

Document Front Sheet



NE-LCP Contractor/Supplier

Contract or Purchase Number and Description: LC-EV-092		Contractor/Supplier Name: STANTEC CONSULTING	
Document Title: LCP Avifauna Management Plan		Total Number of Pages Incl. Front Sheet 35	
Contractor/ Supplier Document Number:		Revision Number:	
EPC(M) Document Number:		Issue Number:	
NE-LCP Document Number: LCP-SC-CD-0000-EV-RP-0002-01		NE-LCP Issue Number: A2	
Approver's Signature: <i>Penny Dwyer</i>		Date (dd-mmm-yyyy): <i>25-Feb-2013</i>	Review Class:
Comments: Cover sheet created by LCPDCC		Equipment Tag or Model Number:	

NE-LCP or EPC(M)

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☐ 03 – REVIEWED - NOT ACCEPTED
☐ 04 – INFORMATION ONLY
☐ 05 – NOT REVIEWED

Lead Reviewer:	Date (dd-mmm-yyyy):	Project Manager:	Date (dd-mmm-yyyy):
NE-LCP or EPC(M) Management:	Date (dd-mmm-yyyy):		

General Comments:



**LOWER CHURCHILL PROJECT
AVIFAUNA MANAGEMENT PLAN
MUSKRAT FALLS CONSTRUCTION**

Version: 1.0

Date: February 5, 2013

**LOWER CHURCHILL
HYDROELECTRIC GENERATION PROJECT
Avifauna Management Plan
Muskrat Falls Construction**

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Project # 121511052

February 5, 2013



**LOWER CHURCHILL PROJECT
AVIFAUNA MANAGEMENT PLAN
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1.0 INTRODUCTION

Avifauna in Newfoundland and Labrador are managed by both federal and provincial regulatory agencies. For certain species, there are policies and regulations governing development activities on the landscape. As there is a risk that activities associated with the Lower Churchill Hydroelectric Development Project (the Project) may cause disturbance to bird species, Nalcor Energy has developed this *Avifauna Management Plan* to manage the potential effects.

1.1 Project Overview

The Project will include hydroelectric generating facilities at Muskrat Falls and Gull Island, and interconnecting transmission lines to the existing Labrador grid. At this time Nalcor is proceeding with the Muskrat Falls facility that consists of a generating station of approximately 824 MW in capacity and will include:

- a dam with two sections on the north and south abutments of the river;
- a 100 km² reservoir at an assumed full supply level (fsl) of 39 m above sea level (asl); and
- a powerhouse will contain four Kaplan turbines.

The north section dam will be 32 m high and 432 m long, while the south section will be 29 m high and 325 m long. The reservoir will be 60 km long and the area of inundated land will be 41 km² at fsl.

Although not under consideration for this Avifauna Management Plan at this time, the relevant elements of the Gull Island facility are that it will have a generating capacity of 2,250 MW; a dam 99 m high and 1,315 m long; a reservoir 215 km² in area at an assumed of 125 m asl; and a powerhouse with five Francis turbines. The dam will be a concrete faced rockfill dam. The reservoir will be 232 km long, and the area of inundated land will be 85 km² at fsl.

The interconnecting transmission lines between these two facilities will consist of two 315 kV transmission lines from Muskrat Falls to Churchill Falls. Both lines will be lattice-type steel structures. The transmission lines will be located north of the Churchill River parallel to the existing line TL 240.

1.2 Schedule of Activities

Construction activities proposed for the Muskrat Falls component in 2012 consist of clearing and road construction activities from May through October 2012 (Table 1.1)

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Table 1.1 Proposed Start Date for 2012 Construction Activities

2012 Activity	Date
On-Site Start Date for Clearing of South Side Access Road	18 June 2012
South Side Access Road Clearing to Intersection of Camp Access Road Completed	18 July 2012
Camp Access Road to Accommodations Complex Clearing Completed	31 July 2012
Accommodations Complex - Starter Camp Clearing Completed	31 July 2012
25 kV Line on North Side of Churchill River Clearing Completed	31 July 2012
Accommodations Complex – Main Site Clearing Completed	31 August 2012
South Side Access Road Clearing to Project Site Completed – (South Side Access Road Clearing Completed)	30 September 2012
Company Laydown Area Clearing Completed	31 October 2012
25 kV Line on South Side of Churchill River Clearing Completed	
Contractor Laydown Area Clearing Completed	
Bulk Excavation Spoils Area Clearing Completed	
Project Site Clearing Completed	

1.3 Regulatory Context

1.3.1 Migratory Birds Convention Act

The *Migratory Birds Convention Act* (MBCA) was designed to protect and conserve migratory birds, both as populations and individual birds, and their nests (internet site: Government of Canada 1994a). In Canada, the MBCA and associated *Migratory Birds Regulations* (internet site: Government of Canada 1994b) are administered through Environment Canada by the Canadian Wildlife Service (CWS) (internet site: Government of Canada 1994a). Coverage of the MBCA includes 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, ptarmigan, hawks, eagles, owls, crows or jays (Environment Canada 1991).

The *Migratory Birds Regulations* prohibit the disturbance, destruction, or taking of a nest, 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 (internet site: Government of Canada 1994b). Permits for these activities cannot be issued by CWS or Environment Canada (Joint Review Panel 2011, pg. 140).

1.3.2 Species at Risk Act

The *Species at Risk Act*, 2002 (SARA) was established to provide wildlife species additional protection against extirpation, extinction or endangerment (internet site: Government of Canada 2002). This includes protection from human activity. 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 (internet site: Government of Canada 2002).

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1.3.3 Newfoundland and Labrador Endangered Species Act

Provincially, wildlife species at risk are managed under the *Newfoundland and Labrador Endangered Species Act*, 2004 (NLESA), 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) (internet site: Government of Newfoundland and Labrador 2004). Under NLESA it is prohibited to disturb, harass, injure or kill any individual of a listed species, disturb or destroy the residence of listed species, or be in possession of individuals of a listed species (internet site: Government of Newfoundland and Labrador 2004). There are currently 14 bird species listed under NLESA (NLDEC 2012a).

2.0 BASELINE INFORMATION

2.1 Key Avifauna Species

There are both migratory and year-round resident species of avifauna within the lower Churchill River valley. The majority of migratory species, which are protected under federal and / or provincial legislation, can be grouped into four categories:

- Landbirds;
- Waterfowl;
- Waterbirds; and
- Shorebirds.

Although raptors are not covered under the MBCA, they are subject to provincial regulations.

