

City of Greater Sudbury

Aquatic Vegetation and Eurasian Milfoil Preliminary Survey

2014

Lake Water Quality Program
Environmental Planning Initiatives Section



1.0 Introduction

Aquatic plants, often referred to as macrophytes, normally live in water and must spend at least part of their life cycle in water. Macrophytes have been classified based on the position of the leaves in relation to the water surface: submerged (e.g., pondweed), free-floating leaves (e.g., duckweed), and emergent species (e.g., cattails). The term 'macrophyte' typically excludes algae.

Many native aquatic plant species include the word 'weed' in their common name (e.g., Pickerelweed, Duckweed, Pondweed, etc). Often, aquatic plants in a lake are collectively referred to as simply 'weeds', meant as a pejorative term. This is most unfortunate and unfair as these plants are a natural and vital part of a lake or river's ecosystem.

Life in lakes depends, directly or indirectly on aquatic plants, which help maintain water quality and provide many benefits to fish, wildlife and people. Macrophytes provide food and shelter for all manner of aquatic creatures from insects to fish and waterfowl. Macrophytes provide services for human beings too by clarifying lake and river water and slowing the action of waves that erode shorelines. A healthy, native aquatic plant community also reduces the risk that algae will take over a lake.

Many lakes in Greater Sudbury have been devoid of aquatic vegetation due to decades of local smelting activities and deposition of acid rain induced by distant industrial activity. The affected lakes were termed 'dead lakes' due to the lack of living organisms such fish, aquatic insects and aquatic plants. The aquatic ecosystem has recovered substantially in these formerly dead lakes with expanding populations of microscopic organisms, aquatic plants and fish.

One macrophyte that has spread in some lakes in Greater Sudbury is Eurasian Water-milfoil (*Myriophyllum spicatum*), a species not native to North America. Eurasian Water-milfoil (EWM) is widely distributed in North America and difficult to control once established. Dense mats of EWM can outcompete native aquatic plants and alter a lake's natural ecosystem. These dense mats can also interfere with recreational activities such as swimming, fishing, water skiing, and boating.

Following approval of a proposal brought to City Council by the Greater Sudbury Watershed Alliance in early 2011, the City of Greater Sudbury retained the services of EnviroScience Inc. for a 3-year contract to conduct biological control of EWM on six lakes within Greater Sudbury using the Milfoil Weevil (*Euhrychiopsis lecontei*). An important component of the long-term biological control of EWM is the development and competition from native plants once the EWM stands have been weakened and reduced by the feeding of milfoil weevils. A healthy native plant community developing within weakened stands of EWM helps to keep this aggressive plant in check.

In 2014, following the three-year stocking program City staff agreed to:

- 1) Retain EnviroScience Inc to monitor for a fourth year the EWM beds that had been stocked with milfoil weevils during the 2011-2013 period and to also monitor some EWM

beds that had not been stocked with weevils. Monitoring results are found in a separate report prepared by EnviroScience Inc.

- 2) Conduct a survey of the stocked lakes, specifically mapping and identifying the native aquatic vegetation (macrophytes) and the EWM beds not surveyed by EnviroScience Inc. The methods and results of this survey are described in the sections below.

2.0 Survey Method

From July to September, 2014, five lakes were surveyed: Hannah, Long, McFarlane, Richard and St. Charles. Due to time restraints, Simon, Middle and Grant lakes were not sampled in 2014.

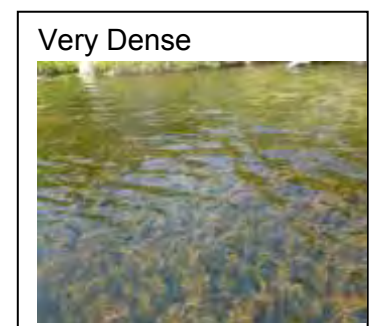
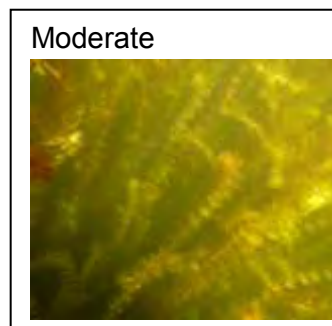
The surveys were conducted from a boat and survey involved two parts: 1) a visual survey of native aquatic plants on the surface of the lake and just below the water line and 2) rakes tosses to determine the type and percentage of native aquatic plant species and EWM growing under water. The rake toss method is commonly used in scientific studies and in lake management to sample macrophytes. Rake tosses were done at the weevil stocked sites as well as other EWM beds in the lakes. The results were recorded on the lake map with a list of the native aquatic species found within each lake.

