



Keeyask Generation Project Terrestrial Effects Monitoring Plan

Rare Plant Survey Report

TEMP-2015-02



KEEYASK GENERATION PROJECT

TERRESTRIAL EFFECTS MONITORING PLAN

REPORT #TEMP-2015-02

2014 RARE PLANT SURVEY

Prepared for

Manitoba Hydro

By

ECOSTEM Ltd.

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SUMMARY

BACKGROUND

Construction of the Keeyask Generation Project (the Project) at Gull Rapids began in July 2014. Before the government issued a licence to construct the Project, the Keeyask Hydropower Limited Partnership (KHLP) was required to prepare a plan to monitor the effects of construction and operation of the generating station on the terrestrial environment. Monitoring results will help the KHLP, government regulators, members of local First Nation communities, and the general public understand how construction and operation of the generating station will affect the environment, and whether or not more needs to be done to reduce harmful effects.

Terrestrial plants perform important functions in ecosystems. Among other things, they provide food and shelter for wildlife, contribute to soil development, store carbon and ultimately are the source for most life because they convert solar energy to plant tissue. Some terrestrial plants are particularly important for ecological reasons (e.g., rare species) and/or social reasons (e.g., food and cultural importance to the Keeyask Cree Nations (KCNs)).

This report describes the results of rare plant monitoring conducted during the first summer of Project construction. Surveys were carried out in and around the areas planned to be cleared for the Project, and were focused in areas where rare plants were most likely to occur.

WHY IS THE STUDY BEING DONE?

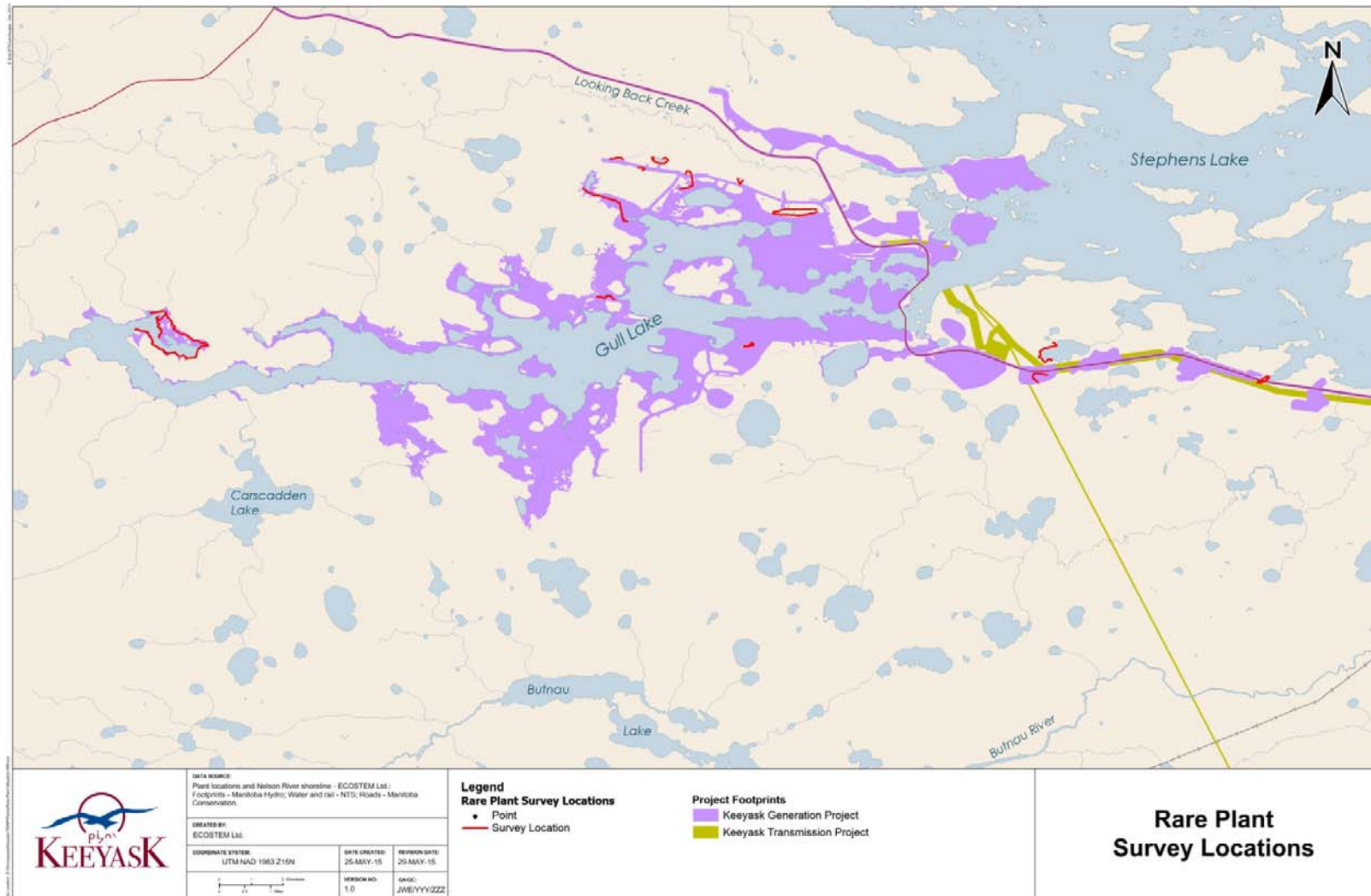
Rare plants are those not commonly found in an area. Rare plant populations can be highly sensitive to the loss or disturbance of even a few individual plants. Because of this, pre-clearing surveys for rare plants are done in areas that are planned to be cleared for the Project. If rare plants are found, avoiding the areas (if possible) or transplanting the plants to a new location where they won't be disturbed are measures that can be undertaken to protect the plants.

