

**ALDERON IRON ORE CORP.**



AMENDMENT TO THE ENVIRONMENTAL IMPACT STATEMENT  
VOLUME 3 APPENDICES – INFORMATION REQUEST RESPONSES

# **Appendix H**

Rare Plant Survey





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## **Rare Plant Survey Report**

# **Kami Iron Ore Mine and Rail Infrastructure Project**

Prepared for

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Final Report

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## **EXECUTIVE SUMMARY**

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In 2011, Stassinu Stantec Consulting Ltd. (Stassinu Stantec) was contracted by Alderon Iron Ore Corp (Alderon) to conduct a Rare Plant Survey for an area encompassing the Kamistiatusset (Kami) Iron Ore Mine and Rail Infrastructure Project (the “Project”), in western Labrador.

A survey for rare vascular plants was undertaken to assist the description of the local ecological context of the Rare Plant Study Area, such that interactions between biota, the physical environment and the Project can be assessed within the context of the specific ecology of the area. The rare plant baseline was completed in support of the Project and to supplement information on vegetation and vegetation communities in the vicinity of the proposed Project for use in the EIS.

This report describes the methodology and results of the survey for federally and provincially listed rare or potentially uncommon plants as completed for the Project. Listed plant species, as defined here, include those taxa listed under Schedule 1 of the *Species at Risk Act* (SARA) (Government of Canada 2011) and/or *Newfoundland and Labrador Endangered Species Act* (NLESA) (NLESA 2007) and designated as “endangered, threatened, or special concern” by Committee on the Status of Endangered Wildlife in Canada (COSEWIC). A rare plant species, in the context of this baseline report, is defined as one having been assigned SRanks of SU, S1, S2, or combinations thereof by the Newfoundland and Labrador Department of Environment and Conservation (DOEC) Wildlife Division and as recorded by the Atlantic Canada Conservation Data Centre (ACCDC). While S3 species are of concern from a provincial biodiversity perspective, they have not been included as their populations are considered less sensitive.

Surveys were undertaken over 5 days in late-July and early August 2011 with additional surveys completed during another 5 day period in mid-July 2012. Field work was conducted by employing a single field team consisting of a botanist and a vegetation ecologist. Botanical surveys were conducted in the area of the proposed Project components, in part as follow-up to the completion of associated baseline studies (e.g., Ecological Land Classification, Wetland Surveys), and as focused rare plant surveys of additional areas (i.e., wetlands, floodplains of slow-moving rivers and streams, cliff faces) deemed to have the highest potential for rare plant species.

Field results were compared to the current understanding of plant distribution and population as determined by the DOEC Wildlife Division and through the ACCDC. A list of observed vascular plant species observed was generated for each site visited during the survey. Locations were recorded with a Garmin™ global positioning system (GPS), and photographs were taken of representative habitats and plant species.

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A search of the ACCDC database (ACCDC 2011) and review of relevant literature revealed the potential for element occurrences of some 23 rare plant species from within or adjacent the Rare Plant Study Area. In total, 271 vascular and non-vascular plant species were observed and recorded during the 2011 and 2012 field surveys. Based on the results of these surveys, 37 rare vascular plant species were identified, including northern valerian (*Valeriana dioica* subsp. *sylvatica*), green false hellebore (*Veratrum viride* var. *viride*), chestnut sedge (*Carex castanea*), alpine hedysarum (*Hedysarum alpinum*), tall northern green orchid (*Platanthera aquilonis*), Jack pine (*Pinus banksiana*), Mistassini primrose (*Primula mistassinica*), trailing arbutus (*Epigaea repens*), bog willow (*Salix pedicellaris*), Buxbaum's sedge (*Carex buxbaumii*), variegated scouring-rush (*Equisetum variegatum* subsp. *variegatum*), Lapland buttercup (*Coptidium lapponicum*), horned dandelion (*Taraxacum ceratophorum*), sticky tofieldia (*Triantha glutinosa*), lesser paniced sedge (*Carex diandra*), swamp thistle (*Cirsium muticum*), beautiful cottongrass (*Eriophorum callitrix*), toad rush (*Juncus bufonius* var. *bufonius*), American moor rush (*Juncus stygius* var. *americanus*), golden groundsel (*Packera aurea*), pink pyrola (*Pyrola asarifolia*), small yellow lady-slipper (*Cypripedium parviflorum*), beautiful sedge (*Carex concinna*), daisy fleabane (*Erigeron hyssopifolius*), northeastern white water-crowfoot (*Ranunculus aquatilis* var. *diffusus*), greenish-flowered wintergreen (*Pyrola chlorantha*), kidney-leaf white violet (*Viola renifolia*), smooth woodsia (*Woodsia glabella*), inland sedge (*Carex interior*), Kotzebue's grass-of-parnassus (*Parnassia kotzebuei*), purple false melic (*Schizachne purpurascens*), small-fruited bulrush (*Scirpus microcarpus*), northern pondweed (*Potamogeton alpinus*), white-stem pondweed (*Potamogeton praelongus*), and alpine threadleaf pondweed (*Stuckenia filiformis* subsp. *alpina*). Two additional species, spike muhly (*Muhlenbergia glomerata*) and yellow sedge (*Carex flava*), have not been previously recorded for Labrador and are therefore considered rare.

None of the plant species observed within the Rare Plant Study Area were listed under Schedule 1 of the SARA and/or pursuant to the NLESA.

The abundance of some rare plant species and a literature review of other Newfoundland and Labrador plant surveys suggest that the current S Ranks for several of those species may be conservative. For example, bog willow is classified as rare primarily because it is restricted to specific habitats on peaty substrates; however, these species are locally well represented within these habitats. Lack of adequate information on the distribution of some Labrador plant species also contributes to conservative scarcity rankings. As new information becomes available through additional botanical surveys for these species, their scarcity ranks are adjusted accordingly by DOEC.

The results of this survey and other studies will increase knowledge and understanding of ecological relationships within the Study Areas.

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## ABBREVIATIONS

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ACCDC	Atlantic Canada Conservation Data Centre
Alderon	Alderon Iron Ore Corp
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DMS	Data Management Systems
EA	Environmental Assessment
EIS	Environmental Impact Statement
ELC	Ecological Land Classification
FNA	Flora of North America
Footprint	Areas where project related infrastructure and alternatives are proposed
GIS	Geographic Information System
ISO	International Organization for Standardization
ITIS	Integrated Taxonomic Information System Database
MSF	Mid Subarctic Forest (Michikamau) Ecoregion
DOEC	Newfoundland and Labrador Department of Environment and Conservation
<i>NLEPA</i>	<i>Newfoundland and Labrador Environmental Protection Act</i>
<i>NLESA</i>	<i>Newfoundland and Labrador Endangered Species Act</i>
QMS	Quality Management System
S Rank	Sub-national (provincial) rarity ranking for a species
<i>SARA</i>	<i>Species at Risk Act</i>
SMR	Soil Moisture Regime
SNR	Soil Nutrient Regime
UTM	Universal Transverse Mercator
VASCAN	Database of Canadian Vascular Plants

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## **1.0 INTRODUCTION**

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Alderon Iron Ore Corp. (Alderon) is proposing to develop an iron ore mine in western Labrador, and build associated infrastructure at the Pointe-Noire Terminal in the Port of Sept-Îles, Québec. The mine property is located south of the towns of Wabush and Labrador City in Newfoundland and Labrador and east of Fermont, Québec (Figure 1.1). The Kami Iron Ore Mine and Rail Infrastructure (the “Project”) is located entirely within Labrador, and includes construction, operation, and rehabilitation and closure of an open pit, waste rock disposal areas, processing infrastructure, a tailings management facility (TMF), ancillary infrastructure to support the mine and process plant, and a rail transportation component. The mine will have a nominal capacity of 16 million metric tonnes of iron ore concentrate per year. Concentrate will be transported by existing rail to the Pointe-Noire Terminal at the Port of Sept-Îles, where Project-related components will be located on land within the jurisdiction of the Port Authority of Sept-Îles.

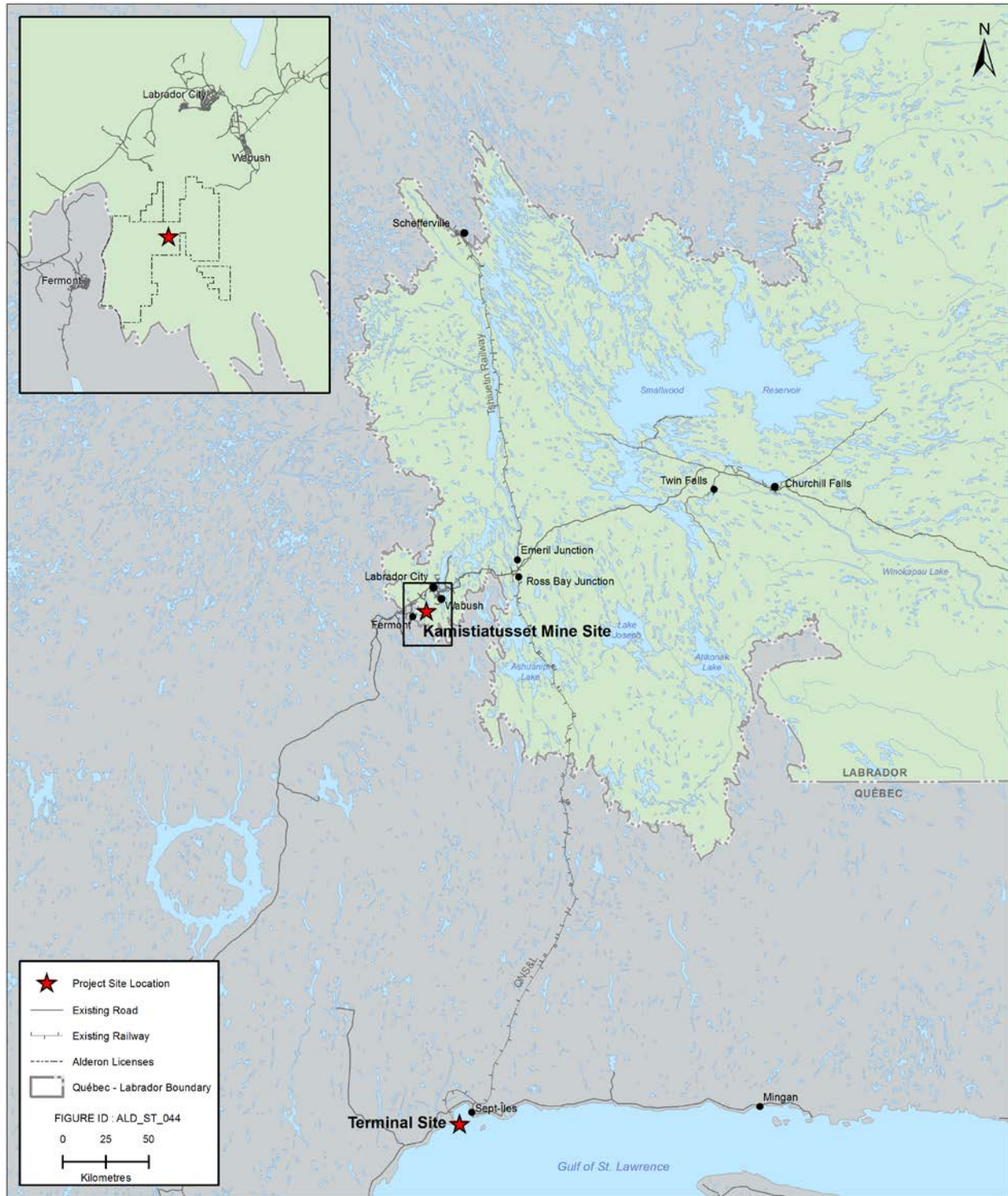
The Labrador Project components will require approvals from the Government of Newfoundland and Labrador and are subject to environmental assessment (EA) under the *Environmental Protection Act* (NLEPA) and associated *Environmental Assessment Regulations*. Federal approvals will also be required, which trigger the requirement for a federal EA under the *Canadian Environment Assessment Act* (CEAA), at the comprehensive study level. The Project was registered in accordance with the NLEPA and CEAA in October 2011.

The Newfoundland and Labrador Minister of Environment and Conservation required an Environmental Impact Statement (EIS), for which Guidelines were provided by the Ministerial-appointed EA Committee. This environmental study was conducted in support of the EIS and federal EA.

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**Figure 1.1 Project Location for the Kamistatusset (Kami) Iron Ore Mine Project**



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### **1.1 Kami Iron Ore Project Overview**

The Kami Iron Ore Project in Labrador includes construction, operation, and closure / decommissioning of the following primary components.

- Open pit (Rose Pit);
- Waste rock disposal areas (Rose North and Rose South);
- Processing infrastructure includes crushing, grinding, spiral concentration, magnetic separation, and tailings thickening areas;
- Tailings management facility (TMF);
- Effluent treatment facility;
- Ancillary infrastructure to support the mine and process plant (gate and guardhouse, reclaim water pumphouse, truck wash bay and shop, electrical substation, explosives magazine storage, administration / office buildings, maintenance offices, warehouse area and employee facilities, conveyors, load-out silo, stockpiles, sewage and water treatment units, mobile equipment, access road and transmission lines);
- A rail transportation component to connect the mine site to the Québec North Shore & Labrador (QNS&L) Railway; and
- Electrical transmission line from terminal to be located by Nalcor Energy to the mine site.

### **1.2 Overview of Rare Plants**

A rare plant species is generally defined as any native species that, because of its biological characteristics or because it occurs at the periphery of its range, or for some other reason, exists in low numbers or in very restricted areas in Newfoundland and Labrador or in Canada.

For the purposes of the 2011/2012 Rare Plant Survey, rare vascular plants (including their habitats) were the focus with an emphasis on listed species as nationally "at risk" (endangered, threatened or of special concern) under Schedule 1 SARA, those listed as endangered, threatened or vulnerable under the NLESA or those assessed as at risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). SARA prohibits the interference, disturbance, or destruction of endangered species or critical habitats for listed species. Definitions of COSEWIC and SARA wildlife species status categories are summarized in Appendix A.

In the context of this survey, a rare plant is defined as a species which meets one or more of the following criteria:

- A vascular plant species listed under Schedule 1 of *SARA* (Government of Canada 2011) and designated as "endangered, threatened, or special concern" by COSEWIC are protected by that Act. *SARA*-listed species designated as "Special Concern" are not protected by the prohibitions of Sections 32-36 of *SARA*; however; they do require that provincial or regional management plans are developed to protect the species

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- Named or listed species or candidates for possible future listing by the Newfoundland and Labrador Department of Environment and Conservation (DOEC) Wildlife Division as endangered, threatened or vulnerable under NLESA (Government of Newfoundland and Labrador 2002) and applicable parts of the *Newfoundland and Labrador Wildlife Act*.

The DOEC Wildlife Division, through the Atlantic Canada Conservation Data Centre (ACDC), also maintains a comprehensive list of vascular plant species it considers to be rare, unusual or uncommon (i.e., species with current ACCDC scarcity ranks of SU (unrankable), S1 (extremely rare), S2 (rare), and S3 (uncommon) or combinations thereof). Their ranking method is based on a system developed by the Nature Conservancy (Nature Conservancy 2011) that is used throughout North America.

As a result, a rare plant species is also defined as:

- A plant taxon not designated under one of the Acts or their associated regulation (i.e., afforded legal protection under SARA and/or NLESA), but considered unique or unusual, either locally or regionally, by the DOEC Wildlife Division as recorded by the ACCDC. That is, all SU, S1 and S2 species are considered rare. A combined rank (e.g., S1/S2) is given for species whose status is uncertain; the first rank indicates the rarity status given current documentation, and the second rank indicates the rarity status that will most likely be assigned after all historical data and likely habitats have been checked. While S3 species are of concern from a provincial biodiversity perspective, they have not been included as their populations are considered less sensitive. In addition, all elements not previously reported from Newfoundland and Labrador are considered rare.

There is also a provincial General Status assessment process that serves as a first alert tool for identifying species in the province that are potentially at risk. Under this process, the populations of species that are native to the province are classified to be either “At Risk”, “May be at Risk”, “Sensitive” to human activities or natural events, “Secure”, or “Undetermined” should there be insufficient data, information, or knowledge available to assess their status. Although species listed under this process are not granted legislative protection, the presence of species whose populations are considered to be At Risk, May be at Risk, or Sensitive is an issue of concern for provincial regulators.

A summary of the ranking systems outlined by the SARA, NLESA and ACCDC are provided in Appendix A. A complete list of the flora (including common and scientific names) identified in the Rare Plant Study Area is provided in Appendix B.

### 1.3 Study Team

The Ecological Land Classification (ELC) Baseline Study was conducted by Stassinu Stantec Limited Partnership (Stassinu Stantec). The Study Team included a Study Manager and Field Lead, Senior Reviewer, Scientific Authority, Field Observers, and Information Management / Geographical Information System (GIS) Specialists (Table 1.1). All team members have in-depth knowledge and experience in their fields of expertise and a broad general knowledge of

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the work conducted by other experts in related fields. Brief biographical statements, highlighting project roles and responsibilities and relevant education and employment experience, are provided below.

**Table 1.1 Study Team – Rare Plants Baseline Study**

Role	Personnel
Study Manager and Field Lead	Sean Bennett
Senior Review	Sue Meades
Field Team	Sean Bennett
	Rich LaPaix
Data Analysis and Report Preparation	Sean Bennett
	Rich LaPaix
Scientific Authority (Vegetation)	Sue Meades
Information Management / GIS	Chris Shupe (GIS Team Lead), Amber Frickleton

**Sean Bennett, B.Sc., P.Biol., R.P.F.**, is a Professional Biologist (ASPB) and Professional Forester (CAPF) in Stantec’s St. John’s, Newfoundland and Labrador, office, with over 14 years’ experience in the area of environmental consulting. A technical professional with focus on the assessment and characterization of terrestrial ecosystems, Mr. Bennett has provided expertise and coordinated projects throughout Canada in accordance with applicable federal and provincial (Yukon, North West Territories, Nunavut, British Columbia, Alberta, Saskatchewan, and Newfoundland and Labrador) regulatory requirements. Proficient in botanical / vegetation inventories (including taxonomy and species identification), soil classification (Canadian System of Soil Classification), and the application of ecological land classification (ELC) principles, he has conducted baseline environmental studies evaluating a variety of habitats to identify site-specific constraints (i.e., environmentally sensitive areas) and developing appropriate mitigative measures for proposed developments. Mr. Bennett served in the capacity of Study Manager and Field Lead for this Study.

**Rich LaPaix, M.Sc.**, is a terrestrial ecologist for Stantec’s office in Dartmouth, Nova Scotia, and has over five years professional experience in the field. He is an experienced botanist and vegetation ecologist, having conducted numerous botanical surveys and plant community studies in a wide range of ecotypes within both eastern and western North America. Mr. LaPaix is experienced in wetland delineation, classification, and functional assessment and also has expertise as a wildlife ecologist. He was a field researcher for this Project and has been involved in similar projects within Newfoundland and Labrador, including development of an ELC for the Labrador-Island Transmission Link project.

**Susan J. Meades, M.Sc.**, is a field botanist with over 30 years’ experience. She has a B.A. (Botany) from Rutgers University-NCAS and a M.Sc. (Botany) from Eastern Illinois University. Ms. Meades was an adjunct professor in the Biology Department of Algoma University College (1997-2008), where she taught Principles of Ecology, Diversity of Vascular Plants, Plant Identification Techniques, and Plant Systematics. She lived in Newfoundland and Labrador for 17 years, where she worked as a consultant and was instrumental in the

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establishment of Burnt Cape Ecological Reserve. She is the senior author of the *Annotated Checklist of the Vascular Plants of Newfoundland and Labrador* and the author of *Natural Regions of Newfoundland and Labrador (1990)*. Ms. Meades is also the botanical illustrator for the *Forest Site Classification Manual: A Field Guide to the Damman Forest Types of Newfoundland and Indicator Plant Species in Canadian Forests*. She is currently working on an illustrated guide to the wildflowers of Newfoundland and Labrador, a checklist of the Vascular and Non-Vascular Plants of northern Ontario and is the project leader of the Northern Ontario Plant Database project. Ms. Meades was responsible for verifying the identity of potentially rare or unconfirmed vascular plant species collected from the Rare Plant Study Area.

**Chris Shupe, Ad. Dip Remote Sensing, Dip. Cartography** is Team Leader for GIS / Information Management Services in Nova Scotia and Newfoundland and Labrador. Mr. Shupe is responsible for preparation, interpretation and analysis of satellite and air photo data to support various disciplines in preparing environmental assessments. He performs land cover identification and land use and disturbance classification to identify the effect of disturbances on the landscape. Mr. Shupe has played a key role in the project planning, spatial analysis and mapping on key projects including Imperial Oil's Mackenzie Gas pipeline, Cold Lake and Kearl Lake SAGD projects and Altalink's Heartland 500kV transmission line project.

**Amber L. Frickleton, Ad. Dip GIS, B.A. Environmental Studies**, is the GIS Coordinator for the Information Management Group in Stantec's St. John's office. She manages and maintains geographic and related attribute data for the creation of maps and datasets for internal staff and clients to support the implementation of environmental assessments. Her role includes map design and production, data manipulation and analysis and the maintenance of databases through editing and adding new features in accordance with standard formats and procedures. Ms. Frickleton's multifaceted educational experience includes relational database design and management, spatial and statistical analysis, quality assurance / quality control, data dissemination, data analysis, and map creation and reporting.



## **2.0 RATIONALE AND OBJECTIVES**

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This Rare Plant Survey (RPS) report forms one aspect of Alderon's environmental study program for the Project. The purpose of this and other such baseline studies has been to gather and present information on key aspects of the environment, and thus, provide an appropriate understanding of the existing environmental conditions within and near the Rare Plant Study Area.

The RPS was developed with the intent of: 1) providing information on the spatial distribution of potentially rare plant species in a given geographic location; 2) preparing a comprehensive GIS database; and 3) producing a map product that will serve as the basis for understanding ecological relationships with respect to rare plant species diversity and the potential environmental effects of the Project on the natural environment.

An understanding of rare vascular plants, including their habitats, is important for various reasons, including:

- the preservation of rare and/or unique genetic information and biological compounds that may provide potentially important social and economic benefits;
- regionally uncommon plants offer unique insight into biological adaptation and evolution;
- the preservation of unique habitats in which other regionally uncommon plants or plant communities exist, interact with and function within the larger ecosystem; and
- the preservation of overall biological diversity necessary for a sustainable and resilient ecosystem.

The concept of rarity is seemingly simple: a species is rare because it has relatively few individuals, it is uncommon or scarce, or it occurs within a limited geographical range. The rarity of a plant species may also be a matter of scale, meaning that a species may not be rare in Canada but may be considered "regionally rare" in Newfoundland and Labrador. The rarest species are those with small geographic ranges, few occurrences and few individuals in each occurrence.

Although an understanding of rare plant species and their protection is important for the reasons outlined above, the protection of the rarest such species within the province is also a legal requirement under the federal *Species at Risk Act (SARA)* and provincially under the *Newfoundland and Labrador Endangered Species Act (NLESA)*. There are at present numerous plant species within the province that are designated/listed under the provincial and/or federal legislation.

The objective of the RPS was to determine the potential presence / absence (not detected) and distribution of vascular plant species within the Rare Plant Study Area that are considered rare or are listed federally under the SARA, or under the NLESA.

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This survey was executed in juxtaposition with the ELC to identify potential rare plant habitats. As a result, the ELC was used to help identify appropriate sampling sites for the 2011 field season. Baseline information collected as part of this study will be used to support the environmental assessment for the proposed Project and in ongoing Project planning and design.

