Six Mile Brook Pit Expansion Project - 2023 Terrestrial Biophysical Baseline Report

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EXECUTIVE SUMMARY

McCallum Environmental Ltd (MEL) was retained by S.W. Weeks Ltd to prepare baseline biophysical reports, including flora, fauna, and habitat inventory surveys, for the proposed Six Mile Brook Pit Expansion Project (the Project), which is a sand and gravel pit located in Six Mile Brook, Nova Scotia. These assessments are to support the preparation and submission of the provincial EARD.

The objectives of the flora, fauna, and habitat surveys were to:

- Identify species and habitat usage with a focus on Species at Risk (SAR) and Species of Conservation Interest (SOCI) within and surrounding the Study Area (the Study Area was designed to include the maximum extent of expected terrestrial impacts (and in consideration of property ownership)).
- Compile a general flora, fauna, and habitat inventory based on observed species within the Study Area
- Determine trends in species composition and bird group usage throughout different seasons.

The biophysical surveys completed by MEL took place within the EA Study Area, which borders Stillman Road to the south, and is within 300 m of Four Mile Brook Rd to the east. The Study Area includes the entirety of PIDs 65173437, 00834622, and 00834721 as well as the northern portion of PID 00834739 and a 100 m buffer on a mapped watercourse, south of the proposed expansion. The EA Study Area is 96.9 ha in size, which includes 36.3 ha of disturbed area (historic and current pit), as indicated in Figure 1. One mainland moose pellet group inventory took place outside the Study Area to provide greater context to species activity in the area.

The results of these surveys will be carried forward in the EARD to evaluate the Project's effect to flora, fauna, and known habitats.

Terrestrial assessments took place between April 2023 – September 2023. The Study Area is a mix of early to mid-successional mixedwood and softwood forest. The habitat is comprised of vegetation types within Tolerant Hardwood Forest Group (TH), Intolerant Hardwood Forest Group (IH), Mixedwood Forest Group (MW), Spruce Hemlock Forest Group (SH), and Wet Decidious Forest Group (WD), 'cut over' group and the existing quarry. The majority of the Study Area is dominated by mixedwood forests, which are used by numerous wildlife species, including those associated with both hardwood and softwood forests. The three VT groups TH3, WD1 and WD3 are known to support rare plants due to fertile soils and saturated conditions.

The Study Area is within mainland moose core habitat; however, no observations of moose were observed during targeted surveys or incidentally. Suitable habitat for summer foraging, winter, and summer cover, was observed throughout the Study Area. No other SAR or SOCI mammal incidental observations were identified during any of the field surveys.

A total of 148 vascular plant species were identified during vascular plant surveys. Two priority plant species were identified during within the Study Area: Meadow Horsetail (S3S4) and American Beech (S3S4). Two SOCI lichens were identified during targeted lichen surveys; *Fuscopannaria sorediata* (S2S3) and Spotted Camouflage Lichen (*Melanohalea olivacea*)(S3S4).

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1 INTRODUCTION

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1.1 Regulatory Context

The Project has potential to interact with flora and fauna species which may be protected under several federal and provincial legislations as well as regulatory guidelines. Surveys were designed to detect species which are designated in these documents. Legislation that may direct resource development and conservation of fauna include:

Federal Legislation:

- *Species at Risk Act*

Provincial Legislation:

- *Nova Scotia Wildlife Act*, and,
- *Nova Scotia Endangered Species Act*

The Project is also driven by policies, guidelines, and standards that provide guidance on the development of the Project and the survey design.

These guidance/policies include:

- The Guide to Addressing Wildlife Species and Habitat in an EA Registration document.
- Various Nova Scotia Department of Natural Resources and Renewables (NSDNRR) *Special Management Practices* (SMP), SAR Recovery Strategies, and Management Plans, as well

as Environment and Climate Change Canada (ECCC) SAR Management Plans, and Recovery Strategies.

2 BASELINE SURVEY METHODOLOGY

2.1.1 Terrestrial Assessments

Biophysical field studies for the Project began in April 2023 and continued until October 2023, complying with the requirements for a *Class I* undertaking under Section 9(1) of the *Nova Scotia Environmental Assessment Regulations*. The field studies were focused on highlighting the ecological linkages within the Study Area, as well as with the surrounding habitats. The biophysical field assessments, timing, and surveyors that completed the assessments are outlined in Table 2-1.

Table 2-1:Biophysical Assessment Components, Timing, and Surveyors

Survey		Date	Surveyor(s)
Vegetation Community and Classification (i.e., habitat)		June 12 & 13, 2023	Christina Daffre Emma Halupka
Vascular Plant Surveys	Early botany	June 12 & 13, 2023	Christina Daffre Emma Halupka Mark MacDonald
	Late botany	September 25, 2022	Christina Daffre
Lichen Survey		May 25, 2023	Cole Vail
Wildlife Surveys	Incidental observations	Opportunistically throughout all biophysical surveys	All surveyors
	Mainland Moose	May 30th, 2023	Hannah Machat
Avifauna Surveys	Spring migration	April 24, 2023, and May 30, 2023	Jessica Lohnes Mark MacDonald Nicholas Doane
	Breeding bird	June 7, 2023, and July 6, 2023	
	Common nighthawk	Jul 7, 2023	
	Fall migration	August 24, 2023, September 21, 2023, and October 13, 2023	
	Owl Surveys	April 14, 2023, and May 6, 2023	
Wetland and Watercourse Delineations and Assessments		June 27-30, 2023	Duncan McCallum Katrina Ferrari Manminder Singh Christina Daffre Emily Maclean

The biophysical assessment methods for mainland moose were shared with Mark McGarrigle (NSDNRR SAR Biologist) during a project introduction meeting on June 7, 2023, for review and comment. Mr. McGarrigle was aligned with McCallum's approach for transect placement within the Study Area and outside of the Project footprint but recommended that transect placement be further refined to ensure the transects will inform the Project team of mainland moose habitat and use of the species. Recommendations were implemented by the Project team through communications with NSDNRR.

2.1.2 Priority Species

Assessment of wildlife, vegetation, and habitat was completed based on the requirements outlined in the NSECC *Guide to Addressing Wildlife Species and Habitat in an EA Registration Document* (NSE, 2009). The priority species list was created in accordance with this guide and outlined below; and it is used for the following purposes:

1. To identify which targeted surveys were required based on species and habitats available within the Study Area.
2. To identify key detection times for targeted surveys; and,
3. To inform field staff of priority species which may be encountered during biophysical surveys.

2.1.2.1 Development of a Priority Species List

In support of the assessment of priority species occurrence and use of the Study Area, a priority species list was created prior to commencing field assessments. The purpose of the priority species list is to identify a broad list of species that have the potential to be present within the Study Area. Priority species include Species of Conservation Interest (SOCI) that are not listed species under provincial or federal legislation (i.e., Committee on the Status of Endangered Wildlife in Canada [COSEWIC] species and/or Atlantic Canada Conservation Data Center [ACCDC] S1, S2 and S3 species or any combination thereof (i.e., S3S4 is considered a SOCI)), and Species at Risk (SAR) which are listed under the Species at Risk Act (SARA) and/or the Nova Scotia Endangered Species Act (NSESA).