WHAT WAS DONE?

Rare plant surveys were done in late July, August, and early September 2014. Any Project areas which had not been previously searched during the environmental assessment studies, and which had the highest potential for supporting rare plant species, were selected for searches. A botanist (plant scientist) did ground searches for rare plants in these areas.

All discovered rare plant patches were documented by taking pictures, marking the locations on maps and taking other notes. Recorded information included information such as:

- Type of plant (species)
- Number of plants
- Plant health
- Site conditions where the plant was found



Areas surveyed for rare plants in 2014.

Any locations of rare plant species found during the surveys were flagged in the field. A GPS location was recorded and the locations and sizes of the rare plant patches were later mapped. The locations of any rare plant species were reported to Manitoba Hydro.

WHAT WAS FOUND?

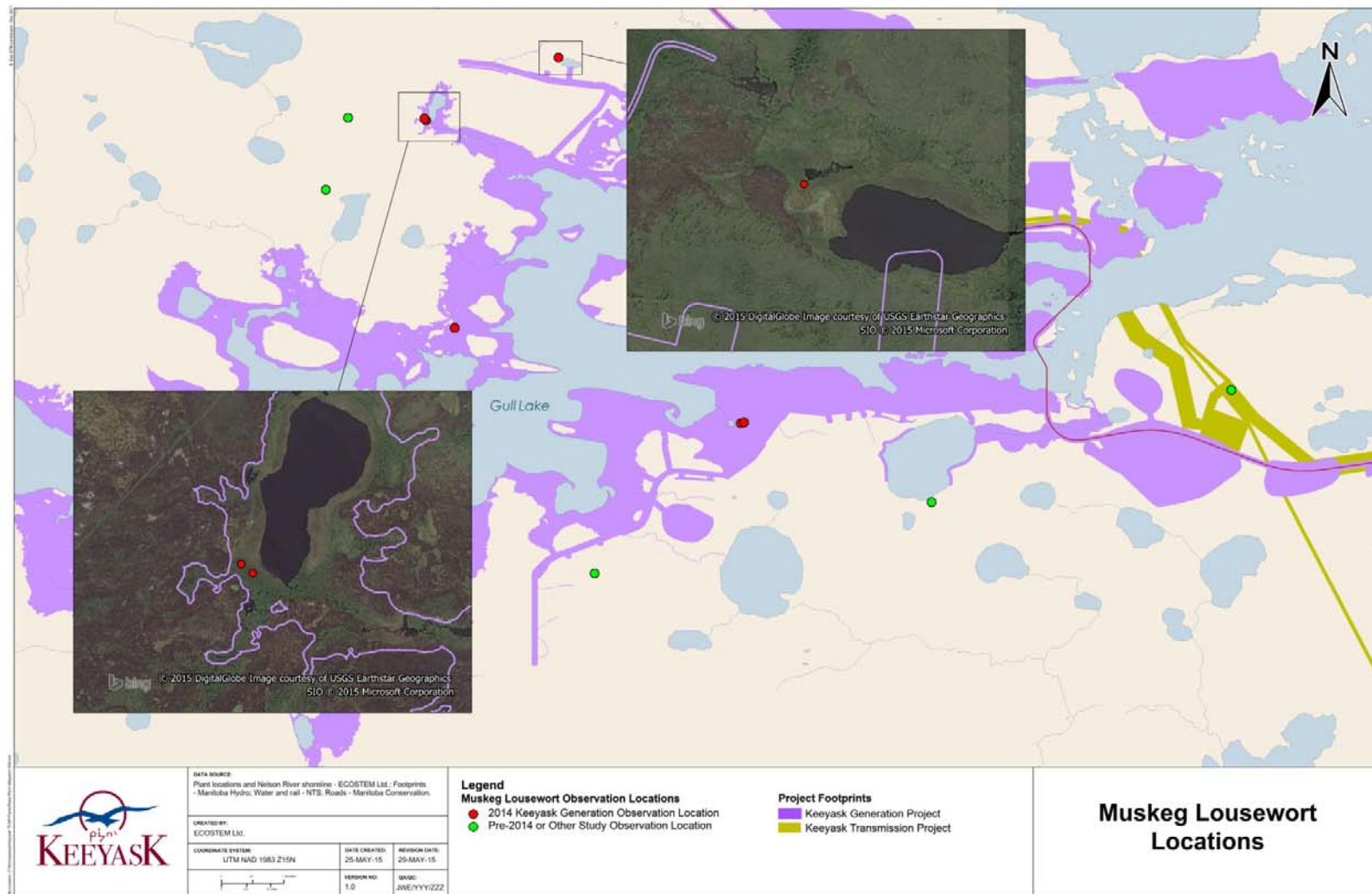
Field surveys detected one rare plant species, known as muskeg lousewort. Muskeg lousewort was found at four locations within the future reservoir area and at one location near the north dyke.