Of particular concern are the species at risk. The species at risk known to occur within the lower Churchill River valley include the Olive-sided flycatcher (*Contopus cooperi*), Common Nighthawk (*Chordeiles minor*), Rusty Blackbird (*Euphagus carolinus*), Harlequin Duck (*Histrionicus histrionicus*), and Gray-cheeked Thrush (*Catharus minimus*).

Surveys were conducted to determine the presence and in some cases, relative abundance, of each category of avifauna species within the lower Churchill River valley (Minaskuat Inc. 2008a). Breeding forest landbird surveys were completed by surveying ground transects at different locations and in different habitat types. The most commonly observed landbird species 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 (*Setophagus petechia*), Boreal Chickadee (*Poecile hudsonicus*) and Black-throated Green Warbler (*Setophagus virens*).

Waterfowl presence and abundance was determined from aerial and water based surveys of rivers and wetlands (LGL 2008). The activity, productivity and success of raptor nests within the lower Churchill River valley was determined by surveying known nest sites and searching for others within areas of future disturbance (Minaskuat Inc. 2008b).

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2.2 Habitat within Project Area

2.2.1 Ecological Land Classification

An Ecological Land Classification (ELC) of the Project Area was completed along the lower Churchill River valley (Minaskuat Inc. 2008b). Thirteen ecotypes were combined into habitat types based on similar characteristics (Table 2.1).

Table 2.1 Summary of ELC Ecotypes for the Lower Churchill River Valley

Ecotype	General Description
Black Spruce/Lichen Woodland	Open black spruce/lichen complex; small patches of mostly stunted black spruce surrounded by large areas of <i>Cladina</i> spp. Lichens
Black Spruce/Sphagnum Woodland	Open canopy of stunted black spruce with understory of <i>Sphagnum</i> spp. mosses, forbes, sedges and other mosses; often at the margin of wetlands such as between bogs and fens, and coniferous forest
Marsh	Exists along the banks of the Churchill river and its tributaries; flooding and scouring by ice limit vegetative growth; no tree cover and sparse ground cover including bulrushes, rushes, sedges and grasses
Black Spruce on Outcropping	Exists on exposed bedrock typically on crests of hill and ridges; due to exposure in these areas, shrub cover is sparse and tree cover consists of black spruce growing in small sheltered areas; ground cover may include <i>Cladina</i> spp. lichens and feathermoss
Fen	Ground cover includes sphagnum mosses, sedges and grasses with sparse shrub cover; trees are balsam fir and American larch; fens may be ribbed fens or unpatterned
Low Shrub Bog	Peat lands that support sparse tree cover (black spruce or American larch) and stunted patchy shrub cover; sphagnum mosses and sedges form the ground cover; bogs may also be patterned and unpatterned; most common wetland ecotype
Riparian Meadow	Exist along the shores of long rivers with large flood plains; due to ice scouring and flooding, vegetation is maintained at an early stage of succession; meadows consist primarily of blue-joint reedgrass, tall meadow-rue and dwarf red raspberry mixed with patches of shrubs, generally less than 2 m tall; there is no tree cover
Black Spruce/Feathermoss	Dense black spruce tree canopy; shrub layer consists of Labrador tea, velvetleaf blueberry and small black spruce; ground vegetation includes feathermoss and <i>Cladina</i> spp; occurs in river valley and surrounding upland areas
Mixedwood Forest	Occurs along the Churchill River valley and the valleys of tributaries; dense tree canopy includes heart-leaved paper birch, balsam fir and black spruce; shrub layer includes green alder, squashberry and young black spruce and balsam fir; ground vegetation consists of mosses intermixed with forbes and pteridophytes
Fir-White Spruce Woodland	Dense tree canopy of balsam fir and white spruce that may include heart-leaved paper birch; shrub cover primarily composed of regenerating balsam fir and speckled alder and squashberry; ground cover includes mosses mixed with forest forbs
Hardwood	On upland slopes mostly north of Gull Island; dense canopy includes heart-leaved paper birch, paper birch, quaking aspen, balsam poplar, balsam fir and black or white spruce; shrub layer may be green or speckled alder, squashberry and regenerating balsam fir, black spruce and heart-leaved paper birch; ground cover includes forest forbs
Spruce-Fir Feathermoss	Churchill River valley and the larger tributaries; moderately dense canopy consisting of black spruce and balsam fir; shrub layer includes regenerating canopy tree species; ground cover of moss carpet and may include other species such as mountain cranberry
Riparian Thicket	Along shores of large rivers where sediments have accumulated at bends and on river islands; are a successional stage between Riparian Meadow and other forest ecotypes; shrub cover includes alder and willow spp.; tree cover is sparse and may include heart-leaved paper birch, white spruce and balsam fir with sparse ground cover

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Ecotype	General Description
Notes: Source: Minaskuat Inc. 2008b	

2.2.2 Avifauna Associated with Habitat Types

Of the avifauna species that may be breeding within the lower Churchill River valley, many have specialized habitat requirements and therefore are associated with particular habitat types (Table 2.2).

Table 2.2 Most Abundant Breeding Landbirds; Species at Risk (SARA) and Newfoundland and Labrador Endangered Species; and Naturally Rare Occurring Species by Habitat Type in Lower Churchill River Valley

Habitat	Most Abundant Breeding Landbirds	Species at Risk (SARA/COSEWIC) and Newfoundland and Labrador Endangered Species (NLESA)
Riparian	Yellow Warbler, Northern Waterthrush, Cedar Waxwing, Alder Flycatcher, Magnolia Warbler, Lincoln's Sparrow, White-throated Sparrow	Harlequin Duck
Wetland	Lincoln's Sparrow, Northern Waterthrush, White-throated Sparrow, Wilson's Warbler, Swamp Sparrow, Yellow Warbler	Rusty Blackbird
Dry Spruce	Dark-eyed Junco, Ruby-crowned Kinglet, Yellow-rumped Warbler, Boreal Chickadee, White-throated Sparrow, Fox Sparrow	N/A
Wet Spruce	Dark-eyed Junco, Ruby-crowned Kinglet, Yellow-rumped Warbler, Swainson's Thrush, Boreal Chickadee, Tennessee Warbler	N/A
White Spruce	Tennessee Warbler, Magnolia Warbler, Yellow-rumped Warbler, Swainson's Thrush, Ruby-crowned Kinglet, Black-throated Green Warbler, White-throated Sparrow	N/A
Fir/Spruce	Swainson's Thrush, Ruby-crowned Kinglet, Tennessee Warbler, Dark-eyed Junco, Yellow-rumped Warbler, White-throated Sparrow	N/A
Mixed Fir	Black-throated Green Warbler, Tennessee Warbler, Swainson's Thrush, Boreal Chickadee, Yellow-rumped Warbler, Ruby-crowned Kinglet	N/A
Mixed Spruce	Dark-eyed Junco, Ruby-crowned Kinglet, Swainson's Thrush, Tennessee Warbler, Black-throated Green Warbler, Boreal Chickadee, Yellow-rumped Warbler	Gray-cheeked Thrush
Hardwood	White-throated Sparrow, Tennessee Warbler, Black-throated Green Warbler, Least Flycatcher, Swainson's Thrush, Northern Waterthrush, Orange-crowned Warbler	N/A
Burn	White-throated Sparrow, Dark-eyed Junco, Hermit Thrush, Boreal Chickadee, Swainson's Thrush, Yellow-bellied Flycatcher, American Robin	Olive-sided Flycatcher
Open Areas	N/A	Common Nighthawk
Source: Avifauna Species Observed in the Churchill River Valley, 2006-2007 (Minaskuat Inc. 2008a)		