Development of a priority species list for lichen, vascular plants, avifauna, and wildlife was completed based on a compilation of listed species from the following sources:

1. COSEWIC and SARA – All species listed as Endangered, Threatened, or of Special Concern.
2. NSESA – All species listed as Endangered, Threatened, or Vulnerable; and,
3. ACCDC Conservation Rank – All Species designated as S1, S2, or S3.

Additionally, invertebrates listed under NSESA, COSEWIC and SARA as described above, were included in the development of the priority species list.

The priority species list was first narrowed by broad geographic area and then further narrowed by identifying specific habitat requirements for each species. For example, if a listed species on the NSESA required open water habitat and no open water habitat is present inside the Study Area, this species was not carried forward to the final list.

The compilation of a priority species list is habitat driven, rather than observation driven (e.g., ACCDC report of Maritime Breeding Bird Atlas [MBBA]). This is based on the recognition that observation-based datasets are not comprehensive lists of species in any given area. As such, the information provided by observation driven sources are supplementary to the priority species list, rather than forming the basis of the list.

A single desktop priority species list was developed for all seasons for the Project using the methodology provided above. The seasonality of mobile species is not used to screen species into, or out of, the priority species list. All field staff reviewed the desktop evaluation for priority species prior to commencing field work to ensure they were familiar with the priority species identification and their status ranks. The priority species list is referenced across the various biophysical assessments and is provided in Appendix B. Refer to Table 2-2 for status rank definitions across multiple regulatory levels.

Table 2-2: Status Ranks Definitions

Protection	Status	Definition
COSEWIC	**Extinct**	A wildlife species that no longer exists.
COSEWIC	**Extirpated**	A wildlife species that no longer exists in the wild in Canada, but exists elsewhere
COSEWIC	**Endangered**	A wildlife species facing imminent extirpation or extinction
COSEWIC	**Threatened**	A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction
COSEWIC	**Special Concern**	A wildlife species that may become threated or endangered because of a combination of biological characteristics and identified threats.
COSEWIC	**Data Deficient**	A category that applies when the available information is insufficient (a) to resolve a wildlife species' eligibility for assessment or (b) to permit an assessment of the wildlife species' risk of extinction.
COSEWIC	**Not at Risk**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
SARA	**Extirpated**	Species which no longer exist in the wild in Canada but exist elsewhere in the wild.
SARA	**Endangered**	Species facing imminent extirpation of extinction.
SARA	**Threatened**	Species which are likely to become endangered if nothing is done to reverse the factors leading to their extirpation or extinction.
SARA	**Special Concern**	Species which may become threatened or endangered because of a combination of biological characteristics and identified threats.
NSESA	**Endangered**	A species facing imminent extirpation or extinction.
NSESA	**Threatened**	A species likely to become endangered if limiting factors are not reversed.
NSESA	**Vulnerable**	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
NSESA	**Extirpated**	A species that no longer exists in the wild in the province but exists in the wild outside of the Province.
NSESA	**Extinct**	A species that no longer exists.
ACCDC	**SX**	**Presumed Extirpated** - Species or community is believed to be extirpated from the province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
ACCDC	**S1**	**Critically Imperiled** - Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.
ACCDC	**S2**	**Imperiled** - Imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.
ACCDC	**S3**	**Vulnerable** - Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
ACCDC	**S4**	**Apparently Secure** - Uncommon but not rare; some cause for long-term concern due to declines or other factors.
ACCDC	**S5**	**Secure** - Common, widespread, and abundant in the province.
ACCDC	**SNR**	**Unranked** - Nation or state/province conservation status not yet assessed.
ACCDC	**SU**	**Unrankable** - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

Protection	Status	Definition
ACCDC	**SNA**	**Not Applicable** - A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
ACCDC	**S#S#**	**Range Rank** - A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).
ACCDC	**Not Provided**	Species is not known to occur in the province.
Breeding Status Qualifiers		
Protection	**Qualifier**	**Definition**
ACCDC	**B**	Breeding - Conservation status refers to the breeding population of the species in the province.
ACCDC	**N**	Nonbreeding - Conservation status refers to the non-breeding population of the species in the province.
ACCDC	**M**	Migrant - Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient population of the species in the province.

2.1.2.2 Additional Desktop Priority Species Review

Several sources were used to supplement the desktop priority species list. These sources are described herein and include observations-based datasets (i.e., ACCDC report) and proximal datasets (e.g., provincial abandoned mine openings [AMO] database, moose concentration areas) (Figure 2, Appendix A). Proximal datasets are those that provide information that may support the understanding of priority species in proximity to an area. For example, AMO's may support bat hibernacula, but this dataset does not represent known bat hibernacula or observations of the species.

The ACCDC houses a comprehensive biodiversity database for Atlantic Canada, including conservation status ranks, which is updated regularly. ACCDC reports provide important supplementary, observation-driven data sources including sightings of priority species recorded within five km and 100 km. An ACCDC report was prepared for the Study Area on May 5, 2022 (Appendix C).

NSDNRR has classified several species as 'location sensitive', meaning that ACCDC is not permitted to provide specific location data for these species in their reports. Location sensitive species in Nova Scotia include black ash (*Fraxinus nigra*), Blanding's turtle (*Emydoidea blandingii*), wood turtle (*Glyptemys insculpta*), peregrine falcon populations (*Falco peregrinus, pop.1*), and any bat hibernaculum. If any of these species are present within five km of the Study Area, the ACCDC report will simply identify that they are present. If noted in the ACCDC report, McCallum will consult with NSDNRR to obtain additional information on the observation.

Additional datasets reviewed during the desktop review for priority species included:

- Lichen databases, included those provided by the Mersey Tobeatic Research Institute (MTRI), that were assessed to identify potential for priority lichen species including vole ears (*Erioderma mollissimum*) and boreal felt lichen (BFL);
- Provincial government records of AMOs were reviewed as AMOs that are uncapped and unflooded may provide bat hibernacula.

- The NSNDRR significant species and habitats database;
- Maritime Breeding Bird Atlas (MBBA)
- Canada Wildlife Service Migratory Bird Sanctuary (MBS)
- Canada Important Bird Area (IBA)
- SARA critical habitat layers
- SARA recovery strategies
- DFO critical habitat mapping
- Atlantic salmon atlas
- Freshwater fish species distribution records
- Provincial Landscape Viewer – Atlantic Coastal Plain Flora (ACPF) Buffer, Lynx Buffer, Marten Range Patches 2019, Marten Range Patches 2030, Marten Habitat Management Zones, Mainland Moose Concentration Areas
- Provincial Special Management Practice layers – wood turtle, vole ears, mainland moose, etc.

