

**Lichen Survey for the Proposed Access Road  
at the Big Triangle Pond Mineral Exploration Site  
Eagleridge International Limited**

**Submitted to:**

**Department of Environment and Conservation,  
Government of Newfoundland and Labrador**

**September, 2015**

## **Executive Summary**

*Erioderma pedicellatum* (Boreal Felt Lichen) exists in relatively low numbers worldwide. Originally found in Europe in Norway and Sweden for a period, the species had only been known to occur in Eastern Canada in Nova Scotia and Newfoundland (Maass and Yetman, 2002). This rare lichen thus requires protection and management in current areas in which it exists, and new search efforts must remain high to determine any potential new locations within the province as well as in other jurisdictions.

Subsequently, most proposed development work in Newfoundland and Labrador, especially on the Avalon Peninsula, through the Environmental Assessment process, requires the facilitation of lichen surveys to determine if *E. pedicellatum* may be present, in addition to *Erioderma mollissimum* (Vole Ears Lichen). While it has been determined that there are currently greater than 14,000 *E. pedicellatum* thalli in the province, according to new estimates from the provincial Department of Natural Resources, *E. mollissimum* has only been found at six different sites on the Avalon Peninsula, with a total of 23 juveniles and 153 adults (Environment Canada, 2014).

This report highlights the methods utilized to conduct the lichen survey at the Big Triangle Pond site with a description of what sections of the proposed 11 km access road were surveyed in the fall of 2014, winter of 2015 and summer and fall of 2015. Nine days of surveying was conducted in a joint effort by both Eagleridge International Limited and the Wildlife Division of the provincial Department of Environment and Conservation, facilitated by helicopter, snowmobile and foot. Overall, 5 *E. pedicellatum* thalli and 0 *E. mollissimum* thalli were discovered. Other significant uncommon species found include *Lichinodium sirosiphoideum* and *Parmeliella parvula*.

As such, a 20 m buffer will be maintained between each tree containing *E. pedicellatum* thalli and the proposed access road. This is consistent with the 5 Year Management Plan as outlined by the Wildlife Division of the provincial Department of Environment and Conservation.

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## **1.0 Introduction**

In accordance with the Newfoundland and Labrador Environmental Assessment Act, and as a condition of the Environmental Assessment release, Eagleridge International Limited has conducted a Boreal Felt Lichen (*Erioderma pedicellatum*) survey in the immediate vicinity of the proposed access road for the Big Triangle Pond project. This survey was conducted to ensure no *Erioderma* thalli exist in the planned route of the proposed access road. *Erioderma pedicellatum* is currently listed under the provincial *Endangered Species Act* as vulnerable and endangered under the federal *Species at Risk Act* (SARA). *Erioderma mollissimum* (Vole Ears Lichen) is also listed as endangered under SARA.

## **1.1 Background Information**

### **1.1.1 Past Survey Work near Project Site**

A previous *E. pedicellatum* survey has been performed in the Salmonier Line area in 2007 by Jacques Whitford Limited. To cover an approximate total area of 56.2 km, a two person survey crew took 11 days and surveyed approximately 28.1 km on each transect. This survey focused particularly on host trees which measured less than 10 cm in diameter, with forest stands already pre-selected. Areas deemed not suitable for *Erioderma* such as bogs were removed from surveying effort. All stands which had a canopy closure greater than 75% (class 1) were not sampled or surveyed. Special attention was given to forest stands aged approximately 40 years or older, with significant proportions of balsam fir (*Abies balsamea*) and epiphytic lichens present, as well as topography described as scrub and transitional areas around wetlands. Site data sheets were completed for each site surveyed and then tabulated in electronic format. In total, 644 hectares were surveyed.

In Newfoundland and Labrador, surveying for *E. pedicellatum* has been mostly classified as opportunistic in nature, with the first discovery dating back over 30 years (Wiersma and Skinner, 2011). Concentrated survey efforts became established in 1998 (Wiersma and Skinner, 2011). Most efforts have concentrated on looking for known hotspots with already established abundances (Wiersma and Skinner, 2011). Consequently, the majority of surveys have been facilitated by roadsides and trail access routes near already established hotspots, resulting from the difficulty of survey work (Wiersma and Skinner, 2011). Gaining access to locations that are even a few kilometers from roads and trails is considered to be both difficult and time consuming, as Newfoundland is classified as largely unpopulated in nature (Wiersma and Skinner, 2011). Adding to the difficulty of conducting *E. pedicellatum* surveys on the island of Newfoundland is the rocky and hilly terrain, which encompasses many gulches, ravines and rivers that are hard to navigate effectively (Wiersma and Skinner, 2011). Compounding this problem is the high occurrence of fog and wind in the spring, summer and fall seasons, and ice during the winter, as well as difficult coastline access (Wiersma and Skinner, 2011).

### 1.1.2 Surveyor Information

Lesley Sullivan has completed the MFNNR, Miawpukek First Nations Natural Resources Department, *Erioderma pedicellatum* (Boreal Felt Lichen) Identification Seminar in Conne River, NL, in addition to a course administered by the Forestry and Agrifoods Agency on the Avalon Peninsula. This constituted classroom-based learning and training, followed by fieldwork identifying *E. pedicellatum* in its natural habitat, in both *Erioderma* “hotspots” for insular Newfoundland.

To serve as a guide for the area, as well as to help ensure the surveyor’s safety, Bradley Chislett accompanied the surveyor during each survey effort. Mr. Chislett has great expertise regarding the terrain and layout of the Big Triangle Pond site and was able to direct the surveyor as to where the proposed access road is to be built to ensure that all sensitive areas adjacent were adequately surveyed. Lesley Sullivan holds an undergraduate degree in Environmental Science (Biology Stream) from Memorial University’s Grenfell Campus and a Master’s of Environmental Science degree from Memorial University, with a thesis specializing in trail construction and environmental best management practices. Through her undergraduate work, she has experience in executing common survey protocols such as line transects and point counts, with extensive identification practice specializing in the taxonomy of Newfoundland flora.

The MFNNR identification seminar field training encompassed recognizing *E. pedicellatum* habitat, identifying tagged *E. pedicellatum* thalli in the field and differentiating between *E. pedicellatum* and common indicator species such as *Coccocarpia palmicola*. This involved surveying areas in which no species were tagged, correctly identifying the species, flagging them and learning how to properly complete field data sheets. These are the data sheets submitted to appropriate regulatory agencies such as the Department of Environment and Conservation to maintain data and inventories of *Erioderma* occurrences throughout the province. This entailed providing GPS start and end waypoints as well as location specifics such as aspect, crown closure, slope, gradient, soil moisture, stand age, tree species present and any indicator species.

When *E. pedicellatum* was discovered, the following data and characteristics were recorded on field data sheets:

- i) GPS waypoints (i.e. start and end points);
- ii) Diameter at breast height of the host tree;
- iii) Tree species;
- iv) Tree age (i.e. young or mature);
- v) Developmental stage of the thallus (i.e. juvenile, adult or necrotic);
- vi) Necrosis level (i.e. loose, regenerating or dead).

Once the tree and thallus data was recorded, the species was marked with flagging tape, with two pieces located approximately 6 inches apart on the trunk. Although not found throughout the duration of the course, if *E. pedicellatum* is located on the branches of the tree, one piece of flagging tape would be placed on the trunk, with one on the branch. To help locate the species for future monitoring, the tape was tied such that the knots were

located directly under the thallus to indicate orientation. Digital photographs were also taken of all species found.

### **1.1.3 *Erioderma pedicellatum* Description**

*E. pedicellatum* is characterized as a foliose, cyanolichen with a typical diameter between 2 to 5 cm, with the potential to measure up to 12 cm (Maass and Yetman, 2002). These lichens are arboreal and epiphytic, and are located in areas that have cool, humid oceanic climates (Keeping and Hanel, 2006). The lobes of the thallus are involute in shape, or curled upward along their margins, with undersides that are white in color (Maass and Yetman, 2002). The coloration of the thallus fluctuates depending on weather conditions (Maass and Yetman, 2002). When the thallus is hydrated, it appears bluish-gray due to the presence of the cyanobacterium *Scytonema* (Maass and Yetman, 2002). Alternatively, when the thallus is dry, the color appears dark gray to grayish brown (Maass and Yetman, 2002). The upper surface of the thallus of *E. pedicellatum* contains hairs which may either be poorly developed or prominent, and are described when visible as stiff in nature (Maass and Yetman, 2002; Galloway and Jorgensen, 1987).

*E. pedicellatum* is distinctive in the field due to the presence of apothecia, which are a disk or cup-shaped ascocarp. Once the thallus attains a diameter of at least 1.0 cm, these short-stalked fruiting bodies develop up to a diameter of 1.5 mm (Maass and Yetman, 2002). When the thallus matures, they reach an average diameter of at least 2-5 cm, sometimes reaching up to 10 cm or more (Maass and Yetman, 2002). The margins of these apothecia are typically fringed with whitish hairs, and eventually become scattered along the upper surface of the thalli, with up to 100 per thallus documented (Maass and Yetman, 2002).

Currently, *E. pedicellatum* is classified as critically endangered worldwide by the International Union for the Conservation of Nature (IUCN). On the island of Newfoundland, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has classified the species as Special Concern and the Newfoundland and Labrador provincial government has listed the species as vulnerable under the *Endangered Species Act*.

### **1.1.4 *Erioderma pedicellatum* Habitat**

*E. pedicellatum* is located in habitat characterized as Sub-oceanic where *Sphagnum* mosses are abundant (Maass and Yetman, 2002). In Newfoundland in particular, *E. pedicellatum* can be located on or near east-west running forested ridges of unique geological formations (Maass and Yetman, 2002). *E. pedicellatum* is typically located on north or east facing exposed slopes as they generally have a constant supply of moisture (Maass and Yetman, 2002). In these sub-oceanic areas, thalli are most commonly found on balsam fir (*Abies balsamea*) trees, and to a lesser extent black spruce (*Picea mariana*), as well as rarely on the following tree species: white spruce (*Picea glauca*), red maple (*Acer rubrum*) and white birch (*cf. Betula cordifolia*) (Maass and Yetman, 2002). On these trees, *E. pedicellatum* is mostly situated on the trunk and branches, depending on variables such as the level of moisture and light (Maass and Yetman, 2002). *E.*

*pedicellatum* is usually found in close association with the liverwort *Frullania tamarisci* ssp. *Asagrayana* (Maass and Yetman, 2002).

