]	0	0	0.095	1.74	0	0
Fir-White Spruce Forest[1]	1	1	0.39	11.37	2.56	0.088
Spruce-Fir Feathermoss Forest[1]	0	1	0	7.60	0	0.13
Black Spruce Lichen Forest[2]	0	0	0	0.037	0	0
Conifer Forest[2]	0	0	0	4.75	0	0
Open Conifer Forest[2]	0	0	0	0.31	0	0
Coniferous Dense[3]	0	0	0.00014	1.03	0	0
Coniferous Open[3]	0	0	0	0.42	0	0
Coniferous Sparse[3]	0	0	0.000007	1.08	0	0
Hardwood Forest[1]	3	0	0.20	5.25	14.60	0
Hardwood Forest[2]	0	0	0	0.068	0	0
Broadleaf Dense[3]	0	0	0	0.63	0	0
Mixedwood Forest[1]	0	0	0.35	21.03	0	0
Mixedwood Forest[2]	0	0	0	0.068	0	0
Mixedwood Dense[3]	0	0	0	0.037	0	0
Riparian Marsh[1]	0	0	0	1.02	0	0
Riparian Thicket[1]	2	0	0.24	6.23	8.28	0
Conifer Scrub[2]	0	0	0	0.070	0	0
Shrub Low[3]	0	0	0.0018	0.45	0	0
Wetland-Shrub[3]	0	0	0	0.0014	0	0
Fen[1]	0	0	0.0037	3.15	0	0
Bryoids[3]	0	0	0.0083	0.17	0	0
Bog[1]	0	0	0	0.57	0	0
Marsh[1]	0	0	0	1.27	0	0
Wetland[1]	0	0	0.019	2.85	0	0

ELC Habitat*	Total Number of Setbacks		Total Area Surveyed (km²)		Setback Density (# setbacks/km2)	
	Ground	Aerial	Ground	Aerial	Ground	Aerial
Wetland[2]	0	0	0	0.0031	0	0
Lichen Heathland[2]	0	0	0	0.0012	0	0
Anthropogenic[1]	0	0	0.010	0.14	0	0
Exposed Earth/Anthro/Cutblock[2]	0	0	0	0.033	0	0
Exposed/Barren Land[3]	0	0	0.0055	0.23	0	0
Gravel Bar[1]	0	0	0.070	7.01	0	0
Unvegetated[1]	0	0	0	0.063	0	0
Open Water[1]	0	0	0	1.92	0	0
Open Water[2]	0	0	0	0.14	0	0
Water[3]	0	0	0.000072	0.0059	0	0
River[1]	0	0	0.13	56.19	0	0
Shadow[3]	0	0	0.00006	0.00048	0	0

* 1- HVac transmission line/Churchill ELC (Minaskuat Inc. 2008b)
2 – HVdc Transmission Line (Minaskuat Inc. 2008b)
3- EOSD (Government of Canada 2014a)

Notes: Habitats described in detailed in Minaskuat Inc. 2008b and summarized in Stassinu Stantec Consulting Ltd. 2013

Table 3.6 Area Surveyed and Nests Identified during HVdc Transmission Line Surveys

ELC Habitat*	Total Number of Setbacks		Total Area Surveyed (km²)		Setback Density (# setbacks/km2)	
	Ground	Aerial	Ground	Aerial	Ground	Aerial
Black Spruce Feathermoss Forest[1]	2	0	0.26	1.79	7.65	0
Black Spruce Lichen Forest[1]	0	0	0	0.045	0	0
Black Spruce Sphagnum Woodland[1]	1	0	0.010	0	0	0
Fir-White Spruce Forest[1]	0	0	0.069	0.91	0	0
Spruce-Fir Feathermoss Forest[1]	3	0	0.65	4.93	4.60	0
Black Spruce Lichen Forest[2]	0	0	0.46	15.71	0	0
Conifer Forest[2]	2	8	3.05	199.71	0.655	0.040
Open Conifer Forest[2]	3	10	0.71	186.08	4.23	0.054

ELC Habitat*	Total Number of Setbacks		Total Area Surveyed (km^2)		Setback Density (# setbacks/km2)	
	Ground	Aerial	Ground	Aerial	Ground	Aerial
Coniferous Dense[3]	9	0	2.19	27.95	4.10	0
Coniferous Open[3]	0	0	0.059	1.28	0	0
Coniferous Sparse[3]	0	0	0.019	0.77	0	0
Hardwood Forest[1]	0	0	0	0.024	0	0
Hardwood Forest[2]	0	0	0	0.000011	0	0
Mixedwood Forest[2]	0	0	0	3.19	0	0
Broadleaf Dense[3]	0	0	0	0.52	0	0
Mixedwood Dense[3]	0	0	0.068	0	0	0
Riparian Marsh[1]	0	0	0.000047	0.19	0	0
Riparian Thicket[1]	0	0	0	0.074	0	0
Conifer Scrub[2]	0	2	0.36	112.76	0	0.018
Shrub Low[3]	0	0	0.0083	0.45	0	0
Wetland-Shrub[3]	0	0	0	0.024	0	0
Lichen Heathland[2]	0	0	0.013	31.34	0	0
Exposed/Barren Land[3]	0	0	0	0.0084	0	0
Wetland[1]	0	0	0	0.012	0	0
Wetland[2]	0	5	0.30	135.55	0	0.037
Bryoids[3]	0	0	0	0.000002	0	0
Gravel Bar[1]	0	0	0	0.072	0	0
Unvegetated[1]	0	0	0	0.037	0	0
Anthropogenic[2]	0	0	0.060	2.32	0	0
Burn[2]	0	0	0	4.72	0	0
Open Water[2]	0	1	0	12.39	0	0.081
Water[3]	0	0	0	0.0041	0	0
River[1]	0	0	0	3.44	0	0
Cloud/Shadow[2]	0	0	0	1.35	0	0
Shadow[3]	0	0	0	0.0081	0	0

* 1- HVac transmission line/Churchill ELC (Minaskuat Inc. 2008b)
2 – HVdc Transmission Line (Minaskuat Inc. 2008b)
3- EOSD (Government of Canada 2014a)
Notes: Habitats described in detailed in Minaskuat Inc. 2008b and summarized in Stassinu Stantec Consulting Ltd. 2013

3.3 Species at Risk

Species at Risk were encountered during the avifauna surveys (Appendix B). Three setbacks were established, one each for Rusty Blackbird, Common Nighthawk, and Short-eared Owl (*Asio flammeus*). Incidental observations of species at risk included Rusty Blackbird, Olive-sided Flycatcher, Surf Scoter (*Melanitta perspicillata*), and Bank Swallows (*Riparia riparia*).

3.4 Limitations and Assumptions

As the density of vegetation increases, the likelihood of observing bird nests decreases. Teams would adjust their pace and spacing as necessary to compensate for any reduction in visibility. Species with small nests are more likely to be overlooked, especially those that prefer nesting high in trees.

Due to the passive approach of this survey, cavity nests are susceptible to being missed; therefore, it is important that observers make an effort to investigate potential nest cavities.

Following the guidelines provided by Environment Canada will help mitigate the risk of nesting birds being disturbed by vegetation clearing. However, complete assurance of avoiding disturbances to migratory birds can be achieved only by limiting construction to outside the breeding season for bird species present in the Project area. It is assumed that most birds nesting at the time of the survey will be detected, but some may be missed (e.g., if adults happen to be away from the nest when observers pass by, a small or well-concealed nest may be overlooked since there is no motion or sound to draw attention to it).

The methods applied throughout this project were developed to mitigate the likelihood of missing active nests. These measures include: trained ornithologists leading each field team, focusing on behavioural cues for nesting, not just the observation of nests; and, adjustments of spacing depending on vegetation types.

4.0 SUMMARY

Aerial and ground surveys were conducted between May 12 and August 10 and were conducted less than 7 days prior to any vegetation clearing during the breeding season (May 1 – July 31) in the survey area. Ninety-three setbacks were established for landbirds, waterbirds, waterfowl, and shorebirds and 72 setbacks for raptors. The level of effort for the program was 14,900 field hours by five avifauna survey teams. Three of the setbacks established were for species at risk including Common Nighthawk, Rusty Blackbird, and Short-eared Owl. As a result of the implementation of the AMP, residual environmental effects on avifauna were successfully mitigated. Given the variety of terrain and habitats in which the nest surveys were conducted, in addition to little published literature on nest distribution and abundance in the area, attempting to quantify overall project success would be irresponsible. However, the efforts applied certainly mitigated the potential effects of cutting through the breeding season.

5.0 FUTURE CONSIDERATIONS

There are important considerations when implementing this AMP. There is a need to understand the habitat being cleared in terms of species abundance and diversity since this affects the number of setbacks that will be established in a particular location which in turn will adversely affect construction schedules. A potential opportunity is to preferentially clear areas likely to harbor high densities of nesting birds outside of the breeding season to minimize delays.

Avifauna breeding period could be taken into account while coordinating the timing of the clearing activities. Higher densities of nests can be expected in the early stages of the breeding season as compared to later in the breeding season when most species have completed their nesting. Areas surveyed early in the breeding season will require more follow-up surveys to confirm fledging of young than those surveyed late in the breeding season. Generally, there is a decrease in breeding activity as the season progresses, especially in northern latitudes such as Labrador where there is little opportunity for a second breeding period (Thomson 1950).

To assure efficiencies of avifauna surveys, there is a need for good communication and logistical coordination between contractors and avifauna survey teams so that surveys are conducted in the appropriate time and place. Where possible, contractors should provide accurate information regarding the areas to be cleared and must provide sufficient lead time to allow avifauna teams to be mobilized and deployed in a timely and effective manner. Avifauna survey teams must provide timely feedback to the contractors to minimize down time. Useful information collected by the avifauna survey teams includes: GPS files of survey areas, start and end points, and communications through the agreed upon protocols. Nest locations must be accurately described to facilitate locating the nests during follow-up surveys to determine if fledging has occurred.

Environment Canada guidelines with regards to incidental take (Government of Canada 2014b) should be used for timing of avifauna surveys; however, environmental conditions should also be taken into consideration when determining when the breeding season has begun. For example, if there is still significant snow cover by May 1, avifauna surveys could be delayed until appropriate avifauna breeding conditions are met.

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APPENDIX A

Study Team

Table A.1 Study Team for Avifauna Ground Survey May 12 to August 10, 2014

Name	Role
Wayne Tucker	Team Lead
Perry Trimper	Senior Technical Advisor
Barry Keough	Project Co-ordinator
Jacinthe Amyot	Field Lead with experience conducting similar biological surveys in Canada
Mary Ann Aylward	Field Lead with experience conducting similar biological surveys in Canada
Daniel Brown	Field Lead with experience conducting similar biological surveys in Canada
Anna Buchheit	Field Lead with experience conducting similar biological surveys in Canada
Stacey Camus	Field Lead with experience conducting similar biological surveys in Canada
Mike Crowell	Field Lead with experience conducting similar biological surveys in Canada
Matthew Ginn	Field Lead with experience conducting similar biological surveys in Canada
Chris Kolaczan	Field Lead with experience conducting similar biological surveys in Canada
Rich LaPaix	Field Lead with experience conducting similar biological surveys in Canada
Tina Newbury	Field Lead with experience conducting similar biological surveys in Canada
Dustin Oaten	Field Lead with experience conducting similar biological surveys in Canada
Tony Parr	Field Lead with experience conducting similar biological surveys in Canada
Sterling Pearce	Field Lead with experience conducting similar biological surveys in Canada
Jennifer Randall	Field Lead with experience conducting similar biological surveys in Canada
Karen Rashleigh	Field Lead with experience conducting similar biological surveys in Canada
Emily Upham-Mills	Field Lead with experience conducting similar biological surveys in Canada
Jonathan Willans	Field Lead with experience conducting similar biological surveys in Canada
Dayne Wilkinson	Field Lead with experience conducting similar biological surveys in Canada

Table A.2 Study Team for Avifauna Aerial Survey on June 3 and June 28, 2014

Name	Role (Position in Helicopter)		Organization
	June 3	June 28	
Neal Rose	Pilot (front right)	-	UHNL
Richard Martin	-	Pilot (front right)	UHNL
Mary Ann Aylward	-	Observer (rear right)	Stantec
Randy Best	-	Observer (rear left)	Stantec
Stacey Camus	Observer/ Data Recorder (rear left)	-	Stantec
Chris Kolaczan	Observer (rear right)	-	Stantec
Perry Trimper	Navigator/Observer/Data Recorder (front left)	Navigator/Data Recorder/Observer (front left)	Stantec

Table A.3 Stassinu Stantec Field Assistants for Ground Surveys, May 12 – August 10, 2014

Name	
Victoria Allen	Richard Mitchelmore
Randy Best	Deidre Park
Matthew Boychuk	Lucas Patey
Margie Clark	Mackay Paul
Gabriel Flowers	Matshiu Penashue
Marjorie Flowers	Anautek Phillips
Zac Hajjaoui	Jared Pilgrim
Jean Luc Hervieux	Taylor Pilgrim
Ashley Ivany	Desmond Rich
Petshish Jack	Michelle Saunders
Trish Layden	David Sheppard
Jeffrey Loder	Alissa Tobin
Jacquline Melindy	Sherry Turnbull
Jessica Melindy	Alicia Webster

APPENDIX B

Avifauna Species at Risk

Table B.1 Species at Risk Incidental Observations during Avifauna Nest Searches, May 12-July 31, 2014

Date	Species	Ecotype	Observation
May 29	Rusty Blackbird	Black Spruce Lichen Forest	2 Individuals seen and singing
June 8	Rusty Blackbird	Black Spruce Lichen Forest	Individual
June 10	Olive-sided Flycatcher	Black Spruce Lichen Forest	Singing
June 20	Unconfirmed Rusty Blackbird	Black Spruce Feathermoss Forest	Individual
June 24	Surf Scoter	Open Water	Group on pond
June 24	Bank Swallow	Black Spruce Feathermoss Forest	Colony observed; Out of survey area
June 27	Short-eared Owl	Conifer Scrub	Nest
June 28	Rusty Blackbird	Open Water	Group of six individuals
July 4	Rusty Blackbird	Black Spruce Lichen Forest	Singing
July 7	Rusty Blackbird	Wetland	Individual
July 8	Common Nighthawk	Black Spruce Lichen Forest	Individual
July 19	Rusty Blackbird	Black Spruce Sphagnum Woodland	1 individual
*Ecotypes are provided rather than coordinates as these are species at risk.			

APPENDIX C

2014 AMP Survey Results

Table C.1 Survey Effort and Total Number of Nest Setbacks Established, May-July, 2014

Date	Survey Type (Aerial or Ground)	Number of Field Teams	Number of Field Personnel (Total Person Days)	Number of Setbacks
May 12	Ground	2	10	0
May 13	Ground	2	10	0
May 14	Ground	2	10	1
May 15	Ground	2	10	0
May 16	Ground	2	18	0
May 17	Ground	2	12	0
May 18	Ground	3	16	0
May 19	Ground	3	16	0
May 20	Ground	4	16	0
May 21	Ground	4	16	0
May 22	Ground	3	12	0
May 23	Ground	4	20	0
May 24	Ground	4	19	0
May 25	Ground	4	20	3
May 26	Ground	4	18	0
May 27	Ground	3	16	0
May 28	Ground	4	21	0
May 29	Ground	4	19	1
May 30	Weather Day	-	-	-
May 31	Ground	4	20	0
June 1	Ground	4	19	1
June 2	Ground	5	22	2
June 3	Ground	1	5	0
June 3	Aerial	1	3	41
June 4	Ground	5	25	1
June 5	Ground	5	22	0
June 6	Ground	1	8	0
June 7	Ground	2	10	0
June 8	Ground	2	10	2
June 9	Ground	4	22	0
June 10	Ground	5	21	3
June 11	Ground	4	23	2

Date	Survey Type (Aerial or Ground)	Number of Field Teams	Number of Field Personnel (Total Person Days)	Number of Setbacks
June 12	Ground	3	21	1
June 13	Ground	5	23	3
June 14	Ground	4	21	0
June 15	Ground	5	25	0
June 16	Ground	5	25	2
June 17	Ground	5	25	0
June 18	Ground	4	22	2
June 19	Ground	5	26	2
June 20	Ground	4	21	4
June 21	Ground	5	22	6
June 22	Ground	5	23	7
June 23	Ground	3	15	0
June 24	Ground	4	20	4
June 25	Ground	4	18	0
June 26	Ground	4	19	0
June 27	Ground	4	17	1
June 28	Ground	4	18	2
June 28	Aerial	1	3	26
June 29	Ground	3	16	2
June 30	Ground	4	18	0
July 1	Ground	5	24	4
July 2	Ground	4	21	0
July 3	Ground	4	20	0
July 4	Ground	4	21	1
July 5	Ground	3	13	2
July 6	Ground	4	16	3
July 7	Ground	3	16	1
July 8	Ground	4	18	6
July 9	Ground	5	22	5
July 10	Ground	4	19	1
July 11	Ground	5	22	0
July 12	Ground	4	17	0
July 13	Ground	4	20	1
July 14	Ground	4	20	0
July 15	Ground	4	20	0

Date	Survey Type (Aerial or Ground)	Number of Field Teams	Number of Field Personnel (Total Person Days)	Number of Setbacks
July 16	Ground	5	23	1
July 17	Ground	5	22	4
July 18	Ground	5	23	2
July 19	Ground	5	23	1
July 20	Ground	5	22	1
July 21	Ground	4	18	3
July 22	Ground	4	20	4
July 23	Ground	4	19	0
July 24	Ground	4	20	1
July 25	Ground	3	15	1
July 26	Ground	4	19	0
July 27	Ground	4	20	0
July 28	Ground	4	19	1
July 29	Ground	4	20	0
July 30	Ground	4	20	2
July 31	Ground	3	17	1
August 10	Aerial	1	1	0

Table C.2 Avifauna Species Encountered and Total Number of Setbacks Established

Common Name	Scientific Name	# Nest Setbacks
American Black Duck	*Anas rubripes*	1
Red-Tailed Hawk	*Buteo jamaicensis*	1
Bald Eagle	*Haliaeetus leucocephalus*	2
Osprey	*Pandion haliaetus*	56
Merlin	*Falco columbarius*	1
Ruffed Grouse	*Bonasa umbellus*	2
Spruce Grouse	*Falcipennis canadensis*	8
Wilson's Snipe	*Gallinago delicata*	2
Solitary Sandpiper	*Tringa solitaria*	1
Greater Yellowlegs	*Tringa melanoleuca*	5
Short-eared Owl	*Asio flammeus*	1
Great Horned Owl	*Bubo virginianus*	1
Common Nighthawk	*Chordeiles minor*	1
Downy Woodpecker	*Picoides pubescens*	1
Black-backed Woodpecker	*Picoides arcticus*	6
Tree Swallow	*Tachycineta bicolor*	1
Boreal Chickadee	*Poecile hudsonicus*	1
Ruby-crowned Kinglet	*Regulus calendula*	3
Swainson's Thrush	*Catharus ustulatus*	6
American Robin	*Turdus migratorius*	1
American Crow	*Corvus brachyrhynchos*	2
Cedar Waxwing	*Bombycilla cedrorum*	1
Black-throated Green Warbler	*Setophaga virens*	1
Yellow-rumped Warbler	*Setophaga coronata*	1
Yellow Warbler	*Setophaga petechia*	1
Northern Waterthrush	*Parkesia noveboracensis*	1
White-throated Sparrow	*Zonotrichia albicollis*	6
White-crowned Sparrow	*Zonotrichia leucophrys*	2
American Tree Sparrow	*Spizella arborea*	1
Fox Sparrow	*Passerella illiaca*	2
Dark-eyed Junco	*Junco hyemalis*	25
Rusty Blackbird	*Euphagus carolinus*	1
Unidentified Passerine	-	1
Unidentified Shorebird	-	1

Common Name	Scientific Name	# Nest Setbacks
Unidentified Sparrow	-	1
Unidentified Yellowlegs	-	1
Unknown	-	16
TOTAL		**165**

Table C.3 Survey Results and Setbacks Established during the 2014 AMP

Species	Project Location (Reservoir, AC Line, DC Line)	Setback Size (m)	UTM Northing	UTM Easting	ELC Habitat Type(s)	ELC Dataset
American Black Duck	AC Line	100	450595	5928572	Black Spruce Lichen Forest	AC Line + Churchill ELC
Red-tailed Hawk	DC Line	800	669855	5894382	Coniferous Dense	EOSD
Bald Eagle	AC Line	200	578382	5880665	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Bald Eagle	DC Line	800	823861	5802737	Open Water	DC Line ELC
Osprey	Reservoir	200	605703	5869678	Spruce-Fir Feathermoss Forest	AC Line + Churchill ELC
Osprey	Reservoir	200	606763	5869892	Fir-White Spruce Forest	AC Line + Churchill ELC
Osprey	AC Line	800	601254	5877459	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Osprey	AC Line	800	585929	5879335	Black Spruce on Bedrock Outcropping	AC Line + Churchill ELC
Osprey	AC Line	200	583865	5880494	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Osprey	AC Line	200	579433	5880804	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	200	582020	5880858	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	573913	5882905	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	571110	5884198	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	568324	5885255	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	565369	5886389	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	560220	5889101	Wetland	AC Line + Churchill ELC
Osprey	AC Line	200	553016	5892889	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	546140	5896638	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	544779	5897054	Black Spruce Lichen Forest	AC Line + Churchill ELC

Species	Project Location (Reservoir, AC Line, DC Line)	Setback Size (m)	UTM Northing	UTM Easting	ELC Habitat Type(s)	ELC Dataset
Osprey	AC Line	200	540052	5898659	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	200	536484	5902080	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	535861	5902661	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	527909	5904191	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	530889	5904634	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	523284	5905363	Wetland	AC Line + Churchill ELC
Osprey	AC Line	200	520852	5905600	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	519786	5905755	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	200	515055	5905798	Wetland	AC Line + Churchill ELC
Osprey	AC Line	200	517522	5906044	Wetland	AC Line + Churchill ELC
Osprey	AC Line	200	508272	5906135	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	504148	5907811	Black Spruce on Bedrock Outcropping	AC Line + Churchill ELC
Osprey	AC Line	800	500059	5909311	Black Spruce on Bedrock Outcropping	AC Line + Churchill ELC
Osprey	AC Line	800	497949	5909825	Black Spruce on Bedrock Outcropping	AC Line + Churchill ELC
Osprey	AC Line	800	495677	5910513	Black Spruce on Bedrock Outcropping	AC Line + Churchill ELC
Osprey	AC Line	800	494261	5911374	Wetland	AC Line + Churchill ELC
Osprey	AC Line	800	492426	5912484	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	488446	5916324	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Osprey	AC Line	800	487911	5917741	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Osprey	AC Line	800	479838	5920892	Black Spruce Lichen Forest	AC Line + Churchill ELC

Species	Project Location (Reservoir, AC Line, DC Line)	Setback Size (m)	UTM Northing	UTM Easting	ELC Habitat Type(s)	ELC Dataset
Osprey	AC Line	800	471714	5921627	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Osprey	AC Line	800	465246	5923619	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	462102	5925138	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	800	459673	5926312	Black Spruce Lichen Forest	AC Line + Churchill ELC
Osprey	AC Line	200	458364	5926646	Black Spruce on Bedrock Outcropping	AC Line + Churchill ELC
Osprey	AC Line	800	446691	5930797	Black Spruce on Bedrock Outcropping	AC Line + Churchill ELC
Osprey	AC Line	800	441649	5933431	Black Spruce on Bedrock Outcropping	AC Line + Churchill ELC
Osprey	DC Line	800	914520	5770352	Conifer Forest	DC Line ELC
Osprey	DC Line	800	914164	5771282	Conifer Forest	DC Line ELC
Osprey	DC Line	800	913001	5772077	Open Conifer Forest	DC Line ELC
Osprey	DC Line	800	892314	5783324	Wetland	DC Line ELC
Osprey	DC Line	800	864776	5787529	Conifer Forest	DC Line ELC
Osprey	DC Line	800	851275	5797748	Open Conifer Forest	DC Line ELC
Osprey	DC Line	800	796039	5804915	Wetland	DC Line ELC
Osprey	DC Line	800	792285	5806107	Open Conifer Forest	DC Line ELC
Osprey	DC Line	800	784523	5807541	Open Conifer Forest	DC Line ELC
Osprey	DC Line	800	767746	5814921	Open Conifer Forest	DC Line ELC
Osprey	DC Line	800	682328	5871384	Conifer Forest	DC Line ELC
Osprey	DC Line	800	680402	5872600	Conifer Forest	DC Line ELC
Osprey	DC Line	800	670943	5879162	Open Conifer Forest	DC Line ELC
Osprey	AC Line	800	507036	5905559	Coniferous Open	EOSD
Merlin	AC Line	800	436201	5931400	Black Spruce Lichen Forest	AC Line + Churchill ELC
Ruffed Grouse	Reservoir	30	609423	5870297	Riparian Thicket	AC Line + Churchill ELC
Ruffed Grouse	Reservoir	30	621303	5879828	Hardwood Forest	AC Line + Churchill ELC
Spruce Grouse	DC Line	30	655049	5899888	Spruce-Fir Feathermoss Forest	AC Line + Churchill ELC

Species	Project Location (Reservoir, AC Line, DC Line)	Setback Size (m)	UTM Northing	UTM Easting	ELC Habitat Type(s)	ELC Dataset
Spruce Grouse	DC Line	30	650040	5900965	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Spruce Grouse	AC Line	30	533392	5903669	Wetland	AC Line + Churchill ELC
Spruce Grouse	AC Line	30	532094	5904345	Black Spruce Lichen Forest	AC Line + Churchill ELC
Spruce Grouse	AC Line	30	521318	5905587	Wetland	AC Line + Churchill ELC
Spruce Grouse	AC Line	30	517632	5905942	Wetland	AC Line + Churchill ELC
Spruce Grouse	AC Line	30	508541	5905155	Coniferous Sparse	EOSD
Spruce Grouse	AC Line	30	515657	5904985	Bryoids	EOSD
Wilson's Snipe	AC Line	100	533920	5903669	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Wilson's Snipe	AC Line	100	533376	5903749	Wetland	AC Line + Churchill ELC
Solitary Sandpiper	AC Line	100	551807	5893486	Black Spruce Lichen Forest	AC Line + Churchill ELC
Greater Yellowlegs	AC Line	30	551050	5894428	Wetland	AC Line + Churchill ELC
Greater Yellowlegs	AC Line	100	548296	5895389	Black Spruce Lichen Forest	AC Line + Churchill ELC
Greater Yellowlegs	AC Line	100	524552	5905072	Black Spruce Lichen Forest	AC Line + Churchill ELC
Greater Yellowlegs	AC Line	100	516722	5905797	Wetland	AC Line + Churchill ELC
Greater Yellowlegs	DC Line	100	685382	5866672	Open Conifer Forest	DC Line ELC
Short-eared Owl	DC Line	800	[redacted]	[redacted]	Conifer Scrub	DC Line ELC
Great Horned Owl	DC Line	800	787923	5806788	Open Conifer Forest	DC Line ELC
Common Nighthawk	Reservoir	75	[redacted]	[redacted]	Black Spruce Lichen Forest	AC Line + Churchill ELC
Downy Woodpecker	Reservoir	30	610642	5870934	Hardwood Forest	AC Line + Churchill ELC
Black-	Reservoir	30	617992	5876796	Black Spruce Lichen	AC Line +

Species	Project Location (Reservoir, AC Line, DC Line)	Setback Size (m)	UTM Northing	UTM Easting	ELC Habitat Type(s)	ELC Dataset
backed Woodpecker					Forest	Churchill ELC
Black-backed Woodpecker	Reservoir	30	616184	5877220	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Black-Backed Woodpecker	Reservoir	30	619083	5878934	Black Spruce Lichen Forest	AC Line + Churchill ELC
Black-backed Woodpecker	Reservoir	30	619811	5879096	Black Spruce Lichen Forest	AC Line + Churchill ELC
Black-backed Woodpecker	Reservoir	30	619693	5879258	Black Spruce Lichen Forest	AC Line + Churchill ELC
Black-backed Woodpecker	Reservoir	30	620624	5879389	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Tree swallow	AC Line	30	537166	5901290	Black Spruce Lichen Forest	AC Line + Churchill ELC
Boreal Chickadee	Reservoir	30	615238	5874343	Fir-White Spruce Forest	AC Line + Churchill ELC
Ruby-crowned Kinglet	AC Line	30	520931	5905534	Black Spruce Lichen Forest	AC Line + Churchill ELC
Ruby-crowned Kinglet	AC Line	30	517703	5905925	Wetland	AC Line + Churchill ELC
Ruby-crowned Kinglet	AC Line	30	439995	5932768	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Swainson's Thrush	Reservoir	30	621410	5879539	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Swainson's Thrush	DC Line	30	651501	5900311	Black Spruce Sphagnum Woodland	AC Line + Churchill ELC
Swainson's Thrush	DC Line	30	666777	5885633	Open Conifer Forest	DC Line ELC
Swainson's Thrush	DC Line	30	659296	5898605	Open Conifer Forest	DC Line ELC
Swainson's Thrush	DC Line	30	667509	5898154	Coniferous Dense	EOSD
Swainson's Thrush	DC Line	30	662305	5899320	Coniferous Dense	EOSD

Species	Project Location (Reservoir, AC Line, DC Line)	Setback Size (m)	UTM Northing	UTM Easting	ELC Habitat Type(s)	ELC Dataset
American Robin	AC Line	30	521427	5905517	Wetland	AC Line + Churchill ELC
American Crow	AC Line	30	645541	5905431	Open Conifer Forest	DC Line ELC
American Crow	AC Line	30	489386	5915358	Exposed/Barren Land	EOSD
Cedar Waxwing	AC Line	30	532810	5903959	Wetland	AC Line + Churchill ELC
Black-throated Green Warbler	DC Line	30	650476	5900533	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Yellow-rumped Warbler	AC Line	30	547841	5895559	Black Spruce on Bedrock Outcropping	AC Line + Churchill ELC
Yellow Warbler	AC Line	30	518851	5905848	Black Spruce Lichen Forest	AC Line + Churchill ELC
Northern Waterthrush	Reservoir	30	611906	5872032	Black Spruce Lichen Forest	AC Line + Churchill ELC
White-throated Sparrow	DC Line	30	667672	5898071	Coniferous Dense	EOSD
White-throated Sparrow	DC Line	30	667941	5897824	Coniferous Dense	EOSD
White-throated Sparrow	Reservoir	30	616465	5876541	Riparian Thicket	AC Line + Churchill ELC
White-throated Sparrow	Reservoir	30	616226	5876882	Black Spruce Lichen Forest	AC Line + Churchill ELC
White-throated sparrow	DC Line	30	652320	5900076	Spruce-Fir Feathermoss Forest	AC Line + Churchill ELC
White-throated sparrow	AC Line	30	439093	5932461	Mixedwood Forest	AC Line + Churchill ELC
White-crowned Sparrow	AC Line	30	526628	5904465	Black Spruce Lichen Forest	AC Line + Churchill ELC
White-crowned	DC Line	30	667427	5890021	Conifer Forest	DC Line ELC

Species	Project Location (Reservoir, AC Line, DC Line)	Setback Size (m)	UTM Northing	UTM Easting	ELC Habitat Type(s)	ELC Dataset
Sparrow						
American Tree Sparrow	Reservoir	30	617977	5876766	Black Spruce Lichen Forest	AC Line + Churchill ELC
Fox Sparrow	AC Line	30	614818	5877427	Black Spruce Lichen Forest	AC Line + Churchill ELC
Fox Sparrow	AC Line	30	516989	5905968	Wetland	AC Line + Churchill ELC
Dark eyed Junco	AC Line	30	470204	5922012	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Dark-eyed Junco	Reservoir	30	616151	5877261	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	600992	5877641	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	600613	5877913	Black Spruce Lichen Forest	AC Line + Churchill ELC
Dark-eyed Junco	Reservoir	30	619335	5878903	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Dark-eyed Junco	Reservoir	30	621482	5879452	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	548064	5895460	Black Spruce Lichen Forest	AC Line + Churchill ELC
Dark-eyed Junco	DC Line	30	653083	5900048	Spruce-Fir Feathermoss Forest	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	537175	5901195	Black Spruce Lichen Forest	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	534526	5903210	Black Spruce Lichen Forest	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	524738	5904914	Black Spruce Lichen Forest	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	511731	5905436	Black Spruce Lichen Forest	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	521455	5905468	Black Spruce Lichen Forest	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	515094	5905477	Black Spruce Lichen Forest	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	500944	5909267	Black Spruce on Bedrock Outcropping	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	500359	5909420	Black Spruce on Bedrock Outcropping	AC Line + Churchill ELC

Species	Project Location (Reservoir, AC Line, DC Line)	Setback Size (m)	UTM Northing	UTM Easting	ELC Habitat Type(s)	ELC Dataset
Dark-eyed Junco	AC Line	30	476226	5920571	Black Spruce Lichen Forest	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	478634	5920615	Black Spruce Lichen Forest	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	467493	5922810	Black Spruce Lichen Forest	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	454492	5927523	Black Spruce Lichen Forest	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	453725	5927777	Black Spruce Lichen Forest	AC Line + Churchill ELC
Dark-eyed Junco	AC Line	30	450455	5928559	Black Spruce Lichen Forest	AC Line + Churchill ELC
Dark-eyed Junco	DC Line	30	668916	5892449	Coniferous Dense	EOSD
Dark-eyed Junco	AC Line	30	515877	5904820	Coniferous Open	EOSD
Dark-eyed Junco	AC Line	30	515772	5904911	Coniferous Sparse	EOSD
Rusty Blackbird	AC Line	75	516940	5905806	Wetland	AC Line + Churchill ELC
Unidentified Passerine	DC Line	30	662726	5899450	Coniferous Dense	EOSD
Unidentified Shorebird	AC Line	100	517933	5905889	Wetland	AC Line + Churchill ELC
Unidentified Yellowlegs	AC Line	100	551885	5893454	Wetland	AC Line + Churchill ELC
Unidentified Sparrow	AC Line	30	468891	5922448	Black Spruce Lichen Forest	AC Line + Churchill ELC
Unknown	DC Line	200	904791	5781687	Open Conifer Forest	DC Line ELC
Unknown	DC Line	200	834942	5797008	Open Conifer Forest	DC Line ELC
Unknown	DC Line	200	804387	5800324	Wetland	DC Line ELC
Unknown	DC Line	200	804827	5801011	Conifer Forest	DC Line ELC
Unknown	DC Line	200	773539	5810593	Wetland	DC Line ELC
Unknown	DC Line	200	754021	5821926	Wetland	DC Line ELC
Unknown	DC Line	200	725872	5839492	Conifer Scrub	DC Line ELC
Unknown	DC Line	200	710051	5850461	Open Conifer Forest	DC Line ELC
Unknown	DC Line	200	686724	5866766	Conifer Forest	DC Line ELC
Unknown	DC Line	200	683280	5869616	Conifer Forest	DC Line ELC

Species	Project Location (Reservoir, AC Line, DC Line)	Setback Size (m)	UTM Northing	UTM Easting	ELC Habitat Type(s)	ELC Dataset
Unknown	Reservoir	30	610348	5870800	Black Spruce Feathermoss Forest	AC Line + Churchill ELC
Unknown	Reservoir	30	610840	5871046	Hardwood Forest	AC Line + Churchill ELC
Unknown	AC Line	30	453070	5927849	Black Spruce Lichen Forest	AC Line + Churchill ELC
Unknown	DC Line	30	656926	5899142	Conifer Forest	DC Line ELC
Unknown	DC Line	30	664576	5899708	Coniferous Dense	EOSD
Unknown	DC Line	30	667361	5898219	Coniferous Dense	EOSD

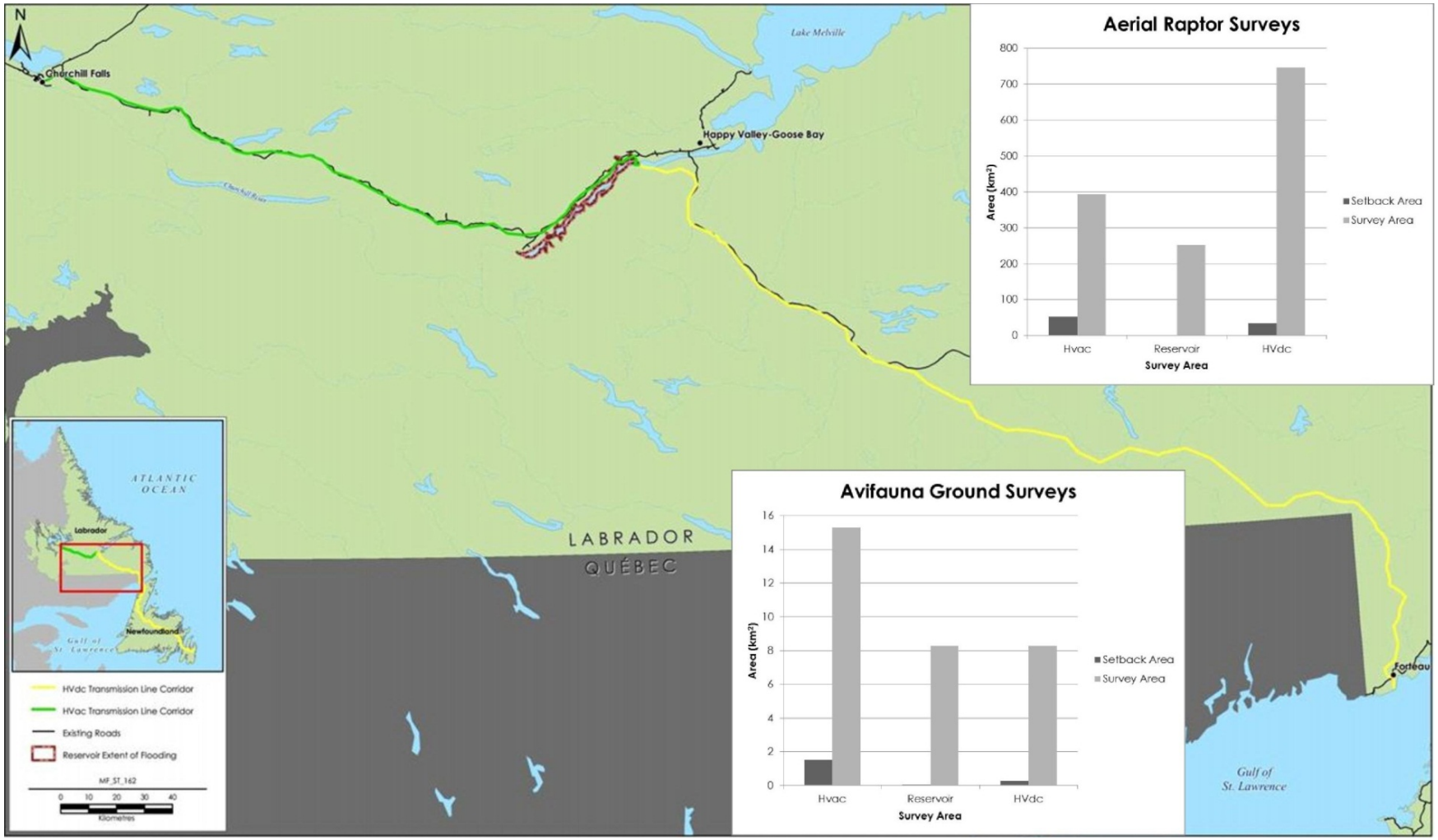

Figure C-1 Total Area Surveyed and Nest Setbacks Established, May-July, 2014

ATTACHMENT 7.3

Lower Churchill Project, Environmental Effects Monitoring Program – 2014 Avifauna, Avifauna Field Surveys in the Lower Churchill River Valley

Nalcor Energy Lower Churchill Project, Environmental Effects Monitoring Program – 2014 Avifauna

Avifauna Field Surveys in the Lower Churchill River Valley

Prepared for:
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Interim Report

September 26, 2014

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Executive Summary

The 2014 Avifauna Environmental Effects Monitoring Program (EEMP) was completed as part of a larger EEMP developed based on the requirements and commitments in the Lower Churchill Generation Project Environmental Impact Statement (EIS) (Nalcor 2009a and 2009b). The primary objectives of the avifauna EEMP were to: collect additional information on the distribution and habitat associations of avifauna Species At Risk (SAR); assess the effect of Project-related activities on the distribution and habitat associations of avifauna; and monitor Surf Scoter use of ashkui in the lower Churchill River valley.

Aerial surveys were conducted in May and June, 2014, to document ice conditions and presence of Surf Scoter along the Churchill River and at three control sites (Anne-Marie, Minipi and Wilson Lakes). Ground-based behavioural observations of scoters were made at two locations in the Churchill River. The percent of time that females and/or flocks spent diving (19.8% to 34.4%), feeding (21.7% to 28.1%), swimming and resting (12.6% to 19.8%), in comfort movements (4.2% to 10. 5%) and other activities (e.g., alert, courtship, flying; <1%) was recorded.

A total of 111 forest songbird point count surveys were conducted over a five day period between June 18 and June 25. Forty-two species were confirmed during surveys and an additional six species were identified outside of the point count period (considered incidental).

A combination of point count observations, call playback, and dedicated surveys were used to collect information on avifauna SAR. Call playback was used for two species [Olive-sided Flycatcher (*Contopus cooperi*) and Gray-cheeked Thrush (*Catharus minimus*)] following a point count when in suitable habitat, and evening surveys targeting Common Nighthawk (*Chordeiles minor*) were carried out over six evenings between June 16 and July 8. One Olive-sided Flycatcher was recorded during point count surveys; no other avifauna SAR was documented through these surveys. Common Nighthawk, Gray-cheeked Thrush and Rusty Blackbird (*Euphagus carolinus*) were recorded during other field EEMPs and incidentally in the town of Happy Valley-Goose Bay.