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3.0 PROPOSED MITIGATION MEASURES

There are three levels of mitigation measures to be implemented with this Avifauna Management Plan:

- Level I - designed to reduce the likelihood of interaction during clearing and other construction activities;
- Level II - considerations personnel should be aware of that may identify an active nest; and
- Level III – protocols for aerial and ground avifauna surveys that should be completed by ornithologists in areas of potential habitat within or near the Project footprint.

3.1 Level 1 Protection - General Mitigation Measures

There are a number of general mitigation measures that will be implemented to reduce the effects of construction on all species of wildlife, including avifauna:

- Avoid disturbance and / or the clearing of sensitive wildlife areas during all clearing;
- Implement no harvesting policy and other harassment of wildlife, and no possession of firearms or pets by Project personnel;
- Implement environmental awareness training and conduct regular briefings for all personnel;
- Oversee EPP using trained and experienced environmental monitors;
- Use existing roads, quarries and other disturbed areas where possible;
- Restrict public access to temporary roads and work areas;
- Post and enforce speed limits;
- Locate construction roads within the reservoirs where possible;
- Rehabilitate work areas and access roads no longer required in accordance with the EPP to encourage re-formation of natural conditions;
- Undertake blasting in accordance with permits and standard procedures;
- Use existing right-of-way corridors for construction of transmission lines where possible;
- Schedule activities related to transmission line construction around sensitive periods or areas;
- Create conditions for establishing formation of hardwood forest at selected locations; and
- Encourage the formation of riparian marsh wetland.

3.2 Level 2 Protection - General Awareness Mitigation Measures

The disturbance footprint for the Project will include potential nesting habitat for many migratory bird species (ground, tree and shrub nesters). The presence of natural upland and wetland habitat in the disturbance footprint increases the chances of having nesting migratory bird species onsite.

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

- the presence of birds or eggs in a nest
- adult birds carrying food or nesting materials to a specific location
- adult birds defending territory, through singing, screeching, or diving

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When one or more of these indicators are noted, measures should be undertaken to identify if the potential location of the nest is in the disturbance footprint or within a recommended setback buffer. If the nest is not physically detected, the area will be considered a potentially active nest and have a recommended setback buffer.

3.3 Level 3 Protection – Directed Survey Protocols

Additional avifauna mitigation measures include surveys of the construction areas prior to activity including activity surveys of known raptor nests, aerial search for additional nests (either previously unknown raptor nests or nest of other species), and ground surveys to identify breeding migratory bird species within the areas.

Aerial Surveys

Helicopter surveys for active raptors (Landbirds) nests will be completed during late May through early June of the area of interest. Results will be reported to the Construction Manager who will communicate to the On-site Environmental Monitors. Line transects are to be flown along 3 transect lines covering 100% of the area to be cleared.

Ground Surveys

Trained ornithologists will complete ground searches for avifauna nests during 1 May to 31 July, <7 days prior to the clearing activity. The census techniques will vary according to habitat but will be based on 100% coverage of the area of interest. To assure 100% coverage of the area of interest, three ornithologists will each survey line transects of 10 m wide. The line transects will be completed in the area of interest by 1km intervals to insure a thorough search. Active and potentially active nests will be identified using the criteria identified above according to species with information collected based on Maritime Bird Breeding Atlas Nest Record Card (Bird Studies Canada, 2006) and locations and mitigation measures communicated to the Construction Manager who will communicate to the On-site Environmental Monitors. The area of interest will only be cut after the ornithologists have cleared the area after completing their search. No cutting will be permitted until the ornithologists have returned to a buffered area to confirm fledging within the appropriate timeframe for the species in question found at the active nest. Note that ornithologists will be available for assistance and consultation following the initial surveys and throughout the identified period for the project.

In addition, personnel will be instructed in the identification of such nests that may be readily visible or well concealed. It is therefore important to be aware of behavioural cues that suggest the presence of an active nest, even if it cannot be seen. These include singing males, pairs observed together (including courtship and copulation), adult birds repeatedly carrying nest materials or foods to a specific location, aggressive defense of a location (against other birds or people), or the presence of recently fledged birds (often with some tufts of down feathers remaining, or begging persistently for food). Shorebirds may also attempt to lure intruders away from an active nest with a broken-wing display. Table 3.1 provides an overview of the types of nests that may be expected within the Project area. Expected species of avifauna and photos of typical nest sites are presented in Appendices A, B, C and D.

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Table 3.1 Identification of Active Avifauna Nests

Nest Type	Location	Typical Species	Notes
Open cup – small nests woven from coarse plant fibres such as grass stems, leaves and bark strips	Usually in shrubs or trees, but can be on the ground; depends on foraging and shelter preferences of species	Flycatchers, vireos, thrushes, warblers, sparrows, finches, blackbirds	Often concealed in forks of trees, within shrubs, or under overhanging forbs or other dense vegetation; difficult to see in trees
Domed - ground nests with grasses or other vegetation used to cover the nest, leaving an entrance hole on one side	Ground	Some warblers and sparrows	Often well camouflaged and difficult to detect; best found through behavioural cues
Bank – burrows in sandy slopes	Sand banks, especially along rivers	Bank Swallow, Belted Kingfisher	Usually the nest holes can be seen from a distance; bird activity is easy to monitor from a distance
Cavity – excavated inside a rotting trunk or stump	On the main trunk of living or dead trees	Woodpeckers, chickadees, nuthatches, Tree Swallow	Used by different species over time; look for woodpecker activity (holes and missing bark) on nearby trees
Stick – large nest made of small to large sticks, lined with bark and grasses	On or near the top of large trees	Osprey, Bald Eagle, Red-tailed Hawk, Great Horned Owl, Common Raven	Visible from the air, difficult to detect from below; nest may be built by one species and then adopted by another; often used for several years
Scrape – lightly excavated depression on the ground, often lined with grasses, down, or other material from nearby	Wetland edges	Dabbling ducks, geese, shorebirds	Well concealed; females may remain on nest hoping that their plumage provides good camouflage (better than allowing the eggs to be visible)
Floating – clumps of aquatic vegetation upon which a loose cup platform is built	Over water, often in sheltered part of a wetland	Waterfowl	Relatively poorly constructed and can look like a naturally occurring clump of vegetation
Source: The Cornell Lab of Ornithology 2012 Available: http://www.allaboutbirds.org/Page.aspx?pid=1189			

3.4 Specific Measures by Activity Type

The proposed construction activities in 2012 will result in approximately 179.9 ha across a variety of habitat types (Table 3.2). The most common habitats affected will be Black Spruce/Feathermoss Forest, Spruce-Fir Feathermoss Forest, and Fir-White Spruce Forest (Figure 3.1). Note that approximately one third of the forested area to be cleared occurs beyond the Project Area ELC.