### **3.0 STUDY AREA**

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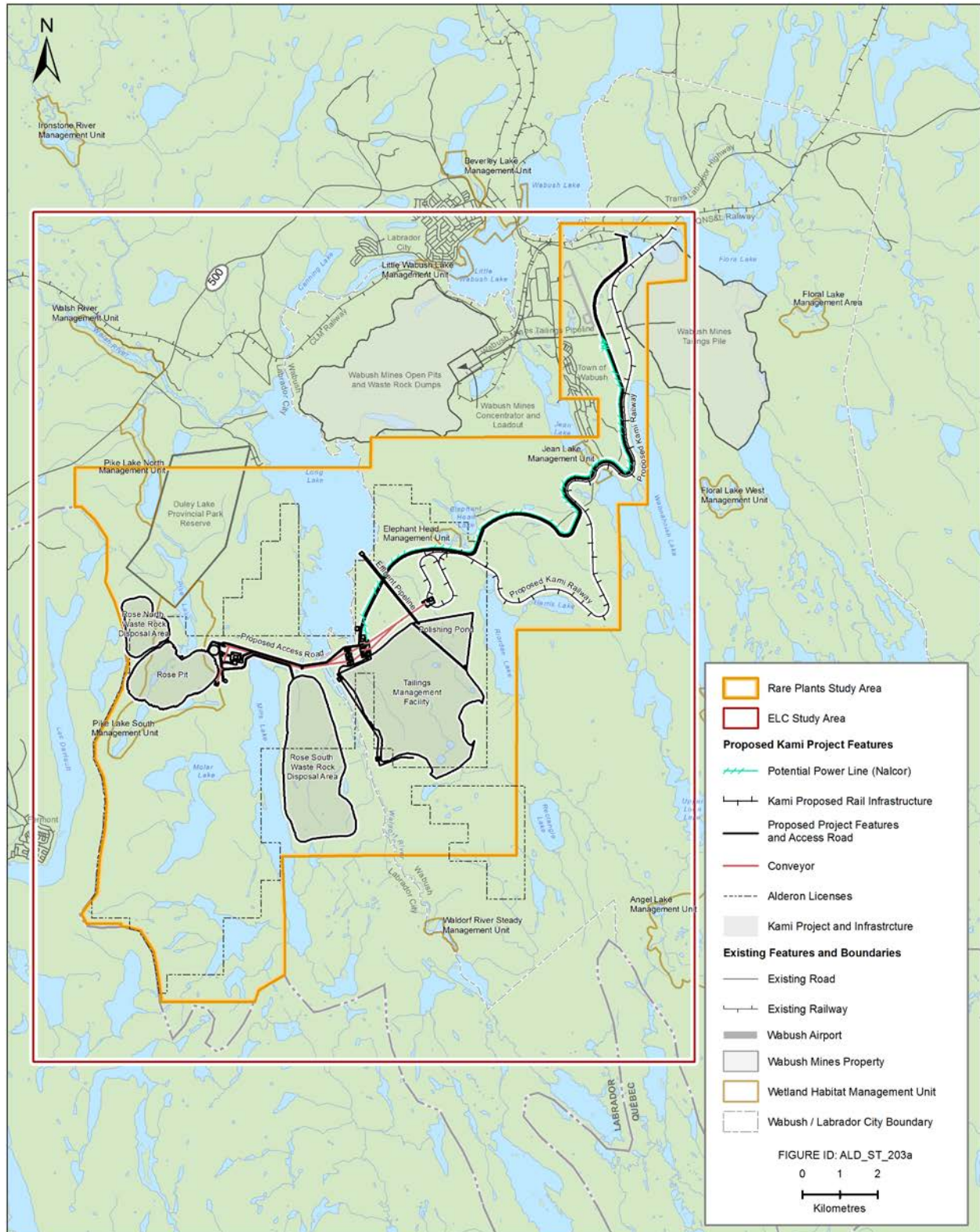
The boundaries of the RPS baseline study encompass those portions within which the principal Project components will be located (Figure 3.1). The boundaries of the Rare Plant Study Area have been used for other environmental studies relating to the Project (e.g., the ELC) and was selected to encompass all existing and proposed developments associated with the Kami mine site. Boundaries of the Rare Plant Study Area were selected using the following criteria:

- All features and infrastructure associated with the Kami mine site will be within the Rare Plant Study Area.
- The Rare Plant Study Area will include habitat(s) of key flora (i.e., “species of concern”) that could potentially interact with the proposed Project.
- The Rare Plant Study Area encompasses key areas used for resource harvesting, recreation and cultural activities.

The boundaries of the Rare Plant Study Area encompass an area of approximately 161 km<sup>2</sup> whereas the larger ELC Study Area comprises an area of 396 km<sup>2</sup>. The Rare Plant Study Area fully encompasses the proposed mine site, access road, and rail transportation components, and therefore the zone which is proposed to be directly affected by the construction and operation of the mine (Figure 3.1).

Rare Plant Surveys at this scale are considered appropriate and will provide detailed information on presence / absence of rare vascular plants and their distribution, which can in turn be used to assess potential environmental effects of the Project in the EIS.

**Figure 3.1 Kami Project ELC and Rare Plant Study Areas**



## **4.0 METHODS**

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### **4.1 Literature Review**

A review of relevant botanical and ecological information was conducted to:

- Develop an inventory of listed (as protected under either the SARA or the NLESA) and / or "rare" (SU, S1, S2, or combinations thereof) (ACCDC 2010) plant species within the Rare Plant Study Area prior to conducting field surveys.
- Identify any previous surveys or previously observed occurrences of rare vascular plants in the Rare Plant Study Area.
- Assess COSEWIC Status Assessments and / or SARA Recovery Strategies or Action Plans (if available).
- Source regional floras (*Gray's Manual of Botany* (Fernald 1950), *Flora of Canada* (Scoggan 1978) and available volumes of the *Flora of North America* (FNA) (1993, 1997, 2002, 2006, 2007).
- Collect information from other published literature, including peer-reviewed academic journals, research project reports, government publications, and current federal legislation and regulations.

### **4.2 Pre-Survey Planning**

Project planning and initial data compilation included: defining the objectives and the purpose of the work; conducting a detailed literature review of the prior vegetation and ecosystem classification studies with potential to have been performed within the region; and developing a field sampling plan and appropriate survey intensity.

#### **4.2.1 Rare Plant Element Occurrences**

In the context of vascular plants, an element occurrence can be described as an area of land or water on / in which a plant is, or was, present. It is a physical location important to the conservation of a species or community. The status ranking or conservation value (S rank) of a species or community is based on a combination of eight primary factors and is determined using the following criteria:

- Abundance
- Range
- Abundance trend (an estimate of change based on historical accounts)
- Distribution trend (species' distribution over its provincial range)
- Element occurrences (estimated number of occurrences in the province or region)
- Protected occurrences (estimated number of adequately protected occurrences in the province or region)

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- Population threats
- Habitat threats (quality of surrounding area, effect on continued existence of element occurrence).

Assuming adequate information, a letter of A, B, C, or D is assigned to each factor. A species rated as A for these eight factors will be ranked as S1 (rare), whereas a species having been assigned all Ds will be ranked as S5 (common). These criteria are used to determine status for all plant species occurring in Newfoundland and Labrador.

As of August 2011, a search of the ACCDC database (ACCDC 2011) returned 29 element occurrences (i.e., historical records) of 18 rare vascular plant species (i.e., those listed under Schedule 1 of the SARA, ranked as SU, S1, S2, or combinations thereof by the ACCDC, and / or considered May Be At Risk or Sensitive by the DOEC) with potential to occur in the vicinity of the Project (i.e., ACCDC database queries were performed for an area of 1,890 km<sup>2</sup> centered on the Project). This list was evaluated based on the specific ecological requirements of the listed plants. A summary of known rare vascular plant occurrences in the Rare Plant Study Area is provided in Table 4.1.

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**Table 4.1 Summary of Known Rare Vascular Plant Occurrences within the Rare Plant Study Area**

LB ID	Scientific Name	Common Name	G Rank <sup>1</sup>	N Rank <sup>2</sup>	Provisional S Rank <sup>3</sup>	General Status	Observation Year	Site Name	Survey Site	Accuracy
743627	<i>Veratrum viride</i> var. <i>viride</i>	green false hellebore	G5	NNR	S1	May be at risk	1997		Road from Labrador City, Labrador to Fermont, Quebec; 7 km WSW of main stop lights at Labrador City	200
743627	<i>Veratrum viride</i> var. <i>viride</i>	green false hellebore	G5	NNR	S1	May be at risk	1953	Labrador West Distr.	N. end Carol Lake	0
743627	<i>Veratrum viride</i> var. <i>viride</i>	green false hellebore	G5	NNR	S1	May be at risk	1967	Smoky Mt.	near Labrador City	1000
743332	<i>Carex concinna</i>	northern elegant sedge	G4G5	NNR	S1S2	May be at risk	1967	Labrador West Distr.	Long (Duley) Lake; near Labrador City	0
743893	<i>Cystopteris montana</i>	mountain bladder fern	G5	NNR	S1S2	May be at risk	1967	Smoky Mt.	near Labrador City	1000
743871	<i>Potamogeton pusillus</i> subsp. <i>tenuissimus</i>	narrowleaf small pondweed	G5T5	NNR	S1S3	Undetermined	1967	Smoky Mt.	near Labrador City	1000
743625	<i>Triantha glutinosa</i>	sticky tofieldia	G3G5	NNR	S1S3	Undetermined	1997		Road from Labrador City to Fermont, Quebec; Walsh River, 11.8 km SW of main stop light at Labrador City	500
743625	<i>Triantha glutinosa</i>	sticky tofieldia	G3G5	NNR	S1S3	Undetermined	1997		Road from Labrador City, Labrador to Fermont, Quebec; 8.6 km WSW of main stop lights at Labrador City	200
743276	<i>Viola renifolia</i>	kidneyleaf violet	G5	NNR	S1S3	Undetermined	1967	Smoky Mt.	near Labrador City	1000
742678	<i>Hedysarum alpinum</i>	alpine hedsyarum	G5	NNR	S2	May be at risk	1967	Labrador West	Long (Duley) Lake; near Labrador City	0
742074	<i>Osmorhiza depauperata</i>	blunt sweet-cicely	G5	NNR	S2	May be at risk	1967	Smoky Mt.	near Labrador City	1000
742074	<i>Osmorhiza depauperata</i>	blunt sweet-cicely	G5	NNR	S2	May be at risk	1967	Smoky Mt.	near Labrador City	1000
742902	<i>Primula mistassinica</i>	Mistassini primrose	G5	NNR	S2	Sensitive	1953	Labrador West Distr.	NW side, Carol Lake	0
742902	<i>Primula mistassinica</i>	Mistassini primrose	G5	NNR	S2	Sensitive	1963	Labrador West Distr.	Wabush City	1000

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LB ID	Scientific Name	Common Name	G Rank <sup>1</sup>	N Rank <sup>2</sup>	Provisional S Rank <sup>3</sup>	General Status	Observation Year	Site Name	Survey Site	Accuracy
743912	<i>Equisetum pratense</i>	meadow horsetail	G5	NNR	S2S3	Sensitive	1967	Smoky Mt.	near Labrador City	1000
743912	<i>Equisetum pratense</i>	meadow horsetail	G5	NNR	S2S3	Sensitive	1967	Smoky Mt.	near Labrador City	1000
743401	<i>Carex media</i>	intermediate sedge	G5	NNR	S2S4	Undetermined	1967	Smoky Mt.	near Labrador City	1000
742163	<i>Cirsium muticum</i>	swamp thistle	G5	N5?	S2S4	Undetermined	1967	Smoky Mt.	near Labrador City	1000
743517	<i>Eriophorum callitrix</i>	beautiful cottongrass	G5	NNR	S2S4	Undetermined	1967	Smoky Mt.	near Labrador City	1000
743771	<i>Hordeum jubatum</i> subsp. <i>jubatum</i>	foxtail barley	G5T5	N5	S2S4	Undetermined	1997		Road from Labrador City to Churchill Falls; just E of the junction with the Labrador City-Wabush Road	500
742230	<i>Packera aurea</i>	golden groundsel	G5	NNR	S2S4	Undetermined	1953	Labrador West Distr.	NW side.; Carol Lake	0
742230	<i>Packera aurea</i>	golden groundsel	G5	NNR	S2S4	Undetermined	1967	Smoky Mt.	near Labrador City	1000
742230	<i>Packera aurea</i>	golden groundsel	G5	NNR	S2S4	Undetermined	1967	Labrador West	Long (Duley) Lake; near Labrador City	0
743172	<i>Parnassia palustris</i> var. <i>tenuis</i>	marsh grass-of-parmassus	G5T3T5	NNR	S2S4	Undetermined	1997		Jean Lake, Wabush	200
743172	<i>Parnassia palustris</i> var. <i>tenuis</i>	marsh grass-of-parmassus	G5T3T5	NNR	S2S4	Undetermined	1997		Wabush; entrance road to Wabush Airport Terminal	50
743853	<i>Potamogeton alpinus</i>	northern pondweed	G5	NNR	S2S4	Undetermined	1967	Smoky Mt.	near Labrador City	1000
743853	<i>Potamogeton alpinus</i>	northern pondweed	G5	NNR	S2S4	Undetermined	1967	Smoky Mt.	near Labrador City	1000
743136	<i>Salix pedicellaris</i>	bog willow	G5	NNR	S2S4	Sensitive	1963	Labrador West Distr.	Wabush City	1000
743136	<i>Salix pedicellaris</i>	bog willow	G5	NNR	S2S4	Sensitive	1967	Smoky Mt.	near Labrador City	1000

<sup>1</sup> Global Conservation Status Rank, <sup>2</sup> National Conservation Status Rank, <sup>3</sup> Subnational (or Provincial) Conservation Status Rank



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A search of the COSEWIC database revealed that there are no known SARA- listed species (endangered, threatened, or special concern) within the Rare Plant Study Area (COSEWIC 2011).

### **4.2.2 Existing Spatial Reference Data**

Geospatial reference data related to known occurrences of rare vascular plant species were acquired from the ACCDC. These were overlaid on existing geospatial data layers (e.g., National Topographic System maps at 1:50,000 scale or larger, aerial photographs / photo mosaics, at a resolution appropriate for facilitating ground-based surveys) of the Rare Plant Study Area.

GIS layers were then used to produce a base map upon which the survey plan was developed, and included all biophysical and geospatial data needed to stratify the landscape into patches with differing likelihood of occurrence for each species, where applicable. Additionally, a botanical surveyor's map was used to illustrate the areas to be surveyed. This included transect or sample point locations with Universal Transverse Mercator (UTM) coordinates, access routes, and any information related to natural hazards in the Rare Plant Study Area.

Current ACCDC general status rank data were uploaded to each of the Trimble Nomad™ hand-held data collection and mobile GIS devices. The use of these devices provided additional rigor to the survey, enabling surveyors to record the location of potential special status plant taxa directly into a Project-specific rare plant database, while also immediately identifying the general status rank for that species.

### **4.3 Field Sampling**

Rare plant surveys were conducted between July 25 to August 4, 2011 and July 17 to 22, 2012 and consisted of not less than 10 combined field-team-days of surveys, or approximately 200 person-hours. A sampling strategy was designed that selected those habitats that typically have the highest potential to harbour rare plants. Information gathered during the 2011 ELC, wetlands and rare plant surveys was used to further refine the target search areas for 2012. Timing coincided with a period when the probability of encountering both cool and warm season perennials was highest, and when potential species of interest (i.e., rare vascular plants) including diagnostic features were most identifiable and the detectability of the majority of species maximized (S. Meades, pers. comm. 2011). Field results in 2011 indicated that mid to late July presented the optimum sampling period (most species in flower) from which to conduct future surveys. As such, the 2012 field schedule was adjusted accordingly. Field time in 2012 was used to search for additional rare vascular plant species from within the proposed Project footprint and to better determine the range of those rare plant species observed in 2011 and deemed of conservation concern to the Province. Targeted habitats included wetlands (fens), flood plains of slow-moving rivers and streams, and unique rock outcrops and landforms.

At present, standardized guidelines for rare plant surveys have not been adopted by any government or regulating agency in eastern Canada.

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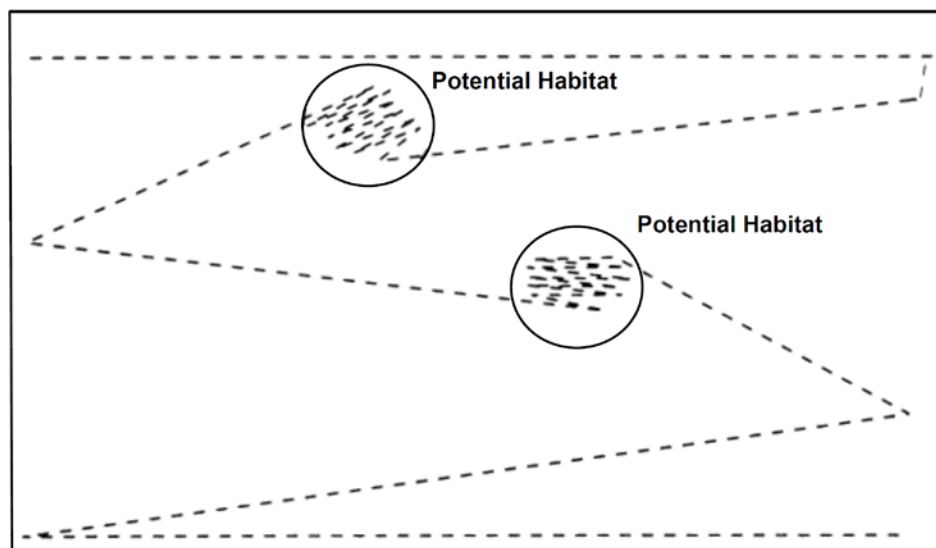
Minimum requirements for a thorough rare plant survey (ANPC 2000) include:

- The RPS should provide reasonable geographic coverage of the study area, including:
  - Sampling of representative vegetation communities or habitat types
  - All unique or uncommon plant associations
  - All features or biotic patterns with high probability of supporting rare plants
- Timing surveys to occur during periods when potential rare species are most visible (when diagnostic features are most identifiable), and when the probability of encountering both cool and warm season perennials is highest.
- Revisit an adequate number of sites where rare plant element occurrences have been previously recorded.

All requirements were achieved during this survey.

### **4.3.1 Stratified Sampling**

RPS plots were investigated using a floristic survey method with stratified, random meander searches (Figure 4.1). A floristic survey, in the context of a RPS, permits all species encountered during searches of the Rare Plant Study Area to be sufficiently evaluated to determine whether they are, in fact, a potential rare vascular plant species. Stratified sampling involves a survey of habitats with the greatest search effort applied to areas (i.e., microhabitats) having the highest potential to support rare vascular plant species. This method is used to account for different areas (or strata) that are identified within a larger habitat polygon. Individual plant associations or plant communities are rarely uniform throughout their extent, and there are often smaller, identifiable areas within a habitat that are substantially different from that of the larger habitat polygon. These strata are inclusions within the larger habitat matrix; as such, they may be sampled separately from the main body of the ecotype. If sufficient biodiversity information is available on the habitat requirements of potentially occurring species (plant community, substrate, etc.), and portions of the survey location are believed to be potentially suitable for those species, the stratified sample technique is used to document and validate the assumptions regarding species presence or absence (no detection) within the Rare Plant Study Area.

**Figure 4.1 Illustration of Stratified Sampling Method**

#### 4.3.2 Data Collection

Surveys of the Rare Plant Study Area were completed in a two-stage process, initially; in juxtaposition with ecosystem mapping (Alderson 2012a) conducted from July 25 to 30, 2011, and later through the use of focused RPS in 2011 and 2012. During ecosystem mapping, approximately 15 minutes of effort was expended at the end of field sampling for each ELC full and ground plot to look specifically for rare plant species. As a result of this preliminary effort, specific habitats (e.g., alpine habitats, seepage areas, riparian areas) were identified for follow-up RPS. Focused RPS focused on fine-scale habitats identified during the ELC field program and reconnaissance flights of the ELC Study Area.

During focused RPS, a single team consisting of two experienced botanist sampled selected sites during the peak growing period from July 31 to August 4, 2011, and July 17 to 22, 2012. Sampling sites were identified from helicopter reconnaissance flights during earlier environmental studies. A subset of potential sites was selected based on spatial distribution and accessibility throughout the Rare Plant Study Area (2011/2012) and regionally (2012), ensuring that it's full geographic range was sampled. Search effort focused on inspecting as many fine-scale biotic habitats, unusual plant communities and biophysical features as possible. In addition, portions of the most dominant habitat types and plant communities were also inspected. At each site, a complete list of observed vascular plants in that habitat was recorded. The size of the area sampled within each site varied according to the size of the habitat and ranged from approximately ten to several hundred square metres. Depending on the size of the area being sampled, field crews searched a site for several minutes to approximately one hour.

As such, a survey of key habitats was completed, and a list of all observed plant taxa compiled. The plant community where each taxon occurred was recorded using Trimble Nomad™ handheld data logger technology, which included pre-loaded current ACCDC status rank data. High

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potential habitat areas included areas defined in the pre-survey literature review of rare plant taxa, and areas where these taxa were encountered.

When a potential rare vascular plant species was encountered, it was identified using nomenclature of the FNA and the Database of Canadian Vascular Plants (VASCAN), and the point or polygon where it was located was recorded with a Trimble Nomad™ hand-held computer (in UTM 1983; North American Datum [NAD 83] coordinates). GPS accuracy (measurement error) was monitored to establish accuracy of the unit at or below  $\pm 5$  m. Careful attention ensured the measured point or polygon was not simply a small portion of a much larger polygon less than 10 m away, thus representing a separate occurrence.

Rare vascular plant species were mapped and abundance was recorded, depending on the growth form of the species. In most instances, the numbers of stems were counted. There were a few instances where a rare vascular plant species occurred in high densities (e.g., green false hellebore [*Veratrum viride* var. *virid*]; S2 [ACCDC]; may be at risk [General Status]), making it necessary to estimate numbers or cover percentage as an indicator of abundance.

In addition to location, the general distribution of the species and a description of habitat in the Rare Plant Study Area within which each potential rare plant occurrence was recorded. Point location data are suitable for plant species occurrences that are less than 10 m in diameter, and greater than 10 m apart from the next nearest occurrence of the same species. Where necessary, polygons are considered suitable for those occurrences that are greater than 10 m in diameter or for clusters of smaller patches less than 10 m apart that collectively occupy a patch greater than 10 m in diameter. Polygons of different species can overlap and the area of occupancy may extend for large distances.

Each observation of an individual or grouping of a rare vascular plant species was recorded in accordance with the information outlined in Table 4.2.

**Table 4.2 Rare Plant Species Occurrence Information**

Plant Information	Definition
Site ID	The name assigned to the survey site
Date	Date of observation
Observer	Observer's name
Survey Location #	The survey number for the site (e.g., Rare Plant Survey1)
Plant GPS Point	The survey number for the site in coordination with a unique identifier for each species found at that site (e.g., Rare Plant Survey1-RL1 for survey number - observer name, plant #)
Species	Plant species observed
# Individuals	The number of individual plants (or groups if it is difficult to identify individuals of a species); estimate if >50 individuals
# Groups	The number of groups only if it was not possible to easily identify individuals for this species - estimate if >50
Distribution	The approximate distribution: widely scattered; evenly distributed; or densely clumped
Area of Distribution	The approximate area (m <sup>2</sup> ) within which the species is distributed

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Plant Information	Definition
Phenology	The approximate percentage of the individuals that are: in leaf (0 to 100%); in bud (0 to 100%); in flower (0 to 100%); in fruit (0 to 100%); dispersing seed (0 to 100%); or dormant (0 to 100%)
Unique ID	If there are >20 individuals and identification is not certain, a single specimen may be collected (necessary permits are required) and deposited in a designated herbarium (e.g., Herbarium of the Provincial Museum of Newfoundland and Labrador). In such an event, the specimen was given a unique code or collection number: YYMMDD + 6-character GPS point
Habitat	Biodiversity information regarding plant association / plant community type, soil, slope, aspect, soil moisture regime, and soil nutrient regime
Photos	Digital photographs were taken of each encountered rare plant species and of the general landscape in which the occurrence was recorded

### 4.3.3 Voucher Specimens

If a plant could not be identified in the field, a sample (voucher) was collected for post-field work identification and preservation. Rare plant vouchers were collected only if the population was sufficient to permit collection (i.e., their removal would not lead to an immediate loss of greater than 5 percent of the observed population). This was done to ensure that the potential for future plant propagation was not compromised. Voucher specimens are particularly important when identifying uncommon, unconfirmed, or unrecognized species of sedges, grasses, and other graminoids. Vouchers collected included the minimum amount of material (leaf, seeds, twigs) needed to ensure proper identification. Whole plants were collected only if the population was large enough. Collected specimens were labeled and prepared for identification, verification and / or archiving.