The results of the 2014 Avifauna EEMP provide additional baseline information on SAR and other species in the Project Study Area prior to inundation. Additional point count surveys will be carried out in 2015 and 2016, and an assessment of Project-related environmental effects on species richness will be completed when all data are available.

1.0 2014 AVIFAUNA PROGRAM

The 2014 Avifauna Environmental Effects Monitoring Program (EEMP) was completed by Stassinu Stantec Limited Partnership (Stassinu Stantec) and is part of the broader EEMP that Nalcor Energy is completing in conjunction with the Lower Churchill Generation Project (the Project). The work is based on the requirements and commitments in the Lower Churchill Generation Project Environmental Impact Statement (EIS) (Nalcor 2009a and 2009b). The specific objectives of the avifauna EEMP were to:

- Document ice conditions and monitor Surf Scoter (*Melanitta perspicillata*) use of *ashkui* (areas of early or permanent open water on rivers) in the lower Churchill River using a combination of aerial and ground-based (behavioural) surveys
- Assess the effect of Project-related activities on the distribution and habitat associations of avifauna using songbird species richness as an index of change over time; and
- Collect additional information on the distribution and habitat associations of select avifauna Species At Risk (SAR) in the lower Churchill River Valley, based on commitments made in the EISin regards to Olive-sided Flycatcher (*Contopus cooperi*), Rusty Blackbird (*Euphagus carolinus*), Gray-cheeked Thrush (*Catharus minimus*) and Common Nighthawk (*Chordeiles minor*).

This report provides a summary of the methods used and results from each field component in 2014, and represents findings from the first year of this multi-year EEMP.

1.1 Background

In 2006 and 2007, a series of avifauna and related surveys were carried out as part of baseline studies in support of the Project, including forest songbird (point count) surveys (Minaskuat Inc. 2008); waterfowl breeding pair, brood and spring staging surveys (LGL Limited 2008); and an ice dynamics study of the Lower Churchill River valley (Hatch 2007).

Between 72 (2006) and 82 (2007) avifauna species were recorded from point count stations in the lower Churchill River valley, along the Transmission Line right-of-way (Row), and in control locations in the Goose River valley (Minaskuat Inc. 2008). Sampling in 2007 was designed to replicate samples from 2006, with additional point count transects surveyed to fill geographic gaps across the landscape and/or to target under-surveyed habitats. The most widespread species identified during these surveys were Swainson's Thrush (*Catharus ustulatus*) and White-throated Sparrow (*Zonotrichia albicollis*).

A variety of waterfowl species were identified during surveys, including breeding Canada Goose (*Branta canadensis*), American Black Duck (*Anas rubripes*), Common Goldeneye (*Bucephala clangula*), Common Merganser (*Mergus merganser*) and Red-breasted Merganser (*Mergus serrator*). Species likely to occur in the river valley during spring staging include goldeneyes, mergansers, Long-tailed Duck (*Clangula hyemalis*), Harlequin Duck (*Histrionicus histrionicus*),

scaup, and Ring-necked Duck (*Aythya collaris).* Relatively large aggregations of waterfowl can be found in the mainstem of the Churchill River during this period. High densities of Surf Scoter (and their broods) were also documented during staging. However, waterfowl use of the lower Churchill River in spring is variable and related to seasonal conditions (i.e., timing of spring thaw). In general, the lower Churchill River was considered relatively unproductive for waterfowl due to extent of sandy shoreline and sediments, although there are localized wetlands associated with tributary outflows, adjacent to the river, that are important to waterfowl.

Five species listed under the federal *Species at Risk Act* and/or the Newfoundland and Labrador *Endangered Species Act* were identified in the lower Churchill River valley through point count and waterfowl surveys including Harlequin Duck, Common Nighthawk, Olive-sided Flycatcher, Gray-cheeked Thrush and Rusty Blackbird.

Ice dynamics modeling indicated that, following Project development, there will be up to a two-week delay in the cool-down and warm-up periods in the reservoirs, as compared to the existing river. Within the reservoirs, a solid ice cover will persist throughout each winter, including areas that previously remained open throughout the year. However, *ashkui* in certain areas (such as that which occurs at the confluences of the Metchin River, Elizabeth River, Upper Brook and Lower Brook) will likely move upstream into the tributary at the interface with the new shoreline. It was believed that the topography at these locations would continue to enhance *ashkui* formation.

In the EIS (Nalcor 2009a, 2009b), Project-related environmental effects on avifauna was predicted to be not significant for the species of avifauna assessed, as these species will continue to persist as sustainable populations in the Study Area. Specific monitoring and follow-up programs identified for avifauna were forest avifauna surveys, aerial ashkui surveys, and maintenance of a log book to record any bird mortalities associated with the Project.

In August 2011, the "Report of the Joint Review Panel – Lower Churchill Hydroelectric Generation Project" was released, highlighting the Panel's recommendations (JRP 2011). Specifically, the Panel recommended that surveys be carried out to:

- Monitor *ashkui* formation in the Project area;
- Monitor direct and indirect impacts on waterfowl (e.g., waterfowl adjustment to changes in riparian habitat, and changes in the location and formation of *ashkui*); and
- Develop a detailed mitigation and monitoring plan for all listed species.

1.2 Study Team

The study team for the field components of the avifauna EEMP included personnel from Stassinu Stantec and Universal Helicopters Newfoundland and Labrador Limited Partnership (UHNL) (Table 1.1).

Table 1.1 2014 Avifauna Study Team

Name	Survey	Role	Organization
Diane Ingraham	all	Project Management	Stassinu Stantec
Perry Trimper	all	Senior Technical Advisor	Stassinu Stantec
Mike Crowell	all	Senior Review	Stassinu Stantec
Tina Newbury	Aerial Surf Scoter & Ice Point counts	Observer/navigator Team Lead/Ornithologist Reporting	Stassinu Stantec
Bruce Turner	Aerial Surf Scoter & Ice	Observer/navigator	Stassinu Stantec
Mary Ann Aylward	Aerial Surf Scoter & Ice	Observer	Stassinu Stantec
Ken Cashin	Aerial Surf Scoter &Ice	Pilot	Universal Helicopters
Jonathan Willans	Point counts	Team Lead/Ornithologist	Stassinu Stantec
Margie Clark	Point counts	Field technician	Stassinu Stantec
Daniel Windeler	Point counts Common Nighthawk	Field technician	Stassinu Stantec
Karen Rashleigh	Common Nighthawk	Team Lead Reporting	Stassinu Stantec
Trish Layden	Common Nighthawk	Field technician	Stassinu Stantec
Angela Dunphy	Common Nighthawk	Field technician	Stassinu Stantec
Alissa Tobin	Common Nighthawk	Field technician	Stassinu Stantec
Jacqueline Melindy	Common Nighthawk	Field technician	Stassinu Stantec
Matthew Boychuk	Common Nighthawk	Field technician	Stassinu Stantec

Prior to the start of the field component of the 2014 Avifauna EEMP, all personnel reviewed the Health, Safety, and Environment (HSEQ) Plan, and the Risk Management Strategy (RMS) 1 (Stassinu Stantec Limited Partnership 2014). A daily hazard assessment (RMS 2) was completed each morning. The required scientific research permit (permit #IW2013-66, Appendix A) was acquired from the Government of Newfoundland and Labrador, Department of Environment and Conservation prior to the initiation of the surveys.

2.0 METHODS

2.1 Study Area

Aerial Surf Scoter surveys encompassed the area within the lower Churchill River valley from Muskrat Falls to Churchill Falls, and the following lakes: Anne Marie Lake, Minipi Lake, and Wilson Lake (Figure 2-1). Areas were selected based on baseline study results and other earlier investigations (Goudie 1991, AGRA Earth & Environmental Ltd. and Harlequin Enterprises 1999, LGL Environmental Research Associates 2008).

Breeding forest songbird point counts were conducted in the area between Gull Island and the town of Happy Valley-Goose Bay (Figure 2-1). Point count locations were placed in a variety of habitats within and adjacent to the Project-related activities (e.g., reservoir and transmission lines), with effort to have a representative sample of points within and beyond 1 km of recent forest cutting. Potential habitat for SAR species (Olive-sided Flycatcher, Gray-cheeked Thrush, and Rusty Blackbird) was also targeted.

Common Nighthawk surveys were carried out within and adjacent to the Project Footprint between Muskrat Falls and Gull Island (Figure 2-1). Surveys targeted habitat believed to be ideal for this species, but other potentially less ideal habitats were also surveyed.

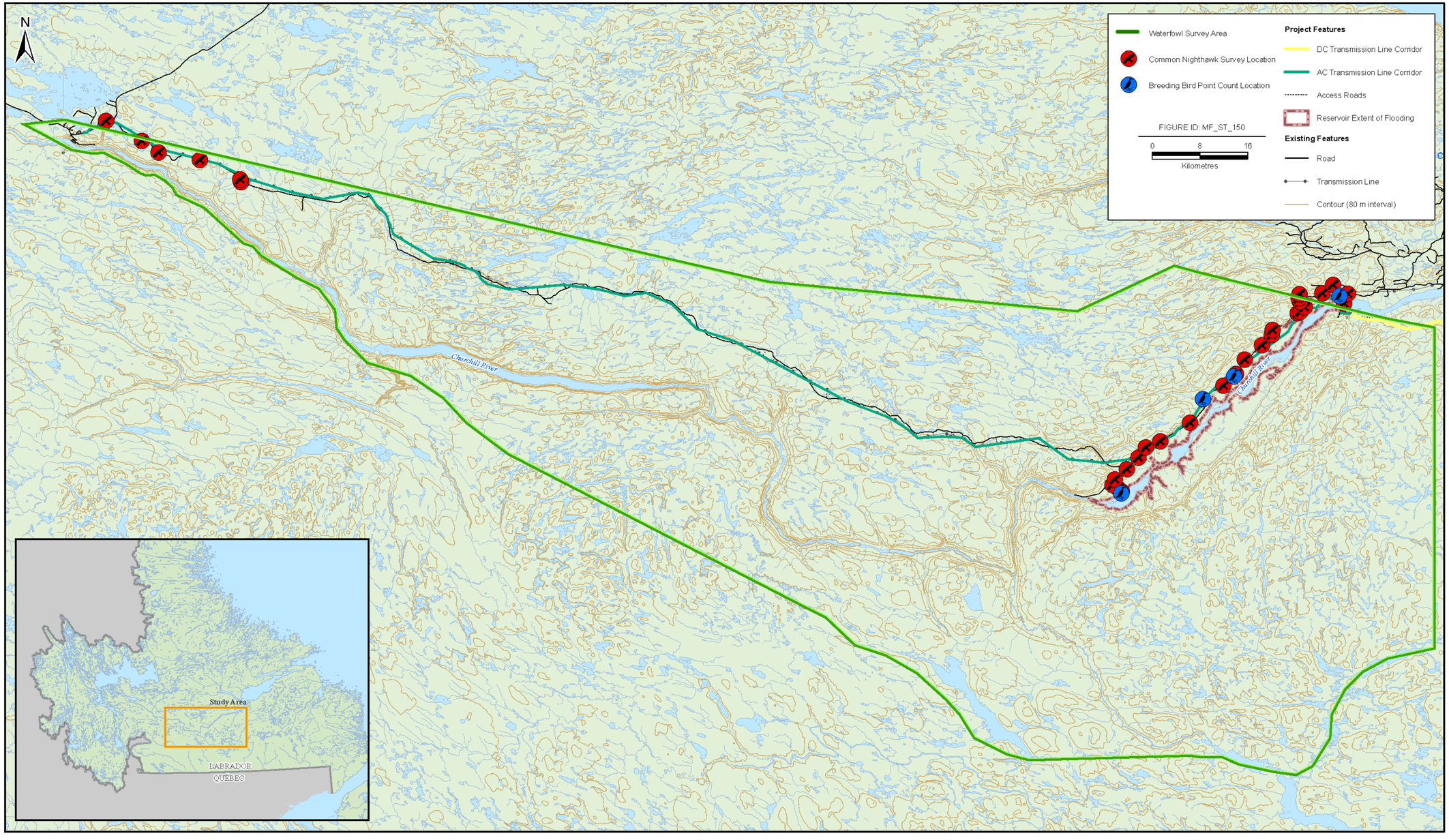

Figure 2-1 2014 Avifauna EEMP Study Area

2.2 *Ashkui* and Surf Scoter Surveys

2.2.1 Aerial Survey

Aerial surveys were conducted from a Bell 206L helicopter flown at 50-75 m above ground level (agl) and at speeds from 50-100 km/h. The helicopter was equipped with rear bubble windows which enhanced visibility. The survey crew consisted of a front seat observer and navigator, with two rear observers. The pilot also assisted with observations.

Survey routes typically followed along the center of the Churchill River, although in areas where Surf Scoter had been previously identified, the helicopter would make a second pass. Surveys of nearby lakes were similarly surveyed to assess whether Surf Scoter had dispersed to these areas for breeding.

Information on ice conditions and in particular locations of *ashkui* along the Churchill River and in the lakes was recorded, as well as all observations of waterfowl and other bird and wildlife species.

2.2.2 Behavioural Observations

Surf Scoters observed during the aerial survey were selected for behavioural observation, where a suitable helicopter landing area and observation location could be identified. Observations were made from an elevated position along the river bank, at distances ranging from 200-300 m (Churchill Falls site) to 500-1400 m (Muskrat Falls site). These distances were believed to be sufficient to not have an impact on Surf Scoter behaviour.

Observations primarily focused on individual females however where distance, wind, sun glare and/or other factors prevented observations of an individual, flocks were monitored. Flocked birds tended to act in unison and as such the Study Team was able to assess diving (i.e., foraging) behaviour, but had difficulty in quantifying other behaviours. Regardless of whether an individual or flock was monitored, the total number and sex ratios of Surf Scoter in the area was estimated.

Observations were categorized into recognized behaviours and fell into one of 10 categories (Bergen et al. 1989; Alexander and Hair 1979) (Table 2.1).

Table 2.1 Behaviour Observation Categories

Behaviour	Description
Courtship	Head extend frontward or upward, retract and pump; head nod and bill to breast, lateral to and fro of head. Parties of males may compete for female
Agonism	Aggression to neighboring bird
Alert	Head held upright; bird watching and listening for disturbance or threats
Comfort	Splash bathe, preen and wingflap
Dive	-
Pause	Interval between feeding dives
Surface feed or upend	-
Fly	-
Rest	Not moving; in one spot but not alert
Swim	-

2.3 Forest Songbird (Point Count) Surveys

Two 2-person field teams (consisting of a lead biologist experienced with point counts in boreal forest habitats and a technician) conducted point count surveys. Starting locations for all point count transects were accessed by vehicle (one transect per team per day).

Survey protocols were designed to follow the Newfoundland and Labrador Boreal Bird Monitoring Protocol Initiative SOP#3 (NLDOEC 2012). Surveys began no earlier than 30 minutes before sunrise and ended by 0930h, and only under suitable weather conditions (e.g., temperatures above freezing, winds <25 km/h, no precipitation (or intermittent precipitation), visibility >50m).

Point count stations were spaced 300 m apart, and consisted of a five-minute listening period followed by call playback. All birds heard or observed were recorded in the five minute period, and distance categories were assigned to each observation: 0-50 m, 50–100 m, and 100–200 m. After the survey, a Black-capped Chickadee (*Poecile atricapillus*) mobbing call was broadcast for two minutes (using a FoxPro game caller), and any new species were recorded in a one minute listening period. When suitable habitat for SAR of interest to this EEMP was encountered, call playback of the species was also played for two minutes (following the chickadee playback-listening period), followed by a one minute listening period.

At each point count location, the following information was recorded on prepared datasheets: date, GPS location, weather conditions, and habitat information. Survey start and end times were also documented. Any birds, mammals, and herptiles (or their sign) heard or observed in transit between point count locations, were recorded as incidentals.

2.4 Species at Risk Surveys

A combination of point count observations and call playback (described in Section 2.3), and targeted Common Nighthawk surveys were used to collection information on avifauna SAR.

Common Nighthawk surveys were carried out concurrently with evening amphibian acoustic surveys to enhance program efficiencies. The Study Team consisted of a team lead and technician, however on one evening a larger crew participated in surveys (five technicians) as a training activity for new field crew members.

Surveys followed Stantec's national protocols for Nocturnal Nightjar Surveys (Stantec 2013). Sample stations were spaced a minimum of 500 m apart, and commenced one half-hour prior to sunset and continued until the end of the dusk crepuscular period (nautical twilight). Survey locations targeted potential Common Nighthawk nesting (e.g., gravel pits, recent clear-cuts, disturbed areas) and feeding (e.g., lakes, ponds, rivers and wetlands) habitats in the Study Area that were accessible by road. Surveys were only conducted under suitable weather conditions (i.e., temperature >7°C, wind of Beaufort 3 or less, with nil to light precipitation).

Upon arrival at a survey location, all light and noise sources were turned off, and observers waited one minute to allow potential effects from such disturbances to subside. During this time, location, weather and habitat data were recorded. Any species detected during this period, but not during the actual count, were recorded as incidentals.

Surveys consisted of passive listening and watching for Common Nighthawk over a six minute period at each station. Each six minute sampling period was followed by a two minute call playback, and a final two minute listening period (i.e., ten minutes total). Common Nighthawk observations were recorded as occurring during one of the following time intervals: first 3-minutes, second 3-minutes, 2-minute playback, or last 2- minutes, where applicable. For any birds observed, the approximate distance and angle from the observation point was recorded, as well any information on behaviour (e.g., flight pattern, evidence of breeding).

3.0 RESULTS

3.1 *Ashkui* and Surf Scoters

Aerial surveys and behavioural observations were carried out under suitable weather conditions over a three day period between May 30 and June 1, 2014 (Appendix B).

Surf Scoters were observed at four locations along the lower Churchill River (Appendix C): immediately upstream of Muskrat Falls (~ 30 birds); the west end of Lake Winakopau near Wolfe Island (12 birds); upstream from the confluence of the Metchin River (8 birds); and approximately 10 km downstream of the Churchill Falls tail-race (estimated between 20 and 30 birds on

different survey days). All of these river sections were wide and slow-moving; there were no scoters observed on the faster moving stretches of the river.

Subsequent ground observations at the Churchill Falls site confirmed 35 birds on May 30, and at the Muskrat Falls site, 22 scoters on May 31 and 41 scoters on June 1. The difference in numbers between aerial and ground counts can be related to the behavioural tendency of Surf Scoters to dive upon the approach of a helicopter such that at any one time an unknown number of birds are not visible. Sex ratios were highly unbalanced and distorted heavily toward males. At their highest counts, females numbered four at Muskrat Falls and ranged between five and seven at Churchill Falls, translating into male:female sex ratios of 10.25:1 and 5:1 to 7:1, respectively.

As expected, Surf Scoters were relatively more abundant on some of the larger lakes sampled in the Study Area (Anne Marie and Minipi Lakes are known breeding areas). A total of 124 Surf Scoters were recorded on surveyed portions of Anne Marie and Minipi Lakes; no observations were made on Wilson Lake (Appendix C). Separate flocks of 20 and 40 birds comprised close to 50% of total observations (median flock size of four). Other observations included two lone males, five distinct pairs and several small mixed sex flocks ranging in size from three to six birds. The two large flocks observed at Anne Marie and Minipi Lakes indicates that these birds were in a pre-breeding stage, while the numerous small groups noted indicated that at least some birds were preparing for dispersal and breeding, and the presence of lone males in other areas indicated that nest initiation had likely already begun.

Areas within the lower Churchill River were ice-covered at the time of surveys. Gull Lake was ice-covered except for an area where the stronger currents had cut an open channel, as well as the western portion (half to two-thirds) of Lake Winakopau with the exception of isolated areas along the shoreline and the occasional channel extending into the lake. Ice coverage on the larger lakes and smaller waterbodies outside the Churchill River Valley was variable. Anne Marie Lake was completely ice-free, as well as the eastern portion of Minipi Lake. However, the southern portion of Minipi was still ice-covered, and most of Dominion Lake (except for a small area at its southern end and a ribbon of open waster along its western shore). Wilson Lake was also largely ice-covered, with areas of open water generally confined to the shoreline and areas of high energy (e.g., constrictions in the lake). Practically all small waterbodies were open and pairs of Surf Scoters were infrequently observed on them (Appendix C), indicating that some dispersion to breeding lakes had occurred.

Behavioural observations of females and flocks were conducted over a total of 6.95 hours, combined among the two sampling locations (Table 3.1).

Table 3.1 Summary of Behavioural Observations of Surf Scoter

Location	Date	Cohort	Observation Time (hrs)
Churchill Falls site	May 30	female	3.5
Muskrat Falls site (North Spur)	May 31	female	1.5
		flock	1.1
	June 1	flock	0.88

Time activity budgets were created based on observation location, date and cohort. While activity budgets of females were created based on all behaviour categories (listed in Table 3.1 above), only the time spent diving (i.e., feeding) was determined for flocks (due to a lack of precision in assessing other behaviour types with larger numbers of birds). The percent of the time that females spent diving (i.e., feeding) was 34.4% at Churchill Falls on May 30 and 19.8% at Muskrat Falls on May 31 (Figures 3.1 and 3.2). Flocks spent 21.7% of the time feeding at Muskrat Falls on May 31 and 28.1% on June 1 (Figures 3.3 and 3.4).

Swimming and resting were also frequent activities, and accounted for up to 49.2% of the time activity budgets for females (Figures 3.1 and 3.1). Comfort movements accounted for 4.2% and 10.5% of the activity budget of females at Churchill Falls and Muskrat Falls sites, respectively (Figures 3.1 and 3.2). All other activities (e.g., agonism, alert, courtship) consumed less than 1% of the time activity budgets of monitored females.

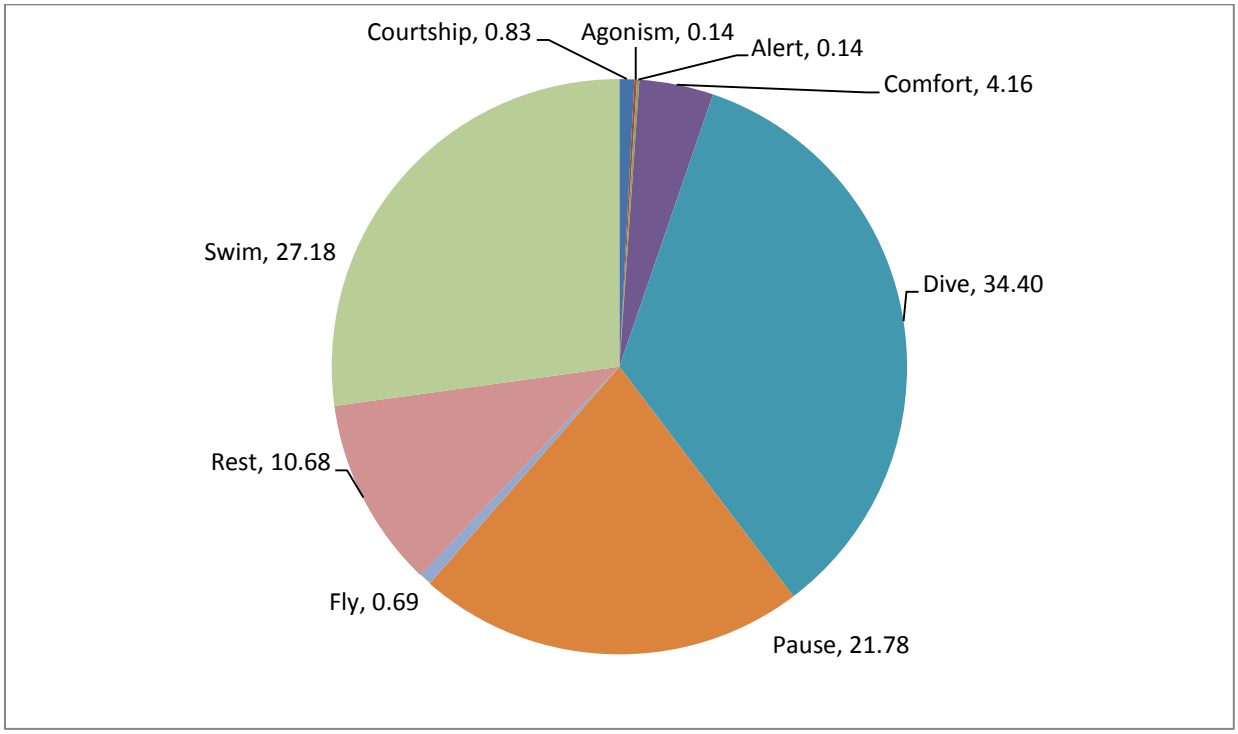

Figure 3-1 Activity budget (% of time observed) of female Surf Scoters at Churchill Falls site May 30, 2014

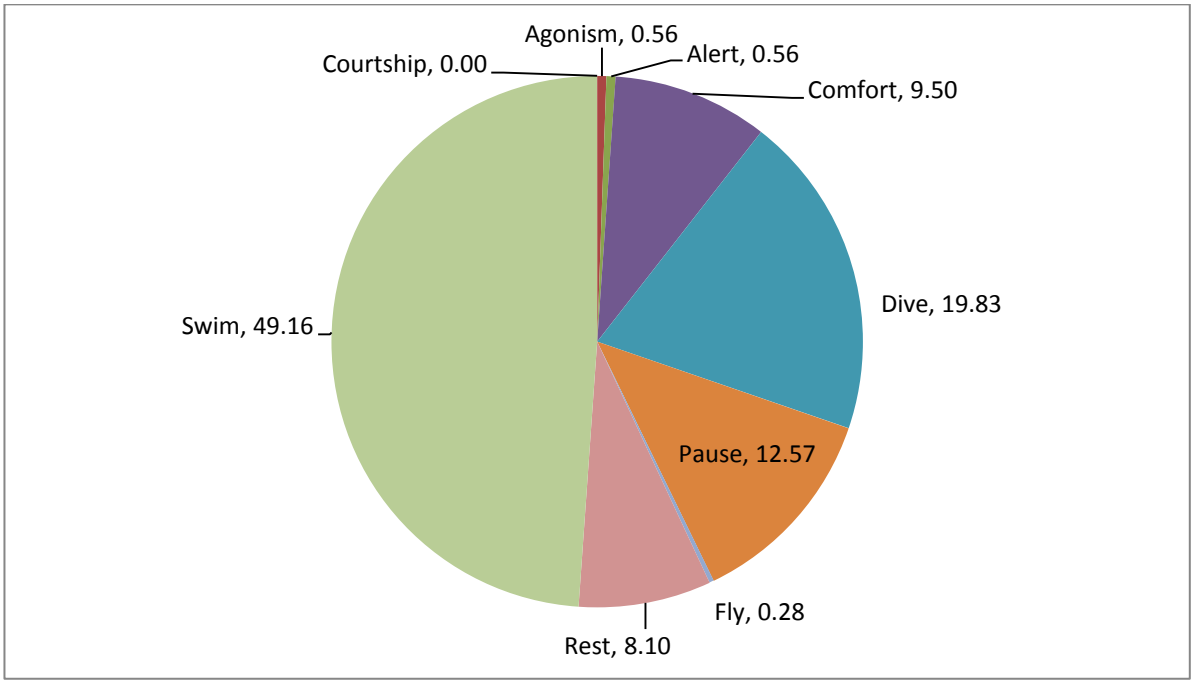

Figure 3-2 Activity budget (% of time observed) of female Surf Scoters at Muskrat Falls site May 31, 2014

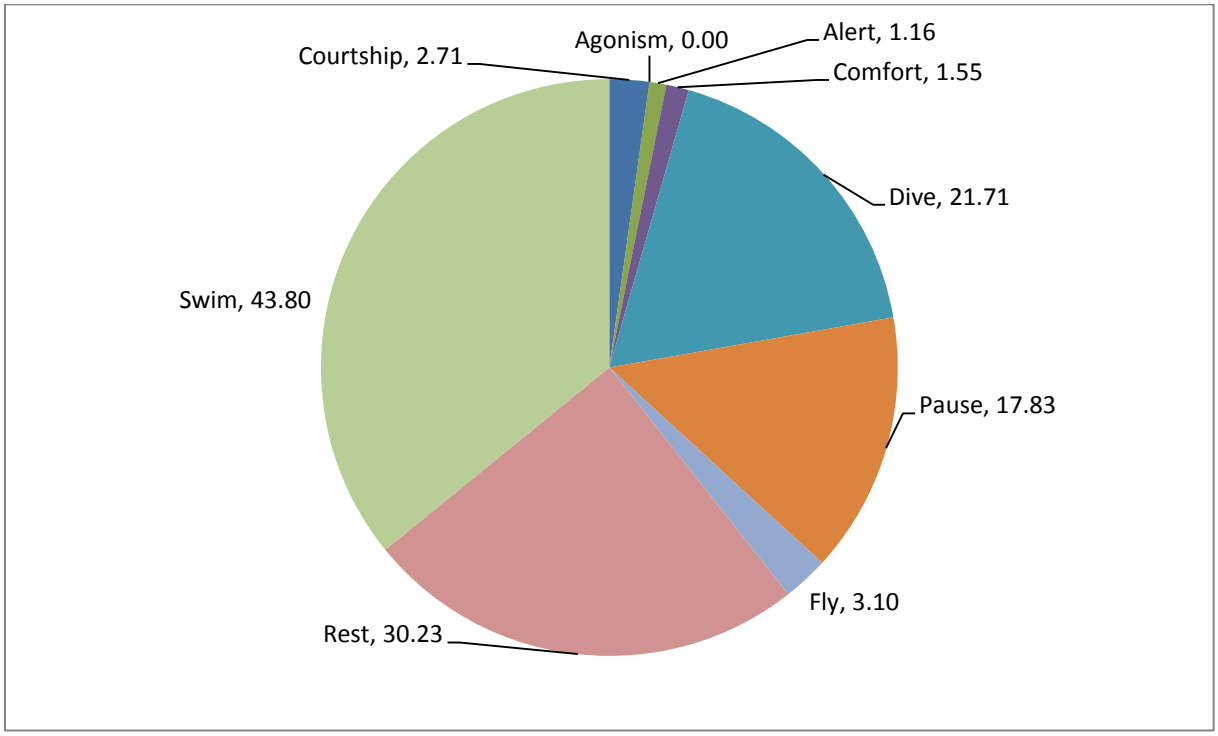

Figure 3-3 Activity budget (% of time observed) of flocked Surf Scoters at Muskrat Falls site May 31, 2014

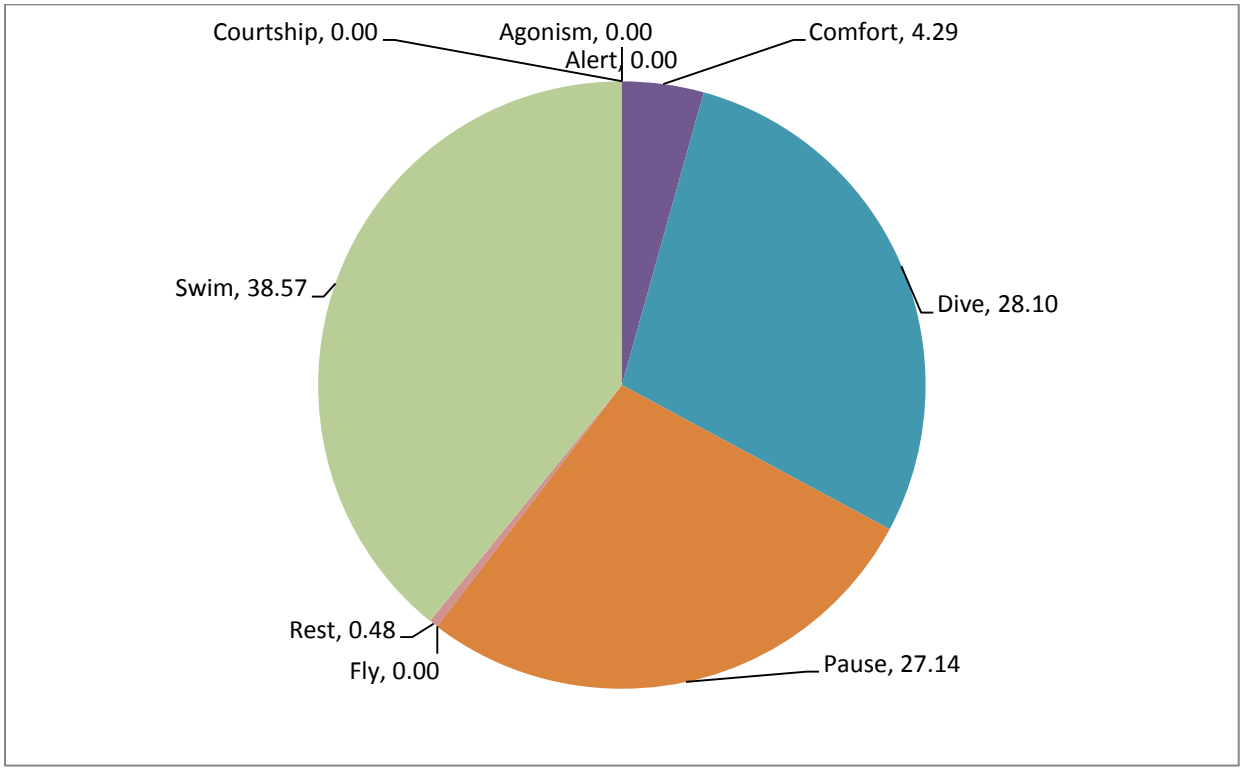

Figure 3-4 Activity budget (% of time observed) of flocked Surf Scoters at Muskrat Falls site June 1, 2014

3.2 Forest Songbirds

A total of 111 breeding bird point count surveys were conducted over a five day period between June 18 and June 25, 2014, under suitable weather conditions (Appendices B, C). Forty species plus an unconfirmed woodpecker species were identified during point counts (Appendix D). An additional six incidental species (i.e., recorded outside the point count period) were recorded including Greater Yellowlegs (*Tringa melanoleuca*), Merlin (*Falco columbarius*), ptarmigan sp.(*Lagopus* sp.), Purple Finch (*Haemorhous purpureus*), Red-eyed Vireo (*Vireo olivaceous*), and Red-tailed Hawk (*Buteo jamaicensis*)(Appendix E).

3.3 Species At Risk

One Olive-sided Flycatcher was recorded during point count surveys. Call playback was used following point counts for both Olive-sided Flycatcher and Gray-cheeked Thrush, but no additional birds were detected. There were no point counts established in suitable habitat for Rusty Blackbird and therefore no call playback was used for this species. Common Nighthawk, Gray-cheeked Thrush and Rusty Blackbird were all recorded during other field EEMPs and

incidentally in the town of Happy Valley-Goose Bay. A summary of information related to SAR considered in the 2014 Avifauna EEMP is provided Appendices C and F.

Thirty-three locations were surveyed for Common Nighthawk over six evenings between June 16 and July 8, 2014, under suitable weather conditions (Appendices B and F). Common Nighthawk were not recorded from any of the survey sites in the Study Area, despite records of this species within the Town of Happy Valley-Goose Bay and during other field EEMPs during the same period. These incidental observations confirm that this species was active at the crepuscular period during survey dates, and that weather conditions were suitable to allow for adequate observer detection.

Two observations of the same Common Nighthawk were made on different days, during the daytime, as part of the 2014 nest search program. The individual was observed on both days resting in the same location in a recent (2013) burn. On both occasions, the bird flushed when field crews were close (<10-15 m) from the location. The observation was on an access trail (yet to be cleared) associated with the Project.

4.0 SUMMARY

The 2014 Avifauna EEMP included a combination of aerial and ground-based surveys to document ice conditions and the presence of Surf Scoter and use of *ashkui* sites along the Churchill River and adjacent lakes; forest songbird point count surveys to collect information on species richness and additional information on SAR in the Study Area; and targeted evening surveys for Common Nighthawk.

Behavioural observation of Surf Scoters indicated that the birds were using specific areas of the Churchill River for feeding during spring staging. Observations of large flocks, numerous small groups, and lone males indicated that birds were in varying life history stages at the time of survey (i.e., pre-breeding / preparing for dispersal and breeding, and already breeding). A total of 48 species of breeding songbirds were documented in the Study Area during point count surveys, including one SAR (Olive-sided Flycatcher). Other SAR considered in the 2014 Avifauna EEMP (i.e., Common Nighthawk, Gray-cheeked Thrush and Rusty Blackbird) were recorded during other field EEMPs and incidentally in the town of Happy Valley-Goose Bay. Common Nighthawk was not detected during targeted surveys in 2014.

The results of the 2014 Avifauna EEMP provide additional baseline information on SAR and other species in the Project Study Area prior to inundation. Additional point count surveys will be carried out in 2015 and 2016, and an assessment of Project-related environmental effects on species richness will be completed when all data are available.

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Newfoundland Labrador

GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Dept of Environment & Conservation

Scientific Research Permit

(as under Section 86 of the Wildlife Regulations, Consolidated Newfoundland and Labrador Regulation 1156/96)

Permit #: IW2013-66

Project Title: *Wildlife Environmental Effects Monitoring During Construction of the Lower Churchill Hydroelectric Development*

Issued to:
Perry Trimper, Stassinu Stantec Limited Partnership
P.O. Box 482, Station C, Happy Valley-Goose Bay, NL A0P 1C0
Tel: (709) 896-5860

Permit to:
1) ***Winter Research***: Undertake winter aerial and ground track surveys for moose, otter, marten, porcupine and other wildlife;
2) ***Spring Summer Research***: Undertake spring/summer breeding bird point count surveys, otter and black bear hair snag trapping, and directed surveys for spring peeper and salamanders;
3) ***Fall Research***: Undertake fall aerial surveys for beaver colonies and deploy specialized traps to determine presence of water and pygmy shrews.

The objectives of these studies are to collect additional baseline information and to monitor potential environmental effects during construction of the Lower Churchill Hydroelectric Development.

Date of research: March 1 to October 1, 2014.

Date of Permit Expiration: November 1, 2014.

Location: All field investigations will occur primarily within the lower Churchill River watershed of Labrador. Of interest is a 20 km radius around the Project footprint in the lower Churchill River valley and the AC transmission line from Muskrat Falls to Churchill Falls (Figure 1). The intent is to establish a monitoring grid throughout the Study Area where cells become permanent monitoring stations. Where possible and appropriate, pre-existing transects and grids will be resurveyed and supplemented.

Conditions:
1) The permit holder may designate other individuals to perform these actions on his behalf, with suitable supervision. The permit holder is responsible for the training of any designated individuals and must ensure that designated individuals follow all conditions of this permit.

2) Names and contact information for all individuals participating in research activities shall be provided to the Wildlife Division, Department of Environment and Conservation prior to commencement of field work. Additional names or deletion of names can be provided to Wildlife Division on an ongoing basis.

3) Prior to initiation of the field program for effects monitoring and baseline investigations, a digital copy of the shape files of all survey routes must be provided to the Wildlife Division.

4) This permit is only valid for work within the indicated study area (Figure 1).

5) With the exception of activities covered under this permit, no wildlife species, including the study species, will be unduly harassed, injured or killed as a result of activities performed under this permit. The Wildlife Division advises applicants to operate under established regulations and guidelines with respect to wildlife and wildlife habitat to minimize adverse impacts (Section 106 of the Wild Life Regulations under the *Wild Life Act* (O.C. 96-809)).

6) Disturbance of all wildlife should be minimized during helicopter and ground transportation. Whenever possible, aircraft should not descend lower than 100 meters (above ground level) during surveys.

7) The field program will be conducted using accepted wildlife research techniques and targeted species will be disturbed as little as possible. The methods and survey dates described in the application will be followed as closely as possible. Any changes to the survey design or methodology outlined in the initial permit request will require prior approval before implementation.

8) A detailed protocol should be provided to the Wildlife Division for approval prior to any sampling of small mammals or amphibians. Any samples that are collected must be turned into the Wildlife Division following identification. A permit is required and must be obtained prior to transporting any samples or specimens out of the province.

9) To avoid the introduction of non-native species all research equipment should be new and unused, or equipment that has not been previously used outside of Labrador.

10) Final reports should be submitted for each of the components of the work proposed and permitted. Reports should provide a synopsis of the location of surveys, methods employed, number of samples/specimens taken, location of samples/specimens, additional relevant ecological information and a summary of next steps. The raw data and coordinates should be submitted in digital format along with the final reports for each component and for the following: small mammals, amphibian, otter, marten, moose, black bear, porcupine, beaver, breeding birds, mercury level analysis and all sightings of wildlife and sign. The permit holder is responsible to obtain any and all permissions which may be required to release this information to the Wildlife Division. Final reports are to be remitted by the following dates to the Wildlife Division:

Winter Research: May 1, 2014
Spring/Summer Research: October 1, 2014
Fall Research: December 1, 2014

11) Any unusual wildlife observations or any adverse effects observed during the Project are to be reported immediately to the Wildlife Division.

12) This permit does not absolve or relieve the permit holder from any other laws, permits, regulations or orders.

13) This permit does not relieve the permit holder from the requirement to acquire permission to access private property.

14) All conditions of this permit must be adhered to and data and results from this project submitted to the Wildlife Division prior to another permit being issued.