Because thalli of *E. pedicellatum* are photophilous, they often are located on trees at or near the bottom of slopes, in habitats that are open and in close proximity to *Sphagnum*-rich wetlands (Maass and Yetman, 2002). Other accurate indicators of *E. pedicellatum* habitat are mature forests with the presence of cryptogram species and distinct herbaceous species such as the following: *Clintonia borealis*, *Coptistrifolia*, *Cornus canadensis*, *Gaultheria hispidula* and *Osmunda cinnamomea* (Maass and Yetman, 2002). Beard lichens in the crowns of trees are also indicators of *E. pedicellatum* presence and the most common associated include *Usnea longissima*, *Alectoria sarmentosa* and *Bryoria trichodes* ssp. *Trichodes* (Maass and Yetman, 2002).

### **1.1.5 Distribution of *Erioderma pedicellatum* in Newfoundland**

Currently, there are two main areas of *E. pedicellatum* thalli concentrations, which include Bay d'Espoir and the Avalon Peninsula (Environment Canada, 2010). Research has determined that these two main areas are somewhat divergent, and thus may be completely isolated (Environment Canada, 2010). Formal protected areas constitute more than half of the known *E. pedicellatum* thalli, which include Wilderness Reserves, Provincial Parks as well as the Salmonier Nature Park, where 25 thalli were discovered at 3 different sites over an approximate area of 14.55 km<sup>2</sup> (Environment Canada, 2010). However, the majority of protected thalli are presently located in the Bay d'Espoir region (Environment Canada, 2010). Alternatively, less than 5% of known thalli in reserves and parks are found on the Avalon Peninsula (Environment Canada, 2010). Extensive surveying facilitated between 1998 and 2008 have identified the 2 distinct hyperpopulated regions ("hotspots") as the Avalon population within the Lockyer's Waters region and near the Jipujikuei Kuespem Provincial Park in Bay d'Espoir (Wiersma and Skinner, 2011). The combination of these two hotspots constitutes approximately 96% of the known individual thalli presently in Newfoundland (24 and 72% of the entire known population, respectively) (Wiersma and Skinner, 2011).

Discoveries made in south central Newfoundland constituted areas between Great Burnt Lake, the Twin Brooks area to Northwest of Highway 362, Jipujikuei Kuespem Park, Hermitage Bay and Belle Bay areas (Maass and Yetman, 2002). Prior to 1995, a total of 483 thalli were discovered on various tree types: 280 thalli on balsam fir, 199 on black spruce and 4 on red maple (Maass and Yetman, 2002). After 1994, a total of 2675 *E. pedicellatum* thalli were discovered, with 2671 on balsam fir and 5 on black spruce (Maass and Yetman, 2002).

Discoveries on the Avalon Peninsula were localized to Lockyer's Waters, Ripple Pond, Ninth Fox Pond as well as Noseworthy's Gully (Maass and Yetman, 2002). During the past 3 to 4 years, the total count for *E. pedicellatum* thalli on the Avalon Peninsula is approximately 2148, with 2085 located on balsam fir and 63 on black spruce (Maass and Yetman, 2002). The Lockyer's Waters population recorded approximately 900 thalli in total by the end of 1997, with 500 on balsam fir within 10 sub sites (Maass and Yetman, 2002). This number has been most recently adjusted to 953 thalli (Maas and Yetman,



2002). These sites encompass an approximate area of 20 hectares, while most trees with *E. pedicellatum* would only cover 5.54 hectares (Maass and Yetman, 2002).

In the Ripple Pond Road population, a total of 350 thalli have been discovered, with 18 located on black spruce (Maass and Yetman, 2002). After 1994, this constituted the second largest habitat for occurrences of *E. pedicellatum* on black spruce (Maass and Yetman, 2002). Two subpopulations, approximately 600 m apart, were located in woodlands about 300-350 m behind the western shores of Ripple Pond, for a total count of 154 thalli, covering an area up to 300,000 m<sup>2</sup> (Maass and Yetman, 2002). The Ninth Fox Pond population recorded 95 thalli on 70 trees of balsam fir, with 39 located on branches, as well as 9 thalli on black spruce, at 2 sub sites (Maass and Yetman, 2002). The final population of *E. pedicellatum* thalli on the Avalon Peninsula is the Noseworthy's Gully population, with 122 thalli discovered on approximately 65 balsam fir at one site, with a few thalli on numerous black spruce (Maass and Yetman, 2002). An interesting discovery also yielded a few thalli northward at Pegs Pond on the Carbonear Line (Maass and Yetman, 2002).

Discoveries of *E. pedicellatum* thalli have also been made on the Great Northern Peninsula, Burgeo, the Burin Peninsula and east central Newfoundland (Maass and Yetman, 2002). Discoveries on the Great Northern Peninsula yielded 23 thalli before 1995, all located on balsam fir (Maass and Yetman, 2002). In Burgeo, there were two main sites where *E. pedicellatum* discoveries were made (Maass and Yetman, 2002). In the northern area of Burgeo Road, 22 thalli were found on balsam fir, with one thallus on black spruce, located between the Trans-Canada Highway and Peter Strides Pond (Maass and Yetman, 2002). On the headlands of Grandy Brook, *E. pedicellatum* was only recorded after 1994, with 88 thalli all on balsam fir (Maass and Yetman, 2002).

On the Burin Peninsula, which encompasses the peninsula as well as the nearby islands in Placentia Bay, 12 thalli were discovered on balsam fir and 1 thallus on the trunk of white spruce before 1995 (Maass and Yetman, 2002). In east central Newfoundland, areas included the pond-rich sub-oceanic Bay du Nord Wilderness area and the areas between Glovertown and Come-By-Chance, with 125 thalli discovered on balsam fir, with the majority found near Goobies before 1995 (Maass and Yetman, 2002). After 1994, 128 thalli were recorded in the Bay du Nord Lake District (Maass and Yetman, 2002).

Figure 1 below depicts the proposed access road in relation to *E. pedicellatum* occurrences for insular Newfoundland. The proposed access road is to be built as highlighted in yellow, ending an approximate 3 km away from the highlighted Avalon Wilderness Reserve. The black arrow in the bottom right corner of figure 1 points to the locality of the project site, which is highlighted by a yellow circle.

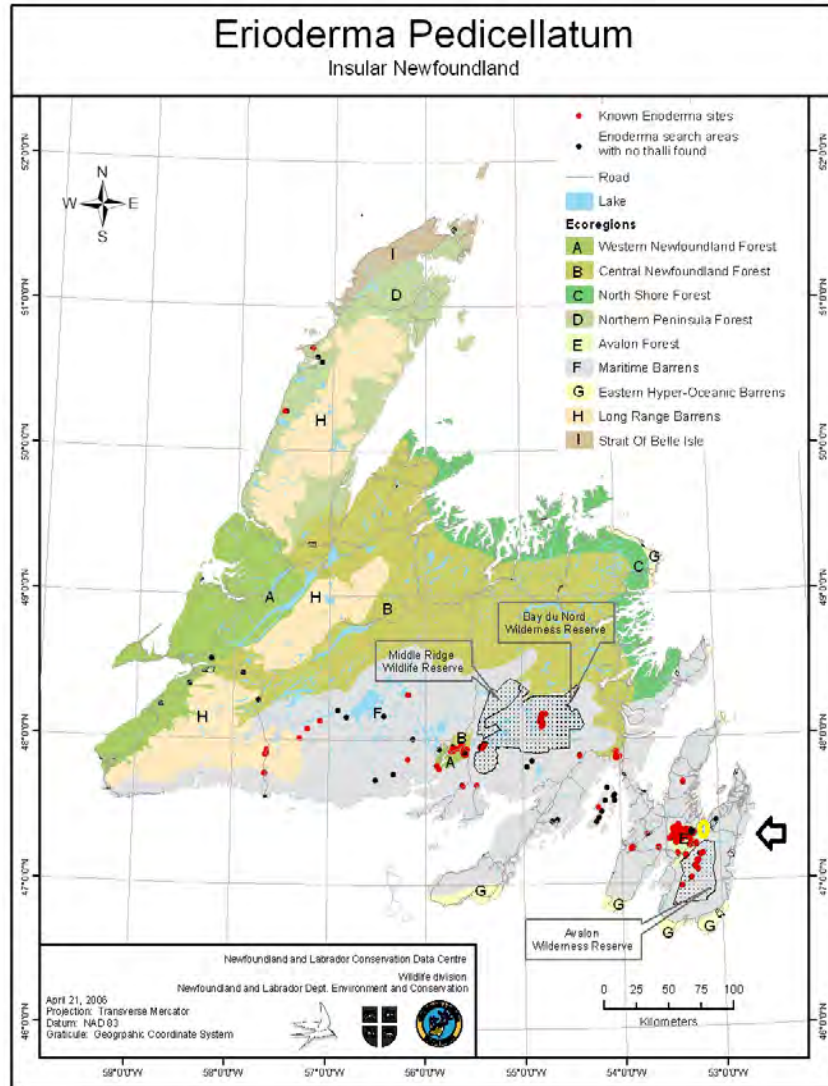


Figure 1: Depiction of the proposed access road in relation to

*E. pedicellatum* distribution in insular Newfoundland.

(Modified from Environment Canada, 2010).

### 1.1.6 *Erioderma mollissimum* (Vole Ears Lichen) Description

*Erioderma mollissimum*, Vole Ears Lichen, is characterized as a leafy lichen, large in size with a felty, grey-brown upper surface that when moistened has the ability to turn grey-green (Environment Canada, 2014). The thallus of *E. mollissimum* has a diameter of up to 12 cm and is composed of radiating, loosely attached lobes that measure up to a width of 1 cm (Environment Canada, 2014). The thallus lacks an outer protective layer on the lower surface and is densely hairy and light-brown in color, except near the pale, bare margins (Environment Canada, 2014). Along the lobe margins, reproductive structures are produced that are granular and bluish in color, and can also be located in tiny patches.

on the upper surface of older lobes (Environment Canada, 2014). Near the parent thallus, *E. mollissimum* can also sometimes be located in clusters of individuals, resulting from regeneration or fragmentation (Environment Canada, 2014). The cyanobacterium *Scytonema* is the photosynthetic component of *E. mollissimum*, which is also found in the lichens *Lichinodium sirosiphoideum* and *Coccocarpia palmicola*. These lichens are both sometimes found in similar habitats of *E. mollissimum* and are therefore a good indicator of its presence (Environment Canada, 2014).