Listed below are the survey dates for each lake:

Lake Name	Survey Date (2014)
Hannah Lake	September 9
Long Lake	July 11, 14, 17 & 18 August 8, 18 & 28
McFarlane Lake	July 22 & 24
Richard Lake	August 4 & 11
St. Charles Lake	September 8

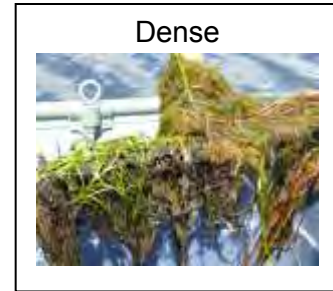
2.1 Visual Observations

Visual observations of native aquatic vegetation and EWM were conducted from a 14-foot aluminum boat. Plants growing on the water surface (emergent and floating) and below the water line (submergent) were identified along with the relative density of the vegetation. Aquatic vegetation beds were classified into 4 categories depending on the density: Sparse, Moderate, Dense and Very Dense. Below are photos showing examples of the different categories of aquatic vegetation density. The maps at the end of this report show the densities of the EWM beds.



2.2 Rake Toss

Rake tosses were used to sample native plant species and EWM growing below the water surface and not easily identified by eye. Rake tosses were done at the weevil stocked sites as well as additional EWM beds and large native macrophyte beds. Water temperature and location depth were recorded at each site. Densities of the aquatic vegetation were determined based on the fullness of the vegetation on the rake head. Below are photos showing the 3 different categories of rake density.



3.0 Results

In total, 29 different native aquatic plant species were found. Long Lake had the most native macrophytes with 22 species. Hannah Lake had the least native macrophytes with only 8 species. A complete list of the macrophytes per lake is located below.

Hannah Lake (8)	Long Lake (22)	McFarlane Lake (17)	Richard Lake (12)	St Charles Lake (9)
Bullrush	Arrowhead	Bullrush	Bullrush	Cattails
Bushy Pondweed	Burreed	Canadian Waterweed	Canadian Waterweed	Fern Pondweed
Cattails	Canadian Waterweed	Cattails	Cattails	Largeleaf Pondweed
Pickerelweed	Cattails	Common Waterweed	Common Waterweed	Muskgrass
Pipewort	Common Waterweed	Duck Weed	Fern leaf Pondweed	Pipewort
Quillwort	Fern Pondweed	Floating Leaf Bullrush	Largeleaf Pondweed	Richardson's Pondweed
Richardson's Pondweed	Hard Stemmed Bullrush	Largeleaf Pondweed	Muskgrass	Slender Leaf Pondweed
White Water Lily	Largeleaf Pondweed	Muskgrass	Richardson Pondweed	Wild Celery
	Muskgrass	Pickerelweed	Shore Plantain	Yellow Pond Lily
	Pickerelweed	Ribbon Leaf Pondweed	Slender Pondweed	
	Pipewort	Richardson's Pondweed	Smart Weed	
	Quillwort	Shore Plantain	White Water Lily	
	Ribbon Leaf Pondweed	Slender Leaf Pondweed		
	Richardson's Pondweed	Water Shield		
	Sedges	White Water Lily		
	Slender Pondweed	Wild Celery		
	Stone Wart	Yellow Pond Lily		
	Water Lobelia			
	Water Shield			
	White Water Lily			
	Wild Celery			
	Yellow Pond Lily			

Hannah Lake

At the time of the survey on September 9, 2014, Hannah Lake had moderate to dense EWM beds with plants growing up to approximately 0.5 to 1.0 meter below the water surface. The native vegetation cover was generally sparse, however, a large White Water Lily bed was found at the west end of the lake close to the highway.

Rake Toss

The table below outlines the aquatic vegetation density (EWM and native species), the percent and list of native species as well as water temperature and location depth at the rake toss site.