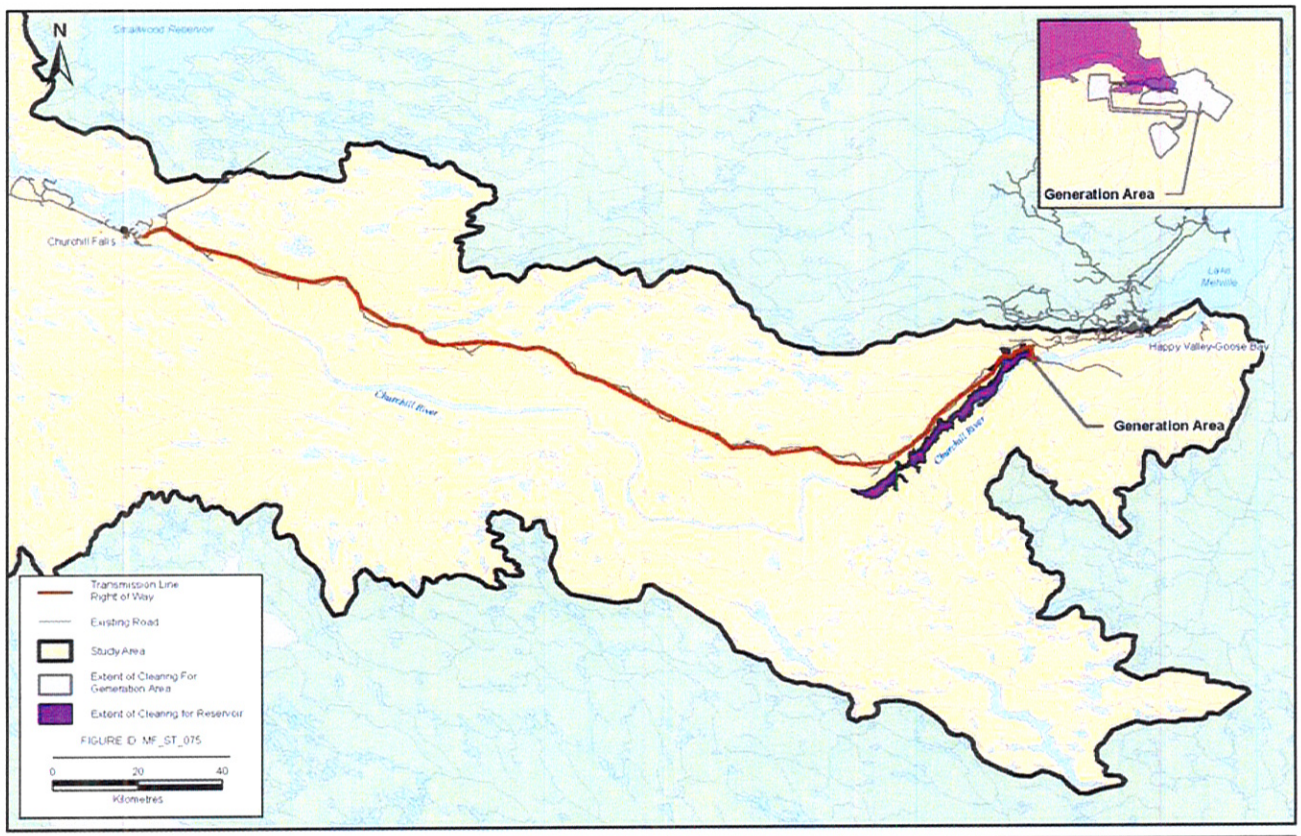
15) Under the discretion of the Director of Wildlife, this permit can be revoked without notice.

March 12, 2014
Date:

Director of Wildlife

PO Box 2007
Corner Brook, NL
A2H 2L7
Phone: (709) 637-2008
Fax: (709) 637-2004

Figure 1.1 **Study Area Overview: Happy Valley – Goose Bay to Churchill Falls**



nalcor energy	FIGURE 1.1
	Study Area Overview: Happy Valley-Goose Bay to Churchill Falls

APPENDIX A

Research Permit

APPENDIX B

Survey Effort and Weather Conditions

Table B.1 Survey Effort and Weather Conditions during *Ashkui* and Surf Scoter Surveys

Date	Total Survey Time (Hours)	Survey Type & Areas surveyed	Weather Conditions
May 30	3.6	Aerial Surveys (Churchill River from Muskrat Falls to Churchill Falls) Behavioural observations (Churchill Falls)	9°C, Winds ~ 5 km/h; 100% cloud cover; excellent visibility
May 31	0.7	Behavioural Observations (Muskrat Falls)	8°C, 10% cloud cover, excellent visibility
June 1	4.8	Aerial Surveys (Goose Bay to Churchill Falls, Anne Marie Lake, Minipi Lake, and Wilson Lake) Behavioural observations (Muskrat Falls)	20°C, winds ~5 km/h, 5% cloud cover, excellent visibility

Table B.2 Survey Effort and Weather Conditions during Point Count Surveys

Date	Number of point counts	Weather Conditions
June 18	20	14°C, winds <5 km/h, overcast with intermittent drizzle
June 20	23	6°C, winds <5 km/h, overcast with intermittent drizzle
June 23	24	5-12°C, calm, scattered clouds
June 24	22	17°C, calm, scattered clouds
June 25	22	7°C, calm, scattered clouds

Table B.3 Survey Effort and Weather Conditions during Common Nighthawk Surveys

Date	Number of points surveyed	Weather Conditions
June 16	7	Warm (>15°C), overcast with some clear areas, no rain
June 17	5	Warm (>18°C), overcast with light rain beginning ~2220h; ended survey at 2300 due to rain
June 18	6	Warm (>15°C), partial cloud, zero precipitation, light winds (~10-15 km/h)
July 2	5	Warm (>15°C), overcast, intermittent drizzle, low winds (<5-10 km/h)
July 7	6	Warm (>15°C), generally clear skies, calm
July 8	4	Warm (>15°C), cloudy, no rain, low winds (<5-10 km/h)

APPENDIX C

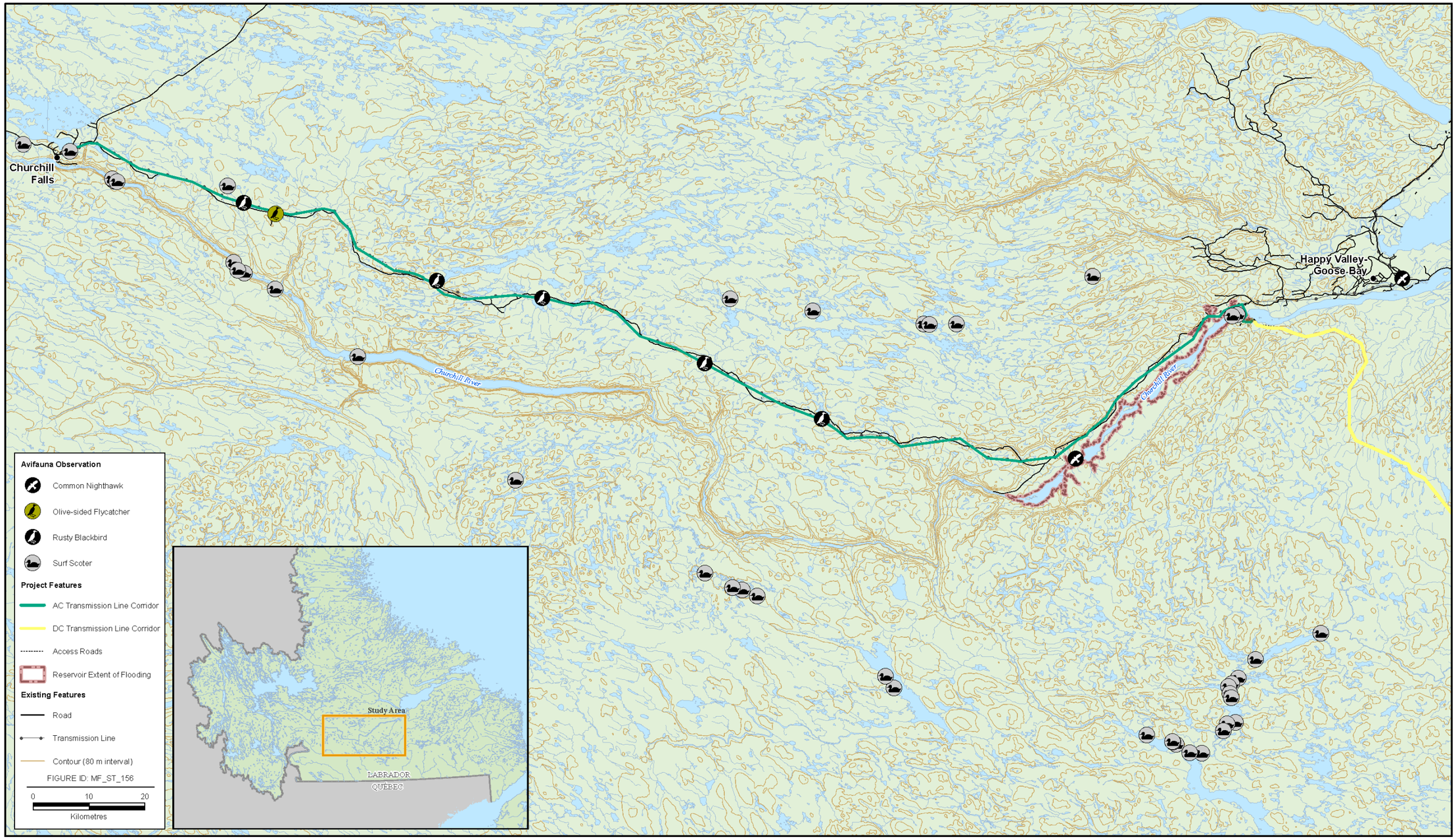


Figure C-1 Summary of 2014 Avifauna EEMP Observations

APPENDIX D

Forest Songbird Point Count Survey results

Table D.1 Species observed during 2014 point count surveys

English Name	Scientific Name	# Forest Songbird Point Count Records (2014)
Canada Goose	*Branta canadensis*	14
Spruce Grouse	*Falcipennis canadensis*	1
Spotted Sandpiper	*Actitis macularia*	2
Wilson's Snipe	*Gallinago delicata*	1
Black-backed Woodpecker	*Picoides arcticus*	2
Downy Woodpecker	*Picoides pubescens*	1
Yellow-bellied Sapsucker	*Sphyrapicus varius*	1
Least Flycatcher	*Empidonax minimus*	16
Alder Flycatcher	*Empidonas alnorum*	7
Yellow-bellied Flycatcher	*Empidonax flaviventris*	4
Olive-sided Flycatcher	*Contopus cooperi*	1
Philadelphia Vireo	*Vireo philadelphicus*	3
Gray Jay	*Perisoreus canadensis*	45
American Crow	*Corvus brachyrhyncos*	3
Common Raven	*Corvus corax*	1
Boreal Chickadee	*Poecile hudsonicus*	3
Red-breasted Nuthatch	*Sitta canadensis*	10
Ruby-crowned Kinglet	*Regulus calendula*	56
Golden-crowned Kinglet	*Regulus satrapa*	1
Swainson's Thrush	*Catharus ustulatus*	133
Hermit Thrush	*Catharus guttatus*	9
American Robin	*Turdus migratorius*	47
Tennessee Warbler	*Vermivora peregrina*	63
Orange-crowned Warbler	*Vermivora celata*	3
Yellow Warbler	*Dendroica petechia*	10
Mourning Warbler	*Oporonis philadellphia*	1
Palm Warbler	*Dendroica palmarum*	1
Magnolia Warbler	*Dendroica magnolia*	2
Yellow-rumped Warbler	*Dendroica coronata*	66
Blackpoll Warbler	*Dendroica striata*	4
Cape May Warbler	*Dendroica tigrina*	6
Black-throated Green Warbler	*Dendroica virens*	45
Wilson's Warbler	*Wilsonia pusilla*	7
Northern Waterthrush	*Seiurus noveboracensis*	26

English Name	Scientific Name	# Forest Songbird Point Count Records (2014)
Song Sparrow	*Melospiza melodia*	1
Lincoln's Sparrow	*Melospiza lincolnii*	4
White-throated Sparrow	*Zonotrichia albicollis*	49
Fox Sparrow	*Passerella iliaca*	30
Dark-eyed Junco	*Junco hyemalis*	61
Pine Siskin	*Carduels pinus*	12

APPENDIX E

Incidental observations during 2014 Avifauna Field Program

Table E-1: Incidental Observations of Avifauna and Other Wildlife

Observations	
Avifauna	**Mammals and Herpetiles**
Surf Scoter Component	
Common Loon (*Gavia immer*)	Moose (*Alces americanus* syn. *Alces alces*); female
Canada Goose (*Branta canadensis*)	Caribou (*Rangifer tarandus*); male and female
American Black Duck (*Anas rubripes*)	Porcupine (*Erethizon dorsatum*)
Common Merganser (*Mergus merganser*)	Black bear (*Ursus americanus*); adult and cub
Red-breasted Merganser (*Mergus serrator*)	
Ring-necked Duck (*Aythya collaris*)	
Black Scoter (*Melanitta americana*)	
Common Goldeneye (*Bucephala clangula*)	
Spotted Sandpiper (*Actitis macularius*)	
Golden Eagle (*Aquila chrysaetos*)	
Bald Eagle (*Haliaeetus leucocephalus*)	
Osprey (*Pandion haliaetus*); active nest	
Red-tailed Hawk (*Buteo jamaicensis*)	
Unidentified Scaup species (*Aythya sp.)*	
Unidentified Gull Species (*Larus sp.*)	
Forest Songbird Point Count Component (in addition to those detected during point count surveys)	
Ptarmigan species (*Bonasa/ Falcipennis/ Lagopus sp.)*	Moose (*Alces americanus* syn. *Alces alces*); tracks, scat and browse
Red-tailed Hawk (*Buteo jamaicensis*)	Fox (*Vulpes sp.*); tracks
Merlin (*Falco columbarius*)	American toad (*Anaxyrus americanus*)
Greater Yellowlegs (*Tringa melanoleuca*)	Porcupine (*Erethizon dorsatum*); browse
Red-eyed Vireo (*Vireo olivaceus*)	Small mammal (trails)
Purple Finch (*Haemorhous purpureus*)	Snowshoe hare (*Lepus americanus*); browse, and runs
Unidentified Woodpecker species (holes in trees)	Red squirrel (*Tamiasciurus hudsonicus*)
	American beaver (*Castor canadensis*)
Common Nighthawk Component	
Canada Goose (*Branta canadensis*)	American Toad (*Anaxyrus americanus*)
Bank Swallow (*Riparia riparia*)	
Wilson's Snipe (*Gallinago delicate*)	
Gray Jay (*Perisoreus canadensis*)	

Observations	
Common Raven (*Corvus corax*)	
Swainson's Thrush (*Catharus ustulatus*)	
Hermit thrush (*Catharus guttatus*)	
American Robin (*Turdus migratorius*)	
American Pipit (*Anthus rubescens*)	
Tennessee Warbler (*Oreothlypis peregrine*)	
Yellow-rumped warbler (*Setophaga coronate*)	
Black-throated Green Warbler (*Setophaga virens*)	
Northern Waterthrush (*Parkesia noveboracensis*)	
White-throated Sparrow (*Zonotrichia albicollis*)	
Fox Sparrow (*Passerella iliaca*)	
Dark-eyed Junco (*Junco hyemalis*)	
Unidentified Gull species (*Larus sp.*)	

APPENDIX F

Species at Risk

Table F.1 Avifauna Species and Risk and Habitat Associations Considered in the 2014 Avifauna EEMP

Scientific Name	Common Name	Status	Habitat	ELC Ecotype	Occurrence in Relation to Project[1]
Contopus cooperi	Olive-sided Flycatcher	Threatened under SARA	Open areas containing tall live trees or snags for perching. Open areas include forest clearings, forest edges located near natural openings (such as wetlands, rivers or streams), burned forest or openings within old-growth forest stands characterized by mature trees and large numbers of dead trees or human-made openings (such as logged areas).	Wetland	Documented during baseline point count surveys (n=1 in 2006; n=3 in 2007), and during 2014 point count surveys (n=1) Suitable primary habitat (14%) may be found in the lower Churchill River watershed (regional ELC)
Euphagus carolinus	Rusty Blackbird	Special Concern	Breeding habitat corresponds closely to with the boreal forest. Primarily occupies forest wetlands, such as slow-moving streams, peat bogs, sedge meadows, marshes, swamps, beaver ponds and pasture edges	Wetland	Documented during baseline point count surveys (n=1 in 2006; n=15 in 2007), and during the 2014 nest search field program (n=7) Suitable primary habitat (3.7%) may be found in the lower Churchill River watershed (Regional ELC)
Chordeiles minor	Common Nighthawk	Threatened	Burns and burn edges, anthropogenically disturbed sites for ground nesting; wetland areas for foraging on insects	Black Spruce Lichen Forest / Burn / Anthropogenic	Incidental observations during 2006 field season 2014 nest search field program and 2014 Common Nighthawk program Suitable primary habitat (42.3%) may be found in the lower Churchill River Watershed (Regional ELC)

Scientific Name	Common Name	Status	Habitat	ELC Ecotype	Occurrence in Relation to Project[1]
Catharus minimus	Gray-cheeked Thrush	Vulnerable under NLESA	A variety of mature forest types including white spruce, wet spruce and dry spruce adjacent to wetland or riparian habitat	Open Conifer Forest / Mixedwood Forest	Documented during baseline point count surveys (n=1 in 2006; n=8 in 2007) Suitable primary habitat (16.9%) may be found in the lower Churchill River watershed (Regional ELC)

[1] percentages of available primary habitat available in Regional ELC were taken from Tables 5-24 to 5-27 in Volume IIB of the EIS

Table F.2 Results of 2014 Common Nighthawk Surveys

Date	UTM Coordinates (20 U)		Start Time	# CONI	Start Time		# CONI	Habitat	Comments
	Northing	Easting	6-minute Listening Period		2-minute Call Playback	2-Minute Listening Period			
16June	611005	5871409	21:45	0	21:51	21:53	0	At end of Gull Island road; sandy area bordered by mixed forest	
16June	610481	5871809	22:01	0	22:07	22:09	0	open sand pit on Gull Island road, bordered by Black Spruce forest	
16June	609481	5872499	22:20	0	22:26	22:28	0	Sand pit off Gull Island road, bordered by dry Black Spruce forest	
16June	609841	5873387	22:36	0	22:42	22:44	0	Gull Island road; 3 wetlands in area, open Black Spruce habitat along roadside	
16June	611890	5875093	22:51	0	22:57	22:59	0	Clearing / open Black Spruce; wetlands approximately 500 m to east and west of road	
16June	613862	5877047	23:06	0	23:12	23:14	0	open / mulched area of Transmission Line; Black Spruce surrounding cleared areas	overcast with some clear skies; not fully dark
16June	615068	5878732	23:19	0	23:25	23:27	0	burn habitat on south side of TLH; closed Black Spruce habitat on north side	very quiet
17June	622495	5882913	21:24	0	21:30	21:32	0	TLH near pond / cabins, with areas of open Black Spruce on north side and some areas of wet Black Spruce on south side	

Date	UTM Coordinates (20 U)		Start Time	# CONI	Start Time		# CONI	Habitat	Comments
	Northing	Easting	6-minute Listening Period		2-minute Call Playback	2-Minute Listening Period			
17June	628057	5889109	22:00	0	22:06	22:08	0	large wetland complex on north side of TLH; near access road AT13	
17 June	630186	5891052	22:14	0	22:20	22:22	0	on TLH between string bog and wetland habitats; with mixed forest (coniferous dominant) along edges of TLH	light rain started at end of survey; 18*C
17 June	631614	5893425	22:29	0	22:35	22:37	0	on TLH adjacent to a large sandpit with Black Spruce habitat on north side and surrounding the sand pit	
17 June	634528	5895873	22:46	0	22:52	22:54	0	in parking lot of old camp; large cleared area of sand, with several wetland areas nearby	
18 June	636131	5897564	21:18	0	21:24	21:26	0	gravel pit on north side of TLH	had attempted to survey on June 17 but conditions became unfavorable
18 June	636267	5898457	21:32	0	21:38	21:40	0	on side of road adjacent to TLH; several cabins in the area; open/sandy with sparse deciduous trees and bordered by coniferous forest	could hear river rushing
18 June	640467	5901194	21:54	0	22:00	22:02	0	recently cut Transmission Line intersecting TLH; bordered by Black Spruce-Lichen forest	

Date	UTM Coordinates (20 U)		Start Time	# CONI	Start Time		# CONI	Habitat	Comments
	Northing	Easting	6-minute Listening Period		2-minute Call Playback	2-Minute Listening Period			
18 June	640959	5901479	22:09	0	22:15	22:17	0	south side of road overlooks cut area and some wet areas; north side of road is dense, mixed forest	could hear waterfall/stream
18 June	641529	5902655	22:23	0	22:29	22:31	0	sand pit on south side of TLH; possible access road	Swainson's Thrush made unusual start to song
18 June	644612	5904535	22:45	0	22:51	22:53	0	cleared trail/road; generally sandy with wetlands in distance; Black Spruce forest along road edges	could hear machinery from the construction site; got dark very quickly on this night
2 July	463575	5923182	21:01	0	21:07	21:09	0	Gravel pit on south side of TLH	Swallow sp (undefined) came out during call playback
2 July	463418	5923601	21:17	0	21:23	21:25	0	Gravel pit on one side of TLH, small pond on opposite side	
2 July	456696	5926899	21:40	0	21:46	21:48	0	gravel access road leading to cleared Right-of-Way	recently disturbed with some gravel areas
2 July	449776	5928131	22:03	0	22:09	22:11	0	South of TLH is scrubby black spruce habitat with wetland; north side of TLH is rock ledge	
2 July	446971	5930030	22:24	0	22:30	22:32	0	Gravel pit on south side of TLH	
2 July	440928	5933400	22:44	0	22:50	22:52	0	Gated, cleared area/pit on north side of TLH	

Date	UTM Coordinates (20 U)		Start Time	# CONI	Start Time		# CONI	Habitat	Comments
	Northing	Easting	6-minute Listening Period		2-minute Call Playback	2-Minute Listening Period			
7 July	641698	5902272	21:20	0	21:26	21:28	0	cleared road/ turn around adjacent to cleared Right-of-Way; low shrub valley area with small river	
7 July	640880	5903155	21:41	0	21:47	21:49	0	sandy/cleared area off TLH with low shrub bordering; north side of TLH is coniferous dominated forest (closed canopy)	
7 July	640678	5903721	21:57	0	21:63	21:65	0	sandy/open area near cabin on road adjacent to TLH; some low shrub; overlooks valley	
7 July	640790	5904418	22:17	0	22:23	22:25	0	road off north side of TLH, low shrub trees and larger coniferous	
7 July	646405	5905934	22:47	0	22:53	22:55	0	gravel pit adjacent to road on north side of TLH	
7 July	[redacted]	[redacted]	22:30	1	22:36	22:38	2	On bike trail in Goose Bay	
8 July	617520	5879736	22:07	0	22:13	22:15	0	recent burn	
8 July	648278	5902835	23:02	0	23:08	23:10	0	end of Muskrat Falls road (archaeology site); open area	
8 July	648868	5904475	23:20	0	23:26	23:28	0	on Muskrat Falls road	
8 July	666987	5905209	23:49	0	23:55	23:57	0	TLH: near bridge to Port Hope Simpson	

Note: TLH=Trans Labrador Highway

ATTACHMENT 7.4

Annual Report on the Implementation of the Avifauna Management Plan – Torrent River Harlequin Duck Survey (2014)

FINAL

LOWER CHURCHILL PROJECT

Annual Report on the Implementation of the Avifauna Management Plan – Torrent River Harlequin Duck Survey

Submitted to:
Nalcor Energy
Hydro Place, 500 Columbus Drive
P.O. Box 12400
St. John's, Newfoundland and Labrador
Canada A1B 4K7

Submitted by:
Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited
133 Crosbie Road, PO Box 13216
St. John's, Newfoundland & Labrador
Canada, A1B 4A5

15 October 2015
Amec Foster Wheeler Project #: TF14104133

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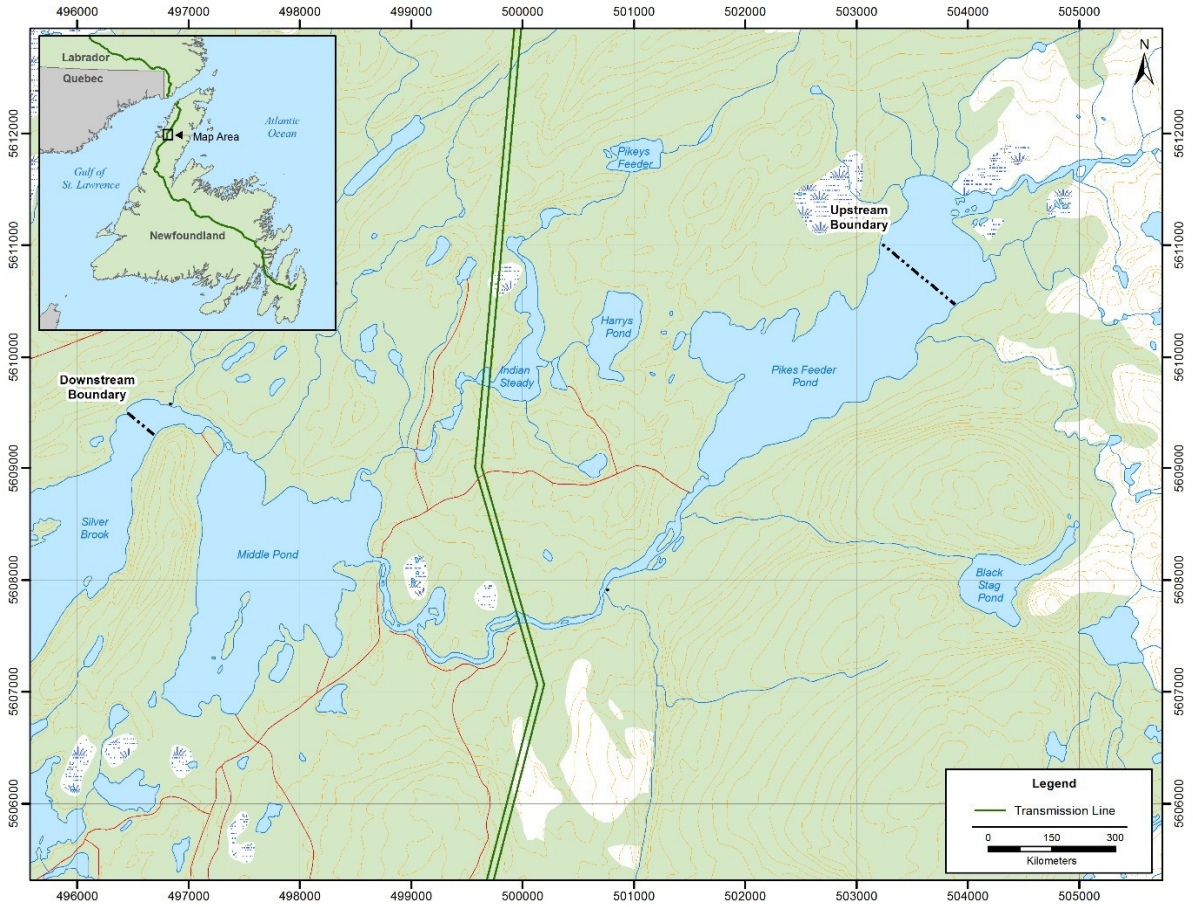
1.0 SUMMARY

The objective of this survey was to assess the occurrence of harlequin ducks (*Histrionicus histrionicus*) in the immediate section of the Torrent River that is bisected by the proposed transmission line. Harlequin ducks are listed as Special Concern under the federal Species at Risk Act and as Vulnerable under the Newfoundland and Labrador Endangered Species Act; therefore, consideration of potential impacts on resident birds is warranted. Harlequin ducks are known to nest along turbulent rivers across the Northern Peninsula and have previously been detected along the Torrent River during the breeding season (W. Barney, NL Wildlife Division, Pers. Comm.). A single male Harlequin Duck was observed just beyond the 5 km upstream section during the aerial survey completed for Nalcor by Amec in 2014. The section of the Torrent River bisected by the proposed transmission line is characterized by turbulent rapids, pools, and larger lakes. Stream width is approximately 50 m and riparian vegetation is dominated by late successional balsam fir forest.

On July 7, 2015, AMEC personnel (team leader and 2 observers) used a Long Ranger Helicopter to search for Harlequin Ducks along a 5 km section upstream and downstream of where the proposed transmission line bisects the Torrent River (Figure 1.1). This work was done in conjunction with aerial surveys for raptors along the entire propose TL route from Soldier's Pond to Shoal Cove. One observer/navigator was positioned in the front of the aircraft and two in the rear seat facing the opposite side of the helicopter. The pilot functioned as a third observer and primary navigator. Flying speed and altitude were maintained at 50 km/h and 50 m above ground level, respectively. This ensured that any birds potentially present would likely be detected. Timing of the survey (early July) was conducted at a time when females would be present on the water with fledglings.

Flying conditions during the time of the survey were ideal for detecting waterfowl. Winds were light (<30 km/h), air temperature varied from 12-15^0 C, and skies were clear with no precipitation. Total time spent searching for Harlequin Ducks was 24 minutes. No Harlequin Ducks were observed during this survey. Other waterfowl species present along the 10 km section of the Torrent River included Canada Goose, American Black Duck, and Red-breasted Merganser. This survey, as detailed in the project Avifauna Management Plan, fulfils commitments made during the EA and ensures compliance with provincial legislation (Wildlife Act and Endangered Species Act).

Figure 1.1 Harlequin duck survey along the Torrent River, Northern Peninsula, July 7, 2015.



APPENDIX A

AMEC FOSTER WHEELER AVIFAUNA SURVEY TEAM, MAY-JULY, 2015

John Gosse, Senior Biologist

SUMMARY OF EXPERIENCE:

John Gosse is a wildlife biologist with over 20 years of experience in resource conservation issues including species at risk recovery and assessing the impacts of non-native species on forest regeneration. Mr. Gosse has extensive experience in conducting surveys for woodland birds of prey, Harlequin Ducks, shorebirds, and boreal songbirds. He is a current member of the Newfoundland Land-birds and Shorebirds Recovery Teams and has contributed to the development of population monitoring guidelines for the Province. John recently authored the provincial Recovery Strategy for Olive-sided Flycatchers and has published multiple articles in scientific journals on avian ecology. Mr. Gosse is also a long-time participant of the North American Breeding Bird Survey and has led survey efforts in several regions of eastern Newfoundland.

RELEVANT PROJECTS

- Avifauna nest survey, Nalcor, NL, Canada. From May-August, 2015, John was the lead field biologist responsible for implementing the nest survey program along the proposed transmission line corridor in western Newfoundland.
- Avifauna nest survey, EMERA, Stephenville, NL, Canada. During summer, 2013, John participated in a field study to determine the presence/absence of nesting birds along a proposed transmission line corridor route in western Newfoundland.
- Breeding bird survey, Canadian Wildlife Service, St. John's, NL, Canada. During summer, 2013, John conducted breeding bird surveys in a remote wilderness setting along the Mecatina River in southern Labrador.
- Labrador West Transmission Link, Nalcor Energy Limited, NL; Conducted the collection of data on the composition of mammal communities along the proposed transmission line route in western Labrador.
- Western Newfoundland Transmission Line Assessment (EMERA); Conducted field surveys for the threatened Newfoundland marten along the proposed transmission line route in western Newfoundland.
- Species at Risk Recovery, Parks Canada; Led a long-term recovery program to establish a viable population of Newfoundland marten in Terra Nova National Park/eastern Newfoundland. Components of this program included ecological research, translocations to increase the number of resident animals, the development of alternative trapping approaches to mitigate accidental mortality, and the development and delivery of educational products and programs.
- Ecological research on Harlequin Ducks; Conducted research on the distribution and abundance of Harlequin Ducks in Hebron Fiord, Labrador. Also, assessed diel activity, reproductive success and feeding ecology.

ATTACHMENT 7.5

2015 Annual Report on the Implementation of the Avifauna Management Plan - Labrador

2015 Annual Report on the Implementation of the Avifauna Management Plan - Labrador

Prepared for:
Nalcor Energy
Hydro Place, 500 Columbus Drive
P.O. Box 12800
St. John's, NL A1B 0C9

Prepared by:
Stassinu Stantec Limited Partnership
141 Kelsey Drive
St. John's, NL A1B 0L2

File No: 121413500

Annual Report

September 8, 2016

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Executive Summary

The 2015 implementation of the Avifauna Management Plan (AMP), completed by Stassinu Stantec Limited Partnership (Stassinu Stantec), represents a component of the Environmental Protection Plan executed by Nalcor Energy (Nalcor) for construction of the Lower Churchill Project (the Project) in Labrador. The program is based on the requirements and commitments in the Lower Churchill Generation Project and Labrador-Island Transmission Link Project Environmental Impact Statements. The two objectives of the 2015 implementation of the AMP were to: (1) mitigate potential disturbances of incidental take on avifauna species in the Project Area by implementing three levels of protection, and (2) identify and monitor nest setbacks of migratory, non-migratory, and species at risk within and adjacent to the Project Area for scheduled vegetation clearing during the breeding season. This report summarizes the results of the directed surveys of the AMP mitigation measures from the 2015 field program, and represents the third year of implementation of the AMP (Stassinu Stantec 2013).

The Project Area has both migratory and resident avifauna species, which are protected either under federal and/or provincial legislations. These protected avifauna species can be classified as landbirds, waterfowl, waterbirds, and shorebirds. There are also species at risk that occur within this area.

Aerial and ground surveys were conducted between May 21, 2015 and July 30, 2015 and occurred less than 7 days prior to any vegetation clearing during the breeding season of May 1 – July 31 according to recommended guidelines from Environment Canada (Government of Canada 2014a). A decision was made in early May to delay the start of surveys due to the persistent snowpack in the Study Area. Ground surveys covered approximately 6.85 km^2, while aerial surveys covered approximately 755 km^2, over a combined total of 1840 field hours.

A total of forty-five setbacks were established. Thirty-one setbacks were established for landbirds, waterbirds, waterfowl, and shorebirds and fourteen for raptors. There were no setbacks established for species at risk. As a result of the implementation of the AMP, residual environmental effects on avifauna were mitigated.

1.0 2015 IMPLEMENTATION OF THE AVIFAUNA MANAGEMENT PLAN

The 2015 implementation of the Avifauna Management Plan (AMP), completed by Stassinu Stantec Limited Partnership (Stassinu Stantec), is a component of the Environmental Protection Plan initiated by Nalcor Energy (Nalcor) in conjunction with the Lower Churchill Project (the Project). The program is based on the requirements and commitments in the Lower Churchill Generation Project and Labrador-Island Transmission Link Environmental Impact Statements (Nalcor 2009a, 2009b, 2012). The objectives of the 2015 implementation of the AMP were to:

- Mitigate potential disturbances of incidental take on avifauna species in the Project area by implementing three levels of protection;
- Identify and monitor nest sites of migratory, non-migratory, and species at risk within and adjacent to the Project Area for scheduled vegetation clearing during the breeding season.

This report summarizes the results of the directed surveys of the AMP mitigation measures from the 2015 field program, and represents the third year of implementation of the AMP.

1.1 Background

Nalcor has implemented its AMP for a third year to mitigate potential disturbance (i.e., incidental take) to migratory and resident avifauna. The AMP (Stassinu Stantec 2013) targets all species of avifauna in the Project area, with mitigation measures divided into three levels of protection:

1. General Mitigation Measures: mitigation measures employed in the Project design;
2. General Awareness Mitigation Measures: awareness of the AMP mitigation measures and bird breeding cues for personnel on site;
3. Directed Surveys: aerial and ground surveys for nesting avifauna (all species), to be conducted prior to any vegetation clearing during the breeding season.

Avifauna in Newfoundland and Labrador are managed by both federal and provincial regulatory agencies. At the federal level, there is the *Migratory Birds Convention Act* (MBCA) and associated *Migratory Birds Regulations* (MBR), and the *Species at Risk Act* (SARA). Provincially, there is the Newfoundland and Labrador *Wild Life Act,* the *Newfoundland and Labrador Endangered Species Act* (NLESA), and the *Minerals Exploration Standards Regulations*.

The MBCA was designed to protect and conserve migratory birds, both as populations and individual birds, and their nests located on all land regardless of ownership in Canada (Government of Canada 1994a). In Canada, the MBCA and associated Migratory Birds Regulations (MBR) (Government of Canada 1994b) are administered through Environment Canada by the Canadian Wildlife Service (CWS) (Government of Canada 1994a). Coverage of the MBCA includes landbirds (e.g., warblers, thrushes, and sparrows), waterfowl (e.g., ducks, loons and geese), and waterbirds (e.g., gulls and terns) but does not include grouse, quail,

pheasants, ptarmigan, hawks, eagles, owls, falcons, cormorants, crows, jays, or kingfishers (Environment Canada 1991). Further, the MBR prohibit the disturbance, destruction, or taking of a nest referred to as incidental take, nest shelter, eider duck shelter or duck box of a migratory bird, or the possession of a live migratory bird, or a carcass, skin, nest or egg of a migratory bird (Government of Canada 1994b). Permits for these activities are not issued by CWS or Environment Canada (Joint Review Panel 2011, pg. 140). Environment Canada provides guidelines to reduce the risk of incidental take (Government of Canada 2014a).

SARA was established to provide wildlife species additional protection against extirpation, extinction, or endangerment (Government of Canada 2002). Species at risk are classified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as extirpated, endangered, threatened, or of special concern depending on the level of risk. Like the MBCA, this affords protection at a federal level by prohibiting the killing, harming, harassment, capture or taking, or collection of a listed species, and the damage or destruction of a residence of a listed species (Government of Canada 2002).

The *Wild Life Act* (Government of Newfoundland and Labrador 1990a) and associated *Wild Life Act Regulations* (Government of Newfoundland and Labrador 1990b) are administered by the Newfoundland and Labrador Department of Environment and Conservation (NLDOEC). This act offers protection to non-migratory species such as raptors, eagles, owls, crows, jays, grouse and ptarmigan. The Newfoundland and Labrador *Mineral Exploration Standards* prohibit vegetation clearing within 800 m of an active Osprey, eagle, and raptors during breeding season and 200 m outside of breeding season (Government of Newfoundland and Labrador 2007). These standards also state that clearing activities are to stop when any active nest is identified (Government of Newfoundland and Labrador 2007).

The NLESA protects wildlife species, subspecies or populations within the province that are considered endangered, threatened, or vulnerable based on recommendations from COSEWIC or the provincial Species Status Advisory Committee (SSAC) (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 (Government of Newfoundland and Labrador 2004). There are currently 14 avifauna species listed under the NLESA (NLDEC 2012a).

The lower Churchill River valley, central, and southern Labrador have both migratory and resident avifauna species (LGL Ltd. 2008, Minaskuat Inc. 2008a, Stassinu Stantec 2014), which are protected either under federal and/or provincial legislations (Stassinu Stantec 2013). Species at risk have also been documented within the lower Churchill River valley (Stassinu Stantec 2014, Stassinu Stantec 2013, LGL Ltd. 2008, Minaskuat Inc. 2008a).

1.2 Study Team

The study team for ground surveys consisted of Stassinu Stantec field leads and field assistants (Appendix A). The aerial survey study team included personnel from Stassinu Stantec and Universal Helicopters Newfoundland and Labrador Limited Partnership (UHNL) (Appendix A).

Prior to the start of the field component of the 2015 implementation of the AMP, all personnel reviewed the Health, Safety, Environment and Quality (HSEQ) Plan, and the Risk Management Strategy 1 (RMS 1) (Stassinu Stantec 2015). Each morning, a daily hazard assessment (RMS 2) was completed and teams attended on-site toolbox meetings with Nalcor and/or the cutting contractors (depending on where teams were deployed), prior to field surveys.

2.0 METHODS

2.1 Project Setting

2.1.1 Study Area

The study area was determined by the vegetation clearing schedule for May 1, 2015 to July 31, 2015, encompassing areas along the HVdc transmission line, an area on the HVac transmission line, and an archaeological site in the reservoir (Figure 2-1). The HVdc transmission line spans Muskrat Falls to Forteau, a distance of approximately 400 km. The HVac transmission line is between Muskrat Falls and Churchill Falls, a distance of approximately 245 km. The extent of the reservoir is approximately 41 km^2.

Due to the size of the study area and the availability of ecological data, habitats were described using three separate Ecological Land Classifications (ELCs) prepared for the Project.

1. The lower Churchill River valley Project Area was classified using high resolution aerial photography, LiDAR, digital forestry data, terrain, soils, wildlife, and vegetation field sampling at a scale of 1:20,000 (Minaskuat 2008b, Nalcor 2009a).
2. The interconnecting transmission line was characterized using publically available aerial photography, digital forestry data, digital elevation models, terrain, soils, wildlife, and vegetation field sampling at a scale of 1:50,000 (Minaskuat 2008b, Nalcor 2009a).
3. Missing areas were supplemented using Earth Observation for Sustainable Development (EOSD) forest cover maps at a scale of 1: 250,000 (Government of Canada 2014b).