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Table 3.2 Construction Footprint and Habitat Types within the Lower Churchill River Valley

Habitat Type	Area (Ha) Cleared for each Project Element (Percentage)				
	Site Clearing and Access Road	Quarries	Laydown	Dam	Total Footprint
Anthropogenic / Disturbed	0	0	0	0	0
Black Spruce / Feathermoss Forest	38.6	1.1	0	1.4	41.1
Black Spruce / Sphagnum Woodland	4.0	0	0	1.0	5.0
Black Spruce / Lichen Woodland	0	0	0	0	0
Black Spruce on Bedrock Outcropping	0	0	0	0	0
Spruce-Fir / Feathermoss Forest	19.8	1.4	8.0	0	29.2
Fir-White Spruce Forest	33.5	0	0	3.3	36.8
Hardwood Forest	0	0	0	0	0
Mixedwood Forest	0	0	0	0.4	0.4
Gravel Bar	0	0	0	0	0
Wetland	6.0	0	0	0	6.0
Riparian	5.3	0	1.6	0.3	7.2
Water	0	0	0	0	0
Unvegetated	1.4	0	0	0.9	2.3
No ELC Data ¹	36.3	15.6	0	0	51.9
TOTAL	144.9	18.1	9.6	7.3	179.9

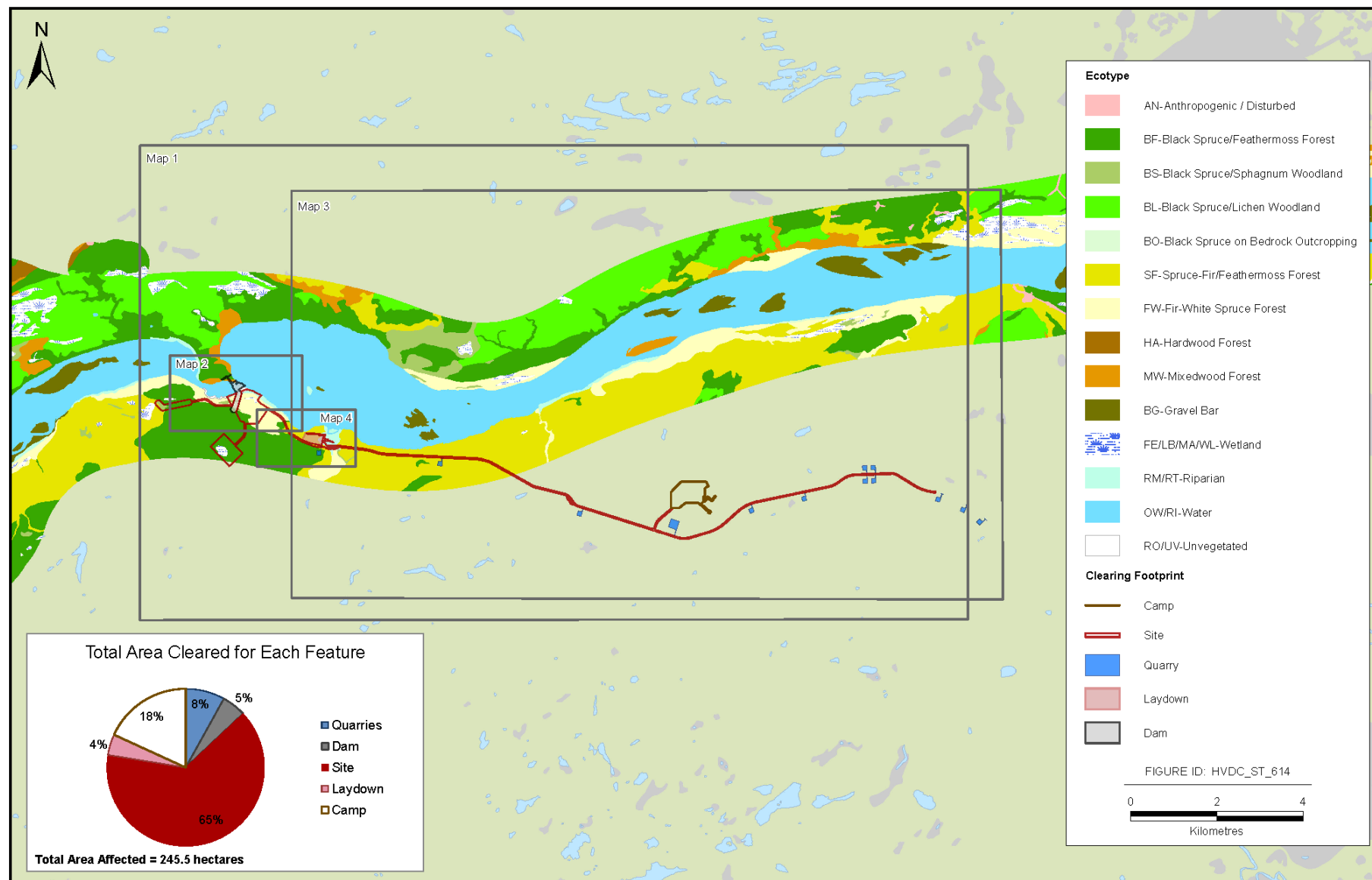


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Figure 3.1 Overview Location of Clearing Activities and Habitats Affected at Muskrat Falls During 2012