No additional rare plant species were identified during the 2014 field surveys.



A photo of muskeg lousewort, taken in the fall.

Field surveys done between 2005 and 2014 found a total of 14 muskeg lousewort locations. Eleven of the locations were around the northwest side of Gull Lake as well as the south side of Gull Lake and Gull Rapids. Five of these locations are within areas that may be affected by the Project.



Muskeg lousewort locations near the Project, including those found in 2014 surveys.

WHAT DOES IT MEAN?

The locations of muskeg lousewort found during the 2014 surveys, and during previous field studies, indicate that it may be more common in the study area than suggested by its provincial conservation ranking. It is recommended that further searches be conducted within the study area during summer 2015 to determine if there are other muskeg lousewort populations that will not be affected by the Project.

WHAT WILL BE DONE NEXT?

More rare plant surveys will be done in summer 2015 (Year 2 of construction) within the study area to better understand the overall effect of Project development on muskeg lousewort. Gathering more information on where this plant is found in areas surrounding the Project site will help us make decisions on whether avoidance or transplanting would be needed.

Results of monitoring conducted in 2015 will be presented in the Year 2 construction report.

STUDY TEAM

Dr. James Ehnes was the project manager and study designer.

Fieldwork was conducted by Ryan Sheffield, Brock Epp and Alanna Sutton.

Data analysis and report writing were completed by Alanna Sutton and James Ehnes. GIS analysis and cartography was completed by Alex Snitowski.

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1.0 INTRODUCTION

Construction of the Keeyask Generation Project (the Project), a 695 megawatt hydroelectric generating station (GS) and associated facilities, began in July 2014. The Project is located at Gull Rapids on the lower Nelson River in northern Manitoba where Gull Lake flows into Stephens Lake, 35 km upstream of the existing Kettle GS.

The *Keeyask Generation Project: Response to EIS Guidelines*, completed in June 2012, provides a summary of predicted effects and planned mitigation for the Project. Technical supporting information for the terrestrial environment, including a description of the environmental setting, effects and mitigation, and a summary of proposed monitoring and follow-up programs is provided in the *Keeyask Generation Project Environmental Impact Statement: Terrestrial Environment Supporting Volume* (TE SV). As part of the licencing process for the Project, a Terrestrial Effects Monitoring Plan (TEMP) was developed detailing the monitoring activities of various components of the terrestrial environment including the focus of this report, rare plants, for the construction and operation phases of the Project.

Terrestrial plants perform key functions in ecosystems. Among other things, they provide food and shelter for wildlife, contribute to soil development, store carbon and ultimately are the source for most life because they convert solar energy to plant tissue. Some terrestrial plant species are particularly important for ecological reasons (e.g., rare species) and/or social reasons (e.g., food and cultural importance to the Keeyask Cree Nations (KCNs)).

Priority plants are defined as those plants that are particularly important for ecological and/or social reasons. Priority plants are the native plant species that are highly sensitive to features of the Keeyask Generation Project (the Project), make high contributions to ecosystem function and/or are of particular interest to the KCNs. For example, the KCNs have noted a variety of plants of traditional importance, such as *wihkis* (sweet flag), cranberries, Labrador tea, and white birch.

A plant species is considered to be highly sensitive to human features if it is globally, nationally, provincially or regionally rare, near a range limit, has low reproductive capacity, depends on rare environmental conditions and/or depends on the natural disturbance regime. Plant species that are critical for the survival and/or reproduction of an animal species are addressed in the relevant wildlife sections of TEMP.

Rare plant populations can be highly sensitive to the loss or disturbance of even a few individuals. The Project EIS (KHLP 2012) predicted that substantial effects on endangered, threatened, provincially very rare (S1) and provincially rare (S2) plant species were not expected, since studies had either not detected or had detected only a small number of individuals of these species in the Keeyask Region (Map 1). However, since some of the species that could potentially occur in the study area may have gone undetected in previous surveys due to their rarity, the Terrestrial Effects Monitoring Plan (TEMP) includes pre-clearing rare plant surveys for these species. In the event that a plant species ranked as being

provincially very rare (S1) or provincially rare (S2) by the Manitoba Conservation Data Centre is discovered, mitigation will include avoidance where practicable, or transplantation.

2.0 METHODS

2.1 PRE-CLEARING S1 AND S2 PLANT SURVEYS

2.1.1 INTRODUCTION

S1 or S2 plant monitoring includes pre-clearing searches for these species in areas within Study Zone 2 (Map 1) that were not previously surveyed, and in the event locations are identified, prescribing and monitoring appropriate mitigation.

Pre-clearing rare plant surveys are conducted in portions of Study Zone 2 that were not previously surveyed and have the highest potential for supporting S1 or S2 species. In the event that a S1 or S2 species is discovered within these areas and there are not at least 20 known healthy patches outside of Study Zone 2 in the Keeyask Region (Map 1), then the discovered locations will either be avoided or the plants will be transplanted outside of Study Zone 2.