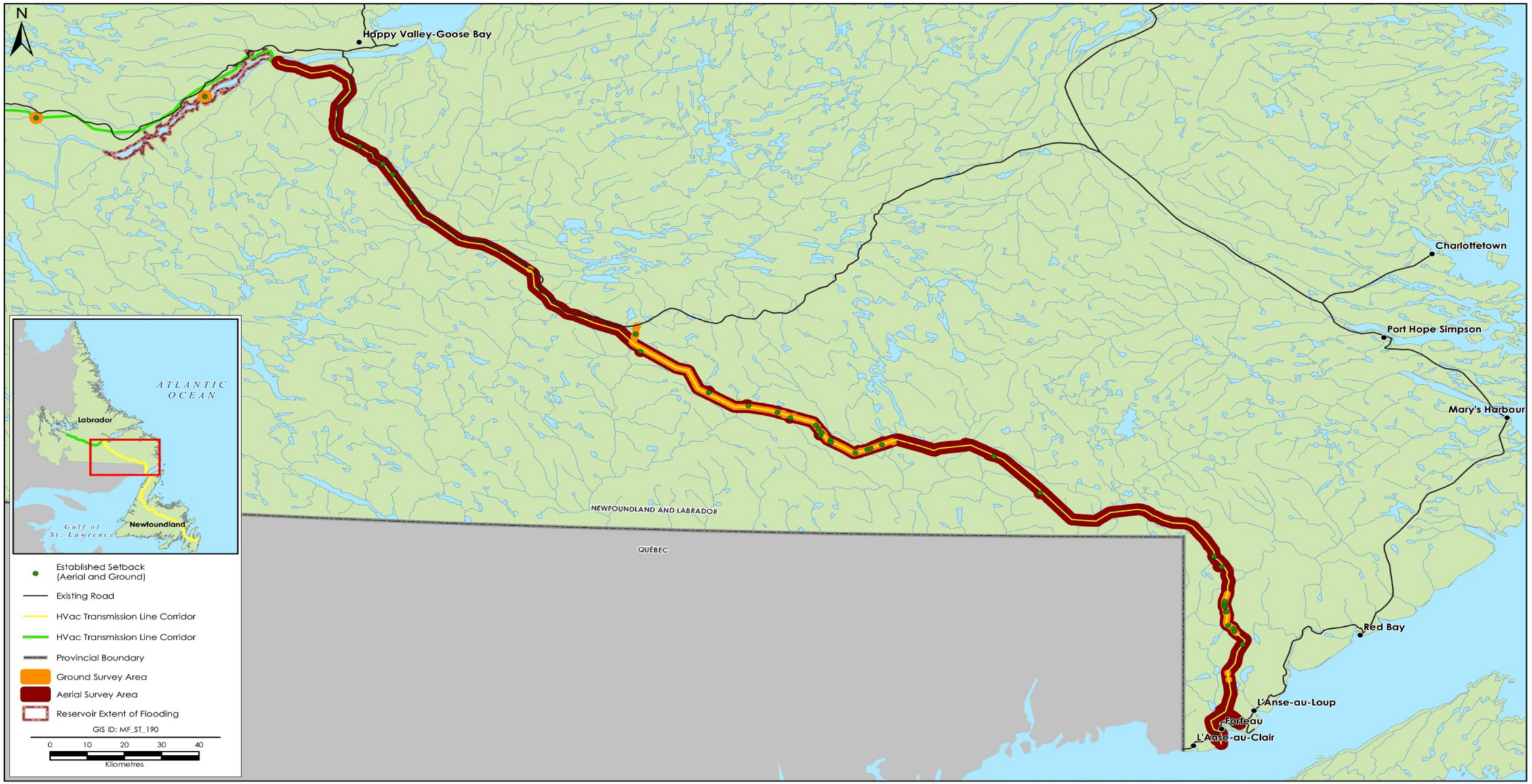

Figure 2-1 2015 Implementation of the AMP Study Area

2.1.2 Ecological Setting

The HVdc transmission line traverses the Lake Melville (High Boreal Forest) Ecoregion, along with the Mecatina River (Low Subarctic Forest), Eagle River Plateau (String Bog) and Forteau Barrens Ecoregions (NLDEC 2008b, NLDEC 2008c, NLDEC 2008d, Lopoukhine 1978). The Mecatina River Ecoregion is characterized by rolling hills of open black spruce (*Picea mariana*) lichen woodland and black spruce *sphagnum spp.* forests along with string bogs and fens. Eskers, kames, and drumlins, evidence of past glacial activity, are common. The Eagle River Plateau is dominated by string bogs and open water. The hummocks within the string bogs are vegetated with stunted black spruce and larch (*Larix laricina*) with Labrador tea (*Rhododendron groenlandicum*) and mosses. There are scattered balsam fir and white spruce (*Picea glauca*) uplands, and open black spruce lichen woodlands. The Forteau barrens on the coast have some wet tuckamore of black spruce. Uplands are mainly barrens with black spruce with some balsam fir, willow (*Salix spp.*), and ericaceous species as well as some areas of with heavy lichen cover.

The HVac transmission line and the reservoir are located within the Lake Melville (High Boreal Forest) Ecoregion (NLDEC 2008a, Lopoukhine 1978). Forests on lower slopes are composed of balsam fir (*Abies balsamea*), black spruce, white birch (*Betula papyrifera*), and trembling aspen (*Populus tremuloides*). The black spruce dominated forests of the dryer upper terraces are interspersed with string bogs or fens. Black spruce and balsam fir are common on upper terraces with shallow soils. Forest fires are common in upland areas and river terraces resulting in a dominance of black spruce and lichen (predominately *Cladina spp.*). Slopes where fires have occurred usually regenerate as white birch and trembling aspen.

Additional detail at a smaller scale regarding ecotypes within the Project footprint is available in an Ecological Land Classification (ELC) of the Lower Churchill River valley (Minaskuat Inc. 2008b) and is summarized in the AMP (Stassinu Stantec Consulting Ltd. 2013).

Baseline avifauna studies completed for the Project have examined the presence of waterfowl/waterbirds species (Stassinu Stantec Consulting Ltd. 2013, LGL 2008), raptors (Stassinu Stantec Consulting Ltd. 2013, Minaskuat Inc. 2008a), and landbirds (Stassinu Stantec Consulting Ltd. 2013, Minaskuat Inc. 2008a). Landbirds were the dominant species group observed in the Lower Churchill River valley, and the most common observations included: Ruby-crowned Kinglet (*Regulus calendula*), Dark-eyed Junco (*Junco hyemalis*), Swainson's Thrush (*Catharus ustulatus*), Tennessee Warbler (*Oreothlypis peregrina*), White-throated Sparrow (*Zonotrichia albicollis*), Yellow Warbler (*Setophaga petechia*), Boreal Chickadee (*Poecile hudsonicus*), and Black-throated Green Warbler (*Setophaga virens*) (Minaskuat Inc. 2008b). Many of the avifauna species have specific habitat requirements that associate them with particular ecotypes, which are described in more detail in the AMP (Stassinu Stantec Consulting Ltd. 2013).

Species at risk that occur within the lower Churchill River valley include Olive-sided flycatcher (*Contopus cooperi*), Common Nighthawk (*Chordeiles minor*), Rusty Blackbird (*Euphagus carolinus*), Harlequin Duck (*Histrionicus histrionicus*), and Gray-Cheeked Thrush (*Catharus minimus*) (Minaskuat Inc. 2008a).

2.2 Field Surveys

Surveys were conducted during the identified breeding season (May 1 – July 31) (Environment Canada 1991, Government of Canada 2014b) for the Study Area. Surveys were conducted less than seven days prior to any vegetation clearing along the HVdc transmission line, archaeological sites in the reservoir, and the area along the HVac transmission line. Weather limitations for avifauna nest surveys include steady rain and/or a wind speed of four or higher on the Beaufort scale (> 20 km/h) (Stantec Consulting Ltd. 2013).

2.2.1 Ground Surveys

Field teams conducted nest searches from May 21, 2015 to July 30, 2015, as per scheduled vegetation clearing and snow conditions. Field teams consisted of two to four observers spaced at 10 m intervals walking along the transect at approximately 2-3 km/h. If dense vegetation was encountered, the spacing and speed were reduced to approximately 5 m and 1-2 km/h respectively, to compensate for any reduction in visibility. The survey team would begin surveys at the indicated start point at one of the farthest survey area boundaries, walk to the end point, pivot, and survey the return leg parallel to the first sweep, concluding the survey at a point parallel to the start point. These "sweeping" transects were conducted until 100% of the survey area was covered. The survey area included the width of the Right of Way (RoW) with an additional 30 m beyond the boundary to account for potential landbird nests adjacent to the Project area (Figure 2-1).

Active and potentially active nesting areas were identified using either or both of the following two main indicators: 1) observation of a nest and 2) behavioral cues. Avifauna nests that could be encountered can have a variety of forms including open cup nests in trees, domed nests on the ground, burrows in banks, cavities in trees or snags, stick nests in tree tops, scrapes on wetland edges, or nests on floating vegetation mats in sheltered wetland areas (Stassinu Stantec Consulting Ltd. 2013). Behavioral cues are usually the most important indicator of an active nest as nests are typically well concealed. These cues can vary from singing males, observed pairs (e.g., alarm calls, courting, or copulation), flushing of an individual, alarm calls, adults repeatedly carrying nesting materials, fecal sacks, or food to the same location, aggressive defense behaviors (against other birds or people) near a location, or the presence of recently fledged birds (often with tufts of down feathers, may be persistently begging for food). Some shorebird species may exhibit a broken-wing display to lead a perceived threat away from an active nest. As part of this AMP, observation of behavioural indicators was prioritized, such that setbacks could be established where nesting was suspected, even if an actual nest could not be located.

2.2.2 Aerial Surveys

The area within 800 m of the north and south boundaries of the HVdc transmission line from Muskrat Falls to Forteau Point was surveyed (100% coverage) to account for potential nests adjacent to the Project area (Figure 2-1). A Bell 206 Long Ranger equipped with rear bubble windows was used during the aerial surveys. The aircraft maintained an altitude of

approximately 100 m above ground level and speed of 100 km/h during the surveys. All raptor and wildlife incidental observations were recorded and geo-referenced.

2.2.3 Active Nest Procedures

Setbacks were established when active or potentially active nests were identified using the indicators described above. Setbacks varied for species not of management concern (Government of Canada 2014b), raptors (NLDEC 2007) and species at risk (to be determined in consultation with Newfoundland and Labrador Wildlife Division; P. Trimper, pers. comm.) and included:

- 30 m for landbirds;
- 75 m for landbird species at risk;
- 100 m for waterfowl / waterbird / shorebird species;
- 800 m for raptor species when nest is active; 200 m when nest is inactive.

To avoid detection by predators or other threats, setbacks were indicated by flagging along the 30 m, 75 m, 100 m, or 800 m boundary. Information collected for each setback included species name, GPS coordinates for the nest or suspected nest site (UTM; NAD83), nesting stages, and a record of what behavioral cues initiated the setback. The location and recommended mitigation measures were communicated to each contractor manager via daily reports from the team leads.

In the event of the crews identifying a nesting area outside of the survey areas in the vicinity of proposed clearing, activities would cease within a minimum of 30 m of the area until the On-Site Environmental Monitor (OSEM) was notified by the Construction Manager. Once the OSEM was notified, a Stassinu Stantec avifauna field team would investigate to identify the species/nests and determine appropriate mitigation. If a nest was found adjacent to an existing trail/road, vehicles would continue to use this area but would not be permitted to stop within the recommended setback.

Nest setbacks for most species remained active until August 15 (or earlier if confirmed inactive). Resurveys were only conducted when considered unlikely to flush birds at vulnerable stages of development. Setbacks around raptor nests were maintained continuously, with setback size reduced from 800 m to 200 m when a nest was confirmed inactive.

3.0 RESULTS

3.1 Survey Effort

Surveys were conducted from May 21, 2015 to July 30, 2015. A total of 45 setbacks (ground surveys: n=31, aerial surveys: n=14) were established over approximately 1840 field hours, equivalent to 184 field person days. Ground surveys covered a total area of approximately

6.85 km^2 (HVdc ~6.84 km^2; HVac and reservoir ~0.01 km^2), while aerial surveys covered 755 km^2 (HVdc: ~755 km^2).

Table 3.1 Survey Effort for the 2015 Implementation of the AMP

Month	Survey	Total Field Person Days	Number of Setbacks
May	Ground	10	2
	Aerial	0	0
June	Ground	99	12
	Aerial	2	14
July	Ground	73	17
	Aerial	0	0
TOTALS		**184**	**45**

3.2 Ground Surveys

A total of 31 nest setbacks were established during ground surveys using a combination of behavioural cues and / or observation of a nest. Observation of behavioural cues allowed the team to establish a nest setback where nesting was suspected, even if an actual nest could not be located. Based on the professional experience of the study team and protocols implemented, ground coverage of the survey area is believed to be complete.

Nests of landbirds (n=25) were the most commonly identified, followed by waterfowl / waterbirds / shorebirds (n=2), and raptors (n=2) (Table 3.2, Appendix B). Habitats in which setbacks were established included lichen heathland (0.3 setbacks / 100 km^2), open conifer forest (0.02 setbacks / 100 km^2), wetland (0.03 setbacks / 100 km^2), conifer forest (0.04 setbacks / 100 km^2), conifer scrub (0.06 setbacks / 100 km^2), black spruce lichen forest (N/A), and low shrub (N/A) (Table 3.3).

No setbacks were established for species at risk. However, there were incidental observations of species at risk made for Short-eared Owl (*Asio flammeus*), Common Nighthawk, Bank Swallow (*Riparia riparia*), and Rusty Blackbird (Appendix C).

Table 3.2 Setbacks Established During Ground Surveys of the 2015 Implementation of the AMP

Survey Area	Species Group	Setback Size (m)	Number of Setbacks Established	Proportion of Area Surveyed (%)
HVac	Landbirds	30	1	100*
	Species at Risk	75	0	0
	Waterfowl/Waterbirds/Shorebirds	100	0	0
	Inactive Raptor	200	0	0
	Active Raptor	800	0	0
HVdc	Landbirds	30	25	1
	Species at Risk	75	0	0
	Waterfowl/Waterbirds/ Shorebirds	100	2	0.9
	Inactive Raptor	200	2	3
	Active Raptor	800	0	0
Reservoir	Landbirds	30	1	100*
	Species at Risk	75	0	0
	Waterfowl/Waterbirds/ Shorebirds	100	0	0
	Inactive Raptor	200	0	0
	Active Raptor	800	0	0
* Setback area was larger than survey area				

Table 3.3 Summary of 2015 Implementation of the AMP Ground and Aerial Surveys

ELC Habitat*	Total Number of Setbacks		Total Area Surveyed (km^2)		Setback Density	
	Ground	Aerial	Ground	Aerial	Ground (setback / 100 km^2)	Aerial (setback / km^2)
Black Spruce Feathermoss Forest[1]	0	0	-	-		-
Black Spruce Lichen Forest[1]	1	0	0.002	-	-[5]	-
Black Spruce Sphagnum Woodland[1]	0	0	-	-	-	-
Fir-White Spruce Forest[1]	0	0	-	-	-	-

ELC Habitat*	Total Number of Setbacks		Total Area Surveyed (km^2)		Setback Density	
	Ground	Aerial	Ground	Aerial	Ground (setback / 100 km^2)	Aerial (setback / km^2)
Spruce-Fir Feathermoss Forest[1]	0	0	-	-	-	-
Black Spruce Lichen Forest[2]	0	0	0.1	14	-	-
Conifer Forest[2]	5	4	1	191	0.04	0.02
Open Conifer Forest[2]	7	6	3	178	0.02	0.03
Coniferous Dense[3]	0	0	-	24	-	-
Coniferous Open[3]	0	0	-	1	-	-
Coniferous Sparse[3]	0	0	-	0.3	-	-
Hardwood Forest[1]	0	0	-	-	-	-
Hardwood Forest[2]	0	0	-	0.1	-	-
Mixedwood Forest[2]	0	0	-	3	-	-
Broadleaf Dense[3]	0	0	-	-	-	-
Mixedwood Dense[3]	0	0	-	0.4	-	-
Riparian Marsh[1]	0	0	-	-	-	-
Riparian Thicket[1]	0	0	-	-	-	-
Conifer Scrub[2]	6	0	0.9	143	0.06	0
Shrub Low[3]	1	0	0.001	0.247	-[5]	-
Wetland-Shrub[3]	0	0	-	-	-	-
Lichen Heathland[2]	6	0	0.1	42	0.3	0
Exposed/Barren Land[3]	0	0	-	0.1	-	-
Wetland[1]	0	0	-	-	-	-
Wetland[2]	4	4	1	130	0.03	0.03
Bryoids[3]	0	0	-	-	-	-
Gravel Bar[1]	0	0	-	-	-	-
Unvegetated[1]	0	0	-	-	-	-
Anthropogenic[2]	0	0	-	2	-	-
Burn[2]	0	0	-	4	-	-
Open Water[2]	0	0	-	14	-	-
Water[3]	0	0	-	0.004	-	-
River[1]	0	0	-	-	-	-
Cloud/Shadow[2]	1	0	0.05	1	-[4]	-
Shadow[3]	0	0	-	-	-	-

ELC Habitat*	Total Number of Setbacks		Total Area Surveyed (km^2)		Setback Density	
	Ground	Aerial	Ground	Aerial	Ground (setback / 100 km^2)	Aerial (setback / km^2)
Notes: [1] - HVac transmission line/Churchill ELC (Minaskuat Inc. 2008b) [2] - HVdc Transmission Line (Minaskuat Inc. 2008b) [3] - EOSD (Government of Canada 2014b) [4] - Not calculated as habitat unavailable due to cloud cover on imagery [5] - Not calculated as setback and total area surveyed were small and could lead to erroneous conclusions Habitats described in detailed in Minaskuat Inc. 2008b and summarized in Stassinu Stantec 2013						

3.3 Aerial Surveys

During aerial surveys, six inactive raptor setbacks and eight active raptor setbacks were established (Table 3.4). Raptors setbacks were established in conifer forests (0.02 setbacks / km^2), open conifer forests (0.03 setbacks / km^2), and wetland (0.03 setbacks / km^2) (Table 3.3). No species at risk were observed during aerial surveys.

Table 3.4 Setbacks Established During the Aerial Survey of the 2015 Implementation of the AMP

	Species Group	Setback Size (m)	Number of Setbacks Established	Proportion of Area Surveyed (%)
HVdc	Inactive Raptor	200	6	0.002
	Active Raptor	800	8	2

4.0 SUMMARY

There is no legal mechanism to authorize the incidental take of a migratory bird, its nest or its eggs. Primary mitigation to reduce the risk of incidental take is the avoidance of potentially disruptive or destructive activities during the bird breeding season. Should complete avoidance not be feasible, nest setbacks can be used to help mitigate the risk, in accordance with the recommended guidelines provided by Environment Canada (Government of Canada 2014a).

Aerial and ground surveys were conducted between May 21, 2015 and July 30, 2015 and were conducted less than seven days prior to any vegetation clearing during the breeding season in the survey area. Based on the professional experience of the study team and survey protocols, 31 setbacks were established for landbirds, waterbirds, waterfowl, and shorebirds, and 14 setbacks for raptors over 1840 field hours. Ground coverage of the area affected by

construction activities is believed to be complete. As a result of the implementation of the AMP, residual environmental effects on avifauna were mitigated.

4.1 Future Considerations

There are important considerations when implementing the AMP. There is a need to understand the habitat being cleared in terms of species abundance and diversity as this affects the number of setbacks that will be established in a particular location, which in turn will adversely affect construction schedules. Where possible, areas likely to have high densities of nesting birds should be preferentially cleared outside of the breeding season to minimize delays. Based on past implementations of the AMP, these habitats can include lichen heathland, conifer forests, and conifer scrub for areas on the Eagle Plateau and in Southern Labrador (Table 3.3), as well hardwood forest, coniferous sparse, wetlands, riparian thicket, and black spruce feathermoss forest in the Churchill River valley (Stassinu Stantec 2014).

The avifauna breeding period (Government of Canada 2014a) should be considered when coordinating the timing of clearing activities. Higher densities of nests can be expected in the early stages of the breeding season as compared to later in the breeding season when most species have completed their nesting. Annual environmental conditions also influence the timing of bird breeding and should also be taken into consideration when determining the beginning of bird breeding activities. For example, if there is still significant snow cover by May 1, avifauna surveys could be delayed until appropriate avifauna breeding conditions are met. Likewise, extension of the breeding bird survey period should be considered based on annual conditions.

To assure efficiencies of surveys, good communication between contractors and field teams is required to ensure surveys are conducted in the appropriate time and place. Contractors must provide accurate information regarding the areas to be cleared and must provide sufficient lead time to allow field teams to be mobilized and deployed in a timely and effective manner. Field teams must provide timely feedback to the contractors to minimize down time. Useful information collected by the avifauna survey teams includes: GPS files of survey areas, start and end points, and name of the contractor supervisor. Nest locations need to be accurately described to facilitate re-location, if required, to determine nest status (i.e., if fledging has occurred). Clear and timely communications continues to maximize efficiencies between various contractors who are collectively delivering the Project.

5.0 REFERENCES

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APPENDIX A

2015 AMP Study Team

Table A.1 2015 Study Team for the Implementation of the AMP Ground and Aerial Surveys

Name	Role	Position in helicopter	Organization
Wayne Tucker	Project Manager	-	Stassinu Stantec
Barry Keough	Assistant Project Manager	-	Stassinu Stantec
Caroline Hong	HSEQ Co-coordinator	-	Stassinu Stantec
Marcel Gahbauer	Senior Technical Advisor	-	Stassinu Stantec
Victoria Greeley	Project Controls	-	Stassinu Stantec
Ground Survey			
Stacey Camus	Team Lead /Reporting	-	Stassinu Stantec
Julie Henderson	Team Lead	-	Stassinu Stantec
Tina Newbury	Team Lead /Reporting	-	Stassinu Stantec
Tony Parr	Team Lead	-	Stassinu Stantec
Daniel Windeler	Team Lead/Field Assistant	-	Stassinu Stantec
Nathan Fequet	Field Assistant	-	Stassinu Stantec
Mackay Paul	Field Assistant	-	Stassinu Stantec
Jared Pilgrim	Field Assistant	-	Stassinu Stantec
Todd Watts	Field Assistant	-	Stassinu Stantec
Chris White	Field Assistant	-	Stassinu Stantec
Aerial Survey			
Richard Martin	Pilot	Front right	Universal Helicopters
Stacey Camus	Observer and Data Recorder	Front left	Stassinu Stantec
Mary Ann Aylward	Observer	Right rear	Stassinu Stantec

APPENDIX B

2015 AMP Survey Results

Table B.2 2015 Implementation of the AMP Survey Effort and Total Number of Nest Setbacks Established

Date	Survey (aerial or ground)	Number of Field Teams	Number of Field Personnel (Total Person Days)	Number of Setbacks
May 19	Team travelled to Eagle Camp			
May 20	Weather day			
May 21	Ground	1	3	0
May 22	Ground	1	3	1
May 23	Scheduled day off			
May 24	Scheduled day off			
May 25	Weather day due to high water levels			
May 26	Weather day due to high water levels			
May 27	Team travelled to Eagle Camp			
May 28	Weather day due to fog and deteriorated road			
May 29	Ground	1	4	1
May 30	Scheduled day off			
May 31	Scheduled day off			
June 1	Ground	1	4	0
June 2	Ground	1	4	0
June 3	Ground	1	4	0
June 3	Ground	1	4	0
June 4	Ground	1	4	0
June 5	Ground	1	4	0
June 6	Scheduled day off			
June 7	Scheduled day off			
June 8	Ground	1	4	0
June 9	Ground	1	4	0
June 10	Weather day			
June 11	Ground	1	4	1
June 12	Weather day			
June 13	Ground	1	3	0
June 14	Ground	1	3	0
June 15	Scheduled day off			
June 16	Scheduled day off			
June 17	Ground	1	3	1
June 18	Ground	1	3	0

Date	Survey (aerial or ground)	Number of Field Teams	Number of Field Personnel (Total Person Days)	Number of Setbacks
June 19	Ground	1	3	1
June 20	Ground	1	3	0
June 21	Scheduled day off			
June 22	Ground	1	2	0
	Aerial	1	2	14
June 23	Ground	1	3	3
June 24	Ground	1	3	1
June 25	Ground	1	4	1
	Weather day for Forteau team			
June 26	Ground	2	7	0
June 27	Ground	1	3	0
June 28	Ground	1	3	1
June 29	Ground	3	9	1
June 30	Ground	3	11	2
July 1	Ground	2	7	2
July 2	Ground	1	4	1
July 3	Ground	1	3	0
July 4	Ground	1	2	1
July 5	Scheduled day off for Eagle Camp team			
	Weather day for Forteau team			
July 6	Ground	2	6	0
July 7	Ground	2	6	2
July 8	Ground	2	7	0
July 9	Ground	2	7	3
July 10	Ground	1	3	0
July 11	Ground	1	3	1
July 12	Ground	1	3	3
July 13	Ground	2	6	1
July 14	Ground	2	6	0
July 15	Ground	2	6	0
July 16	Ground	2	6	0
July 17	Ground	2	6	0
July 18	Ground	1	2	0
July 19	Scheduled day off			
July 20	Ground	2	7	0

Date	Survey (aerial or ground)	Number of Field Teams	Number of Field Personnel (Total Person Days)	Number of Setbacks
July 21	Ground	2	6	1
July 22	Ground	2	6	0
July 23	Ground	1	3	0
July 24	Ground	1	3	0
July 25	Ground	1	3	0
July 26	Ground	1	3	0
July 27	Ground	1	3	0
	Weather day for Forteau team			
July 28	Ground	2	6	1
July 29	Ground			0
July 30	Ground	1	2	0
TOTAL				**45**

Table B.3 Avifauna Species and Number of Setbacks Established during the 2015 Implementation of AMP

Common Name	Scientific Name	# Nest Setbacks
American Black Duck	*Anas rubripes*	1
Red-tailed Hawk	*Buteo jamaicensis*	1
Osprey	*Pandion haliaetus*	8
Spruce Grouse	*Falcipennis canadensis*	2
Solitary Sandpiper	*Tringa solitaria*	1
Great Horned Owl	*Bubo virginianus*	1
Black-backed Woodpecker	*Picoides arcticus*	1
Tree Swallow	*Tachycineta bicolor*	1
Boreal Chickadee	*Poecile hudsonicus*	1
Swainson's Thrush	*Cathaus ustulatus*	1
Blackpoll Warbler	*Setophaga striata*	1
Yellow Warbler	*Setophaga petechial*	1
White-throated Sparrow	*Zonotrichia albicolis*	2
White-crowned Sparrow	*Zonotrichia leucophrys*	5
American Tree Sparrow	*Spizella arborea*	1
Fox Sparrow	*Passerella iliaca*	2
Savannah Sparrow	*Passerculus sandwichensis*	1
Dark-eyed Junco	*Junco hyemalis*	7
Unidentified landbird	-	1
Unidentified raptor	-	6
TOTAL		**45**

Table B.4 Setbacks Established During the 2015 Implementation of the AMP

Species	Setback Size (m)	UTM Northing	UTM Easting	ELC Habitat Type	ELC Dataset
American Black Duck	100	5733162	506065	Conifer Scrub	HVdc ELC
Red-tailed Hawk	800	5861504	689146	Open Conifer Forest	HVdc ELC
Osprey	800	5874371	277578	Conifer Forest	HVdc ELC
Osprey	800	5797289	387014	Wetland	HVdc ELC
Osprey	800	5754991	500794	Open Conifer Forest	HVdc ELC
Osprey	800	5755236	500866	Open Conifer Forest	HVdc ELC
Osprey	800	5792021	395073	Wetland	HVdc ELC
Osprey	800	5798915	383592	Open Conifer Forest	HVdc ELC
Osprey	200	5822684	345507	Open Conifer Forest	HVdc ELC
Osprey	200	5798917	383593	Wetland	HVdc ELC
Spruce Grouse	30	5789789	398008	Lichen Heathland	HVdc ELC
Spruce Grouse	30	5787991	408593	Conifer Forest	HVdc ELC
Solitary Sandpiper	100	5793876	394648	Conifer Forest	HVdc ELC
Great Horned Owl	800	5800923	375792	Open Conifer Forest	HVdc ELC
Black-backed Woodpecker	30	5894899	229775	Shrub Low	EOSD
Tree Swallow	30	5792684	395499	Open Conifer Forest	HVdc ELC
Boreal Chickadee	30	5795053	393878	Open Conifer Forest	HVdc ELC
Swainson's Thrush	30	5787632	407736	Conifer Forest	HVdc ELC
Blackpoll Warbler	30	5732345	506319	Open Conifer Forest	HVdc ELC
Yellow Warbler	30	5734134	504666	Conifer Scrub	HVdc ELC
White-throated Sparrow	30	5738315	504127	Lichen Heathland	HVdc ELC
White-throated Sparrow	30	5795029	393875	Open Conifer Forest	HVdc ELC
White-crowned Sparrow	30	5740950	503681	Lichen Heathland	HVdc ELC
White-crowned Sparrow	30	5740856	503627	Conifer Scrub	HVdc ELC
White-crowned Sparrow	30	5741480	503689	Cloud/Shadow	HVdc ELC
White-crowned Sparrow	30	5739857	503734	Lichen Heathland	HVdc ELC
White-crowned Sparrow	30	5740309	503601	Conifer Scrub	HVdc ELC
American Tree Sparrow	30	5741016	503689	Lichen Heathland	HVdc ELC

Species	Setback Size (m)	UTM Northing	UTM Easting	ELC Habitat Type	ELC Dataset
Fox Sparrow	30	5739725	503778	Lichen Heathland	HVdc ELC
Fox Sparrow	30	5740315	503630	Conifer Scrub	HVdc ELC
Savannah Sparrow	30	5738359	504053	Wetland	HVdc ELC
Dark-eyed Junco	30	5786567	404509	Conifer Forest	HVdc ELC
Dark-eyed Junco	30	5888413	184473	Black Spruce Lichen Forest	HVac ELC
Dark-eyed Junco	30	5879705	271180	Open Conifer Forest	HVdc ELC
Dark-eyed Junco	30	5790187	397833	Wetland	HVdc ELC
Dark-eyed Junco	30	5786505	404475	Conifer Forest	HVdc ELC
Dark-eyed Junco	30	5790605	397801	Wetland	HVdc ELC
Dark-eyed Junco	30	5789085	411578	Open Conifer Forest	HVdc ELC
Unidentified Landbird	30	5728347	508505	Wetland	HVdc ELC
Unidentified Raptor	200	5804908	365125	Wetland	HVdc ELC
Unidentified Raptor	200	5871210	280166	Conifer Forest	HVdc ELC
Unidentified Raptor	200	5752005	502865	Conifer Forest	HVdc ELC
Unidentified Raptor	200	5774469	454071	Conifer Forest	HVdc ELC
Unidentified Raptor	200	5785551	441706	Open Conifer Forest	HVdc ELC
Unidentified Raptor	200	5817448	346815	Wetland	HVdc ELC

APPENDIX C

Avifauna Species at Risk: Incidental Observations

Table C.1 Species at Risk Incidental Observations During the Implementation of the 2015 AMP

Date	Species	Status (Legislation)	Ecotype[1]	Observation
May 20	Rusty Blackbird	Special Concern (SARA[3]) and Vulnerable (NLESA[4])	Conifer Scrub	Individual observed near a pond on the TLH on the Eagle River plateau
June 7	Common Nighthawk	Threatened (SARA[3] and NLESA[4])	Open Sandy Area bordered by black spruce and dwarf birch	Individual
June 15	Common Nighthawk	Threatened (SARA[3] and NLESA[4])	Treed bog with black spruce and larch	Individual
June 21	Common Nighthawk	Threatened (SARA[3] and NLESA[4])	Gravel pit bordered by mixedwood	Individual
June 22	Bank Swallow	Threatened (SARA[3])	Disturbed (cleared area with black spruce edges)	10 Individuals
June 25	Bank Swallow	Threatened (SARA[3])	Black Spruce	3 Individuals
June 25	Bank Swallow	Threatened (SARA[3])	Black Spruce	2 Individuals
June 27	Short-eared Owl	Special Concern (SARA[3]) and Vulnerable (NLESA[4])	Lichen Heathland	Individual[2]
July 8	Short-eared Owl	Special Concern (SARA[3]) and Vulnerable (NLESA[4])	Lichen Heathland	Individual[2]
July 9	Short-eared Owl	Special Concern (SARA[3]) and Vulnerable (NLESA[4])	Lichen Heathland	Individual[2]
July 13	Short-eared Owl	Special Concern (SARA[3]) and Vulnerable (NLESA[4])	Lichen Heathland	Individual[2]
July 14	Short-eared Owl	Special Concern (SARA[3]) and Vulnerable (NLESA[4])	Lichen Heathland	Individual[2]

Notes:

[1] - Ecotypes are provided rather than coordinates as these are species at risk

[2] - Suspected to be same individual observed on multiple occasions as it was observed in the same location

[3] - Government of Canada 2002

[4] - Government of Newfoundland and Labrador 2004

ATTACHMENT 7.6

2015 Annual Report on the Implementation of the Avifauna Management Plan – Newfoundland

LOWER CHURCHILL PROJECT

2015 Annual Report on the Implementation of the Avifauna Management Plan – Newfoundland

Submitted to:
Nalcor Energy
Hydro Place, 500 Columbus Drive
P.O. Box 12400
St. John's, Newfoundland and Labrador
Canada A1B 4K7

Submitted by:
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a Division of Amec Foster Wheeler Americas Limited
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1 December 2015
Amec Foster Wheeler Project #: TF14104133

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1.0 SUMMARY

The direct removal of vegetation along the transmission corridor from Shoal Cove to Soldier's Pond has the potential to impact the residency and reproductive success of birds that utilize this area during the breeding season (15 May to 15 August). From 21 May to 7 August, Amec Foster Wheeler implemented the directed survey protocol consistent with the Project Avifauna Management Plan along the proposed transmission line right-of-way and associated sites (access roads and rock quarries), and established protective buffers in an effort to limit disturbance to breeding birds. Five crews (5 individuals/crew) were deployed throughout west-central Newfoundland and the Northern Peninsula and worked collaboratively with Nalcor Energy and local contractors to provide this service. Active nesting sites were physically marked in the field using flagging tape and relevant information was uploaded daily to Nalcor using ArcGIS software.

During this period, 156 active nesting sites were located along a linear distance of 88.8 km and circular buffers ranging from 30-800 m (radius) were established. Peak numbers of nests were found between June 3 and July 4 and coincided with the expected period of heightened bird activity. Thirty-eight individual species were detected from a range of function groups including raptors, waterfowl, songbirds, and waterbirds. The most commonly encountered species included white-throated sparrow (*Zonotrichia albicollis*), American robin (*Turdus americanus*), palm warbler (*Dendroica palmarum*), hermit thrush (*Catharus guttatus*) and Lincoln's sparrow (*Melospiza lincolnii*). The nests of two species at risk (olive-sided flycatcher and rusty blackbird) were found as well as a number of incidental sightings of species at risk throughout the Project area.

Implementation of this field program by Amec Foster Wheeler mitigated some of the risks imposed by construction activities and aligned the Project with the requirements of the Migratory Birds Convention Act (1994), the Provincial Wildlife Act, and both Federal and Provincial Species at Risk legislation.

2.0 INTRODUCTION

The direct removal of vegetation and associated construction activities along the transmission corridor from Shoal Cove to Soldier's Pond has the potential to impact the residency and reproductive success of birds that utilize this area during the breeding season (May 15 to August 15). The implementation of Nalcor's Avifauna Management Plan is intended to mitigate some of the risks imposed by these activities and to align the project with the requirements of the Migratory Birds Convention Act (1994), the Provincial Wildlife Act, and both Federal and Provincial Species at Risk legislation.

The primary objective of this avifauna management program was to locate active nests of migratory and resident birds in order to establish protective buffer zones around these areas in advance of vegetation clearing. Active nests were geo-referenced and clearly marked in the field to ensure that disturbance to nesting birds was minimized during construction. We recognize that locating all active nests for all species is impractical over such an extensive geographic area. Therefore, we allocated additional effort to locate nest sites of species at risk that may have occurred in the study area. Potential species at risk included gray-cheeked thrush (*Catharus minimus*), olive-sided flycatcher (*Contopus cooperii*), rusty blackbird (*Euphagus carolinus*), short-eared owl (*Asio flammeus*), barrow's goldeneye (*Bucephala islandica*), and harlequin duck (*Histrionicus histrionicus*; NLDEC 2012). We also searched for any inactive raptor nests that may have occurred in the study area and established appropriate buffers around these structures. Raptor populations are sensitive to various forms of anthropogenic disturbance thus their occurrence is often considered a surrogate of intact and functioning ecosystems (Caro and O'Doherty 1998).

2.1 Applicable Legislation for Species Protection

The applicable legislation intended to protect birds that occurred in the study area is provided here.

2.1.1 Migratory Birds Convention Act and Wild Life Act

All species of birds in the study area, except for those species that were introduced to North America, are protected by either the federal *Migratory Birds Convention Act* (MBCA) or the provincial *Wild Life Act*. The MBCA governs most of these species, both migratory and non-migratory. Some of these species are game birds whose harvest is regulated by this legislation (i.e., waterfowl, cranes, rails, coots, shorebirds, murres, and doves). This Act protects individuals from harm and harassment, and also protects their active nests (i.e., those containing viable eggs or nestlings). The remaining species (cormorants, pelicans, grouse, ptarmigan, hawks, owls, eagles, falcons, kingfishers, crows, jays, and blackbirds), receive the same form of protection from the provincial *Wild Life Act*. This act also governs the harvest of upland game birds (i.e., grouse and ptarmigan). Neither of these Acts protect habitat for these species.

2.1.2 Species at Risk Act

The Species at Risk Act, 2002 (SARA) was established to provide wildlife species additional protection against extirpation, extinction or endangerment. Species at risk are classified by COSEWIC as extirpated, endangered, threatened or of special concern, depending on the level of risk. Similar to the

MBCA, this Act affords protection at the federal level by prohibiting the killing, harming, harassment, capture, or collection of a listed species, and the damage or destruction of a residence of a listed species (Government of Canada 2002).

2.1.3 Newfoundland and Labrador Endangered Species Act

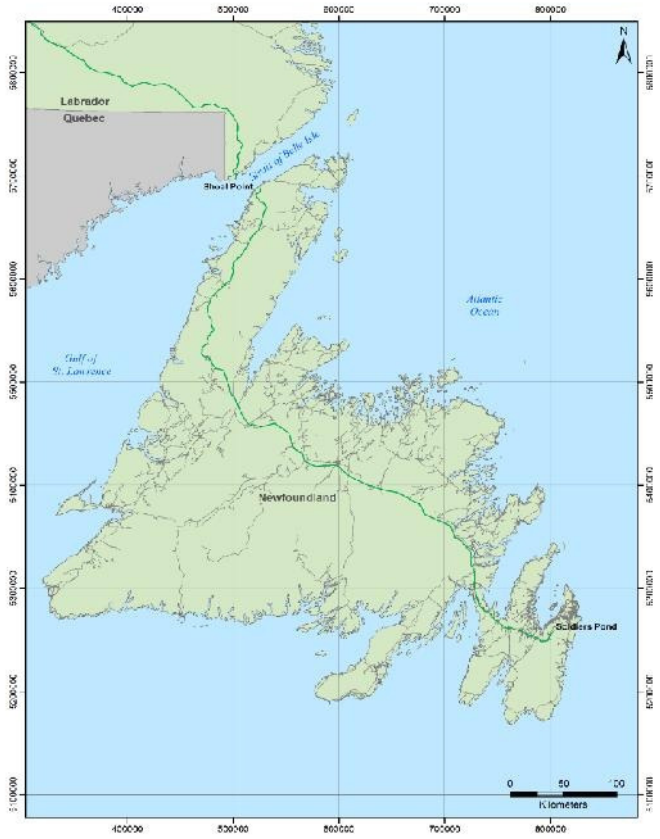
Provincially, wildlife species at risk are managed under the Newfoundland and Labrador Endangered Species Act (NLESA; 2004), which is designed to complement federal SARA legislation. The NLESA protects wildlife species, subspecies or populations within the province that are considered endangered, threatened or vulnerable based on recommendations from COSEWIC or the provincial Species Status Advisory Committee (SSAC; 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.

3.0 STUDY AREA AND METHODS

3.1 Study Area

The transmission line Right-of-Way (ROW) from Soldier's Pond to Shoal Cove spans a linear distance of 696 km (Figure 1) and bisects a number of ecoregions including the Maritime Barrens, Avalon Forest, Central Newfoundland, Long Range Mountains, and Northern Peninsula (Meades 1990). Vegetation and topography is extremely variable across this study area and ranges from open heath and rocky outcrops on the Avalon Peninsula and areas of high elevation on the Northern Peninsula, stunted black spruce and balsam fir forest through parts of eastern Newfoundland, and dense productive forest through parts of central and western Newfoundland. Water bodies are prevalent across the entire island and provide foraging opportunities for riparian songbirds, waterfowl, and shorebirds. Nest searches during the 2015 breeding season occurred throughout west-central Newfoundland (west of Badger) and the Northern Peninsula and coincided with construction activity. All work fronts were accessible by truck though moderate hiking was required to move throughout the study area in advance of vegetation clearing.

Figure 1. Transmission line corridor from Shoal Point to Soldier's Pond, Newfoundland.



3.2 Survey Methodology

Searches for active nests were conducted along the 60 m wide transmission line corridor, associated bypass roads and quarries by walking five parallel transects (spaced equidistant apart) throughout the

entire area where vegetation clearing was scheduled to occur. Crew members remained in visual contact of each other and walked slowly through the study area while searching for evidence of breeding activity including; 1) the occurrence of singing males or interacting male-female pairs, 2) distraction displays (i.e., broken wing display), 3) delivery of nesting material and/or food to a specific location, 4) aggressive territorial behaviour (e.g. diving), and/or, 5) the presence of nestlings or recently fledged birds. If one or more of these behaviours was observed, effort was made to locate the specific nest location and to establish the appropriately sized protective buffer. If nest sites were found within previously established access roads designed to bypass wetlands (or other sensitive/hazardous sites) then an alternate route adjacent to this access road was 'cleared' of nesting activity by our crews.