### **1.1.7 *Erioderma mollissimum* Habitat**

In Atlantic Canada, *E. mollissimum* can be found at elevations less than 200 m within 30 km of the coast (Environment Canada, 2014). These areas are typically highly humid coastal forests, which due to fog and rain receive large amounts of moisture, often exceeding 1400 mm annually (Environment Canada, 2014). Consequently, *E. mollissimum* is often located in or very near to wetlands (Environment Canada, 2014). Within the province, *E. mollissimum* is typically located in mature to over-mature coniferous forest patches, with the dominant tree type being balsam fir (Environment Canada, 2014). These patches of balsam fir are usually found in areas which are imperfectly to poorly-drained, flat to gently sloping fragmented landscapes and contain coniferous stands in differing age classes (Environment Canada, 2014). However, initial observations in the province infer that *E. mollissimum* is located on particularly slow growing trees (Environment Canada, 2014).

The herbaceous layer associated with *E. mollissimum* habitat is dominated by *Osmunda cinnamomea* (cinnamon fern) with *Sphagnum* moss species occurring at a total ground cover of 70% or more (Environment Canada, 2014). *E. mollissimum* in the province is often found growing on or alongside liverworts, most commonly *Frullania* species, with Bryophyte species dominated by *Hylocomium*, *Pleurozium*, *Sphagnum*, *Ptilium*, *Rhytidiadelphus* and *Bazzania* (Environment Canada, 2014).

### **1.1.8 Distribution of *Erioderma mollissimum* in Newfoundland**

As of 2012, in Newfoundland and Labrador, *E. mollissimum* was discovered on 10 trees at six different sites on the Avalon Peninsula, with a total of 23 juveniles and 153 adults (Environment Canada, 2014). However, for Eastern Canada, a GIS-based prediction distribution model was developed for the species, with indications that population size and distribution may be larger than originally thought (Environment Canada, 2014). Figure 2 below depicts occurrences of *E. mollissimum* in Atlantic Canada, displaying the discoveries made on the Avalon Peninsula in Newfoundland.

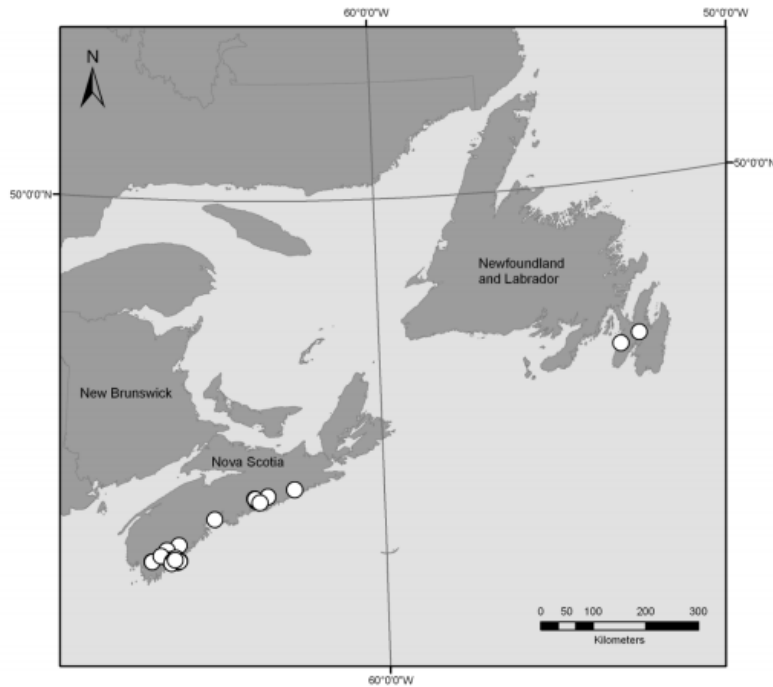


Figure 2: Distribution of *Erioderma mollissimum* in Atlantic Canada

(Environment Canada, 2014).

### 1.1.9 Project Site Ecoregion: The Avalon Forest

The Big Triangle Pond area is situated within the Avalon Forest ecoregion. The Avalon Forest ecoregion constitutes a sheltered outlier that is situated in the more exposed and open Maritime Barrens ecoregion (Natural Resources, 2015). It consists of pure stands of balsam fir, along with a mixture of yellow birch and white birch (Natural Resources, 2015). Black spruce is abundant on wet site types while trembling aspen is rare (Natural Resources, 2015). Unlike the surrounding Maritime Barrens ecoregion, the Avalon Forest did not undergo episodes of fire, which converted the landscape to open heathland (Natural Resources, 2015). This 500 km<sup>2</sup> ecoregion is also considered to be unique due to its excessively moist climate and ribbed moraine topography (Natural Resources, 2015).

The Avalon Forest has excessive fog frequency that can be seen by the high abundance of pendant lichens that hang from the branches of balsam fir (Natural Resources, 2015). Depending on aspect, south facing slopes are dominated by *Clintonia*-balsam fir and *Nemopanthus-Kalmia*-black spruce with an abundance of *Taxus canadensis*. North facing slopes are dominated by *Dryopteris*-balsam fir (Natural Resources, 2015). The area consists of gleyed ferro-humic podzols with loam to silt loam texture (Natural Resources, 2015). The forests in this ecoregion are prone to climatic stress from wind and generally rare, under stocked sites have *Ericaceous* heath vegetation on slope summits with raspberry and birch (Natural Resources, 2015).

The Avalon Forest ecoregion is categorized by cool summers and cold winters, with summers known to have higher fog frequencies than the surrounding Maritime Barrens (Ecological Framework of Canada, n.d.). The mean annual temperature of the ecoregion is approximately 5.5<sup>0</sup> C, with a mean summer temperature of 11.5<sup>0</sup> C, and a mean winter temperature of -1<sup>0</sup> C (Ecological Framework of Canada, n.d.). The ecoregion averages a mean annual precipitation range of 1400 to 1500 mm. The Avalon Forest ecoregion is part of the Appalachian peneplain and thus consists of a mix of late Precambrian sedimentary and volcanic rocks (Ecological Framework of Canada, n.d.).

## **2.0 Methods**

Survey methods utilized for this *Erioderma* survey were consistent with the survey protocols published by the Wildlife Division of the provincial Department of Environment and Conservation, which can be found in appendix C. Such protocols follow pre-determined transects at approximate lengths of 100 m per hectare in areas determined to be suitable habitat for *Erioderma* growth. For each transect, at least 40 trees were surveyed per hectare, concentrating on balsam fir and examining the trunk area from the ground up to 2.5 m as well as the branches. To date, no surveying protocols have been developed for *Erioderma mollissimum* in Newfoundland and Labrador. As a result, extra caution was given to examining and taking photographs of any unknown lichen species that bore any resemblance to the species. As consistent with section 5 of survey protocol B for *E. pedicellatum* surveying published by the Wildlife Division, protocol C was followed in these circumstances.

Prior to the start of surveying, the proposed area was delineated to predict potential areas of *E. pedicellatum* abundance. The project site for the proposed access road on the Avalon Peninsula is made up of forest, water and bog. As *E. pedicellatum* is an arboreal lichen, water bodies and bogs were removed from the total area to be surveyed, as was done in the previously mentioned Salmonier Line survey performed by Jacques Whitford Limited in 2007. The project site encompasses approximately 609.09 hectares of bog and 424.52 hectares of lakes.

Forest stands were pre-selected using topographic maps obtained from the provincial Department of Natural Resources and targeted stands containing significant compositions of balsam fir and to a lesser extent, black spruce. Host trees less than 10 cm in diameter and at least 40 years in age were aggressively targeted. All forested areas with a stand crown closure of >75% (class 1) were not surveyed. Site data sheets, attached in Appendix A, were completed for each site surveyed.

The project site contains very moist soils, with a high proportion of transitional areas such as forested patches lining the edges of bogs. The area also contains extensive blow down areas as well as numerous forest patches where significant moose browse on balsam fir is evident.

Search effort was concentrated at the bases of north facing slopes and areas bordering on open peat lands. Transition zones were also targeted, which contain a mix of both balsam

fir and black spruce. Effort also focused on stands of old-growth balsam fir, with the majority of trees having an average diameter at breast height (dbh) ranging from 6-9 cm although trees in these stands can also have diameters as low as 3 cm, up to a maximum of 16 cm or more.

Indicator species found at the site included *Coccocarpia palmicola*, *Lobaria scrobiculata* and *Lichinodium sirosiphoideum* in addition to the liverwort *Fruallania*. When found, search efforts switched to survey protocol B as outlined in the survey protocols by the Wildlife Division in Appendix C. This included searching an additional 100 m per hectare as well as surveying an additional 40 trees or more.

The first four days of surveying completed by Eagleridge International Limited occurred in October of 2014 and February of 2015, as depicted below in figure 3. During this survey effort, a helicopter was utilized in October to maximize search effort in addition to the use of snowmobiles in February. Survey lines are highlighted in yellow, with the proposed access road route highlighted in red.