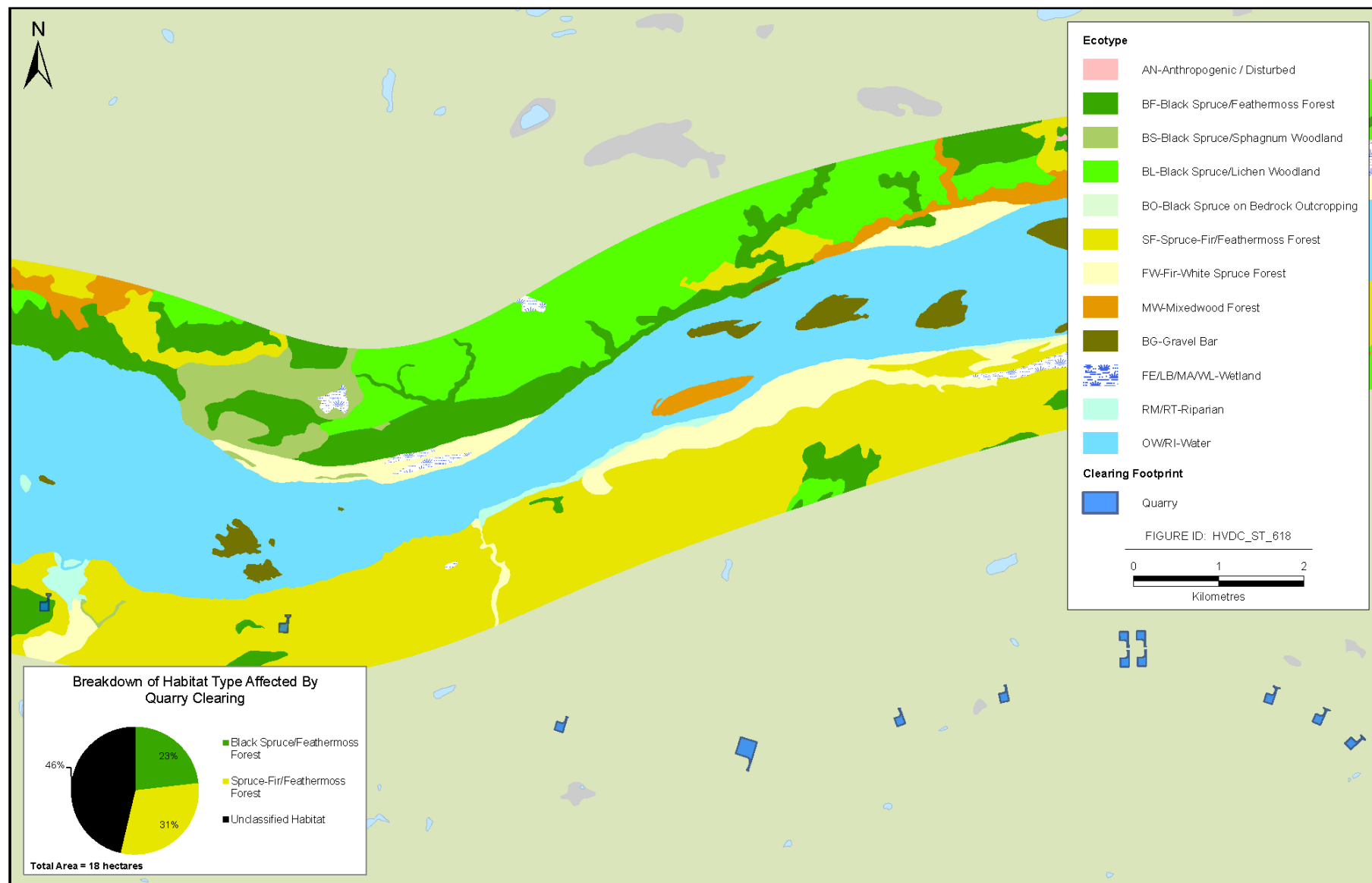


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3.4.1 Quarries

The clearing for the quarries (along the Access Road and elsewhere) will represent approximately 18.08 ha. Most of this clearing (i.e., 86 %) will occur in forested habitat (15.6 ha) that was not classified in the Project Area ELC, the rest (14 %) will be in Spruce-Fir/Feathermoss Forest (1.4 ha) and Black Spruce / Feathermoss Forest (1.1 ha) (Table 3.2; Figure 3.2).

Figure 3.2 Location of Clearing Activities for Quarries and Habitats Affected at Muskrat Falls During 2012



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3.4.1 Access Road and Site

The clearing for the Access Road and Site will represent approximately 144.9 ha in primarily Black Spruce / Feathermoss Forest (26.7 % or 38.6 ha), Fir-White Spruce Forest (23.1% or 33.5 ha), and Spruce-Fir/Feathermoss Forest (13.7 % or 19.8 ha) with 25.0 % (or 36.3 ha) in forested area that was not classified by the Project Area ELC (Table 3.2; Figure 3.3). Other habitats are within the area to be cleared for this Project element in 2012 included Wetland (4.2 % or 6.0 ha), Riparian (3.7 % or 5.3 ha), Black Spruce Sphagnum Woodland (2.7 % or 4.0 ha), and unvegetated (1 % or 1.4 ha).