2.1.2 OBJECTIVES

The objectives of this study are to:

- Determine if any S1 or S2 plants occur within Study Zone 2; and,
- In the event that a S1 or S2 plant is discovered:
 - Confirm that any identified locations are well marked for avoidance where avoidance is practicable;
 - Develop a transplanting plan for S1 or S2 plant locations where avoidance is not practicable and there are not at least 20 known locations of this species in the Keeyask Region outside of Study Zone 2; and,
 - Monitor the survival and vigour of all rare plants in any locations identified for avoidance or transplanting.

2.1.3 DESIGN

The list of S1 to S2 plant species that could potentially occur within the Keeyask Region includes approximately 40 species based on distribution records and past observations (see KHLP 2012). S1 species have not been previously recorded within the Keeyask Region. Four S2 and one S1S2 species have been previously recorded, including elegant hawk's beard

(*Crepis elegans*; S1S2), small pondweed (*Potamogeton pusillus* ssp. *tenuissimus*; S2), Robbin's pondweed (*Potamogeton robbinsii*; S2), and swamp lousewort (*Pedicularis macrodonta*; S2).

Based on highest potential to occur in the Keeyask Region and the documented number of species locations, the S1 or S2 plant species of highest conservation concern for Project monitoring are elegant hawk's-beard (*Crepis elegans*), small grass-of-parnassus (*Parnassia palustris* var. *parviflora*), slender-leaved sundew (*Drosera linearis*), ground fir (*Diphasiastrum sitchense*) and swamp lousewort (*Pedicularis macrodonta*).

S1 and S2 plant ground surveys are conducted along transects in portions of Study Zone 2 that were not previously surveyed and have the highest potential for supporting S1 or S2 species. A qualified botanist searches for all potentially occurring S1 or S2 species and plant species at risk while conducting surveys. Newly discovered locations are marked and Manitoba Hydro is notified. In the event that an S1 or S2 species is discovered in Study Zone 2, the discovered location is either avoided, if practicable, or the plants are transplanted.