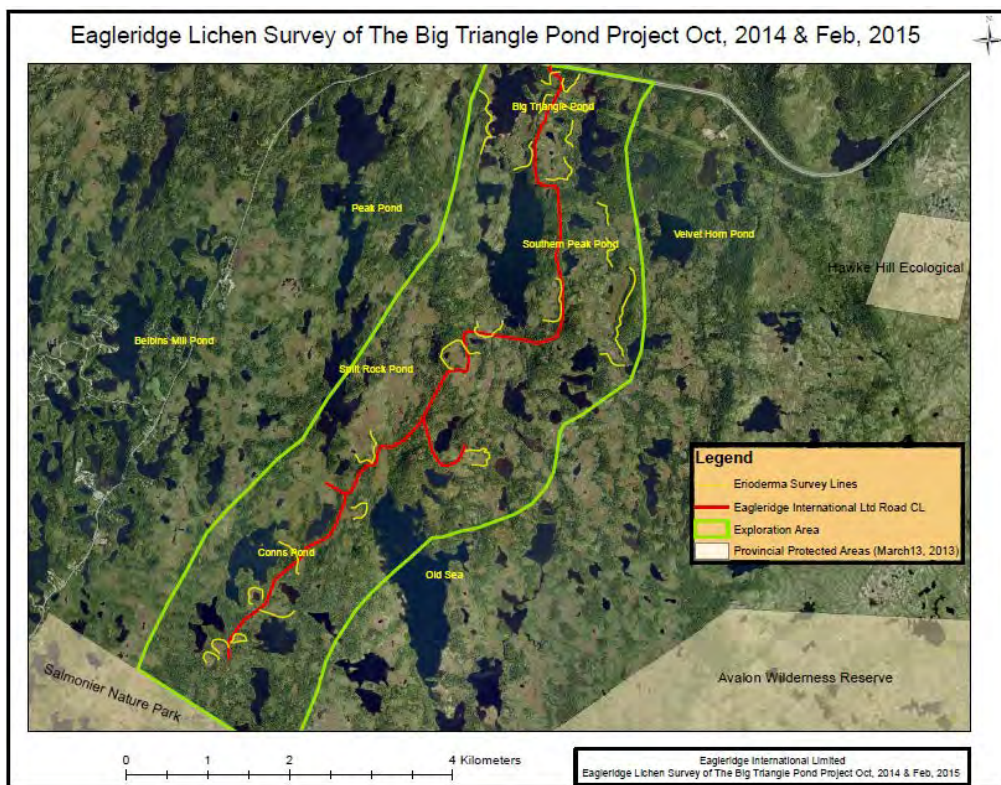


Figure 3: Eagleridge survey effort - October 2014 and February 2015.

Days 5, 6 and 7 of surveying took place on June 23<sup>rd</sup>, 24<sup>th</sup> and 25<sup>th</sup> by the Wildlife Division of the provincial Department of Environment and Conservation. These tracks are depicted below in figure 4.

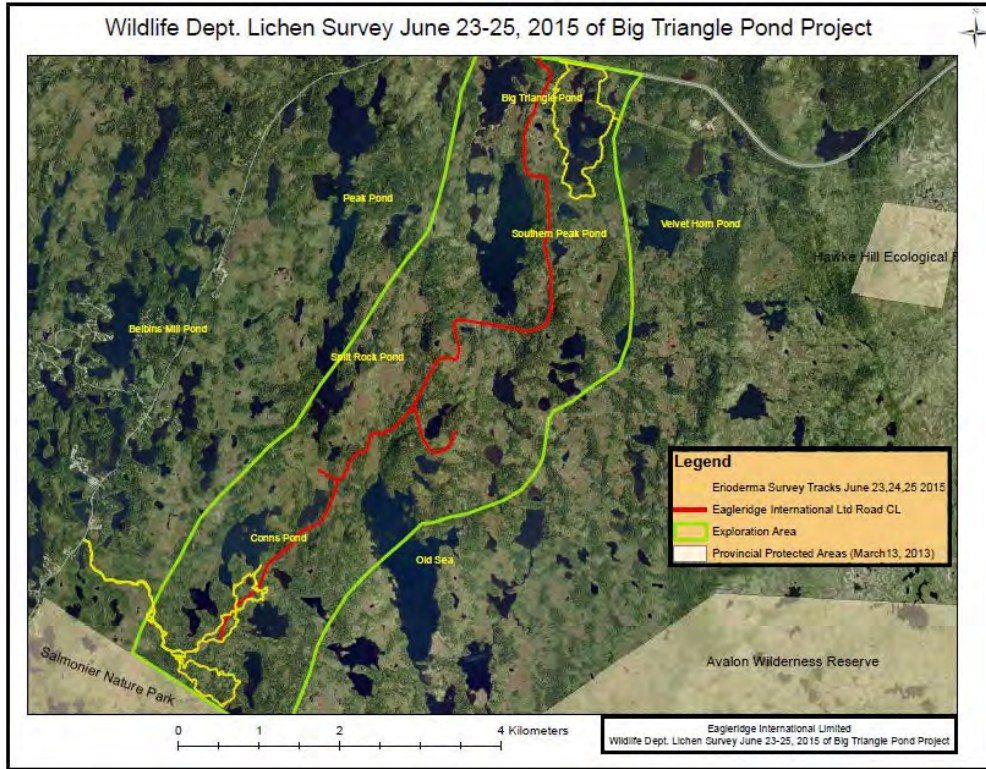


Figure 4: Wildlife Division survey effort - June 2015.

Day of 8 of surveying took place on September 3<sup>rd</sup>, 2015 as a joint effort between Eagleridge and the Wildlife Division at sites pre-determined following an aerial survey facilitated by helicopter. This was to determine high, medium and low probability areas pre-defined by polygons supplied by the Wildlife Division. Day 9 of surveying took place the following day on September 4<sup>th</sup>, 2015. This survey effort is depicted below in figure 5.

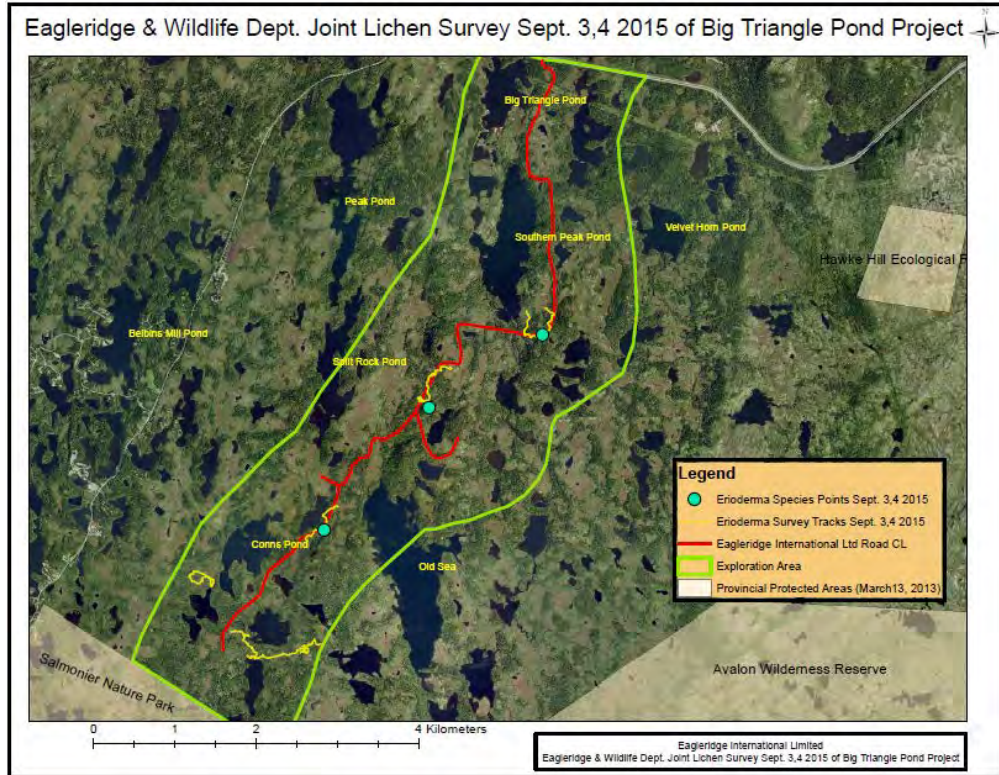


Figure 5: Eagleridge and Wildlife Division joint survey effort - September 2015.

Figure 6 below displays the total surveying effort to date at the proposed Big Triangle Pond site. The three *Erioderma pedicellatum* occurrences are highlighted in blue.



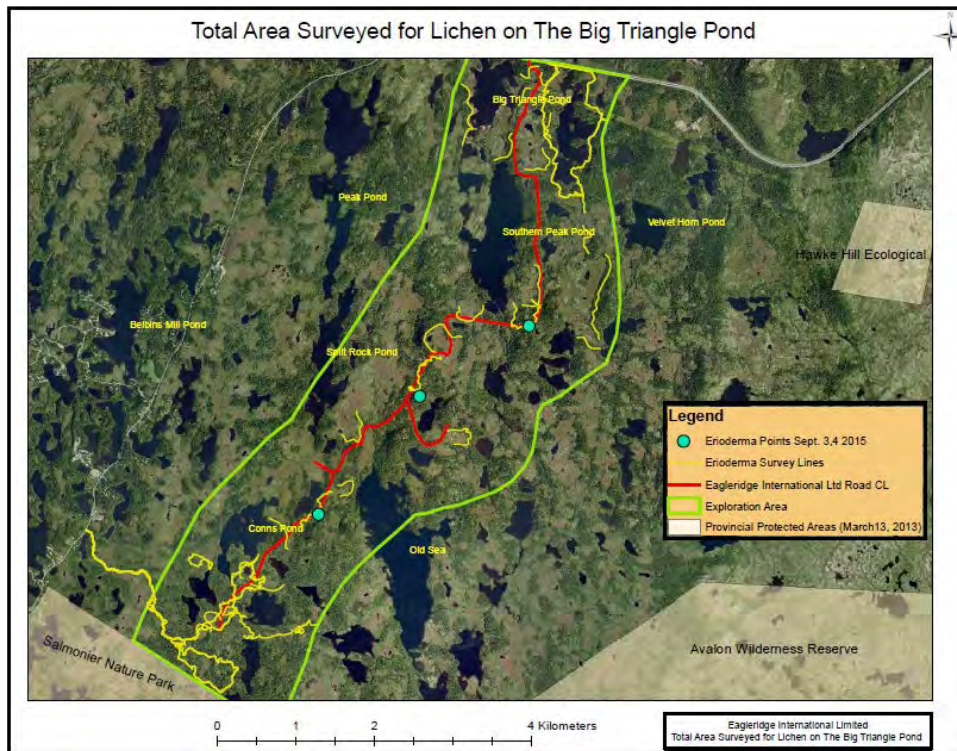


Figure 6: Total survey effort to date, with *E. pedicellatum* occurrences highlighted.

