Environmental Impact Study

NP-8671, Lot 188, Strathcona or Forestry Island, in the Municipality of Temagami, Ontario

Prepared For

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September 21st, 2024

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1.0 Introduction

BAE Environmental was retained to complete an Environmental Impact Study (EIS) to assess the presence of and potential impacts to the natural heritage features and functions to support a proposed severance application for NP-8671, Lot 188, Strathcona or Forestry Island, in the Municipality of Temagami, Ontario (Site). Field work, reporting, and recommendations were completed to meet the requirements under the Provincial Policy Statement (PPS) (2020), sections 7.1, 7.3, Municipality of Temagami Official Plan (2013), Fisheries Act (1985), Fish and Wildlife Conservation Act (1997), Endangered Species Act (ESA) (2007), Migratory Birds Convention Act (1994) and other relevant legislation and policies. The Site location is shown on Figure 1.

1.1 Background Information

The property is currently zoned Remote Residential (R2). Two 0.787ha lots are proposed to be severed from the one 1.574ha lot described as NP-8671, Lot 188, Strathcona or Forestry Island, in the Municipality of Temagami (Figure 2).

The property is bounded by Lake Temagami to the south, west and north. A seasonal cottage property is adjacent to the northeast and a seasonal cottage property is adjacent to the east. There is one existing seasonal cottage located on the west-central portion of the subject property. There is also a newer cottage under development (Permit 2024-002) just north of the existing seasonal cottage.

1.2 Field Investigations

Field investigations were carried out on October 14, 2023, February 17, May 29-30 and July 28-31, 2024. The weather was generally warm and sunny to partly cloudy and there was no precipitation during any of the site visits.

The following natural heritage features and associated ecological functions on or within 120 meters of the property boundary were evaluated and potential impacts assessed:

a) Habitat of endangered and threatened species
b) Significant wetlands
c) Significant wildlife habitat
d) Significant areas of natural and scientific interest (ANSIs),
e) Fish habitat

Figure 1: Site Location

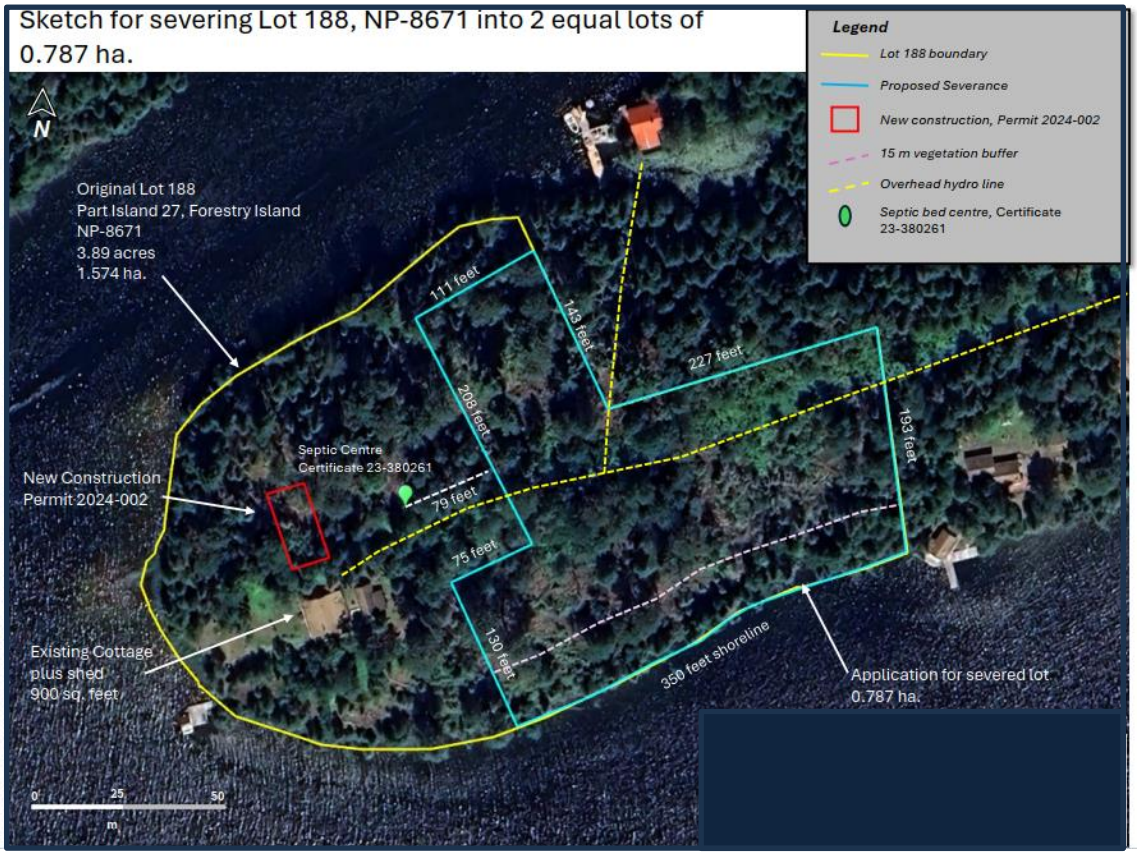


Figure 2: Sketch for severing Lot 188, NP-8671 into 2 equal lots of 0.787 ha.

2.0 Ecological Setting

The study area is located within the Lake Temagami Ecoregion (4E). The climate in this ecoregion is humid and cool. It has been classified by the Ecoregions Working Group (1989) as the Humid Low Boreal Ecoclimatic Region. Mean annual precipitation in the ecoregion ranges between 725 and 1,148 mm per year and the mean summer rainfall is between 217 and 291 mm. The mean annual temperature ranges from 0.8 to 4.3°C and the mean growing season length is 171 to 200 days (Ecoregions Working Group, 1989.

This ecoregion is situated on the Precambrian Shield and is predominantly underlain by granitic and gneissic bedrock. This undifferentiated rock is exposed at the surface or covered by a thin, irregular layer of drift. Glaciofluvial deposits of sand and gravel are scattered throughout with topography described as gently to moderately rolling uplands of shallow soils and bedrock knobs with interspersed sand-filled depressions. Site specific ecosites represented on the subject property and adjacent lands were identified during field investigations; each described below.

2.1 Ecological Land Classification

Ecological land classification is determined by assessing the soil and vegetation characteristics of a site and deducing its local ecosite. To assist in the assessment for presence of potential natural heritage features, including habitat for species at risk and significant wildlife habitat, the ecosites on the property were determined during field investigations.

Through field investigations and mapping, two natural ecosites were found to be present on the subject property, one forested the other an open water component - connection to Lake Temagami. The natural ecosites are detailed with representative photos in sections below.