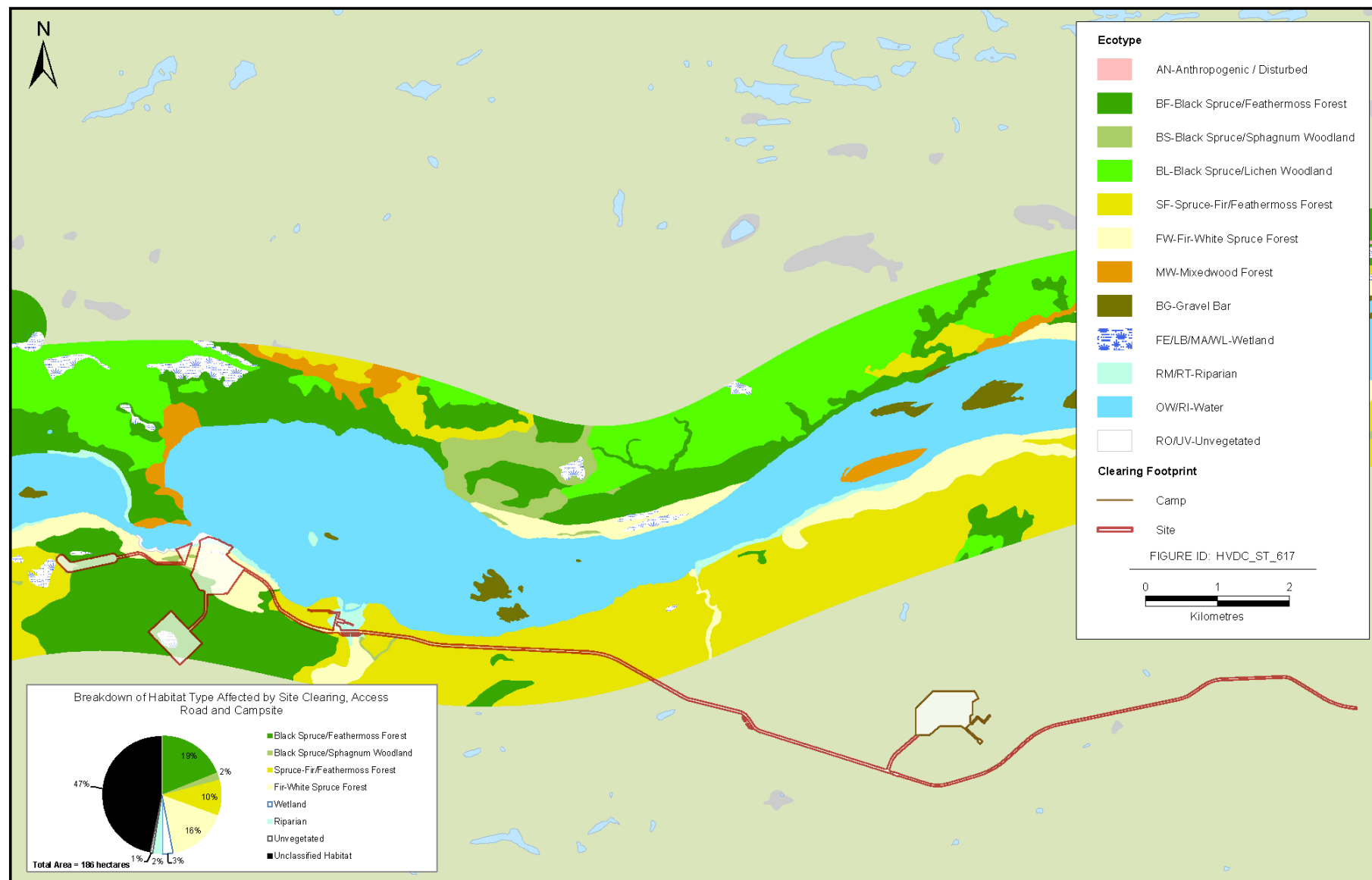


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Figure 3.3 Location of Access Road and Site Clearing and Habitats Affected at Muskrat Falls During 2012

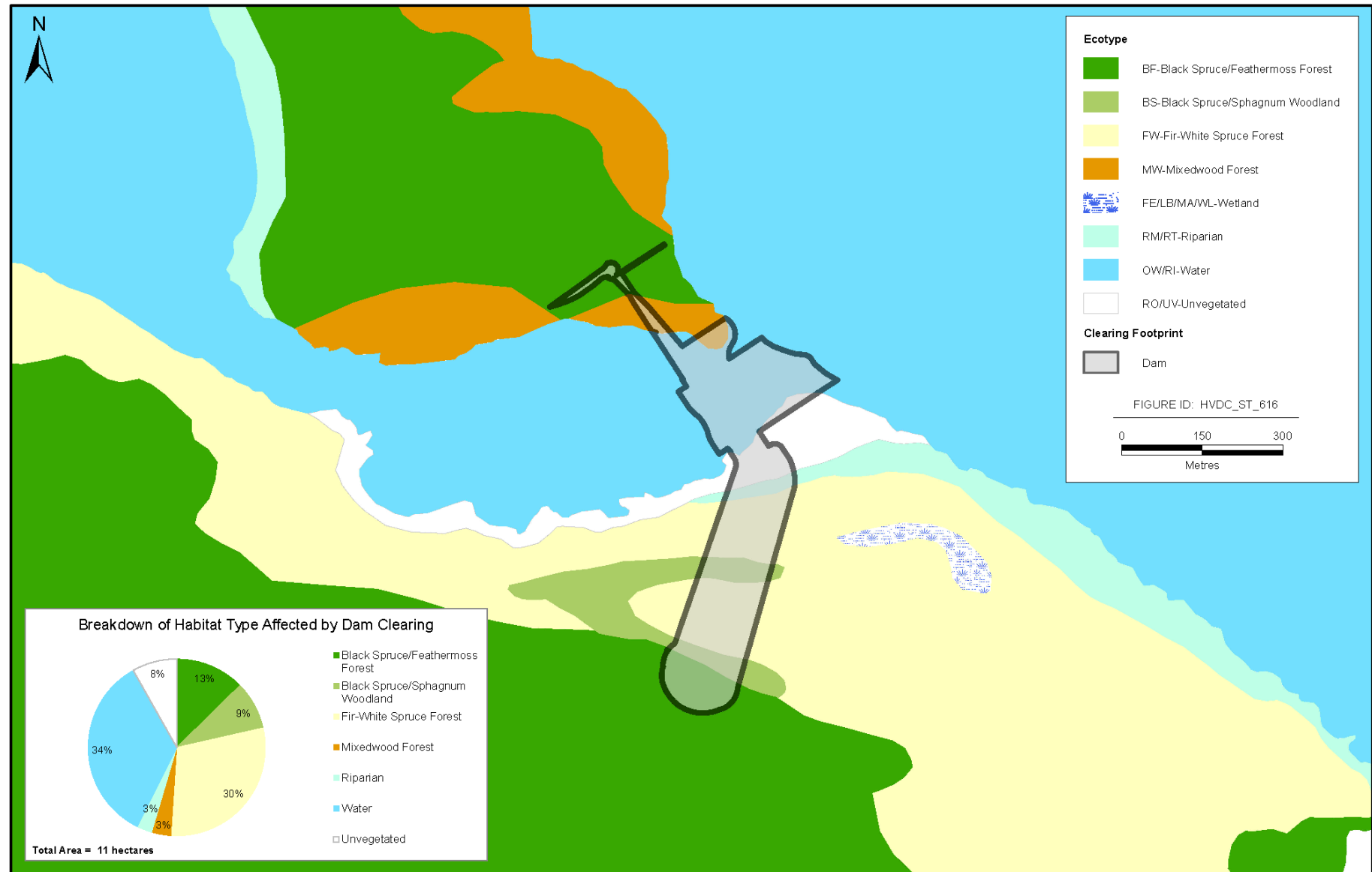


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3.4.2 Dam Construction

The clearing for the dam construction will represent approximately 7.3 ha that is primarily Fir-White Spruce Forest (3.3 ha) with lesser amounts of Black Spruce / Feathermoss Forest (1.4 ha), Black Spruce/Sphagnum Woodland (1.0 ha), unvegetated (0.9 ha), Mixedwood Forest (0.4 ha), and Riparian (0.3 ha) habitats (Table 3.2; Figure 3.4).