Locations of active nests were recorded using GPS and physically marked using uniquely patterned flagging tape. All relevant information (including location, species, stage of breeding, buffer size) was recorded using ArcGIS software and uploaded to the project manager, GIS coordinator, logistics co-ordinator and local contractors on a daily basis. This ensured effective and timely communication of the extent of progress (i.e. areas where nest searches have been completed) as well as the location of active nest sites. An example of the daily maps produced to illustrate nesting locations is shown in Appendix A. If structure boxes were not harvested by contractors within a period of seven days following nest searches then the area was scheduled for re-survey since birds may have dispersed into the area and established a nest site during this time frame. Some of the active nest sites were also re-surveyed later in the breeding season (25 July-7 August) to determine if young had fledged from the site. If nest sites were vacated and family groups had dispersed then flagging tape was removed and this information was relayed to Nalcor Energy. The sizes of buffer zones established for each species group is given in Table 1.

In accordance with standard protocols for conducting point counts and nest searches, fieldwork was not conducted during periods of prolonged rain or high wind as these variables are known to decrease the detectability of birds. Exposure to heavy rain and cool temperatures can lead to nest failure thus surveys were avoided during periods of inclement weather. In instances where species at risk were detected, additional time and effort was spent searching for nests and delineating buffer zones.

Given the large geographic extent where clearing work occurred, survey teams were strategically stationed to ensure that sites were efficiently visited when required. The personnel employed by Amec Foster Wheeler and their respective roles is given in Appendix B.

Table 1. Species group and the radius of buffer zones established around nest sites encountered along the transmission line right of way and associated work sites, May – August, 2015.

Species Group	Setback buffer radius (m)
Active raptor nest	800
Inactive raptor nest	200
Waterfowl	100
Waterbirds	100
Shorebirds	30
Landbirds	30
Species at Risk	100

3.3 Health and Safety

Prior to deployment in the field, all team members received health and safety training and site orientation from Amec Foster Wheeler, Nalcor Energy, Valard Construction and Johnson's Construction. All field crews were supplied with requisite safety equipment including hard hats, reflective vests, safety glasses, and gloves. Each crew were also outfitted with a first aid kit, insect repellent and sunscreen. An additional first aid kit was also placed in each vehicle along with a spill kit and fire extinguisher. All field crew were instructed to wear long sleeved shirts, full length pants and sturdy, comfortable footwear. Steel toed boots were not required given the distances that crew members were required to walk and their general avoidance of construction areas where hazards were more prevalent. Hard hats were to be worn when approaching active work sites. Each crew leader also carried a hand-held VHF radio and regularly communicated with construction crews to inform them of their position and proximity to operating equipment. Field crews only bypassed active equipment once communication was established and machines were temporarily shut-down. Radios were also used while driving on access roads to communicate the location on in-bound or out-bound traffic. Recommended speed limits were adhered to and safety equipment (whip-antennas and beacons) were used at all times. Prior to the start of each work day, crew leaders conducted a 'tail-gate' meeting to discuss the daily work-plan, to assess potential hazards and strategies for avoiding accidents and injuries. Remote SPOT™ devices were also used by each crew member to communicate locations of field crews to management and Nalcor Energy throughout each field day.

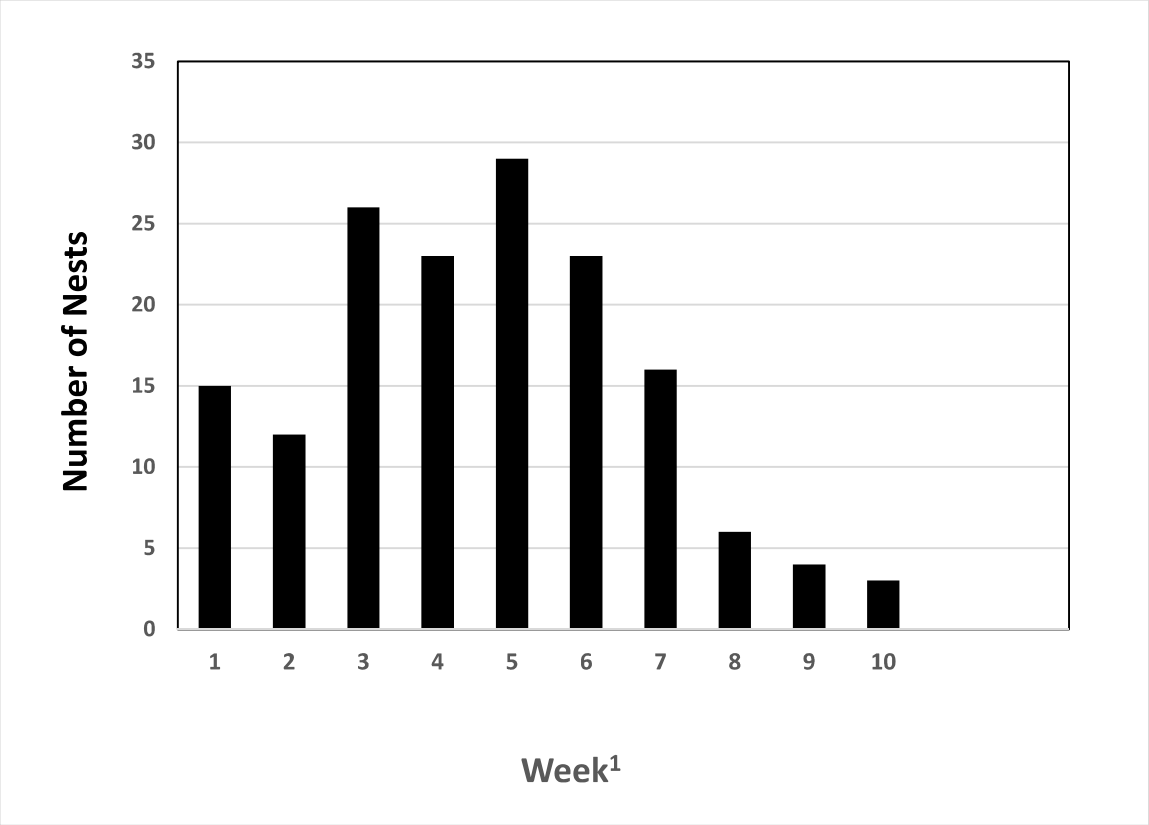
4.0 RESULTS AND DISCUSSION

4.1 Area Surveyed

Surveys for active nests were primarily conducted in two large geographic areas; 1) west-central Newfoundland from Badger to Sheffield Lake, and 2) from the Main River watershed to Plum Point on the Northern Peninsula. Two hundred and ninety-three individual structure boxes were surveyed (each structure box is ~ 300 m in length and 60 m wide) for a total linear distance of 88.8 km. In addition to areas immediately within the right-of-way, 96 access roads of variable length and 10 quarries were also surveyed. Sites that were re-surveyed following the seven day expiry period included 36 structure boxes, two access roads, two quarries and 21 individually buffered nest-sites. A summary of the date and sites surveyed throughout the season is provided in Appendix C.

Figure 2 illustrates the number of active nesting sites recorded during each week of the survey period. As expected, the number of nests found earlier in the season prior to the return of all migrant species and the initiation of nest-building was lower than the period from June 3 to July 4. The number of nests found during this peak period ranged from 23 to 29 nests/week. The number of nests discovered subsequently decreased after the first week of July as paired birds became increasingly non-vocal and remained concealed on eggs and nestlings.

Figure 2. Distribution of nests found along the transmission corridor, access roads, and quarries by week (May 23-August 7, 2015) in western and central Newfoundland.



[1]Weeks 1 and 2 = May 23 to June 6; weeks 3 to 6 = June 6 to July 4; weeks 7 to 10 = July 4 to August 7

4.2 Avifauna Species Detected

One hundred and fifty-six nesting areas were detected between May 21 and August 7, 2015. Most species were found within the transmission line right-of-way (n=132) though 15 and 9 nests were found within areas proposed for access road and quarry construction, respectively (Appendix D). White-throated sparrow (*Zonotrichia albicollis*) was the most frequently encountered species (23.9 % of all nests found) and nesting activity was detected for a total of 36 species (Table 2). Other frequently encountered species included American robin (*Turdus migratorius*), palm warbler (*Dendroica palmarum*), hermit thrush (*Catharus guttatus*), and Lincoln's sparrow (*Melospiza lincolnii*). Functional groups included within the list of species detected included songbirds (e.g., sparrow, warblers, and thrushes), woodpeckers (e.g. northern flicker, downy woodpecker), birds of prey (northern goshawk), waterfowl (ring-necked duck), and aerial insectivores (e.g. tree swallow, yellow-bellied flycatcher). All of the nesting species found during this project are common, expected breeders for the island of Newfoundland (Mactavish et al. 2003). Table 2 shows the buffer radius established for each of these species as well as a general description of habitat where species were found. Nesting habitats included open, grassy fens and forest edges, shrubby mixed coniferous-deciduous forest, and dense forest dominated by black spruce (*Picea mariana*) and balsam fir (*Abies balsamea*). Specific nesting structures included tree cavities (utilized by chickadee spp., swallows, and woodpecker spp.), large stick nests (northern goshawk (*Accipiter gentilis*) and gray jay (*Perisoreus canadensis*)), shallow depressions in the forest understory (spruce grouse (*Falcipennis Canadensis)*), and typical 'cup-shaped' nest on the ground or on low branches (most songbird species). Figure 3 shows a typical ground nest with eggs, a rusty blackbird nest with early-staged nestlings, wetland habitat, and crew members fording a stream.

Table 2. Nests recorded along the transmission line right-of-way, access roads, and quarries by descending frequency of abundance; 23 May - 7 August, 2015. Species highlighted in 'bold text' are Species at Risk under both federal and provincial species at risk legislation.

Species	Scientific name	Number of nests	Nest Location	Setback buffer radius (m)
White-throated sparrow	*Zonotrichia albicollis*	38	Ground; grassy vegetation	30
American robin	*Turdus migratorius*	9	Ground; grassy vegetation	30
Palm warbler	*Dendroica palmarum*	8	Ground; grassy vegetation	30
Hermit thrush	*Catharus guttatus*	8	Ground; grassy vegetation	30
Lincoln's sparrow	*Melospiza lincolnii*	7	Ground; grassy vegetation	30
Black-and-white warbler	*Mniotilta varia*	6	Ground; mixed coniferous forest	30
Downy woodpecker	*Picoides pubescens*	6	Tree cavity; mature forest	30
Wilson's warbler	*Wilsonia pusilla*	6	Ground; grassy vegetation	30
Wilson's snipe	*Gallinago delicata*	6	Ground; grassy vegetation	30
Hairy woodpecker	*Picoides villosus*	5	Tree cavity; mature forest	30

Species	Scientific name	Number of nests	Nest Location	Setback buffer radius (m)
Dark-eyed junco	*Junco hyemalis*	4	Ground; mixed vegetation	30
Fox sparrow	*Passerella iliaca*	4	Ground; grassy vegetation	30
Boreal chickadee	*Poecile hudsonicus*	3	Tree; Dense coniferous forest	30
Magnolia warbler	*Dendroica magnolia*	3	Ground; mixed coniferous forest	30
Ruby-crowned kinglet	*Regulus calendula*	3	Tree; coniferous forest	30
Olive-sided flycatcher	*Contopus cooperii*	3	Tree; mixed coniferous forest	100
Song sparrow	*Melospiza melodia*	2	Ground; grassy vegetation	30
Northern flicker	*Colaptes auratus*	2	Tree cavity; mature forest	30
Spruce grouse	*Falcipennis canadensis*	2	Ground; mixed coniferous forest	30
Tree swallow	*Tachycineta bicolor*	2	Tree cavity; riparian vegetation	30
Black-capped chickadee	*Poecile atricapillus*	2	Tree; dense coniferous forest	30
Gray jay	*Perisoreus canadensis*	1	Tree; coniferous forest	30
Blackpoll warbler	*Dendroica striata*	1	Tree; shrubby coniferous forest	30
Swamp sparrow	*Melospiza georgina*	1	Ground; grassy vegetation	30
White-crowned sparrow	*Zonotrichia leucophrys*	1	Tree; dense, grassy vegetation	30
Northern goshawk	*Accipiter gentilis*	1	Mature deciduous forest	800
Cedar waxwing	*Bombycilla cedrorum*	1	Tree; mixed coniferous forest	30
Northern waterthrush	*Seirus noveboracensis*	1	Ground; dense, mixed forest	30
Yellow-rumped warbler	*Dendroica coronata*	1	Tree; dense coniferous forest	30
Common yellowthroat	*Geothlypis trichas*	1	Ground; grassy vegetation	30
Rusty blackbird	*Euphagus carolinus*	1	Tree; riparian habitat	100
Ring-necked duck	*Aythya collaris*	1	Ground; riparian habitat	30
Yellow-bellied flycatcher	*Empidonax flavivetris*	1	Tree; dense, mixed vegetation	30
Blue-headed vireo	*Vireo solitarius*	1	Tree; mature mixed forest	30
Unidentified woodpecker	NA	2	Tree cavity; mature forest	30
Unidentified species	NA	12	Variable habitats	30
TOTAL # of NESTS =		**156**		

Figure 3. Images from the nest survey project, 2015. Top left panel; fox sparrow nest with eggs. Top right panel; Wilson's snipe nest in wetland habitat. Bottom left image; rusty blackbird nest with chicks. Bottom right panel; Crew members fording a stream on the Northern Peninsula. Photo credits; Doug Hynes, Amec Foster Wheeler, 2015.

4.3 Species at Risk

A rusty blackbird and three olive-sided flycatcher nesting sites were found within the 60 m transmission line right-of-way during the survey period (Table 2). Setback buffers for these species was set at a radius of 100 m to ensure minimal disturbance and effective protection during the survey period. This buffer radius deviated from the recommended radius of 75 m (as specified in Nalcor's Avifauna Management Plan; Stassinu Stantec 2012) but was selected following dialogue with species at risk biologists with Environment Canada, Mount Pearl, NL. Other incidental encounters with these species as well as with gray-cheeked thrushes and red crossbills are reported in Table 3. In addition to being important information for Nalcor with respect to this Project, these data are valuable to the general conservation community since the areas surveyed were generally remote and there is limited knowledge on the distribution of species at risk in these regions. Other species of conservation concern detected in the study area included boreal owl (*Aegolius funereus*) and northern hawk-owl (*Surnia ulula*).

Table 3. Species at risk recorded incidentally during nest searches in west-central Newfoundland and the Northern Peninsula, May-August, 2015.

Date	Species	Number of individuals	Longitude	Latitude
23-May	Rusty blackbird[1,2]	1	[redacted]	
01-Jun	Rusty blackbird	1		
02-Jun	Olive-sided flycatcher[3]	2		
09-Jun	Olive-sided flycatcher	1		
16-Jun	Gray-cheeked thrush	1		
19-Jun	Rusty blackbird	2		
20-Jun	Olive-sided flycatcher	2		
17-Jul	Red crossbill[4]	4		
18-Jul	Red crossbill	2		
19-Jul	Gray-cheeked thrush	2		
20-Jul	Olive-sided flycatcher	1		
29-Jul	Olive-sided flycatcher	1		
30-Jul	Olive-sided flycatcher	2		
31-Jul	Olive-sided flycatcher	1		
02-Aug	Olive-sided flycatcher	3		
06-Aug	Olive-sided flycatcher	1		
07-Aug	Rusty blackbird	5		

[1]Vulnerable (NL Endangered Species Act)
[2]Special Concern (Species at Risk Act)
[3]Threatened (NL Endangered Species Act)
[4]Endangered (NL Endangered Species Act)

4.4 Survey Effectiveness

Overall, surveys were effective at locating and protecting 156 nesting sites from 36 different bird species within the study area and for meeting the requirements of the general mitigation measures contained within Nalcor's Avifauna Management Plan (Stassinu Stantec 2013). However, crews undoubtedly missed a proportion of nesting birds as many species nest high in the forest canopy and are exceedingly difficult to detect (Martin and Geupel 1993). This is particularly true since the majority of the survey area was dominated by dense conifers (balsam fir and black spruce) which retain their crowns throughout the year. Of the 156 nesting sites that were found only 22% were tree nesters and of these, most were woodpecker spp. which are very vocal and relatively easy to detect. Despite being very abundant in the study area (based on the qualitative frequency of vocalizations), only 6 nests were collectively found for tree nesting yellow-rumped warblers, ruby-crowned kinglets, and black-capped chickadees.

An additional unknown was the total number of nest sites identified (for both ground and tree nesting species) relative to their absolute occurrence within the study area. Determining this variable would allow for an accurate assessment of the 'true effectiveness' of survey crews in locating nests. However, this type of scientific evaluation was beyond the scope of our field duties and required an independent and carefully-planned study design. A thorough review of relevant journals did not yield any useful information on the effectiveness of finding nests in boreal forest environments suggesting that this academic question is difficult to evaluate. Despite our likely inability to locate all breeding birds, we are confident that many breeding pairs that were deemed 'undetected' were inadvertently protected within the buffered areas of species that were found. This is particularly true where setback buffers of 100 m and 800 m were established in the project area.

To improve the efficacy of locating nesting pairs in future years, it is recommended that nest searches be initiated earlier in the morning when birds are most vocal and are more apt to reveal nesting microsites. This was difficult to implement during the 2015 season as work plans were often adjusted 'last minute' and crews had to spend additional time travelling to alternate sites. This circumstance, coupled with generally long travelling distances to remote portions of the study area, often resulted in crews missing the peak period of bird activity (6 – 8 a.m.). Improved planning on where crews are required on a daily basis would improve the effectiveness of locating nest sites.

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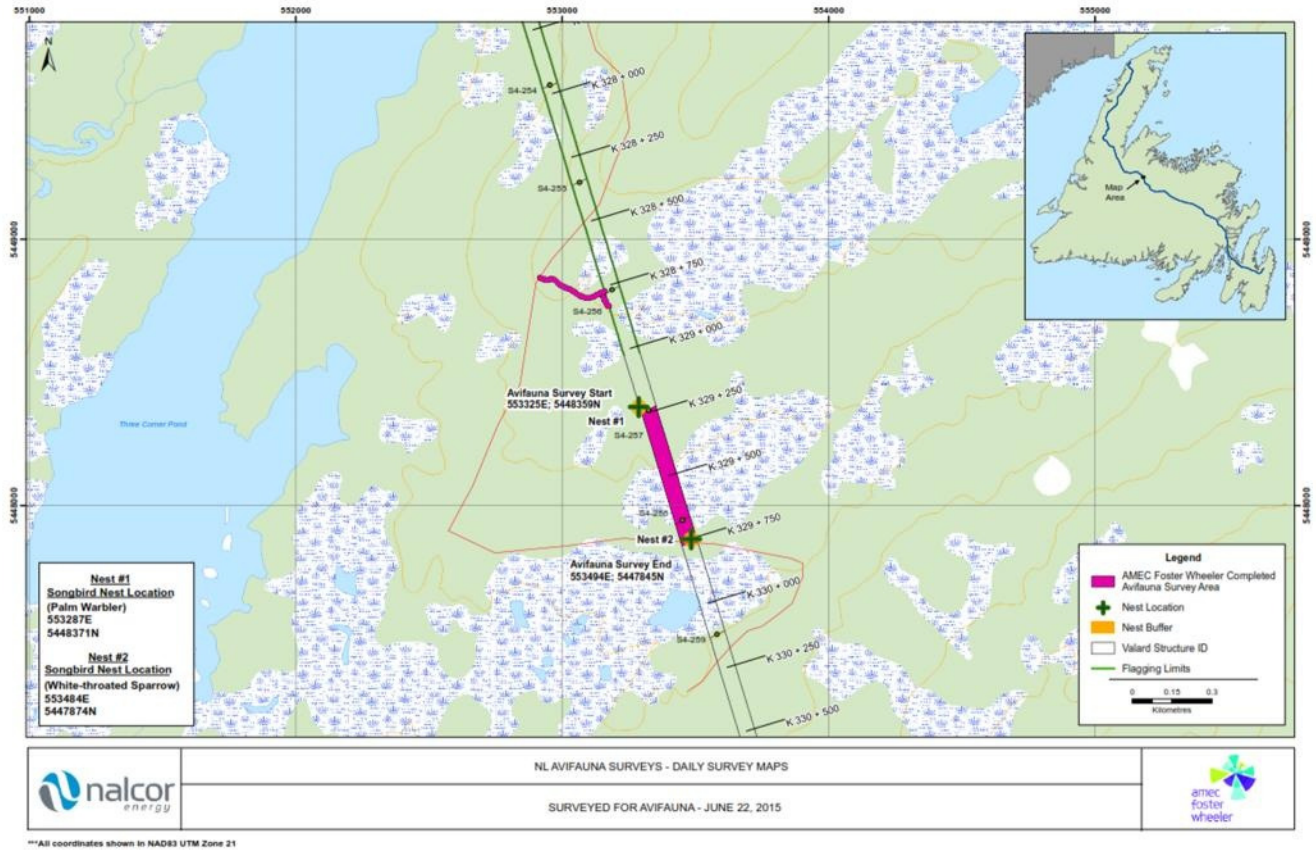
APPENDIX A: A REPRESENTATIVE MAP ILLUSTRATING THE AREA SURVEYED AND THE LOCATION OF TWO ACTIVE NEST SITES IN CENTRAL NEWFOUNDLAND, 2015.



APPENDIX B: AMEC FOSTER WHEELER TEAM STRUCTURE FOR CONDUCTING NEST SURVEYS ALONG THE TRANSMISSION LINE RIGHT-OF-WAY, MAY-AUGUST, 2015.

Name	Team Number	Role	Primary Survey Area
John Gosse	1	Avifauna biologist	West-central NF
Claude Roberge	1	Team co-leader	West-central NF
Erin Penney	1	Field technician	West-central NF
Mark Simpson	1	Field technician	West-central NF
Tyler Wells	1	Field technician	West-central NF
Courtney King	1	Field technician	West-central NF
Holly Hogan	2	Avifauna biologist	West-central NF
Shane Frost	2	Field technician	West-central NF
Greg White	2	Field technician	West-central NF
Marina Montevecchi	2	Field technician	West-central NF
Rosalind Ford	2	Field technician	West-central NF
Derm Kenny	3	Avifauna biologist	Northern Peninsula/Central NF
Aedon Lemon	3	Field technician	Northern Peninsula/Central NF
Daniel Robbins	3	Field technician	Northern Peninsula/Central NF
Fiona Elgar	3	Field technician	Northern Peninsula/Central NF
Catie Young	3	Field technician	Northern Peninsula/Central NF
Kyle Reid-Fairhurst	4	Avifauna biologist	Northern Peninsula
Jonathan Forward	4	Field technician	Northern Peninsula
Jens Fiegler	4	Field technician	Northern Peninsula
David Butler	4	Field technician	Northern Peninsula
Matthew Learie	4	Field technician	Northern Peninsula
Doug Hynes	5	Avifauna biologist	Northern Peninsula
Gabrielle Deveau	5	Field technician	Northern Peninsula
Kristian Wiseman	5	Field technician	Northern Peninsula
Nathan White	5	Field technician	Northern Peninsula
Lucas Giroux	5	Field technician	Northern Peninsula

APPENDIX C: SCHEDULE AND LOCATION OF AREAS SURVEYED ALONG THE TRANSMISSION LINE RIGHT-OF-WAY AND ASSOCIATED STRUCTURES, MAY-AUGUST, 2015.

Week #	Date	Segment Locations	Structures Surveyed
Week 1	May 21-23	S3	270, 277, 319, and 320. Quarry near 270. Access roads near 319-320.
		S4	198, 219, 199 to 203, and 290 Access roads near 127 and 321. Quarries near 137 and 272.
Week 2	May 24-30	S3	316, 321-323, 313, and 266
		S4	278-287, 196-197, and 269-277. Access roads near 182 and 188. Quarry near 188.
Week 3	May 31-June 6	S3	342-344, 303-309, 310-312, and 332-336. Access roads near 104, 335, 305, and 311-312. Quarries near 134 and 272.
		S4	295-303, 271-272, 316-318, and 269-270.
Week 4	June 7-13	S3	390-392, 311-313, 335-336, 337-339, 394-395, 332-333, and 371-372. Access roads near 305, 390-392, 98, 106, 271, and 372. Quarries near 134, 105, 269 and 256.
		S4	314-315, 308-309, and 319-321. Access road near 302.
Week 5	June 14-20	S3	329-332, 310-311, 334, 389, 392-394, 382-386, 302-304, and 267-269. Access road around two nests at 332. Quarries near 101 and 241. Access roads near 393-394, 390-391, and 304.
		S4	322-331, 245-248, and 250-257. Access on Upper Humber road. Access roads near 353, 252, 253, 254, 256, and 324.
Week 6	June 21-27	S3	309-310, 323-328, 332-339, 311, 394-395, and 386-389. Access roads near 304, 394, and 110-111. Quarries near 391 and 101.
		S4	258-266, 219-220, 308-309, and 65-69. Access roads near 257-258, 219-220, 330-331, 66, and 174.

Week #	Date	Segment Locations	Structures Surveyed
			Quarry near 101.
Week 7	June 28-July 4	S3	644-655, 323-328, 158-162, 299-304, 380-382, 267-273, and 377-380. Access roads near 265-266, 304-307, 668, and 273. Quarries near 101, 309, and 264
		S4	138-140. Access road near 65-66.
Week 8	July 5-11	S3	249-251, 95, 383, 139, 659-667, 373-377, 174-177, 255-258, 241, 268-273, and 266 Access roads near 653, 302-305, 375-377, 664-667, and 299. Quarry near 309.
		S4	141-143, 219-221, 36, and 223-224. Access roads near 36, 220, 175, and 219.
Week 9	July 12-18	S3	654-657, 392-394, 303-304, 178-182, and 165-174, 246-248, 272-273, 309, and 268. Access roads near 274, 174-177, 167, 162, 178, 646, 165 and 657-659.
		S4	243-248, 219, 221-222, 323-324, and 225-229. Access roads near 243-248, 223-225, 221-222, and 84-85.
Week 10	July 19-25	S3	177-187, 156-164, 151-153, 168-174, 369-373, 644, and 271-272. Access roads near 155, 160, 164, 184-187, and 180-181.
		S4	239-243, 246-248, and 36. Access roads near 241, and 176-177.
Week 11	July 26-August 7	S3	301-313, 145-150, 362-367, and 373-379. Access roads near 309, 395, 155, 364, 367, and 371. Quarries near 174 and 177.
		S4	219-223, 308, 36-38, 290, 286-292, and 176-178. Access roads near 176 and 177.

APPENDIX D: SURVEY DATE AND LOCATION OF NESTING BIRDS DETECTED ALONG THE TRANSMISSION LINE RIGHT-OF-WAY AND ASSOCIATED STRUCTURES, WESTERN AND CENTRAL NEWFOUNDLAND, 2015.

Date Surveyed	Structure area Surveyed	Location	Nest Coordinates		Species
			Easting	Northing	
19-May	Access road near Hampden	Access road	504798	5477664	Gray jay
23-May	S4-290	ROW	557303	5435712	Northern goshawk
24-May	S3-321	ROW	491951	5593538	Downy woodpecker
24-May	S4-280	ROW	556102	5439264	Black-capped chickadee
25-May	S4-283-284	ROW	556438	5438026	Palm warbler
25-May	S4-284-287	ROW	556687	5437334	Ruby-crowned kinglet
26-May	Quarry at S3-272	Quarry	499547	5610209	Black throated green warbler
			499518	5610344	Downy woodpecker
27-May	S3-322 to S3-323	ROW	491418	5593158	American robin
27-May	S4-270-272	ROW	554992	5442784	Magnolia warbler
28-May	S4-181	ROW	527433	5456867	Spruce grouse
28-May	S4-182-183	ROW	527801	5457021	Unidentified species
28-May	S4-273-276	ROW	555211	5442024	Magnolia warbler
29-May	S3-313	ROW	493922	5595871	Blue-headed vireo
			494060	5595878	Ruby-crowned kinglet
29-May	S3-266	ROW	499923	5612949	Wilson's snipe
30-May	Quarry near S4-188	Quarry	530634	5457489	Black-and-white warbler
1-June	S3-305	ROW	496784	5597649	Hairy woodpecker
			496791	5597693	Unidentified woodpecker
			496973	5597727	Northern flicker
2-June	S3-303-304	ROW	497861	5598237	Unidentified woodpecker
2-June	S3-306-309	ROW	495564	5597061	Hairy woodpecker
2-June	S4-295-297	ROW	559565	5434216	Wilson's warbler
4-June	Access road near S3-335	Access road	488139	5590558	American robin
4-June	S4-299-301	ROW	560814	5433464	Unidentified species
4-June	S4-271-272	ROW	555157	5442307	Hermit thrush
5-June	Roadside near Brigs Bay Road	Access road	526497	5647846	White-throated sparrow
			527430	5648919	White-throated sparrow
6-June	Quarry near S3-134	Quarry	523673	5646664	Fox sparrow
6-June	Access Road near S3-104	Access road	527646	5658332	White-throated sparrow

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Date Surveyed	Structure area Surveyed	Location	Nest Coordinates		Species
			Easting	Northing	
7-June	Quarry near S3-134	Quarry	523665	5646543	Hermit thrush
8-June	S3-390-392	ROW	475756	5572806	White-throated sparrow
			475793	5572394	White-throated sparrow
			475802	5572342	Boreal chickadee
			475801	5571919	Black-and-white warbler
8-June	S4-S14-315	ROW	565936	5429696	Unidentified species
			565981	5429655	White-throated sparrow
9-June	Bypass roads near S4-302	Bypass road	562361	5432076	Hairy woodpecker
10-June	S4-310-313	ROW	564702	5431046	Unknown species
			565077	5430732	White-throated sparrow
10-June	Quarry near S3-105	Quarry	527170	5657437	American robin
11-June	Quarry near S3-256	Quarry	500868	5616705	Hermit thrush
			500749	5616573	American robin
			500786	5616560	Spruce grouse
			500638	5616443	Fox sparrow
			500613	5616415	White-throated sparrow
			500635	5616323	Wilson's warbler
			500623	5616307	Yellow-rumped warbler
12-June	S3-332-333	ROW	488622	5590591	Downy woodpecker
			488606	5590558	White-crowned sparrow
			488399	5590263	American robin
			488358	5590196	Magnolia warbler
			488335	5590186	White-throated sparrow
12-June	Bypass road near S3-392	Bypass road	475990	5571867	White-throated sparrow
13-June	S3-271-272	ROW	499702	5610284	Unidentified Sparrow
14-June	S3-310-311	ROW	495060	5596633	White-throated Sparrow
14-June	S4-247-250	ROW	552131	5450998	Unidentified Species
			551995	5451093	Palm warbler
14-June	S4-322	ROW	566669	5426676	Lincoln's sparrow
15-June	S4-323-325	ROW	566736	5426434	American robin
			566730	5426346	Hairy woodpecker
			566776	5426251	Common yellowthroat
15-June	S4-245-247	ROW	551244	5451610	Palm warbler

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Date Surveyed	Structure area Surveyed	Location	Nest Coordinates		Species
			Easting	Northing	
			550857	5451864	Palm warbler
16-June	S4-251-253.	ROW	552587	5450710	White-throated sparrow
16-June	S4-325-327.	ROW	566960	5425255	White-throated sparrow
			567029	5425208	Ruby-crowned kinglet
			567136	5424592	White-throated sparrow
			567186	5424624	Wilson's warbler
18-June	S3-392-394	ROW	475815	5571764	Wilson's snipe
			475915	5570700	Unidentified species
18-June	S4-253-254	ROW	552853	5449963	Yellow-bellied flycatcher
19-June	Access road near S3-390	Access road	475841	5572289	American Robin
			475875	5572318	White-throated sparrow
19-June	S3-304	ROW	497326	5597880	American robin
			497375	5598066	Rusty blackbird
19-June	S4-254-257	ROW	552917	5449607	Lincoln's sparrow
20-June	Quarry near S4-241	Quarry	504507	5619679	White-throated sparrow
			504695	5619649	Tree swallow
20-June	S3-267-269	ROW	499820	5611721	White-throated sparrow
20-June	S3-302	ROW	497867	5598323	Northern flicker
			497845	5598256	Olive-sided flycatcher
20-June	S3-303	ROW	497840	5598089	Downy woodpecker
20-June	Access road near S3-304	Access road	497357	5597924	Boreal chickadee
20-June	S4-328-331	ROW	567196	5424268	Unidentified species
20-June	S4-325	Access road	566912	5425557	White-throated sparrow
21-June	S3-309-310	ROW	495262	5596768	Ring-necked duck
21-June	S3-323-328	ROW	491203	5593053	White-throated sparrow
			491004	5592937	Wilson's snipe
			490769	5592745	White-throated sparrow
22-June	S3-329-332	ROW	489546	5591727	Black-capped chickadee
			489421	5591518	Hairy woodpecker
			489428	5591494	White-throated sparrow
22-June	Bypass road	Bypass road	497923	5598804	Hermit thrush
			497661	5598495	Hermit thrush
22-June	S4-258-259	ROW	553287	5448371	Palm warbler

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Date Surveyed	Structure area Surveyed	Location	Nest Coordinates		Species
			Easting	Northing	
			553484	5447874	White-throated sparrow
23-June	S4-308-309	ROW	564416	5431165	Palm warbler
24-June	Bypass roads near S4-330	Bypass road	567411	5423029	Unidentified species
			567429	5423010	White-throated sparrow
24-June	S4-259-261	ROW	553692	5447056	White-throated sparrow
			53815	5446849	White-throated sparrow
25-June	S4-262	ROW	553866	5446469	White-throated sparrow
			553892	5446455	Blackpoll warbler
26-June	S4-66-69	ROW	499762	5486756	White-throated sparrow
26-June	Bypass road near S4-66	Bypass road	499539	5486836	Black-and-white warbler
27-June	S4-263-266	ROW	554008	5446180	Wilson's warbler
			554014	5446029	White-throated sparrow
			554080	5445919	Cedar waxwing
			554266	5445299	Black-and-white warbler
			554266	5445267	Palm warbler
28-June	S3-644-645	ROW	479492	5519504	Downy woodpecker
28-June	S3-326-328	ROW	489635	5591982	Wilson's snipe
			489639	5591980	White-throated sparrow
			490183	5592356	Dark-eyed Junco
29-June	S3-323-326	ROW	491236	5593052	Wilson's snipe
30-June	S3-158-162	ROW	517106	5639556	Downy woodpecker
			517062	5639543	Tree swallow
			516999	5639471	White-throated sparrow
			516999	5639469	Unidentified species
			516778	5638719	Black-and-white warbler
1-July	S3-158	ROW	517231	5639817	White-throated sparrow
1-July	Quarry near S3-264	Quarry	499693	5613323	Northern waterthrush
2-July	S3-267 to S3-269	ROW	499890	5612284	Unidentified species
			499899	5612460	White-throated sparrow
2-July	Quarry near S3-264	Quarry	499573	5613220	White-throated sparrow
2-July	S3-377-380	ROW	477756	5576377	Fox sparrow
			477805	5576428	White-throated sparrow
3-July	S3-270-273	ROW	499730	5610548	Song sparrow

Lower Churchill Project
Transmission Line Nest Survey
Amec Foster Wheeler Project TF14104133
December 2015

Date Surveyed	Structure area Surveyed	Location	Nest Coordinates		Species
			Easting	Northing	
4-July	S4-138-140	ROW	513590	5460360	Lincoln's sparrow
4-July	Bypass road near S3-265	Bypass road	499930	5613388	American robin
5-July	S4-141-143	ROW	513831	5459921	White-throated sparrow
5-July	S3-249-251	ROW	502178	5617777	Downy woodpecker
6-July	S3-139	ROW	522080	5645360	Lincoln's sparrow
6-July	S4-36	ROW	495485	5497726	Dark-eyed junco
6-July	S3-661-663	ROW	482699	5514078	White-throated sparrow
7-July	S4-219-221	ROW	541833	5458169	Swamp sparrow
7-July	S3-376-377	ROW	478222	5577236	Boreal chickadee
			478182	5577133	Unidentified species
			478148	5577022	Lincoln's sparrow
8-July	S3-664-677	ROW	483039	5513670	Black-and-white warbler
8-July	S4-222-223	ROW	[redacted]		Olive-sided flycatcher
9-July	S3-373-375	ROW	478299	5577675	White-throated sparrow
10-July	S3-256-258	ROW	500512	5616069	Wilson's warbler
10-July	S3-268-269	ROW	499873	5611858	Northern waterthrush
11-July	Bypass road near S4-220	Bypass road	542284	5457804	Unidentified species
			542617	5457401	Song sparrow
13-July	Access Road near S3-167	Access road	515906	5638589	Wilson's warbler
14-July	S4-247-248	ROW	551660	5451321	Hermit thrush
15-July	S4 221-222	ROW	542751	5457543	Lincoln’s sparrow
16-July	S4 246-248	ROW	551525	5451443	Lincoln’s sparrow
16-July	S4 223-224	ROW	543214	5457235	Hermit thrush
18-July	S4 165-166	ROW	516211	5637468	Wilson’s snipe
19-July	S4-243 to S4-241	ROW	549310	5452974	Palm warbler
20-July	S3 159 to 164	ROW	516760	5638704	Fox sparrow
20-July	S3 159 to 164	ROW	516360	5637857	Tree swallow
27-July	S3 309	ROW	[redacted]		Olive-sided flycatcher
27-July	S4 308	ROW	564178	5431322	Hermit thrush
31-July	S4 290-292	ROW	557814	5435363	Dark-eyed junco

[1]ROW = 60 m transmission line right-of-way

ATTACHMENT 7.7

Nalcor Energy Lower Churchill Project, Environmental Effects Monitoring Program – 2015 Avifauna, 2015 Avifauna EEMP Surveys

Nalcor Energy Lower Churchill Project, Environmental Effects Monitoring Program – Avifauna

2015 Forest Songbird and Common Nighthawk (*Chordeiles minor*) Point Count Surveys

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Annual Report

December 2, 2015

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EXECUTIVE SUMMARY

The 2015 Avifauna Environmental Effects Monitoring Program (EEMP) is one component of Nalcor Energy's (Nalcor) larger, multi-year program designed to monitor potential environmental effects on wildlife during the development on the Lower Churchill Generation Project (the Project). The 2015 annual report is a descriptive summary of the methods and results of field surveys conducted spring/early summer during the second year of the Avifauna EEMP.

Stassinu Stantec Limited Partnership (Stassinu Stantec) completed forest songbird and Common Nighthawk (*Chordeiles minor*) point count surveys in 2015. The forest songbird point count surveys were designed to assess distribution and habitat associations based on species richness and additional information on provincially listed species at risk (SAR) in the Study Area. The Common Nighthawk point count surveys were designed to collect additional information on their distribution and habitat associations in the Study Area.

A total of 48 species were identified. The highest species richness was observed in hardwood (n=7), disturbed (n=6), and white spruce (n=6) habitats. Black spruce lichen woodland (n=5), mixedwood (n=5), black spruce (n=4) and bog (n=4) had lower species richness. None of the targeted provincially listed SAR species were recorded during the forest songbird point count surveys, but a federally listed threatened species, Bank Swallow (*Riparia riparia*), was documented. Three Common Nighthawks were recorded in breeding and foraging habitats.

The 2015 Avifauna EEMP program field survey results provide preliminary information on the avifauna, SAR, and Common Nighthawk distribution and habitat associations in the Study Area. Stassinu Stantec will use this information in combination with results of past and future surveys to monitor any potential Project effects on avifauna from Project activities in the Project Area.

1.0 2015 AVIFAUNA EEMP

The 2015 Avifauna Environmental Effects Monitoring Program (EEMP) was completed by Stassinu Stantec Limited Partnership (Stassinu Stantec) and is part of the broader EEMP that Nalcor Energy (Nalcor) is completing in conjunction with the Lower Churchill Generation Project (the Project. The work is based on the requirements and commitments in the Lower Churchill Generation Project Environmental Impact Statement (EIS) (Nalcor 2009a, 2009b).

The two objectives of the 2015 Avifauna EEMP were to:

1. Assess the effect of Project-related activities on the distribution and habitat associations of avifauna using species richness as an index of change over time
2. Collect additional information on the distribution and habitat associations of select avifauna Species At Risk (SAR) in the lower Churchill River Valley, based on commitments made in the EIS regarding Olive-sided Flycatcher (*Contopus cooperi*), Rusty Blackbird (*Euphagus carolinus*), Gray-cheeked Thrush (*Catharus minimus*), and Common Nighthawk (*Chordeiles minor*).

The 2015 annual report is a descriptive summary of the methods and results of field surveys conducted spring/early summer during the second year of the Avifauna EEMP.

1.1 Background

In 2006 and 2007, a series of three baseline studies were carried out in support of the Project including: (1) forest songbird (point count) surveys (Minaskuat Inc. 2008), (2) waterfowl breeding pair, brood, and spring staging surveys (LGL Limited 2008), and (3) an ice dynamics study of the lower Churchill River valley (Hatch 2007). These surveys identified a variety of songbird, waterfowl and raptor species, including five species listed under the federal *Species at Risk Act* and/or the Newfoundland and Labrador *Endangered Species Act*: Harlequin Duck (*Histrionicus histrionicus)*, Common Nighthawk, Olive-sided Flycatcher, Gray-cheeked Thrush, and Rusty Blackbird. Ice dynamics modeling indicated that *ashkui* (areas of open water), which waterfowl use as staging areas in certain areas, will likely move as a result of the Project but will continue to exist. Monitoring and follow-up programs identified in the Project EIS (Nalcor 2009a, 2009b) and recommended by the Joint Review Panel (JRP 2011) included:

1. Monitoring of ashkui formation in the Project area
2. Monitoring of direct and indirect impacts on waterfowl
3. Development a detailed mitigation and monitoring plan for all listed species (e.g., point count surveys).

Ice conditions/*ashkui* formation and waterfowl [Surf Scoter (*Melanitta perspicillata*)] use of *ashkui* in the lower Churchill River valley were monitored during the first year of the Avifauna EEMP

(2014). Additionally, the first point count surveys of the three year monitoring program were carried out to collect distribution and habitat associations of forest songbirds and targeted SAR.