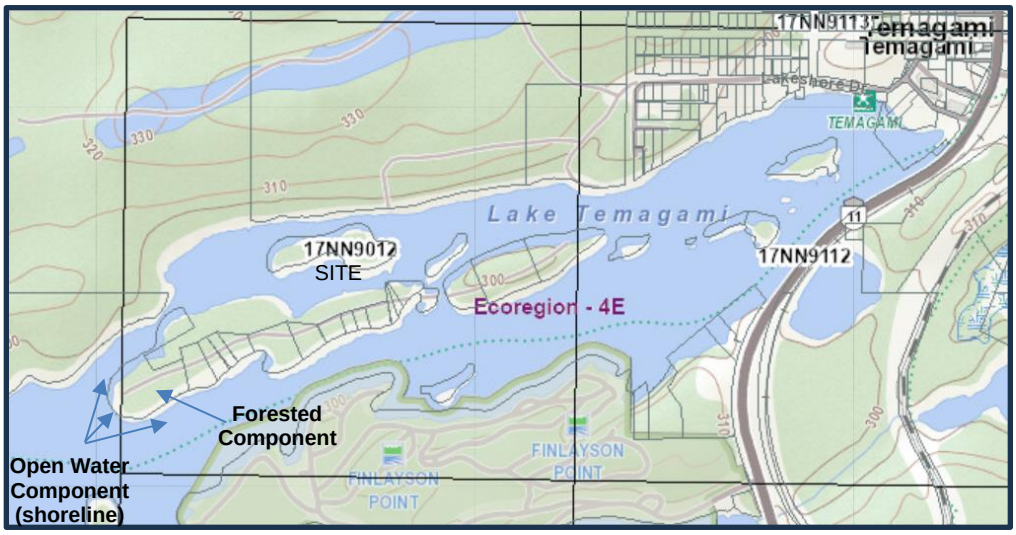
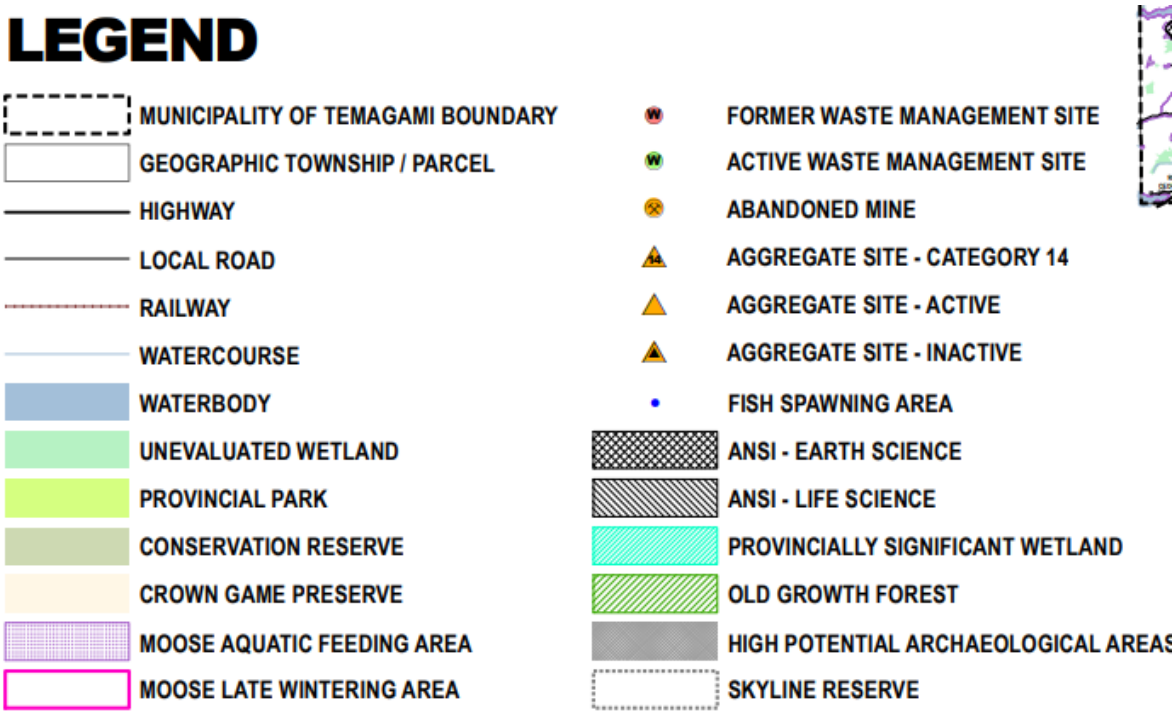