### **3.0 Results**

Overall, 5 adult thalli of *E. pedicellatum* have been discovered at the Big Triangle Pond site. These areas of occurrences can be seen in figures 5 and 6. The first adult thalli was found on September 3<sup>rd</sup>, 2015, the second and third adult thalli on two adjacent trees on September 4<sup>th</sup>, 2015 and thalli four and five were discovered on the same tree on September 4<sup>th</sup>, 2015. Thalli four and five were deemed to have high levels of necrosis, at a rank of 4 and 3, respectively. Table 1 below depicts the waypoints and locations where the thalli were discovered, with figures 7 through 11 depicting photographs of all thalli. All thalli were found on balsam fir, with trees having diameters ranging from 6.5 – 15 cm. All thalli were discovered in relatively wet areas and in close association with the indicator species *Coccocarpia palmicola*. For detailed information on site conditions, refer Appendix A for site data sheets for each *E. pedicellatum* discovery.

Table 1: *Erioderma pedicellatum* occurrences at the Big Triangle Pond site.

Waypoint	UTM Easting (NAD 83)	UTM Northing	Number of Adult BFL	Number of Juvenile BFL
Sep3tree1a	0333124	5240825	1	0
Sep4tree1a	0334549	5241692	1	0
Sep4tree2a	0334549	5241692	1	0
Sep4tree1b	0331797	5239365	1	0
Sep4tree1c	0331797	5239365	1	0

Note: *Erioderma* waypoints Sep4tree1a and Sep4tree2a have the same GPS coordinates, as they were located less than 5 m apart; Sep4tree1b and Sep4tree1c also have the same GPS coordinates as they were found on the same tree.

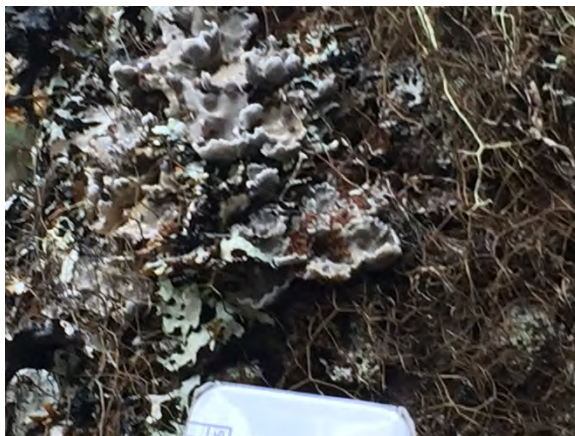


Figure 7: First thalli - September 3rd, 2015.



Figure 8: Second thalli - September 4th, 2015.



Figure 9: Third thalli - September 4th, 2015.



Figure 10: Fourth thalli - September 4th, 2015.



Figure 11: Fifth thalli - September 4th, 2015.

## **4.0 Recommendations**

Although 5 adult thalli of *E. pedicellatum* were discovered, each thalli was an approximate distance of at least 20-30 m away from the route of the proposed access road. As such, a 20 m buffer from the proposed access road will be maintained for each tree bearing *E. pedicellatum* by the EM, under supervision of the HSE Manager. This is consistent with the 5 Year Management Plan outlined by the Wildlife Division of the provincial Department of Environment and Conservation.

## **5.0 Works Cited**

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# **Appendix A**

## **Field data reports**

Transect Data Sheet  
Species: *Erioderma pedicellatum*/*E. mollissimum*

General Location: Big Triangle Pond  
 Date: 10/29/14 Observers: Lesley Sullivan

Segment number	Transect number*	Type of transect (Reconnaissance, Erioderma survey)	Track name**	Start Waypoint	End Waypoint	Start time	End time	Stand # (Forest Inventory)	Stand size (ha)	Tree species present	# of trees of each species checked	Photo Waypoint	Photo direction
1		Erioderma Survey		Start site 1	End site 1					bF, bS	40		
2		Erioderma Survey		Start site 2	End site 2					bF, bS	40		
3		Erioderma Survey		Start site 3	End site 3					bF, bS	40		
4		Erioderma Survey		Start site 4	End site 4					bF, bS	40		
5		Erioderma Survey		Start site 5	End site 5					bF, bS, Ws	40		
6		Erioderma Survey		Start site 6	End site 6					bF, bS	40		
7		Erioderma Survey		Start site 7	End site 7					bF, bS	40		
8		Erioderma Survey		Start site 8	End site 8					bF, bS	40		
9		Erioderma Survey		Start site 9	End site 9					bF, bS	40		
10		Erioderma Survey		Start site 10	End site 10					bF, bS	40		
11		Erioderma Survey		Start site 11	End site 11					bF, bS	40		
12		Erioderma Survey		Start site 12	End site 12					bF, bS	40		
13		Erioderma Survey		Start site 13	End site 13					bF, bS	40		
14		Erioderma Survey		Start site 14	End site 14					bF, bS	40		
15		Erioderma Survey		Start site 15	End site 15					bF, bS	40		

\* A transect for a stand can be composed of several segments, either done by different observers or with some sort of "break", such as another stand transect, in the middle

\*\* Several transects can be grouped in a single saved GPS track if waypoints separating the segments are clearly identified

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Transect Data Sheet  
Species: *Erioderma pedicellatum*/*E. mollissimum*

General Location: Big Triangle Pond  
 Date: 10/29/14 Observers: Lesley Sullivan

Segment number	Transect number*	Type of transect (Reconnaissance, Erioderma survey)	Track name**	Start Waypoint	End Waypoint	Start time	End time	Stand # (Forest Inventory)	Stand size (ha)	Tree species present	# of trees of each species checked	Photo Waypoint	Photo direction
1		Erioderma survey		Start site 6	End site 6					bF, bS	40		
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													

\* A transect for a stand can be composed of several segments, either done by different observers or with some sort of "break", such as another stand transect, in the middle  
 \*\* Several transects can be grouped in a single saved GPS track if waypoints separating the segments are clearly identified

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_







































Transect Data Sheet  
Species: *Erioderma pedicellatum*/*E. mollissimum*

General Location: Big Triangle Pond  
 Date: 02/11/15 Observers: Lesley Sullivan

Segment number	Transect number*	Type of transect (Reconnaissance, Erioderma survey)	Track name**	Start Waypoint	End Waypoint	Start time	End time	Stand # (Forest Inventory)	Stand size (ha)	Tree species present	# of trees of each species checked	Photo Waypoint	Photo direction
1		Erioderma survey		Start site 7	End site 7	9:52	11:16			bF, bS	40		
2		Erioderma survey		Start site 8	End site 8	11:46	12:50			bF, bS	40		
3		Erioderma survey		Start site 9	End site 9	1:10	1:55			bF, bS	40		
4		E											
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													

\* A transect for a stand can be composed of several segments, either done by different observers or with some sort of "break", such as another stand transect, in the middle  
 \*\* Several transects can be grouped in a single saved GPS track if waypoints separating the segments are clearly identified

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_







## Transect Data Sheet

Species: *Erioderma pedicellatum*/*E. mollissimum*General Location: Big Triangle PondDate: 07/19/15Observers: Lesley Sullivan

Segment number	Transect number*	Type of transect (Reconnaissance, Erioderma survey)	Track name**	Start Waypoint	End Waypoint	Start time	End time	Stand # (Forest Inventory)	Stand size (ha)	Tree species present	# of trees of each species checked	Photo Waypoint	Photo direction
1		Erioderma survey		Start site 20	End site 20	9:52	10:49			bF, bS	40		
2		Erioderma survey		Start site 21	End site 21	11:00	11:40			bF, bS	40		
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													

\* A transect for a stand can be composed of several segments, either done by different observers or with some sort of "break", such as another stand transect, in the middle

\*\* Several transects can be grouped in a single saved GPS track if waypoints separating the segments are clearly identified

Comments:





Transect Data Sheet  
Species: *Erioderma pedicellatum*/*E. mollissimum*

General Location: Big Triangle Pond

Date: 07/21/15

Observers: Lesley Sullivan

Segment number	Transect number*	Type of transect (Reconnaissance, Erioderma survey)	Track name**	Start Waypoint	End Waypoint	Start time	End time	Stand # (Forest Inventory)	Stand size (ha)	Tree species present	# of trees of each species checked	Photo Waypoint	Photo direction
1		Erioderma survey		Start site 22	End site 22	9:05	10:29			bF, bS	40		
2		Erioderma survey		Start site 23	End site 23	10:38	1:40			bF, bS	40		
3		Erioderma survey		Start site 24	End site 24	2:10	3:50			bF, bS	40		
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													

\* A transect for a stand can be composed of several segments, either done by different observers or with some sort of "break", such as another stand transect, in the middle

\*\* Several transects can be grouped in a single saved GPS track if waypoints separating the segments are clearly identified

Comments:

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## Transect Data Sheet

Species: *Erioderma pedicellatum*/*E. mollissimum*General Location: Big Triangle Pond, Newfoundland & LabradorDate: 09/03/15Observers: Claudia Hanel, Lesley Sullivan

Segment number	Transect number*	Type of transect (Reconnaissance, Erioderma survey)	Track name**	Start Waypoint	End Waypoint	Start time	End time	Stand # (Forest Inventory)	Stand size (ha)	Tree species present	# of trees of each species checked	Photo Waypoint	Photo direction
1		Erioderma survey		Sep3Start site 1	Sep3End site 1	1:25	12:41			bF.bS			
2		Erioderma survey		Sep3Start site 2	Sep3End site 2	1:04	2:15			bF.bS			
3		Erioderma survey		Sep3Start site 3	Sep3End site 3	2:41	4:54			bF.bS			
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													

\* A transect for a stand can be composed of several segments, either done by different observers or with some sort of "break", such as another stand transect, in the middle

\*\* Several transects can be grouped in a single saved GPS track if waypoints separating the segments are clearly identified

Comments:

Site Data Sheet

Species: *Erioderma pedicellatum*/*E. mollissimum*

Date: 09/03/15 Observers: Claudia Hanel, Lesley Sullivan GPS site waypoint: Sep3 Erioderma 1

Location: Big Triangle Pond, Newfoundland's Labrador

Site: \_\_\_\_\_ Photos: \_\_\_\_\_ UTM: 0333104 E 524 0825 N  NAD83  NAD27 Accuracy: \_\_\_\_\_

Stand comments (Moose browsing or regeneration etc.): Erioderma thallus ~ 40cm x 40cm, slope was SE