## 4.4 Post-Survey Data Management and Analysis

### 4.4.1 Taxonomic Nomenclature

Plant taxonomy has in the past few years become an issue for conducting vegetation baseline studies in northern regions. Until recently, many studies were able to use *Gray's Manual of Botany* (Fernald 1970) and *Flora of Canada* (Scoggan 1978) as the "authority" for all nomenclature of vascular plants, keeping identification simple. However, there have been so many taxonomic changes since the publication of these documents that they are now outdated.

For this study, the taxonomy for all plants collected in 2011 was checked using two primary authorities, the *Database of Canadian Vascular Plants* (VASCAN), the *Integrated Taxonomic Information System Database* (2009) and in select cases, available volumes of the FNA (1993 to 2010). Taxonomy was checked and validated during report preparation.

The plants listed in this report are generally referred to using their widely accepted common names. Within the document, the scientific species name is used the first time a plant name appears in the text. A common name is used thereafter, unless there is a possibility of confusion, in which case the scientific name is used. Some plants have no common names, in which case only the scientific name is used. Where there is a list of several species in the same genus, this report follows the commonly used procedure of using the genus name first, and only

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the initial for that genus in the rest of the text (e.g., “*Salix uva-ursi*, *S. discolor* and *S. pedicellaris*”).

### 4.4.2 Verification by Taxonomic Experts

Identification of potentially rare plant species ultimately requires both the use of taxonomic keys, and follow-up confirmation of the identification by a recognized taxonomic expert. These specialists are aware of any new developments in their particular areas of expertise. Taxonomic expertise for the Project was provided by Sue Meades (Scientific Authority - vascular plants).

In those cases where a confirmed identification was not possible in the field, verification by Sue Meades, M.Sc. with the assistance of staff (Dr. Stu Hay) from the University of Montreal Herbarium was obtained.

### 4.4.3 Analysis of Vegetation Data

Upon completion of the RPS, all field data collected from both the ELC and RPS sample plot locations were entered into a digital database(s) (i.e., Microsoft Excel / Microsoft Access) for summary and analysis. The database was subsequently queried to extract relevant information for further analyses. Potential and confirmed rare vascular plant species were then mapped using the UTM coordinates from GPS waypoints taken at each rare plant location to depict the distribution of these rare plants within the Rare Plant Study Area.

### 4.4.4 ArcGIS

ArcGIS software was used to manage all spatial data collected during field surveys. Data were stored in a geodetic datum using the NAD 83, with mapping created using the same NAD 83 coordinate system. Sampling databases, ELC (Stantec 2010b) polygons, and associated base map information and imagery were all managed in ArcMap GIS (Version 9.3). ArcGIS was used for all data analysis and cartographic output.

## 4.5 Quality Assurance / Quality Control Procedures

A number of quality assurance and control measures were employed to facilitate correct identification and naming of all recorded plant species. Those measures include:

- consultation with botanists recognized as experts within specific taxonomic groups for verification of species identification;
- nomenclature followed that of the VASCAN, FNA and the *Annotated Checklist of the Vascular Plants of Newfoundland and Labrador* (Meades et al. 2000. Updated 2010);
- a relational database program was used to verify S Ranks and alternate names (synonyms) for all collected species as provided by the ACCDC;
- synonyms were cross-checked with the VASCAN, FNA and the *Annotated Checklist of the Vascular Plants of Newfoundland and Labrador* (Meades et al. 2000. Updated 2010);
- consultation with recognized and established herbaria throughout North America; and

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- timely submission of voucher specimens to the DOEC (where applicable).

An in-house technical review process was conducted by senior technical reviewers to confirm this report adequately addresses the work scope and conforms to the quality requirements stipulated by Stassinu.

## 5.0 STUDY OUTPUTS

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### 5.1 Context and Overview

#### 5.1.1 Ecological Context

The Rare Plant Study Area is located within the Mid Subarctic Forest / Michikamau Ecoregion (Meades 1989, in Meades 1990). The Mid Subarctic Forest / Michikamau ecoregion extends across central and western Labrador and is marked by cool, short summers and severe, cold winters. The mean annual temperature is approximately -3.5°C. The mean summer temperature is 9°C and the mean winter temperature is -16°C. Mean annual precipitation ranges from 700 mm in the north to 1,000 mm near the Québec / Labrador border in the southwest. The Ecoregion is classified as having a low subarctic ecoclimate. The growing season is short, lasting between 100 and 120 days. Its open coniferous forests are transitional, both to tundra and alpine tundra vegetation communities to the north, and to the closed cover of typical coniferous boreal forests to the south. The pedological soil types and range of natural habitats and wildlife found in the Rare Plant Study Area are well characterized. There are few tree species, predominantly black spruce (*Picea mariana*); with secondary occurrence of balsam fir (*Abies balsamea*), tamarack (*Larix laricina*), white birch (*Betula papyrifera*), and white spruce (*Picea glauca*). Trees are 6 to 23 m in height; with an average of approximately 10 m. Forests are restricted to locally rich and protected sites between high, rounded rock ridges.

#### 5.1.2 Overview of Ecosystems within the Rare Plant Study Area

The rare plant surveys were preceded by ELC habitat mapping in July 2011 which covered the entire ELC Study Area (see Ecological Land Classification Report), and thus Rare Plant Study Area. This prior work allowed the rare plant survey team to identify habitats with potential to support the rare vascular plant species which is where the target RPS occurred.

Ecosystems within the ELC Study Area were defined during the development of the ELC for the Project. Lower elevation forests were dominated by black spruce, with balsam fir as a minor component on sites with mineral substrates. Forested areas with organic soils were dominated by stands of tamarack and black spruce. Shrub and graminoid-dominated wetlands occupy depressional areas where increasingly poor drainage and high water tables persist. On well-drained upland sites, hardwood and/or mixedwood stands often include white spruce and white birch as co-dominants, especially on south-facing slopes. White birch stands are infrequently distributed on moist and rich soils on north-facing slopes and in drainage channels where moister conditions reduce the incidence of fire. At higher elevations, black spruce dominates the forested areas but becomes increasingly stunted (krummholz form) with increased elevation.

Shrub communities consisting mainly of dwarf birch (*Betula glandulosa*) and willows (*Salix* spp.) dominate the landscape from low to high elevations. Historic incidences of fire across the region have contributed to an increase in shrub-dominated communities in previously forested areas.



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At higher elevations, willow and scrub-birch become reduced in size and species composition expands to include a variety of dwarf alpine shrubs.

Alpine communities were generally small and patchy in their distribution and were dominated by dwarf willows, dwarf birch, crowberry (*Empetrum nigrum*), alpine bearberry (*Arctous alpina*), alpine bilberry (*Vaccinium uliginosum*), and lichen species (*Cladina* spp.).

Burns, particularly from fires in or around the mid to late 1990s, cover large expanses (approximately 77 km<sup>2</sup>) of the ELC Study Area, particularly at the southern end of the section. The vast majority of these areas are now the site of post-fire shrub regeneration. Thus, there are many young regenerating stands, both coniferous, mixed coniferous, and deciduous (i.e., young white birch and trembling aspen [*Populus tremuloides*]). Between 15 and 20 years after a fire, average regenerated cover is anticipated to reach 25 to 75 percent, depending on the landscape and site conditions. Between 25 and 50 years after a fire, regeneration density will likely increase and conifer species become increasingly dominant. After 50 years, the landscape can be classified as forest.

Ecotype descriptions are described in detail in the ELC, as prepared for the Project. The distribution of ecosystems (ecotypes) within the Assessment Area was mapped as part of the ecosystem mapping strategy for the Project. Ecosystem mapping within a 396 km<sup>2</sup> ELC Study Area was guided by the British Columbia Terrestrial Ecosystem Mapping inventory standards and mapped at a scale of 1:35,000 (Resource Inventory Committee [RIC] 1998). This system provides a uniform method of describing vegetation, soil, and terrain characteristics based on air photo interpretation and field data collection, and are designed to be scientifically accurate and efficient, particularly when collecting field data in remote locations (RIC 1998). The area of individual ecosystem map units (forested and non-forested ecotypes and sparsely vegetated, non-vegetated, and anthropogenic units) is presented in Table 5.1.

**Table 5.1 Summary of Ecosystem Units (Ecotypes) within the ELC Study Area**

Ecosystem	Ecotype / Subtype	Area (km <sup>2</sup> )	Percentage of ELC Study Area (%)
Alpine Ecosystem	Alpine Heath	1.0	0.2
Forested Ecosystem	Hardwood Forest	5.4	1.4
Forested Ecosystem	Hardwood Burn / Regeneration	34.1	8.6
Forested Ecosystem	Mixedwood Forest	17.5	4.4
Forested Ecosystem	Mixedwood Burn / Regeneration	5.3	1.3
Forested Ecosystem	Black Spruce-Labrador Tea-Feathermoss	91.5	23.1
Forested Ecosystem	Black Spruce-Lichen	19.7	5.0
Forested Ecosystem	Softwood Burn / Regeneration	37.5	9.5
Forested Wetland Ecosystem	Black Spruce / Tamarack-Sphagnum Woodland	49.6	12.5
Forested Riparian Ecosystem	Tamarack / Black Spruce-Feathermoss (Water Track)	30.1	7.6
Non-Forested Wetland Ecosystem	Patterned Shrub Fen	3.1	0.8
Non-Forested Wetland Ecosystem	Non-Patterned Shrub Fen (*incl. Graminoid Fen)	9.3	2.3

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Ecosystem	Ecotype / Subtype	Area (km <sup>2</sup> )	Percentage of ELC Study Area (%)
Non-Forested Riparian Ecosystem	Riparian Thicket	0.3	0.1
Non-Forested Riparian Ecosystem	Riparian Marsh / Fen	0.6	0.2
Aquatic Ecosystem	Shallow Open Water with Vegetation	5.0	1.3
Aquatic Ecosystem	Open Water (incl. Lake / Pond / River)	54.5	13.7
Anthropogenic	Exposed Earth / Anthropogenic	22.4	5.7
	Cloud	7.8	2.0
	Shadow	1.7	0.4
Totals (Rounded)		396	100.0

### 5.2 Rare Vascular Plants

During the five field days allocated for the 2011 Rare Plant Survey, the Study Team expended over 50 person-hours in the field searching. In total, in excess of 87 RPS locations (56 ELC and 31 focused Rare Plant Surveys) were examined for occurrences of rare vascular plant species within the proposed Project footprint during this period. Additional focused RPS of the proposed Project footprint and regional area were conducted in summer 2012. Included in these studies were targeted searches for those rare vascular plant species deemed to be “of conservation concern” to the Province (as identified by DOEC Wildlife Division, June 7, 2012) based on the results of the 2011 surveys. As previously stated, field surveys were performed by two botanists over a five day period and averaged approximately 10 hours per day; therefore the entire survey effort totaled approximately 80 person-hours on the ground. Surveys were floristic in nature. A list of observed vascular plant species is provided in Appendix B.

#### 5.2.1 Species at Risk

There were no observations of species listed under Schedule 1 of SARA or pursuant to the NLESA during surveys of the Rare Plant Study Area.

#### 5.2.2 Rare Plant Species

A total of 28 rare plant species were found during field surveys in 2011. Five of these species, northern valerian (*Valeriana dioica* subsp. *sylvatica*), green false hellebore (*Veratrum viride* var. *viride*), chestnut sedge (*Carex castanea*), alpine hedsarum (*Hedysarum alpinum*) and tall northern green orchid (*Platanthera aquilonis*) are considered as “May be at Risk” by DOEC and are therefore considered to be of high conservation concern within Labrador. The occurrence of a sixth “May be at Risk” species, jack pine (*Pinus banksiana*), appears (planting arrangement and tree spacing) to be the result of planting or the establishment of small experimental seedlots or trials by the local branch (Wabush) of Newfoundland and Labrador Department of Natural Resources.

Seven plant species have been assigned a “Sensitive” ranking by DOEC indicating, they are potentially susceptible to human activities or natural events, and include Mistassini primrose (*Primula mistassinica*), trailing arbutus (*Epigaea repens*), bog willow (*Salix pedicellaris*),

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Buxbaum's sedge (*Carex buxbaumii*), variegated scouring-rush (*Equisetum variegatum* subsp. *variegatum*), Lapland buttercup (*Coptidium lapponicum*), and horned dandelion (*Taraxacum ceratophorum*).

Populations of the remaining 14 species are considered "Sensitive" or status "Undetermined" by DOEC but have been assigned rankings varying from "S1S2" to "S3" by the ACCDC, indicating that their populations are considered to be extremely rare to uncommon within Labrador and of long term concern. These taxa include sticky tofieldia (*Triantha glutinosa*), lesser paniced sedge (*Carex diandra*), swamp thistle (*Cirsium muticum*), beautiful cottongrass (*Eriophorum callitrix*), toad rush (*Juncus bufonius* var. *bufonius*), American moor rush (*Juncus stygius* var. *americanus*), golden groundsel (*Packera aurea*), pink pyrola (*Pyrola asarifolia*), purple false melic (*Schizachne purpurascens*), small-fruit bulrush (*Scirpus microcarpus*), northern pondweed (*Potamogeton alpinus*), whitestem pondweed (*Potamogeton praelongus*) and alpine threadleaf pondweed (*Stuckenia filiformis* subsp. *alpina*). Spike muhly (*Muhlenbergia glomerata*) and yellow sedge (*Carex flava*) have not been previously recorded for Labrador and is therefore considered status Unranked.

In 2012, additional surveys from within or in proximity to the Project footprint and regionally, in areas of high potential habitat for the aforementioned species, resulted in nine additional rare plant taxa (small yellow lady-slipper (*Cypripedium parviflorum*), beautiful sedge (*Carex concinna*), daisy fleabane (*Erigeron hyssopifolius*), and northeastern white water-crowfoot (*Ranunculus aquatilis* var. *diffusus*), umbellate bastard toad-flax (*Comandra umbellata*), inland sedge (*Carex interior*), Kotzebue's grass-of-parnassus (*Parnassia kotzebuei*), greenish-flowered wintergreen (*Pyrola chlorantha*) and kidney-leaf white violet (*Viola renifolia*) being added. A total of 37 rare vascular plant taxa were identified within or in proximity of the proposed Project footprint.

Of the aforementioned species, 11 (green false hellebore, northern elegant sedge, sticky tofieldia, kidney-leaf white violet, alpine hedsarum, Mistassini primrose, swamp thistle, beautiful cottongrass, golden groundsel, northern pondweed, and bog willow) had previously been identified through queries of the ACCDC database as potentially occurring within or in close proximity to the Rare Plant Study Area. A listing of all rare plant species and their associated habitat type(s) is provided in Table 5.2 and the generalized locations of the each rare plant location is illustrated on Figure 4.1. A comprehensive list of vascular plant species observed in the Rare Plant Study Area and general vicinity of the Project (regionally) during the course of the 2011 and 2012 RPS is provided in Appendix B.

Table 5.2 Summary of Rare Vascular Plant Species Occurrences within the Rare Plant Study Area

Scientific Name	Common Name	G Rank <sup>1</sup>	N Rank <sup>2</sup>	Provisional S Rank <sup>3</sup>	General Status	Number of Individuals/Populations	Phenology	Observed Habitat / ELC Ecotype	Photo Number
<b>2011</b>									
<i>Veratrum viride</i> Aiton var. <i>viride</i>	green false hellebore	G5TNR	NNR	S1	May be at risk	41	Plant fully developed; full bloom	In various woodland habitats throughout the Rare Plant Study Area; on subhygric soils; calcareous or basic substrates (calciphile); Black Spruce-Labrador Tea-Feathermoss, Black Spruce / Tamarack-Sphagnum Woodland, Tamarack / Black Spruce-Feathermoss (Water Track) and Non-Patterned Shrub Fen ecotypes	1 - 2
<i>Hedysarum alpinum</i> L.	alpine hedsarum	G5	NNR	S2	May be at risk	8	Plant fully developed; full bloom	River terraces, lake shores (beaches) with exposed calcareous or basic substrates (calciphile);	3 - 4
<i>Valeriana dioica</i> subsp. <i>syvatica</i> (S. Watson) F. G. Mey.	northern valerian	G5T4T5	N4N5	S1	-	36	Plant fully developed	Floodplains of small rivers and stream, in seepage areas, on subhygric soils; calcareous or basic substrates (calciphile); Tamarack / Black Spruce-Feathermoss (Water Track) ecotype	5 - 6
<i>Pinus banksiana</i> Lamb.	jack pine	G5	N5	S1	May be at risk	1	Shoot elongate Inflorescence fully developed; spikelet's drooping on long peduncles	Former burn site (seed trial), open woodland, sandy soils; Black Spruce-Lichen ecotype	7 - 8
<i>Carex castanea</i> Wahlenb.	chestnut sedge	G5	N5	S1S2	May be at risk			Wet meadows; calcareous or basic substrates (calciphile); Tamarack / Black Spruce-Feathermoss (Water Track) ecotype	no photo
<i>Platanthera aquilonis</i> Sheviak	tall northern green orchid	G5	N5	S2S3	May be at risk	13	Plant fully developed; full bloom	Wetlands, floodplains of small rivers and stream; in seepage areas. Non-Patterned Shrub Fen and Tamarack / Black Spruce-Feathermoss (Water Track) ecotypes	9 - 10
<i>Triantha glutinosa</i> (Michx.) Baker	sticky tofieldia	G4G5	NNR	S1S3	Undetermined	49	Plant fully developed; fading	Open wetland habitats; calcareous or basic substrates (calciphile); Non-Patterned Shrub Fen ecotypes	11 - 12

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Scientific Name	Common Name	G Rank <sup>1</sup>	N Rank <sup>2</sup>	Provisional S Rank <sup>3</sup>	General Status	Number of Individuals/Populations	Phenology	Observed Habitat / ELC Ecotype	Photo Number
<b>2011</b>									
<i>Primula mistassinica</i> Michx.	Mistassini primrose	G5	NNR	S2	Sensitive	16	Plant fully developed; fading	Wetlands, floodplains of small rivers and stream; in seepage areas; calcareous or basic substrates (calciphile); Non-Patterned Shrub Fen ecotype	13 - 14
<i>Epigaea repens</i> L.	trailing arbutus	G5	NNR	S2S3	Sensitive	1	Full leaf unfolding	Open woodlands, on sandy soils; Black Spruce-Lichen ecotype	15 - 16
<i>Coptidium lapponicum</i> (L.) Gand	Lapland buttercup	G5	NNR	S2S3	Sensitive	3	Plant fully developed	Floodplains of small rivers and stream, in seepage areas, on subhygric soils; Tamarack / Black Spruce-Feathermoss (Water Track) ecotype	17
<i>Salix pedicellaris</i> Pursh	bog willow	G5	NNR	S2S4	Sensitive	9	Full leaf unfolding	Wetlands; Non-Patterned Shrub Fen, Black Spruce / Tamarack-Sphagnum and Riparian Marsh (Fen) ecotypes	no photo
<i>Taraxacum ceratophorum</i> (Ledeb.) DC.	horned dandelion	G5T5	N5	S3	Sensitive	4	Plant fully developed; full bloom	Floodplains of small rivers and stream, in seepage areas, on subhygric soils; Tamarack / Black Spruce-Feathermoss (Water Track) ecotype	no photo
<i>Equisetum variegatum</i> Schleich. ex F. Weber & D. Mohr subsp. <i>variegatum</i>	variegated scouring-rush	G5T5	N5	S3	Sensitive	2	Plant fully developed	Edge of a Non-Patterned Shrub Fen ecotype	19 - 20
<i>Cirsium muticum</i> Michx.	swamp thistle	G5	N5?	S2S4	Undetermined	2	Plant fully developed; full bloom	Open wetlands on peaty soils; edge of a Non-Patterned Shrub Fen ecotype	21 - 22
<i>Pyrola asarifolia</i> Michx. subsp. <i>asarifolia</i>	pink pyrola	G5	NNR	S2S4	-	1	Plant fully developed; fading	Moist woods; Tamarack/Black Spruce-Feathermoss (Water Track) ecotypes	23 - 24
<i>Carex buxbaumii</i> Wahlb.	Buxbaum's sedge	G5	N5	S3	Sensitive	2	Inflorescence fully developed	Open wetlands on wet, peaty soils; Non-Patterned Shrub Fen ecotype	25
<i>Eriophorum callitrix</i> Cham.	beautiful cottongrass	G5	NNR	S2S4	Undetermined	1	Plant fully developed	Open wetlands on wet, peaty soils; Non-Patterned Shrub Fen ecotype	26 - 27
<i>Stuckenia filiformis</i> subsp. <i>alpina</i> (Blytt) R.R. Haynes, et al.	alpine threadleaf pondweed	G5	N5	S2S4	Undetermined	>1000 plants	Plant fully developed	Small flowing brook (halophytic); often from calcareous or basic substrates (calciphile)	28