Rake Toss	Date	Water Temperature (°C)	Depth (m)	Vegetation Density	% Native Species	Native Species
1	September 9, 2014	20.2	2.5	Sparse	0%	None
2	September 9, 2014	20.2	2.5	Sparse	80%	Richardson's Pondweed, Bushy Pondweed and Quillwort
3	September 9, 2014	20.2	2.5	Moderate	20%	Richardson's Pondweed and Bushy Pondweed

Map

A schematic map of Hannah Lake outlining the EWM and the native aquatic vegetation beds is located at the end of this report

Long Lake

Long Lake had sparse to moderate EWM throughout the different times of the summer survey. The EWM beds were 0.5 to 1.0 meters below the surface and had larvae and adult weevils present and visible stem damage. Surface EWM was absent in the Birch Hill bays at the east end of the lake making it easy to navigate the boat right under Long lake road through the culvert. Long Lake had moderate native aquatic vegetation beds.

Rake Toss

The table below outlines the aquatic vegetation density (EWM and native species), the percent and list of native species as well as water temperature and location depth at the rake toss site.

Rake Toss	Date	Water Temperature (°C)	Depth (m)	Vegetation Density	% Native Species	Native Species
1	July 11, 2014	24.2	2.0	Moderate	80%	Canadian Waterweed, Largeleaf Pondweed, Fern Pondweed and Slender Pondweed
2	July 11, 2014	24.2	1.5	Sparse	80%	Canadian Waterweed, Largeleaf Pondweed, Fern Pondweed, Slender Pondweed and Richardson's Pondweed
3	July 11, 2014	24.2	2.0	Very Sparse	10%	Stonewort

4	July 14, 2014	22.0	2.5	Very sparse	10%	White Water Lily and Watershield
5	July 14, 2014	22.0	3.0	Sparse	10%	Common Waterweed, Slender Pondweed and Largeleaf Pondweed
6	July 18, 2014	23.0	2.5	Very sparse	10%	Largeleaf Pondweed and Fernleaf Pondweed
7	August 8, 2014	21.8	1.5	Sparse	50%	Richardson's Pondweed and Muskgrass,
8	August 8, 2014	25.0	3.5	Sparse	50%	Muskgrass, Ribbonleaf Pondweed and Common Waterweed
9	August 28, 2014	23.5	2.0	Sparse	10%	Largeleaf Pondweed

Map

A schematic map of Long Lake outlining the EWM and the native aquatic vegetation beds is located at the end of this report.

McFarlane Lake

The EWM beds in McFarlane Lake were moderate to dense and growing a half meter below the water surface. Larvae and adult weevils were observed. McFarlane Lake was the only lake where numerous floating fragments of EWM with white roots were observed. The lake had moderate native aquatic vegetation.

Rake Toss

The table below outlines the aquatic vegetation density (EWM and native species), the percent and list of natural vegetation as well as water temperature and location depth at the rake toss site.

Rake Toss	Date	Water Temperature (°C)	Depth (m)	Vegetation Density	% Native Species	Native Species
1	July 22, 2014	25.0	1.5	Moderate	80%	Wild Celery, Ribbonleaf Pondweed
2	July 22, 2014	23.0	2.0	Sparse	0%	None

Map

A schematic map of McFarlane Lake outlining the EWM and the native aquatic vegetation beds is located at the end of this report.

Richard Lake

Richard Lake had moderate to dense EWM beds and moderate to dense native aquatic vegetation. The EWM beds were 2.0 meters below the water surface. The lake also had a variety of wildlife species: ducks, Great Blue Heron, water snakes, painted turtles and snapping turtles.

Rake Toss

The table below outlines the aquatic vegetation density (EWM and native species), the percent and list of native species as well as water temperature and location depth at the rake toss site.

Rake Toss	Date	Water Temperature (°C)	Depth (m)	Vegetation Density	% Native Species	Native Species
1	August 1, 2014	22.0	1.5	Moderate	50%	Muskgrass, Leafy Pondweed, Slender Pondweed and Quillwort
2	August 1, 2014	23.0	2.0	Dense	100%	Muskgrass, Richardson's Pondweed, Slender Pondweed, Bushy Pondweed, Quillwort, Pipewort, White Water Lily and Yellow Pond Lily

Map

A schematic map of Richard Lake outlining the EWM and the native aquatic vegetation beds is located at the end of this report.