1.2 Study Team

The study team for the 2015 the Avifauna EEMP was comprised of personnel from Stassinu Stantec (Table 1.1).

Table 1.1 2015 Avifauna Study Team

Name	Role	Survey
Wayne Tucker	Project Manager	Forest Songbirds Common Nighthawk
Barry Keough	Assistant Project Manager	Forest Songbirds Common Nighthawk
Victoria Greeley	Project Controls	Forest Songbirds Common Nighthawk
Caroline Hong	HSEQ Coordinator	Forest Songbirds Common Nighthawk
Karen Rashleigh	Team Lead Reporting	Forest Songbirds
Todd Watts	Team Lead	Forest Songbirds
Stacey Camus	Team Lead Reporting	Common Nighthawk
Tony Parr	Team Lead	Common Nighthawk
Daniel Windeler	Field Technician Team Lead	Common Nighthawk
Margie Clark	Field Technician	Forest Songbirds Common Nighthawk
Jean-Luc Hervieux	Field Technician	Forest Songbirds
Chris White	Field Technician	Common Nighthawk

Prior to the start of the field component of the 2015 Avifauna EEMP, all personnel reviewed the Health, Safety, Environment and Quality (HSEQ) and Project Execution Plan, and the Risk Management Strategy (RMS 1) (Stassinu Stantec 2015). A daily hazard assessment (RMS 2) was completed each morning. The required scientific research permit #IW2015-03 (Appendix A) was acquired from the Government of Newfoundland and Labrador, Department of Environment and Conservation prior to the surveys.

2.0 METHODS

2.1 Study Area

The Avifauna EEMP Study Area encompassed a variety of habitats representative of the Project Study Area within and adjacent to the Project Development Area. Forest songbird point count surveys were carried out in the area between Gull Island, Happy Valley-Goose Bay, and Goose River (Figure 2-1). Point count locations were the same as those used in 2014 (5 days), and additional point count locations were established along the Goose River (1 day), which was previously surveyed during baseline surveys in 2006 as a control.

Common Nighthawk point count surveys were carried out towards the west of the Study Area between Happy Valley-Goose Bay and Gull Island, as well as south from Blackrock Bridge on the Churchill River to the Traverspine River within the Project Development Area (Figure 2-1). Surveys targeted Common Nighthawk breeding and foraging habitats (Table 2.1) based on representative habitat availability in the Study Area. Point count locations included areas previously surveyed in 2014 towards the West with additional point count stations towards the South within the Study Area.

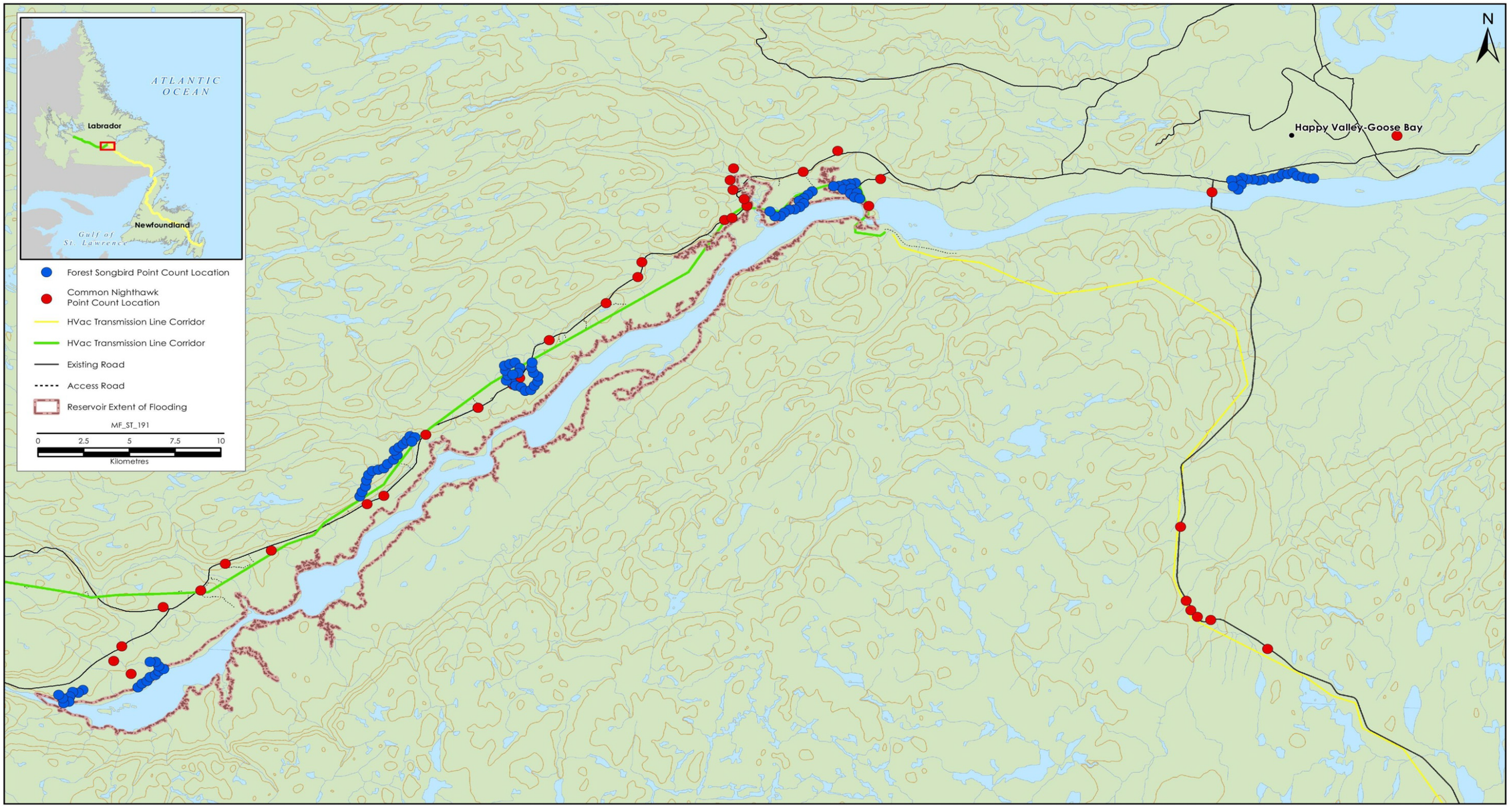

Figure 2-1 2015 Avifauna EEMP Study Area

2.2 Forest Songbird Point Count Surveys

Two 2-person field teams conducted the point count surveys. Starting locations for all point count transects were accessed by vehicle (one transect per team per day).

Survey protocols were designed to follow the Newfoundland and Labrador Boreal Bird Monitoring Protocol Initiative SOP#3 (NLDOEC 2012). The surveys began no earlier than 30 minutes before sunrise and ended by 0930. Survey were conducted only under suitable weather conditions including temperatures above freezing, winds less than 25 km/h, no precipitation (or intermittent light precipitation), and visibility of more than 50 m.

Point count stations were spaced at 300 m intervals along each transect. At each point count station, the following information was recorded on prepared datasheets: date, GPS location, weather conditions, habitat information, and survey start and end times.

The surveys consisted of a five-minute listening period followed by call playback. All birds heard or observed within the five minute period were recorded. Each bird observation was recorded based on distance categories of 0-25, 25-50 m, 50–100 m, and 100–400 m. After the five-minute listening period, a Black-capped Chickadee (*Poecile atricapillus*) mobbing call was broadcasted for two minutes using a FoxPro game caller. Any new species were recorded in a one-minute listening period after the broadcast[1]. Any birds (or other wildlife species) heard or observed during transit between point count stations were recorded as incidental observations.

2.2.1 Analysis

Species richness was determined by the total of number of species observed during forest songbird point count surveys. For this analysis, species richness was calculated for each point count station and averaged by habitat type. Habitat types that had three or more point count stations were included in the analysis (black spruce, black spruce lichen woodland, bog, disturbed, hardwood, mixedwood, and white spruce) (Stantec Consulting Ltd. 2013). Habitat types omitted were balsam fir (two point counts), regenerating (one point count), and riparian (two point counts) due to low sample size. Only species targeted by point count surveys (passerines and woodpeckers) were included when determining species richness (Stantec Consulting Ltd. 2013). Other species were omitted based on the following restrictions (Stantec Consulting Ltd. 2013):

- Waterfowl and waterbirds - their primary habitats are not forests
- Raptors – their territories exceed area surveyed by point counts
- Early nesters as described by Environment Canada (Government of Canada 2014) as they may not be breeding during the timing of point counts – Gray Jay (*Perisoreus canadensis*),

[1] On June 20, a Boreal Owl (*Aegolius funereus*) mobbing call was used as there were technical issues with the Black-capped Chickadee call in the FoxPro.

American Crow (*Corvus brachyrhynchos*), Common Raven (*Corvus corax*), Red Crossbill (*Loxia curvirostra*), and White-winged Crossbill (*Loxia leucoptera*).

- Colonial species (all Swallows, except Tree Swallow) – can result in error when extrapolated to larger study area

2.2.2 Species at Risk

Olive-sided Flycatcher, Rusty Blackbird, Common Nighthawk, and Gray-cheeked Thrush were selected as targeted SAR species for the avifauna EEMP based on the EIS (Nalcor 2009a, 2009b). When suitable habitat for the four targeted SAR species was encountered (Table 2.1), call playback of the species was also played for two-minute call playback period (following the chickadee playback-listening period), followed by a one-minute listening period.

Table 2.1 Species at Risk and Their Habitats in the Study Area

Scientific Name	Common Name	Status	Habitat	Occurrence in the Study Area
Contopus cooperi	Olive-sided Flycatcher	Threatened under *SARA* and *NLESA*	Open areas (e.g., forest clearings, wetlands, burns) containing mature trees and large numbers of dead trees.	Four observations during baseline surveys in 2006 and 2007, and one during 2014 point count surveys. Suitable primary habitat estimated to comprise 14% of the lower Churchill River watershed (LCRW).
Euphagus carolinus	Rusty Blackbird	Special Concern under *SARA* Vulnerable *NLESA*	Primarily occupies forest wetlands, such as slow-moving streams, peat bogs, sedge meadows, marshes, swamps, beaver ponds and pasture edges.	16 observations during baseline surveys in 2006 and 2007, and seven during area nest searches in 2014. Suitable primary habitat estimated to comprise 3.7% of the LCRW.
Chordeiles minor	Common Nighthawk	Threatened under *SARA* and *NLESA*	Burns and burn edges, or anthropogenically disturbed sites for ground nesting; wetland areas for foraging on insects.	Incidental observations during baseline surveys in 2006 (number unconfirmed) and one during area nest searches in 2014. Suitable primary habitat estimated to comprise 42.3% of the LCRW.
Catharus minimus	Gray-cheeked Thrush	Threatened under NLESA	A variety of mature forest types including white spruce, wet spruce and dry spruce adjacent to wetland or riparian habitat.	Nine observations during baseline surveys in 2006 and 2007. Suitable primary habitat estimated to comprise 16.9% of the LCRW.

Notes:
- LCRW – Lower Churchill River Watershed; SARA – Species at Risk Act, NLESA – Newfoundland and Labrador Endangered Species Act.
- Estimate of primary habitat is based on the regional Ecological Land Classification (ELC) conducted in support of the Project.

2.3 Common Nighthawk Point Count Surveys

The surveys followed Stantec's Standard Operating Protocols (SOPs) for Common Nighthawk as well as other species of the Nightjar family (Stantec Consulting Ltd. 2010) based upon recommendations from Britsh Columbia's Resource Inventory Committee (BC RIC 1998) and United States Nightjar Survey Network (US NSN 2012).

Surveys were conducted during mid-to late June, when males call are more likely to call (BC RIC 1998). Surveys began at sunset and continued until the end of the dusk crepuscular period, or nautical twilight. Nautical twilight period was identified using a sunrise/sunset calculator from the National Research Council of Canada (Government of Canada 2015). Surveys were conducted under favourable weather conditions with temperature above 7°C, winds below 3 on the Beaufort scale (explained in Table 3.1), and either no precipitation to light, intermittent drizzle.

Surveys were carried out by two-person field teams. The field team surveyed point count stations spaced a minimum of 500 m apart (BC RIC 1998) in Common Nighthawk habitat in the Study Area as described above in Section 2.1.

Upon arrival at a survey location, all light and noise sources were turned off, and observers waited one-minute to allow potential effects from such disturbances to subside. During this time, UTM coordinates, weather, moon visibility, noise, and habitat data were recorded. Moon phase was determined before heading into the field using the following website: http://www.timeanddate.com/moon/phases/canada/happy-valley-goose-bay. Any species detected during this period were recorded as incidental observations. The one-minute period was following by a six-minute listening period. During the six-minute listening period, all Common Nighthawk observations were recorded. For any Common Nighthawk observations, the number of individuals, visual or auditory observation, sex, habitat, approximate distance, and angle from the observation point was recorded. Other bird or wildlife sign were recorded as incidental observations. The six-minute listening period was followed by a two-minute Common Nighthawk call playback. A final two-minute listening period (ten minutes total) followed the call playback where any Common Nighthawk observations were recorded.

3.0 RESULTS

3.1 Forest Songbirds Point Count Surveys

3.1.1 Forest Songbird Point Count Survey Conditions and Effort

Forest songbird point count surveys were conducted over the six day period from June 20 to June 25 under favourable weather conditions (Table 3.1). A total of 122 point counts were completed over 240 field hours. All but one survey began before the 0930 suggested cut-off. Four point counts ended just after the cut-off, but had started before 0930.

Table 3.1 2015 Forest Songbird Point Count Survey Conditions and Effort

Date	General Location	Survey Length		Point Counts	Survey Conditions		Field Effort (Hours per Person per Day)
		Start	End		Temperature (°C)	Wind (Beaufort Scale[1])	
June 20	Outside Happy Valley-Goose Bay	0445	0943	19	11	0 - 2	40
June 21	~50 km west of Happy Valley-Goose Bay	0523	0931	20	14	0 - 3	40
June 22	Muskrat Falls – Lower Brook	0510	0932	22	12	0 - 2	40
June 23	Edwards Brook	0556	0938	18	18	0 - 1	40
June 24	Gull Island	0549	0939	18	17	0 - 3	40
June 25	Goose River	0441	0842	25	9	0 - 3	40

Notes:

[1] – Beaufort Scale : 0 = <2 km/h; 1 = 2-5 km/h; 2 = 6-11 km/h; 3 = 12-19 km/h; 4 = 20-29 km/h; 5 = 30-39 km/h; 6 = 40-50 km/h; 7 = 51-61 km/h; 8 = 62-74 km/h; 9 = 75-87 km/h; 10 = 88-101 km/h; 11 = 102-116 km/h; and 12 = 117+ km/h

3.1.2 Forest Songbird Point Count Results

The highest species richness was observed in hardwood (n=7), disturbed (n=6), and white spruce (n=6) habitats (Figure 3-1). The Lower species richness was observed in the following habitats: Black spruce lichen woodland (n=5), mixedwood (n=5), black spruce (n=4) and bog (n=4) had lower species richness.

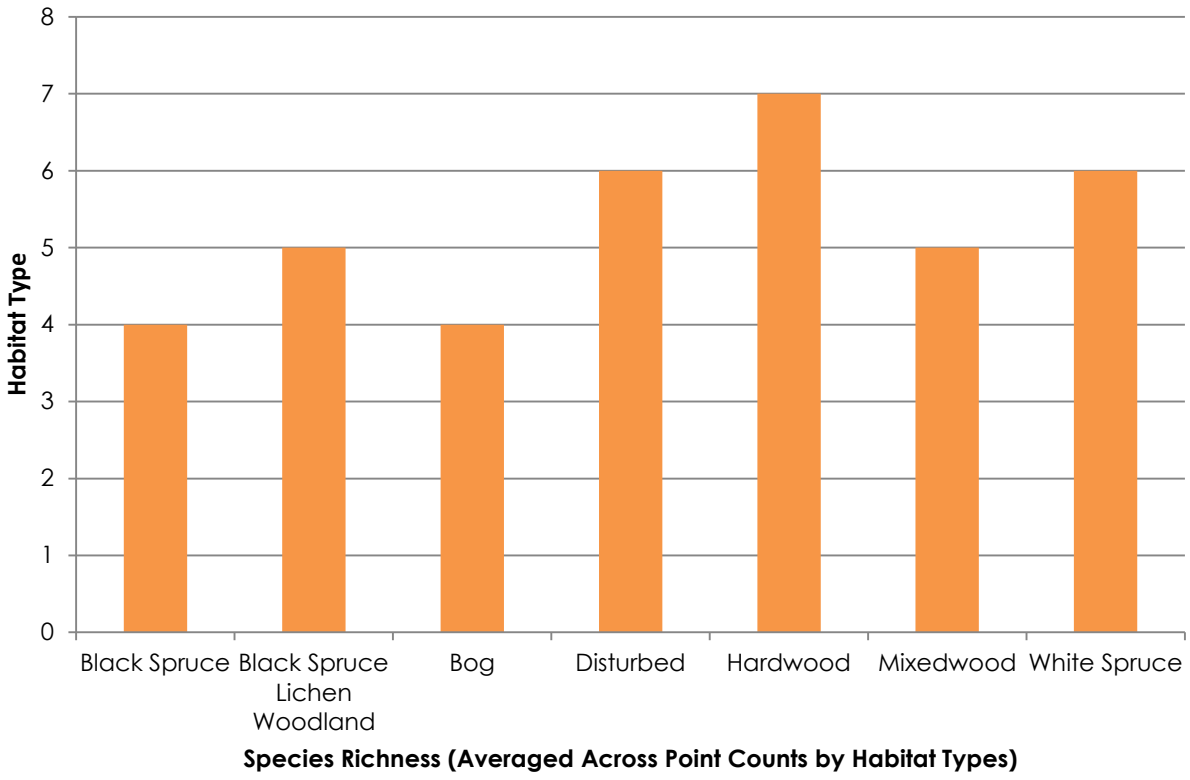

Figure 3-1 Species Richness by Habitat in the Lower Churchill River Valley

A total of 48 species were identified during point counts (Appendix B). No new species were identified following call playback. Ten of the species detected in 2015 were not detected in 2014, either during point counts or incidentally (Appendix B; Stassinu Stantec 2014): Ruffed Grouse (*Bonasa umbellus*), Common Loon (*Gavia immer*), Greater Yellowlegs (*Tringa melanoleuca*), American Three-toed Woodpecker (*Picoides dorsalis*), Bank Swallow , Winter Wren (*Troglodytes hiemalis*), American Redstart (*Setophaga ruticilla*), White-crowned Sparrow (*Zonotrichia leucophrys*), Savannah Sparrow (*Passerculus sandwichensis*), Pine Grosbeak (*Pinicola enucleator*), and White-winged Crossbill. Similarly, eight species detected in 2014 were not detected in 2015: Spotted Sandpiper (*Actitis macularius*), Wilson's Snipe (*Gallinago delicata*), Downy Woodpecker (*Picoides pubescens*), Philadelphia Vireo (*Vireo philadelphicus*), Olive-sided Flycatcher, Golden-crowned Kinglet (*Regulus satrapa*), Mourning Warbler (*Geothylpis philadelphia*), and Song Sparrow (*Melospiza melodia*).

The following species were observed as incidental during point count surveys: Red-tailed Hawk (*Buteo jamaicensis*), Ruffed Grouse, Common Loon, American Three-toed Woodpecker, Alder Flycatcher (*Empidonax alnorum*), Gray Jay, Boreal Chickadee (*Poecile hudsonicus*), Hermit Thrush (*Catharus guttatus*), Orange-crowned Warbler (*Oreothylpis celata*), Magnolia Warbler (*Setophaga magnolia*), Yellow-rumped Warbler (*Setophaga coronata*), Northern Waterthrush

(*Parkesia noveboracensis*), Fox Sparrow (*Passerella iliaca*), White-throated Sparrow (*Zonotrichia albicollis*), Pine Grosbeak, White-winged Crossbill (*Loxia leucoptera*), and unidentified Woodpecker spp. (*Picoides spp.*).

3.1.3 Species at Risk

None of the four targeted SAR species were recorded. Bank Swallow (*Riparia riparia*) was observed during forest songbird point count surveys. Bank Swallow is currently listed as Threatened under the federal *Species At Risk Act* (Government of Canada 2002), but has no legal listing under the *Newfoundland and Labrador Endangered Species Act* (Government of Newfoundland and Labrador 2014). The status report prepared for this species indicates that even though populations are declining elsewhere "there is insufficient evidence to establish that the species is presently at risk in Newfoundland and Labrador" and the recommended listing for this species in the province is "Not at Risk" (SSAC 2009).

3.2 Common Nighthawk Point Count Surveys

3.2.1 Common Nighthawk Point Count Survey Effort and Conditions

Common Nighthawk point count surveys were conducted over four evenings between June 7 and June 21 (Table 3.2). A total of 37 point count surveys were completed over 55 field hours. All point count surveys were completed within the identified nautical twilight period.

Table 3.2 2015 Common Nighthawk Point Count Survey Conditions and Effort

Date	General Location	Survey Duration		Point Counts	Survey Conditions							Field Effort (Hours per Person per Day)
		Start	End		Temperature (^{0}C)	Wind (Beaufort Scale[1])	Cloud Cover (%)	Precipitation	Noise	Moon (Y/N)	Moon Phase	
June 7	Happy Valley-Goose Bay and Lower Brook	21h00	22h43	8	10	0	95	None	Ambient Traffic River	N	Waning Gibbous	12
June 15	South along the TLH, to Travespine River, Dome Mountain, Muskrat Falls, Lower Brook	20h29	22h34	12	16	2	75	None	Ambient Traffic River	N	Waxing Crescent	20
June 20	Lower Brook and Upper Brook	20h36	22h10	5	13	0-2	55	None	Ambient	Y	Waxing Crescent	8
June 21	Edwards Brook Pinus River	20h59	22h46	12	14	0	25	None	Ambient Traffic River	Y	Waxing Crescent	15

Notes:

[1] – Beaufort Scale : 0 = <2 km/h; 1 = 2-5 km/h; 2 = 6-11 km/h; 3 = 12-19 km/h; 4 = 20-29 km/h; 5 = 30-39 km/h; 6 = 40-50 km/h; 7 = 51-61 km/h; 8 = 62-74 km/h; 9 = 75-87 km/h; 10 = 88-101 km/h; 11 = 102-116 km/h; and 12 = 117+ km/h

3.2.2 Common Nighthawk Point Count Survey Results

Three Common Nighthawks were recorded during point count surveys (Table 3.3). Two Common Nighthawks were observed near breeding habitat types of gravel and sandy areas. The other Common Nighthawk was observed adjacent a foraging habitat, bog.

Table 3.3 2015 Common Nighthawk Point Count Survey Results

Date	Location		Habitat	Number	Type (Auditory/ Visual)	Sex
	Easting	Northing				
June 7	[redacted]	[redacted]	Sandy area bordered by black spruce and dwarf birch	1	Auditory & Visual	Unknown
June 15	[redacted]	[redacted]	Bog treed with black spruce and larch	1	Visual	Unknown
June 21	[redacted]	[redacted]	Gravel pit bordered mixedwood	1	Auditory & Visual	Unknown

The following bird species were observed incidentally during Common Nighthawk surveys: Canada Goose (*Branta canadensis*), Common Merganser (*Mergus merganser*), Spotted Sandpiper (*Actitis macularius*), Greater Yellowlegs (*Tringa melanoleuca*), Wilson's Snipe (*Gallinago delicata*), Herring Gull (*Larus argentatus*), Great Horned Owl (*Bubo virginianus*), Alder Flycatcher (*Empidonax alnorum*), Red-eyed Vireo (*Vireo olivaceus*), Gray Jay), American Crow (*Corvus brachyrhynchos*), Red-breasted Nuthatch (*Sitta canadensis*), Ruby-Crowned Kinglet (*Regulus calendula*), and Swainson's Thrush (*Catharus ustulatus*). Mammal species observed included Moose (*Alces alces*), Snowshoe Hare (*Lepus americanus*), Red Squirrel (*Tamiasciurus hudsonicus*), and Little Brown Myotis (*Myotis lucifugus*). Herpetiles recorded during surveys were American Toad (*Anaxyrus americanus*), Wood Frog (*Lithobates sylvaticus*), and Spring Peeper (*Pseudacris crucifer*).

4.0 SUMMARY

The 2015 Avifauna EEMP program field survey results provide preliminary information on avifauna, SAR, and common nighthawk distribution and habitat associations in the Study Area. This was the second year of a three year program, which will continue in 2016. Stassinu Stantec will use this information in combination with results of past and future surveys to monitor any potential Project effects on avifauna from Project activities in the Project Area.

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APPENDIX A

2015 Research Permit

Newfoundland Labrador

GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Dept of Environment & Conservation

Scientific Research Permit

(as under Section 86 of the Wildlife Regulations, Consolidated Newfoundland and Labrador Regulation 1156/96)

Permit #: IW2015-03

Supplement to Permit(s) #: IW2013-66; IW2014-25

Project Title: *Wildlife Environmental Effects Monitoring Programs for the Lower Churchill Generation Project and Labrador-Island Transmission Link*

Issued to:
Wayne Tucker, Team Lead
Stassinu Stantec Limited Partnership
19 Union Street
Corner Brook, NL, A2H 5P9
Tel: (709) 639-9712

Permit to:
1) ***Winter Research:*** Undertake winter aerial and ground track surveys for moose, porcupine and other wildlife;
2) ***Spring/Summer Research:*** Undertake spring/summer breeding bird point count surveys and nest searches;
3) ***Fall Research:*** Undertake fall aerial surveys for beaver colonies

The objectives of these studies are to investigate and monitor potential environmental effects during construction of the Lower Churchill Generation Project and Labrador-Island Transmission Link Project.

Dates of Research: March 3 to November 1, 2015.

Date of Permit Expiration: December 1, 2015.

Location: All field investigations associated with the Lower Churchill Generation Project will occur primarily within the lower Churchill River watershed of Labrador (Figure 1). Of interest is a 20 km radius around the Project footprint in the lower Churchill River valley and the AC transmission line from Muskrat Falls to Churchill Falls. There are also field investigations associated with the Labrador-Island Transmission Link which extends from Happy Valley-Goose Bay in Labrador to the Northern Peninsula of Newfoundland (Figure 2). The intent is to establish a monitoring grid throughout the study area of each Project where cells become permanent monitoring stations. Where possible and appropriate, pre-existing transects and grids will be resurveyed and supplemented.

Conditions:

1) The permit holder may designate other individuals to perform these actions on his behalf, with suitable supervision. The permit holder is responsible for the training of any designated individuals and must ensure that designated individuals follow all conditions of this permit.

2) Names and contact information for all individuals participating in research activities shall be provided to the Wildlife Division-Department of Environment and Conservation, prior to commencement of field work. Additional names or deletion of names can be provided to the Wildlife Division on an ongoing basis.

3) Prior to initiation of the field program for effects monitoring and baseline investigations, a digital copy of the shape files of all survey routes must be provided to the Wildlife Division.

4) This permit is only valid for work within the indicated study areas (Figures 1 and 2).

5) With the exception of activities covered under this permit, no wildlife species, including the study species, will be unduly harassed, injured or killed as a result of activities performed under this permit. The Wildlife Division advises applicants to operate under established regulations and guidelines with respect to wildlife and wildlife habitat to minimize adverse impacts (Section 106 of the Wild Life Regulations under the *Wild Life Act* (O.C. 96-809)).

6) Disturbance of all wildlife should be minimized during helicopter and ground transportation. Whenever possible, aircraft should not descend lower than 100 meters (above ground level) during surveys.

7) The field program will be conducted using accepted wildlife research techniques and targeted species will be disturbed as little as possible. The method and survey dates described in the initial permit request will be followed as closely as possible. Any changes to the survey design or methodology outlined in the initial permit request will require approval before implementation.

8) Any samples that are collected must be turned into the Wildlife Division following identification. A permit is required and must be obtained prior to transporting any samples or specimens out of the province.

9) To avoid introduction of non-native species, all research equipment should be new and unused, or equipment that has not been previously used outside of Labrador or the Island of Newfoundland.

10) Final reports should be submitted for each of the components of the work proposed and permitted. Reports should provide a synopsis of the location of surveys, methods employed, number of samples/specimens taken, location of samples/specimens,

additional relevant ecological information and a summary of next steps. The raw data and coordinates should be submitted in digital format along with the final reports for each component of the field program and for all sightings of wildlife and sign. The permit holder is responsible to obtain any and all permissions which may be required to release this information to the Wildlife Division. Final reports are to be remitted by the following dates to the Wildlife Division:

Winter Research: May 1, 2015
Spring/Summer Research: October 1, 2015
Fall Research: December 1, 2015

11) Any unusual wildlife observations or any adverse effects observed during the field program are to be reported immediately to the Wildlife Division

12) This permit does not absolve or relieve the permit holder from any other laws, permits, regulations or orders.

13) This permit does not relieve the permit holder from the requirement to acquire permission to access private property.

14) All conditions of this permit must be adhered to and data and results from the field program submitted to the Wildlife Division prior to another permit being issued.

15) Under the discretion of the Director of Wildlife, this permit can be revoked without notice.

March 4, 2015
Date:

Director of Wildlife

Wildlife Division
PO Box 2007
Corner Brook, NL
A2H 7S1
Ph (709) 637-2008
Fax (709) 637-2004

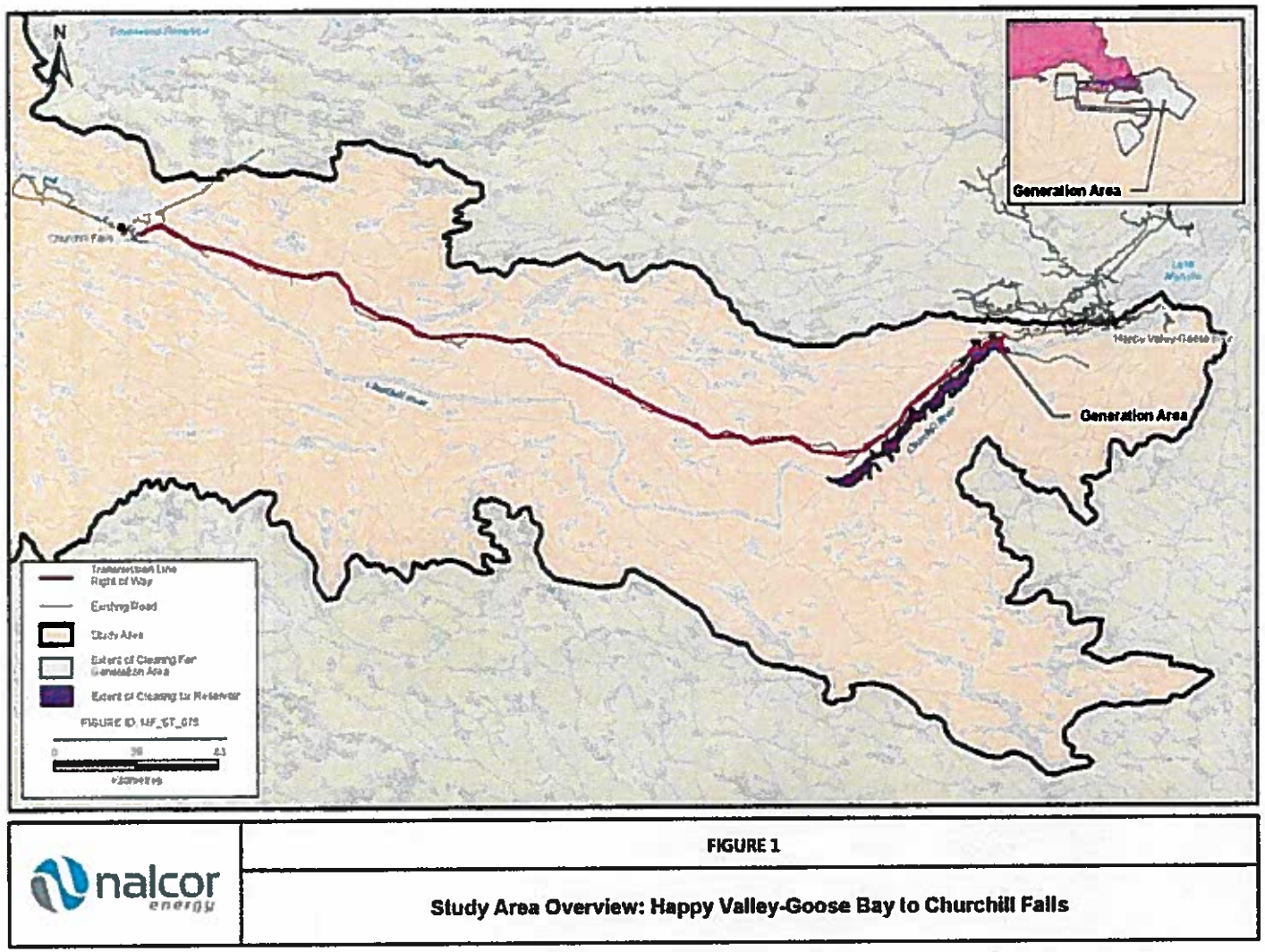
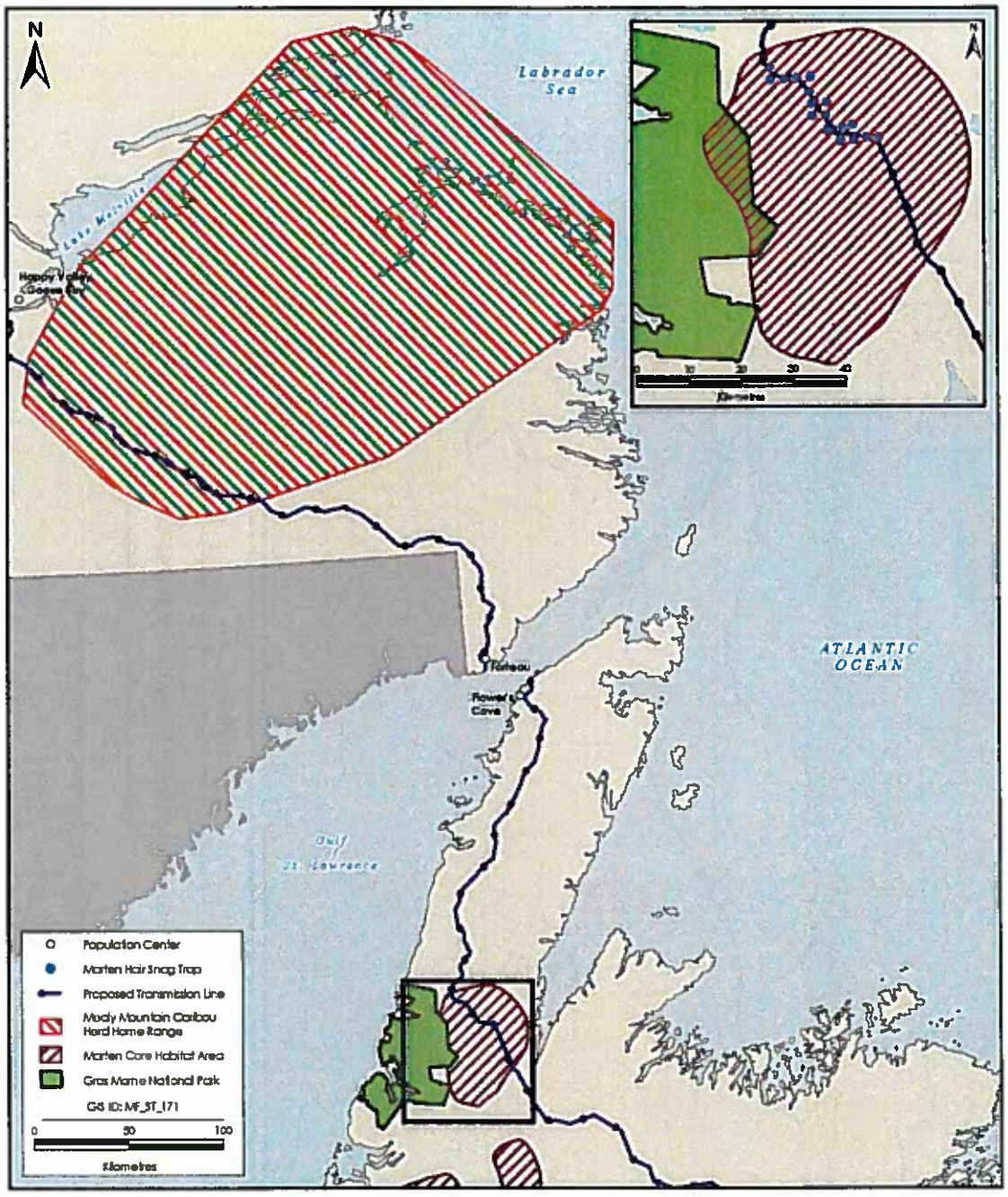


Figure 1 **Study Area Overview for the Lower Churchill Generation Project**



nalcor energy	**Figure 2** **Study Area Overview for the Labrador-Island Transmission Link Project**

Figure 2 **Study Area Overview for the Labrador-Island Transmission Link Project**

APPENDIX B

Forest Songbird Point Count Survey Data

Table B.1 Species recorded during 2015 forest songbird point count surveys

English Name	Scientific Name	# Forest Songbird Point Count Records	
		2014	2015
Canada Goose	*Branta canadensis*	14	1
Ruffed Grouse	*Bonasa umbellus*	-	1
Spruce Grouse	*Falcipennis canadensis*	1	1
Common Loon	*Gavia immer*	-	1
Merlin	*Falco columbarius*	-	1
Spotted Sandpiper	*Actitis macularius*	2	-
Greater Yellowlegs	*Tringa melanoleuca*	-	2
Wilson's Snipe	*Gallinago delicata*	1	-
American Three-toed Woodpecker	*Picoides dorsalis*	-	4
Black-backed Woodpecker	*Picoides arcticus*	2	1
Downy Woodpecker	*Picoides pubescens*	1	-
Yellow-bellied Sapsucker	*Sphyrapicus varius*	1	1
Least Flycatcher	*Empidonax minimus*	16	4
Alder Flycatcher	*Empidonax alnorum*	7	14
Yellow-bellied Flycatcher	*Empidonax flaviventris*	4	21
Olive-sided Flycatcher	*Contopus cooperi*	1	-
Red-eyed Vireo	*Vireo olivaceus*	-	1
Philadelphia Vireo	*Vireo philadelphicus*	3	-
Gray Jay	*Perisoreus canadensis*	45	25
American Crow	*Corvus brachyrhyncos*	3	5
Common Raven	*Corvus corax*	1	7
Bank Swallow	*Riparia riparia*	-	15
Boreal Chickadee	*Poecile hudsonicus*	3	7
Red-breasted Nuthatch	*Sitta canadensis*	10	5
Winter Wren	*Troglodytes hiemalis*	-	1
Ruby-crowned Kinglet	*Regulus calendula*	56	55
Golden-crowned Kinglet	*Regulus satrapa*	1	-
Swainson's Thrush	*Catharus ustulatus*	133	127
Hermit Thrush	*Catharus guttatus*	9	12
American Robin	*Turdus migratorius*	47	19
Tennessee Warbler	*Oreothylpis peregrina*	63	82
Orange-crowned Warbler	*Oreothylpis celata*	3	20
Yellow Warbler	*Setophaga petechia*	10	9

English Name	Scientific Name	# Forest Songbird Point Count Records	
Mourning Warbler	*Geothylpis philadelphia*	1	-
Palm Warbler	*Setophaga palmarum*	1	3
Magnolia Warbler	*Setophaga magnolia*	2	9
Yellow-rumped Warbler	*Setophaga coronata*	66	49
Blackpoll Warbler	*Setophaga striata*	4	5
American Redstart	*Setophaga ruticilla*	-	5
Cape May Warbler	*Setophaga tigrina*	6	7
Black-throated Green Warbler	*Setophaga virens*	45	37
Wilson's Warbler	*Cardellina pusilla*	7	3
Northern Waterthrush	*Parkesia noveboracensis*	26	30
Song Sparrow	*Melospiza melodia*	1	-
Lincoln's Sparrow	*Melospiza lincolnii*	4	6
White-throated Sparrow	*Zonotrichia albicollis*	49	41
White-crowned Sparrow	*Zonotrichia leucophrys*	-	2
Savannah Sparrow	*Passerculus sandwichensis*	-	1
Fox Sparrow	*Passerella iliaca*	30	40
Dark-eyed Junco	*Junco hyemalis*	61	79
Pine Grosbeak	*Pinicola enucleator*	-	2
Purple Finch	*Haemorhous purpureus*	-	1
White-winged Crossbill	*Loxia leucoptera*	-	16
Pine Siskin	*Spinus pinus*	12	2
"-" indicates no records			