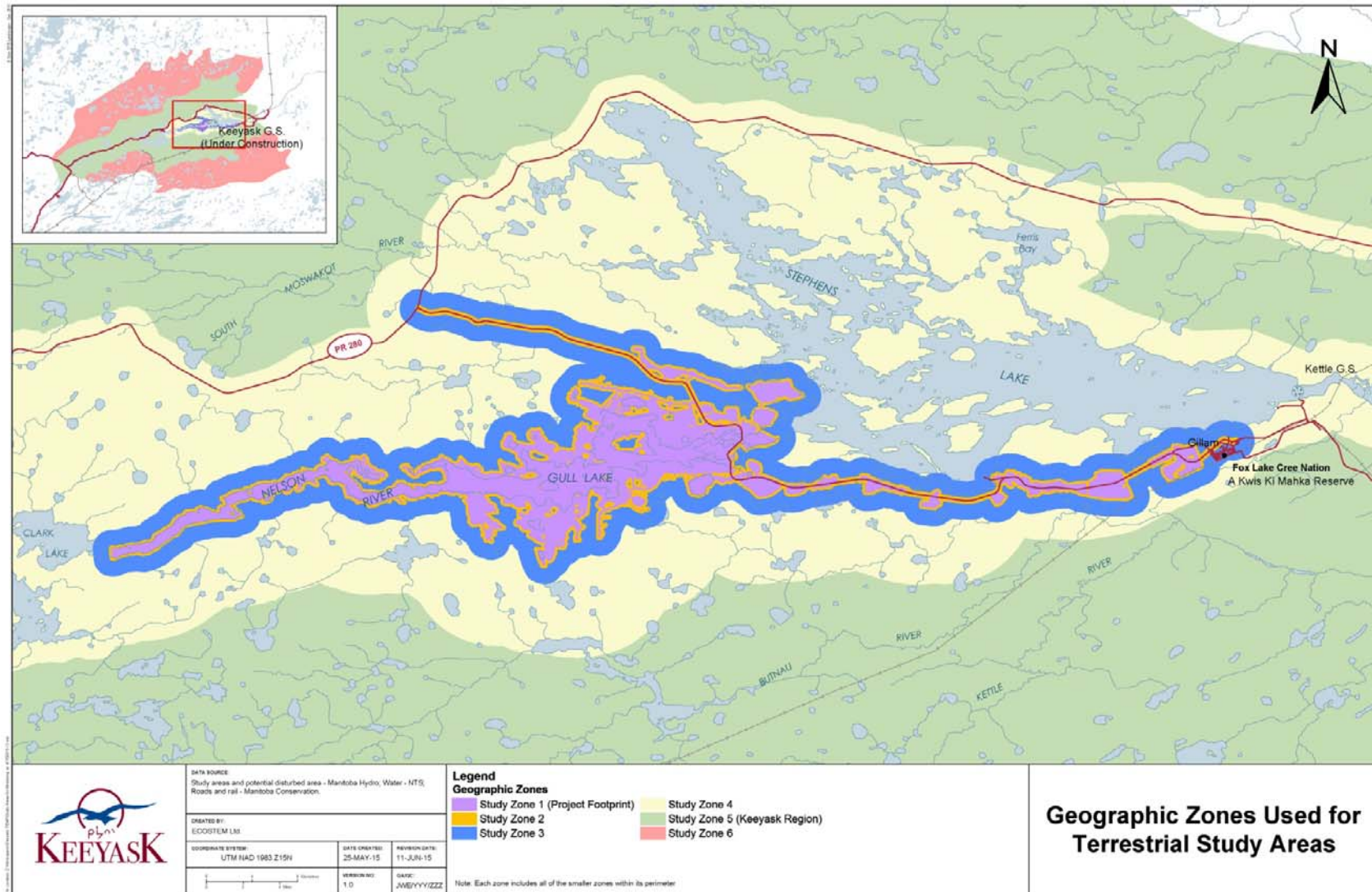
2.1.4 PARAMETERS OF CONCERN

Parameters being measured are:

- Locations and sizes of S1 or S2 plant patches that are located in the Project zone of influence;
- For each detected species, the number of known locations outside of Study Zone 2;
- For each transplant, the survival and vigour of transplanted plants; and,
- Degree of disturbance and plant survival and vigour in any plant patches marked for avoidance.

2.1.5 STUDY AREA

The study area is Study Zone 2 (Map 1), which is the planned Project Footprint and adjacent areas (within 150 m) that could be indirectly affected by Project impacts.



Map 1: Keeyask Region and terrestrial study zones.

2.1.6 SAMPLE LOCATIONS

Field surveys were confined to the study area because all of the Project effects on terrestrial plants are expected to be confined to this area. The study area will be expanded if terrestrial monitoring information identifies terrestrial habitat effects outside of this area. Field surveys during 2014 were conducted at the locations shown in Map 2.

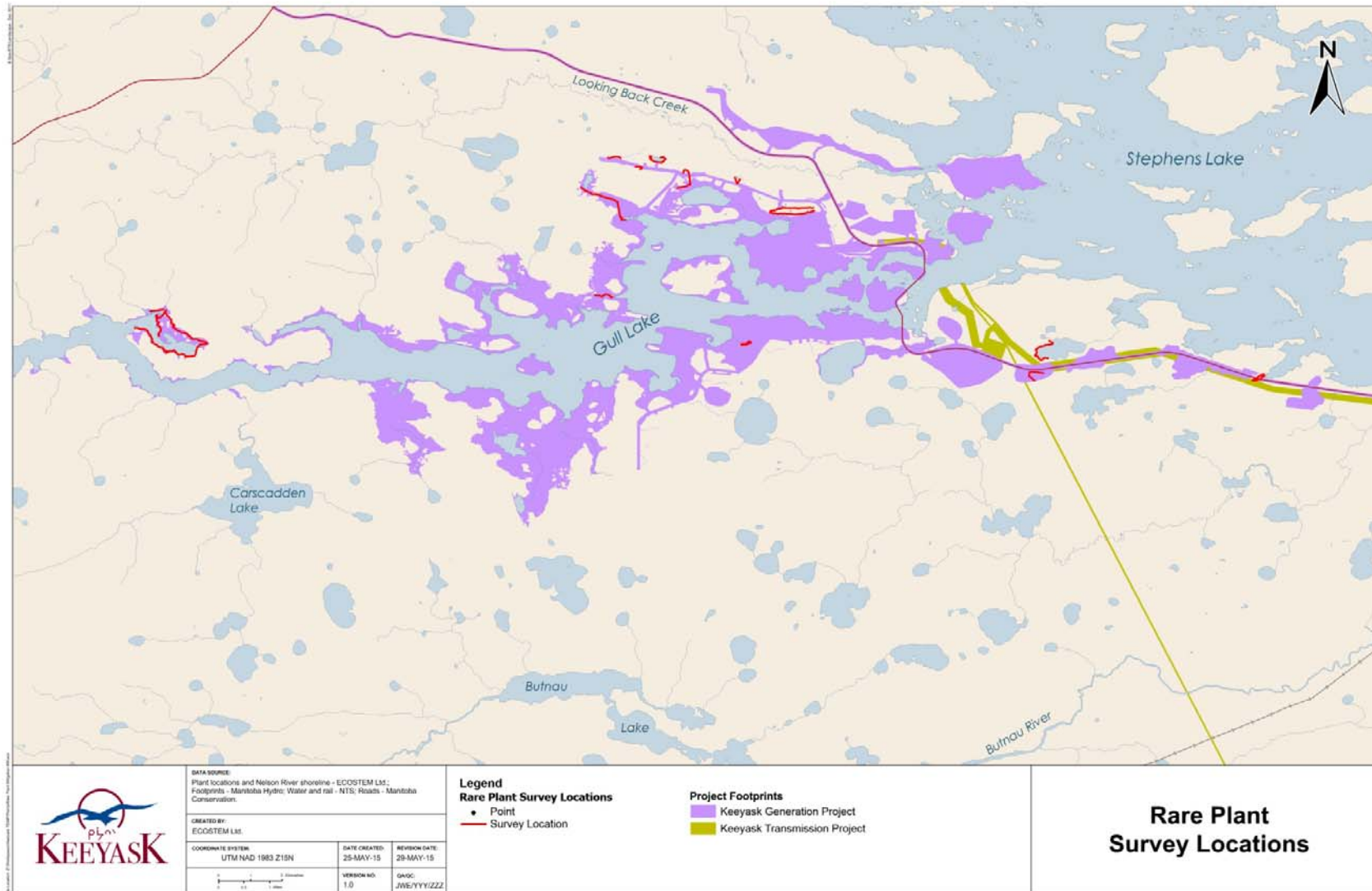
2.1.7 SAMPLING FREQUENCY AND SCHEDULE

Pre-clearing surveys for S1 and S2 plant species were conducted prior to the clearing of Project Footprint areas. Field surveys during 2014 (Map 2) were conducted on July 31, August 1, August 28 and September 9.