St. Charles

St. Charles had dense EWM but sparse native aquatic vegetation. The EWM was a half-meter below the surface and weevil damage was observed.

Rake Toss

The table below outlines the aquatic vegetation density (EWM and native species), the percent and list of native species as well as water temperature and location depth at the rake toss site.

Rake Toss	Date	Water Temperature (°C)	Depth (m)	Vegetation Density	% Native Species	Native Species
1	September 8, 2014	21.6	2.0	Dense	0%	None
2	September 8, 2014	21.6	2.0	Moderate	80%	Largeleaf and Slenderleaf Pondweed
3	September 8, 2014	21.6	2.0	Moderate	80%	Muskgrass, Slenderleaf Pondweed and Richardson's Pondweed

Map

A schematic map of St. Charles Lake showing the EWM and the native aquatic vegetation beds is located at the end of this report.

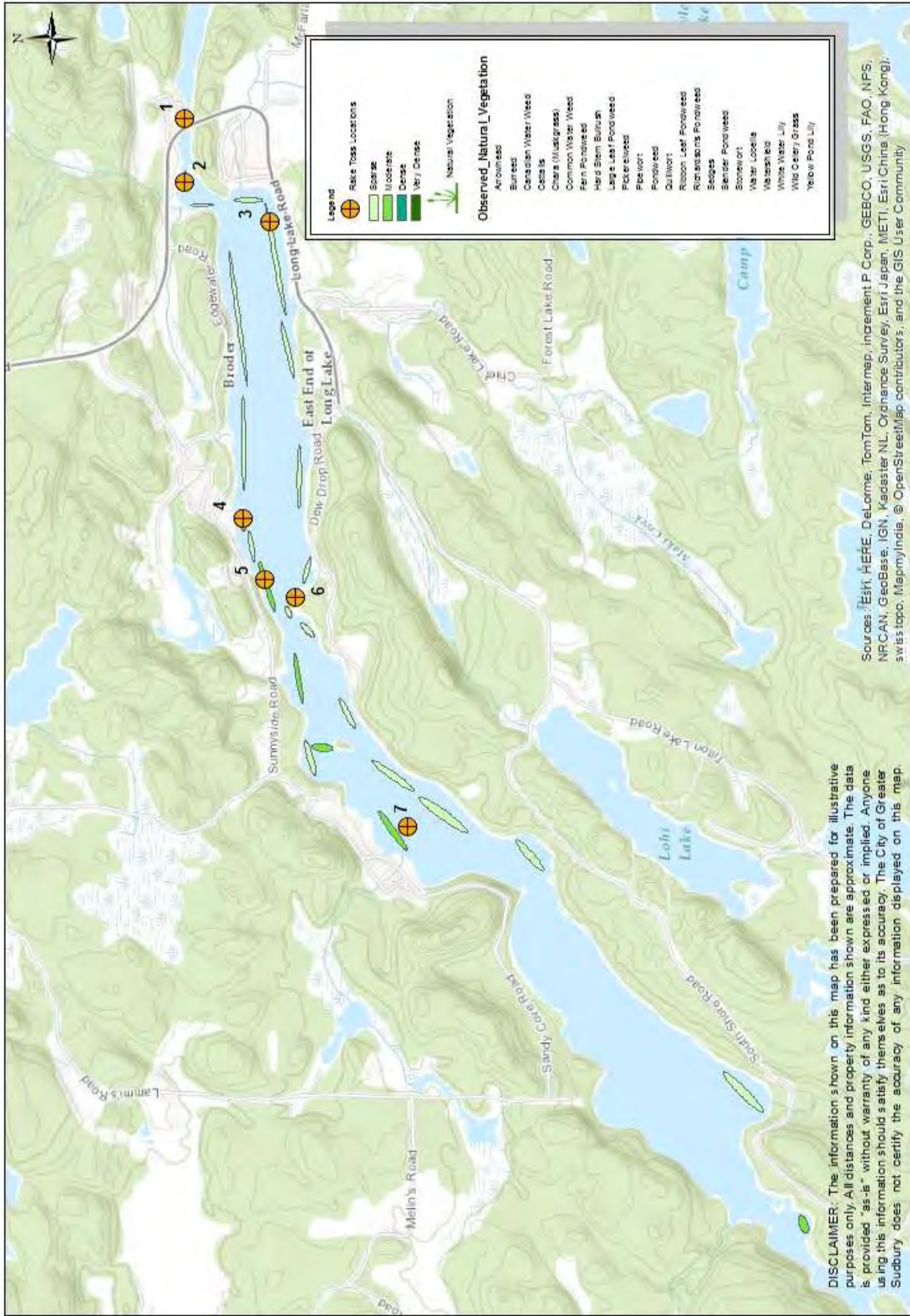
Hannah Lake Map

Hannah Lake Native Aquatic Vegetation and Eurasian Milfoil Survey 2014



Long Lake Map – Part 1

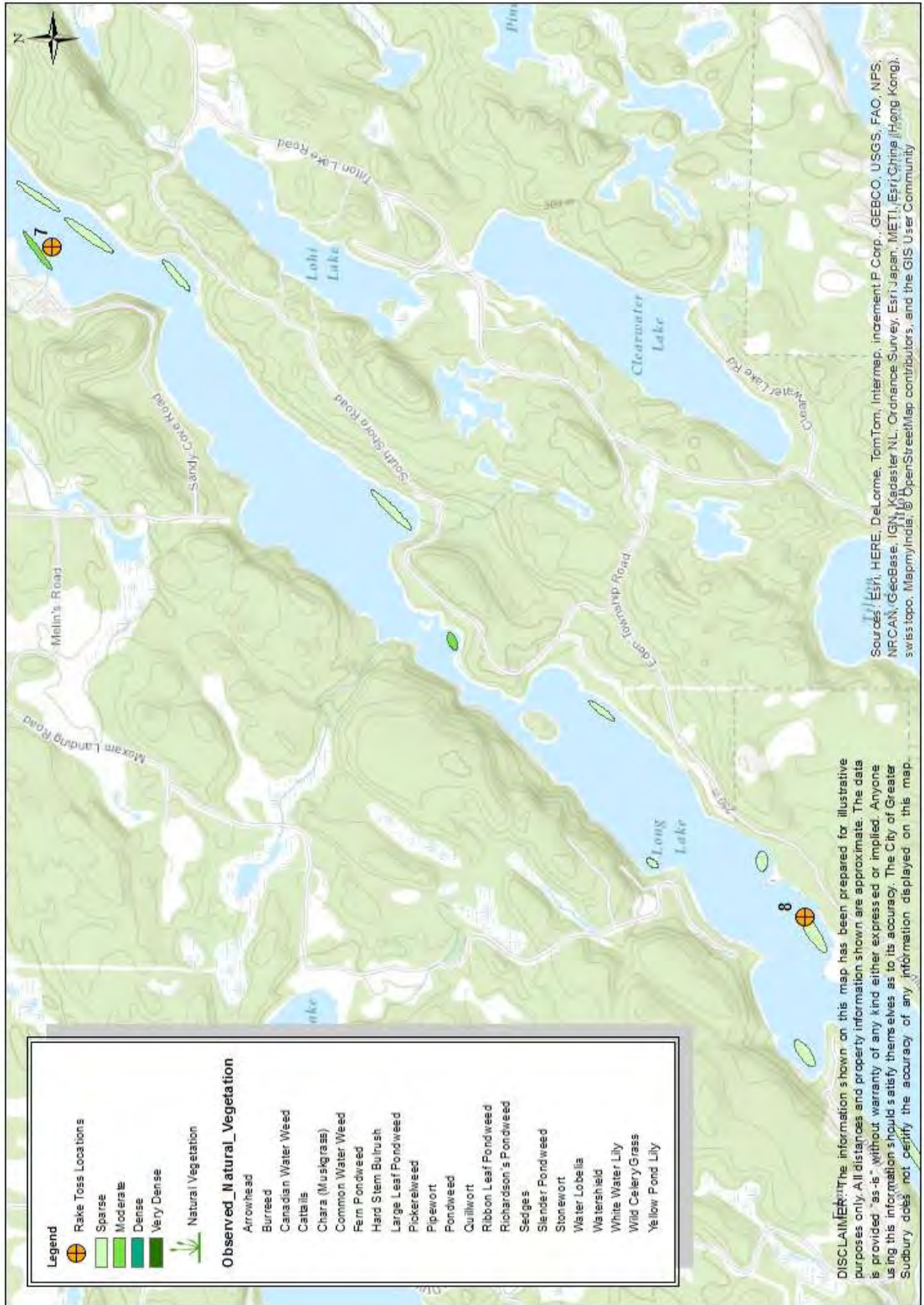
Long Lake - Part 1 Native Aquatic Vegetation and Eurasian Milfoil Survey 2014