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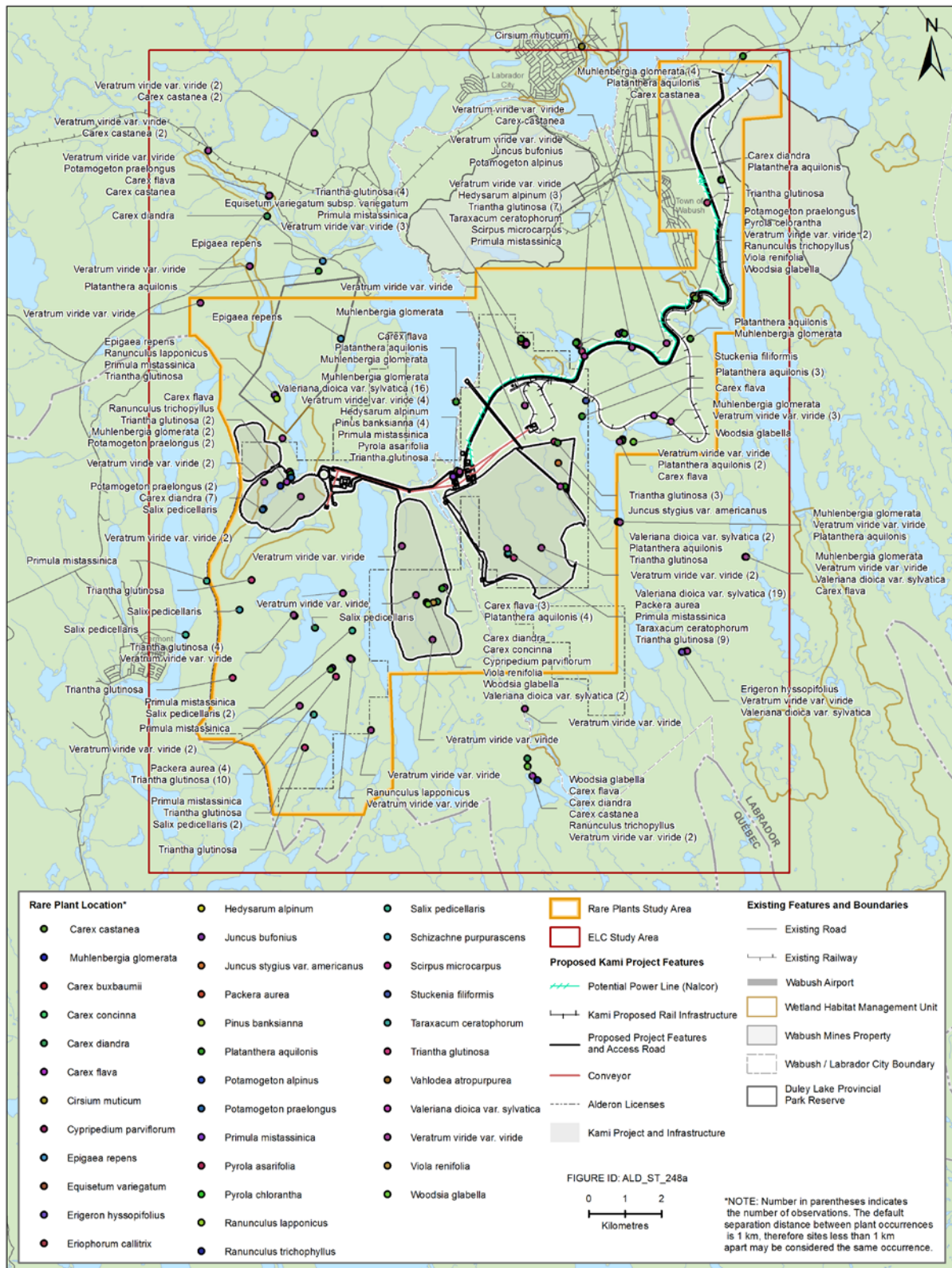
Scientific Name	Common Name	G Rank <sup>1</sup>	N Rank <sup>2</sup>	Provisional S Rank <sup>3</sup>	General Status	Number of Individuals/Populations	Phenology	Observed Habitat / ELC Ecotype	Photo Number
<b>2011</b>									
<i>Potamogeton praelongus</i> Wulfén	whitestem pondweed	G5	NNR	S2S4	Undetermined	1	Plant fully developed	Submerged in shallow wetland pool (halophytic); often from calcareous or basic substrates (calciphile)	29
<i>Carex diandra</i> Schrank	lesser panicled sedge	G5	NNR	S2S4	Undetermined	2	Inflorescence fully developed	Open wetlands and seepage areas; Non-Patterned Shrub Fen and Riparian Marsh (Fen) ecotypes	30 - 31
<i>Packera aurea</i> (L.) A.Löve & D.Löve	golden groundsel	G5	NNR	S2S4	Undetermined	4	Plant fully developed	Tamarack/Black Spruce-Feathermoss (Water Track) ecotypes	no photo
<i>Schizachne purpurascens</i> (Torr.) Swallen	purple false melic	G5	NNR	S2S4	Undetermined	2	Inflorescence fully developed	Black Spruce / Tamarack - Sphagnum Bog	no photo
<i>Scirpus microcarpus</i> J.Presl & C.Presl	red-tinged bulrush	G5	NNR	S2S4	Undetermined	1	Plant fully developed	Open wetlands on wet, peaty soils; Non-Patterned Shrub Fen ecotype	no photo
<i>Juncus bufonius</i> var. <i>bufonius</i>	toad rush	G5T5	NNR	S2S4	Undetermined	1	Plant fully developed	Open wetlands on wet, peaty soils; Non-Patterned Shrub Fen ecotype	no photo
<i>Juncus stygius</i> var. <i>americanus</i> Buchenau	American moor rush	G5	NNR	S2S4	Undetermined	1	Plant fully developed	Open wetlands on wet, peaty soils; Non-Patterned Shrub Fen ecotype	no photo
<i>Potamogeton alpinus</i> Balbis	northern pondweed	G5	NNR	S2S4	Undetermined	1	Plant fully developed	Small flowing brook; Riparian Marsh (Fen)	no photo
<i>Vahlodea atropurpurea</i> (Wahlenb.) Fr. ex Hartm.	mountain hairgrass	G5	NNR	S2S4	Undetermined	1	Inflorescence fully developed	Disturbed site along woods road near Jean Lake	no photo
<i>Muhlenbergia glomerata</i> (Willd.) Trin.	spike muhly	G5	N5	Not ranked	Not ranked	3	Inflorescence fully developed	Open wetlands on wet, peaty soils; Non-Patterned Shrub Fen ecotype	32 - 33
<i>Carex flava</i> L.	yellow sedge	G5	N5	not ranked	Not ranked	1	Inflorescence fully developed	Open wetlands on wet, peaty soils; Non-Patterned Shrub Fen ecotype	34

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Scientific Name	Common Name	G Rank <sup>1</sup>	N Rank <sup>2</sup>	Provisional S Rank <sup>3</sup>	General Status	Number of Individuals/ Populations	Phenology	Observed Habitat / ELC Ecotype	Photo Number
<b>2012</b>									
<i>Carex concinna</i> R. Brown	beautiful sedge	G5	N5	S1S2	May be at risk	1	Inflorescence fully developed	Moderately open, mesic woods on outcrops, cliff tops; on semi-acidic to neutral soils; mature Balsam Fir / White Spruce Forest ecotype	35
<i>Carex interior</i> L.H. Bailey	inland sedge	G5	N5	S2S4	Undetermined		Inflorescence fully developed	Wetlands (fens), floodplains of small rivers and stream; in seepage areas. Non-Patterned Shrub Fen and Tamarack / Black Spruce-Feathermoss (Water Track) ecotypes	no photo
<i>Cypripedium parviflorum</i> Salisb.	small yellow lady-slipper	G5	N5	Not ranked	Not ranked	1	Plant fully developed; fading	Moderately open, mesic woods on outcrops, cliff tops; on semi-acidic to neutral soils; mature Balsam Fir / White Spruce Forest ecotype	36
<i>Erigeron hyssopifolius</i> Michx.	hyssop-leaf fleabane	G5	N5	Not ranked	Not ranked		Plant fully developed; full bloom	Floodplains of small rivers and stream, in seepage areas, on subhygic soils; Tamarack / Black Spruce-Feathermoss (Water Track) ecotype	37
<i>Parnassia kotzebuei</i> Chamisso ex Sprengel	Kotzebue's grass-of-parnassus	G5	N5	S3S4	Sensitive		Plant fully developed; full bloom	Floodplains of small rivers and stream, in seepage areas, on subhygic soils; Tamarack / Black Spruce-Feathermoss (Water Track) ecotype	no photo
<i>Pyrola chlorantha</i> Swartz	greenish-flowered wintergreen	G5	N5?	S2S3	Sensitive		Plant fully developed; full bloom	Moderately well shaded in mature forests; on well drained, sandy soil, likely ranging from slightly acidic to slightly calcareous; Balsam Fir / White Spruce Forest or Black Spruce-Labrador Tea-Feathermoss ecotype	no photo
<i>Ranunculus aquatilis</i> var. <i>diffusus</i> Withering	northeastern white water-crowsfoot	G5	NNR	SNA	Not ranked		Plant fully developed; petals attached	Semi-submerged in ponds, lake margins, slow-moving rivers and streams	no photo
<i>Viola renifolia</i> A. Gray	kidney-leaved white violet	G5	NNR	S1S3	Undetermined		Plant fully developed; full bloom	Floodplains of small rivers and stream, in seepage areas, on subhygic soils; Tamarack / Black Spruce-Feathermoss (Water Track) ecotype	38
<i>Woodсия glabella</i>	Smooth woodsia	G5	NNR	S2S3	Sensitive		Plant fully developed	Moist to wet cliff face; mature Balsam Fir / White Spruce Forest ecotype	39

<sup>1</sup> globally (G Rank), <sup>2</sup> nationally (N Rank), <sup>3</sup> Newfoundland and Labrador (S Rank)

**Figure 5.1 Rare Plant Occurrences within the Rare Plant Study Area**





### 5.2.3 Rare Vascular Plant Descriptions and their Distribution in Labrador

The following descriptions relate to all rare vascular plant species occurrences within the Rare Plant Study Area. They include species that were found during the detailed vegetation surveys completed for the ELC, in addition to those of focused RPS of the Rare Plant Study Area conducted in 2011 and 2012.

#### ***Veratrum viride* Aiton var. *viride* – green false hellebore**

*Veratrum viride* var. *viride* is a temperate eastern North American species, with a range that extends north to southwestern Labrador (Carol Lake, Labrador City) (Meades et al. 2000; FNA 2003a).

Green false hellebore is classified as “May Be At Risk” by DOEC and is ranked as “S1” by the ACCDC signifying that its population is rare within the province and may be vulnerable to extirpation. It is considered globally secure with a rank of G5TNR and unranked nationally as indicated by its NNR rank. According to historical ACCDC records, the nearest population(s) of this species is from Labrador West, approximately 7 km west southwest of Labrador City, along the Trans Labrador Highway (ACCDC 2011). During the 2011 RPS completed for the Project, green false hellebore was observed from more than 41 locations across the Rare Plant Study Area (see Figure 5.1; Appendix C, Photographs 1 and 2). Individual species were not restricted to any one habitat type, but rather found in a variety of habitats, where it appeared in association with a distinctive assemblage of plants specifically adapted to wet (i.e., subhygric to hygric), calcareous substrates. Preferred habitats include those areas characterized by the Black Spruce-Labrador Tea-Feathermoss, Black Spruce / Tamarack-Sphagnum Woodland, Tamarack / Black Spruce-Feathermoss (Water Track) and Non-Patterned Shrub Fen ecotypes.

#### ***Hedysarum alpinum* L. – alpine hedysarum**

Alpine hedysarum is an Arctic-alpine North American-eastern Eurasian disjunct, with a range that includes central, western and north western Newfoundland, and southern and western Labrador (Meades et al. 2010).

Alpine hedysarum is an erect or decumbent-ascending perennial herb that is typically associated with river terraces, lake shores (beaches), cliffs, and eskers. It is commonly found occupying imperfectly drained or moderately well-drained sands and gravels on river-banks and near sheltered lake shores (Aiken et al. 2007). It is classified as “May Be At Risk” by DOEC and has been given a ranking of “S2” by the ACCDC for Labrador. It is considered globally secure with a rank of G5 and unranked nationally, as indicated by its NNR rank. ACCDC records indicate the closest known population of alpine hedysarum as from Labrador West, at Long (Duley) Lake (ACCDC 2011), in the centre of the Rare Plant Study Area. Alpine hedysarum was encountered at eight locations (accounting for several hundred plants) in the Rare Plant Study Area during the 2011 RPS. The majority of occurrences were found on exposed sandy substrates in the area of Long (Duley) Lake, with the remaining populations occupying similar

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substrates along an existing access road at the east side of Elephant Head Lake (see Figure 5.1; Appendix C, Photographs 3 and 4).

### ***Valeriana dioica* L. subsp. *sylvatica* (S. Watson) F.G. Mey. – northern valerian**

Northern valerian is a boreal North American species with a range that includes western and northwestern Newfoundland, extending north to southwestern Labrador (Hultén 1968; Scoggan 1978; Meades et al. 2010). On the Island of Newfoundland, it is known from a variety of habitats over calcareous bedrock (Bouchard et al., 1991).

Northern valerian is listed as status “Unranked” by DOEC, though it has a rank of “S1” by the ACCDC (its population considered rare in Labrador and potentially vulnerable to extirpation). It is globally and nationally secure, with rankings of G5T4T5 and N4N5, respectively. ACCDC records indicate the closest known population of northern valerian is from Labrador West, at Long (Duley) Lake (ACCDC 2011), in the center of the Rare Plant Study Area. Occurrences of northern valerian were encountered within the floodplain of slow-moving rivers and streams. The large majority of those encountered (approximately 347 plants from 36 locations [see Figure 5.1]) were within areas characterized by the Tamarack/Black Spruce-Feathermoss (Water Track) ecotype (Appendix C, Photographs 5 and 6). Occurrences of this species were restricted to hummocks or areas immediately outside the floodplain of a river or stream and were not found in association with micro-depressions or in areas that were more readily inundated (i.e., it appeared to be restricted to a rather specific moisture regime [subhygric sites]).

### ***Pinus banksiana* Lamb. – Jack pine**

Jack pine is the most widely distributed pine species in North America. It is shown to have a distribution that extends across boreal North America, including a disjunct that extends into western Labrador (Meades et al. 2000) where it is known from one native site. Jack pine is typically found on sandy well-drained soil or on rock outcrops; in places that are dry and usually nutrient poor. The species is short lived reaching full maturity in about 80 years.

Jack pine is classified as “May Be At Risk” by DOEC and is ranked as “S1” by the ACCDC (its population considered rare within Labrador and may be vulnerable to extirpation). It is considered globally and nationally secure with rankings of G5 and N5, respectively. A review of ACCDC records revealed no prior recorded occurrences of Jack pine from within or adjacent to the Study Area. Jack pine was observed from a single location, in previously burned areas on sandy substrates, south of Long (Duley) Lake (Figure 5.1; Appendix C, Photographs 7 and 8). Occurrences of Jack pine in this area appears to be the result of planting or the establishment of small experimental seedlots or trials, possibly by the local branch (Wabush) of Newfoundland and Labrador Department of Natural Resources (Harrison et al. 1995).

### ***Carex castanea* Wahlenb. – chestnut sedge**

Chestnut sedge is a boreal eastern North American sedge species reported to occur in areas underlain by limestone or other basic substrates and may be found growing in calcium-rich wetlands (fens), wet meadows, and along the shores of rivers and lakes and roadside ditches. It

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is known from throughout Newfoundland (except southern), north to central and western Labrador (Meades et al. 2000; FNA 2002), although there are very few records from Labrador. Its distribution in western Labrador is discussed in Waterway (1994), where chestnut sedge has been collected from two locations, near the reservoir at Churchill Falls and in proximity to the towns of Labrador City and Wabush.

Chestnut sedge is classified as “May Be At Risk” by DOEC and is ranked as “S1S2” by the ACCDC (its population considered rare within Labrador and may be vulnerable to extirpation). It is considered globally and nationally secure with rankings of G5 and N5, respectively. A review of ACCDC records reveals no prior recorded occurrences of chestnut sedge from within or adjacent to the Rare Plant Study Area. Chestnut sedge was observed from a single location in the Rare Plant Study Area, in proximity to a low-grade gravel road south of Jean Lake (see Figure 5.1; no photographs available), where it was found in association with the Larch Woodland ecotype.

### ***Platanthera aquilonis* Sheviak – tall northern green orchid**

Tall northern green orchid is a boreal North American and eastern Asian perennial species, with a distribution that extends across continental North America (FNA 1999) and a range that includes central, western and northern Newfoundland, and extends throughout the Ungava Peninsula to northern Labrador (Meades et al. 2000). Tall northern green orchid is a yellowish-green orchid typically associated with open wet meadows, marshes, fens, stream banks, lake shores, seeping slopes, mesic deciduous forest slopes, roadsides, ditches and borrow pits (FNA 1999).

Tall northern green orchid is classified as “May Be At Risk” by DOEC and is ranked “S2S3” by the ACCDC for Labrador (considered rare to uncommon in Labrador and of long term concern). It is considered globally secure with a rank of G5 and unranked nationally, as indicated by its NNR rank. ACCDC records (1963) show the closest known population of tall northern green orchid as from Labrador West, in the area of the town of Wabush (ACCDC 2011). Within the Rare Plant Study Area, tall northern green orchid was found in 10 open wetland locations characterized by the Non-Patterned Shrub Fen ecotype (see Figure 5.1; Appendix C, Photographs 9 and 10), with additional occurrences from the floodplain of slow-moving rivers and streams as characterized by the Tamarack/Black Spruce-Feathermoss (Water Track) ecotype (Stassinu Stantec 2012a).

### ***Triantha glutinosa* (Michx.) Baker – sticky tofieldia**

Sticky tofieldia is a perennial herb characteristic of calcareous wet meadows, bogs, fens and stream banks. It is shown by FNA (2004) to have a disjunct distribution that extends across boreal North America, including southeastern and western Labrador (Meades et al. 2000; FNA 2004).

Sticky tofieldia is listed as status “Unranked” by DOEC, although it has a rank of “S1S3” by the ACCDC, its population considered extremely rare to uncommon within Labrador and may be vulnerable to extirpation. Globally it is considered secure with a rank of G4G5 and is unranked nationally, as indicated by its NNR ranking. According to the ACCDC, the nearest population(s)

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of this species is from Labrador West, at two locations approximately 9 and 12 km west southwest of Labrador City, along the Trans Labrador Highway (ACCDC 2011). Sticky tofieldia was observed in open wetland habitats at approximately 50 locations throughout the Rare Plant Study Area. Non-patterned shrub fen ecotypes were found to support several hundred individual occurrences of this species (see Figure 5.1; Appendix C, Photographs 11 and 12) during surveys conducted in 2011. This species was often found in association with that of another closely related member of the Tofieldiaceae, *Tofieldia pusilla*.

### ***Primula mistassinica* Michx. – Mistassini primrose**

Mistassini primrose is a small, erect perennial herb found in bog, fen, and marsh habitats of boreal North American, with a range that includes central, western and northern Newfoundland, extending north to central Labrador (FNA 2009; Meades et al. 2010).

Mistassini primrose is ranked as G4G5, indicating a taxon that is widespread, abundant and secure globally and is unranked nationally, as indicated by its NNR ranking. The species is considered “Sensitive” by DOEC, and ranked “S2” by the ACCDC. A review of ACCDC records show that the closest record of this species is from Labrador West, northwest of Carol Lake and in the area of the town of Wabush (ACCDC 2011). Within the Rare Plant Study Area, Mistassini primrose was found in 16 open wetland locations during surveys conducted in 2011. All observed locations were wetland sites characterized by the Non-Patterned Shrub Fen ecotype (see Figure 5.1; Appendix C, Photographs 13 and 14). A calciphile, Mistassini primrose was observed throughout the Rare Plant Study Area and may be considered common where calcareous bog, fen, and marsh habitats exist.

### ***Epigaea repens* L. – trailing arbutus**

Trailing arbutus is a temperate North American species with a southern affinity and range that includes central, southern, and western Newfoundland, extending north to southern Labrador (Hultén 1968), specifically Minipi Lake (Meades et al. 2000). A low, spreading perennial shrub occupying moist sandy soils, it is often found in shaded woods where snow remains late into the season.

Trailing arbutus it is considered secure globally with a rank of G4G5 and is unranked nationally, as indicated by its NNR ranking. The species has been assigned a “Sensitive” ranking by DOEC, indicating they are potentially susceptible to human activities or natural events, and a status ranking of “S2S3” by the ACCDC. According to ACCDC records, there have been no recorded occurrences of trailing arbutus from the Rare Plant Study Area. During field surveys, a single occurrence of trailing arbutus was noted from an area along the south side of the existing Duley Lake Provincial Park access road, in the northwest corner of the Rare Plant Study Area (see Figure 5.1). Located immediately adjacent a recreational ATV trail, trailing arbutus plants were observed growing within an area of exposed vegetation overlying a substrate of coarse sand, and characterized by the Black Spruce-Lichen ecotype (Appendix C, Photographs 15 and 16). Due to their proximity to the road edge, the habitat of this population is likely periodically disturbed by ongoing recreational ATV activities.

**Coptidium lapponicum (L.) Gand. - Lapland buttercup**

Lapland buttercup is a small, prostrate herb species found in moist to wet wooded bog habitats of boreal North America, with a range that includes western and central Labrador (Meades et al. 2000). Hultén (1968) mapped a range that includes all but southern Labrador, while FNA (vol 3, 1997) shows a range across western and central Labrador. Recently, several new collections of Lapland buttercup were reported from Trans Labrador Highway surveys from central Labrador (JWEL / IELP 2004). A single historical report of Lapland buttercup from Central Newfoundland was reported in Bouchard et al. (1991), but it has not been relocated. The collection of Lapland buttercup at Forteau Point greatly extends the known range of this species in Labrador.

Lapland buttercup is considered secure globally with a rank of G5 and is unranked nationally, as indicated by its NNR ranking. The species has been assigned a “Sensitive” ranking by DOEC and a status ranking of “S2S3” by the ACCDC. A review of ACCDC records reveals no prior recorded occurrences of Lapland buttercup from within or adjacent the Rare Plant Study Area. During field surveys, this species was observed at three locations, in association with drainage channels and seepage tracks characterized by the Tamarack / Black Spruce-Feathermoss (Water Track) ecotype (see Figure 5.1; Appendix C, Photograph 17).

***Salix pedicellaris* Pursh – bog willow**

Bog willow is a boreal North American species with a range that includes southern, central, western and northern western Newfoundland, extending north to include areas of central (Hultén 1968; Meades et al. 2010) and western Labrador (Argus 2007). A low, deciduous shrub, classified as rare in Nfld., bog willow is associated with a variety of wetland habitats, including bogs, fens, and marshes (Bouchard et al., 1991). Argus (2007) provided the most accurate distributional information at the time, showing the range of bog willow to cover all of western Labrador and extending east to the Goose Bay area; its range was extended eastward to areas just southwest of the Adlatok Bay in 2008 following Stantec field surveys (Minaskuat Inc. 2009).

Bog willow is considered globally secure with a rank of G4G5, and is unranked nationally, as indicated by its NNR ranking. The species is classified as “Sensitive” by DOEC, indicating they are potentially susceptible to human activities or natural events. It has been assigned a ranking of “S2S4” by the ACCDC. Historical (1963) records compiled by the ACCDC show that the closest record of this species is from Labrador West, in the area of the town of Wabush (ACCDC 2011). Bog willow was found at nine sites during field surveys (see Figure 4.1; no photos available). The large majority of those observations were encountered within wetland habitats characterized by the Non-Patterned Shrub Fen ecotype. Additional occurrences of this species were also identified from the Black Spruce / Tamarack-Sphagnum and Riparian Marsh (Fen) ecotypes (see Figure 5.1; Appendix C, no photos available). As this species was observed from a number of the wetland sites examined during surveys of the Rare Plant Study Area, it may be considered fairly common in its habitat and is likely under recorded for Labrador.

***Taraxacum ceratophorum* (Ledeb.) DC. – horned dandelion**

Horned dandelion is a perennial Arctic-alpine North American and northern Asia plant species, with a range that includes southern, western, and northwestern Newfoundland, and northern Labrador (Hultén 1968; Meades et al. 2000). It is reported in *A Digital History of Newfoundland and Labrador* (Maunder 2001) as occurring in the area of L'Anse-au-Loup in southeastern Labrador. Until recently (FNA 2006), this species was divided into several species (e.g., *Taraxacum arctogenum*, *T. dumetorum*, *T. lacerum*, *T. groenlandicum*) with smaller ranges; therefore, older range maps do not provide an accurate picture of the distribution of this species. Preferred habitats for the horned dandelion include wet to moist areas, calcareous or igneous rocks, gravel, sand, or clay, wet meadows, shores of streams, sandy or gravelly seashores, seepage slopes, early-melting snowbeds (FNA 2006).

Horned dandelion is considered “Sensitive” by DOEC and is ranked as “S3” by the ACCDC, indicating that its population is uncommon within the province. It is considered globally and nationally secure with rankings of G5T5 and N5, respectively. A review of ACCDC records reveals no prior recorded occurrences of horned dandelion from within or adjacent the Rare Plant Study Area. During field surveys, this species was observed at two locations, in association with locations characterized by the Tamarack / Black Spruce-Feathermoss (Water Track) ecotype (see Figure 5.1; no photos available), in addition to that of areas of subhygic mineral soils along the floodplain of slow-moving rivers and streams.