Figure 3: Ecological Land Classification

Figure 4: Map Showing ANSI



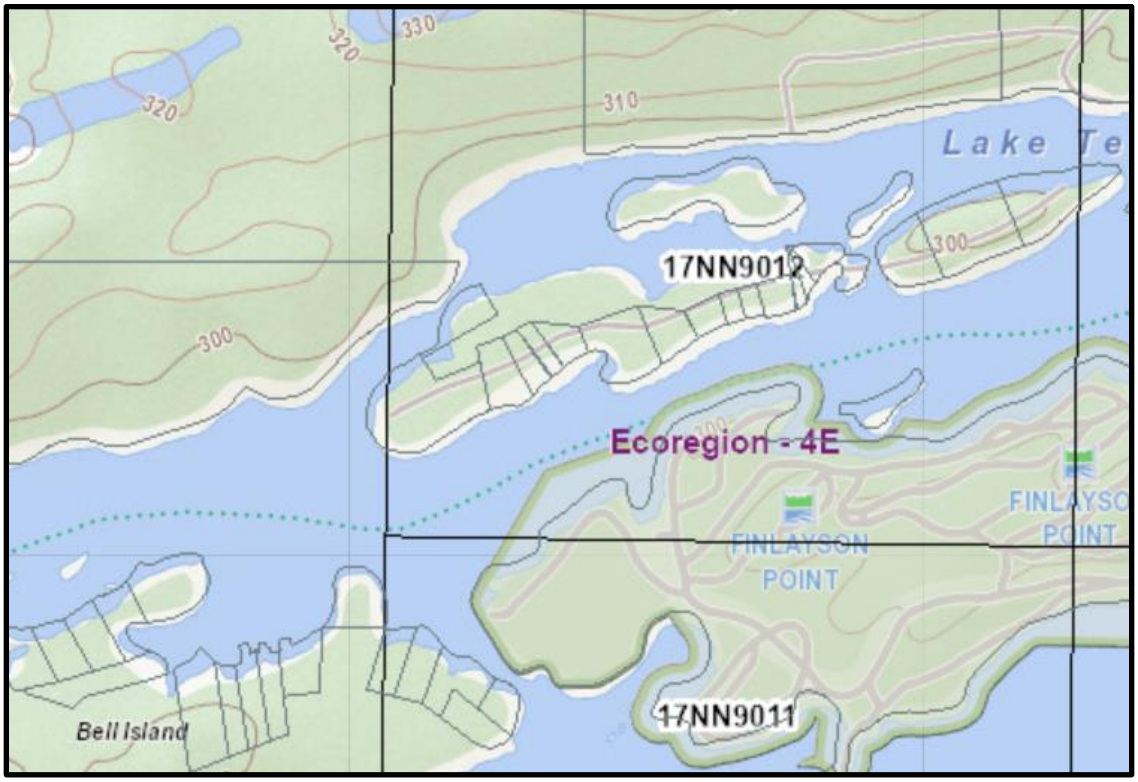


Figure 5: Ministry of Natural Resources and Forestry – Natural Heritage Areas

Forested Component

Coniferous - Very Shallow, Dry to Fresh: Pine, Fir, Birch, Cedar, Aspen

This area is found in elevated area of the Site. The mineral soils are shallow, fine sand with large rock fragments and boulders at the surface (Photo 2). The dominant tree species are white birch (Betula papyrifera), balsam fir (Abies balsamea), white cedar (Thuja occidentalis) and aspen (Populus spp.) in the canopy. Understory tree species include and herbaceous vegetation includes large leaf aster (Eurybia macrophylia), fly honeysuckle (Lonicera Canadensis), quaking aspen (Populus tremuloides) and cladoniaceae (Cladoniaceae).

No plant species that are regulated under the Ontario Endangered Species Act or the Canada Species at Risk Act were encountered during the botanical investigation. A review of the MNRF Natural Heritage Information Centre (2021) indicates that there are no historic records of plant species at risk within the area of the property.

Photo 1: Forested Area of Site

Photo 2: Representative photo of bedrock and pincushion moss at substrate surface

Photo 3: Representative photo of fragmented bedrock at substrate surface

Photo 4: Representative photo of balsam fir stand and deadfall

Photo 5: Representative photo of white cedar

Photo 6: Representative photo of large leaf aster

Open Water Component (shoreline)

These ecosites are found along the north, west and south shorelines of the property and associated with areas of open water (Lake Temagami). The open water ecosite contains white meadowsweet (Spiraea alba), reed canary grass (Phalaris arundinacea), sweetgale (Myrica gale), yellow pond lily (Nuphar variegatum). The riparian areas transition to white cedar (Thuja occidentalis) quaking aspen (Populus tremuloides), pincushion moss (Leucobryum) and cladoniaceae (Cladoniaceae).

No plant species that are regulated under the Ontario Endangered Species Act or the Canada Species at Risk Act were encountered during LGL's botanical investigation. A review of the MNRF Natural Heritage Information Centre (2021) indicates that there are no historic records of plant species at risk within the area of the property.