Soil Moisture: <input type="checkbox"/> Very wet <input checked="" type="checkbox"/> Wet <input type="checkbox"/> Moist <input type="checkbox"/> Mesic <input type="checkbox"/> Dry	Stand photos: Wpt. direction 1. _____ 2. _____ 3. _____	Stand age/condition: <input type="checkbox"/> Young <input checked="" type="checkbox"/> Mature <input type="checkbox"/> Senescent <input type="checkbox"/> Stunted <input type="checkbox"/> Krummholz/Tuckamore <input type="checkbox"/> Edge of Blowdown Age: _____	Tree species: (check all that are present) <input type="checkbox"/> balsam fir <input type="checkbox"/> black spruce <input type="checkbox"/> red maple <input type="checkbox"/> white spruce <input type="checkbox"/> yellow birch <input type="checkbox"/> other _____ <input checked="" type="checkbox"/> white birch	Crown closure: <input type="checkbox"/> 0-25% <input type="checkbox"/> 26-50% <input checked="" type="checkbox"/> 51-75% <input type="checkbox"/> 76+ %	Slope: <input type="checkbox"/> upper slope <input type="checkbox"/> crest <input type="checkbox"/> mid slope <input type="checkbox"/> flat <input checked="" type="checkbox"/> lower or toe <input type="checkbox"/> depression Aspect: _____ Gradient: _____ <input type="checkbox"/> % <input type="checkbox"/> Deg	Indicator lichens: <input checked="" type="checkbox"/> <i>Coccocarpia palmicola</i> <input type="checkbox"/> <i>Lobaria scrobiculata</i> <input type="checkbox"/> <i>Lichinodium siosiphoides</i> <input type="checkbox"/> other <u><i>Sphaerophorus</i></u>
--	---	---	---	---	--	--

Tree information:

Tree age/condition (enter all that apply)

(Young, mature, overmature,

dead, broken, leaning, collapsed)

Tree comments

Erioderma information:

#Adult

#Juvenile

Erioderma comments (necrosis etc.)

Photo#

Tree #	GPS wpt.	Accuracy	species	Tree age/condition	Tree comments	#Adult	#Juvenile	Erioderma comments (necrosis etc.)	Photo#
1	Sep3-trce 1a		BF	Overmature	healthy, 15cm dbh	1		Mostly healthy necrosis rank 1	
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
Total number of thall:						1			

Transect Data Sheet

Species: *Erioderma pedicellatum*/*E. mollissimum*

General Location: Big Triangle Pond, Newfoundland, Labrador

Date: 09104115

Observers: Claudia Hahel, Lesley Sullivan

Segment number	Transect number*	Type of transect (Reconnaissance, Erioderma survey)	Track name**	Start Waypoint	End Waypoint	Start time	End time	Stand # (Forest Inventory)	Stand size (ha)	Tree species present	# of trees of each species checked	Photo Waypoint	Photo direction
1		Erioderma survey		Sep 4 start site 1	Sep 4 End site 1	17:22	19:58			bf, bs, wB			
2		Erioderma survey		Sep 4 start site 2	Sep 4 End site 2	10:05	12:01			bf, bs, wB			
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													

\* A transect for a stand can be composed of several segments, either done by different observers or with some sort of "break", such as another stand transect, in the middle

\*\* Several transects can be grouped in a single saved GPS track if waypoints separating the segments are clearly identified

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Site Data Sheet**  
**Species: *Erioderma pedicellatum*/E. mollissimum**

Date: 09/04/15 Observers: Claudia Hanel, Lesley Sullivan GPS site waypoint: Sep 4 Erioderma 1 - 2

Location: Big Triangle Pond, Newfoundland & Labrador

Site: \_\_\_\_\_ Photos: \_\_\_\_\_ UTM: 0334549 E 5241692 N  NAD83  NAD27 Accuracy: \_\_\_\_\_

Stand comments (Moose browsing or regeneration etc.): \_\_\_\_\_

<b>Soil Moisture:</b> <input type="checkbox"/> Very wet <input checked="" type="checkbox"/> Wet <input type="checkbox"/> Moist <input type="checkbox"/> Mesic <input type="checkbox"/> Dry	<b>Stand photos:</b> Wpt. direction 1. _____ 2. _____ 3. _____	<b>Stand age/condition:</b> <input type="checkbox"/> Young <input checked="" type="checkbox"/> Mature <input type="checkbox"/> Senescent <input type="checkbox"/> Stunted <input type="checkbox"/> Krummholz/Tuckamore <input type="checkbox"/> Edge of Blowdown Age: _____	<b>Tree species:</b> (check all that are present) <input checked="" type="checkbox"/> balsam fir <input type="checkbox"/> black spruce <input type="checkbox"/> red maple <input type="checkbox"/> white spruce <input type="checkbox"/> yellow birch <input type="checkbox"/> other _____ <input type="checkbox"/> white birch	<b>Crown closure:</b> <input type="checkbox"/> 0-25% <input type="checkbox"/> 26-50% <input checked="" type="checkbox"/> 51-75% <input type="checkbox"/> 76+ %	<b>Slope:</b> <input checked="" type="checkbox"/> upper slope <input type="checkbox"/> crest <input type="checkbox"/> mid slope <input type="checkbox"/> flat <input type="checkbox"/> lower or toe <input type="checkbox"/> depression <b>Aspect:</b> _____ <b>Gradient:</b> _____ <input type="checkbox"/> % <input type="checkbox"/> Deg	<b>Indicator lichens:</b> <input checked="" type="checkbox"/> <i>Cococarpia palmicola</i> <input checked="" type="checkbox"/> <i>Lobelia scrobiculata</i> <input type="checkbox"/> <i>Lichinodium sirsiphoideum</i> <input type="checkbox"/> other <u>Sphaerophorus</u>
---	--	--	--	--	---	---

Tree information:			Tree age/ condition (enter all that apply) (Young, mature, overmature, dead, broken, leaning, collapsed)		Erioderma information:			
Tree #	GPS wpt.	Accuracy	species	Tree comments	#Adult	#Juvenile	Erioderma comments (necrosis etc.)	Photo#
1	Sep 4 tree 1a		bF	Overmature / suppressed Tree dbh 6.5cm	1		Healthy, necrosis rank 2	
2	Sep 4 tree 2a		bF	Overmature Tree dbh 12cm	1		OVG w/ <i>Frullaria</i> , mite damage	
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
Total number of trees:					2			

Site Data Sheet

Species: *Erioderma pedicellatum*/*E. mollesimum*

Date: 09/04/15 Observers: Claudia Hanel, Lesley Sullivan GPS site waypoint: Sep4Erioderma3-4

Location: Big Triangle Pond, Newfoundland & Labrador

Site: \_\_\_\_\_ Photos: \_\_\_\_\_ UTM: 0331797 E 5239365 N  NAD83  NAD27 Accuracy: \_\_\_\_\_

Stand comments (Moose browsing or regeneration etc.): Dominated by feather moss, hummocky with sphagnum

Soil Moisture: <input type="checkbox"/> Very wet <input checked="" type="checkbox"/> Wet <input type="checkbox"/> Moist <input type="checkbox"/> Mesic <input type="checkbox"/> Dry	Stand photos: Wpt. direction 1. _____ 2. _____ 3. _____	Stand age/condition: <input type="checkbox"/> Young <input checked="" type="checkbox"/> Mature <input type="checkbox"/> Senescent <input type="checkbox"/> Stunted <input type="checkbox"/> Krummholz/Tuckermore <input type="checkbox"/> Edge of Blowdown Age: _____	Tree species: (check all that are present) <input type="checkbox"/> balsam fir <input type="checkbox"/> black spruce <input type="checkbox"/> red maple <input type="checkbox"/> white spruce <input type="checkbox"/> yellow birch <input type="checkbox"/> other _____ <input checked="" type="checkbox"/> white birch	Crown closure: <input type="checkbox"/> 0-25% <input type="checkbox"/> 26-50% <input checked="" type="checkbox"/> 51-75% <input type="checkbox"/> 76+ %	Slope: <input type="checkbox"/> upper slope <input type="checkbox"/> crest <input type="checkbox"/> mid slope <input type="checkbox"/> flat <input checked="" type="checkbox"/> lower or toe <input type="checkbox"/> depression Aspect: _____ Gradient: _____ <input type="checkbox"/> % <input type="checkbox"/> Deg	Indicator lichens: <input checked="" type="checkbox"/> <i>Coccocarpha palmicola</i> <input checked="" type="checkbox"/> <i>Loberia scrobiculata</i> <input type="checkbox"/> <i>Lichinodium sirospioideum</i> <input type="checkbox"/> other
--	---	--	---	---	--	--

Tree Information:				Tree age/ condition (enter all that apply)		Erioderma Information:				
Tree #	GPS wpt.	Accuracy	species	Young, mature, overmature, dead, broken, leaning, colapsed)	Tree comments		#Adult	#Juvenile	Erioderma comments (necrosis etc.)	Photo#
1	Sep4 tree 1b	bF	bF	Overmature, suppressed	Tree dbh of 8cm		1		Necrosis rank 4	
2	Sep4 tree 1c	bF	bF	Overmature, suppressed			1		Necrosis rank 3	
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
Total number of thalli:							2			