Figure 3.4 Location of Dam clearing activities and habitats affected at Muskrat Falls during 2012



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3.4.3 Laydown

The clearing for the laydown area will represent approximately 9.6 ha in Spruce-Fir/Feathermoss Forest (83.5 % or 8.0 ha) and Riparian (16.5 % or 1.6 ha) habitats (Table 3.2; Figure 3.5).



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Figure 3.5 Location of Laydown Area Clearing Activities and Habitats Affected at Muskrat Falls During 2012





4.0 PROCEDURES FOR ACTIVE NESTS

If a potentially active nest has been identified during pre-construction surveys, the setback buffer needs to be established around the nest site to ensure no further disturbance of the nesting migratory species. The size of the buffer is based on the recommended nest setback guidelines recommended by Environment Canada (M. Gahbauer, pers. comm.) or the Government of Newfoundland and Labrador for species of management concern (NLDEC 2012a). Setback distance for nests of species not of management concern is 30m for passerine nests and 100m for waterfowl/waterbird nests. Any adjustments to the recommended setback buffers need to be discussed with the appropriate regulatory body.

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

4.1 Avoidance of Active Raptor Nests

Buffers for known active raptor nests include:

- Replace physically disturbed Osprey or Bald Eagle nests with artificial platforms;
- Restrict activities within 200m of active raptor nests; and
- Restrict clearing within 800 m of active raptor nest.

4.2 Protocol for Removing Exclusion Areas

In order to reduce the potential for nest abandonment or failure, monitoring or rechecking of an identified active nest will occur after the estimated completion of the fledging period (or when the young have left the nest). Depending on the nesting stage (i.e., incubating or fledging) observed during the nest search, the timing of follow-up nest checks will be determined using literature-based estimates of the species-specific incubation and fledging periods (i.e., approximate number days for incubation and/or fledging to be completed).

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5.0 REPORTING

Nalcor Energy will institute a series of reporting and documentation initiatives regarding activities and results related to the scope of this Avifauna Management Plan. On a daily basis a suitable form would be completed by the Site Environmental Monitor and/or on-site ornithologist during 1 May-31 July (and as appropriate thereafter regarding avifauna) documenting the following:

- Instance of personnel briefing and training;
- Results of dedicated aerial survey for tree-nesting raptors or ground surveys for other nesting avifauna;
- Locations of any active nests and mitigation measures implemented to address potential incidental take;
- Documentation that such nests are no longer active (i.e., post-fledging) before proceeding with construction activities; and
- Documentation of all communications with appropriate federal and provincial authorities.

These daily reports will be kept onsite with active nests identified in subsequent daily briefings and other notifications regarding stated avoidance measures.

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6.0 REFERENCES

6.1 Literature Cited

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6.2 Internet Sources

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6.3 Personnel Communication

Gahbauer, M. Senior Wildlife Biologist, Stantec Consulting Ltd. Correspondence with Environment Canada in 2009.

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Appendix A

Avifauna Species Observed in the Churchill River Valley, 2006-2007

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Table A.1 Avifauna Species Observed in Lower Churchill River Valley in 2006-2007

Common Name	Scientific Name	MBCA ¹	SARA ²	NLESA ³	Other Regulations ⁴
Protected under Legislation					
Alder Flycatcher	<i>Empidonax alnorum</i>	Y			
American Black Duck	<i>Anas rubripes</i>	Y			
American Green-winged Teal	<i>Anas crecca</i>	Y			
American Pipit	<i>Anthus rubescens</i>	Y			
American Redstart	<i>Setophaga ruticilla</i>	Y			
American Robin	<i>Turdus migratorius</i>	Y			
American Three-toed Woodpecker	<i>Picoides tridactylus</i>	Y			
Bank Swallow	<i>Riparia riparia</i>	Y			
Black Scoter	<i>Melanitta nigra</i>	Y			
Black-and-white Warbler	<i>Mniotilta varia</i>	Y			
Black-backed Woodpecker	<i>Picoides arcticus</i>	Y			
Black-capped Chickadee	<i>Poecile atricapilla</i>	Y			
Blackpoll Warbler	<i>Dendroica striata</i>	Y			
Black-throated Green Warbler	<i>Dendroica virens</i>	Y			
Bohemian Waxwing	<i>Bombycilla garrulous</i>	Y			
Boreal Chickadee	<i>Poecile hudsonicus</i>	Y			
Brown Creeper	<i>Certhia Americana</i>	Y			
Canada Goose	<i>Branta Canadensis</i>	Y			
Cape May Warbler	<i>Dendroica tigrina</i>	Y			
Cedar Waxwing	<i>Bombycilla cedrorum</i>	Y			
Common Goldeneye	<i>Bucephala clangula</i>	Y			
Common Loon	<i>Gavia immer</i>	Y			
Common Merganser	<i>Mergus merganser</i>	Y			
Common Nighthawk	<i>Cordeles minor</i>	Y	Y	Y	
Common Redpoll	<i>Carduelis flammea</i>	Y			
Common Tern	<i>Sterna hirundo</i>	Y			
Common Yellowthroat	<i>Geothlypis trichas</i>	Y			
Dark-eyed Junco	<i>Junco hyemalis</i>	Y			
Downy Woodpecker	<i>Picoides pubescens</i>	Y			
Fox Sparrow	<i>Passerella iliaca</i>	Y			
Golden-crowned Kinglet	<i>Regulus satrapa</i>	Y			
Great Black Backed Gull	<i>Larus marinus</i>	Y			
Greater Scaup	<i>Aythya marila</i>	Y			
Greater Yellowlegs	<i>Tringa melanoleuca</i>	Y			
Gray-cheeked Thrush	<i>Catharus minimus</i>	Y		Y	
Hairy Woodpecker	<i>Picoides villosus</i>	Y			
Harlequin Duck	<i>Histrionicus histrionicus</i>	Y	Y	Y	
Hermit Thrush	<i>Catharus guttatus</i>	Y			
Herring Gull	<i>Larus argentatus</i>	Y			
Least Flycatcher	<i>Empidonax minimus</i>	Y			
Least Sandpiper	<i>Calidris minutilla</i>	Y			
Lesser Scaup	<i>Aythya affinis</i>	Y			
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	Y			
Long-tailed Duck	<i>Clangula hyemalis</i>	Y			
Magnolia Warbler	<i>Dendroica magnolia</i>	Y			
Mourning Dove	<i>Zenaida macroura</i>	Y			
Nashville Warbler	<i>Vermivora ruficapilla</i>	Y			
Northern Flicker	<i>Colaptes auratus</i>	Y			
Northern Pintail	<i>Anas acuta</i>	Y			
Northern Shoveler	<i>Anas clypeata</i>	Y			
Northern Shrike	<i>Lanius excubitor</i>	Y			
Northern Waterthrush	<i>Seiurus noveboracensis</i>	Y			