Photo 7: South shoreline

Photo 8: West shoreline

Photo 9: North shoreline

Photo 10: Northwest shoreline

Photo 11: Forested shoreline

Photo 12: Representative photo of Reed canary grass

Photo 13: Representative photo of white meadowsweet

Photo 14: Representative photo of sweetgale

Photo 15: Representative photo of pincushion moss

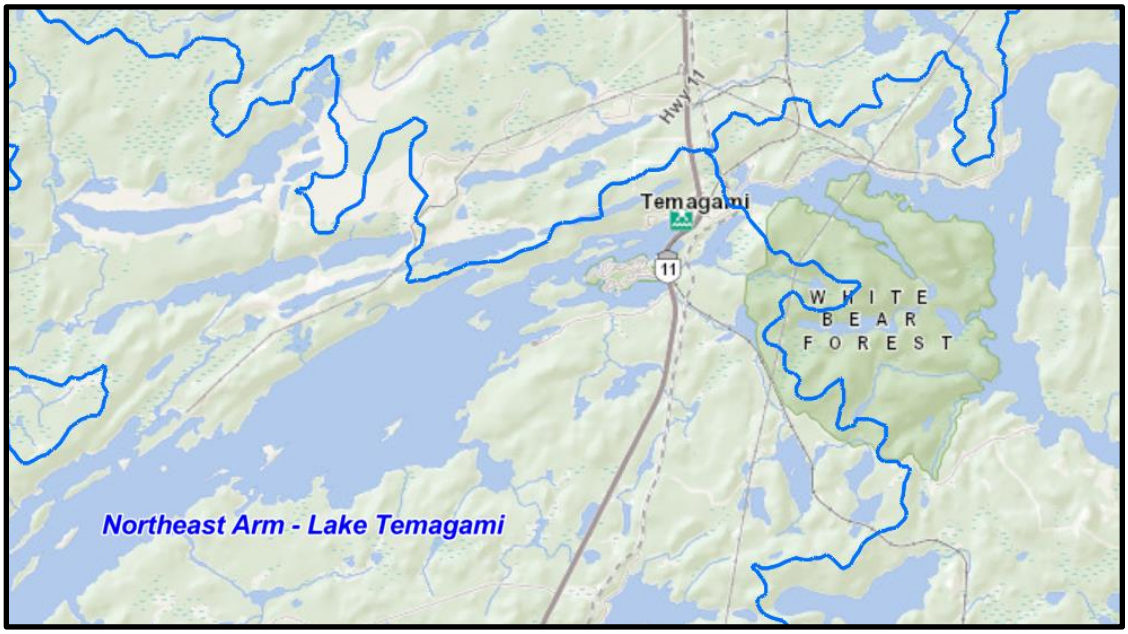


Figure 6: Temagami Subwatersheds

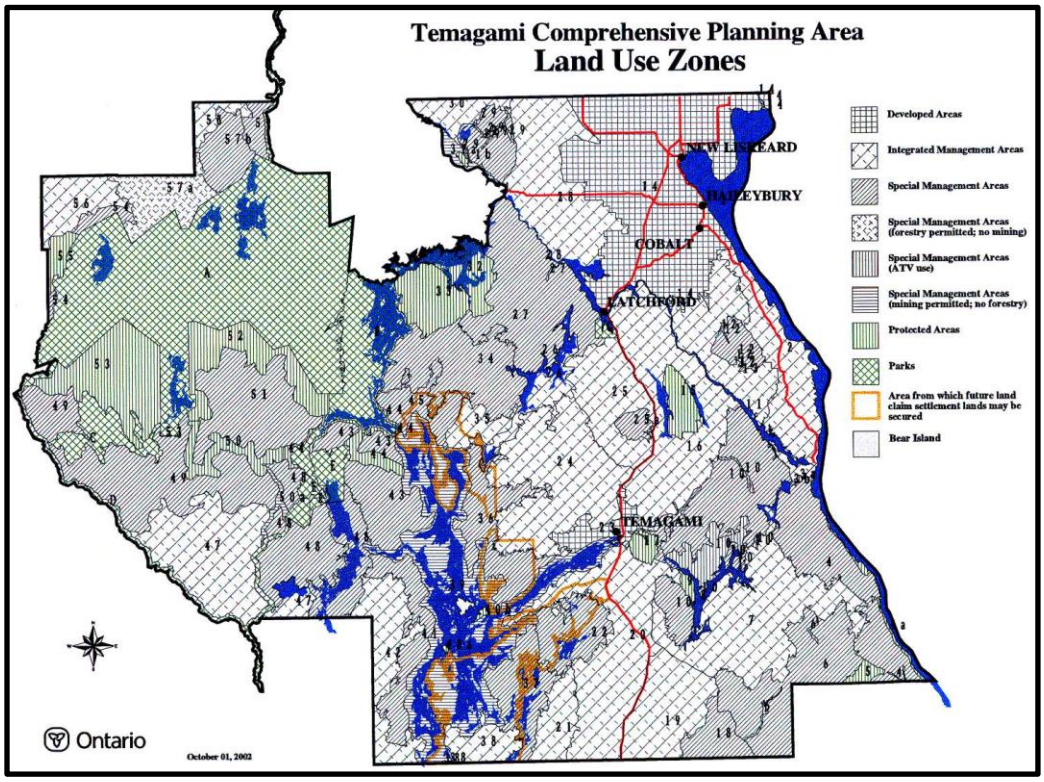


Figure 7: Temagami Land Use Zones

3.0 Habitat of Endangered and Threatened Species

A desktop review of the available information was conducted in advance of field investigations. An initial list of species for consideration was generated from several sources (Natural Heritage Areas mapping, SAR Ontario species list, eBird.org, etc.) and was subsequently scoped following initial habitat (ecosite) investigations to species with potential habitat on or presence of individuals using the subject lands. The following species were considered in greater detail: Blanding's turtle and SAR Bats (Little Brown Myotis and Tricolor Bat).

3.1 Blanding's Turtle (Emydoidea blandingii)

The Blanding's turtle is a mostly aquatic turtle found in a variety of habitats, including lakes, ponds, marshes, ditches, creeks, rivers, and bogs. Within these habitats, the species generally prefers shallow water, organic substrates and dense submergent and/or emergent vegetation. Basking sites are a critical component of suitable habitat. These are characteristically floating vegetation mats, hummocks, partially submerged logs, rocks, bog mats, or suitable shoreline areas with access to full sunlight. Blanding's turtles hibernate from October through April, usually in permanent bodies of water, often

the same wetlands they utilize during the active season. Recent studies confirm seasonally isolated wet areas, ditches for example, are used for hibernacula in some years.

Blanding's turtles will travel up to 6 km or more to nesting sites that are usually within 250 m from the shore of some waterbody. Nesting activities generally occur at the end of June through the beginning of July. Nest sites are chosen in areas that offer suitable substrate for digging (e.g. loose soil), well-drained, open locations which increases the incubation temperatures because of sunlight exposure. This in turn increases nest success. Upland areas adjacent wetlands can be used for nesting, basking and travel between summer activity areas.

A review of background information did not confirm any known Blanding's turtle occurrences within 2km of the Site. Surveys for basking turtles were conducted from the shoreline and nearshore areas. The open water wetland habitat provides suitable active season habitat (basking, foraging) however unlikely to offer suitable overwintering habitat. The ecosites on either side of the wetland transition immediately to upland forest with a shaded, well-vegetated understory and shallow substrates. There were no open, sandy areas or south facing rock barrens that would be suitable for turtle nesting.

The current habitat functions that the subject property provides for Blanding's turtles are limited. However, to maintain these noted habitat functions, it is recommended that no development or site alteration occur in the shoreline ecosite and a naturally vegetated buffer and development setback of 30m is retained from the edge of the open water ecosite. For the proposed severance where the north, west and south shoreline is fronting on Lake Temagami, it is recommended that all proposed structures (such as a dwelling) are located outside of the retained 30m naturally vegetated setback area.

3.2 SAR Bats

Little Brown Myotis and the Tri-colored Bat are listed as endangered species at risk in Ontario. They are experiencing significant population declines because of a disease called White Nose Syndrome. During the active season, bats feed on insects at night and roost during the day. They roost either individually (males) or in groups (females with pups), usually in warm, elevated spaces. Bats often choose human-created roosts such as attics and abandoned buildings as they offer optimum habitat for summer roosts, usually close to water and open areas for foraging. Natural roosts include large hollow trees and spaces behind loose bark. Both SAR bat species show distinct seasonal behavioural shifts, hibernating reliably in caves and abandoned mines each year from October through April where temperatures remain above freezing and humidity levels are high.

Little Brown Myotis (Myotis lucifugus)

Little brown myotis often use caves, quarries, tunnels, hollow trees or buildings for roosting. Maternity colonies of Little Brown Myotis are most frequently found in warm dark areas, like barns, attics, and old buildings and overwinters in caves and mine adits (horizontal mine shafts) in Ontario. These bats mainly forage over open areas including wetlands and near forest edges where insect densities are greatest.

Tri-colored Bat (Perimyotis subflavus)

During the active season, Tri-colored Bats can be found throughout older forested habitats. The species is known to form day roosts and maternity colonies in forests but may also be found roosting in barns or other anthropogenic structures. They forage for flying insects over water and along streams in the forest. Nearing the end of the summer, Tri-colored Bats will travel to their overwintering site, often situated underground or near a cave, where they swarm. This species typically overwinters in caves where they roost by themselves rather than as part of a group.

Ministry of Northern Development and Mines (MNDM) (now ENDM) mapping of abandoned mines was queried; there are no appropriate mines or other similar features within 10 km of the property.

Individual day roosts for bats are impossible to rule out completely for the Site. Bats depart for hibernation habitat in late September and overwinter from October to April.

To avoid impacts to individual bats, any initial site preparation including tree clearing should occur outside the bat active season. If tree removal takes place from October 1 to March 31 of any given year, no impacts to bats are expected as a result of the proposed development.

4.0 Significant Wetlands

There are no provincially-evaluated or significant wetlands found on the property or within 120m. The Municipality of Temagami's Official Plan considers adjacent lands to provincially significant wetlands to be within 120m.

5.0 Significant Wildlife Habitat

Significant wildlife habitat was considered throughout field investigations, including seasonal concentration areas, rare vegetation communities and specialized habitat for wildlife, habitat of species of conservation concern and animal movement corridors. The Significant Wildlife Habitat Technical Guide (SWHTG) (MNR 2000), the Significant Wildlife Habitat Criteria Schedules for Ecoregion 5E (SWHECS) (MNRF 2015) and the

process outlined in the Ministry of Natural Resources Natural Heritage Reference Manual (2010) (NHRM) were used to guide field investigations related to significant wildlife habitat.
To date, final criteria schedules have been produced for eco-regions 3E, 5E, 6E and 7E. Schedule 4E represents the final criteria schedule to be drafted for the Northeast Region. This schedule follows the criteria within the SWHTG as well as similar development and formatting to those schedules which have been previously finalized.
According to the SWH Ecoregion 5E Criterion Schedule, there are several different types of significant wildlife habitat that were considered; only those that were present or had the potential to be present are described further.