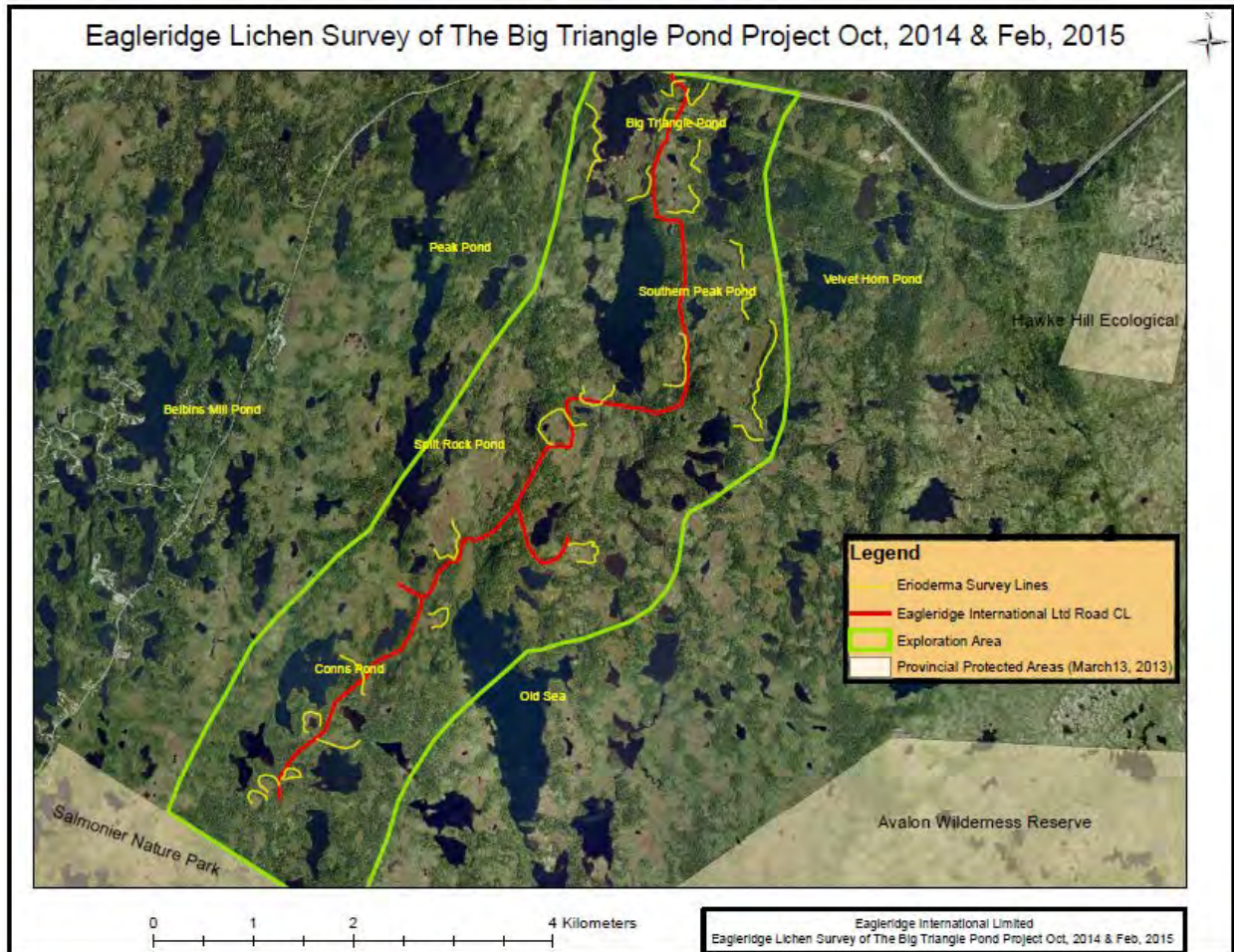
Thalli notes: Both thalli were located on the same tree, with mite damage & overgrown with *Frullania* (CG1). Thalli 1 was oriented NW with a height of 133cm; thalli 2 was oriented W at a height of 128cm.



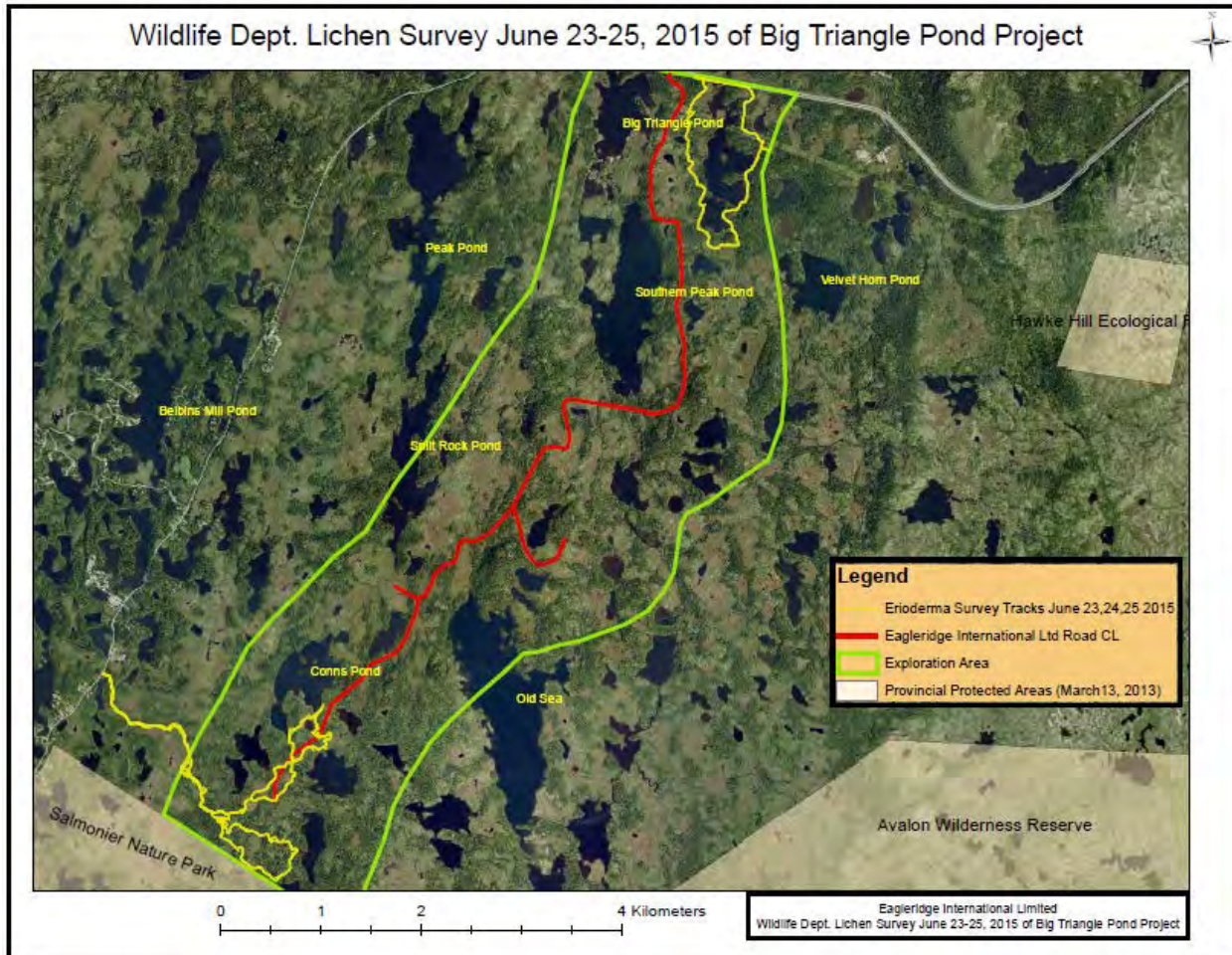
# **Appendix B**

## **Overview of Survey Effort Maps**

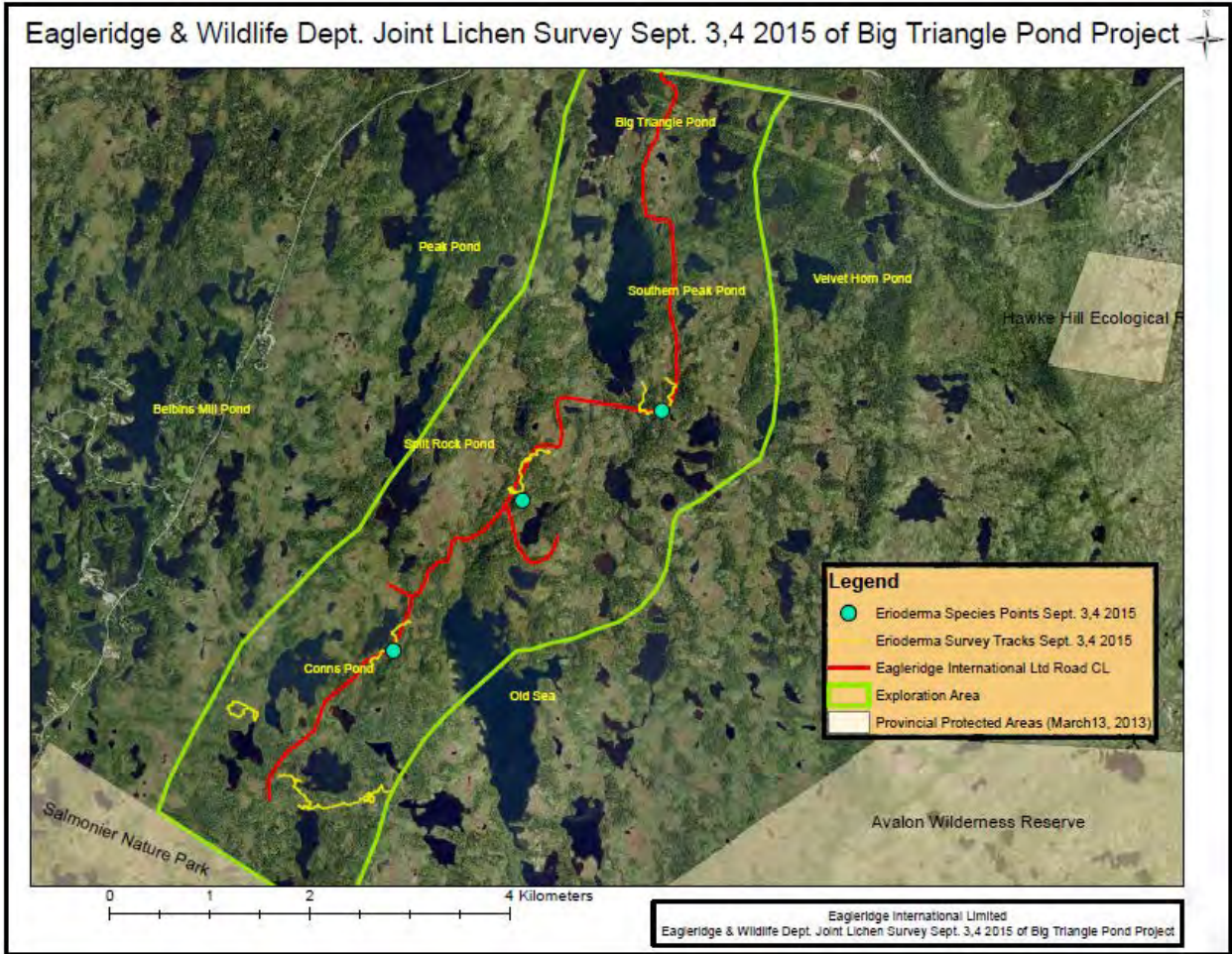
# Eagleridge Survey Effort for October 2014 and February 2015