2.1.3 Habitat

The following are the desktop and field methodologies used during the vegetation community identification and classification program. The purpose of defining the vegetation communities within the Study Area is to determine what communities are present, what habitats and species they can support, and if unique or rare habitats are present (i.e., areas to target during other biophysical surveys).

2.1.3.1 Desktop Review

Prior to completing field assessments, several geospatial datasets were reviewed to inform the vegetation community surveys:

- Study Area spatial boundary
- Nova Scotia forestry inventory
- Nova Scotia Environment and Climate Change (NSECC) wetland and watercourse inventory
- Nova Scotia Topographic Database (NSTDB)
- Ecological Land Classification (ELC)
- Nova Scotia old forestry policy polygons
- Aerial imagery

Aerial imagery and spatial files of wetland features were invaluable in the desktop review as indicators of different soil regimes often reflect changes in vegetation community structures. The aerial imagery allowed the surveyor to, at a high-level, identify areas of interest.

2.1.3.2 Field Survey

Vegetation community surveys were completed in June 2023 throughout the Study Area. This timing was selected as it facilitates proper detection and characterization of the vegetation communities and allows the findings to guide other surveys (i.e., targeted locations for vascular plant surveys). Surveys were completed during avifauna point count surveys by qualified biologist walking meandering transects. Figure 3 (Appendix A) outlines forest types within the Study Area and targeted habitats as part of the vegetation community surveys. The Nova Scotia Forest Ecosystem Classification System (FEC) was used (e.g., Neily et al., 2010) to classify vegetation communities found within the Study Area.

All vegetation community types encountered within the Study Area were georeferenced using a handheld Garmin GPSMAP 64s unit, and the following information was recorded:

1. Dominant tree, shrub, and herbaceous species
2. Presence of disturbance
   - Anthropogenic (e.g., cut block)
   - Natural (e.g., windthrow)
   - None
3. Approximate stand age
   - Regenerative
   - Mature
4. Representative photographs
5. Vegetation community and classification

Both wetland and upland vegetation communities were assessed, acknowledging that additional wetland information will be recorded during detailed wetland evaluations.

The intent of these surveys was to not only document the locations of vegetation communities, but to delineate the approximate boundary of these communities. Surveyors opportunistically georeferenced and classified community types when a new community type was encountered, as well as the boundaries of these communities. This data was then used in the desktop component to delineate and quantify these vegetation types.

2.1.4 Wildlife

Desktop and field survey methodologies were implemented during the wildlife survey program and these methodologies are discussed below.

2.1.4.1 Desktop Review

Prior to undertaking the terrestrial field assessment, a detailed desktop review of known fauna observations and potential habitat for fauna was completed to support the survey design. The following databases were reviewed:

- ACCDC report (Appendix T);
- NSDNRR Significant Habitat layers;
- SARA Critical Habitat layers;
- Government records of AMOs (NSDNRR 2017)
- SARA Recovery strategies;
- SMPs layers; and,
- Priority species list (Appendix S).

These databases were reviewed to determine what wildlife or habitat is potentially within the Study Area and to support wildlife survey design.

Additionally, NSDNRR was consulted with regarding additional details on the location sensitive species recorded within the ACCDC report and species' core habitat in relation to the Study Area.

2.1.4.2 Field Surveys

Wildlife surveys were completed opportunistically throughout the suite of biophysical surveys in 2023. All observations were identified and recorded by biologists experienced in recognition of wildlife tracks, scat and browse, resulting in an overall species list. Wildlife habitat availability was assessed concurrently with other biophysical surveys, within wetland and upland habitat. The following literature was referenced during the surveys and identification process:

- Mammal Tracks & Signs: A Guide to North American Species (Elbroch, 2003);
- A Field Guide to Animal Tracks (Murie, 1974);
- Dragonflies and Damselflies of the East (Paulson, 2011); and
- Tracking & the Art of Seeing (Rezendes, 1999).

Incidental observations have been chosen over dedicated wildlife surveys as they provide the broadest coverage of the Study Area, both spatially and temporally. Instead of limiting wildlife surveys to transects, incidental observations during other survey types provide a holistic and overarching understanding of wildlife on the landscape.

Based on the desktop review, specialized surveys were deemed necessary to target specific priority species known or having the potential to exist within the general area surrounding the Study Area due to being listed in the ACCDC report and/or the presence of suitable habitat. These specialized surveys were designed, as these species are not reliably detected during the previously described field programs. Where a priority species was identified during surveys, additional effort was made in the field to understand the habitat at the sighting location and evaluate its suitability to support the species' survival or life cycle requirements. Refer to the following subsections for additional details on specialized surveys completed or justifications for not completing targeted surveys.

2.1.4.2.1 Mainland Moose

The desktop review showed that the Study Area is within core habitat for mainland moose (*Alces alces americana)*. Mainland moose is ranked as Endangered by the NSESA and is considered critically imperiled (S1) by ACCDC. The closest reported observation of mainland moose is 5.8 km from the Study Area. Communication with NSDNRR biologist Mark McGarrigle, confirmed the requirement for targeted mainland moose surveys. Moose prefer boreal and temperate coniferous and mixedwood forest habitats with plenty of mature trees that they use for protection and thermal cover (NSDNRR, 2021). Young deciduous trees and shrubs are used for grazing (NSDNRR, 2021). Core habitat for moose is understood as an area with the current biophysical attributes that provide for life cycle requirements of moose and over the next 30 years (NSDNRR, 2021). Core Habitat is present throughout Cumberland/Colchester, Pictou/Antigonish/Guysborough, and Tobeatic regions. Low road density and the presence of corridors between these areas are needed to maintain habitat requirements.

If signs of Mainland moose were observed within the Study Area throughout the 2023 survey season, observations were recorded as incidental.

MEL adopted survey methods recommended in NSDNRR's Mainland Moose Recovery Plan (NSDNRR, 2021). Spring Pellet Group Inventory (PGI) surveys were completed to understand the distribution of Mainland Moose within the Study Area.

The PGI survey was completed in spring before "green up". PGI surveys follow the same standardized transects used in winter track surveys (Figure 4, Appendix A).The number of deer/moose pellets observed

along the transects were recorded. These numbers are used to estimate the distribution of moose within the Study Area.

During all surveys, locations of Mainland Moose tracks, browse, and scat were recorded using a handheld GPS unit. Survey tracks as well as incidental observations of other wildlife species, tracks, and scat were also recorded. Observers also recorded the survey type, weather, and tracking conditions, type of sign observed.

2.1.5 Vascular Plants

Desktop and field survey methodologies were implemented during the vascular plant survey program and these survey methodologies are discussed below.

2.1.5.1 Desktop Review

Prior to undertaking the field assessment, a detailed desktop review of known vascular plant observations and potential habitat for rare plants within the Study Area was conducted. The desktop review process involved a review of the ACCDC database results; Appendix C, mapped wetland habitat, habitat classification surveys, and the priority species list; Appendix B.