Long Lake - Part 2

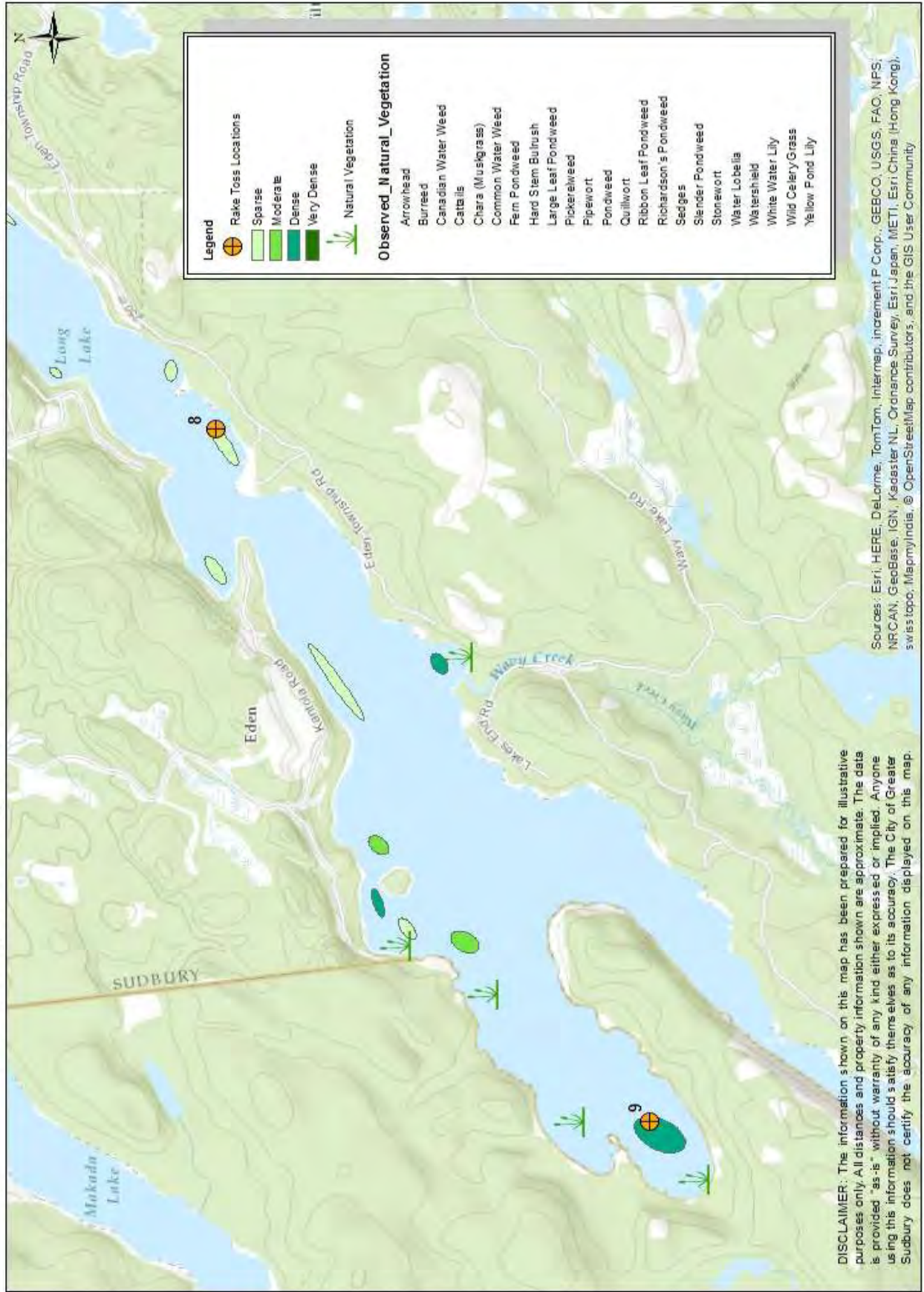
Native Aquatic Vegetation and Eurasian Milfoil Survey 2014