Table B.2 2015 Forest Songbird Point Count Survey Data

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 20, 2015	669745	5906196	Mixedwood	0500	Boreal Chickadee (1) Ruby-Crowned Kinglet (1) Swainson's Thrush (1) American Robin (1) White-throated Sparrow (1) Dark-eyed Junco (2)	Gray Jay (1)	Pine Grosbeak (1)
June 20, 2015	669499	5906124	Mixedwood	0516	Swainson's Thrush (1) American Robin (1) White-throated Sparrow (1) Dark-eyed Junco (2) Yellow-bellied Flycatcher (1) Yellow-rumped Warbler (1) Blackpoll Warbler (1) American Redstart (1)	Gray Jay (1)	None
June 20, 2015	669170	5906151	Mixedwood	0530	Swainson's Thrush (1) American Robin (1) White-throated Sparrow (1) Yellow-bellied Flycatcher (1) Tennessee Warbler (2) Northern Waterthrush (2)	Fox Sparrow (1)	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 20, 2015	668852	5906149	Mixedwood	0547	Swainson's Thrush (2) White-throated Sparrow (1) Dark-eyed Junco (2) Gray Jay (1) Blackpoll Warbler (1) Tennessee Warbler (2) Northern Waterthrush (2) Magnolia Warbler (1)	Black-throated Green Warbler (1)	None
June 20, 2015	668568	5906202	Black Spruce	0610	Northern Waterthrush (3) Fox Sparrow (1) Black-throated Green Warbler (2) Unidentified Woodpecker (1)	None	None
June 20, 2015	668327	5906023	Mixedwood	0640	Tennessee Warbler (1) Northern Waterthrush (2) Alder Flycatcher (1)	None	White-winged Crossbill (1)
June 20, 2015	667991	5906018	Mixedwood	0750	American Redstart (1) Northern Waterthrush (2) Fox Sparrow (1) Alder Flycatcher (1) American Crow (1)	None	None
June 20, 2015	668533	5905786	Riparian	0820	Tennessee Warbler (2) Northern Waterthrush (1) Least Flycatcher (1) Yellow Warbler (2) Wilson's Warbler (1)	American Redstart (1)	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 20, 2015	668388	5905496	Mixedwood	0905	Fox Sparrow (1)	None	American Three-toed Woodpecker (1)
June 20, 2015	668115	5905649	Mixedwood	0934	American Redstart (1) Northern Waterthrush (2) Fox Sparrow (1) Black-throated Green Warbler (2) Red-breasted Nuthatch (1)	Tennessee Warbler (1)	None
June 20, 2015	670243	5906305	White Spruce	0445	Ruby-crowned Kinglet (1) Swainson's Thrush (2) American Robin (1) Northern Waterthrush (1) White-throated Sparrow (2) Dark-eyed Junco (1)	None	None
June 20, 2015	670532	5906396	Mixedwood	0508	Ruby-crowned Kinglet (1) Swainson's Thrush (2) Northern Waterthrush (2) White-throated Sparrow (2) Magnolia Warbler (1) Blackpoll Warbler (1) Fox Sparrow (1)	None	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 20, 2015	670736	5906613	White Spruce	0531	American Robin (3) Northern Waterthrush (3) Blackpoll Warbler (1) Least Flycatcher (1) Gray Jay (1) Tennessee Warbler (1) Yellow Warbler (1) Black-throated Green Warbler (2) Pine Siskin (1)	None	None
June 20, 2015	671033	5906637	White Spruce	0622	Swainson's Thrush (3) American Robin (1) Magnolia Warbler (1) Fox Sparrow (1) Tennessee Warbler (3) Pine Siskin (1)	None	None
June 20, 2015	671300	5906744	White Spruce	0652	Ruby-crowned Kinglet (1) Swainson's Thrush (1) American Robin (1) Northern Waterthrush (1) Fox Sparrow (2) Tennessee Warbler (2) Yellow Warbler (1) Yellow-bellied Flycatcher (1) Yellow-rumped Warbler (1)	None	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 20, 2015	671545	5906576	Mixedwood	0717	American Robin (1) Yellow Warbler (1)	None	None
June 20, 2015	671855	5906530	Mixedwood	0740	Swainson's Thrush (1) Magnolia Warbler (1)	None	None
June 20, 2015	672151	5906474	White Spruce	0759	Ruby-crowned Kinglet (1) American Robin (1) Northern Waterthrush (1)	None	None
June 20, 2015	672454	5906483	White Spruce	0820	Ruby-crowned Kinglet (1) Swainson's Thrush (1) White-throated Sparrow (1) Fox Sparrow (1)	None	None
June 21, 2015	629772	5890757	Bog	0535	Alder Flycatcher (1) Ruby-crowned Kinglet (1) Palm Warbler (2) White-throated Sparrow (1) Dark-eyed Junco (1)	Yellow-rumped Warbler (1)	None
June 21, 2015	629471	5890850	Bog	0600	White-throated Sparrow (1) Dark-eyed Junco (1) Greater Yellowlegs (1) Lincoln's Sparrow (1) Yellow-rumped Warbler (1)	None	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 21, 2015	629525	5891165	Bog	0625	Ruby-crowned Kinglet (1) Dark-eyed Junco (1) Lincoln's Sparrow (1) Fox Sparrow (2) American Robin (1)	None	None
June 21, 2015	629361	5891434	Black Spruce	0648	Ruby-crowned Kinglet (2) Swainson's Thrush (2) White-throated Sparrow (1) Dark-eyed Junco (1) Yellow-rumped Warbler (2)	Boreal Chickadee (1)	None
June 21, 2015	629287	5891722	Black Spruce	0715	Fox Sparrow (1) Yellow-rumped Warbler (1) American Redstart (1) Northern Waterthrush (1)	Swainson's Thrush (1)	Hermit Thrush (1)
June 21, 2015	629571	5891850	Black Spruce	0739	Hermit Thrush (1)	None	None
June 21, 2015	629857	5891964	Bog	0805	Swainson's Thrush (1)	Dark-eyed Junco (1) Lincoln's Sparrow (1) Fox Sparrow (2)	None
June 21, 2015	630146	5891660	Riparian	0832	White-throated Sparrow (1) White-winged Crossbill (1) Tennessee Warbler (1)	None	Fox Sparrow (1)
June 21, 2015	630079	5891347	Black Spruce	0858	Ruby-crowned Kinglet (1) Swainson's Thrush (1) Gray Jay (1)	Dark-eyed Junco (1)	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 21, 2015	629796	5891234	Bog	0922	Ruby-crowned Kinglet (1) Dark-eyed Junco (1)	American Redstart (1)	Gray Jay (1)
June 21, 2015	630011	5890576	Bog	0523	Alder Flycatcher (4) Yellow-rumped Warbler (1) Fox Sparrow (2) Dark-eyed Junco (1)	None	None
June 21, 2015	630316	5890529	Bog	0546	Fox Sparrow (1)	Boreal Chickadee (2) Palm Warbler (1)	None
June 21, 2015	630553	5890326	Black Spruce	0612	Tennessee Warbler (1)	Gray Jay (2)	None
June 21, 2015	630856	5890413	Black Spruce	0640	Yellow-rumped Warbler (1) Ruby-crowned Kinglet (1) Swainson's Thrush (1) White-winged Crossbill (2)	None	None
June 21, 2015	631023	5890679	Black Spruce	0708	Tennessee Warbler (1) Ruby-crowned Kinglet (1) Swainson's Thrush (1)	None	None
June 21, 2015	631188	5890940	Black Spruce	0732	Swainson's Thrush (1)	None	None
June 21, 2015	631166	5891253	Bog	0758	None	None	None
June 21, 2015	630908	5891437	Bog	0819	Dark-eyed Junco (1)	None	None
June 21, 2015	630783	5891732	Black Spruce	0841	Dark-eyed Junco (1) Tennessee Warbler (1) Ruby-crowned Kinglet (2)	None	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 21, 2015	630783	5892040	Black Spruce	0907	Alder Flycatcher (1) Fox Sparrow (1) Ruby-crowned Kinglet (1)	None	None
June 22, 2015	645192	5903433	Black Spruce Lichen Woodland	0510	Swainson's Thrush (2) Lincoln's Sparrow (1) Gray Jay (3)	None	None
June 22, 2015	644977	5903201	Black Spruce Lichen Woodland	0525	Swainson's Thrush (2) Dark-eyed Junco (3) Gray Jay (1)	Northern Waterthrush (1)	None
June 22, 2015	644766	5902981	Black Spruce Lichen Woodland	0550	Swainson's Thrush (1) Dark-eyed Junco (2) Common Raven (1) Tennessee Warbler (1)	Ruby-crowned Kinglet (1)	None
June 22, 2015	644521	5902799	White Birch	0616	Swainson's Thrush (2) Dark-eyed Junco (2) Rufffed Grouse (1) Yellow-bellied Flycatcher (1) Ruby-crowned Kinglet (1) Black-throated Green Warbler (1) White-throated Sparrow (1) Yellow-rumped Warbler (1)	None	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 22, 2015	644797	5902682	Mixedwood	0640	Tennessee Warbler (3) Yellow-bellied Flycatcher (1) Black-throated Green Warbler (2) Yellow Warbler (1)	None	None
June 22, 2015	644598	5902445	Black Spruce Lichen Woodland	0710	Swainson's Thrush (1) Dark-eyed Junco (2) Ruby-crowned Kinglet (1) Black-throated Green Warbler (1) Orange-crowned Warbler (1) Yellow-rumped Warbler (1)	Gray Jay (1)	Red-tailed Hawk (1)
June 22, 2015	644333	5902283	Black Spruce Lichen Woodland	0745	Swainson's Thrush (3) Tennessee Warbler (1) Yellow Warbler (3) American Robin (1) Red-eyed Vireo (1) Northern Waterthrush (1) Cape May Warbler (1)	Black-throated Green Warbler (1)	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 22, 2015	644030	5902240	Black Spruce Lichen Woodland	0810	Dark-eyed Junco (2) Yellow-bellied Flycatcher (1) Ruby-crowned Kinglet (1) Black-throated Green Warbler (1) Orange-crowned Warbler (1) Cape May Warbler (1) Fox Sparrow (1) Hermit Thrush (1) Boreal Chickadee (1)	Gray Jay (1)	None
June 22, 2015	643786	5902052	Black Spruce Lichen Woodland	0825	Dark-eyed Junco (1) Yellow-bellied Flycatcher (1) American Three-toed Woodpecker (1) White-winged Crossbill (1) Hermit Thrush (1)	None	Yellow-rumped Warbler (1)
June 22, 2015	643596	5901804	Black Spruce Lichen Woodland	0845	Dark-eyed Junco (1) Tennessee Warbler (1) Ruby-crowned Kinglet (1) Fox Sparrow (2) Purple Finch (1)	Swainson's Thrush (1) White-throated Sparrow (1) American Robin (1) Hermit Thrush (1)	None
June 22, 2015	643289	5901775	Black Spruce	0900	Dark-eyed Junco (2) Ruby-crowned Kinglet (1) Fox Sparrow (1) Hermit Thrush (1) Greater Yellowlegs (1)	Yellow-rumped Warbler (1) Boreal Chickadee (1)	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 22, 2015	642991	5902050	Black Spruce	0923	Dark-eyed Junco (1) Gray Jay (1) Yellow-bellied Flycatcher (1) Ruby-crowned Kinglet (1) Hermit Thrush (2)	None	None
June 22, 2015	647515	5904114	Black Spruce	0515	Swainson's Thrush (1) Dark-eyed Junco (1)	None	None
June 22, 2015	647219	5904059	Black Spruce	0533	Spruce Grouse (1) Gray Jay (2) Merlin (1)	None	None
June 22, 2015	646929	5903975	Black Spruce	0555	Ruby-crowned Kinglet (1) Hermit Thrush (1) Lincoln's Sparrow (1) Yellow-rumped Warbler (1)	None	None
June 22, 2015	646636	5903883	Black Spruce	0613	Swainson's Thrush (2) Dark-eyed Junco (1) Ruby-crowned Kinglet (1)	None	None
June 22, 2015	646342	5903823	Black Spruce	0633	Swainson's Thrush (3) Boreal Chickadee (1) Tennessee Warbler (1) Cape May Warbler (1)	Yellow-rumped Warbler (1)	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 22, 2015	646883	5903697	Black Spruce	0702	Swainson's Thrush (2) Dark-eyed Junco (1) Tennessee Warbler (2) Cape May Warbler (1) Yellow-rumped Warbler (1)	None	None
June 22, 2015	647292	5903776	Black Spruce	0729	Swainson's Thrush (1) Dark-eyed Junco (1) Hermit Thrush (1) Tennessee Warbler (1) Cape May Warbler (1) Yellow-rumped Warbler (2)	None	None
June 22, 2015	647302	5903476	Black Spruce	0748	Swainson's Thrush (2) Dark-eyed Junco (1) Boreal Chickadee (2) Tennessee Warbler (2) Cape May Warbler (1) Yellow-rumped Warbler (1) White-winged Crossbill (3) Magnolia Warbler (1)	None	None
June 22, 2015	647637	5903555	Black Spruce	0806	Swainson's Thrush (2) Dark-eyed Junco (1) Yellow-rumped Warbler (1)	None	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 22, 2015	647533	5903277	Disturbed (Cleared area with Black Spruce Edge)	0826	Swainson's Thrush (1) Dark-eyed Junco (1) Gray Jay (1) Ruby-crowned Kinglet (1) Yellow-rumped Warbler (1) Bank Swallow (10) Least Flycatcher (1) White-throated Sparrow (1) Fox Sparrow (1) Black-throated Green Warbler (1)	None	None
June 23, 2015	622069	5883343	Hardwood	0613	Yellow-bellied Flycatcher (1) Alder Flycatcher (2) Swainson's Thrush (1) Yellow-rumped Warbler (1) Northern Waterthrush (1) White-throated Sparrow (1) Dark-eyed Junco (1)	Boreal Chickadee (1)	None
June 23, 2015	622161	5883614	Hardwood	0640	Swainson's Thrush (2) Yellow-rumped Warbler (1) White-throated Sparrow (1) Dark-eyed Junco (2) Red-breasted Nuthatch (1) Tennessee Warbler (2) Black-throated Green Warbler (3) Yellow-bellied Sapsucker (1)	None	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 23, 2015	622317	5883968	Mixedwood	0705	Yellow-bellied Flycatcher (2) Swainson's Thrush (3) Tennessee Warbler (2) Black-throated Green Warbler (2) Least Flycatcher (1)	American Redstart (1)	None
June 23, 2015	622340	5884323	Hardwood	0730	Yellow-bellied Flycatcher (1) Swainson's Thrush (2) Tennessee Warbler (2) Black-throated Green Warbler (2) Orange-crowned Warbler (1) Fox Sparrow (1)	None	Unidentified Woodpecker Spp.
June 23, 2015	622442	5884651	Black Spruce	0754	Swainson's Thrush (3) Black-throated Green Warbler (2)	None	None
June 23, 2015	622621	5884900	Mixedwood	0815	Yellow-bellied Flycatcher (1) Swainson's Thrush (1) Tennessee Warbler (2) Black-throated Green Warbler (2) Orange-crowned Warbler (1)	None	Fox Sparrow
June 23, 2015	622931	5885001	Mixedwood	0836	Yellow-bellied Flycatcher (1) Yellow-rumped Warbler (1) Dark-eyed Junco (1) Black-throated Green Warbler (4)	None	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 23, 2015	623233	5885118	Mixedwood	0855	Swainson's Thrush (3) Dark-eyed Junco (1) Black-throated Green Warbler (2)	None	Fox Sparrow
June 23, 2015	623419	5885371	Black Spruce	0911	Swainson's Thrush (2) Black-throated Green Warbler (1)	None	None
June 23, 2015	623726	5885658	Mixedwood	0929	Yellow-rumped Warbler (1) Tennessee Warbler (1) Black-throated Green Warbler (1) Ruby-crowned Kinglet (1)	Dark-eyed Junco (1)	None
June 23, 2015	623905	5885948	Black Spruce	0556	Swainson's Thrush (1) Ruby-crowned Kinglet (1) Canada Goose (1) Palm Warbler (1) Dark-eyed Junco (2)	None	None
June 23, 2015	623720	5886200	Black Spruce	0617	Swainson's Thrush (1) Tennessee Warbler (1) Ruby-crowned Kinglet (1) Yellow-rumped Warbler (1)	None	None
June 23, 2015	623937	5886411	Black Spruce	0636	Yellow-rumped Warbler (1) Black-backed Woodpecker (1)	None	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 23, 2015	624171	5886615	Black Spruce	0654	Common Raven (1) Swainson's Thrush (1) Yellow-rumped Warbler (1)	None	None
June 23, 2015	624355	5886858	Black Spruce	0717	Swainson's Thrush (1) Tennessee Warbler (3) Hermit Thrush (1) Fox Sparrow (1) White-throated Sparrow (1) Magnolia Warbler (1)	None	None
June 23, 2015	624490	5887124	Mixedwood	0746	Swainson's Thrush (4) Tennessee Warbler (1) Ruby-crowned Kinglet (1) Yellow-rumped Warbler (1) Dark-eyed Junco (3) Fox Sparrow (1) American Three-toed Woodpecker (1) Northern Waterthrush (1)	None	None
June 23, 2015	624779	5887085	Mixedwood	0822	Swainson's Thrush (1) Tennessee Warbler (1) Ruby-crowned Kinglet (1) Yellow-rumped Warbler (1) Dark-eyed Junco (1)	White-throated Sparrow (1)	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 23, 2015	624626	5886820	Mixedwood	0911	Common Raven (1) Swainson's Thrush (5) Tennessee Warbler (1) Black-throated Green Warbler (1)	None	None
June 24, 2015	607941	5870651	Black Spruce	0609	Ruby-crowned Kinglet (1) Swainson's Thrush (2) Cape May Warbler (1)	Tennessee Warbler (2) Yellow-rumped Warbler (1)	Magnolia Warbler (1) White-throated Sparrow (1)
June 24, 2015	607710	5870442	Black Spruce	0634	Ruby-crowned Kinglet (1) Swainson's Thrush (1) Gray Jay (1) Tennessee Warbler (1) Dark-eyed Junco (1)	Yellow-rumped Warbler (1) Magnolia Warbler (1) Hairy Woodpecker (1)	None
June 24, 2015	607394	5870476	Black Spruce	0700	Ruby-crowned Kinglet (1) Swainson's Thrush (2) Tennessee Warbler (1) Dark-eyed Junco (1) Yellow-rumped Warbler (1) Hermit Thrush (1)	None	Ruffed Grouse (1)
June 24, 2015	607266	5870193	Black Spruce	0725	Ruby-crowned Kinglet (1) Swainson's Thrush (2) Dark-eyed Junco (1) Yellow-bellied Flycatcher (1)	None	Boreal Chickadee (1)

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 24, 2015	607247	5869882	Balsam Fir	0757	Swainson's Thrush (2) Yellow-bellied Flycatcher (1) Black-throated Green Warbler (2) Winter Wren (1) American Redstart (1)	None	Northern Waterthrush (1) Magnolia Warbler (1)
June 24, 2015	606962	5869774	Disturbed (windthrow)	0837	Swainson's Thrush (3) Red-breasted Nuthatch (1) Northern Waterthrush (1) Magnolia Warbler (1) White-throated Sparrow (1)	None	None
June 24, 2015	606877	5870058	Black Spruce	0912	Ruby-crowned Kinglet (1) Swainson's Thrush (2)	None	None
June 24, 2015	606645	5870248	Black Spruce	0930	Dark-eyed Junco (1) Magnolia Warbler (1) Savannah Sparrow (1)	Yellow-rumped Warbler (1)	None
June 24, 2015	610925	5871052	Black Spruce	0549	Dark-eyed Junco (1) Swainson's Thrush (5) Fox Sparrow (1)	None	None
June 24, 2015	611133	5871280	Black Spruce	0613	Dark-eyed Junco (1) Swainson's Thrush (2) Fox Sparrow (1) Black-throated Green Warbler (2)	None	None
June 24, 2015	611379	5871460	Black Spruce	0637	Dark-eyed Junco (3)	None	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 24, 2015	611528	5871717	Black Spruce	0659	Dark-eyed Junco (1) Swainson's Thrush (2) White-throated Sparrow (3) Blackpoll Warbler (1) Ruby-crowned Kinglet (1) Orange-crowned Warbler (1)	None	None
June 24, 2015	611805	5871851	Black Spruce	0720	Dark-eyed Junco (1) Swainson's Thrush (2) White-throated Sparrow (1) Ruby-crowned Kinglet (1) Yellow-rumped Warbler (1) Magnolia Warbler (1)	None	None
June 24, 2015	611987	5872091	Black Spruce	0736	Dark-eyed Junco (1) Swainson's Thrush (2) White-throated Sparrow (1) Ruby-crowned Kinglet (1) Yellow-rumped Warbler (1)	None	None
June 24, 2015	612242	5872252	Balsam Fir	0756	Dark-eyed Junco (1) Yellow-rumped Warbler (1)	None	Common Loon (1)
June 24, 2015	611950	5872387	Black Spruce	0830	Yellow-rumped Warbler (1) Red-breasted Nuthatch (1) Tennessee Warbler (1)	None	None
June 24, 2015	611756	5872625	Black Spruce	0900	Swainson's Thrush (1)	None	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 24, 2015	611449	5872620	Black Spruce	0919	Dark-eyed Junco (1) Ruby-crowned Kinglet (1) Yellow-rumped Warbler (1)	None	None
June 25, 2015	670779	5920036	Black Spruce Lichen Woodland	0449	Common Raven (1) Swainson's Thrush (1) Tennessee Warbler (1) Fox Sparrow (1) White-crowned Sparrow (1) Dark-eyed Junco (2)	None	None
June 25, 2015	670800	5919726	Black Spruce Lichen Woodland	0510	Common Raven (2) Swainson's Thrush (1) Tennessee Warbler (3) Fox Sparrow (1) Dark-eyed Junco (2) White-throated Sparrow (1) Yellow-rumped Warbler (1)	Gray Jay (1)	Alder Flycatcher (1)
June 25, 2015	670482	5919962	Black Spruce Lichen Woodland	0535	Common Raven (1) Tennessee Warbler (1) Fox Sparrow (1) Dark-eyed Junco (2) Yellow-rumped Warbler (2) Hermit Thrush (2)	Ruby-crowned Kinglet (1)	Orange-crowned Warbler (1)

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 25, 2015	670198	5919850	Disturbed (sandy area)	0550	Swainson's Thrush (3) Tennessee Warbler (2) Fox Sparrow (1) Alder Flycatcher (2) Gray Jay (1) Orange-crowned Warbler (1) Lincoln's Sparrow (1) White-winged Crossbill (1)	None	None
June 25, 2015	670259	5919550	Black Spruce	0610	Tennessee Warbler (1) Fox Sparrow (1) White-throated Sparrow (1) Yellow-rumped Warbler (2) Ruby-crowned Kinglet (1) Alder Flycatcher (2) Orange-crowned Warbler (1) Lincoln's Sparrow (1) American Robin (1)	None	None
June 25, 2015	670601	5919590	Black Spruce	0634	Gray Jay (1)	None	None
June 25, 2015	670585	5919227	Black Spruce	0730	Tennessee Warbler (2) Gray Jay (1) Orange-crowned Warbler (1) American Robin (1)	Fox Sparrow (1)	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 25, 2015	670280	5919245	Black Spruce Lichen Woodland	0747	Tennessee Warbler (1) Orange-crowned Warbler (1) American Robin (1) Northern Waterthrush (1)	Common Raven (1) Boreal Chickadee (1)	None
June 25, 2015	669810	5919742	Black Spruce	0805	Swainson's Thrush (3) Tennessee Warbler (2) Fox Sparrow (1) White-throated Sparrow (1) Yellow-rumped Warbler (2) Gray Jay (1) Yellow-bellied Flycatcher (1)	Hermit Thrush (1)	None
June 25, 2015	669398	5919825	Black Spruce	0820	Swainson's Thrush (1) Tennessee Warbler (2) Fox Sparrow (2) White-throated Sparrow (1) Ruby-crowned Kinglet (1) Orange-crowned Warbler (2) Northern Waterthrush (1) Black-throated Green Warbler (1)	None	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 25, 2015	671683	5919967	Black Spruce	0441	American Crow (2) Swainson's Thrush (2) Tennessee Warbler (1) Yellow-rumped Warbler (2) Fox Sparrow (1) White-throated Sparrow (2) Dark-eyed Junco (2)	None	None
June 25, 2015	672021	5919973	Mixedwood	0457	Swainson's Thrush (2) Tennessee Warbler (3) Fox Sparrow (1) White-throated Sparrow (1) Ruby-crowned Kinglet (1) Orange-crowned Warbler (1)	None	None
June 25, 2015	672414	5919981	Black Spruce	0510	Tennessee Warbler (1) Yellow-rumped Warbler (1) Fox Sparrow (1) Ruby-crowned Kinglet (2) Orange-crowned Warbler (2) Gray Jay (2)	None	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 25, 2015	672790	5919993	Black Spruce	0523	Swainson's Thrush (1) Tennessee Warbler (1) Yellow-rumped Warbler (1) Fox Sparrow (1) White-throated Sparrow (1) Dark-eyed Junco (1) Orange-crowned Warbler (2) Gray Jay (1)	None	None
June 25, 2015	673120	5919882	Black Spruce	0535	Yellow-rumped Warbler (1) Dark-eyed Junco (2) Ruby-crowned Kinglet (1) Orange-crowned Warbler (1) White-crowned Sparrow (1) Bank Swallow (3) Yellow-bellied Flycatcher (1)	None	None
June 25, 2015	673383	5919689	Bog	0550	Tennessee Warbler (1) Yellow-rumped Warbler (1) White-throated Sparrow (1) Dark-eyed Junco (2) Gray Jay (3) Pine Grosbeak (1)	None	None
June 25, 2015	673681	5919470	Black Spruce	0607	Tennessee Warbler (1) Dark-eyed Junco (2) Orange-crowned Warbler (1) Bank Swallow (2) Pine Grosbeak (1)	None	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 25, 2015	673983	5919259	Black Spruce	0620	Swainson's Thrush (1) Tennessee Warbler (2) Dark-eyed Junco (1)	None	None
June 25, 2015	674283	5919055	Black Spruce	0635	Tennessee Warbler (2) Ruby-crowned Kinglet (1) Orange-crowned Warbler (1)	None	None
June 25, 2015	674665	5918933	Black Spruce	0654	Tennessee Warbler (2) Yellow-rumped Warbler (1) Dark-eyed Junco (1) Gray Jay (1) American Three-toed Woodpecker (1) White-winged Crossbill (6)	None	None
June 25, 2015	674367	5918756	Black Spruce	0713	Tennessee Warbler (1) White-throated Sparrow (1) Ruby-crowned Kinglet (1) Gray Jay (1)	None	None
June 25, 2015	675062	5918660	Black Spruce	0735	Tennessee Warbler (2)	None	None
June 25, 2015	675382	5918502	Black Spruce	0753	Swainson's Thrush (1) Tennessee Warbler (1) Yellow-rumped Warbler (1) Fox Sparrow (1) Dark-eyed Junco (1)	None	None

Date	Coordinate (20 U)		Habitat	5-minute Listening Period		Species following call playback (Number) [1-minute listening period]	Incidental Observations (Number)
	Northing	Easting		Start Time	Species (Number)		
June 25, 2015	675795	5918300	Regenerating Forest	0807	American Crow (2) Tennessee Warbler (1) White-throated Sparrow (1) Dark-eyed Junco (1) Ruby-crowned Kinglet (1)	None	None
June 25, 2015	674217	5918488	Black Spruce	0833	Tennessee Warbler (2) Yellow-rumped Warbler (1) White-throated Sparrow (1) Ruby-crowned Kinglet (2) Orange-crowned Warbler (1) American Three-toed Woodpecker (1)	None	None

APPENDIX C

Common Nighthawk Survey Data

Table C.1 Common Nighthawk Point Count Survey Data

Date	UTM Coordinate (20 U)		Start Time	Common Nighthawk	Incidental Observation	Start Time		Common Nighthawk	Incidental Observation	Habitat
	Northing	Easting	6-minute Listening Period			2-minute Call Playback	2-Minute Listening Period			
June 7, 2015	[redacted]	[redacted]	2100	0	White-throated Sparrow American Robin	2108	2110	1	None	Happy Valley-Goose Bay - Sandy open area
June 7, 2015	641698	5902272	2142	0	Fox Sparrow Swainson's Thrush White-throated Sparrow Snowshoe Hare Red Squirrel American Toad Ruby-crowned Kinglet	2148	2150	0	Wilson's Snipe	Lower Brook – Sandy open area bordered by mixedwood
June 7, 2015	648349	5902837	2145	0	American Toad White-crowned Sparrow	2153	2155	0	Alder Flycatcher	Muskrat Falls/North Spur - Recently cleared area

Date	UTM Coordinate (20 U)		Start Time	Common Nighthawk	Incidental Observation	Start Time		Common Nighthawk	Incidental Observation	Habitat
	Northing	Easting	6-minute Listening Period			2-minute Call Playback	2-Minute Listening Period			
June 7, 2015	640880	5903155	2200	0	Swainson's Thrush White-throated Sparrow Wilson's Snipe	2207	2209	0	None	Lower Brook – Open sandy area bordered by black spruce and trembling aspen
June 7, 2015	648867	5904470	2204	0	American Toad Spring Peeper	2212	2214	0	None	Muskrat Falls – Open sandy area bordered by black spruce
June 7, 2015	640678	5903721	2218	0	Swainson's Thrush White-throated Sparrow Red-breasted Nuthatch	2224	2226	0	None	Lower Brook – Open sandy pit bordered by black spruce and trembling aspen
June 7, 2015	646391	5905939	2221	0	American Toad Alder Flycatcher	2229	2231	0	White-throated Sparrow	Lower Brook – Open sandy pit bordered by black spruce

Date	UTM Coordinate (20 U)		Start Time	Common Nighthawk	Incidental Observation	Start Time		Common Nighthawk	Incidental Observation	Habitat
	Northing	Easting	6-minute Listening Period			2-minute Call Playback	2-Minute Listening Period			
June 7, 2015	640790	5904418	2235	0	Red-breasted Nuthatch	2241	2243	0	None	Lower Brook – Open sandy pit bordered by black spruce and trembling aspen
June 15, 2015	611005	5871409	2022	0	Fox Sparrow White-throated Sparrow	2030	2032	0	Dark-eyed Junco	Gull Island – Open sandy area bordered by mixedwood
June 15, 2015	672290	5878487	2029	0	Hermit Thrush Ruby-crowned Kinglet Pine Grosbeak Red Squirrel	2036	2036	0	None	South TLH – Bog with black spruce and larch
June 15, 2015	610481	5871809	2038	0	Dark-eyed Junco Hermit Thrush	2046	2048	0	Swainson's Thrush	Gull Island – Open sandy area bordered by black spruce
June 15, 2015	609481	5872499	2052	0	Swainson's Thrush White-throated Sparrow	2100	2102	0	Dark-eyed Junco Ruby-crowned Kinglet	Gull Island – Open sandy area bordered by black spruce

Date	UTM Coordinate (20 U)		Start Time	Common Nighthawk	Incidental Observation	Start Time		Common Nighthawk	Incidental Observation	Habitat
	Northing	Easting	6-minute Listening Period			2-minute Call Playback	2-Minute Listening Period			
June 15, 2015	669048	5879923	2058	0	Unidentified Waterfowl American Crow Common Merganser White-throated Sparrow Ruby-crowned Kinglet	2105	2107	0	Herring Gull	South TLH/Traverspine River – Riparian
June 15, 2015	609841	5873387	2106	0	Northern Waterthrush Dark-eyed Junco	2114	2116	0	White-throated Sparrow	Gull Island - Open black spruce near bog
June 15, 2015	[redacted]	[redacted]	2118	0	White-throated Sparrow Ruby-crowned Kinglet Spring Peeper	2125	2127	1	Hermit Thrush	South TLH – Bog with black spruce and larch
June 15, 2015	611890	5875903	2127	0	Swainson's Thrush Dark-eyed Junco	2135	2137	0	White-crowned Sparrow Moose	Gull Island – Open black spruce with bogs

Date	UTM Coordinate (20 U)		Start Time	Common Nighthawk	Incidental Observation	Start Time		Common Nighthawk	Incidental Observation	Habitat
	Northing	Easting	6-minute Listening Period			2-minute Call Playback	2-Minute Listening Period			
June 15, 2015	667905	5880427	2138	0	Hermit Thrush	2145	2147	0	None	South TLH – Bog with black spruce and larch
June 15, 2015	613862	5877047	2144	0	Northern Waterthrush	2152	2154	0	None	Pinus River - Recently mulched bordered by black spruce
June 15, 2015	667597	5880960	2158	0	Spring Peeper Hermit Thrush Dark-eyed Junco Canada Goose	2205	2207	0	None	South TLH/Traverspine River – Riparian
June 15, 2015	666927	5885302	2225	0	American Toad Greater Yellowlegs	2232	2234	0	None	South TLH – Bog with black spruce and larch
June 20, 2015	640568	5901336	2036	0	Swainson's Thrush Ruby-crowned Kinglet White-crowned Sparrow	2042	2044	0	None	Lower Brook – Open gravel area bordered by black spruce and trembling aspen

Date	UTM Coordinate (20 U)		Start Time	Common Nighthawk	Incidental Observation	Start Time		Common Nighthawk	Incidental Observation	Habitat
	Northing	Easting	6-minute Listening Period			2-minute Call Playback	2-Minute Listening Period			
June 20, 2015	640959	5901479	2053	0	Dark-eyed Junco Swainson's Thrush Red-eyed Vireo Tennessee Warbler Black-throated Green Warbler Spring Peeper	2059	2101	0	American Robin	Lower Brook - Open sandy area bordered by black spruce and trembling aspen
June 20, 2015	641529	5902655	2109	0	Swainson's Thrush Dark-eyed Junco Woodpecker Spp. Black-throated Green Warbler	2115	2117	0	White-throated Sparrow	Lower Brook - Open sandy area bordered by black spruce
June 20, 2015	644612	5904535	2128	0	Swainson's Thrush White-crowned Sparrow	2135	2137	0	Ruby-crowned Kinglet	Lower Brook - Open gravel area bordered by black spruce

Date	UTM Coordinate (20 U)		Start Time	Common Nighthawk	Incidental Observation	Start Time		Common Nighthawk	Incidental Observation	Habitat
	Northing	Easting	6-minute Listening Period			2-minute Call Playback	2-Minute Listening Period			
June 20, 2015	666987	5905209	2201	0	Swainson's Thrush American Robin White-throated Sparrow American Toad	2207	2210	0	Spotted Sandpiper	Churchill River Causeway – Riparian
June 21, 2015	630186	5891052	2017	0	American Toad Wood Frog Hermit Thrush Wilson's Snipe	2025	2027	0	Alder Flycatcher	Edward's Brook – Mixedwood adjacent to bog
June 21, 2015	629849	5890641	2038	0	American Toad Spring Peeper Alder Flycatcher Little Brown Myotis	2044	2046	0	None	Edward's Brook – Mixedwood adjacent to bog

Date	UTM Coordinate (20 U)		Start Time	Common Nighthawk	Incidental Observation	Start Time		Common Nighthawk	Incidental Observation	Habitat
	Northing	Easting	6-minute Listening Period			2-minute Call Playback	2-Minute Listening Period			
June 21, 2015	636267	5898457	2059	0	Swainson's Thrush Ruby-crowned Kinglet Dark-eyed Junco American Toad	2107	2109	0	None	Upper Brook – Open area bordered by black spruce and trembling aspen
June 21, 2015	628057	5889109	2105	0	Swainson's Thrush Dark-eyed Junco Hermit Thrush White-throated Sparrow Woodpecker Spp. Ruby-crowned Kinglet	2111	2113	0	White-crowned Sparrow	Edward's Brook – black spruce near bog
June 21, 2015	625349	5887275	2120	0	Swainson's Thrush Gray Jay White-throated Sparrow	2127	2129	0	Spring Peeper	Edward's Brook – black spruce adjacent to waterbody

Date	UTM Coordinate (20 U)		Start Time	Common Nighthawk	Incidental Observation	Start Time		Common Nighthawk	Incidental Observation	Habitat
	Northing	Easting	6-minute Listening Period			2-minute Call Playback	2-Minute Listening Period			
June 21, 2015	[redacted]	[redacted]	2124	1*	None	-	-	-	-	Upper Brook – Open gravel area bordered by mixedwood
June 21, 2015	634528	5895873	2133	0	Wood Frog Spring Peepers Swainson's Thrush White-throated Sparrow Ruby-crowned Kinglet	2141	2143	0	None	Edward's Brook – Open gravel area bordered by mixedwood
June 21, 2015	623367	5883480	2140	0	Swainson's Thrush Great Horned Owl White-throated Sparrow Moose	2146	2148	0	Dark-eyed Junco Gray Jay	Edward's Brook- Black Spruce adjacent to waterbody

Date	UTM Coordinate (20 U)		Start Time	Common Nighthawk	Incidental Observation	Start Time		Common Nighthawk	Incidental Observation	Habitat
	Northing	Easting	6-minute Listening Period			2-minute Call Playback	2-Minute Listening Period			
June 21, 2015	636614	5893425	2154	0	White-throated Sparrow Swainson's Thrush American Toad	2202	2204	0	None	Edward's Brook – Open gravel area bordered by black spruce and trembling aspen
June 21, 2015	622495	5882913	2155	0	American Toad Swainson's Thrush White-throated Sparrow Northern Waterthrush	2201	2203	0	None	Edward's Brook- Gravel area and waterbody in black spruce forest
June 21, 2015	617520	5879736	2215	0	Swainson's Thrush	2222	2224	0	Spring Peeper	Pinus River – Recent burn
June 21, 2015	615068	5878752	2231	0	Swainson's Thrush Spring Peeper	2237	2239	0	American Toad	Pinus River - Recent burn

* Common Nighthawk observed flying over as arrived at site, survey was not continued.

ATTACHMENT 7.8

Annual Report on the Implementation of the Avifauna Management Plan – Island Raptor Survey

LOWER CHURCHILL PROJECT

2015 Annual Report on the Implementation of the Avifauna Management Plan – Newfoundland

Submitted to:
Nalcor Energy
Hydro Place, 500 Columbus Drive
P.O. Box 12400
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1.0 SUMMARY

The direct removal of vegetation along the transmission corridor from Shoal Cove to Soldier's Pond has the potential to impact the residency and reproductive success of birds that utilize this area during the breeding season (15 May to 15 August). From 21 May to 7 August, Amec Foster Wheeler implemented the directed survey protocol consistent with the Project Avifauna Management Plan along the proposed transmission line right-of-way and associated sites (access roads and rock quarries), and established protective buffers in an effort to limit disturbance to breeding birds. Five crews (5 individuals/crew) were deployed throughout west-central Newfoundland and the Northern Peninsula and worked collaboratively with Nalcor Energy and local contractors to provide this service. Active nesting sites were physically marked in the field using flagging tape and relevant information was uploaded daily to Nalcor using ArcGIS software.

During this period, 156 active nesting sites were located along a linear distance of 88.8 km and circular buffers ranging from 30-800 m (radius) were established. Peak numbers of nests were found between June 3 and July 4 and coincided with the expected period of heightened bird activity. Thirty-eight individual species were detected from a range of function groups including raptors, waterfowl, songbirds, and waterbirds. The most commonly encountered species included white-throated sparrow (*Zonotrichia albicollis*), American robin (*Turdus americanus*), palm warbler (*Dendroica palmarum*), hermit thrush (*Catharus guttatus*) and Lincoln's sparrow (*Melospiza lincolnii*). The nests of two species at risk (olive-sided flycatcher and rusty blackbird) were found as well as a number of incidental sightings of species at risk throughout the Project area.

Implementation of this field program by Amec Foster Wheeler mitigated some of the risks imposed by construction activities and aligned the Project with the requirements of the Migratory Birds Convention Act (1994), the Provincial Wildlife Act, and both Federal and Provincial Species at Risk legislation.

2.0 INTRODUCTION

The direct removal of vegetation and associated construction activities along the transmission corridor from Shoal Cove to Soldier's Pond has the potential to impact the residency and reproductive success of birds that utilize this area during the breeding season (May 15 to August 15). The implementation of Nalcor's Avifauna Management Plan is intended to mitigate some of the risks imposed by these activities and to align the project with the requirements of the Migratory Birds Convention Act (1994), the Provincial Wildlife Act, and both Federal and Provincial Species at Risk legislation.

The primary objective of this avifauna management program was to locate active nests of migratory and resident birds in order to establish protective buffer zones around these areas in advance of vegetation clearing. Active nests were geo-referenced and clearly marked in the field to ensure that disturbance to nesting birds was minimized during construction. We recognize that locating all active nests for all species is impractical over such an extensive geographic area. Therefore, we allocated additional effort to locate nest sites of species at risk that may have occurred in the study area. Potential species at risk included gray-cheeked thrush (*Catharus minimus*), olive-sided flycatcher (*Contopus cooperii*), rusty blackbird (*Euphagus carolinus*), short-eared owl (*Asio flammeus*), barrow's goldeneye (*Bucephala islandica*), and harlequin duck (*Histrionicus histrionicus*; NLDEC 2012). We also searched for any inactive raptor nests that may have occurred in the study area and established appropriate buffers around these structures. Raptor populations are sensitive to various forms of anthropogenic disturbance thus their occurrence is often considered a surrogate of intact and functioning ecosystems (Caro and O'Doherty 1998).

2.1 Applicable Legislation for Species Protection

The applicable legislation intended to protect birds that occurred in the study area is provided here.

2.1.1 Migratory Birds Convention Act and Wild Life Act

All species of birds in the study area, except for those species that were introduced to North America, are protected by either the federal *Migratory Birds Convention Act* (MBCA) or the provincial *Wild Life Act*. The MBCA governs most of these species, both migratory and non-migratory. Some of these species are game birds whose harvest is regulated by this legislation (i.e., waterfowl, cranes, rails, coots, shorebirds, murres, and doves). This Act protects individuals from harm and harassment, and also protects their active nests (i.e., those containing viable eggs or nestlings). The remaining species (cormorants, pelicans, grouse, ptarmigan, hawks, owls, eagles, falcons, kingfishers, crows, jays, and blackbirds), receive the same form of protection from the provincial *Wild Life Act*. This act also governs the harvest of upland game birds (i.e., grouse and ptarmigan). Neither of these Acts protect habitat for these species.

2.1.2 Species at Risk Act

The Species at Risk Act, 2002 (SARA) was established to provide wildlife species additional protection against extirpation, extinction or endangerment. Species at risk are classified by COSEWIC as extirpated, endangered, threatened or of special concern, depending on the level of risk. Similar to the

MBCA, this Act affords protection at the federal level by prohibiting the killing, harming, harassment, capture, or collection of a listed species, and the damage or destruction of a residence of a listed species (Government of Canada 2002).