Additional geospatial databases were reviewed for information pertaining to vascular plant community assemblages. These databases include ACPF Group Buffers (Nova Scotia Department of Natural Resources, 2019) and the ecological land classifications of Nova Scotia (Neily, Basquill, Quigley, & Keys, 2017). The desktop review process informs field surveyors if there is an increased likelihood of priority vascular plant species and where they may be expected (e.g., landscape characteristics).

2.1.5.2 Field Survey

Dedicated vascular plant surveys were completed early (June 12th and 13th, 2023) and late (September 25th, 2023) in the growing season (~June 1 to September 30) to capture plant species with different flowering periods. Early botany surveys were completed within the Study Area by environmental scientists Christina Daffre and Emma Halupka and terrestrial lead, Mark MacDonald. Late botany surveys were completed by Christina Daffre. All suitable habitats, as identified within the field, were surveyed. Additionally, incidental vascular plant observations, particularly priority species, were recorded throughout the suite of other biophysical surveys conducted in 2023.

Meandering transects were completed on foot, and all major habitat types were assessed to generate a species list of vascular species and community assemblages observed within the Study Area, along with georeferenced locations of priority vascular flora species (Figure 5, Appendix A). All encountered vascular plant species were identified. If a species could not be identified in the field, detailed photographs were taken to capture diagnostic features, and, if required, specimens were collected and preserved for identification out of the field. Specimens were only collected if they were abundant on site and were not collected if only one or two individuals were observed. All priority species observed were georeferenced, counted (when possible), photographed, and a description of their habitat was recorded. If specimens were present in tufts or in large numbers (e.g., counting was not reasonable), the areas that contained large numbers of that species were measured (e.g., 10 m x 10 m). The following literature were the primary references used during the field surveys and identification process:

- Roland's Flora of Nova Scotia (Zinck, 1998);
- Nova Scotia Plants (Munro, Newell, & Hill, 2014);
- Flora of New Brunswick (Hinds, 2000);
- Go Botany (Native Plant Trust, 2020);

- Field Manual of Michigan Flora (Voss & Reznicek, 2012);
- Sedges of Maine (Arsenault, et al., 2013); and,
- Grasses and Rushes of Maine (Mittelhauser, Arsenault, Cameron, & Doucette, 2019).
- Ferns and fern allies of Canada (Cody, W.J., & Britton, D.M., 1989)

Through the vascular plant survey, the MEL biologists developed a list of species observed, along with a figure identifying locations of priority vascular flora species. All plant species were reviewed to determine if they are a member of the ACPF group or invasive.

2.1.6 Lichens

The following are the desktop and field survey methodologies implemented during the lichen survey program.

2.1.6.1 Desktop Review

Prior to the field assessment, a detailed desktop review of known lichen observations and potential habitat for rare lichens within the Study Area was conducted. The desktop review process involved a review of the following:

- ACCDC database results (Appendix C);
- NSDNR predictive habitat mapping for boreal felt lichen (Erioderma pedicellatum) (2010);
- MTRI Vole Ears and extant Blue Felt Lichen (BFL) GIS databases (Mersey Tobeatic Research Institute, 2019);
- NSDNR forest inventory GIS database (NSL&F, 2021); and,
- The Priority Species List (Appendix B).

The desktop review process informs field surveyors if there is an increased likelihood of priority lichen species and where they may be expected. The forest inventory GIS database helps predict forest characteristics, including age, which are more suitable for lichens. While the specific habitat requirements for each priority lichen species varies, many require mature to old growth forests; stand age is one of the greatest determinants of the presence of many rare epiphytic lichens (McMullin R. , Duinker, Cameron, Richardson, & Brodo, 2008).

2.1.6.2 Field Survey

All suitable lichen habitats within the Study Area, as identified within the field (guided by the desktop review), were surveyed by qualified lichenologist Cole Vail on June 7th, 2023. Meandering transects were completed on foot and targeted mature trees appropriate for hosting priority lichen species, supported by the preliminary habitat assessment and points (Figure 5, Appendix A). These trees were visually inspected, focusing on tree trunks, branches, and twigs. Any identified priority species lichens were clearly marked with flagging tape.

The following information was collected for any priority lichen species identified during field surveys, along with photographs, and any other relevant information:

- Surveyor name
- Weather condition
- Survey condition
- General site location
- Date

- Scientific name
- Count (# of thalli)
- Size of thallus or thalli
- Habitat (host tree and general habitat – including within a wetland or upland)
- Location (waypoint in UTM NAD83)
- Height of the specimen
- Direction that the specimen is facing.
- Any relevant comments

If a lichen specimen could not be readily identified in the field, photos and/or specimens were collected and identified later. Specimens were only collected if they were abundant on site and were not collected if only one or two individuals were observed. If adequate portions of SAR lichens were available on the ground or separated from substrate, collections would be made. If necessary, collected samples were inspected via microscope and standard chemical spot tests in accordance with Brodo *et al.* (2001), to determine the species. The following literature was referenced during the surveys and identification process:

- The Macrolichens of New England (Hinds & Hinds, 2007);
- Lichens of North America (Brodo, Sharnoff, & Sharnoff, 2001);
- Keys to Lichens of North American – Revised and Expanded (Brodo, Sharnoff, & Sharnoff, Keys to Lichens of North America - Revised and Expanded, 2016);
- Microlichens of the Pacific Northwest – Volume 1 – Key to The Genera (McCune, 2009);
- Microlichens of the Pacific Northwest – Volume 2 – Key to the Species (McCune, 2009);
- Common Lichens of Northeastern North America (McMullin & Anderson, 2014); and
- The Lichen Flora of Great Britain and Ireland (Smith, Aptroot, Coppins, Fletcher, Gilbert, James, & Wolseley, 2016).

Through the lichen survey, a list of common lichens was recorded with focus on macrolichens (i.e., foliose, fruticose, and squamulose), along with georeferenced locations of priority lichen species.

3 RESULTS

3.1 Terrestrial Environment

Habitat and vegetation community assessments and surveys for vascular plants and lichens were completed to determine potential impacts to species or their specific habitat which may be protected under legislation.

3.1.1 Habitat

The desktop review and field results for the vegetation community assessment completed within the Study Area are provided in the following sections.

3.1.1.1 Desktop Results

The Study Area is in the Northumberland/Bras D'or ecoregion (500) and the Northumberland Lowlands (530) Eco district (NSDNR, 2015). The Northumberland/Bras d'Or ecoregion includes land on both the mainland of Nova Scotia, along the Northumberland Straight (from the border with New Brunswick to the Straight of Canso) and in Cape Breton Island, bordering the Bras d'Or Lake (Neily et al., 2017). The total area of this ecoregion is 8,407 km^2 or approximately 15.2% of the province (Neily et al., 2017).