5.1 Seasonal Concentration Areas

Seasonal concentration areas are defined by the SWHTG as areas where species of wildlife are concentrated at certain times of the year. Bat maternity colonies (discussed in Section 3.2 of this report) and turtle wintering areas were considered in greater detail based on the presence of suitable ecosites and associated habitat.

The proposed minimum 30-meter setback from the open water component area will serve to protect the feature and its potential function as a hibernacula habitat for turtles. No further mitigation is required.

5.2 Rare Vegetation Communities or Specialized Habitat for Wildlife

Rare vegetation communities and specialised habitats for wildlife are areas that contain a provincially rare vegetation community, areas that support wildlife species with highly specific habitat requirements, or areas of habitat that greatly enhance a species' ability to survive. There were no rare vegetation communities identified on the site. Areas with potential to support Specialized Habitat for Wildlife are discussed below.

5.2.1 Bald Eagle and Osprey Nesting, Foraging and Perching Habitat

Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. The subject lands were investigated for nesting eagles, ospreys, and suitable raptor nesting areas and no evidence was observed. A stick nest survey was conducted in leaf-off conditions (February 2024) and no stick nests were present on the Site or adjacent lands where accessible and visible from public lands. Eagles and ospreys foraging and perching in the general vicinity of the subject lands can continue to do so should post-development occur and no negative impacts are anticipated.

5.2.2 Woodland Raptor Nesting Habitat

The subject lands were searched for stick nests in the appropriate leaf-off condition and no evidence of raptor nesting was observed on or adjacent the property where visible. No negative impacts are anticipated and no further study required.

5.2.3 Denning Sites for Mink, Otter, Marten, Fisher and Wolf

Mink prefer shorelines dominated by coniferous or mixed forests with dens usually underground. Mink will sometimes use old muskrat lodges. Otters prefer undisturbed shorelines along water bodies that support productive fish populations with abundant shrubby vegetation and downed woody debris for denning. Marten and fisher share the same general habitat, often denning in cavities in large trees or under large downed woody debris.

Based on the habitat present along the edge of the wetland ecosite, it is possible that den sites may be present in this general area of the property. Mink and otter den sites are typically found within a riparian area of a lake and a den site will potentially have a movement corridor associated with it. Field investigations did not identify scat nor tracks in the riparian areas of the property. The retained 30m naturally vegetated buffer along the open water ecosite and shoreline of the lake will serve to protect any furbearers that utilize the riparian areas of the property for denning. No additional mitigation required and no negative impacts are anticipated.

5.3 Habitat for Species of Conservation Concern

Habitat for species of conservation concern includes special concern species. Potential special concern species were considered during habitat investigations (Ecological Land Classification) as well as through targeted investigations. Special concern species for consideration included Canada Warbler and Snapping Turtle.

5.3.1 Special Concern Species

<u>Canada Warbler (Cardellina canadensis)</u>
Canada Warblers are most often found in cool, wet, low-lying areas; including swamps, sphagnum bogs and moist forest edges and openings. They are often associated with sites that have a dense understory near open water and vegetation associations including alder and willow. Female Canada Warblers build a loosely constructed cup-shaped nest on or near the ground in early May. The nest is well-concealed, often in thickets or areas with dense ferns. These are typically wet, mossy areas within forest among ferns, stumps, and fallen logs. Nests have been documented in a variety of micro-habitats including within a recessed hole of upturned tree root mass, rotting tree stump or sphagnum moss hummock. Eggs are laid at the end of May, fledglings leave the nest and are ready to

migrate by the end of July, early August. Migration peaks at the end of August, beginning of September.

Forest bird monitoring surveys were conducted in suitable habitat during nesting season (July 28th, 2024) and no Canada Warblers were observed or heard during these surveys. It is possible that Canada Warblers may nest in the riparian areas of the wetland ecosite. Maintaining the wetland area and the associated 30-meter setback will protect the habitats most likely to be used for nesting and no negative impacts to Canada Warblers are anticipated.

Snapping Turtle (Chelydra serpentina)
Snapping turtles are found in the shallow waters of lakes, rivers and ponds. Although no snapping turtles were observed during field investigations, mitigation afforded to Blanding's turtles will also serve to benefit individual snapping turtles on the subject property (see section 3.1). No additional mitigation is recommended and no negative impacts to snapping turtles are anticipated as a result of the proposed development.

5.4 Animal Movement Corridors

Animal movement corridors are defined in the SWHTG as elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another. They can include a wide variety of landscape features including riparian zones and shorelines, wetland buffers, stream and river valleys, woodlands and anthropogenic features such as hydro corridors, abandoned roads and railways.

There were no trail systems, pellet groups, disturbed areas or tracks identified during the winter investigations indicating extensive use of the site by wolf, moose or deer populations. The proposed severance is not anticipated to negatively impact critical habitat of fur bearing populations in the area.

The recommended 30m development setback and vegetated buffer will serve to protect any furbearers that may utilize the riparian areas of the property for foraging or movement. No negative impacts are anticipated.

7.0 Fish Habitat

Fish habitat was confirmed to be present in the open water area and shoreline ecosite of the Site and Lake Temagami.

The shallow water and aquatic macrophyte growth present in the open water areas of the lake likely serve as suitable cover, nursery, and foraging habitat for fish. This feature and its function to support fish habitat will be protected by the recommended 30m naturally vegetated buffer and development setback. The vegetated buffer will serve to mitigate

any potential increases in stormwater runoff and nutrient input, maintain the current shading and thermal regime as well as prevent sedimentation and shoreline erosion.

Lake Temagami is a cold water lake supporting a native population of lake trout, northern pike, walleye, smallmouth bass, and whitefish. There are no confirmed areas of spawning habitat inside of the 120m adjacent lands and no negative impacts to this feature or its function are anticipated as a result of the proposed severance and no further study is needed.

8.0 Summary of Natural Heritage Features, Impacts and Mitigation

The following is a summary of the natural heritage features on the site, the potential impacts and recommended mitigation to minimize or eliminate the risk of impacts.

Table 1: Summary of natural heritage features, impacts, and recommendations

Natural Heritage Feature	Species / Habitat	Recommendations	Negative Impacts Anticipated	Authorization Required
Habitat of Endangered and Threatened Species	Blanding's turtles & habitat	Minimum 30 meter no development setback	No	No
Habitat of Endangered and Threatened Species	Little Brown Myotis, Tricolored Bat	Any tree clearing to take place between October 1 and March 31	No	No
Significant wetlands	N/A	N/A	N/A	N/A
Significant Wildlife Habitat	Turtle wintering area	30m naturally vegetated setback	No	No
Significant Wildlife Habitat	Denning Sites	30m naturally vegetated setback	No	No
Significant Wildlife Habitat	Special Concern Species — Canada Warbler	Any tree clearing to take place between October 1 and March 31	No	No
Significant Wildlife Habitat	Special Concern Species — Snapping Turtle	see recommendations for Blanding's turtles	No	No
ANSIs	N/A	N/A	N/A	N/A
Fish Habitat	Open water area and shoreline ecosite	30m naturally vegetated setback	No	No

8.1 General Mitigation

The following general mitigation is recommended to ensure compliance with the Provincial Policy Statement (201 4), the Endangered Species Act 2007), the Fisheries Act (1 990), the Migratory Birds Convention Act (7994) and the Fish and Wildlife Conservation Act (1997). Many of these recommendations have already been suggested in previous sections of the report. They are reiterated here to confirm their applicability to species groups and habitats which are found on the site.