2.1.8 METHODS AND REPORTING

Construction activity progress reports provided by Manitoba Hydro were used to guide field survey planning. Any areas identified for pre-clearing surveys, which had not been previously searched and which had the highest potential for supporting S1 and S2 species were selected for searches. A qualified botanist conducted ground searches for rare plants in the pre-identified habitat patches. Systematic and meandering searches were conducted within each of the pre-identified habitat patches. Incidental observations were recorded while travelling between sampling areas, and also while conducting other terrestrial habitat and plant fieldwork in the area.

All discovered S1 or S2 plant patches were documented with geo-referenced photographs, marked-up maps and notes. Recorded information includes attributes such as species, population size, plant vigor, site conditions and habitat associations. Any discovered patches of S1 or S2 plant species were flagged. A GPS waypoint was taken and the locations and sizes of the plant patches were later mapped in a Geographic Information System (GIS). The locations of any S1 or S2 plant species were reported to Manitoba Hydro.



Map 2: S1 and S2 plant survey transect locations in 2014.

3.0 RESULTS

3.1 PRE-CLEARING S1 AND S2 PLANT SURVEYS

In total, just over 21 km of survey transects were searched in Study Zone 2 (Map 2) in July, August, and September 2014. The surveyed areas included a creek along the south access road, borrow areas S-4 and S-2b, EMPA areas D9-I and D4-E, portions of the north dyke and one location within the future reservoir area.

Field surveys detected one S2 species, known as muskeg lousewort (*Pedicularis macrodonta*). No additional S1 or S2 plant species were identified during field surveys.

Muskeg lousewort was found at four locations within the future reservoir area (Map 3) and at one location along the north dyke (approximately 90 m from EMPA D4-E, in the riparian fen surrounding a pond).

Muskeg lousewort is a short-lived perennial with a slender root, which grows as a single stem, or is branched at the base (Figure 1, Figure 2). Single purple flowers grow in the stem leaf axils and/or in short spikes at the top of the stem. Leaves are small and deeply lobed.

Muskeg lousewort is scattered across the boreal forest, generally north of latitude 60° from Hudson Bay to Alaska. Several early (prior to 1943) sightings of this species were recorded in the Kettle rapids and York Factory areas, as summarized by Scoggan (1957).

According to the limited information in the literature regarding the muskeg lousewort's habitat associations, it grows in fens, wet bogs, marshes and meadows (Scoggan 1979, Porsild and Cody 1980, Johnson et al. 1995).

Field studies in the Keeyask Region found that muskeg lousewort was most frequently observed in the low vegetation on wet peatland, riparian peatland or ground ice peatland habitat types (Figure 3). Horizontal fen was the most common ecosite type. One location was in a tamarack (*Larix laricina*) dominated wet peatland habitat, with an understory similar to the more common habitats. Two locations were within black spruce dominant habitats and one was in a tall shrub dominant habitat, but in all three of these cases the plants were in wet microsites that were more dominated by tamarack or low vegetation. Muskeg lousewort was found growing with sedges at all locations where habitat data was collected. It was also often associated with bogbean (*Menyanthes trifoliata*), and was less frequently associated with water horsetail (*Equisetum fluviatile*), alpine cotton-grass (*Trichophorum alpinum*) and Sphagnum mosses.

Microsite conditions and associated plants for locations in the planned Project Footprint were similar to those observed for the remaining locations.