Northumberland Lowlands Eco district ranges along the Northumberland Strait coastline from the New Brunswick border in the west to northeastern Pictou County (NSDNR, 2015). This landscape is comprised of eight landscape elements: (i) Spruce pine hummocks, (ii) Red spruce hummocks, (iii) tolerant mixed wood hills, (iv) red and black spruce hummocks, (v) jack pine hummocks and ridges, (vi) wetlands, (vii) coastal beaches and (viii) salt marshes. Spruce pine hummocks represent the dominant matrix element, covering 49% of this Eco district (NSDNR, 2015). This element supports the growth of red and black spruce and white pine forests. No Old Forest polygons (NSDNRR, 2020) are present within the Study Area. NSDNRR forestry polygons (2021) identified the Study Area are composed of hardwoods, softwoods and mixedwood forestry stands, as well as wetlands (Figure 3, Appendix A).

Habitat within the Study Area is dominated by mixedwood stands, followed by softwood stands, and anthropogenic, waterbodies, shrub/alders, wetland, and other accounting for the remaining portions of the Study Area (Figure 3, Appendix A).

3.1.1.2 Field Results

The Study Area is comprised of a mosaic of softwood dominated stands, hardwood dominated stands, open and forested wetlands, and disturbed areas. Disturbed portions of the Study Area include roads and cut blocks in the central and eastern portions of the Study Area. Within the Study Area, three vegetation community groups and eight vegetation types were present. The upland vegetation types belong to the Intolerant Hardwood Forest Group (IH), the Tolerant Hardwood Forest Group (TH), the Mixedwood Forest Group (MW), and the Spruce Hemlock Forest Group (SH). The wetland vegetation types belong to the Wet Deciduous Forest Group (WD).

Table 3-1. Vegetation Community Groups and Vegetation Types within the Study Area

Community Type	Vegetation Group	Vegetation Type (VTs)	Successional Stage	Classification Source
Upland Communities	Tolerant Hardwood Forest Group	TH3- Sugar maple – White ash / Christmas fern	Late successional	FEC
	Intolerant Hardwood Forest Group	IH5 – Trembling aspen – White Ash /Beaked hazelnut / Christmas fern	Early mid successional	FEC
	Mixedwood Forest Group	MW5 - White birch – Balsam fir / Starflower	Early successional	FEC
	Spruce Hemlock Forest Group	SH10 – White spruce – Balsam fir / Broom moss	Mid-successional	FEC
Wetland Communities	Wet Deciduous Forest Group	WD1- White ash / Sensitive fern – Christmas fern	Edaphic climax	FEC
		WD3- Red maple / Sensitive fern – Lady fern / Sphagnum		FEC
Cutover Communities	Cutover	Cutover Area, clearing	NA	MEL
	Existing Quarry	Existing and historical quarry	NA	MEL

3.1.1.2.1 Vegetation Community and Classification – Upland Communities

The following subsections outline the upland vegetation communities identified within the Study Area.

3.1.1.2.1.1 *Spruce Hemlock Forest Group (SH)*

This vegetation group is widespread throughout Nova Scotia and consists of mid to late successional VTs (Neily et al., 2010). This vegetation group is dominated by a canopy consisting of shade tolerant softwoods such as balsam fir (*Abies balsamea*), red spruce (*Picea rubens*), and eastern hemlock (*Tsuga canadensis*). The shrub layer often consists of regenerating conifers and soils are often derived from glacial till (Neily et al., 2010). The SH group provides habitat for a diverse community of birds and mammals (Neily et al. 2010). One VT within the Study Area belongs to this group, SH10.

SH10- White spruce/ Balsam fir/Broom moss

SH10 – White spruce *(Picea glauca)* balsam fir *(Abies balsamea)* /broom moss (*Dicranum scoparium*) is a mid-successional vegetation type with an overstory dominated by white spruce and balsam fir and shrub layer comprising of regenerating balsam fir. SH10 vegetation type usually follows stand-replacing disturbance events such as insect infestation, windthrow or harvesting (Neily et al. 2010). Earlier successional versions of this vegetation type include a higher frequency of white birch *(Betula papyrifera*). Common flora species include wild lily-of-the-valley *(Maianthemum canadense),* bunchberry *(Cornus canadensis),* Schreber's moss (*Pleurozium schreberi*) and broom moss (*Dicranum scoparium*) (Neily et al. 2010).

This VT was observed in the southern portion of the Study Area.

3.1.1.2.1.2 *Intolerant Hardwoods Group (IH)*

This vegetation group represents early to mid-successional hardwood vegetation types, with red maple (*Acer rubrum*), white birch (*Betula papyrifera*), grey birch (*Betula populifolia*), and aspen (*Populus sp*.) dominating. This group covers a range of soil moisture and nutrient regimes, and well-developed shrub and herb layers with reduced bryophyte and lichen cove are typical (Neily et al. 2010). The IH group can provide browse for deer and snowshoe hare (regenerating). One VT belonging to this group, IH5, was observed within the Study Area.

IH5- Trembling Aspen-White Ash/beaked hazelnut/ Christmas fern

IH5 is an early to mid-successional VT with trembling aspen *(Populus tremuloides)* and white ash *(Fraxinus americana)* dominating the overstory of the forest. This VT tends to have ricer moist soils evident of the Christmas fern, New York fern and interrupted fern found in the herbaceous layer. The shrub layer is well developed with beaked hazelnut, fly honeysuckle and regenerating white ash or balsam fir) (Neily et al. 2010). This VT is short lived and follows disturbances such as fire, windthrow or clearcutting. This VT was observed in the northern portion of the Study Area.

3.1.1.2.1.3 *Tolerant Hardwood Forest Group (TH)*

This vegetation group is classified as a mid to late successional hardwood vegetation group (Neily et al. 2010). TH vegetation group is generally composed of a closed canopy dominated by sugar maple (*Acer saccharum),* beech (*Fagus grandifolia*), yellow birch (*Betula alleghaniensis*), and red maple, with balsam fir as a significant understory species. The shrub layer in TH groups can be extensive and will show high diversity and abundance of ferns. Most TH sites contain soils ranging from fresh to moist (Neily et al. 2010). Due to the fertile soils of the TH group, rare plants are often associated with this group (Neily et al. 2010). One VT belonging to this group, TH3, was observed within the Study Area.

TH3- Sugar maple – White ash / Christmas fern

TH3 is a late successional vegetation type that has an overstory of shade tolerant hardwoods such as sugar maple and white ash. It is accompanied with scattered yellow birch, red maple, American beech, and red spruce in the canopy. The shrub layer is dominated by striped maple *(Acer pensylvanicum*), alternative leaved dogwood *(Cornus alternifolia)* and regenerating balsam fir. This VT has fresh-moist to moist, nutrient rich soils, resulting in diverse herbaceous coverage and spring ephemerals (Neily et al. 2010). Species include Christmas fern, oak fern, and Dutchman's breeches *(Dicentra cucullaria).* TH3 is an uneven-aged VT that will develop old forest characteristics and experiences small gap disturbances (Neily et al. 2010). This VT was observed in the southwestern portion of the Study Area and was observed in a portion of WL5.