Minimum 30 meter shoreline setback to protect shoreline values in addition to confirmed Blanding's turtle, snapping turtle, and fish habitat.

Site clearing, tree and vegetation removal shall occur outside April 1 to September 30 (the active season) of any given year which encompasses migratory birds and bats.

9.0 Conclusions

BAE Environmental was retained to complete an Environmental Impact Study (EIS) to assess the presence of and potential impacts to the natural heritage features and functions to support a proposed severance application for NP-8671, Lot 188, Strathcona or Forestry Island, in the Municipality of Temagami, Ontario (Site). Field work, reporting, and recommendations were completed to meet the requirements under the Provincial Policy Statement (PPS) (2020), sections 7.1, 7.3, Municipality of Temagami Official Plan (2013), Fisheries Act (1985), Fish and Wildlife Conservation Act (1997), Endangered Species Act (ESA) (2007), Migratory Birds Convention Act (1994) and other relevant legislation and policies.

The property is zoned Remote Residential (R2). Two 0.787ha lots are proposed to be severed from the one 1.574ha lot described as NP-8671, Lot 188, Strathcona or Forestry Island, in the Municipality of Temagami (Figure 2).

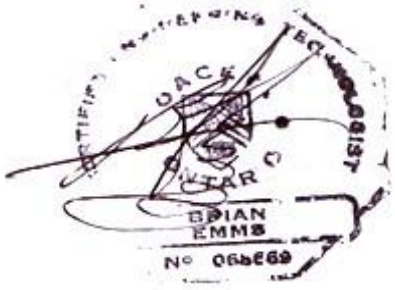
The property is bounded by Lake Temagami to the south, west and north. A seasonal cottage property is adjacent to the northeast and a seasonal cottage property is adjacent to the east. There is one existing seasonal cottage located on the west-central portion of the subject property. There is also a newer cottage under development (Permit 2024-002) just north of the existing seasonal cottage. Field investigations were carried out on October 14, 2023, February 17, May 29-30 and July 28-31, 2024.

The following mitigation measures to ensure compliance with the Provincial Policy Statement (201 4), the Endangered Species Act 2007), the Fisheries Act (1 990), the Migratory Birds Convention Act (7994) and the Fish and Wildlife Conservation Act (1997) are recommended.

- Minimum 30 meter shoreline setback to protect shoreline values in addition to confirmed Blanding's turtle, snapping turtle, and fish habitat.
- Site clearing, tree and vegetation removal shall occur outside April 1 to September 30 (the active season) of any given year which encompasses migratory birds and bats.

In conclusion, the proposed severance application can proceed while avoiding negative impacts on the natural heritage features and functions on and adjacent to the property. Where the recommended mitigation measures as outlined in this report are employed, the proposed severance will be consistent with the Municipality of Temagami Official Plan and Provincial Policy Statement (2020), specifically Section 2.1 as it relates to natural heritage features and areas.