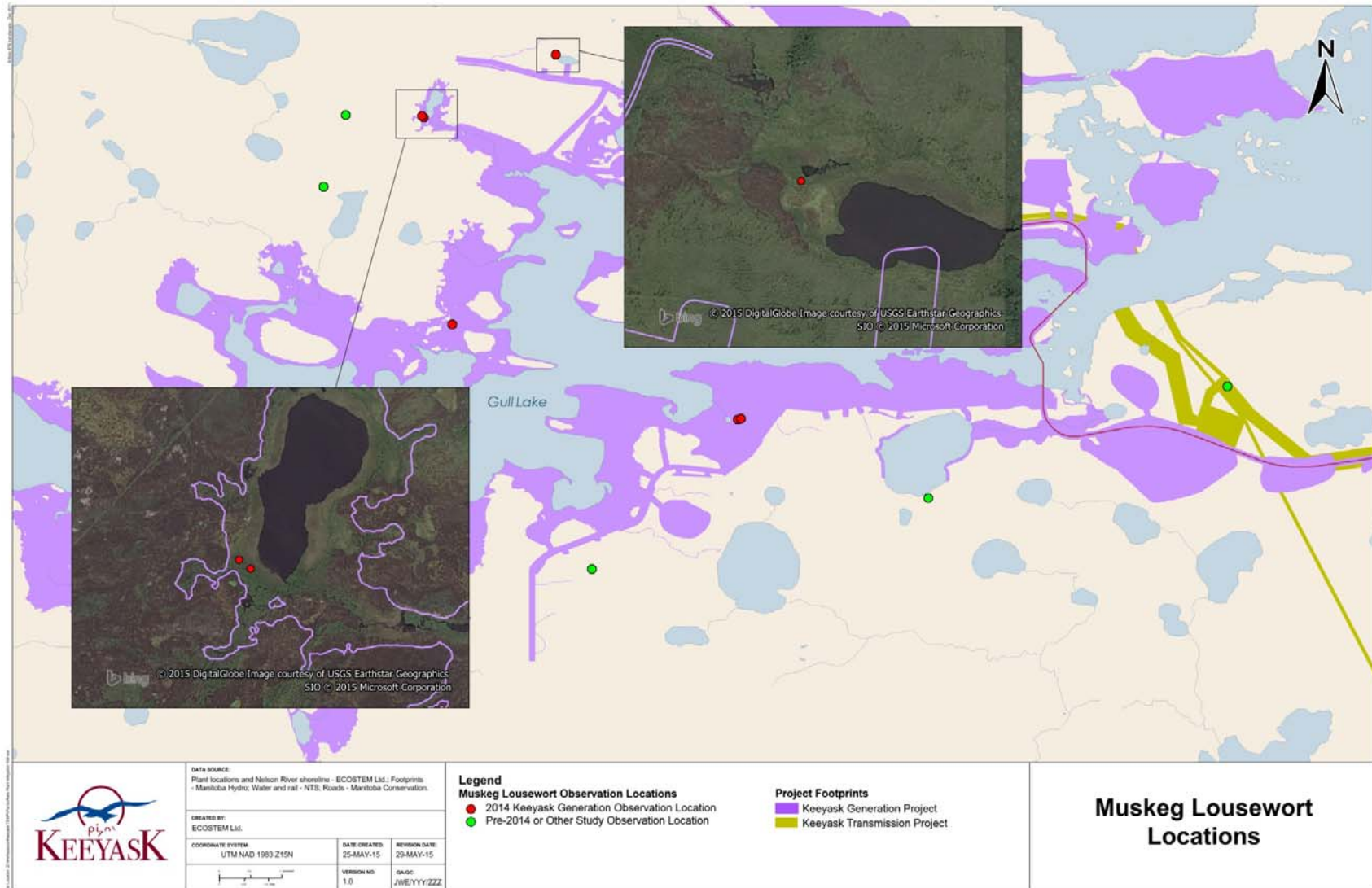
Figure 1: Closeup of muskeg lousewort late in the season after the flowers have gone to seed.



Figure 2: Muskeg lousewort in flower, growing in typical habitat with sedges and bogbean.



Figure 3: Muskeg lousewort and its habitat on a riparian peatland, close to EMPA area D4-E.



Map 3: Muskeg lousewort locations observed during 2014 field surveys.