3.1.1.2.2 Vegetation Community and Classification – Wetland Communities

The following subsections outline the wetland vegetation communities.

3.1.1.2.2.1 *Wet Deciduous Forest Group*

The Wet Deciduous Forest Group are wet forested ecosystems which often have water at or near the surface of the soil for most of the year (Neily et al., 2010). These forested vegetation groups are typically found within swamps in Nova Scotia. The successional dynamics of this group are mainly edaphic climax associations maintained by excessive moisture (Neily et al. 2010). Hardwood species such as red maple, white ash, but also balsam fir dominate in this group. The stand cover of trees is often moderate to high, often with extensive sphagnum cover and acidic and nutrient poor soils. Fern species, such as cinnamon fern (*Osmundastrum cinnamomeum*) and sedges such as the three-seededsedge (*Carex trisperma*) are often associated with this vegetation community group. Common sphagnum species associated with this vegetation group are S. palustre, S. capillifoliumand S. girgensohnii.

WD1 —White ash / Sensitive fern – Christmas fern

WD1 is a wet forest common throughout Nova Scotia. It is characterized by the abundance of white ash and red maple in the overstory. Typically found on imperfect to poorly drained soils with high nutrient availability (Neily et al. 2010). This VT has a diverse well developed herbaceous layer, comprising of sensitive fern *(Onoclea sensibilis),* Christmas fern, and dwarf raspberry *(Rubus pubescens).* Both shrub layer and bryophyte development are low. This VT type supports the growth of rare species such as black ash *(Fraxinus nigra).* This VT was observed in the southwestern half of the Study Area and was observed in a portion of WL1.

WD3 — Red maple / Sensitive fern – Lady fern / Sphagnum

WD3 is characterized by a red maple dominated canopy and a rich herbaceous cover. This wet forest type has persistent poor to very poorly drained soils and is a type of edaphic climax. Balsam fir, wild raisin and sensitive fern are common species found in the understory. The nutrient rich soils support the growth of rare plants such as meadow horsetail (quisetum pratense) and black ash. This vegetation type is common throughout the Northumberland/Bras d'Or ecoregion. Disturbance regimes include windthrow and harvesting. WD3 vegetation type was observed in WL 2, WL3 and WL4.

For more details on the delineated wetlands within the Study Area, refer to the wetland biophysical report.

3.1.1.2.3 Cut-over

The cut-over vegetative group was scattered throughout the Study Area and includes cut areas and roads. Cut areas, as its name implies, are characterized by historic clearing activities (~20 years ago). Cut areas were located throughout the Study Area and a road bisects the Study Area. Cutovers provide suitable breeding and foraging habitat for common nighthawks.

3.1.1.2.4 Existing Quarry

A significant portion of the Study Area is disturbed as it is a part of the existing quarry or has historically been as so. This includes 36.3 ha of disturbed area, as indicated in Figure 1. The vegetation has been cleared and is actively managed. Transitional areas between the edge of the quarry and the forest contain non-native species, including some that are considered invasive species.

3.1.1.3 Vegetation Community and Classification Summary

The Study Area is comprised of VTs within Tolerant Hardwood Forest Group (TH), Intolerant Hardwood Forest Group (IH), Mixedwood Forest Group (MW), Spruce Hemlock Forest Group (SH), and Wet Deciduous Forest Group (WD), 'cut over' group and the existing quarry. The VT groups TH3, WD1 and WD3 are known to support rare plants due to fertile soils and saturated conditions. All other VT groups do not have an elevated potential for priority species. The VTs informed field surveys for rare vascular and nonvascular species.

3.1.2 Wildlife

The following sections outline the results from the desktop review and the field surveys completed within the Study Area.

3.1.2.1 Desktop Results

The desktop review results show that one priority mammals species has the potential to be present within the Study Area. NSDNRR Significant Habitat layers show core habitat for Mainland Moose within the Study Area. No other priority species were identified.

3.1.2.2 Field Results

3.1.2.2.1 Mammals

Wildlife species, including mammals, were assessed through incidental wildlife observations, and recorded within the Study Area during all biophysical surveys. Refer to Table 3-3 for all incidental mammal observations confirmed either visually or by sign (scat, tracks, etc.).

Table 3-2: Confirmed Mammalian Species within the Study Area

Common Name	Scientific Name	COSEWIC	SARA	NSESA	SRank
Snowshoe hare	*Lepus americanus*	-	-	-	**S5**
White-tailed deer	*Odocoileus virginianus*	-	-	-	**S5**
American beaver	Castor canadensis	-	-	-	**S5**
American black bear	Ursus americanus	-	-	-	**S5**

Other species not encountered during field surveys that have the potential to use the Study Area habitat include the following.

Table 3-3: Mammalian Species with Potential Habitat within the Study Area

Common Name	Scientific Name	COSEWIC	SARA	NSESA	SRank
Red fox	*Vulpes vulpes*	-	-	-	S5
Deer mouse	*Peromyscus maniculatus*	-	-	-	S5
Raccoon	*Procyon lotor*	-	-	-	S5
Eastern coyote	*Canis latrans*	-	-	-	S5
Red-backed vole	*Myodes gapperi*	-	-	-	S5
Northwestern moose	*Alces alces andersoni*	-	-	-	S5

3.1.2.2.2 Mainland moose

The PGI survey was completed in snow free conditions on May 30th, 2023, in spring before "green up". During the survey, seven transects were completed in sunny 20 ° Celsius weather conditions. No signs of moose were recorded on any of the transects. Tracks of white-tailed deer (*Odocoileus virginianus)* were observed along Transect 1. Other signs of wildlife observed include snowshoe hare *(Lepus americanus)* scat along transect four and black bear scat along transect one. Refer to Table 3-4 for the full results of surveys.

No incidental observations of mainland moose were observed within the Study Area during the 2023 field season.

Table 3-4: Result of Mainland Moose PGI surveys

Transect Number	Time	Northing Start	Easting End	Northing End	Easting End	Moose signs observed?	Deer signs observed?	Other wildlife observed?
1	10:25	507677	5048245	507914	5049055	No	Yes	Black Bear scat
2	11:25	507831	5049119	507457	5049572	No	No	No
3	11:45	507429	5049561	507295	5049185	No	No	No
4	12:15	50727	5049164	506631	5048863	No	No	Hare scat
5	10:00	506658	504879	507625	5048281	no	no	no
6	1:15	503850	5051185	504241	505219	No	No	No
7	2:00	503025	5049327	502245	5048386	No	No	No

3.1.2.3 Herpetofauna

Within the Study Area and the Aquatic Study Area, habitat for herpetofauna is present within wetlands and watercourses. Confirmed herpetofauna species are listed in Table 3-5.

Table 3-5: Confirmed Herpetofauna Species within the Study Area.