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Common Name	Scientific Name	MBCA ¹	SARA ²	NLESA ³	Other Regulations ⁴
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Y	Y	Y	
Orange-crowned Warbler	<i>Vermivora celata</i>	Y			
Osprey	<i>Pandion haliaetus</i>	N			Y
Palm Warbler	<i>Dendroica palmarum</i>	Y			
Philadelphia Vireo	<i>Vireo philadelphicus</i>	Y			
Pine Grosbeak	<i>Pinicola enucleator</i>	Y			
Pine Siskin	<i>Carduelis pinus</i>	Y			
Purple Finch	<i>Carpodacus purpureus</i>	Y			
Red-breasted Merganser	<i>Mergus serrator</i>	Y			
Red-breasted Nuthatch	<i>Sitta Canadensis</i>	Y			
Red-eyed Vireo	<i>Vireo olivaceus</i>	Y			
Red-throated Loon	<i>Gavia stellata</i>	Y			
Ring-necked Duck	<i>Aythya collaris</i>	Y			
Ruby-crowned Kinglet	<i>Regulus calendula</i>	Y			
Rusty Blackbird	<i>Euphagus carolinus</i>	Y	Y	Y	
Savannah Sparrow	<i>Passerculus sandwichensis</i>	Y	Y		
Semipalmated Plover	<i>Charadrius semipalmatus</i>	Y			
Short-billed Dowitcher	<i>Limnodromus griseus</i>	Y			
Solitary Sandpiper	<i>Tringa solitaria</i>	Y			
Song Sparrow	<i>Melospiza melodia</i>	Y			
Sora	<i>Porzana Carolina</i>	Y			
Spotted Sandpiper	<i>Actitis macularia</i>	Y			
Surf Scoter	<i>Melanitta perspicillata</i>	Y			
Swainson's Thrush	<i>Catharus ustulatus</i>	Y			
Swamp Sparrow	<i>Melospiza Georgiana</i>	Y			
Tennessee Warbler	<i>Vermivora peregrine</i>	Y			
Tree Swallow	<i>Tachycineta bicolor</i>	Y			
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	Y			
White-throated Sparrow	<i>Zonotrichia albicollis</i>	Y			
White-winged Crossbill	<i>Loxia leucoptera</i>	Y			
Wilson's Warbler	<i>Wilsonia pusilla</i>	Y			
Winter Wren	<i>Troglodytes troglodytes</i>	Y			
Wood Duck	<i>Aix sponsa</i>	Y			
Yellow Warbler	<i>Dendroica petechia</i>	Y			
Yellow-bellied Flycatcher	<i>Empidonax flaviventrus</i>	Y			
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	Y			
Yellow-rumped Warbler	<i>Dendroica coronate</i>	Y			
Wilson's Snipe	<i>Gallinago delicate</i>	Y			
Not Protected under Legislation					
American Crow	<i>Corvus brachyrhynchos</i>				
Bald Eagle	<i>Haliaeetus leucocephalus</i>				
Belted Kingfisher	<i>Ceryle alcyon</i>				
Common Raven	<i>Corvus corax</i>				
Double-crested Cormorant	<i>Phalacrocorax auritus</i>				
Gray Jay	<i>Perisoreus Canadensis</i>				
Great Horned Owl	<i>Bubo virginianus</i>				
Merlin	<i>Falco columbarius</i>				
Red-tailed Hawk	<i>Buteo jamaicensis</i>				
Ruffed Grouse	<i>Bonasa umbellus</i>				
Sharp-shinned Hawk	<i>Accipiter striatus</i>				
Spruce Grouse	<i>Falcipennis Canadensis</i>				

Note: ¹ Environment Canada 1991, ² Government of Canada 2012, ³ NLDEC 2012a

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Appendix B

Nest Photos of Common Breeding Songbirds in the Lower Churchill River Valley (Source for written nest description is Source: The Cornell Lab of Ornithology 2012 Available: <http://www.allaboutbirds.org/Page.aspx?pid=1189>)



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Yellow Warbler nest- adult feeding hatchlings

- Cup-shaped nest 1.5m to 5 m off ground in vertical fork of a small tree or shrub
- Found in riparian and wetland habitats



Dark-eyed Junco nest with hatchlings

- Cup-shaped nest on ground or on low tree branches; well concealed
- Found in Dry Spruce, Wet Spruce, Fir/Spruce, Mixed Spruce, and Burn Habitats



008356 [RM] © www.visualphotos.com

Ruby-crowned Kinglet on nest

- Nest is deep and suspended under horizontal branch near tree trunk; 5-10m high
- Found in Dry Spruce, Wet Spruce, White Spruce, Fir/Spruce, and Mixed Spruce Habitats



Swainson's Thrush nest with eggs

- Bulky, open cup nest on horizontal branch of deciduous tree; 0.5- 3 m high
- Found in Wet Spruce, White Spruce, Fir/Spruce, Mixed Fir, Mixed Spruce, Hardwood and Burn Habitat



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Yellow-rumped Warbler – adult with hatchlings in nest

- Cup-shaped nest on horizontal branch of a conifer 1.5-15m high
- Found in Dry Spruce, Wet Spruce, White Spruce, Fir/Spruce, and Mixed Fir Habitats



Tennessee Warbler nest with eggs

- Open cup placed on ground often at base of small shrub or tree
- Found in Wet Spruce, White Spruce, Fir /Spruce, Mixed Fir, Mixed Spruce, and Hardwood Habitats



White-throated Sparrow nest with eggs

- Nests on or just above the ground; surrounded by dense vegetation
- Found in Wetland, Dry Spruce, White Spruce, Fir/Spruce, Hardwood, and Burn Habitats

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Appendix C

Nest Photos of Breeding Raptors in the Lower Churchill River Valley (Source for written nest description is Source: The Cornell Lab of Ornithology 2012 Available: <http://www.allaboutbirds.org/Page.aspx?pid=1189>)



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Osprey nest

- Large stick nests 1-2 m wide; found in tree tops or atop transmission line pole
- Usually found in open area



Red-tailed Hawks in nest

- Nests usually found in top of large tree; may also nest on cliff ledges
- Found in a variety of open habitat types

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Appendix D

Nest Photos of Breeding Waterfowl in the Lower Churchill River Valley (Source for written nest description is Source: The Cornell Lab of Ornithology 2012 Available: <http://www.allaboutbirds.org/Page.aspx?pid=1189>)



Common Goldeneye nest

- Nests found in tree cavities or nest boxes
- Found along lakes and rivers bordered by forests



Harlequin Duck nest with eggs

- Ground nest near river
- Found in fast flowing rivers; usually in forested areas