***Equisetum variegatum* Schleich. ex F. Weber and D. Mohr subsp. *variegatum* – variegated scouring-rush**

Variegated scouring-rush is a circumboreal plant species, known from central, western, and northwestern Newfoundland, and north throughout Labrador (Hultén 1968; FNA vol 2, 1993; Meades et al. 2000). Variegated scouring-rush is a perennial, facultative wetland species from branched, shiny, blackish rhizomes occupying saturated to poorly-drained mineral soil near small ponds, wet sedge meadow, standing water at the edge of a shallow, possibly ephemeral pond, and poorly-drained, bare silt of a seepage slope growing in mossy mats (Aiken et al. 2011).

Variegated scouring-rush is considered “Sensitive” by DOEC and is ranked as “S3” by the ACCDC. It is considered globally and nationally secure with rankings of G5T5 and N5, respectively. Historical (1963) records compiled by the ACCDC show that the closest record of this species is from Labrador West, in the area of the town of Wabush (ACCDC 2011). During field surveys, variegated scouring-rush was observed at two locations; in association with wetland habitats characterized by the Non-Patterned Shrub Fen ecotype (see Figure 5.1; Appendix C, Photographs 19 and 20).

***Cirsium muticum* Michx. – swamp thistle**

Swamp thistle is a very widely distributed temperate eastern North American species, known from throughout Newfoundland, with a range that extends north to central Labrador (Meades et al. 2000; FNA 2006). A biennial forb, Swamp thistle can be distinguished from other *Cirsium*

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species by the appearance of cobweb-like hairs covering its involucre, which support pink to purple flowers. Swamp thistle is typically associated with moist to wet, imperfectly- to poorly-drained peaty soils, preferring habitats that may include alkaline open wet woods meadows, marshes, fens, stream banks, lake shores, seeping slopes, forest slopes, roadsides, ditches, and borrow pits (FNA 2006).

Swamp thistle is considered status “Undetermined” by DOEC and is ranked “S2S4” by the ACCDC for Labrador. It is ranked as G5 and N5? (NatureServe 2011), indicating a taxon that is widespread, abundant and secure globally, though it may be rare in parts of its range. ACCDC records (1967) show the closest known population of swamp thistle as from Labrador West, in the area of the town of Labrador City (ACCDC 2011). Within the Rare Plant Study Area, swamp thistle was found in two open wetland locations characterized by the Non-Patterned Shrub Fen and Tamarack / Black Spruce-Feathermoss (Water Track) ecotypes (see Figure 5.1; Appendix C, Photographs 21 and 22).

### ***Pyrola asarifolia* Michx. – pink pyrola**

Pink pyrola is a boreal North American and eastern Asia plant species, with a distribution that extends across continental North America (FNA 2003), extending throughout Newfoundland (except eastern), and north into southern Labrador (Hultén 1968, Meades et al. 2000); no Labrador range was provided in Scoggan (1978).

Pink pyrola is considered status “Undetermined” by DOEC and is ranked “S2S4” by the ACCDC for Labrador. It is considered globally secure with a rank of G5, and is unranked nationally, as indicated by its NNR ranking (NatureServe 2011). A review of ACCDC records reveals no prior recorded occurrences of pink pyrola from within or adjacent the Rare Plant Study Area. Pink pyrola was observed from a single location during surveys of the Rare Plant Study Area, in moist, rich wooded habitats, on peaty soils associated with the Tamarack/Black Spruce-Feathermoss (Water Track) ecotype (see Figure 5.1; Appendix C, Photographs 23 and 24).

### ***Carex buxbaumii* Wahlenb. - Buxbaum’s sedge**

Buxbaum’s sedge is circumboreal (disjunct) sedge, known from throughout Newfoundland, extending north to central, southern, and western Labrador (Meades et al. 2000; FNA 2002). Hultén (1968) showed a range throughout interior Labrador. Perennial, cespitose sedge from strong, creeping rhizomes, its habitat includes open wet meadows, marshes, fens, and other wet places (FNA 2002), in peaty organics often overlying wet sandy soils.

Buxbaum’s sedge is considered “Sensitive” by DOEC and is ranked as “S3” by the ACCDC. It is ranked as G5 and N5 (NatureServe 2011), indicating a taxon that is widespread, abundant, and secure globally, though it may be quite rare in parts of its range, especially at the periphery. A review of ACCDC records reveals no prior recorded occurrences of Buxbaum’s sedge from within or adjacent the Rare Plant Study Area. This species was observed at two locations (see Figure 4.1; Appendix C, Photograph 25) during surveys of the Rare Plant Study Area.

***Eriophorum callitrix* Cham. - beautiful cottongrass**

Beautiful cottongrass is an Arctic North American and eastern Asia species, with a provincial range that includes northwestern Newfoundland, extending north to northern Labrador (Meades et al. 2000). Classified as rare on the Island of Newfoundland, beautiful cottongrass is found in peaty depressions in limestone barrens along the Strait of Belle Isle (Bouchard *et al.* 1991). It is also reported in the FNA treatment of *Eriophorum* (FNA 2002) as from central and western Labrador, and has been reported primarily as an inland species in Labrador by FNA (2002). Provincial distribution map in VASCAN (Brouillet et al. 2012) shows a Labrador presence for beautiful cottongrass, although specific locations are not provided. General habitat for beautiful cottongrass includes calcareous bogs and wet places (FNA 2002); particularly wet meadows, hummocks, around the margins of ponds, and river terraces overlying imperfectly drained soils with high organic content.

Beautiful cottongrass is considered status “Undetermined” by DOEC and is ranked by the ACCDC as “S2S4” for Labrador, indicating that the species is considered rare to fairly common in Labrador. It is considered globally secure with a rank of G5 and is unranked nationally as indicated by its NNR ranking (NatureServe 2011). Historical (1967) records compiled by the ACCDC indicate that the closest record of beautiful cottongrass as from Labrador West, in the area of the town of Labrador City (ACCDC 2011). Beautiful cottongrass was observed from a single location during surveys of the Rare Plant Study Area, in association with the Non-patterned Shrub Fen ecotype (see Figure 5.1; Appendix C, Photographs 26 and 27).

***Stuckenia filiformis* (Pers.) Börner subsp. *alpina* (Blytt) R.R.Haynes *et al.* - alpine threadleaf pondweed**

Alpine threadleaf pondweed is an aquatic, boreal North American and Asian species, with several disjunct populations across North America (FNA 2005). While its range is listed as 'Transcontinental' extending "north to northern Labrador (to approximately 56°30'N)" (Scoggan 1978; Meades et al. 2000), few actual locations have been documented for Labrador. Alpine threadleaf pondweed is characteristic of cool, slow to fast-flowing alkaline waters, rarely in ponds or lakes. It is confined to alkaline, fresh, brackish, or slightly saline coastal waters throughout its range.

Alpine threadleaf pondweed is ranked as G5 and N5 (NatureServe 2011), indicating a taxon that is widespread, abundant and secure globally, though it may be quite rare in parts of its range, especially at the periphery. It is considered status “Undetermined” by DOEC and is ranked “S2S4” by the ACCDC for Labrador. According to ACCDC records there have been no recorded occurrences of this species from the Rare Plant Study Area. Alpine threadleaf pondweed was observed once during surveys of the Study Area, in the area of a small flowing brook where its local population was estimated at approximately 1000 plants (see Figure 5.1; Appendix C, Photograph 29).



**Potamogeton praelongus Wulfén – whitestem pondweed**

Whitestem pondweed is an aquatic pondweed with a highly disjunct north-temperate/ southern boreal range, with the main range centred on the Great Lakes. It was not reported from Labrador in the FNA treatment of *Potamogeton* (FNA 2005); however, it was reported as occurring as far north as Carol Lake (Labrador City) in western Labrador by Scoggan (1978) and Meades et al. (2000). Carol Lake is located with the mining area of Labrador City, so this location for *P. praelongus* is probably no longer extant. Recent distribution maps in VASCAN (Brouillet et al. 2010) also show a Labrador presence for *Potamogeton praelongus*.

Whitestem pondweed is considered globally secure with a rank of G5, and is unranked nationally, as indicated by its NNR ranking. The species is classified as status “Undetermined” by DOEC, and its classification as SNR signifying that its provincial conservation status has not yet been assessed (ranked) by the ACCDC. With no other Labrador reports, whitestem pondweed could potentially be considered as having an S1 ranking, and status At Risk. Whitestem pondweed was observed once during surveys of the Rare Plant Study Area, in the area of a small flowing brook, where its local population was estimated at approximately 1000 plants (see Figure 511; Appendix C, Photograph 29).

**Carex diandra Schrank – lesser paniced sedge**

Lesser paniced sedge is a widely distributed, circumboreal sedge, known from throughout boreal North America and Eurasia (Hultén 1968), with a provincial range that includes Newfoundland, extending north to southern Labrador, in the area of Forteau (Meades et al. 2000). VASCAN (2012) shows a Labrador presence. Lesser paniced sedge is a perennial, tussock-forming sedge, considered large by most standards, with sharply triangular (cross section) culms ranging from 30 to 90 cm. Its inflorescences are typically small, androgynous, few-flowered and typically tan to brown in color. General habitat for lesser paniced sedge includes open wet meadows, marshes, fens, and other wet places (FNA Vol. 23, 2002) in peaty organics often overlying wet sandy soils. Across its range, lesser paniced sedge is most commonly found in peatlands, ranging from poor to extremely rich fens (Glaser 1992).

Lesser paniced sedge is considered status “Undetermined” by DOEC and is ranked “S2S4” by the ACCDC for Labrador. It is considered globally secure with a rank of G5, and is unranked nationally as indicated by its NNR ranking (NatureServe 2011). A review of ACCDC records reveals no prior recorded occurrences of lesser paniced sedge from within or adjacent the Rare Plant Study Area. Lesser panicle sedge was observed from two locations during surveys of the Rare Plant Study Area; in wetland habitats characterized by the Non-Patterned Shrub Fen and Riparian Marsh (Fen) ecotypes (see Figure 5.1; Appendix C, Photographs 30 - 31).

**Packera aurea (L.) Á.Löve & D.Löve – golden groundsel**

Golden groundsel is an abundant and widespread perennial forb characteristic of calcareous moist to wet woodland, meadows, and stream banks habitats of boreal eastern North American, with a range that includes the island of Newfoundland, extending north to western and central Labrador (Meades et al. 2000; FNA 2006).

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Golden groundsel is considered status “Undetermined” by DOEC and is ranked “S2S4” by the ACCDC for Labrador. It is considered globally secure with a rank of G5, and is unranked nationally, as indicated by its NNR ranking (NatureServe 2011). A review of ACCDC records reveals that there have been three separate historical records for golden groundsel from the vicinity of the Rare Plant Study Area, as from Labrador West, northwest of Carol Lake, near the town of Labrador City and from the center of the Rare Plant Study Area at Long (Duley) Lake (ACCDC 2011). Golden groundsel was observed from four locations during surveys of the Rare Plant Study Area, in association with drainage channels and seepage tracks characterized by the Tamarack / Black Spruce-Feathermoss (Water Track) ecotype (see Figure 5.1; no photos available).

### ***Schizachne purpurascens* (Torr.) Swallen - purple false melic**

Purple false melic is a widely distributed, circumboreal grass (*Poaceae*), known from throughout boreal North American and Eurasia (Hultén 1968), with a provincial range that includes Newfoundland, extending north to northern Labrador, in the area of the Hebron River (Meades et al. 2000). VASCAN (2012) shows a Labrador presence. Purple false melic is a perennial grass, with rhizomes, growing from a loosely tufted (caespitose), decumbent base. General habitat for purple false melic includes open moist woods and meadows (FNA 2002), often occupying sandy or rocky soils.

Purple false melic is considered status “Undetermined” by DOEC and is ranked by the ACCDC as “S2S4” for Labrador. It is considered globally secure with a rank of G5, and is unranked nationally as indicated by its NNR ranking (NatureServe 2011). A review of ACCDC records indicated there have been no prior recorded occurrences of purple false melic from within or adjacent the Rare Plant Study Area. Purple false melic was observed from two locations during surveys of the Rare Plant Study Area, in treed wetland habitats characterized by the Black Spruce / Tamarack-Sphagnum Woodland Ecotype (see Figure 5.1; no photograph available).

### ***Vahlodea atropurpurea* (Wahlenb.) Fr. ex Hartm. - mountain hairgrass**

Mountain hairgrass has a boreal amphi-Atlantic distribution and provincial range that includes northern Newfoundland, extending north throughout Labrador (Meades et al. 2000). VASCAN (2012) shows a regional presence for Labrador. Mountain hairgrass is a perennial grass, with rhizomes, growing from a loosely-tufted (caespitose), decumbent base. General habitat for mountain hairgrass includes snowbank communities (FNA 2007) characterized by late melting snow, high soil moisture levels, and a relatively thick organic soil layer, in addition to that of occurring alongside shaded streams under similar conditions.

Mountain hairgrass is considered status “Undetermined” by DOEC and is ranked by the ACCDC as “S2S4” for Labrador. It is considered globally secure with a rank of G5, and is unranked nationally, as indicated by its NNR ranking (NatureServe 2011). A review of ACCDC records revealed no prior recorded occurrences of mountain hairgrass from within or adjacent the Rare Plant Study Area. Mountain hairgrass was observed from a single location during surveys of the Rare Plant Study Area scattered along the ditchline of a woods road / trail where its local

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population was estimated at approximately 100 culms (see Figure 5.1; no photograph available).

### ***Scirpus microcarpus* J.Presl and C.Presl - small-fruited bulrush**

Small-fruited bulrush is a boreal North America and eastern Asian species, known from throughout Newfoundland, with a range that extends north to southern Labrador, including disjunct populations in central and western Labrador (FNA 2002; Meades et al. 2000). Recent distribution map in VASCAN (Brouillet et al. 2010) also show a Labrador presence for Small-fruited bulrush. A perennial wetland herb from strong, creeping rhizomes; Small-fruited bulrush is large (up to 1.5 m), with 5 to 11 flat, grass like leaves sprouting from the plant base and along the triangular (cross-section) stem. Leaf bases are tinged reddish purple where they clasp the stem. Its habitat includes open moist-wet meadows, marshes, and roadside ditches (FNA 2002), often overlying wet mineral soils.

Small-fruited bulrush is classified as status “Undetermined” by DOEC and is ranked by the ACCDC as “S2S4” for Labrador. It is ranked as G5 and N5 (NatureServe 2011), indicating a taxon that is widespread, abundant and secure globally, though it may be quite rare in parts of its range. A review of ACCDC records reveals no prior recorded occurrences of small-fruited bulrush from within or adjacent the Rare Plant Study Area. Within the Rare Plant Study Area, small-fruited bulrush was observed from a single wetland location characterized by the Non-patterned Shrub Fen ecotype (see Figure 5.1; No photos available).

### ***Juncus bufonius* L. var. *bufonius* - toad rush**

Toad rush is a circumboreal plant species, known from throughout Newfoundland, extending north to central Labrador (FNA 2000; Meades et al. 2000). VASCAN (2012) shows a Labrador presence. Toad rush is an annual, obligate wetland species occupying saturated to poorly drained mineral soils in meadows, along lakeshores or stream banks, ditches, or roadsides, especially frequent in drawdown areas (lowering of the water table); usually in open sites and often becoming weedy (FNA 2000). It is easily recognized from other members of its genus by its annual habit and relatively large inflorescence that occupies 50 percent or more of the plant's height.

Toad rush is considered as status “Unranked” by DOEC, but was ranked of by the ACCDC as “S2S4” for Labrador. It is ranked as G5T5 and N5 (NatureServe 2011), indicating a taxon that is widespread, abundant and secure globally, though it may be quite rare in parts of its range. A review of ACCDC records revealed no prior recorded occurrences of toad rush from within or adjacent the Rare Plant Study Area. Within the Rare Plant Study Area, toad rush was observed from one wetland location characterized by the Non-patterned Shrub Fen ecotype (see Figure 5.1; no photos available).

### ***Juncus stygius* var. *americanus* Buchenau - American moor rush**

American moor rush is a circumboreal plant species, known from throughout Newfoundland, extending north to central Labrador (FNA 2000; Meades et al. 2000). VASCAN (2012) shows a

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Labrador presence. A loosely cespitose perennial herb, American moor rush tends to grow singularly or in small clumps with short (10-40 cm), terminal, compact inflorescence of only 1 to 3 heads with each head having only 1 to 4 flowers. Throughout its range American moor rush occupies wet, mossy habitats (FNA 2000) and poor fens that arise at the margin of raised bogs, as well as floating organic mats, low areas in patterned fens, and edges of small shallow ponds where fluctuating water tables create microhabitats suitable to their establishment.

American moor rush is classified as status “Undetermined” by DOEC and is ranked by the ACCDC as “S2S4” for Labrador. It is considered globally secure with a rank of G5 and unranked nationally, as indicated by its NNR rank. A review of ACCDC records reveals no prior recorded occurrences of American moor rush from within or adjacent the Rare Plant Study Area. Within the Rare Plant Study Area, American moor rush was observed from a single open wetland location characterized by the Non-patterned Shrub Fen (Graminoid Fen) ecotype (see Figure 5.1; no photographs available).

### ***Potamogeton alpinus* Balbis – northern pondweed**

Northern pondweed is reported in the FNA treatment of *Potamogeton* (FNA 2005) as from central and western Labrador; and has been reported primarily as an inland species in Labrador by FNA (1999) and Meades et al. (2000). A recent distribution map in VASCAN (Brouillet et al. 2012) also shows a Labrador presence for northern pondweed, although specific locations are not provided. Northern pondweed was recorded by Stantec field biologists in central Labrador, along the Churchill River during surveys conducted in 2007 (Minaskuat Inc. 2008).

Northern pondweed is ranked as G5 and N5 (NatureServe 2011), indicating a taxon that is widespread, abundant and globally secure, though it may be rare in parts of its range. It is considered status “Undetermined” by DOEC and is ranked “S2S4” by the ACCDC for Labrador. Historical (1967) records compiled by the ACCDC indicate that the closest record of northern pondweed as from Labrador West, in the area of the town of Labrador City (ACCDC 2011). Northern pondweed was observed once during surveys of the Rare Plant Study Area, in a small flowing brook within areas characterized by the Riparian Marsh (Fen) ecotype (see Figure 5.1; no photos available).

### ***Muhlenbergia glomerata* (Willd.) Trin. - spike muhly**

Spike muhly is a rhizomatous perennial grass species characteristic of open wet meadows, marshes, fens, bogs, stream banks, and the shores of lakes and ponds (FNA 1999). Spike muhly was not previously confirmed from Labrador (Meades et al. 2000; FNA 2003). This is a new record, and should therefore be considered rare in Labrador. The only other species of *Muhlenbergia* known from Labrador is *M. unifolia* (Muhl.) Fernald, discovered at two locations during surveys conducted for the Lower Churchill Hydroelectric Generation Project (Minaskuat Inc. 2008.) in 2006 and 2007.

*Muhlenbergia glomerata* is ranked as G5 and N5 (NatureServe 2011), indicating a taxon that is widespread, abundant and secure globally, though it may be quite rare in parts of its range, especially at the periphery. It is listed as status “Unranked” by DOEC, and as it has not been

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previously reported from Labrador, it has not been assessed (ranked) by the ACCDC. Spike muhly was observed in open wetland habitats at three locations during surveys of the Rare Plant Study Area, in association with the Non-patterned Shrub Fen ecotype (see Figure 5.1; Appendix C, Photographs 32 - 33).

### ***Carex flava* L. – yellow sedge**

Yellow sedge is a north-temperate calciphile, typical of wetland habitats, such as open meadows, and open and treed fens on lime-rich soils (FNA 2002). While not previously reported from Labrador (Brouillet et al. 2012), it is common throughout Newfoundland (Rouleau and Lamoureux 1992, Meades 2000).

Yellow sedge is considered status “Undetermined” by DOEC and is ranked by the ACCDC as “SNA” (unknown within Labrador). It is ranked as G5 and N5 (NatureServe 2011), indicating a taxon that is widespread, abundant and secure globally, though it may be quite rare in parts of its range, especially at the periphery. A review of ACCDC records reveals no prior recorded occurrences of yellow sedge from within or adjacent the Rare Plant Study Area. This sedge was observed at water's edge at the same site as Buxbaum's sedge (see Figure 5.1; Appendix C, Photograph 34) during surveys of the Rare Plant Study Area.

The following rare vascular plant species were identified during RPS of the Rare Plant Study Area conducted in 2012.

### ***Carex concinna* R. Br. - beautiful sedge**

Beautiful sedge is a boreal North American species with a range that includes western and northwestern Newfoundland, extending north to western Labrador (Labrador City) (Meades et al. 2000). Scoggan (1978) showed a range that extends across Canada from Northwest Territories to Newfoundland and Labrador. Classified as rare on the Island of Newfoundland, beautiful sedge is found on limestone barrens and ledges on the Great Northern and Port au Port Peninsulas (Bouchard et al. 1991). A slender, low-growing graminoid, with stems 5-15 cm tall, arising singly or a few together from a creeping rhizome, Hultén (1968) emphasized that dry coniferous forests in calcareous soils were its typical habitats.

Beautiful sedge is considered “May be at risk” by DOEC and is ranked as “S1S2” by the ACCDC. It is ranked as G5 and N5 (NatureServe 2011), indicating a taxon that is widespread, abundant, and secure globally, though it may be quite rare in parts of its range, especially at the periphery. Historical (1967) records compiled by the ACCDC indicate that the closest record of beautiful sedge as from Labrador West, in the area of Long (Duley) Lake near the town of Labrador City (ACCDC 2011), and in proximity to the Rare Plant Study Area. This species was observed from a single location (approx. 20 culms), scattered along the face of a potentially calcareous rock outcrop in the area of the Rose South Waste Rock Disposal Area (see Figure 5.1; Appendix C, Photograph 35).

***Carex interior* L.H. Bailey - inland sedge**

Inland sedge is widely-distributed, continental sedge, known from throughout boreal North America, with a provincial range that includes Newfoundland, extending north to southern Labrador, in the area of Forteau (Meades et al. 2000). A densely tufted perennial herb from fibrous roots; with stems 15-50 cm tall, usually longer than the leaves, roughened above on the angles. Inland sedge is typically associated with the moist to wet sphagnum moss of bogs or fens on calcareous substrates.

Inland sedge is considered status “Undetermined” by DOEC and is ranked “S2S4” by the ACCDC for Labrador. It is ranked as G5 and N5 (NatureServe 2011), indicating a taxon that is widespread, abundant, and secure globally, though it may be quite rare in parts of its range, especially at the periphery. A review of ACCDC records reveals no prior recorded occurrences of inland sedge from within or adjacent the Rare Plant Study Area. Within the Rare Plant Study Area, inland sedge was observed from a single location, within a transitional (upland-lowland) habitat characterized by the Tamarack / Black Spruce-Sphagnum Woodland ecotype (see Figure 5.1; no photos available).

***Cypripedium parviflorum* Salisb. – small yellow lady-slipper**

Small yellow lady-slipper is a boreal North American perennial species, with a distribution that extends across continental North America (FNA 2002) and a range that includes western and northwestern Newfoundland (Meades et al. 2000). Small yellow lady-slipper is a yellowish-green orchid that grows as a single plant or part of a small population. In general, small yellow lady-slipper are often found on stony soils that have developed over a calcareous substrate and the base of limestone cliffs, or in peaty soils.

Small yellow lady-slipper is ranked as G5 and N5 (NatureServe 2011), indicating a taxon that is widespread, abundant and secure globally, though it may be quite rare in parts of its range, especially at the periphery. It is listed as status “Unranked” by DOEC, and as it has not been previously reported from Labrador, it has not been assessed (ranked) by the ACCDC. Within the Rare Plant Study Area, small yellow lady-slipper was observed from a single location, clustered (approximately 101 plants) in a small vegetated area of a potentially calcareous rock outcrop within the Rose South Waste Rock Disposal Area (see Figure 5.1; Appendix C, Photograph 36).