Respectfully Submitted,
BAE Environmental



Brian A. Emms, C.E.T.
Senior Env. Technologist

Appendix A
Seasonal Shoreline Photos

Photo 16: Fall 2023 Shoreline

Photo 17: Winter 2024 Shoreline Photo

Photo 18: Winter 2024 Photo

Photo 19: Winter 2024 Shoreline Photo

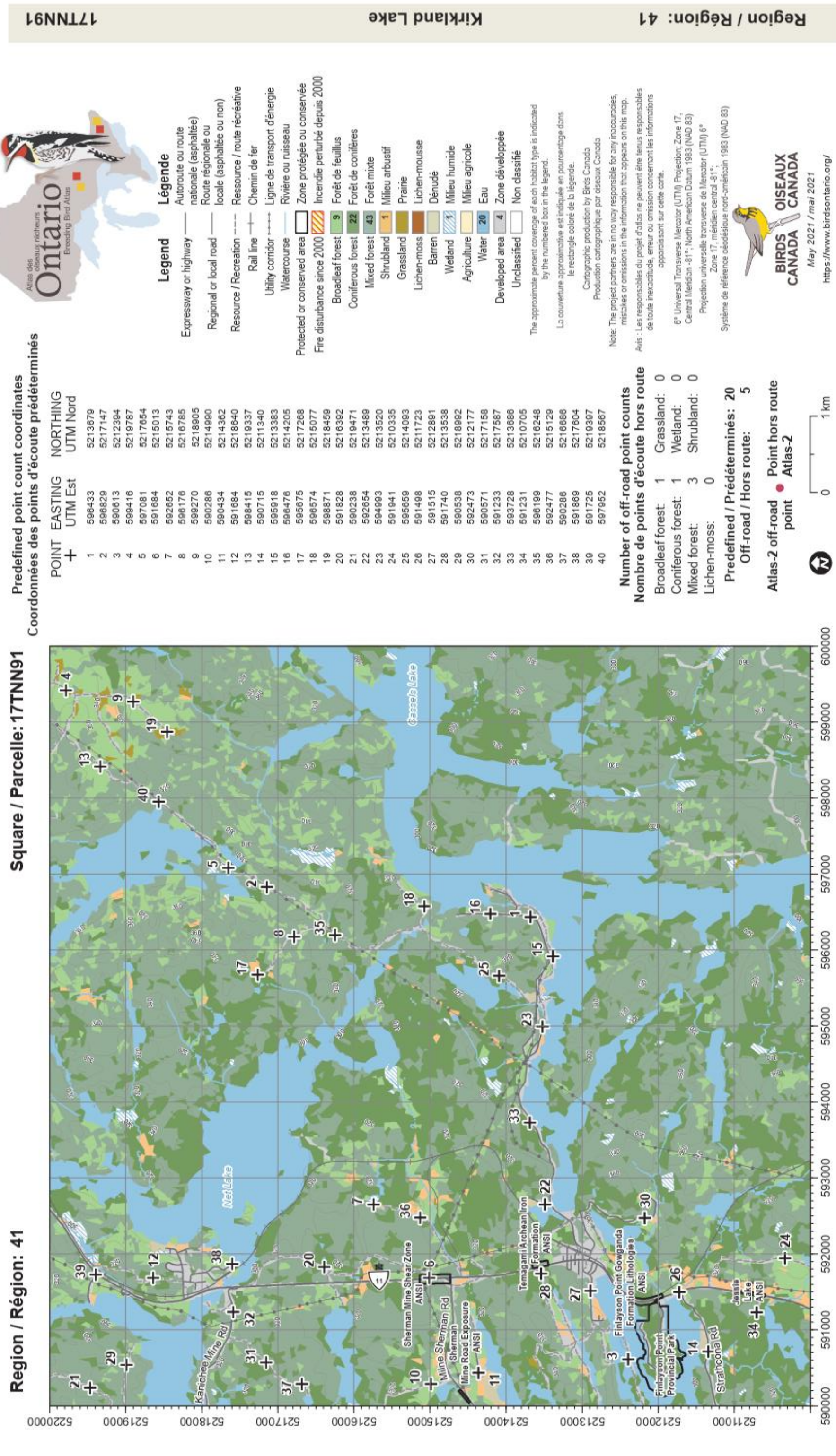
Photo 20: Spring 2024 Shoreline Photo

Photo 21: Spring 2024 Shoreline Photo

Photo 22: Summer 2024 Shoreline Photo

Photo 23: Summer 2024 Shoreline Photo

Appendix B
Ontario Breeding Bird Atlas Mapping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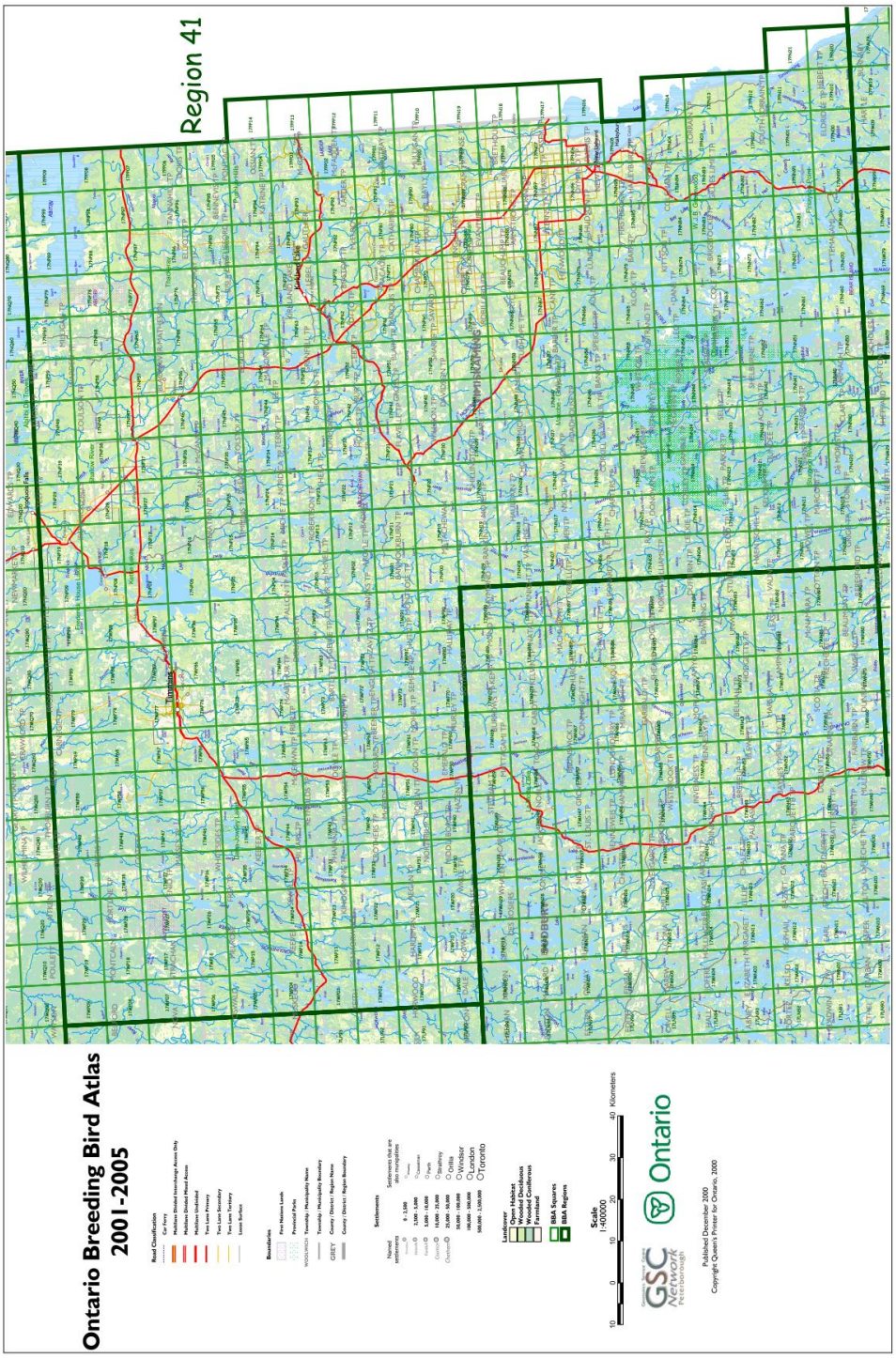
Square / Parcelle: 17TNN91
Kirkland Lake
17TNN91
Predefined point count coordinates
Coordonnées des points d'écoute prédéterminés
Legend
Légende
Ontario Breeding Bird Atlas
BIRDS CANADA
OISEAUX CANADA
May 2021 / mai 2021
https://www.birdsontario.org/


Region 41
Ontario Breeding Bird Atlas
2001-2005
Scale
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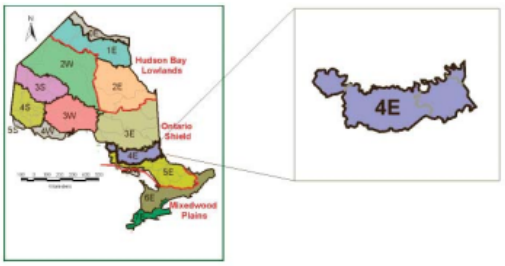
Ontario
GSC
Network
Peterborough
Published December 2000
Copyright Queen's Printer for Ontario, 2000

Appendix C
Ecoregion 4E (Lake Temagami Ecoregion)

Ecoregion 4E (Lake Temagami Ecoregion)



The Lake Temagami Ecoregion is situated between Lake Superior and the Quebec border, south of Wawa, the Chapleau Moraine, and the Donneganna Sand Plain, and north of the Montreal River at its western end, cutting south to include Ranger Lake, and eastward north of Elliot Lake, Sudbury, and Marten River, to include the Little Clay Belt and Temagami. It encompasses 4,057,806 ha or 4.1% of the province's area.