Long Lake Map – Part 2



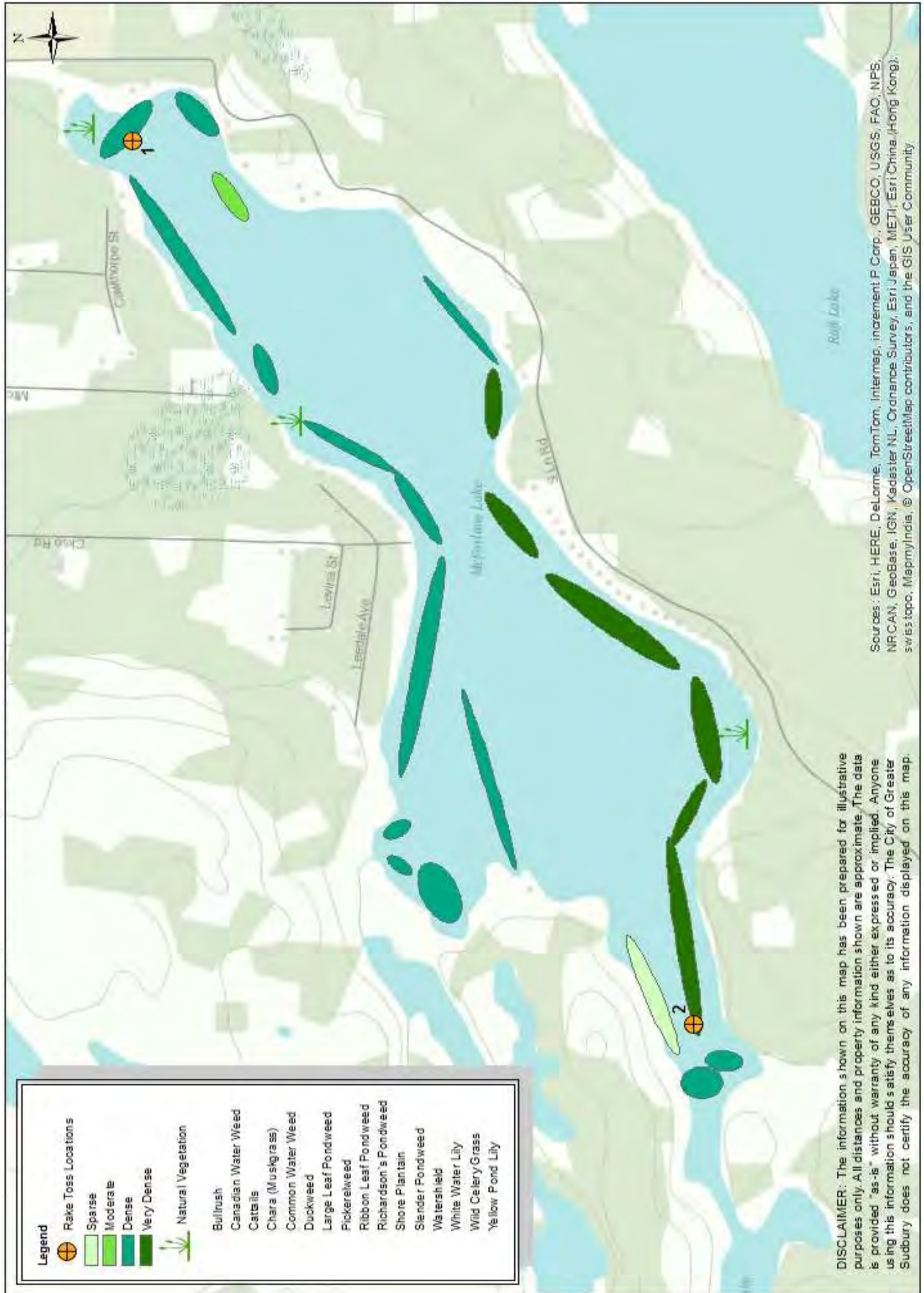
Long Lake Native Aquatic Vegetation and Eurasian Milfoil Survey 2014