***Erigeron hyssopifolius* Michx. - hyssop-leaf fleabane**

Hyssop-leaf fleabane is a small, erect perennial herb growing from slender rootstocks. It is a boreal North American species with a range that includes central, western and northern Newfoundland, extending north to central Labrador (FNA 2006; Meades et al. 2010) reported to occur in areas underlain by limestone or other basic substrates and may be found growing in open woods, rock ledges and crevices, gravel barrens, river gravel, and along the shores of rivers and lakes and roadside ditches.

Hyssop-leaf fleabane is ranked as G5 and N5 (NatureServe 2011), indicating a taxon that is widespread, abundant and secure globally, though it may be quite rare in parts of its range, especially at the periphery. It is listed as status “Unranked” by DOEC, and as it has not been

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previously reported from Labrador, it has not been assessed (ranked) by the ACCDC. A review of ACCDC records reveals no prior recorded occurrences of hyssop-leaf fleabane from within or adjacent to the Rare Plant Study Area. Occurrences of hyssop-leaf fleabane were encountered within the floodplain of small, slow-moving rivers and streams. Where habitat is suitable, the plants are often abundant. The large majority of those encountered (approximately 150 plants from 3 locations [see Figure 5.1]) were within areas characterized by the Tamarack/Black Spruce-Feathermoss (Water Track) ecotype (Appendix C, Photographs 37).

### ***Parnassia kotzebuei* Chamisso ex Sprengel - Kotzebue's grass-of-parnassus**

Kotzebue's grass-of-parnassus is a small and rather inconspicuous member of the Saxifrage family (Saxifragaceae), with short (up to 10 cm tall, possibly taller when fruiting), usually leafless stems, supporting a single terminal flower with small white petals. Kotzebue's grass-of-parnassus is an Arctic-alpine North American and eastern Asian perennial species, and a provincial range that extends south to central Labrador (with disjuncts in southern Labrador, at Forteau) (Meades et al. 2010). On the Island of Newfoundland, Kotzebue's grass-of-parnassus is known from a variety of habitats including moist limestone gravels, as well as alpine ravines and snowbeds (Bouchard et al., 1991).

Kotzebue's grass-of-parnassus is considered globally and nationally secure with rankings of G5 and N5, respectively. The species has been assigned a "Sensitive" ranking by DOEC, indicating they are potentially susceptible to human activities or natural events, and a status ranking of "S3S4" by the ACCDC. According to ACCDC records, there have been no recorded occurrences of this species from within or in proximity to the Rare Plant Study Area. During field surveys, this species was observed at four locations, in association with the Tamarack / Black Spruce-Feathermoss (Water Track) ecotype (see Figure 5.1; no photos available), in addition to that of areas of subhygric mineral soils along the floodplain of slow-moving rivers and streams.

### ***Pyrola chlorantha* Swartz - greenish-flowered wintergreen**

Greenish-flowered wintergreen is a small, erect perennial herb occupying moist to dry wooded habitats. A widely distributed, circumboreal species, known from throughout boreal North America and Eurasia (Hultén 1968), its provincial range includes Newfoundland (except southern), extending north into central Labrador (Meades et al. 2000).

Greenish-flowered wintergreen is ranked as G5 and N5 (NatureServe 2011), indicating a taxon that is widespread, abundant, and secure globally, though it may be quite rare in parts of its range, especially at the periphery. The species has been assigned a "Sensitive" ranking by DOEC, indicating they are potentially susceptible to human activities or natural events, and a status ranking of "S2S3" by the ACCDC. According to ACCDC records, there have been no recorded occurrences of greenish-flowered wintergreen from within or in proximity to the Rare Plant Study Area. During field surveys, a single occurrence of greenish-flowered wintergreen was noted from an area along the north and east side of the existing access road at Jean Lake Rapids (see Figure 5.1; no photos available).

***Ranunculus aquatilis* var. *diffusus* Withering – northeastern white water-crowsfoot**

Northeastern white water-crowsfoot is an aquatic, perennial herb, occupying the margins of shallow ponds, slow-moving streams (ponds, streams, and edges of streams) and ditches. It is a widely distributed, circumboreal species, with a range that extends throughout Newfoundland and Labrador.

Northeastern white water-crowsfoot has not yet been evaluated by DOEC and is ranked by the ACCDC as “SNA” (unknown within Labrador). It is ranked as G5 and N5 (NatureServe 2011), indicating a taxon that is widespread, abundant and secure globally, though it may be quite rare in parts of its range, especially at the periphery. It is unranked nationally, as indicated by its NNR ranking. A review of ACCDC records reveals no prior recorded occurrences of northeastern white water-crowsfoot from within or adjacent the Rare Plant Study Area. Within the Rare Plant Study Area, northeastern white water-crowsfoot was observed from a single location within an area of quiet, shallow water between Jean and Wahnahnish Lakes (see Figure 5.1; Appendix C, no photos available).

***Viola renifolia* A. Gray. – kidney-leaved white violet**

Kidney-leaved white violet is a boreal eastern North American species reported to occur in areas underlain by limestone or other basic substrates and may be found growing in cool, mesic to moist woodlands, open forests, along streambanks, and meadows. Its provincial range includes western and northwestern Newfoundland, extending north to central Labrador (Meades et al. 2000). Kidney-leaved white violet is a small (plants up to 15 cm tall) perennial growing from short ascending rootstocks without horizontal rhizomes or an apparent leafy erect stem. The leaves are born on petioles, kidney-shaped (hence the name) and indented at the base. Flowers are single, from leaf axils and pure white.

Kidney-leaved white violet is listed as status “Undetermined” by DOEC, although it has a rank of “S1S3” by the ACCDC indicating that its population is considered extremely rare to uncommon within Labrador and may be vulnerable to extirpation. Globally it is considered secure with a rank of G5 but is unranked nationally, as indicated by its NNR ranking. Historical (1967) records compiled by the ACCDC indicate that the closest record of kidney-leaved white violet is from Labrador West, in the area of the town of Labrador City (ACCDC 2011). Kidney-leaved white violet was observed from two separate locations during surveys of the Rare Plant Study Area, and primarily in association with mature mixedwood habitats (see Figure 5.1; Appendix C, Photograph 38).

***Woodsia glabella* – smooth woodsia**

Smooth woodsia is an Arctic-alpine circumpolar plant species, known from throughout Labrador, extending south to western and northern Newfoundland (FNA 1993; Meades et al. 2000). Smooth woodsia is the smallest of all the so-called woodsias or cliff ferns, and is easily recognized from other members of its genus as it is the only one without hairs or scales above the joint on the stipe. Its habitat includes moist, often somewhat shaded rock crevices (always on calcareous rock), on slopes, ridges, cliffs.



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Smooth woodsia is ranked as G5 and N5 (NatureServe 2011), indicating a taxon that is widespread, abundant, and secure globally, though it may be quite rare in parts of its range, especially at the periphery. The species has been assigned a “Sensitive” ranking by DOEC, indicating they are potentially susceptible to human activities or natural events, and a status ranking of “S2S3” by the ACCDC. According to ACCDC records, there have been no recorded occurrences of smooth woodsia from within or in proximity to the Rare Plant Study Area. During field surveys smooth woodsia was noted from a single location, south of Long (Duley) Lake, growing from a thin layer of moss and humus near the crest of a potentially calcareous shaded cliff face, within the Rose South Waste Rock Disposal Area (see Figure 5.1; Appendix C, Photograph 39).

## 6.0 SUMMARY

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### 6.1 Summary of Ecosystem Units (Ecotypes) within the ELC Study Area

A total of 14 vegetated and three sparsely or non-vegetated ecotypes were identified within the Study Area, described from 114 sample plots, and based on the ecosystem classification system adapted for use with this and other similar projects completed throughout Labrador. Two of the vegetated ecotypes, Black Spruce-Labrador Tea-Feathermoss and Black Spruce-Lichen, also had corresponding burned subtypes (i.e., Hardwood Burn / Regeneration, Mixedwood Burn / Regeneration and Softwood Burn / Regeneration), which were large enough to be mapped separately, resulting in a total of 14 vegetated map units. The three sparsely or non-vegetated ecotypes included open water (i.e., lake, pond, river), shallow open water with vegetation, and exposed earth / anthropogenic (Table 5.1). Non-ELC areas, those of Cloud and Shadow, account for approximately 2 percent of the mapped ELC areas.

The ELC Study Area covers a total area of 396 km<sup>2</sup> (Table 5.1), of which 54 percent is in upland areas and 24 percent is in lowland areas (ecotypes Black Spruce / Tamarack-Sphagnum Woodland, Tamarack / Black Spruce-Feathermoss (Water Track), Patterned Shrub Fens, Non-Patterned Shrub Fens, Riparian Marsh / Fen, Riparian Thicket). Existing disturbances, including access roads and trails, clearings, exploration drill sites, and recreational properties, cover approximately 6 percent of the ELC Study Area. Water (lakes, ponds, rivers) covers less than 15 percent of the Study Area.

Wetland ecotypes, predominantly Non-Patterned Shrub Fen are the dominant lowland areas, comprising 9.3 km<sup>2</sup> (2.3 percent) of the Study Area. Although classified as shrubby, small black spruce and tamarack are well represented across much of the Non-Patterned Shrub Fen ecotypes. Over time, these sites will likely transition into Black Spruce / Tamarack-Sphagnum Woodland communities. Upland areas are mainly the Black Spruce-Labrador Tea-Feathermoss ecotype (Table 5.1), dominated by black spruce and ericaceous shrubs.

Fens comprised 3.1 percent of the Study Area. Patterned Shrub Fens occupy 0.8 percent of the Study Area (3.1 km<sup>2</sup>). Non-Patterned Shrub Fens occupy 2.3 percent (9.3 km<sup>2</sup>) of the Study Area, of which Graminoid Fens are a minor component.

Ecotypes of restricted distribution (<1 percent of the Study Area) were those of Alpine Heath ecotypes in upland areas and Riparian Thicket, Riparian Marsh, and Patterned Fen ecotypes in the lowlands.

Approximately 2 percent of the Study Area (9.5 km<sup>2</sup>) could not be mapped because of non-existent or poor satellite coverage, cloud cover and/or shadows.

## **6.2 Plant Species Distribution and Abundance**

A total of 271 vascular plant species were found within the combined ELC and Rare Plant Study Areas. An additional 13 were mosses and liverworts and 12 were lichens were also identified. The most prevalent tree species were black spruce and tamarack, with small amounts of paper birch, heartleaf paper birch, balsam fir, white spruce, and jack pine (plantation). For a complete list of the flora identified in the Study Area, refer to Appendix B.

Biodiversity analysis, measured by species richness, found considerable differences between the plant community types in the Study Area. The highest species richness (vascular plants) was recorded in the transitional or ecotonal communities of ecotypes Tamarack / Black Spruce-Feathermoss (Water Track) and Black Spruce / Tamarack-Sphagnum Woodland with 45.3 and 43.8 species, respectively). Species richness was lowest in Riparian Thicket (10.0) and Riparian Marsh (Fen) (12.3), which are maintained at an early stage of succession through frequent scouring by ice and flood waters.

## **6.3 Summary of Rare Plant Species within the Study Area**

The number of rare species found during the RPS, and frequency with which they were encountered, is high in comparison to most floristic rare plant surveys conducted in other locations in Atlantic Canada, but are similar to the results of other recent studies in Labrador. Labrador has historically received little botanical attention. As a result, in some cases, rankings of Labrador species may be the product of a conservative ranking approach due the absence of substantial knowledge of plant species distribution. Surveys such as those conducted for this and other recent projects are helping to more accurately assess the distribution and abundance of various vascular plant species in Labrador.

After analyzing distribution maps in standard botanical references (Hultén 1958, 1971; Scoggan 1978; FNA 1993 to 2010), it is likely that only 11 of the 37 species ranked as rare by the ACCDC are actually rare in Labrador. They include: northern valerian, green false hellebore, tall northern green orchid, lesser-panicled sedge, chestnut sedge, whitestem pondweed, beautiful sedge, small yellow lady slipper, hyssop-leaf fleabane, yellow sedge and spike muhly. Yellow sedge and spike muhly have not previously been reported from Labrador and represent important range extensions of both these species and should therefore be considered rare.

No observations of plant species listed under SARA or the NLESA were found in this study.

Within the ELC Study Area, some RPS locations were characterized by the presence of potentially unique habitats that appeared to yield a disproportionately higher number of rare or uncommon plant species when compared to other areas. Of the eleven species identified above, eight are considered calciphiles (northern valerian, green false hellebore, chestnut sedge, whitestem pondweed, beautiful sedge, small yellow lady slipper, hyssop-leaf fleabane, and yellow sedge). Calciphiles (calcium-loving species) are usually restricted to rocks and/or soil containing calcium (predominantly dolomite and limestone bedrock). The occurrence of so many of these plant species would imply the presence of calcareous substrates derived from dolomite or limestone in the ELC, and therefore Rare Plant Study Areas (Figure 5.1). Due to the

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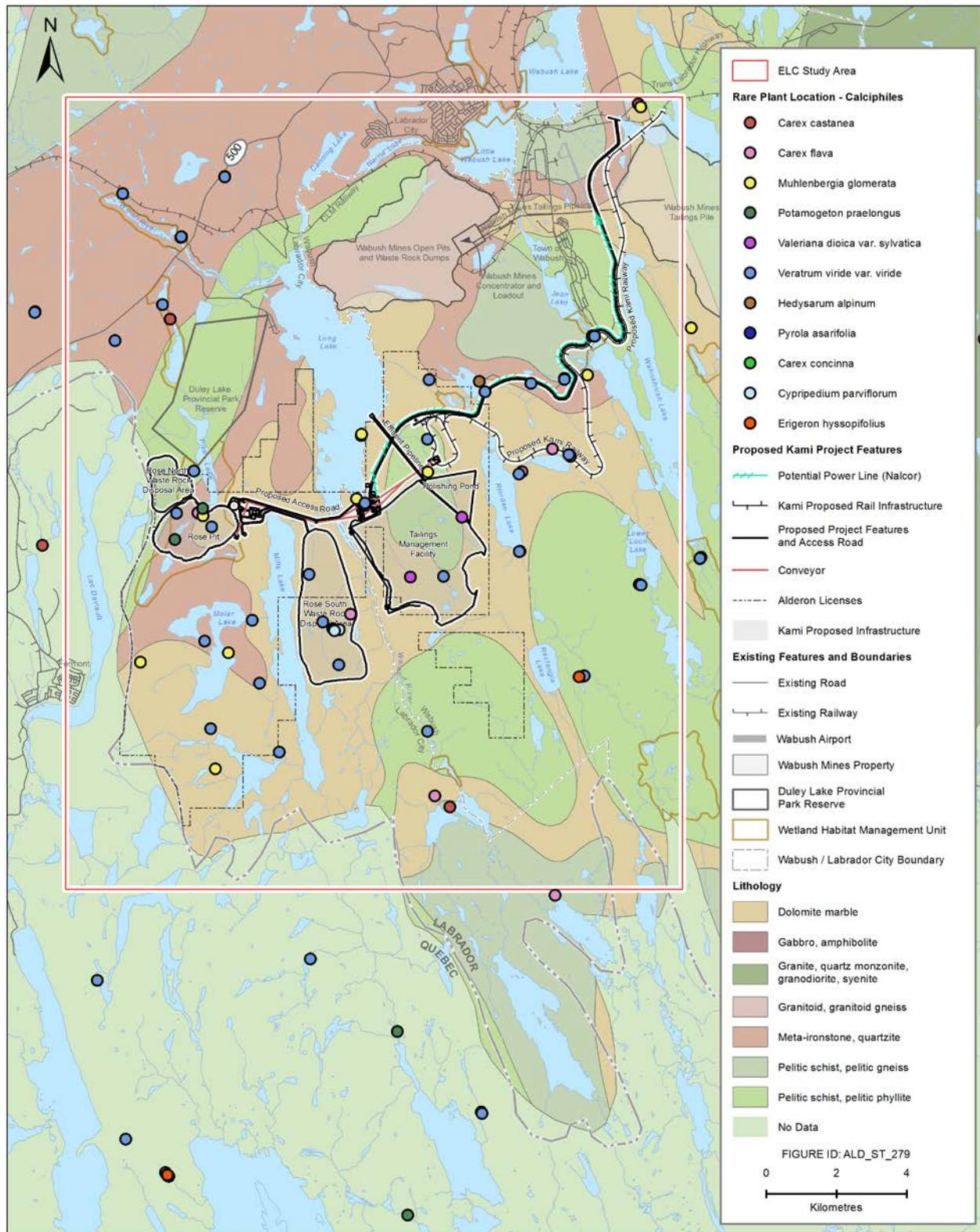
low number of areas where calcium-rich base materials are known to occur in Labrador, other possible range locations (southeastern Labrador being another) for the identified potentially rare plant species may be limited. Substrate preference is therefore an important factor in determining small and large-scale rare plant distributions in the Rare Plant Study Area as most of the rare plant species observed appears to be consistent in their association with calcareous or otherwise basic substrates.

The abundance of some rare plant species and a literature review of other Newfoundland and Labrador plant surveys suggest that the current S Ranks for several of those species identified within the Study Area may be conservative. That is, some species ranked as S2 and S1 / S2 by the ACCDC may not be rare. For example, bog willow is classified as rare primarily because it is restricted to wetland habitats on peaty substrates; however, this species is locally well represented within these habitats. Lack of adequate information on the distribution of some Labrador plant species also contributes to conservative scarcity rankings. As new information becomes available for these species, their scarcity ranks may be adjusted accordingly by DOEC.

Alderon will solicit the advice of DOEC to determine which, if any, draft scarcity rankings for Labrador species will be updated in the near future based on scheduled reviews by DOEC, the ACCDC and the results of ongoing projects across the region.

The findings of this study are the result of surveys conducted over two consecutive years, during the peak growing season (mid-summer), to better understand species presence, distribution, population numbers, and the overall health of populations, and should be considered a snap shot of current environmental conditions. To account for seasonal variation surveys were conducted at times deemed appropriate to provide accurate representations of presence or relative abundance of rare plant species across the Study Area. The natural environment of the ELC Study Area is dynamic, with frequent forest fires. These stressors exert ecological pressures on such environments, and may provide opportunities for range extensions of species not currently found within the Rare Plant Study Area.

**Figure 6.1 Bedrock Geology Associated with Rare Plant Species (Obligate Calciphiles) in the ELC Study Area**



## **7.0 ECOLOGICAL LAND CLASSIFICATION REPORT AND MAP USE**

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ELC units identified in this report and described in detail in the Ecological Land Classification report are intended to be representative of ecological conditions potentially occurring within the Rare Plant Study Area; however, variability is the norm within ecosystems and no classification can be expected to capture all this variation. In addition, the ELC map produced for the Kami Project reflects dominant current conditions within each polygon, which are subject to change over time. In particular, burned ecotypes will change considerably as they move through successional stages. Also, mapped polygons will almost always contain inclusions of ecotypes too small to be reflected in the supervised classification and represented in polygon labels. Therefore, the ELC report and map should be used as a guide to ecotypes potentially occurring within the Rare Plant Study Area. Users should verify conditions on the ground before proceeding with any site-specific management activity.

## **8.0 INFORMATION SOURCES**

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# **APPENDIX A**

Explanation of Global, National and Provincial Species at Risk  
and General Status Ranking

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**Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and Species at Risk Act (SARA) Wildlife Species Status Categories**

COSEWIC and SARA wildlife species status categories are described in Table A1.

**Table A1. Committee on the Status of Endangered Wildlife in Canada and Species at Risk Act Species Status Category Descriptions**

<b>Rank*</b>	<b>Description*</b>
Extinct (X)	A wildlife species that no longer exists
Extirpated (XT)	A wildlife species that no longer exists in the wild in Canada, but exists elsewhere in the wild
Endangered (E)	A wildlife species that is facing imminent extirpation or extinction in Canada
Threatened (T)	A wildlife species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction
Special Concern (SC)	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats
Data Deficient (DD)	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
Not At Risk (NAR)	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.

\*COSEWIC 2011. Excerpt from web site - [http://www.speciesatrisk.gc.ca/legislation/default\\_e.cfm](http://www.speciesatrisk.gc.ca/legislation/default_e.cfm)

Wildlife Species – “a species, subspecies, variety or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years” (COSEWIC 2011).

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**NatureServe Conservation Status Ranks**

The NatureServe Conservation Status Rank is used to rank rare plant species across North America. Rare species are those species that occur in only a few localities and / or are represented by relatively few individuals. The system is consistent with all conservation data centres across North America to facilitate tracking of rare plant occurrences and, where known, threat on global, national (federal) and subnational (provincial) levels. Conservation status ranks range from critically imperilled (N1) to demonstrably secure (N5). Status is assessed and documented at three distinct geographic scales: global (G); national (N); and subnational (S) (i.e., state / province / municipal) (Table A2.). These status assessments are based on the best available information and consider a variety of factors, such as species abundance, distribution, population trends, and threats (NatureServe 2009).

**Table A2 NatureServe National (N) and Subnational (S) Conservation Status Ranks**

Status	Rank	Definition
NX SX	Extinct or Presumed Extirpated	Not located despite intensive searches and no expectation of rediscovery
NH SH	Possibly Extirpated	Possibly extinct or extirpated; known only from historical occurrences but still hope of rediscovery. There is evidence that the species or ecosystem may no longer be present in the jurisdiction, but not enough to state this with certainty
N1 S1	Critically Imperilled	At very high risk of extinction due to extreme rarity (often five or fewer populations), steep declines or other factors, making the species especially susceptible to extirpation or extinction
N2 S2	Imperilled	At high risk of extinction due to very restricted range, few populations (often 20 or fewer), steep declines, or other factors
N3 S3	Vulnerable	At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors
N4 S4	Apparently Secure	Uncommon but not rare, and usually widespread in the range. Some cause for long-term concern
N5 S5	Secure	Common or very common and widespread and abundant. Not susceptible to extirpation or extinction under current conditions
N#N# S#S#	Range Rank	A numeric range rank (e.g., S2/S3 or S1/S3) is used to indicate any range of uncertainty about the status of the species or ecosystem. Ranges cannot skip more than two ranks (e.g., SU is used rather than S1/S4).
NU SU	Unrankable	Currently unrankable due to lack of information or due to substantially conflicting information about status or trends
NNR SNR	Unranked	National or subnational conservation status not yet assessed
N#? S#?	Inexact Numeric Rank	Denotes inexact numeric rank

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**Atlantic Canada Conservation Data Centre Rankings**

The ACCDC status ranks for Labrador were used to identify regionally uncommon vascular plant species. Definitions of the ACCDC rankings are provided in Table A3.

**Table A3 Definitions of the Atlantic Canada Conservation Data Centre S Rankings**

<b>Provincial Ranking</b>	<b>Frequency / Comments</b>
S1	Extremely rare throughout its range in the province (typically five or fewer occurrences or very few remaining individuals). May be especially vulnerable to extirpation
S2	Rare throughout its range in the province (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors
S3	Uncommon throughout its range in the province, or found only in a restricted range, even if abundant in some locations (21 to 100 occurrences)
S4	Usually widespread, fairly common throughout its range in the province and apparently secure with many occurrences, but the species is of long-term concern (e.g., watch list) (100+ occurrences)
S5	Demonstrably widespread, abundant and secure throughout its range in the province, and essentially ineradicable under present conditions
S#/S#	Numeric range rank: A range between two consecutive numeric ranks. Denotes uncertainty about the exact rarity of the species (e.g., S1/S2)
?	Inexact or uncertain: for numeric ranks, denotes inexactness (e.g., SE? denotes uncertainty of exotic status). (The? Qualifies the character immediately preceding it in the S Rank)
SU	Unrankable: Possibly in peril, but status is uncertain - more information is needed
SR	Reported but without persuasive documentation (e.g., misidentified specimen)
SE	Exotic / introduced species
Hybrid	Hybrid of two similar species

Source ACCDC 2010

For Labrador, the ACCDC currently uses both an official and draft ranking system. For many of the species identified in this survey, an official rank of S? has been assigned along with a different draft rank. An S? identifies a species that has not yet been thoroughly assessed for the jurisdiction. A regionally uncommon plant species is defined in this study as those assigned S Ranks of S1, S2, S2/S3 or SU by the provincial DOEC Wildlife Division and as recorded by the ACCDC. While S3 species are of concern from a provincial biodiversity perspective, they have not been included as their populations are considered less sensitive.

