LICHEN COMMUNITIES OF EEYOU ISTCHEE JAMES BAY PEATLANDS: BIODIVERSITY AND INFLUENCING ENVIRONMENTAL FACTORS

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Abstract

Cette étude cherchera à établir quels espèces de lichens sont associés avec les différents types des tourbières, si la richesse spécifique et l'abondance des espèces sont différents entre les types des tourbières, et s'il y a des espèces rare dans ces habitats. Nous allons aussi examiner comment les différents facteurs environnementaux (p.ex. disponibilité des substrats, disponibilité de la lumière, l'âge de l'arbre/peuplement, et l'humidité relatif de l'air) affectent la richesse spécifique ou abondance des lichens. En plus de mieux connaitre des tourbières, cette étude va fournir de l'information qui pourra informer les décisions de gestion du paysage et le surveillance de la pollution et des changements dans le climat.

Introduction

Lichens, especially in peatlands, have **not been widely studied** in the Eeyou Istchee Bay James region. Yet this region is under planning for **further development and resource extraction** (Société du Plan Nord, 2014). Additionally, climate change is disproportionately warming in such northern climates because of **arctic amplification** (Serreze & Francis, 2006). Both these factors could affect lichens because they are **sensitive to pollution and potentially climate change**, and rare species can be threatened by development of their habitats (Kuldeep, S. & Prodyut, B., 2015). Peatlands, defined as water saturated land with a layer of incompletely decomposed organic matter at least 40 cm deep, are a type of wetland (Rydin & Jeglum, 2006). Wetlands, in turn, are known to be **ecologically important and at risk for further development**. Due to the fact that lichens in peatlands have been little studied in the Eeyou Istchee Baie James region before, it is also important to understand the environmental factors (i.e. air humidity and light availability) that may affect lichen communities within peatlands. Thus this study of the lichens of Eeyou Istchee Bay James peatlands will enable us to **better understand** these habitats, **make management decisions**, and **monitor** future changes associated with pollution and climate change.

Methodology

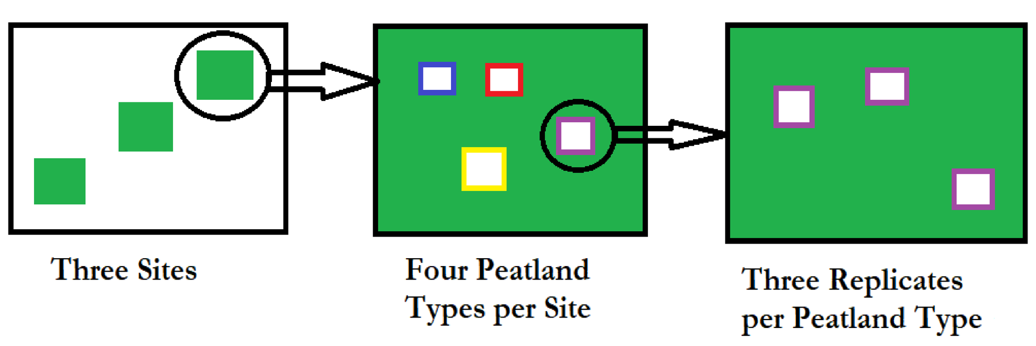

Fig. 1. Visual Representation of Sites vs. Types vs. Replicates

Sites are areas 10,000 km^2 centered around three mines:

- Casa Berardi – Hecla Mining Company
- Whabouchi – Nemaska Lithium
- Renard Mine – Stornaway Diamonds

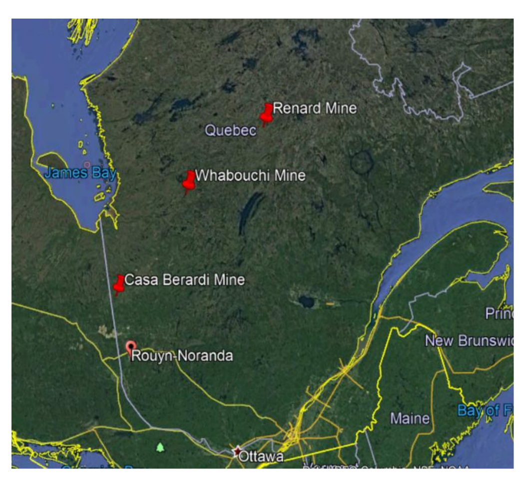

Fig. 2. Site Locations

Peatland Types as defined by Leboeuf et al. (2012):

- Riverine Peatland – along the borders of lakes, streams, and rivers, where there is a mildly sloped area that floods. It is generally characterized by herbaceous and shrubby vegetation.
- Uniform Fen – relatively flat and homogenous, though the vegetation can be diverse. Open water is rare.
- Uniform Bog – relatively flat in terrain dominated by one to all of the following: herbaceous vegetation, Ericaceous vegetation, or lichens.
- Black Spruce (*Picea mariana*) Bog – relatively dense cover of black spruce (*Picea mariana*) that develops on organic soil. At least 10% of the spruce must be taller than 4 m.