4.0 MUSKEG LOUSEWORT MITIGATION

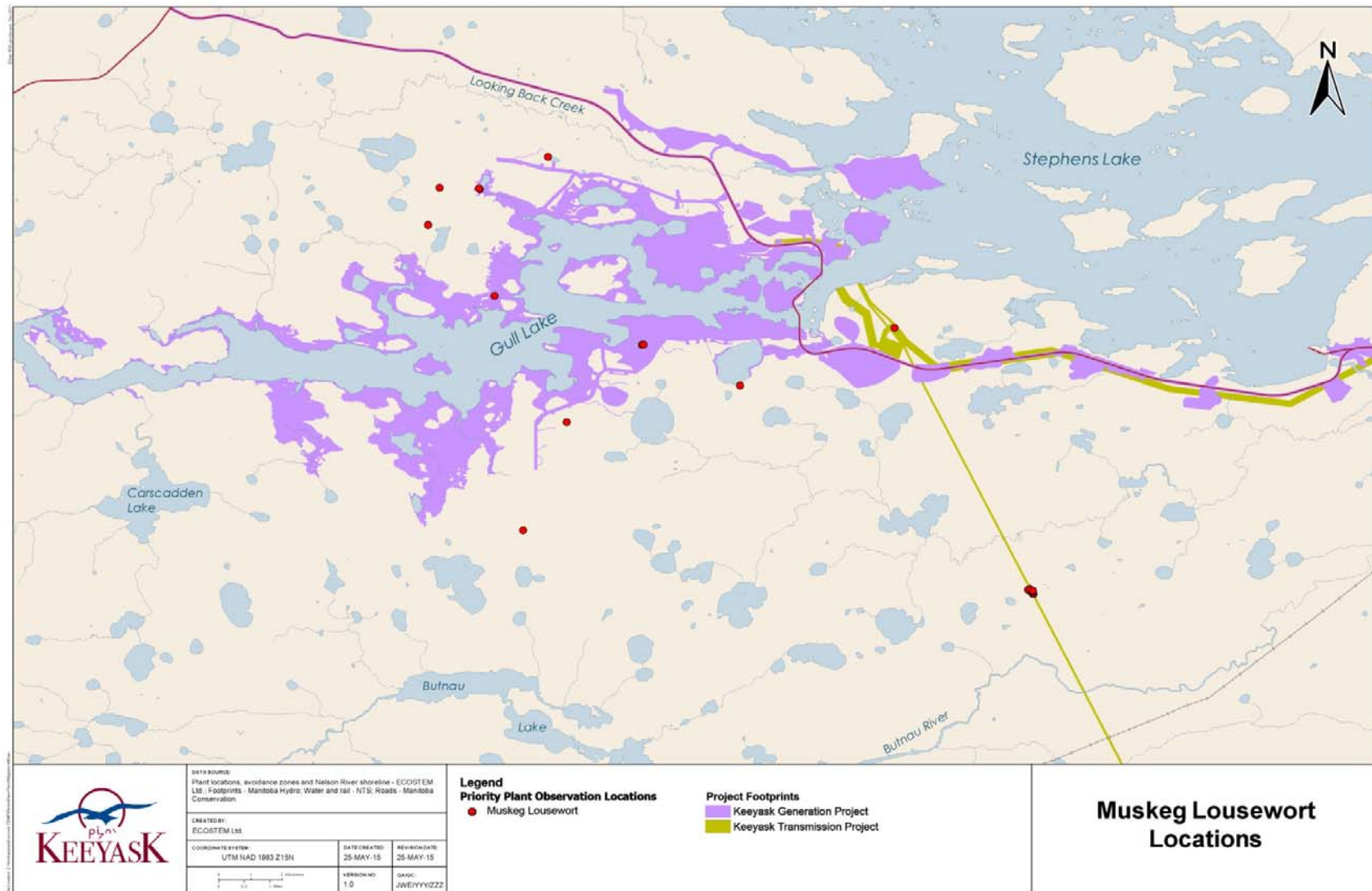
Potential Project effects on muskeg lousewort include the disturbance of local plant populations and their habitat through clearing, excavation, physical disturbance, material stockpiling, flooding, access related effects and indirect changes to hydrology.

Field studies conducted between 2005 and 2014 for the Keeyask Generation and Keeyask Transmission Projects found 14 muskeg lousewort locations scattered within and near Study Zone 4 (see Map 4 for most of the locations). Eleven of the muskeg lousewort locations were scattered around the northwest side of Gull Lake as well as the south side of Gull Lake and Gull Rapids. Nine of these locations are within the Keeyask Generation or Transmission Project's direct and indirect zone of influence on terrestrial plants. The proportion of discovered locations within Study Zone 2 is high because this is where pre-clearing rare plant searches were conducted.

The number of locations observed during field studies indicates that muskeg lousewort may be more common in Study Zone 4 than suggested by its provincial conservation concern ranking. It is recommended that searches be conducted in portions of Study Zone 4 that are outside of Study Zone 2 during summer 2015 to determine the minimum number of muskeg lousewort populations that will not be affected by the Project. This information will help evaluate the potential magnitude of Project effects on muskeg lousewort by placing the affected locations into the broader population context. Avoidance or transplanting would not be required if at least 20 locations are found outside of the Study Zone 2.

The following are the mitigation measures recommended to reduce Project effects on muskeg lousewort:

- Mark any muskeg lousewort patches that can be avoided during construction and operation;
- For muskeg lousewort patches that cannot be avoided:
 - Conduct searches in portions of Study Zone 4 that are outside of Study Zone 2 during summer 2015 to determine if at least 20 muskeg lousewort patches occur within this area. Transplanting mitigation will not be required for patches that cannot be avoided if 20 patches are discovered;
 - In the event that 20 muskeg lousewort patches are not discovered outside of Study Zone 4:
 - Develop a transplanting plan for the plant patches that cannot be avoided;
 - Monitor site disturbance and the survival and vigour of plants in sites marked for avoidance;
 - Monitor the survival and vigour of transplanted plants until they appear to have become well established in their new locations.



Map 4: Muskeg lousewort locations found in the Project area between 2005 and 2014.

5.0 SUMMARY AND CONCLUSIONS

Just over 21 km of pre-clearing S1 and S2 plant survey transects were searched in 2014, to verify the presence/absence of S1 or S2 plants in Study Zone 2, which includes areas that may be directly or indirectly affected by the Project. No S1 species were observed during targeted field surveys or incidentally during other fieldwork. One S2 species, muskeg lousewort, was observed at five locations within Study Zone 2.

Four of the five locations observed within Study Zone 2 were in the future reservoir, on both the north and south side of the Nelson River. As avoidance of these areas is not practicable, additional searches outside of Study Zone 2, but within Study Zone 4 will be conducted during the summer of 2015, in order to determine whether muskeg lousewort is more common in the Keeyask Region than suggested by its provincial conservation concern ranking. If at least 20 locations are observed outside of Study Zone 2, then transplanting will not be necessary. In the event that at least 20 muskeg lousewort locations are not discovered outside of Study Zone 2, then a transplanting plan will be developed for these plants.

Subsequent monitoring will verify that any prescribed avoidance or transplanting has occurred, and to evaluate the survival and vigour of avoided or transplanted populations.

6.0 LITERATURE CITED

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