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**Wild Species: The General Status of Wild Species in Canada Rankings**

The provincialDOEC Wildlife Division also makes use of a different ranking system known as *The General Status of Species in Canada*. *The General Status of Species in Canada* presents the results of general status assessments for a broad cross-section of Canadian species. Under this system, each species assessed in the *Wild Species* reports received a general status rank in each province, territory, or ocean region in which they are known to be present, as well as an overall Canada General Status Rank (Canada rank). Definitions of the General Status rankings are provided in Table A4.

**Table A4 Wild Species: The General Status of Wild Species in Canada**

Rank	General Status Category	Category Description
0.2	Extinct	Species that are extirpated worldwide (i.e., they no longer exist anywhere)
0.1	Extirpated	Species that are no longer present in a given geographic area, but occur in other areas
1	At Risk	Species for which a formal, detailed risk assessment (COSEWIC status assessment or provincial or territorial equivalent) has been completed and that have been determined to be at risk of extirpation or extinction (i.e. Endangered or Threatened). A COSEWIC designation of Endangered or Threatened automatically results in a Canada General Status Rank (Canada rank) of At Risk. Where a provincial or territorial formal risk assessment finds a species to be Endangered or Threatened in that particular region, then, under the general status program, the species automatically receives a provincial or territorial general status rank of At Risk
2	May Be At Risk	Species that may be at risk of extirpation or extinction and are therefore candidates for a detailed risk assessment by COSEWIC, or provincial or territorial equivalents
3	Sensitive	Species that are not believed to be at risk of immediate extirpation or extinction but may require special attention or protection to prevent them from becoming at risk
4	Secure	Species that are not believed to belong in the categories Extinct, Extirpated, At Risk, May Be At Risk, Sensitive, Accidental or Exotic. This category includes some species that show a trend of decline in numbers in Canada but remain relatively widespread or abundant
5	Undetermined	Species for which insufficient data, information, or knowledge are available with which to reliably evaluate their general status
6	Not Assessed	Species that are known or believed to be present regularly in the geographic area in Canada to which the rank applies, but have not yet been assessed by the general status program
7	Exotic	Species that have been moved beyond their natural range as a result of human activity. In this report, exotic species have been purposefully excluded from all other categories
8	Accidental	Species occurring infrequently and unpredictably, outside their usual range

Source 'Wild Species: The General Status of Wild Species in Canada' website Available at: <http://www.wildspecies.ca/ranks.cfm?lang=e> (DOEC 2010)



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# **APPENDIX B**

Scientific and Common Names of Observed Plant Species

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Plant Species				Status Ranking				Habitat	Habitat Characteristics												
Scientific Name	ssp./var	Common Name	Vascular/ Non-vascular	G-Rank	N-Rank	S-Rank	General Status	Affinity (Meades et al, 2000; Meades 2010)	Wetland	Wetland Indicator	Forest / Open	pH	halophyte	seep	aquatic	floodplain	marsh	shore	swamp	peatland	Habitat
<i>Empetrum nigrum</i>		black crowberry	Vascular	G5	NNR	S5	4 - Secure	Arctic-alpine circumpolar		fac											peatland; headland
<i>Epigaea repens</i>		trailing arbutus	Vascular	G5	NNR	S2S3	3 - Sensitive	Temp. NA		facu											
<i>Epilobium angustifolium</i>	subsp. <i>angustifolium</i>	narrow-leaved fireweed	Vascular	G5T5	N5	S5	4 - Secure	Circumboreal		upl											
<i>Epilobium ciliatum</i>	subsp. <i>glandulosum</i>	glandular willowherb	Vascular	G5T5	NNR	S5	4 - Secure	Boreal NA, eAsia		fac											
<i>Epilobium ciliatum</i>	subsp. <i>ciliatum</i>	northern willowherb	Vascular	G5	NNR	S5	4 - Secure			fac											
<i>Epilobium ciliatum</i>	subsp. <i>ciliatum</i>	northern willowherb	Vascular	G5	NNR	S5	4 - Secure	Circumboreal	w	obl	fo	i									
<i>Epilobium palustre</i>		marsh willowherb	Vascular	G5T5	NNR	S5	4 - Secure	Boreal NA, eAsia		fac											
<i>Equisetum arvense</i>		field horsetail	Vascular	G5	NNR	S5	4 - Secure	Circumboreal		fac											
<i>Equisetum fluviatile</i>		water horsetail	Vascular	G5	NNR	SNA	excl -	Temp. NA		fac		c									
<i>Equisetum hyemale</i>	subsp. <i>affine</i>	rough horsetail	Vascular	G5	NNR	SNA	—	Temp. NA		fac		c									
<i>Equisetum sylvaticum</i>		woodland horsetail	Vascular	G5	NNR	S5	4 - Secure	Circumboreal		fac											
<i>Equisetum variegatum</i>	subsp. <i>variegatum</i>	variegated scouring-rush	Vascular	G5T5	NNR	S3	3 - Sensitive	Circumboreal	w	facw	o	c		shore					x		shore seep; disturbance
<i>Erigeron hyssopifolius</i>		Hyssop's fleabane	Vascular	G5	NNR	na	-	Boreal NA		upl											
<i>Eriocaulon aquaticum</i>		seven-angled pipewort	Vascular	G5	NNR	S5	4 - Secure	Boreal eNA	w	obl	o	a		s							aquatic submergent; aquatic emergent
<i>Eriophorum angustifolium</i>	subsp. <i>angustifolium</i>	narrowleaf cottongrass	Vascular	G5	NNR	S4S5	4 - Secure	Arctic circumpolar	w	obl	o	a						x			peatland
<i>Eriophorum callitrix</i>		beautiful cottongrass	Vascular	G5	NNR	S2S4	5 - Undetermined		obl	o	a							peatland		x	w
<i>Eriophorum chamissonis</i>		russet cottongrass	Vascular	G5	NNR	S3S5	4 - Secure	Boreal NA, eAsia	w	obl	o	a									peatland
<i>Eriophorum scheuchzeri</i>		Scheuchzer's cottongrass	Vascular	G5	NNR	S2S4	5 - Undetermined	Boreal eNA	w	obl	o	a								x	peatland
<i>Eriophorum vaginatum</i>		tussock cottongrass	Vascular	G5	N5	S5	4 - Secure	Boreal eNA	w	obl	o	a								x	peatland
<i>Eriophorum viridicarinatum</i>		green-keeled cottongrass	Vascular	G5	NNR	S3S4	4 - Secure	Boreal NA	w	obl	fo	c					f			x	swamp; fen
<i>Euphrasia nemorosa</i>		common eyebright	Vascular	G5	NNR	SNR	5 - Undetermined	Temp. amphi-Atlantic		upl											
<i>Eurybia radula</i>		low rough aster	Vascular	G5	NNR	S4S5	4 - Secure	Boreal eNA	w	obl	efo	i							x	x	shore; swamp
<i>Festuca rubra</i>		red fescue	Vascular	G5	NNR	S4S5	4 - Secure			fac											
<i>Fragaria virginiana</i>	subsp. <i>glauca</i>	smooth wild strawberry	Vascular	G5	NNR	S3S5	5 - Undetermined	Temp.-Boreal NA		fac											
<i>Galium labradoricum</i>		Labrador bedstraw	Vascular	G5	NNR	S3S4	4 - Secure	Boreal NA	w	obl	of	c								f	fen
<i>Galium triflorum</i>		three-flower bedstraw	Vascular	G5	NNR	S3S4	4 - Secure	Circumboreal (disj.)		facu											
<i>Galium trifidum</i>		small bedstraw	Vascular	G5	NNR	S4S5	4 - Secure	Circumboreal	w	obl	of	c								f	fen
<i>Gaultheria hispidula</i>		creeping snowberry	Vascular	G5	NNR	S5	4 - Secure	Boreal NA, thr. NL, N to cLab. (Rigolet).		fac											
<i>Geocaulon lividum</i>		northern comandra	Vascular	G5	NNR	S5	4 - Secure	Boreal NA		fac											
<i>Geum rivale</i>		water avens	Vascular	G5	NNR	S3S4	5 - Undetermined	Boreal amphi-Atlantic	w	obl	fo	c2		forest				f	x	x	swamp; seep; shore; fen
<i>Glyceria striata</i>		ridged mannagrass	Vascular	G5	NNR	S3S5	4 - Secure	Temp.-Boreal NA	w	facw	efo	ic					x		x	x	swamp; shore; marsh

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Plant Species				Status Ranking				Habitat	Habitat Characteristics													
Scientific Name	ssp./var	Common Name	Vascular/ Non-vascular	G-Rank	N-Rank	S-Rank	General Status	Affinity (Meades et al, 2000; Meades 2010)	Wetland	Wetland Indicator	Forest / Open	pH	halophyte	seep	aquatic	floodplain	marsh	shore	swamp	peatland	Habitat	
<i>Gymnocarpium dryopteris</i>		common oak fern	Vascular	G5	NNR	S5	4 - Secure	Circumboreal (disj. in Eurasia)		fac												
<i>Hedysarum alpinum</i>		alpine hedysarum	Vascular	G5	NNR	S2	2 - May be at risk	Arctic-alpine		upl												
<i>Hierochloe odorata</i>		holy grass	Vascular	G4G5	NNR	S3S5	4 - Secure	Circumboreal		upl												
<i>Hippuris vulgaris</i>		common mare's-tail	Vascular	G5	NNR	S4S5	4 - Secure	Circumboreal	w	obl	o	c2			e							aquatic emergent
<i>Anthoxanthum nitens</i>	subsp. <i>nitens</i>	sweetgrass	Vascular	G4G5	NNR	S3S5	4 - Secure															
<i>Huperzia selago</i>		northern firmoss	Vascular	G5	N5			Arctic-alpine circumpolar	w	facw	of	i					?	?		?		shore; peatland; swamp
<i>Juncus arcticus</i>	subsp. <i>balticus</i>	Baltic rush	Vascular	G5	NNR	S4	4 - Secure		w	facw	o	c2	b				x					saltmarsh (upper); shore
<i>Juncus brevicaudatus</i>		short-tailed rush	Vascular	G5	NNR	S3S4	4 - Secure	Boreal NA (disj.)	w	obl	o	i					x		x			shore; marsh; disturbance
<i>Juncus bufonius</i>	var. <i>bufonius</i>	toad rush	Vascular	G5T5	NNR	S2S4	5 - Undetermined	Circumboreal	w	facw	o	ic							x			shore; disturbance
<i>Juncus filiformis</i>		thread rush	Vascular	G5	NNR	S4S5	4 - Secure	Circumboreal	w	obl	o	a1							x			shore
<i>Juncus stygius</i>	var. <i>americanus</i>	American moor rush	Vascular	G5	NNR	S2S4	5 - Undetermined		w	obl	efo[?]	a						x		x		swamp; peatland
<i>Juniperus communis</i>	var. <i>depressa</i>	ground juniper	Vascular	G5	NNR	S4S5	4 - Secure			fac												peatland
<i>Kalmia polifolia</i>		pale bog laurel	Vascular	G5	NNR	S5	4 - Secure	Boreal NA	w	obl	of	a1						x				peatland
<i>Larix laricina</i>		tamarack	Vascular	G5	NNR	S5	4 - Secure	Boreal NA		fac												
<i>Linnaea borealis</i>	subsp. <i>longiflora</i>	longtube twinflower	Vascular	G5	NNR	S5	-			fac												
<i>Listera cordata</i>	var. <i>cordata</i>	heartleaf twayblade	Vascular	G5T5	NNR	S3S5	4 - Secure	Circumboreal	w	facw	f	i						x		x		swamp; peatland
<i>Lonicera villosa</i>		mountain fly honeysuckle	Vascular	G5TNR	NNR	S5	4 - Secure		w	facw	efo	ic					x	x		x		swamp; peatland; marsh
<i>Luzula parviflora</i>		small-flower woodrush	Vascular	G5	NNR	S4S5	4 - Secure	Arctic-alpine circumpolar		fac												
<i>Lycopodium annotinum</i>		stiff clubmoss	Vascular	G5	NNR	S5	4 - Secure	Circumboreal		fac												
<i>Lycopodium lagopus</i>		one-cone clubmoss	Vascular	G5	NNR	SNR	5 - Undetermined	Circumboreal (disj.), also sHemisphere		fac												
<i>Lycopodium dendroideum</i>		round-branched tree-clubmoss	Vascular	G5	NNR	S3S4	4 - Secure	Boreal NA, eAsia		fac												
<i>Maianthemum trifolium</i>		threeleaf false Solomon's seal	Vascular	G5	NNR	S5	4 - Secure	Boreal NA, eAsia	w	obl	efo	i						x		x		peatland; swamp
<i>Matricaria discoidea</i>		pineappleweed	Vascular	G5	NNR	SNA	7 - Exotic / Alien	Eurasian		facu												
<i>Menyanthes trifoliata</i>		bog buckbean	Vascular	G5	NNR	S5	4 - Secure	Circumboreal	w	obl	of	c1			e			f		x		aquatic emergent; swamp; fen
<i>Minuartia groenlandica</i>		Greenland stitchwort	Vascular	G5	NNR	S3S4	4 - Secure	Boreal eNA		upl												
<i>Mitella nuda</i>		naked mitrewort	Vascular	G5	NNR	S3S4	4 - Secure	Boreal NA, Asia	w	facw	f	c2								x		swamp
<i>Moehringia lateriflora</i>		grove sandwort	Vascular	G5	NNR	S3S4	5 - Undetermined	Circumboreal		fac												
<i>Moneses uniflora</i>		one-flower wintergreen	Vascular	G5	NNR	S4S5	4 - Secure	Circumboreal		fac												new record for Labrador
<i>Muhlenbergia glomerata</i>		spike muhly	Vascular	G5	N5			Boreal NA	w	obl	of	i										
<i>Myrica gale</i>		sweet gale	Vascular	G5	NNR	S5	4 - Secure	Circumboreal (disj.)	w	obl	of	i					x	x	x	x		shore; peatland; swamp; marsh
<i>Nuphar variegata</i>		variegated pond lily	Vascular	G5T5	NNR		excl -	Boreal NA	w	obl	o	i			s							aquatic submergent

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Plant Species				Status Ranking				Habitat	Habitat Characteristics												
Scientific Name	ssp./var	Common Name	Vascular/ Non-vascular	G-Rank	N-Rank	S-Rank	General Status	Affinity (Meades et al, 2000; Meades 2010)	Wetland	Wetland Indicator	Forest / Open	pH	halophyte	seep	aquatic	floodplain	marsh	shore	swamp	peatland	Habitat
<i>Orthilia secunda</i>		one-sided wintergreen	Vascular	G5	NNR	S5	4 - Secure	Circumboreal		fac											
<i>Packera aurea</i>		golden groundsel	Vascular	G5	NNR	S2S4	5 - Undetermined	Boreal eNA	w	facw	fo	c1								x	swamp
<i>Papaver spp.</i>		A poppy	Vascular	G5	N5	-	-														
<i>Parnassia kotzebuei</i>		Kotzebue's grass-of-Parnassus	Vascular	G5	N5	S3S4	3 - Sensitive	Boreal NA		facw											
<i>Parnassia palustris</i>		marsh grass-of-parnassus	Vascular	G5	NNR	S3S5	-	Boreal NA	w	facw	o	c					x		x		shore; marsh; disturbance
<i>Petasites frigidus</i>	var. <i>palmatus</i>	palmate coltsfoot	Vascular	G5T5	NNR	S4S5	4 - Secure	Boreal NA & eAsia	w	facw	f	c2		forest						x	swamp; seep
<i>Phegopteris connectilis</i>		northern beech fern	Vascular	G5	NNR	S5	4 - Secure	Circumboreal		fac											
<i>Phleum pratense</i>		common timothy	Vascular	GNR	NNR	SNA	7 - Exotic / Alien	European		facu											
<i>Picea glauca</i>		white spruce	Vascular	G5	NNR	S5	4 - Secure	Boreal NA		fac											
<i>Picea mariana</i>		black spruce	Vascular	G5	NNR	S5	4 - Secure	Boreal NA	w	facw	fo	a1						x		x	peatland; swamp
<i>Pilosella caespitosa</i>		meadow hawkweed	Vascular	GNR	NNR	SNA	7 - Exotic / Alien	European		facu											
<i>Pinguicula vulgaris</i>		common butterwort	Vascular	G5	NNR	S4	4 - Secure	Circumboreal (disj.)	w	obl	o	c		shore						x	shore seep
<i>Pinus banksiana</i>		jack pine	Vascular	G5	NNR	S1	2 - May be at risk	Boreal eNA		facu											occurring in plantation
<i>Piptatheropsis canadensis</i>		Canada mountain ricegrass	Vascular	G5	NNR	SU	5 - Undetermined	Boreal NA		facu											dryish peatland
<i>Platanthera aquilonis</i>		tall northern green orchid	Vascular	G5	NNR	S2S3	2 - May be at risk	Boreal NA, eAsia	w	facw	efo	c1		shore				f	x	x	shore; shore seep; swamp; fen
<i>Platanthera dilatata</i>	var. <i>dilatata</i>	tall white bog orchid	Vascular	G5T5	NNR	S4S5	4 - Secure	Boreal NA, eAsia	w	facw+	efo	c2						f	x	x	shore; swamp; fen
<i>Platanthera obtusata</i>		bluntleaf orchid	Vascular	G5	NNR	S3S4	4 - Secure	Boreal NA, nEurasia (disj.)	w	facw+	f	i						x		x	largely restricted to forested peatlands
<i>Poa alpina</i>		alpine bluegrass	Vascular	G5	NNR	S3S4	4 - Secure	Arctic-alpine NA, Europe		facu											
<i>Poa annua</i>		annual bluegrass	Vascular	GNR	NNA	SNA	7 - Exotic / Alien	Temp.-Boreal NA, Eurasia		facu											
<i>Poa palustris</i>		fowl bluegrass	Vascular	G5	N5	SNA	7 - Exotic / Alien	Temp.-Boreal NA, Eurasia		fac											
<i>Poa pratensis</i>		kentucky bluegrass	Vascular	G5	N5	SNR	5 - Undetermined	Temp.-Boreal NA, Eurasia		facu											
<i>Populus tremuloides</i>		trembling aspen	Vascular	G5	N5	S4	4 - Secure	Boreal NA		fac											
<i>Potamogeton alpinus</i>		northern pondweed	Vascular	G5	N5	S2S4	5 - Undetermined	Circumboreal	w	obl	o	c		s							aquatic submergent
<i>Potamogeton praelongus</i>		whitestem pondweed	Vascular	G5	NNR	SNR	5 - Undetermined	Circumboreal	w	obl	o	c		s							aquatic submergent
<i>Potentilla norvegica</i>		Norwegian cinquefoil	Vascular	G5	NNR	S3S5	4 - Secure		w	facw	of	i									
<i>Primula mistassinica</i>		Mistassini primrose	Vascular	G5	NNR	S2	3 - Sensitive	Boreal NA	w	facw+	o	c								x	shore
<i>Pyrola asarifolia</i>	subsp. <i>asarifolia</i>	pink pyrola	Vascular	G5	NNR	S2S4	-		w	facw	f	c				f				x	floodplain; swamp
<i>Pyrola chlorantha</i>		greenish-flowered wintergreen	Vascular	G5	NNR	S2S3	3 - Sensitive	Circumboreal		facu											
<i>Pyrola minor</i>		lesser pyrola	Vascular	G5	NNR	S4	4 - Secure	Circumboreal		fac											
<i>Ranunculus flammula</i>		lesser spearwort	Vascular	G5	NNR	S4S5			w	obl	o	a1		ae							
<i>Ranunculus trichophyllus</i>		northeastern white water-crowfoot	Vascular	G5	NNR	SNA			w	obl	o	c		ae							



**STASSINU STANTEC LIMITED PARTNERSHIP**

RARE PLANT SURVEY: KAMI IRON ORE MINE AND RAIL INFRASTRUCTURE PROJECT

Plant Species				Status Ranking				Habitat	Habitat Characteristics												
Scientific Name	ssp./var	Common Name	Vascular/ Non-vascular	G-Rank	N-Rank	S-Rank	General Status	Affinity (Meades et al, 2000; Meades 2010)	Wetland	Wetland Indicator	Forest / Open	pH	halophyte	seep	aquatic	floodplain	marsh	shore	swamp	peatland	Habitat
<i>Rhinanthus minor</i>	subsp. <i>groenlandicus</i>	Greenland yellow rattle	Vascular	G5	NNR	SNR	5 - Undetermined			upl											
<i>Rhododendron canadense</i>		rhodora	Vascular	G5	NNR	SNR	5 - Undetermined	Boreal eNA		fac											
<i>Rhododendron groenlandicum</i>		common Labrador tea	Vascular	G5	NNR	S5	-	Boreal NA	w	facw+	of	i					x		x		peatland; swamp
<i>Ribes glandulosum</i>		skunk currant	Vascular	G5	NNR	S5	4 - Secure	Boreal NA		fac											
<i>Ribes lacustre</i>		bristly black currant	Vascular	G5	NNR	S3S4	4 - Secure	Boreal NA, eAsia	w	facw	f	c2								x	swamp
<i>Rubus arcticus</i>	subsp. <i>acaulis</i>	plumboy, stemless raspberry	Vascular	G5	NNR	S3S5	-	Boreal NA													
<i>Rubus chamaemorus</i>		bakeapple, cloudberry	Vascular	G5	NNR	S5	4 - Secure	Arctic circumpolar	w	obl	o	a					x				peatland
<i>Rubus idaeus</i>	subsp. <i>strigosus</i>	wild red raspberry	Vascular	G5T5	NNR	S4S5	-	Boreal NA, Asia		fac											
<i>Rubus pubescens</i>	var. <i>pubescens</i>	dewberry	Vascular	G5T5	NNR	S4S5	4 - Secure	Boreal NA		fac											
<i>Salix arctophila</i>		northern willow	Vascular	G5	NNR	S4S5	4 - Secure														
<i>Salix argyrocarpa</i>		Labrador willow	Vascular	G4	N4N5	S4S5	4 - Secure	Boreal-subarctic eNA		upl											
<i>Salix discolor</i>		pussy willow	Vascular	G5	NNR	S3S4	4 - Secure	Boreal NA		fac											
<i>Salix humilis</i>		prairie willow	Vascular	G5	NNR	S3S5	-	Boreal eNA		facu											
<i>Salix pedicellaris</i>		bog willow	Vascular	G5	NNR	S2S4	3 - Sensitive	Boreal NA	w	obl	o	c					x	f			fen; marsh
<i>Salix pellita</i>		satiny willow	Vascular	G5	NNR	S3S4	4 - Secure	Boreal eNA	w	facw	o	i							x		shore
<i>Salix planifolia</i>		tea-leaf willow	Vascular	G5	NNR	S5	4 - Secure	Boreal eNA													
<i>Salix uva-ursi</i>		bearberry willow	Vascular	G5	NNR	S4S5	5 - Secure	Arctic eNA		upl											
<i>Salix vestita</i>		hairy willow	Vascular	G5	NNR	S3S4	4 - Secure	Arctic-alpine NA		upl											cliff
<i>Sanguisorba canadensis</i>		bottlebrush, Canada burnet	Vascular	G5	NNR	S3S5	4 - Secure	Boreal NA (disj.)	w	facw	o	c							x		shore
<i>Saxifraga aizoides</i>		yellow mountain saxifrage	Vascular	G5	NNR	S4	4 - Secure	Arctic-alpine amph-Atlantic		fac											upl (wet cliff)
<i>Saxifraga oppositifolia</i>		purple mountain saxifrage	Vascular	G5	NNR	S4	4 - Secure	Arctic-alpine amph-Atlantic		fac											upl (cliff)
<i>Scheuchzeria palustris</i>		pod grass	Vascular	G5	NNR	S3S5	4 - Secure		w	obl	o	a1								x	peatland
<i>Schizachne purpurascens</i>		purple false melic	Vascular	G5	NNR	S2S4	5 - Undetermined	Boreal NA, eAsia		fac											floodplain
<i>Scirpus microcarpus</i>		small-fruited bulrush	Vascular	G5	NNR	S2S4	5 - Undetermined	Boreal NA, eAsia	w	obl	of	i					x		x	x	shore; marsh; swamp
<i>Sedum spp.</i>		A stonecrop	Vascular																		
<i>Selaginella selaginoides</i>		low spikemoss	Vascular	G5	NNR	S4S5	4 - Secure	Circumboreal (disj.), nwAfrica	w	obl	o	c						f			fens (rich)
<i>Solidago macrophylla</i>		largeleaf goldenrod	Vascular	G5	NNR	S5	4 - Secure	Boreal eNA		facu											
<i>Solidago multiradiata</i>		multi-rayed foldenrod	Vascular	G5T5?	NNR	S3S4	4 - Secure	Arctic-alpine NA		upl											
<i>Solidago uliginosa</i>		bog goldenrod	Vascular	G4G5	NNR	S5	4 - Secure	Boreal NA	w	obl	efo	i					x	x		x	peatland; marsh; swamp
<i>Sorbus decora</i>		showy mountain ash	Vascular	G4G5	NNR	S3S5	4 - Secure	Boreal eNA		fac											
<i>Sparganium hyperboreum</i>		northern bur-reed	Vascular	G5	NNR	S3S4	4 - Secure	Circumboreal	w	obl	o	i		s							aquatic emergent
<i>Spiranthes romanzoffiana</i>		hooded ladies'-tresses	Vascular	G5	NNR	S3S4	4 - Secure	Boreal NA	w	obl	o	i							x		shore