Common Name	Scientific Name	COSEWIC	SARA	NSESA	SRank
Green frog	*Lithobates clamitans*	-	-	-	S5
Spring peeper	*Pseudacris crucifer*	-	-	-	S3
Red spotted newt	*Notophthalmus viridescens viridescens*	-	-	-	S3
Green frog	*Lithobates clamitans*	-	-	-	S5

No targeted surveys were completed for these species. Observations for these herpetofauna were incidental and occurred during other field surveys.

Table identifies potential herpetofauna species that may inhabit the areas where suitable habitat was observed.

Table 3-6: Herpetofauna Species with Potential to Occupy the Aquatic Study Area.

Common Name	Scientific Name	COSEWIC	SARA	NSESA	SRank
Wood turtle	*Glyptemys insculpta*	T	T	T	S2
Snapping turtle	*Chelydra serpentina*	SC	SC	V	S3
Four-toed salamander	*Hemidactylium scutatum*	-	-	-	S3
Maritime garter snake	*Thamnophis sirtalis pallidulus*	-	-	-	S5
Eastern red-back salamander	*Piethodon cinereus*	-	-	-	S5
Eastern American toad	*Anaxyrus americanus americanus*	-	-	-	S5
Wood frog	*Lithobates sylvatica*	-	-	-	S5
Northern leopard frog	*Lithobates pipiens*	-	-	-	S5

3.1.3 Vascular Plants

The following sections outline the results from the desktop review and the field surveys completed within the Study Area.

3.1.3.1 Desktop Results

The ACCDC report (Appendix C) documented two priority vascular plant species within 5 km of the Study Area. Both species identified are SOCI:

- Narrow Triangle Moonwort (*Botrychium lanceolatum ssp. Angustisegmentum*, S2S3)
- Small Round-leaved Orchid (*Platanthera orbiculate,* S3S4)

The ACCDC report makes no mention of observations of location sensitive species within five km of the Study Area. There are no reported observations of black ash (*Fraxinus nigra*) within five km of the Study Area. Communication with NSDNRR in October 2022 confirmed that there are no records of black ash within the Study Area (M. McGarrigle, NSDNRR SAR Biologist, Personal Communications, October 3, 2022). In addition, Mr. McGarrigle stated that the closest location of core habitat for black ash to the Study Area is 13 km southeast of the Study Area.

There are no ACPF buffers within the Study Area.

3.1.3.2 Field Results

A total of 148 vascular plant species were observed within the Study Area during botany surveys (early and late), wetland delineation, and incidentally. None of the vascular plants identified are classified as SAR, however, two are SOCI. The SOCI identified are Meadow Horsetail (*Equisteum pratense*, S3S4), and American Beech (*Fagus granifolia*, ACCDC S3S4). Within the Study Area, 18.9% of the observed vascular plant species (n=28) comprised of exotics, 71.6% (n=106) were native. Eleven observations were only able to be identified to the level of genus. A list of all plants observed can be found in Appendix D.

The Study Area consists primarily of early to mid-successional mixedwood, softwood and hardwood forested communities and wetlands with disturbed sites consisting of the gravel road and the existing quarry. Hydrophytic vegetation was present in wetlands and in habitat types WD1 and WD3. These habitats offer the potential for rare species due to high soil fertility and saturated conditions. The disturbed habitats (e.g., gravel roads) consisted primarily of herbaceous pioneer species, with much of the exotic species being confined to the edges of the gravel roads.

3.1.3.1 Priority Vascular Plants

Observation details of the two priority vascular plant species identified within the Study Area, Meadow Horsetail and American Beech are outlined in Table 3-7 (Figure 5, Appendix A).

Table 3-7: Summary of Priority Vascular Plant Observations within the Study Area

Scientific Name	Common Name	COSEWIC	SARA	NSESA	SRank	No. of Observation Locations within the Study Area	No. of Individuals Within the Study Area
Equisetum pratense	Meadow Horsetail	-	-	-	S3S4	2	NA
Fagus grandifolia	American Beech	-	-	-	S3S4	4	NA

Meadow Horsetail

Meadow Horsetail is a solitary annual fern that can be either fertile or sterile, the greenish-white stems (up to 50cm in length) are black in the basal portions. This species grows in moist woods or meadows, in sun or partial shade. While not common, the fertile stems shed their spores from late April to early July (Cody, W.J., & Britton, D.M., 1989) Two observations of Meadow Horsetail were made in the southeastern floodplain.

American Beech

The American Beech is a slow-growing medium sized tree which can reach heights of 25 m if long-living. Its leaves are serrated and grow between 6 and 14cm long. It is very often afflicted by the insect-fungus disease complex Beech Bark Disease and the invasive leaf-mining weevil (*Orchestes fagi)*. American beech can live up to 400 years, and their nuts supply food for many birds and mammals such as ruffed grouse, blue jays, and black bears (Sweeney etal., 2020). This species grows in moist, well-drained soil and is shade-tolerant. Four incidental observations of this species were made in various mixedwood and hardwood forests in the northern half of the PA. The trees appear to be affected by the Beech Bark Disease.

3.1.4 Lichens

The following sections outline the results from the lichen desktop review and the field surveys completed within the Study Area.

3.1.4.1 Desktop Results

The ACCDC report (Appendix C) documented two priority lichen species within five km of the Study Area. Both species identified are SOCI:

- Granular Soil Foam Lichen (*Stereocaulon condensatum*, S2S3)
- Gray Starburst Lichen (*Parmeliopsis hyperopta,* S3S4)

No predicted Boreal Felt Lichen polygons are present within the Study Area, with the closest predicted polygon occurring 44 km to the Northwest of the Study Area. According to the MTRI databases, no extant boreal felt lichen populations are within 50 km and the closest vole ears lichen population is located over 50 km away.

3.1.4.2 Field Results

During the field surveys, 21 lichen species were observed within the Study Area. Two SOCI lichen were also observed within the Study Area, Northern Camouflage Lichen (*Melanohaleana septrentionalis,* S2S3) and Gray Sunburst Lichen (*Parmeliopsis hyperopta*, S3S4) (Figure 5, Appendix A).

- *Fuscopannaria sorediata* (S2S3)
- Spotted Camouflage Lichen (*Melanohalea olivacea*, S3S4)

The Study Area consists of both disturbed and intact habitat. Intact habitat is dominated by softwood, mixedwood and hardwood stands, and wetlands. Many of the priority lichens in Nova Scotia have an association with mature forested communities, often associated with wetlands, lakes, and watercourses. The habitat that provided the greatest potential to support priority lichen species was within proximity of watercourses, as well as steeply sloped hardwood forests in the southeast section of the Study Area. Wetland and adjacent upland habitat provided mature forested communities consisting of softwood and hardwood species, in addition to the watercourse system that goes through the northern part of the Study Area. The appropriate tree maturity, bark texture, and pH provided habitat for a suite of priority cyanolichens and calicioids including blue felt lichen (*Pectenia plumbea*), frosted glass-whiskers (*Sclerophora peronella*), and fringe lichen (*Heterodermia neglecta*). Refer to Table 3-9 for a list of lichen species observed within the Study Area.