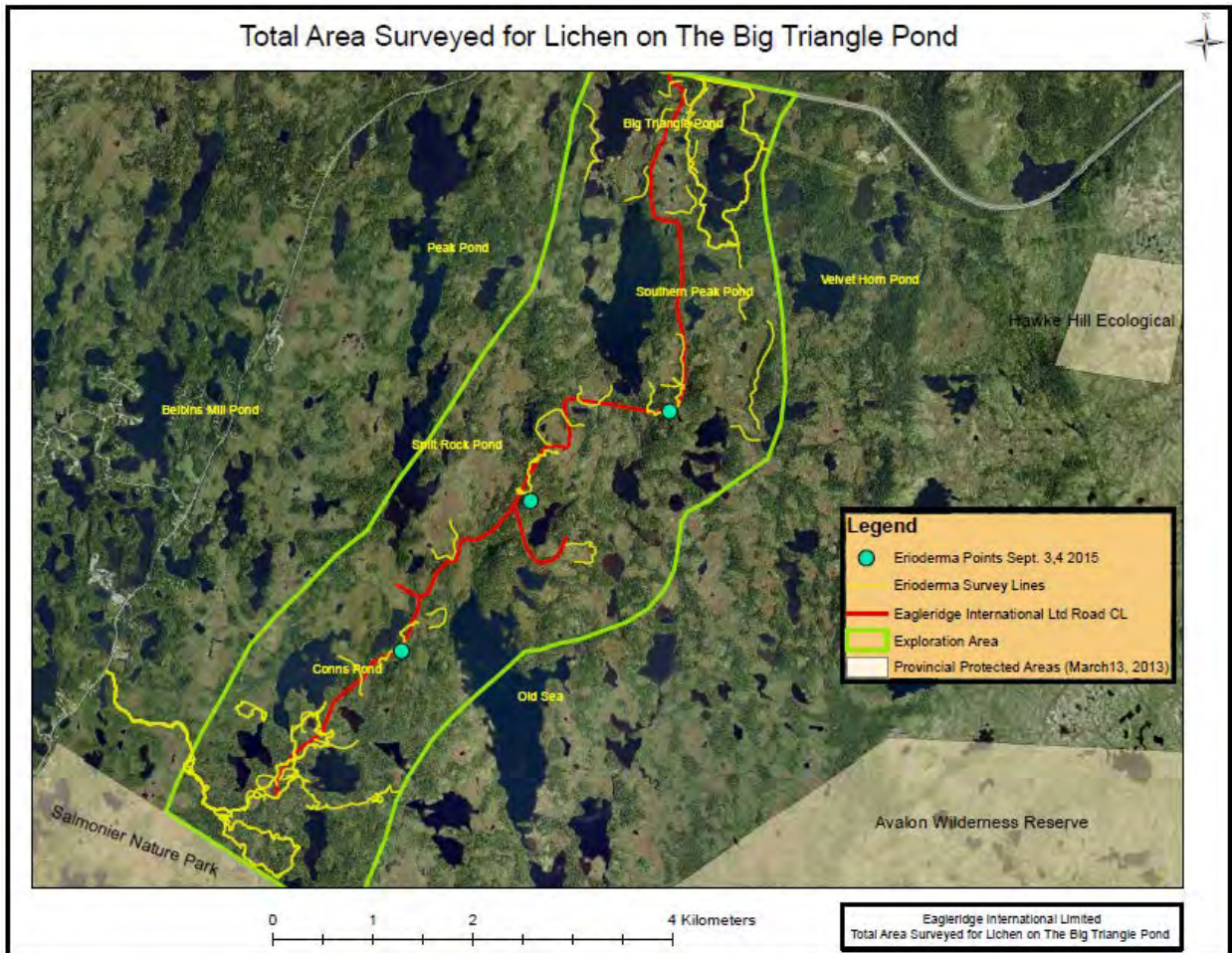
# Wildlife Division Survey Effort for June 2015



# Joint Survey Effort with Eagleridge and Wildlife Division for September 2015



# Total Survey Effort to Date for the Big Triangle Pond Site



# Appendix C

## *Erioderma pedicellatum* Survey Protocols

## *Erioderma pedicellatum* Survey Protocols

A survey for occurrences of *Erioderma pedicellatum* within the survey area designated on Map 1 shall be done in all forest stands (as identified in the Newfoundland and Labrador Forest Inventory) over 40 years old with a large component of balsam fir where epiphytic lichens are present. The total land area within the boundary of the survey area depicted on Map 1 is approximately 1,020 ha. According to Wildlife Division, 376 ha is not considered potential *Erioderma pedicellatum* habitat, leaving an area of approximately 644 ha to be surveyed. A map of the stands to be sampled with a unique number for each stand (including scrub), hereafter referred to as the stand number, will be supplied. The area of the stands to be sampled will also be supplied in a table. Stands with a crown closure of >75% (class 1) do not need to be sampled.

Softwood scrub where excessive moisture is the limiting factor and transitions of productive forest to wetlands should also be searched, and if a scrub patch is large enough to be identified in the Forest Inventory it should be considered a separate stand.

GPS coordinates should be recorded in Universal Transverse Mercator (UTM) North American Datum (NAD) 83. Some GPS units do not have NAD 83 as an option and these should be set to WGS 84.

Start with Protocol A - Reconnaissance.

### Protocol A - Reconnaissance

1. Walk at least 100 m of transect line per hectare. This transect:
  - does not need to be a straight line, but should pass through the habitat considered to be most suitable for *Erioderma pedicellatum* by the surveyor(s). Special attention should be paid to the transition zones between merchantable stands and scrub stands.
  - can be broken into segments, which can be done in separate locations within the stand as long as the portions add up to 100 m per hectare. If there is more than one surveyor, each can do a transect segment, either in parallel or in separate locations. The segments can cross each other. In large stands it is important that the transect segments provide representative coverage of the entire stand.
  - can cross into an adjacent stand, but if crossing is noticed in the field, a GPS waypoint should be taken. The portions in the different stands should be considered separate transect segments.
2. If the stand boundaries are very indistinct in the field, a basic survey intensity of 100 m of transect line per hectare should be maintained. The transects should be relatively evenly spread across the landscape and an effort should be made that no potentially suitable stand remains unsurveyed. GPS tracks can be used to ensure the survey area is adequately covered.

3. Search at least 40 trees per hectare along the transect, concentrating on balsam fir. Trees of species other than balsam fir, including black spruce and hardwoods, should be searched when present but should make up no more than 10% of the trees searched along the transect. Only trees old enough to support lichen growth and *Frullania* (>40 years) should be searched. Some old trees can be of a very small diameter (~2.5 cm) and these should be searched. Trees of this diameter that are obviously young do not need to be searched.
4. For each tree, visually scan all of the trunk area from the ground to 2.5 m and also the lower branches up to 2m (the part near the trunk without needles) for indicator species and *Erioderma pedicellatum*.
5. If the liverwort *Frullannia asagrayana* and any of the following five lichens (*Coccocarpia palmicola*, *Erioderma mollissimum*, *Fuscopannaria ahlneri*, *Lichinodium sirosiphoideum*, *Lobaria scrobiculata*) are present, record a GPS waypoint and switch to Protocol B - *Erioderma pedicellatum* survey.
6. If any *Erioderma pedicellatum*, or lichens that the surveyor cannot identify that may be *Erioderma pedicellatum*, are found, skip directly to Protocol C - Detailed Thallus Survey.
7. If the indicators mentioned above are not found, provide the following:
  - A filled in Transect Data Sheet, including the time and GPS waypoints at the start and end of each transect segment, an indication of which transect segments represent which stand, the stand number, stand size, tree species in the stand, the number of each species of tree checked, and the GPS waypoint and direction.
  - GPS track(s) and waypoints marking the beginning and end of transect segments
  - a digital stand photograph per stand which includes something to provide scale

#### Protocol B - *Erioderma pedicellatum* Survey

1. Survey at least 100 m of transect per hectare in addition to the 100 m in Protocol A. Record a waypoint at the location where the indicator species has been located and note the species. All transect parameters outlined in Protocol A also apply to the *Erioderma pedicellatum* transects.
2. Search at least 40 additional trees per hectare, in the same manner as described for Protocol A.
3. For large stands >5 ha the extra survey effort needs to be expended in the hectare where the indicator lichen was found.
4. Provide the following:
  - GPS track(s) and waypoints marking the beginning and end of transect segments



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- A GPS waypoint of the location where the first indicator lichen was encountered
  - A data sheet filled out with the same information as in Protocol A
  - The names of all the indicator lichens encountered along the transect
5. If any *Erioderma pedicellatum* or lichens that the surveyor cannot identify that may be *Erioderma pedicellatum*, are found, follow Protocol C - Detailed Thallus Survey.

#### Protocol C - Detailed Thallus Survey

1. Flag the tree with two orange ribbons of winter quality flagging tape, preferably both flags below the thallus, but not within 30 cm of it. Ensure that the ends of the flagging tape are not long enough to damage the thalli if flapping in the wind.
2. Provide digital photographs of:
  - the stand to bring the total number of photographs in the stand to three
  - each thallus, and also a photo of the section of the tree with the flags and the thallus (it is especially important to provide a photo if the identity of the thallus is in doubt, and to include something that provides scale in the photo).
3. Use the Site Data Sheets to provide the following information:
  - A GPS reading of the coordinates of the tree, including the accuracy of the reading (if several trees are located within 5 m of one another, a single coordinate may be used)
  - The species and condition of the tree
  - The number of juvenile (without apothecia) and adult thalli on the tree, and if applicable, specify % of necrosis and degree of attachment for each thallus
  - Any other noteworthy information about the trees or thalli
  - The time when the Thallus Survey was started and finished
4. Search all appropriate balsam fir trees within a 20 m radius of the *Erioderma pedicellatum*-bearing tree, and repeat steps 1-3 for all thalli found.
5. If more than 10 thalli are found in one site, search the lower branches of black spruce as well within the 20 m radius of any new *Erioderma pedicellatum*-bearing tree.
6. If no more thalli are found with step 4, resume Protocol B, but not including the trees in the 10 m radii as part of the total transect for the stand.

# **Appendix D**

## **ACCDC Data for Rare and Provincially/Federally Listed Species for the Big Triangle Pond Site**