Climate

The climate in this ecoregion is humid and cool. It has been classified by the Ecoregions Working Group (1989) as the Humid Low Boreal Ecoclimatic Region. Mean annual precipitation in the ecoregion ranges between 725 and 1,148 mm per year and the mean summer rainfall is between 217 and 291 mm. The mean annual temperature ranges from 0.8 to 4.3°C and the mean growing season length is 171 to 200 days (Ecoregions Working Group, 1989; Hills, 1959; Mackey *et al.*, 1996a, b).

Geology and Substrates

This ecoregion is situated on the Precambrian Shield where the bedrock is predominantly granitic and gneissic. Ground moraine is the main surficial feature, although there are numerous north-south-flowing river systems in which valley train deposits are found, and localized areas with end moraines, aeolian deposits, lacustrine deposits, and eskers. Much of the terrain is moderately to strongly broken, although there are some weakly broken areas as well. Upland sites on glaciofluvial sands and on tills tend to have weakly developed Podzols and Brunisols, whereas peats and Gleysols develop on poorly drained sites. Over half of the ecoregion is characterized as having thinly covered acidic bedrock (61%), with very poor substrate development. Of the better developed substrates, 27% of the ecoregion is covered in Humo-ferric Podzols, 7% in Mesisols, 4% in Gleysols, and 1% in Dystric Brunisols.

The Little Clay Belt is situated at the eastern edge of this ecoregion. It differs from the rest of the ecoregion because it is underlain with Paleozoic limestone and related rocks, and as a result, has richer calcareous substrates. These generally are Gray Brown Luvisols on well drained sites, and peats and Gleysols on wetter, poorly drained sites.

Most of the ecoregion is underlain by Precambrian rocks, and the overburden is derived mainly from acidic parent materials, as a result the substrates tend to have a low buffering capacity for acidic deposition, except in the Little Clay Belt (Environment Canada, 1988).

Land Cover

Mixed forest (33.2%), coniferous forest (19.9%), and deciduous forest (17.1%) are the dominant land cover types in this ecoregion. Water (10.9%), sparse forest (5.6%), and cutovers (3.6%) are scattered throughout. Agricultural lands are concentrated in the Little Clay Belt.

The fire cycle in mixed forests in the ecoregion ranges between 70 and 210 years. The cycle is shorter in forests with a higher percentage of coniferous trees. The fire cycle in jack pine systems ranges from 50 to 187 years, and fires tend to be stand replacing. In eastern white pine-red pine-jack pine ecosystems, the fire cycle ranges between 36 and

258 years, with fires burning at variable intensities. Tolerant hardwood fire cycles are much longer, ranging between 300 and 2,700 years. Lowland forests have even longer fire cycles, ranging between 150 and 6,000 years (van Sleeuwen, 2006). Fire plays an important role in forest regeneration, particularly for the pine species. Historically, fire was a more influential force but suppression has changed ecosystem dynamics. There was a substantial decrease in the number of large fires in this ecoregion during the 20th century.

Water

The Lake Temagami Ecoregion is a land of numerous lakes and rivers. The area is well to rapidly drained. Its northern boundary lies just south of the divide between the Hudson Bay and Great Lakes Watersheds, so all of its rivers ultimately drain southward to Lakes Superior and Huron and to the Ottawa/St. Lawrence Rivers. Some of the major river systems that flow from or through the ecoregion include the Montreal (two of them, one in the west and one in the east), Batchawana, Goulais, Garden, Mississagi, Spanish, Sturgeon, Blanche, and Ottawa Rivers. Water control structures have altered the hydrology of many of these rivers. In addition to numerous natural or near-natural lakes, such as Lake Timiskaming, Lake Temagami, Lady Evelyn Lake, and Wanapitei Lake, several large artificial reservoirs are found in the ecoregion, including Rocky Island, Bark, and Biscotasi Lakes.

Flora and Fauna

Ecoregion 4E is situated primarily within the Great Lakes–St. Lawrence Forest Region, and a small portion is located in the Boreal Forest Region (Rowe, 1972). Three forest sections, Algoma, Timagami, and Haileybury Clay comprise the Great Lakes-St. Lawrence portion, while the Boreal portion is contained within the Missinaibi-Cabonga Section (Rowe, 1972). This ecoregion is covered in transitional forests that combine elements of the Great Lakes-St. Lawrence Forest Region to the south and the Boreal Forest Region to the north (Maycock, 1979; Rowe, 1972; Taylor *et al.*, 2000). It contains the hardiest of the Great Lakes-St. Lawrence forest species, such as eastern white pine, red pine, sugar maple, red maple, and yellow birch. It also contains significant concentrations of boreal species on certain landform units, particularly jack pine and black spruce. Tolerant and semi-tolerant hardwoods such as sugar maple, red maple, and yellow birch tend to occur on warmer-than-normal sites (Taylor *et al.*, 2000). Arctic/alpine relict plants occur along basaltic portions of the Lake Superior shoreline.

Barred owl. Photo courtesy: Larry Watkins, OMNR.

Characteristic fauna of this ecoregion include moose, beaver, American marten, American black bear, American black duck, broad-winged hawk, barred owl, winter wren, hermit thrush, black-throated green warbler, white-throated sparrow, eastern red-backed salamander, spring peeper, northern leopard frog, mink frog, snapping turtle, eastern gartersnake, and northern ring-necked snake. Aquatic ecosystems provide habitat for lake trout, brook trout, lake whitefish, northern pike, emerald shiner, longnose sucker, creek chub, rock bass, pumpkinseed, and many other fish species.

Land Use

The major communities within this ecoregion include Temagami, New Liskeard, Earlton, Haileybury, and Cobalt. Although commercial forestry is the predominant land use activity in the ecoregion, agriculture is important in the Little Clay Belt. Wilderness and other forms of outdoor recreation, including canoe tripping, hunting, trapping, and fishing, along with supporting services, also are important activities in the ecoregion.

Currently 14 types of natural heritage areas are located in Ecoregion 4E, including Lake Superior Provincial Natural Environment Class Park, Lady Evelyn Smoothwater Provincial Wilderness Class Park, Ranger North Conservation Reserve, and areas managed by the Nickel District Conservation Authority.

Ecoregion Boundary Delineation and Rationale

The northern boundary with Ecoregion 3E is based on climatic variables (i.e., mean July precipitation, growing season length, and mean annual temperature) and correlates strongly in some sections with major moraines and sand plains. The northern boundary also coincides roughly with the Hudson Bay Watershed.

Its southern boundary is strongly correlated with climatic variables (i.e., mean annual precipitation, mean annual temperature, and mean January temperature) and with elevation and geological differences (Baldwin *et al.*, 1998). The boundary between Ecoregions 4E and 5E approximates the mean annual length of the growing season of about 175 days, and mean annual growing degree-days of about 2,600 (Chapman and Thomas, 1968).

A mixed eastern white pine, cedar, aspen, and balsam fir forest along the Boland River, Mississagi Provincial Park. Photo courtesy: Peter Uhlig, OMNR.