Table 3-8:Summary of Lichen Observations in the Study Area.

Scientific Name	Common Name	SARA	COSEWIC	NSESA	SRank
Fuscopannaria sorediata	**A Lichen**	-	-	-	**S2S3**
Melanholeana septrentionalis	**Northern Camouflage Lichen**	-	-	-	**S2S3**
Stereocaulon dactylophyllum	Finger Foam Lichen	-	-	-	S5
Lobaria pulmonaria	Lungwort Lichen	-	-	-	S5
Lobaria scrobiculata	Textured Lungwort Lichen	-	-	-	S5
Cladonia boryi	Fishnet Lichen	-	-	-	S5
Ricasolia quercizans	Smooth Lung lichen	-	-	-	S5
Menegazzia subsimilis	Tree Flute lichen	-	-	-	S4S5
Cladonia macilenta	Lipstick Powderhorn Lichen	-	-	-	S4S5
Cladonia rei	Wand Lichen	-	-	-	S5
Cladonia stellaris	Star-tipped Reindeer Lichen	-	-	-	S5
Pseudocyphellaria holarctica	Yellow Specklebelly Lichen	-	-	-	S5
Parmelia sulcata	Hammered shield lichen	-	-	-	S5
Parmelia squarrosa	Bottlebrush Shield Lichen	-	-	-	S5
Protopannaria pezizoides	Brown-gray Moss-shingle Lichen	-	-	-	S5
Lecanora caesiorubella	A Lichen	-	-	-	S5
Hypogymnia physodes	Monk's hood Lichen	-	-	-	S5
Dibaeis baeomyces	Methuselah's beard lichen	-	-	-	S5

Scientific Name	Common Name	SARA	COSEWIC	NSESA	SRank
Cladonia uncialis	Thorn Lichen	-	-	-	S5
Cladonia verticillata	Ladder Lichen	-	-	-	S5
Peltigera aphthosa	Common Freckle Pelt Lichen	-	-	-	S5

Note: Scientific names used are in accordance with the latest ACCDC species list retrieved in March 2023. Scientific names may no longer be in use, however, for consistency in this report, species names in the ACCDC species list are used.

"-" indicates no common name and/or ranking currently available.

3.1.4.3 Priority Lichens

Two priority species – both SOCI - were observed within the Study Area during the field surveys: *Fuscopannaria sorediata*, and Spotted Camouflage Lichen as listed in Table 3-9 (Figure 5, Appendix A). Neither species are included in The *At-Risk Lichens – Special Management Practices*, therefore no buffer is required around either observation of the SOCI species (NSDNR, 2018).

Table 3-9: Summary of Priority Lichen Observations in the Study Area

Common Name	Scientific Name	COSEWIC	SARA	NSESA	SRank	No. of Observation Locations Within the Study Area	Total number of Thalli
-	*Fuscopannaria sorediata*	-	-	-	S2S3	1	1
Spotted Camouflage Lichen	*Melanohalea olivacea*	-	-	-	S3S4	1	1

<u>*Fuscopannaria sorediata*</u>

Corrugated shingles lichen is a grey/brown foliose shingle lichen. It is typically found on deciduous trees such as maple, birch, ash, and oak. (Jorgensen, 2000). It has a small thallus, with convex lobes and a rough upper surface. One observation of Fuscopannaria sorediata was in the southwestern portion of the Study Area adjacent to WCaf on a sugar maple. *Fuscopannaria sorediata* is not included in the *At-Risk Lichens – Special Management Practices* (NSDNRR 2018), therefore, no buffer is recommended.

<u>Spotted Camouflage Lichen</u>

Spotted camouflage lichen is a medium sized foliose lichen. Its upper surface is medium to dark -olive brown. There was one observation of spotted camouflage lichen on the branch of a young birch immediately adjacent the observation of *Fuscopannaria sorediata* northern camouflage lichen is not included in the *At-Risk Lichens – Special Management Practices* (NSDNRR 2018), therefore, no buffer is recommended.

4 SUMMARY

Terrestrial assessments took place between April 2023 – September 2023. The Study Area is a mix of early to mid-successional mixedwood and softwood forest. The habitat is comprised of VTs within Tolerant Hardwood Forest Group (TH), Intolerant Hardwood Forest Group (IH), Mixedwood Forest Group (MW), Spruce Hemlock Forest Group (SH), and Wet Deciduous Forest Group (WD), 'cut over' group and the existing quarry. The majority of the Study Area is dominated by mixedwood forests, which are used by numerous wildlife species, including those associated with both hardwood and softwood forests. The three VT groups; The VT groups TH3, WD1 and WD3 are known to support rare plants due to fertile soils and saturated conditions.

The Study Area is within mainland moose core habitat; however, no observations of moose were observed during targeted surveys or incidentally. Suitable habitat for summer foraging, winter, and summer cover, was observed throughout the Study Area. No other SAR or SOCI mammal incidental observations were identified during any of the field surveys.

A total of 148 vascular plant species were identified during vascular plant surveys. Two priority plant species were identified during within the Study Area: Meadow Horsetail (S3S4) and American Beech (S3S4). Two SOCI lichens were identified during targeted lichen surveys; *Fuscopannaria sorediata* and Spotted Camouflage Lichen *(Melanohalea olivacea).*

5 LIMITATIONS

The following limitations regarding terrestrial baseline data collection and interpretation are acknowledged:

- Field methods (flora, fauna, and habitat characterization) have been completed by qualified professionals based upon commonly accepted practices in environmental consulting. However, a single assessment may not define the absolute status of terrestrial conditions within the Study Area. Baseline conditions are highly dynamic and conditions and characteristics may change over the lifetime of this Project, either naturally or through non-Project related anthropogenic influences (e.g., climate change). External influencing factors are not considered in this report.
- GPS coordinates taken in the field using handheld Garmin GPS units have inherent accuracy limitation between 3 to 5 m. Watercourse lines, polygons, and observation points identified in this document are based upon these GPS readings and limited by this positional accuracy.
- There is inherent subjectivity in habitat characterization (e.g., % species composition), which may cause discrepancies between assessors. However, all Project assessors are qualified personnel characterization and thus minor differences should not influence conclusions and analysis based upon the collected information.
- All reasonable assessment programs will involve an inherent risk that some site conditions or characteristics may not be detected during surveys. While multi-faceted and targeted surveys are completed to mitigate this risk, reports and analysis on such investigations will be based on reasonable interpretation from representative field sample points, supporting desktop interpretation and professional judgment.

6 CLOSING

This report has considered relevant factors and influences pertinent within the scope of the assessment and has completed and provided relevant information in accordance with the methodologies described herein.

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7 REFERENCES

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