2.1.3 Newfoundland and Labrador Endangered Species Act

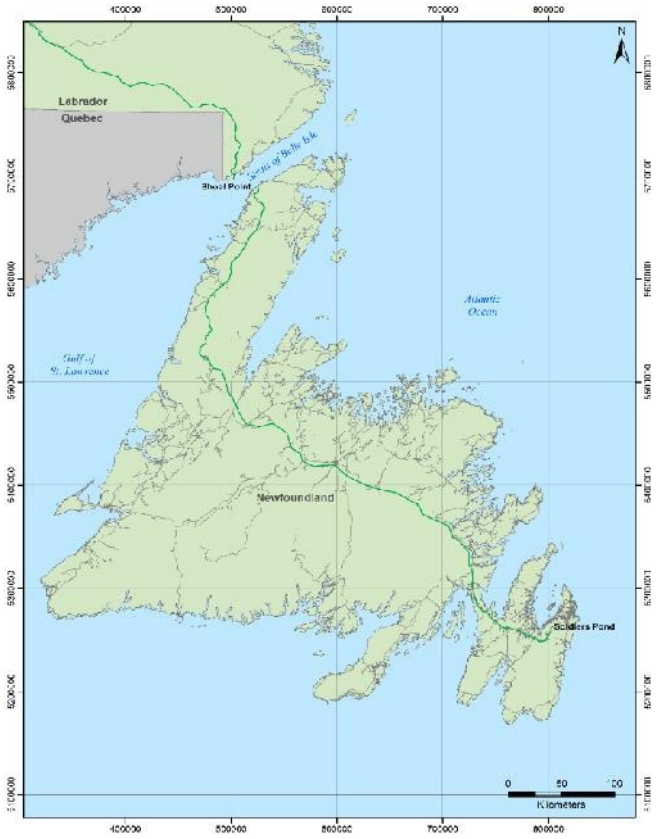
Provincially, wildlife species at risk are managed under the Newfoundland and Labrador Endangered Species Act (NLESA; 2004), which is designed to complement federal SARA legislation. The NLESA protects wildlife species, subspecies or populations within the province that are considered endangered, threatened or vulnerable based on recommendations from COSEWIC or the provincial Species Status Advisory Committee (SSAC; 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.

3.0 STUDY AREA AND METHODS

3.1 Study Area

The transmission line Right-of-Way (ROW) from Soldier's Pond to Shoal Cove spans a linear distance of 696 km (Figure 1) and bisects a number of ecoregions including the Maritime Barrens, Avalon Forest, Central Newfoundland, Long Range Mountains, and Northern Peninsula (Meades 1990). Vegetation and topography is extremely variable across this study area and ranges from open heath and rocky outcrops on the Avalon Peninsula and areas of high elevation on the Northern Peninsula, stunted black spruce and balsam fir forest through parts of eastern Newfoundland, and dense productive forest through parts of central and western Newfoundland. Water bodies are prevalent across the entire island and provide foraging opportunities for riparian songbirds, waterfowl, and shorebirds. Nest searches during the 2015 breeding season occurred throughout west-central Newfoundland (west of Badger) and the Northern Peninsula and coincided with construction activity. All work fronts were accessible by truck though moderate hiking was required to move throughout the study area in advance of vegetation clearing.

Figure 1. Transmission line corridor from Shoal Point to Soldier's Pond, Newfoundland.



3.2 Survey Methodology

Searches for active nests were conducted along the 60 m wide transmission line corridor, associated bypass roads and quarries by walking five parallel transects (spaced equidistant apart) throughout the

entire area where vegetation clearing was scheduled to occur. Crew members remained in visual contact of each other and walked slowly through the study area while searching for evidence of breeding activity including; 1) the occurrence of singing males or interacting male-female pairs, 2) distraction displays (i.e., broken wing display), 3) delivery of nesting material and/or food to a specific location, 4) aggressive territorial behaviour (e.g. diving), and/or, 5) the presence of nestlings or recently fledged birds. If one or more of these behaviours was observed, effort was made to locate the specific nest location and to establish the appropriately sized protective buffer. If nest sites were found within previously established access roads designed to bypass wetlands (or other sensitive/hazardous sites) then an alternate route adjacent to this access road was 'cleared' of nesting activity by our crews.

Locations of active nests were recorded using GPS and physically marked using uniquely patterned flagging tape. All relevant information (including location, species, stage of breeding, buffer size) was recorded using ArcGIS software and uploaded to the project manager, GIS coordinator, logistics co-ordinator and local contractors on a daily basis. This ensured effective and timely communication of the extent of progress (i.e. areas where nest searches have been completed) as well as the location of active nest sites. An example of the daily maps produced to illustrate nesting locations is shown in Appendix A. If structure boxes were not harvested by contractors within a period of seven days following nest searches then the area was scheduled for re-survey since birds may have dispersed into the area and established a nest site during this time frame. Some of the active nest sites were also re-surveyed later in the breeding season (25 July-7 August) to determine if young had fledged from the site. If nest sites were vacated and family groups had dispersed then flagging tape was removed and this information was relayed to Nalcor Energy. The sizes of buffer zones established for each species group is given in Table 1.

In accordance with standard protocols for conducting point counts and nest searches, fieldwork was not conducted during periods of prolonged rain or high wind as these variables are known to decrease the detectability of birds. Exposure to heavy rain and cool temperatures can lead to nest failure thus surveys were avoided during periods of inclement weather. In instances where species at risk were detected, additional time and effort was spent searching for nests and delineating buffer zones.

Given the large geographic extent where clearing work occurred, survey teams were strategically stationed to ensure that sites were efficiently visited when required. The personnel employed by Amec Foster Wheeler and their respective roles is given in Appendix B.

Table 1. Species group and the radius of buffer zones established around nest sites encountered along the transmission line right of way and associated work sites, May – August, 2015.

Species Group	Setback buffer radius (m)
Active raptor nest	800
Inactive raptor nest	200
Waterfowl	100
Waterbirds	100
Shorebirds	30
Landbirds	30
Species at Risk	100

3.3 Health and Safety

Prior to deployment in the field, all team members received health and safety training and site orientation from Amec Foster Wheeler, Nalcor Energy, Valard Construction and Johnson's Construction. All field crews were supplied with requisite safety equipment including hard hats, reflective vests, safety glasses, and gloves. Each crew were also outfitted with a first aid kit, insect repellent and sunscreen. An additional first aid kit was also placed in each vehicle along with a spill kit and fire extinguisher. All field crew were instructed to wear long sleeved shirts, full length pants and sturdy, comfortable footwear. Steel toed boots were not required given the distances that crew members were required to walk and their general avoidance of construction areas where hazards were more prevalent. Hard hats were to be worn when approaching active work sites. Each crew leader also carried a hand-held VHF radio and regularly communicated with construction crews to inform them of their position and proximity to operating equipment. Field crews only bypassed active equipment once communication was established and machines were temporarily shut-down. Radios were also used while driving on access roads to communicate the location on in-bound or out-bound traffic. Recommended speed limits were adhered to and safety equipment (whip-antennas and beacons) were used at all times. Prior to the start of each work day, crew leaders conducted a 'tail-gate' meeting to discuss the daily work-plan, to assess potential hazards and strategies for avoiding accidents and injuries. Remote SPOT™ devices were also used by each crew member to communicate locations of field crews to management and Nalcor Energy throughout each field day.

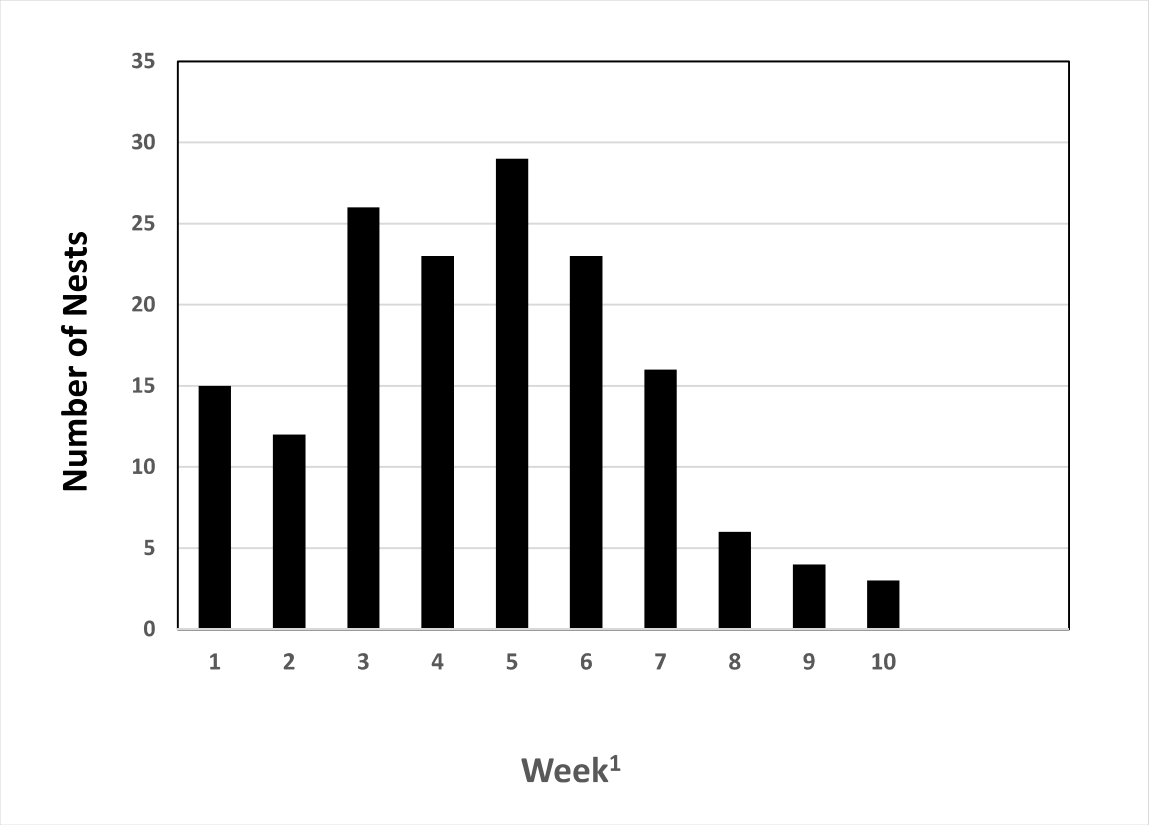
4.0 RESULTS AND DISCUSSION

4.1 Area Surveyed

Surveys for active nests were primarily conducted in two large geographic areas; 1) west-central Newfoundland from Badger to Sheffield Lake, and 2) from the Main River watershed to Plum Point on the Northern Peninsula. Two hundred and ninety-three individual structure boxes were surveyed (each structure box is ~ 300 m in length and 60 m wide) for a total linear distance of 88.8 km. In addition to areas immediately within the right-of-way, 96 access roads of variable length and 10 quarries were also surveyed. Sites that were re-surveyed following the seven day expiry period included 36 structure boxes, two access roads, two quarries and 21 individually buffered nest-sites. A summary of the date and sites surveyed throughout the season is provided in Appendix C.

Figure 2 illustrates the number of active nesting sites recorded during each week of the survey period. As expected, the number of nests found earlier in the season prior to the return of all migrant species and the initiation of nest-building was lower than the period from June 3 to July 4. The number of nests found during this peak period ranged from 23 to 29 nests/week. The number of nests discovered subsequently decreased after the first week of July as paired birds became increasingly non-vocal and remained concealed on eggs and nestlings.

Figure 2. Distribution of nests found along the transmission corridor, access roads, and quarries by week (May 23-August 7, 2015) in western and central Newfoundland.



[1]Weeks 1 and 2 = May 23 to June 6; weeks 3 to 6 = June 6 to July 4; weeks 7 to 10 = July 4 to August 7

4.2 Avifauna Species Detected

One hundred and fifty-six nesting areas were detected between May 21 and August 7, 2015. Most species were found within the transmission line right-of-way (n=132) though 15 and 9 nests were found within areas proposed for access road and quarry construction, respectively (Appendix D). White-throated sparrow (*Zonotrichia albicollis*) was the most frequently encountered species (23.9 % of all nests found) and nesting activity was detected for a total of 36 species (Table 2). Other frequently encountered species included American robin (*Turdus migratorius*), palm warbler (*Dendroica palmarum*), hermit thrush (*Catharus guttatus*), and Lincoln's sparrow (*Melospiza lincolnii*). Functional groups included within the list of species detected included songbirds (e.g., sparrow, warblers, and thrushes), woodpeckers (e.g. northern flicker, downy woodpecker), birds of prey (northern goshawk), waterfowl (ring-necked duck), and aerial insectivores (e.g. tree swallow, yellow-bellied flycatcher). All of the nesting species found during this project are common, expected breeders for the island of Newfoundland (Mactavish et al. 2003). Table 2 shows the buffer radius established for each of these species as well as a general description of habitat where species were found. Nesting habitats included open, grassy fens and forest edges, shrubby mixed coniferous-deciduous forest, and dense forest dominated by black spruce (*Picea mariana*) and balsam fir (*Abies balsamea*). Specific nesting structures included tree cavities (utilized by chickadee spp., swallows, and woodpecker spp.), large stick nests (northern goshawk (*Accipiter gentilis*) and gray jay (*Perisoreus canadensis*)), shallow depressions in the forest understory (spruce grouse (*Falcipennis Canadensis)*), and typical 'cup-shaped' nest on the ground or on low branches (most songbird species). Figure 3 shows a typical ground nest with eggs, a rusty blackbird nest with early-staged nestlings, wetland habitat, and crew members fording a stream.

Table 2. Nests recorded along the transmission line right-of-way, access roads, and quarries by descending frequency of abundance; 23 May - 7 August, 2015. Species highlighted in 'bold text' are Species at Risk under both federal and provincial species at risk legislation.

Species	Scientific name	Number of nests	Nest Location	Setback buffer radius (m)
White-throated sparrow	*Zonotrichia albicollis*	38	Ground; grassy vegetation	30
American robin	*Turdus migratorius*	9	Ground; grassy vegetation	30
Palm warbler	*Dendroica palmarum*	8	Ground; grassy vegetation	30
Hermit thrush	*Catharus guttatus*	8	Ground; grassy vegetation	30
Lincoln's sparrow	*Melospiza lincolnii*	7	Ground; grassy vegetation	30
Black-and-white warbler	*Mniotilta varia*	6	Ground; mixed coniferous forest	30
Downy woodpecker	*Picoides pubescens*	6	Tree cavity; mature forest	30
Wilson's warbler	*Wilsonia pusilla*	6	Ground; grassy vegetation	30
Wilson's snipe	*Gallinago delicata*	6	Ground; grassy vegetation	30
Hairy woodpecker	*Picoides villosus*	5	Tree cavity; mature forest	30

Species	Scientific name	Number of nests	Nest Location	Setback buffer radius (m)
Dark-eyed junco	*Junco hyemalis*	4	Ground; mixed vegetation	30
Fox sparrow	*Passerella iliaca*	4	Ground; grassy vegetation	30
Boreal chickadee	*Poecile hudsonicus*	3	Tree; Dense coniferous forest	30
Magnolia warbler	*Dendroica magnolia*	3	Ground; mixed coniferous forest	30
Ruby-crowned kinglet	*Regulus calendula*	3	Tree; coniferous forest	30
Olive-sided flycatcher	*Contopus cooperii*	3	Tree; mixed coniferous forest	100
Song sparrow	*Melospiza melodia*	2	Ground; grassy vegetation	30
Northern flicker	*Colaptes auratus*	2	Tree cavity; mature forest	30
Spruce grouse	*Falcipennis canadensis*	2	Ground; mixed coniferous forest	30
Tree swallow	*Tachycineta bicolor*	2	Tree cavity; riparian vegetation	30
Black-capped chickadee	*Poecile atricapillus*	2	Tree; dense coniferous forest	30
Gray jay	*Perisoreus canadensis*	1	Tree; coniferous forest	30
Blackpoll warbler	*Dendroica striata*	1	Tree; shrubby coniferous forest	30
Swamp sparrow	*Melospiza georgina*	1	Ground; grassy vegetation	30
White-crowned sparrow	*Zonotrichia leucophrys*	1	Tree; dense, grassy vegetation	30
Northern goshawk	*Accipiter gentilis*	1	Mature deciduous forest	800
Cedar waxwing	*Bombycilla cedrorum*	1	Tree; mixed coniferous forest	30
Northern waterthrush	*Seirus noveboracensis*	1	Ground; dense, mixed forest	30
Yellow-rumped warbler	*Dendroica coronata*	1	Tree; dense coniferous forest	30
Common yellowthroat	*Geothlypis trichas*	1	Ground; grassy vegetation	30
Rusty blackbird	*Euphagus carolinus*	1	Tree; riparian habitat	100
Ring-necked duck	*Aythya collaris*	1	Ground; riparian habitat	30
Yellow-bellied flycatcher	*Empidonax flavivetris*	1	Tree; dense, mixed vegetation	30
Blue-headed vireo	*Vireo solitarius*	1	Tree; mature mixed forest	30
Unidentified woodpecker	NA	2	Tree cavity; mature forest	30
Unidentified species	NA	12	Variable habitats	30
TOTAL # of NESTS =		**156**		

Figure 3. Images from the nest survey project, 2015. Top left panel; fox sparrow nest with eggs. Top right panel; Wilson's snipe nest in wetland habitat. Bottom left image; rusty blackbird nest with chicks. Bottom right panel; Crew members fording a stream on the Northern Peninsula. Photo credits; Doug Hynes, Amec Foster Wheeler, 2015.

4.3 Species at Risk

A rusty blackbird and three olive-sided flycatcher nesting sites were found within the 60 m transmission line right-of-way during the survey period (Table 2). Setback buffers for these species was set at a radius of 100 m to ensure minimal disturbance and effective protection during the survey period. This buffer radius deviated from the recommended radius of 75 m (as specified in Nalcor's Avifauna Management Plan; Stassinu Stantec 2012) but was selected following dialogue with species at risk biologists with Environment Canada, Mount Pearl, NL. Other incidental encounters with these species as well as with gray-cheeked thrushes and red crossbills are reported in Table 3. In addition to being important information for Nalcor with respect to this Project, these data are valuable to the general conservation community since the areas surveyed were generally remote and there is limited knowledge on the distribution of species at risk in these regions. Other species of conservation concern detected in the study area included boreal owl (*Aegolius funereus*) and northern hawk-owl (*Surnia ulula*).

Table 3. Species at risk recorded incidentally during nest searches in west-central Newfoundland and the Northern Peninsula, May-August, 2015.

Date	Species	Number of individuals	Longitude	Latitude
23-May	Rusty blackbird[1,2]	1		
01-Jun	Rusty blackbird	1		
02-Jun	Olive-sided flycatcher[3]	2		
09-Jun	Olive-sided flycatcher	1		
16-Jun	Gray-cheeked thrush	1		
19-Jun	Rusty blackbird	2		
20-Jun	Olive-sided flycatcher	2		
17-Jul	Red crossbill[4]	4		
18-Jul	Red crossbill	2		
19-Jul	Gray-cheeked thrush	2		
20-Jul	Olive-sided flycatcher	1		
29-Jul	Olive-sided flycatcher	1		
30-Jul	Olive-sided flycatcher	2		
31-Jul	Olive-sided flycatcher	1		
02-Aug	Olive-sided flycatcher	3		
06-Aug	Olive-sided flycatcher	1		
07-Aug	Rusty blackbird	5		

[1]Vulnerable (NL Endangered Species Act)
[2]Special Concern (Species at Risk Act)
[3]Threatened (NL Endangered Species Act)
[4]Endangered (NL Endangered Species Act)

4.4 Survey Effectiveness

Overall, surveys were effective at locating and protecting 156 nesting sites from 36 different bird species within the study area and for meeting the requirements of the general mitigation measures contained within Nalcor's Avifauna Management Plan (Stassinu Stantec 2013). However, crews undoubtedly missed a proportion of nesting birds as many species nest high in the forest canopy and are exceedingly difficult to detect (Martin and Geupel 1993). This is particularly true since the majority of the survey area was dominated by dense conifers (balsam fir and black spruce) which retain their crowns throughout the year. Of the 156 nesting sites that were found only 22% were tree nesters and of these, most were woodpecker spp. which are very vocal and relatively easy to detect. Despite being very abundant in the study area (based on the qualitative frequency of vocalizations), only 6 nests were collectively found for tree nesting yellow-rumped warblers, ruby-crowned kinglets, and black-capped chickadees.

An additional unknown was the total number of nest sites identified (for both ground and tree nesting species) relative to their absolute occurrence within the study area. Determining this variable would allow for an accurate assessment of the 'true effectiveness' of survey crews in locating nests. However, this type of scientific evaluation was beyond the scope of our field duties and required an independent and carefully-planned study design. A thorough review of relevant journals did not yield any useful information on the effectiveness of finding nests in boreal forest environments suggesting that this academic question is difficult to evaluate. Despite our likely inability to locate all breeding birds, we are confident that many breeding pairs that were deemed 'undetected' were inadvertently protected within the buffered areas of species that were found. This is particularly true where setback buffers of 100 m and 800 m were established in the project area.

To improve the efficacy of locating nesting pairs in future years, it is recommended that nest searches be initiated earlier in the morning when birds are most vocal and are more apt to reveal nesting microsites. This was difficult to implement during the 2015 season as work plans were often adjusted 'last minute' and crews had to spend additional time travelling to alternate sites. This circumstance, coupled with generally long travelling distances to remote portions of the study area, often resulted in crews missing the peak period of bird activity (6 – 8 a.m.). Improved planning on where crews are required on a daily basis would improve the effectiveness of locating nest sites.

5.0 LITERATURE CITED

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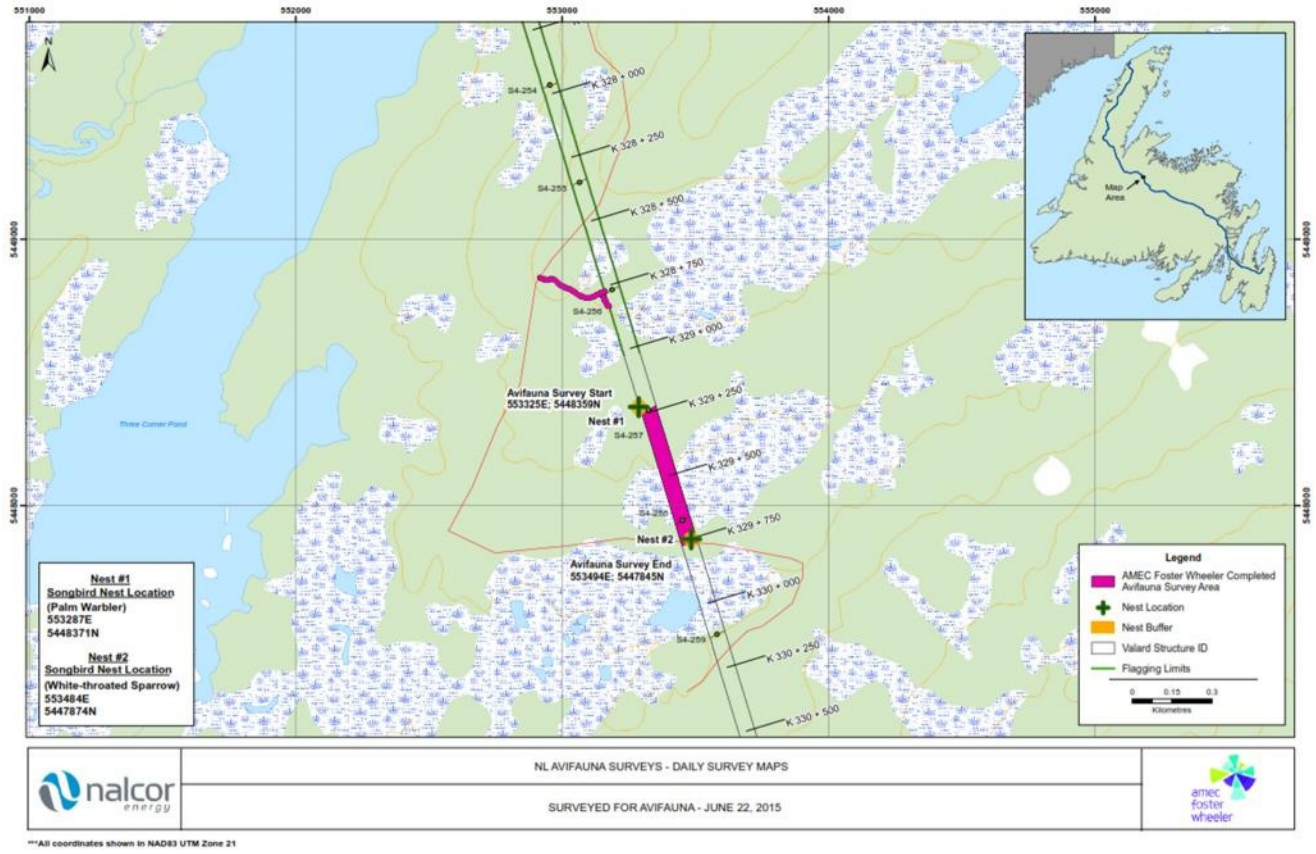
Lower Churchill Project
Transmission Line Nest Survey
Amec Foster Wheeler Project TF14104133
December 2015

APPENDIX A: A REPRESENTATIVE MAP ILLUSTRATING THE AREA SURVEYED AND THE LOCATION OF TWO ACTIVE NEST SITES IN CENTRAL NEWFOUNDLAND, 2015.



APPENDIX B: AMEC FOSTER WHEELER TEAM STRUCTURE FOR CONDUCTING NEST SURVEYS ALONG THE TRANSMISSION LINE RIGHT-OF-WAY, MAY-AUGUST, 2015.

Name	Team Number	Role	Primary Survey Area
John Gosse	1	Avifauna biologist	West-central NF
Claude Roberge	1	Team co-leader	West-central NF
Erin Penney	1	Field technician	West-central NF
Mark Simpson	1	Field technician	West-central NF
Tyler Wells	1	Field technician	West-central NF
Courtney King	1	Field technician	West-central NF
Holly Hogan	2	Avifauna biologist	West-central NF
Shane Frost	2	Field technician	West-central NF
Greg White	2	Field technician	West-central NF
Marina Montevecchi	2	Field technician	West-central NF
Rosalind Ford	2	Field technician	West-central NF
Derm Kenny	3	Avifauna biologist	Northern Peninsula/Central NF
Aedon Lemon	3	Field technician	Northern Peninsula/Central NF
Daniel Robbins	3	Field technician	Northern Peninsula/Central NF
Fiona Elgar	3	Field technician	Northern Peninsula/Central NF
Catie Young	3	Field technician	Northern Peninsula/Central NF
Kyle Reid-Fairhurst	4	Avifauna biologist	Northern Peninsula
Jonathan Forward	4	Field technician	Northern Peninsula
Jens Fiegler	4	Field technician	Northern Peninsula
David Butler	4	Field technician	Northern Peninsula
Matthew Learie	4	Field technician	Northern Peninsula
Doug Hynes	5	Avifauna biologist	Northern Peninsula
Gabrielle Deveau	5	Field technician	Northern Peninsula
Kristian Wiseman	5	Field technician	Northern Peninsula
Nathan White	5	Field technician	Northern Peninsula
Lucas Giroux	5	Field technician	Northern Peninsula

APPENDIX C: SCHEDULE AND LOCATION OF AREAS SURVEYED ALONG THE TRANSMISSION LINE RIGHT-OF-WAY AND ASSOCIATED STRUCTURES, MAY-AUGUST, 2015.

Week #	Date	Segment Locations	Structures Surveyed
Week 1	May 21-23	S3	270, 277, 319, and 320. Quarry near 270. Access roads near 319-320.
		S4	198, 219, 199 to 203, and 290 Access roads near 127 and 321. Quarries near 137 and 272.
Week 2	May 24-30	S3	316, 321-323, 313, and 266
		S4	278-287, 196-197, and 269-277. Access roads near 182 and 188. Quarry near 188.
Week 3	May 31-June 6	S3	342-344, 303-309, 310-312, and 332-336. Access roads near 104, 335, 305, and 311-312. Quarries near 134 and 272.
		S4	295-303, 271-272, 316-318, and 269-270.
Week 4	June 7-13	S3	390-392, 311-313, 335-336, 337-339, 394-395, 332-333, and 371-372. Access roads near 305, 390-392, 98, 106, 271, and 372. Quarries near 134, 105, 269 and 256.
		S4	314-315, 308-309, and 319-321. Access road near 302.
Week 5	June 14-20	S3	329-332, 310-311, 334, 389, 392-394, 382-386, 302-304, and 267-269. Access road around two nests at 332. Quarries near 101 and 241. Access roads near 393-394, 390-391, and 304.
		S4	322-331, 245-248, and 250-257. Access on Upper Humber road. Access roads near 353, 252, 253, 254, 256, and 324.
Week 6	June 21-27	S3	309-310, 323-328, 332-339, 311, 394-395, and 386-389. Access roads near 304, 394, and 110-111. Quarries near 391 and 101.
		S4	258-266, 219-220, 308-309, and 65-69. Access roads near 257-258, 219-220, 330-331, 66, and 174.

Week #	Date	Segment Locations	Structures Surveyed
			Quarry near 101.
Week 7	June 28-July 4	S3	644-655, 323-328, 158-162, 299-304, 380-382, 267-273, and 377-380. Access roads near 265-266, 304-307, 668, and 273. Quarries near 101, 309, and 264
		S4	138-140. Access road near 65-66.
Week 8	July 5-11	S3	249-251, 95, 383, 139, 659-667, 373-377, 174-177, 255-258, 241, 268-273, and 266 Access roads near 653, 302-305, 375-377, 664-667, and 299. Quarry near 309.
		S4	141-143, 219-221, 36, and 223-224. Access roads near 36, 220, 175, and 219.
Week 9	July 12-18	S3	654-657, 392-394, 303-304, 178-182, and 165-174, 246-248, 272-273, 309, and 268. Access roads near 274, 174-177, 167, 162, 178, 646, 165 and 657-659.
		S4	243-248, 219, 221-222, 323-324, and 225-229. Access roads near 243-248, 223-225, 221-222, and 84-85.
Week 10	July 19-25	S3	177-187, 156-164, 151-153, 168-174, 369-373, 644, and 271-272. Access roads near 155, 160, 164, 184-187, and 180-181.
		S4	239-243, 246-248, and 36. Access roads near 241, and 176-177.
Week 11	July 26-August 7	S3	301-313, 145-150, 362-367, and 373-379. Access roads near 309, 395, 155, 364, 367, and 371. Quarries near 174 and 177.
		S4	219-223, 308, 36-38, 290, 286-292, and 176-178. Access roads near 176 and 177.

APPENDIX D: SURVEY DATE AND LOCATION OF NESTING BIRDS DETECTED ALONG THE TRANSMISSION LINE RIGHT-OF-WAY AND ASSOCIATED STRUCTURES, WESTERN AND CENTRAL NEWFOUNDLAND, 2015.

Date Surveyed	Structure area Surveyed	Location	Nest Coordinates		Species
			Easting	Northing	
19-May	Access road near Hampden	Access road	504798	5477664	Gray jay
23-May	S4-290	ROW	557303	5435712	Northern goshawk
24-May	S3-321	ROW	491951	5593538	Downy woodpecker
24-May	S4-280	ROW	556102	5439264	Black-capped chickadee
25-May	S4-283-284	ROW	556438	5438026	Palm warbler
25-May	S4-284-287	ROW	556687	5437334	Ruby-crowned kinglet
26-May	Quarry at S3-272	Quarry	499547	5610209	Black throated green warbler
			499518	5610344	Downy woodpecker
27-May	S3-322 to S3-323	ROW	491418	5593158	American robin
27-May	S4-270-272	ROW	554992	5442784	Magnolia warbler
28-May	S4-181	ROW	527433	5456867	Spruce grouse
28-May	S4-182-183	ROW	527801	5457021	Unidentified species
28-May	S4-273-276	ROW	555211	5442024	Magnolia warbler
29-May	S3-313	ROW	493922	5595871	Blue-headed vireo
			494060	5595878	Ruby-crowned kinglet
29-May	S3-266	ROW	499923	5612949	Wilson's snipe
30-May	Quarry near S4-188	Quarry	530634	5457489	Black-and-white warbler
1-June	S3-305	ROW	496784	5597649	Hairy woodpecker
			496791	5597693	Unidentified woodpecker
			496973	5597727	Northern flicker
2-June	S3-303-304	ROW	497861	5598237	Unidentified woodpecker
2-June	S3-306-309	ROW	495564	5597061	Hairy woodpecker
2-June	S4-295-297	ROW	559565	5434216	Wilson's warbler
4-June	Access road near S3-335	Access road	488139	5590558	American robin
4-June	S4-299-301	ROW	560814	5433464	Unidentified species
4-June	S4-271-272	ROW	555157	5442307	Hermit thrush
5-June	Roadside near Brigs Bay Road	Access road	526497	5647846	White-throated sparrow
			527430	5648919	White-throated sparrow
6-June	Quarry near S3-134	Quarry	523673	5646664	Fox sparrow
6-June	Access Road near S3-104	Access road	527646	5658332	White-throated sparrow

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Date Surveyed	Structure area Surveyed	Location	Nest Coordinates		Species
			Easting	Northing	
7-June	Quarry near S3-134	Quarry	523665	5646543	Hermit thrush
8-June	S3-390-392	ROW	475756	5572806	White-throated sparrow
			475793	5572394	White-throated sparrow
			475802	5572342	Boreal chickadee
			475801	5571919	Black-and-white warbler
8-June	S4-S14-315	ROW	565936	5429696	Unidentified species
			565981	5429655	White-throated sparrow
9-June	Bypass roads near S4-302	Bypass road	562361	5432076	Hairy woodpecker
10-June	S4-310-313	ROW	564702	5431046	Unknown species
			565077	5430732	White-throated sparrow
10-June	Quarry near S3-105	Quarry	527170	5657437	American robin
11-June	Quarry near S3-256	Quarry	500868	5616705	Hermit thrush
			500749	5616573	American robin
			500786	5616560	Spruce grouse
			500638	5616443	Fox sparrow
			500613	5616415	White-throated sparrow
			500635	5616323	Wilson's warbler
			500623	5616307	Yellow-rumped warbler
12-June	S3-332-333	ROW	488622	5590591	Downy woodpecker
			488606	5590558	White-crowned sparrow
			488399	5590263	American robin
			488358	5590196	Magnolia warbler
			488335	5590186	White-throated sparrow
12-June	Bypass road near S3-392	Bypass road	475990	5571867	White-throated sparrow
13-June	S3-271-272	ROW	499702	5610284	Unidentified Sparrow
14-June	S3-310-311	ROW	495060	5596633	White-throated Sparrow
14-June	S4-247-250	ROW	552131	5450998	Unidentified Species
			551995	5451093	Palm warbler
14-June	S4-322	ROW	566669	5426676	Lincoln's sparrow
15-June	S4-323-325	ROW	566736	5426434	American robin
			566730	5426346	Hairy woodpecker
			566776	5426251	Common yellowthroat
15-June	S4-245-247	ROW	551244	5451610	Palm warbler

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Date Surveyed	Structure area Surveyed	Location	Nest Coordinates		Species
			Easting	Northing	
			550857	5451864	Palm warbler
16-June	S4-251-253.	ROW	552587	5450710	White-throated sparrow
16-June	S4-325-327.	ROW	566960	5425255	White-throated sparrow
			567029	5425208	Ruby-crowned kinglet
			567136	5424592	White-throated sparrow
			567186	5424624	Wilson's warbler
18-June	S3-392-394	ROW	475815	5571764	Wilson's snipe
			475915	5570700	Unidentified species
18-June	S4-253-254	ROW	552853	5449963	Yellow-bellied flycatcher
19-June	Access road near S3-390	Access road	475841	5572289	American Robin
			475875	5572318	White-throated sparrow
19-June	S3-304	ROW	497326	5597880	American robin
			497375	5598066	Rusty blackbird
19-June	S4-254-257	ROW	552917	5449607	Lincoln's sparrow
20-June	Quarry near S4-241	Quarry	504507	5619679	White-throated sparrow
			504695	5619649	Tree swallow
20-June	S3-267-269	ROW	499820	5611721	White-throated sparrow
20-June	S3-302	ROW	497867	5598323	Northern flicker
			[redacted]	[redacted]	Olive-sided flycatcher
20-June	S3-303	ROW	497840	5598089	Downy woodpecker
20-June	Access road near S3-304	Access road	497357	5597924	Boreal chickadee
20-June	S4-328-331	ROW	567196	5424268	Unidentified species
20-June	S4-325	Access road	566912	5425557	White-throated sparrow
21-June	S3-309-310	ROW	495262	5596768	Ring-necked duck
21-June	S3-323-328	ROW	491203	5593053	White-throated sparrow
			491004	5592937	Wilson's snipe
			490769	5592745	White-throated sparrow
22-June	S3-329-332	ROW	489546	5591727	Black-capped chickadee
			489421	5591518	Hairy woodpecker
			489428	5591494	White-throated sparrow
22-June	Bypass road	Bypass road	497923	5598804	Hermit thrush
			497661	5598495	Hermit thrush
22-June	S4-258-259	ROW	553287	5448371	Palm warbler

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Date Surveyed	Structure area Surveyed	Location	Nest Coordinates		Species
			Easting	Northing	
			553484	5447874	White-throated sparrow
23-June	S4-308-309	ROW	564416	5431165	Palm warbler
24-June	Bypass roads near S4-330	Bypass road	567411	5423029	Unidentified species
			567429	5423010	White-throated sparrow
24-June	S4-259-261	ROW	553692	5447056	White-throated sparrow
			53815	5446849	White-throated sparrow
25-June	S4-262	ROW	553866	5446469	White-throated sparrow
			553892	5446455	Blackpoll warbler
26-June	S4-66-69	ROW	499762	5486756	White-throated sparrow
26-June	Bypass road near S4-66	Bypass road	499539	5486836	Black-and-white warbler
27-June	S4-263-266	ROW	554008	5446180	Wilson's warbler
			554014	5446029	White-throated sparrow
			554080	5445919	Cedar waxwing
			554266	5445299	Black-and-white warbler
			554266	5445267	Palm warbler
28-June	S3-644-645	ROW	479492	5519504	Downy woodpecker
28-June	S3-326-328	ROW	489635	5591982	Wilson's snipe
			489639	5591980	White-throated sparrow
			490183	5592356	Dark-eyed Junco
29-June	S3-323-326	ROW	491236	5593052	Wilson's snipe
30-June	S3-158-162	ROW	517106	5639556	Downy woodpecker
			517062	5639543	Tree swallow
			516999	5639471	White-throated sparrow
			516999	5639469	Unidentified species
			516778	5638719	Black-and-white warbler
1-July	S3-158	ROW	517231	5639817	White-throated sparrow
1-July	Quarry near S3-264	Quarry	499693	5613323	Northern waterthrush
2-July	S3-267 to S3-269	ROW	499890	5612284	Unidentified species
			499899	5612460	White-throated sparrow
2-July	Quarry near S3-264	Quarry	499573	5613220	White-throated sparrow
2-July	S3-377-380	ROW	477756	5576377	Fox sparrow
			477805	5576428	White-throated sparrow
3-July	S3-270-273	ROW	499730	5610548	Song sparrow

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Date Surveyed	Structure area Surveyed	Location	Nest Coordinates		Species
			Easting	Northing	
4-July	S4-138-140	ROW	513590	5460360	Lincoln's sparrow
4-July	Bypass road near S3-265	Bypass road	499930	5613388	American robin
5-July	S4-141-143	ROW	513831	5459921	White-throated sparrow
5-July	S3-249-251	ROW	502178	5617777	Downy woodpecker
6-July	S3-139	ROW	522080	5645360	Lincoln's sparrow
6-July	S4-36	ROW	495485	5497726	Dark-eyed junco
6-July	S3-661-663	ROW	482699	5514078	White-throated sparrow
7-July	S4-219-221	ROW	541833	5458169	Swamp sparrow
7-July	S3-376-377	ROW	478222	5577236	Boreal chickadee
			478182	5577133	Unidentified species
			478148	5577022	Lincoln's sparrow
8-July	S3-664-677	ROW	483039	5513670	Black-and-white warbler
8-July	S4-222-223	ROW	[redacted]	[redacted]	Olive-sided flycatcher
9-July	S3-373-375	ROW	478299	5577675	White-throated sparrow
10-July	S3-256-258	ROW	500512	5616069	Wilson's warbler
10-July	S3-268-269	ROW	499873	5611858	Northern waterthrush
11-July	Bypass road near S4-220	Bypass road	542284	5457804	Unidentified species
			542617	5457401	Song sparrow
13-July	Access Road near S3-167	Access road	515906	5638589	Wilson's warbler
14-July	S4-247-248	ROW	551660	5451321	Hermit thrush
15-July	S4 221-222	ROW	542751	5457543	Lincoln’s sparrow
16-July	S4 246-248	ROW	551525	5451443	Lincoln’s sparrow
16-July	S4 223-224	ROW	543214	5457235	Hermit thrush
18-July	S4 165-166	ROW	516211	5637468	Wilson’s snipe
19-July	S4-243 to S4-241	ROW	549310	5452974	Palm warbler
20-July	S3 159 to 164	ROW	516760	5638704	Fox sparrow
20-July	S3 159 to 164	ROW	516360	5637857	Tree swallow
27-July	S3 309	ROW	[redacted]	[redacted]	Olive-sided flycatcher
27-July	S4 308	ROW	564178	5431322	Hermit thrush
31-July	S4 290-292	ROW	557814	5435363	Dark-eyed junco

[1]ROW = 60 m transmission line right-of-way