**STASSINU STANTEC LIMITED PARTNERSHIP**

*RARE PLANT SURVEY: KAMI IRON ORE MINE AND RAIL INFRASTRUCTURE PROJECT*

# **APPENDIX C**

Rare Plant Photographs

**STASSINU STANTEC LIMITED PARTNERSHIP**

*RARE PLANT SURVEY: KAMI IRON ORE MINE AND RAIL INFRASTRUCTURE PROJECT*

**STASSINU STANTEC LIMITED PARTNERSHIP**

RARE PLANT SURVEY: KAMI IRON ORE MINE AND RAIL INFRASTRUCTURE PROJECT



**Photo 1: *Veratrum viride* var. *viride***



**Photo 2: *Veratrum viride* var. *viride* habitat**



**Photo 3: *Hedysarum alpinum***



**Photo 4: *Hedysarum alpinum* habitat**

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RARE PLANT SURVEY: KAMI IRON ORE MINE AND RAIL INFRASTRUCTURE PROJECT



**Photo 5: *Valeriana dioica* subsp. *sylvatica***



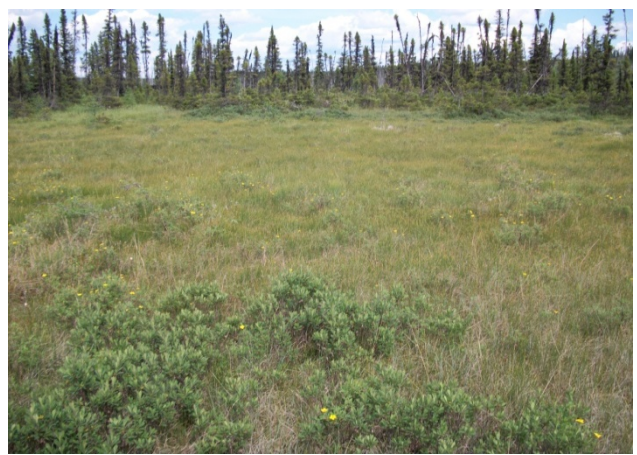
**Photo 6: *Valeriana dioica* subsp. *sylvatica* habitat**



**Photo 7: *Pinus banksiana***



**Photo 8: *Pinus banksiana* habitat**





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RARE PLANT SURVEY: KAMI IRON ORE MINE AND RAIL INFRASTRUCTURE PROJECT

**Photo 9: *Platanthera aquilonis***



**Photo 10: *Platanthera aquilonis* habitat**



**Photo 11: *Triantha glutinosa***



**Photo 12: *Triantha glutinosa* habitat**



**Photo 13: *Primula mistassinica***



**Photo 14: *Primula mistassinica* habitat**



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RARE PLANT SURVEY: KAMI IRON ORE MINE AND RAIL INFRASTRUCTURE PROJECT

**Photo 15: *Epigaea repens***



**Photo 16: *Epigaea repens* habitat**



**Photo 17: *Coptidium lapponicum***



**Photo 18: *Coptidium lapponicum* habitat**



**Photo 19: *Equisetum variegatum* var. *variegatum***



**Photo 20: *Equisetum variegatum* var. *variegatum* habitat**



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RARE PLANT SURVEY: KAMI IRON ORE MINE AND RAIL INFRASTRUCTURE PROJECT

**Photo 21: *Cirsium muticum***



**Photo 22: *Cirsium muticum* habitat (*Veratrum viride* var. *viride* also present)**



**Photo 23: *Pyrola asarifolia***



**Photo 24: *Pyrola asarifolia* habitat**

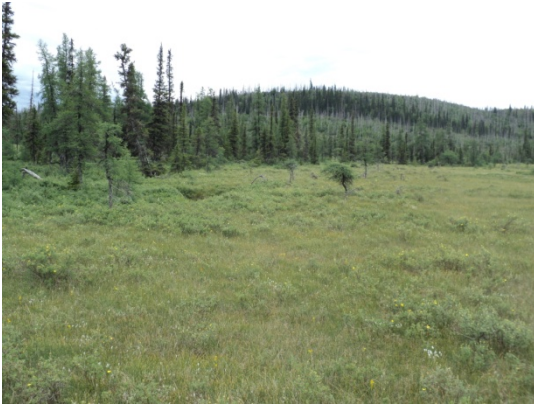


**Photo 25: *Carex buxbaumii***

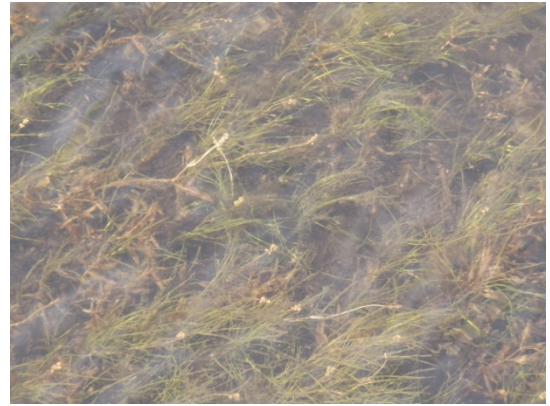
**Photo 26: *Eriophorum callitrix***

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RARE PLANT SURVEY: KAMI IRON ORE MINE AND RAIL INFRASTRUCTURE PROJECT



**Photo 27: *Eriophorum callitrix* habitat**



**Photo 28: *Stuckenia filiformis* subsp. *alpina***



**Photo 29: *Potamogeton praelongus***



**Photo 30: *Carex diandra***



**Photo 31: *Carex diandra* habitat**



**Photo 32: *Muhlenbergia glomerata***

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*RARE PLANT SURVEY: KAMI IRON ORE MINE AND RAIL INFRASTRUCTURE PROJECT*



**Photo 33: *Muhlenbergia glomerata* habitat**



**Photo 34: *Carex flava***



**Photo 35: *Carex concinna***



**Photo 36: *Cypripedium parviflorum***



**Photo 37: *Erigeron hyssopifolius***



**Photo 38: *Viola renifolia***

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RARE PLANT SURVEY: KAMI IRON ORE MINE AND RAIL INFRASTRUCTURE PROJECT



**Photo 39: *Woodsia glabella***

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*RARE PLANT SURVEY: KAMI IRON ORE MINE AND RAIL INFRASTRUCTURE PROJECT*

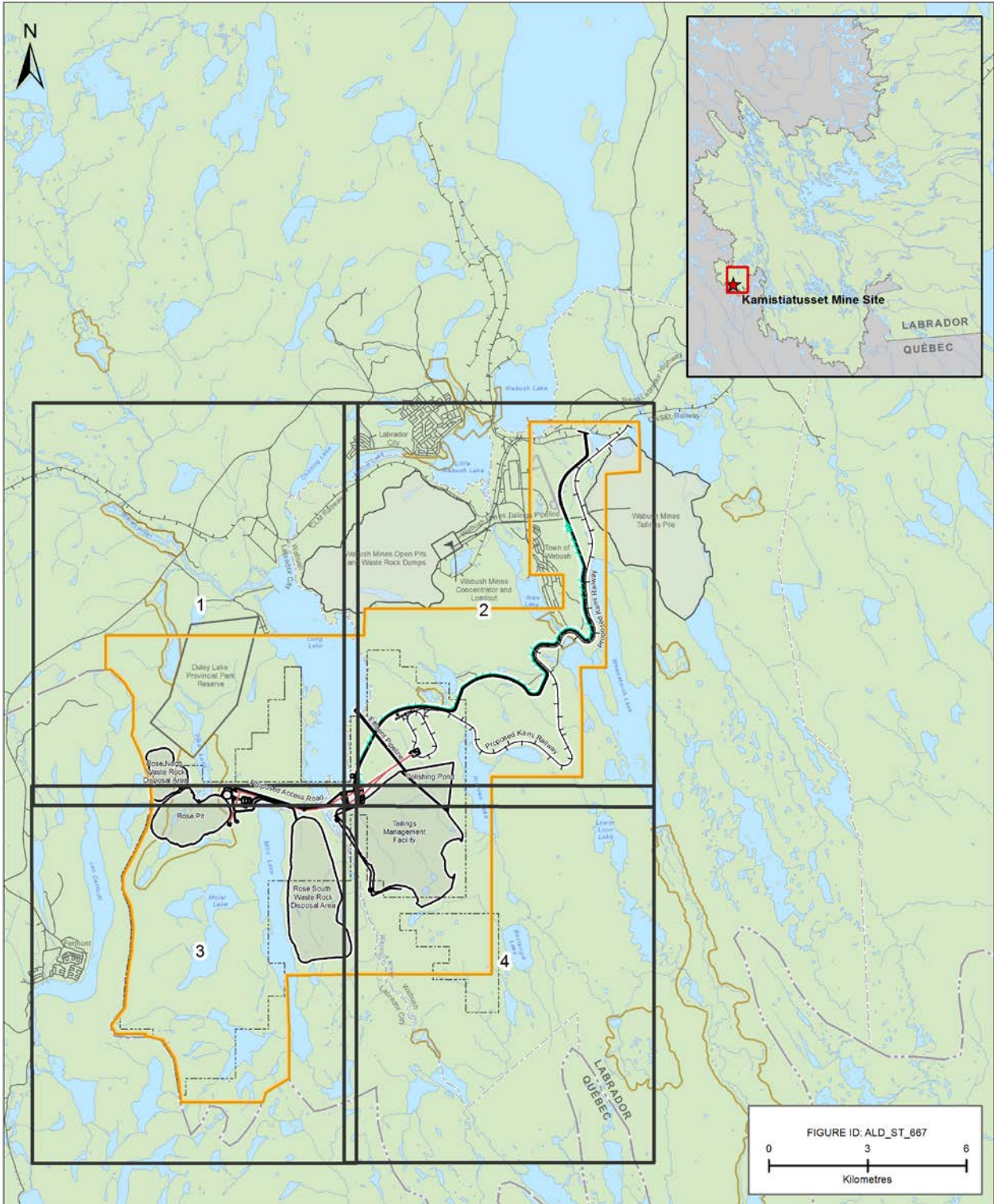
# **APPENDIX D**

Rare Plant Map Series

**STASSINU STANTEC LIMITED PARTNERSHIP**


*RARE PLANT SURVEY: KAMI IRON ORE MINE AND RAIL INFRASTRUCTURE PROJECT*





**LEGEND:**

 Rare Plants Study Area







 ELC Study Area

**Rare Plant Location\***









- Carex castanea
- Muhlenbergia glomerata
- Carex buxbaumii
- Carex concinna
- Carex diandra
- Carex flava
- Cirsium muticum
- Cypripedium parviflorum
- Epigaea repens
- Equisetum variegatum
- Erigeron hyssopifolius
- Eriophorum callitrix
- Hedysarum alpinum
- Juncus bufonius
- Juncus stygius var. americanus
- Packera aurea
- Pinus banksiana

- Platanthera aquilonis
- Potamogeton alpinus
- Potamogeton praelongus
- Primula mistassinica
- Pyrola asarifolia
- Pyrola chlorantha
- Ranunculus lapponicus
- Ranunculus trichophyllus
- Salix pedicellaris
- Schizachne purpurascens
- Scirpus microcarpus
- Stuckenia filiformis
- Taraxacum ceratophorum
- Triantha glutinosa
- Vahlodea atropurpurea
- Valeriana dioica var. sylvatica
- Veratrum viride var. viride
- Viola renifolia
- Woodsia glabella

**Proposed Kami Project Features**

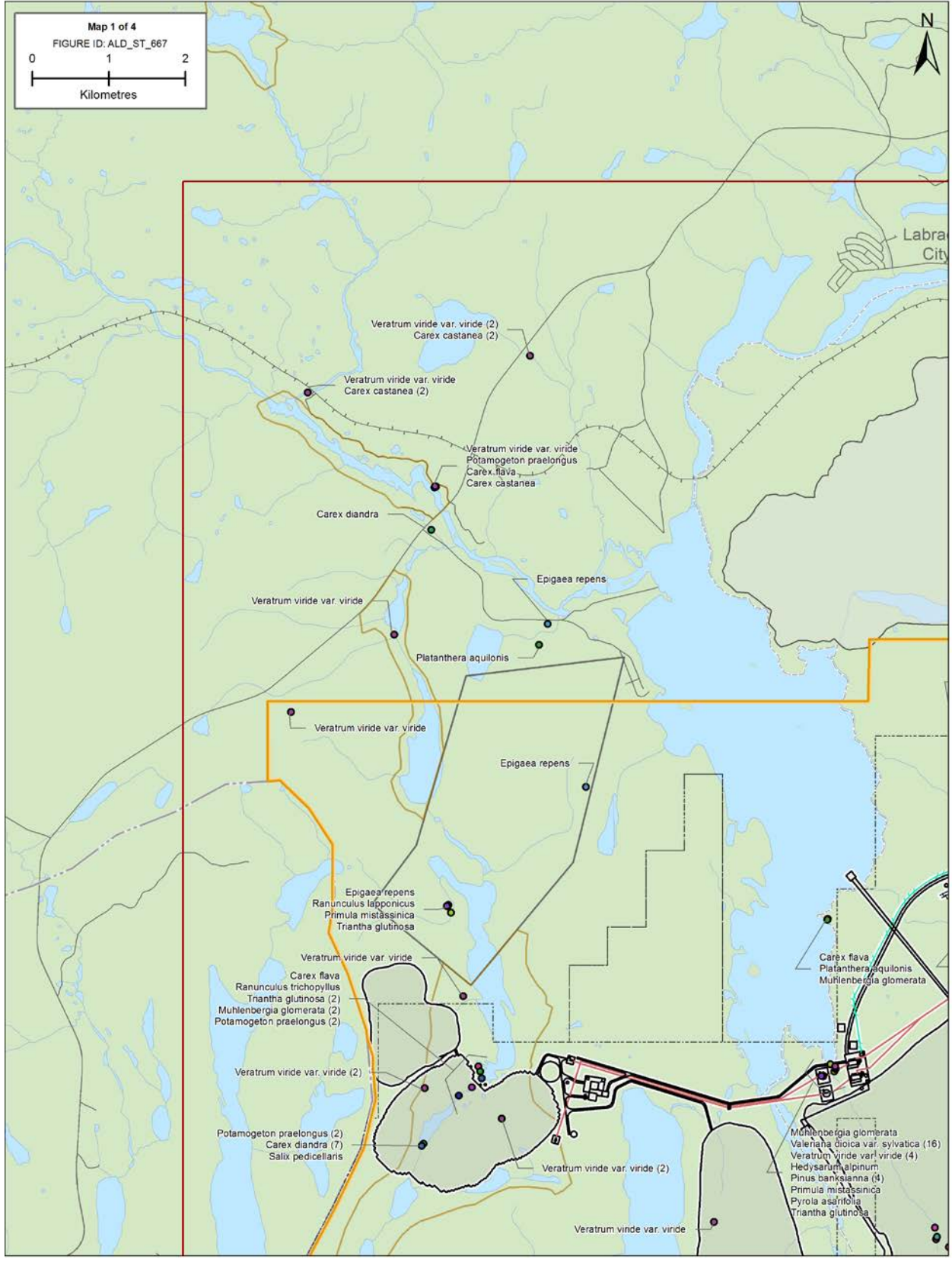
-  Potential Power Line (Nalcor)
-  Kami Proposed Rail Infrastructure
-  Proposed Project Features and Access Road
-  Conveyor
-  Alderon Licenses
-  Kami Proposed Infrastructure

**Existing Features and Boundaries**

-  Existing Road
-  Existing Railway
-  Wabush Airport
-  Wabush Mines Property
-  Wetland Habitat Management Unit
-  Duley Lake Provincial Park Reserve
-  Wabush / Labrador City Boundary
-  Québec - Labrador Boundary

\*NOTE: Number in parentheses indicates the number of observations. The default separation distance between plant occurrences is 1 km, therefore sites less than 1 km apart may be considered the same occurrence.

Map 1 of 4  
 FIGURE ID: ALD\_ST\_667  
 0 1 2  
 Kilometres



*Veratrum viride* var. *viride* (2)  
*Carex castanea* (2)

*Veratrum viride* var. *viride*  
*Carex castanea* (2)

*Veratrum viride* var. *viride*  
*Potamogeton praelongus*  
*Carex flava*  
*Carex castanea*

*Carex diandra*

*Epigaea repens*

*Veratrum viride* var. *viride*

*Platanthera aquilonis*

*Veratrum viride* var. *viride*

*Epigaea repens*

*Epigaea repens*  
*Ranunculus lapponicus*  
*Primula mistassinica*  
*Triantha glutinosa*

*Veratrum viride* var. *viride*  
*Carex flava*  
*Ranunculus trichophyllus*  
*Triantha glutinosa* (2)  
*Muhlenbergia glomerata* (2)  
*Potamogeton praelongus* (2)

*Carex flava*  
*Platanthera aquilonis*  
*Muhlenbergia glomerata*

*Veratrum viride* var. *viride* (2)

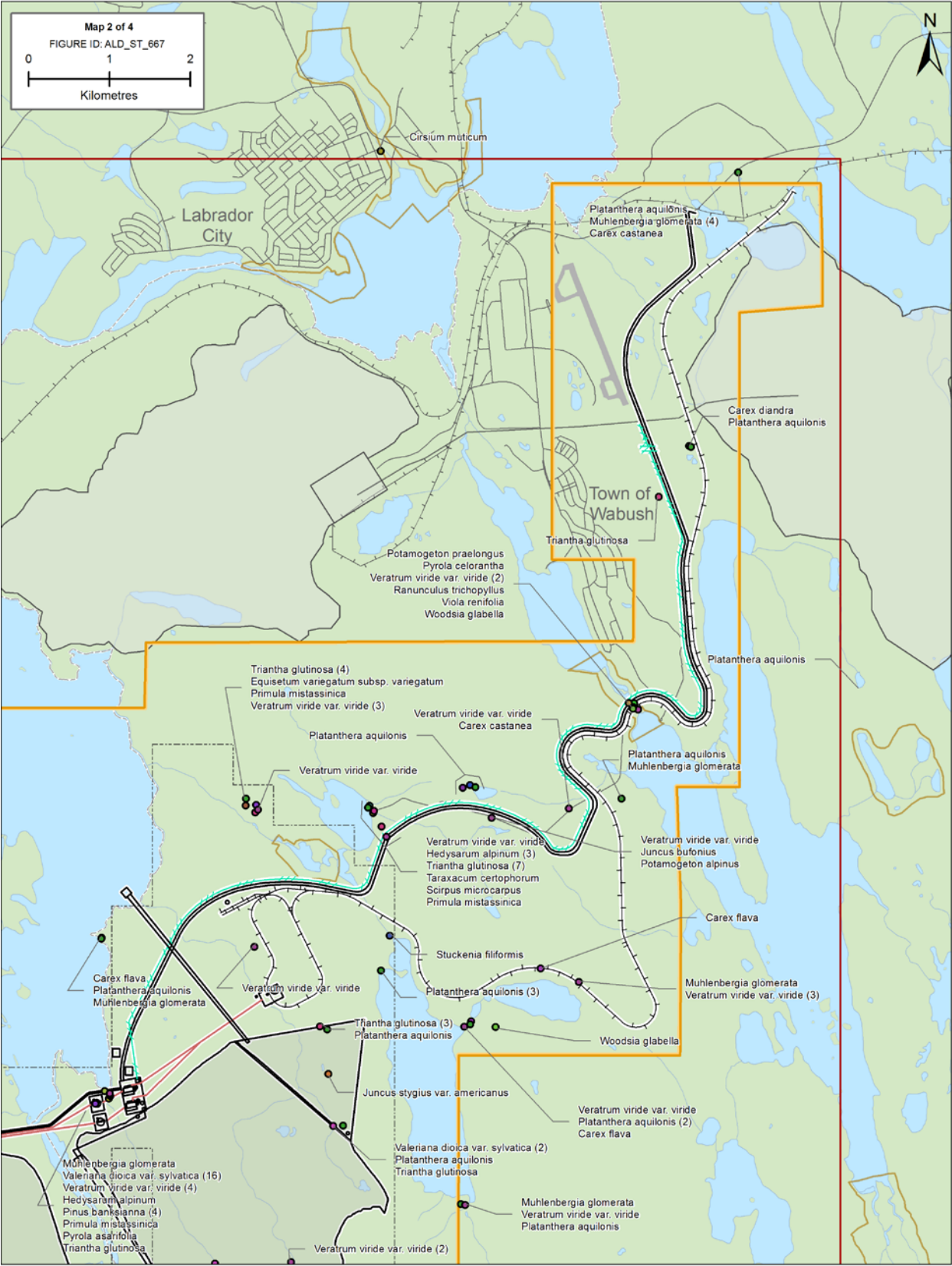
*Potamogeton praelongus* (2)  
*Carex diandra* (7)  
*Salix pedicellaris*

*Veratrum viride* var. *viride* (2)

*Muhlenbergia glomerata*  
*Valeriana dioica* var. *sylvatica* (16)  
*Veratrum viride* var. *viride* (4)  
*Hedysarum alpinum*  
*Pinus banksiana* (4)  
*Primula mistassinica*  
*Pyrola asarifolia*  
*Triantha glutinosa*

*Veratrum viride* var. *viride*

Map 2 of 4  
 FIGURE ID: ALD\_ST\_667  
 0 1 2  
 Kilometres



Map 3 of 4  
 FIGURE ID: ALD\_ST\_667  
 0 1 2  
 Kilometres