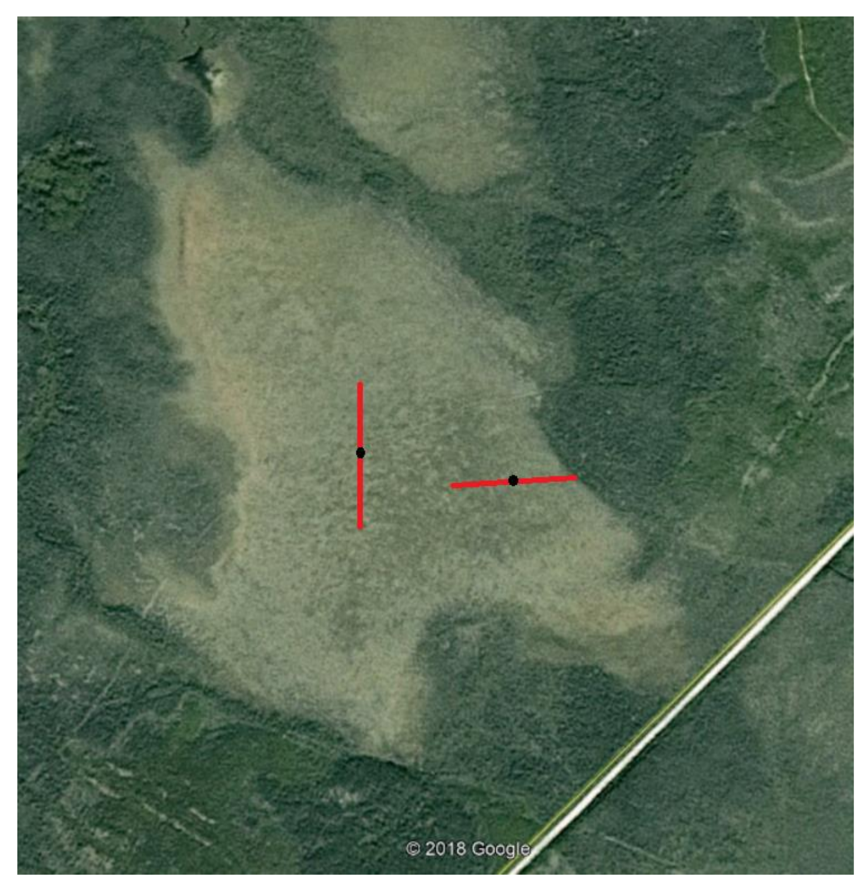

Fig. 3. Wetland Transects (Image not to scale)

At each peatland, lichens were collected from the first ten instances of a microhabitat (see Table 1) along two 20 meter transects. This gives not only lichen biodiversity data, but also occurrence of particular species on particular microhabitats. At the center of each transect a densiometer reading was taken and, except in Riverine Peatlands, a humidity and temperature data logger put in place. (See Fig. 3). These humidity and temperature data loggers will be left in place for a year. After all information was collected from the transects, a Floristic Habitat Sampling method with a time limit of one hour was used to increase the likelihood that no species were missed.

After the fieldwork was finished, all lichens are being identified to species in the laboratory. For this work, dichotomous keys, dissecting microscopes, chemical spot tests, and UV light are used.

Fig. 4. *Cladonia grayi* under UV light

Microhabitat	Definition
Live Tree	Greater than 7.6 cm DBH ("Forest Inventory," 2016)
Tree/Sapling Base	The bark around the base of the tree where it meets the soil
Sapling	2.5 – 7.5 cm DBH ("Forest Inventory," 2016)
Seedling	Greater than 20 cm and less than 2.4 cm DBH ("Forest Inventory," 2016)
Shrub	Less than 4-5 meters in height, generally multiple stemmed ("Growth Habits")
Snag	Dead upright tree
Leaning Deadwood	Dead tree intermediate between an upright snag and a log
Log	Dead tree or branch lying with one side touching the forest floor
Peat (bare)	Bare decomposed organic material that has formed in an anoxic environment
Peat (intermixed)	Decomposed organic material that has formed in an anoxic environment supporting vascular or nonvascular plant-life that is covered with mosses
Hummock (top, mid-level, depression)	A mound created by the growth of Sphagnum moss
Rock	Solid material consisting of minerals

Table 1. Microhabitats and descriptions.

Future Results

It is the intention of this study to provide developers, such as mining companies, in the Eeyou Istchee Baie James region with:

- **Data** on lichen diversity in different peatland types
- **Establish importance** of certain peatland types for lichen biodiversity
- **Management aids** for planning and reducing future impact
- **Increase knowledge** of the environmental factors that influence lichen diversity in peatlands
- **Create a baseline** that can be used for future studies of pollution and climate change

Figs. 5 & 6. A Uniform Fen near Whabouchi Mine and a storm over a Riverine Bog near Casa Berardi Mine

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