Long Lake Map – Part 3



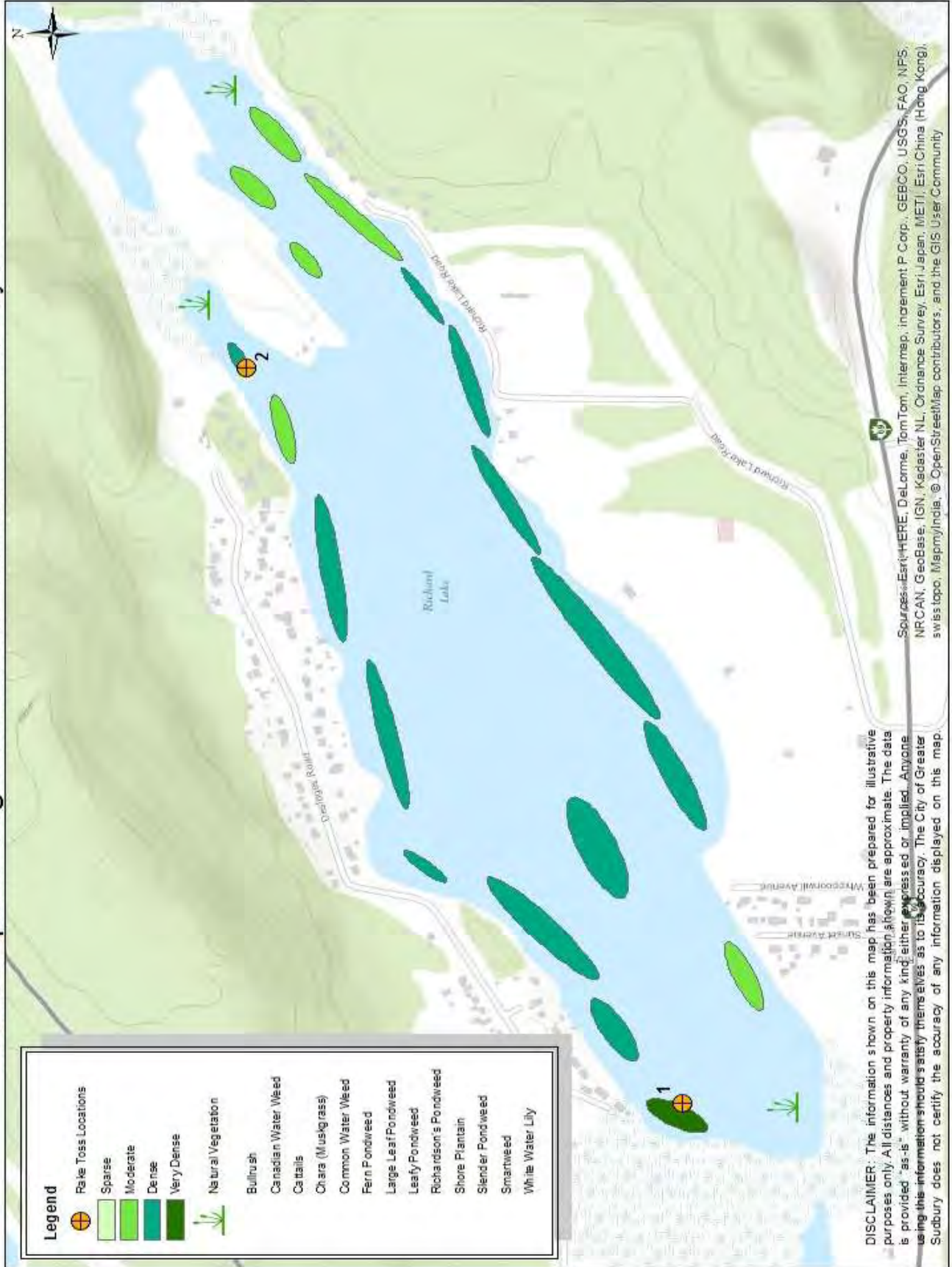
McFarlane Lake Map

McFarlane Lake Native Aquatic Vegetation and Eurasian Milfoil Survey 2014



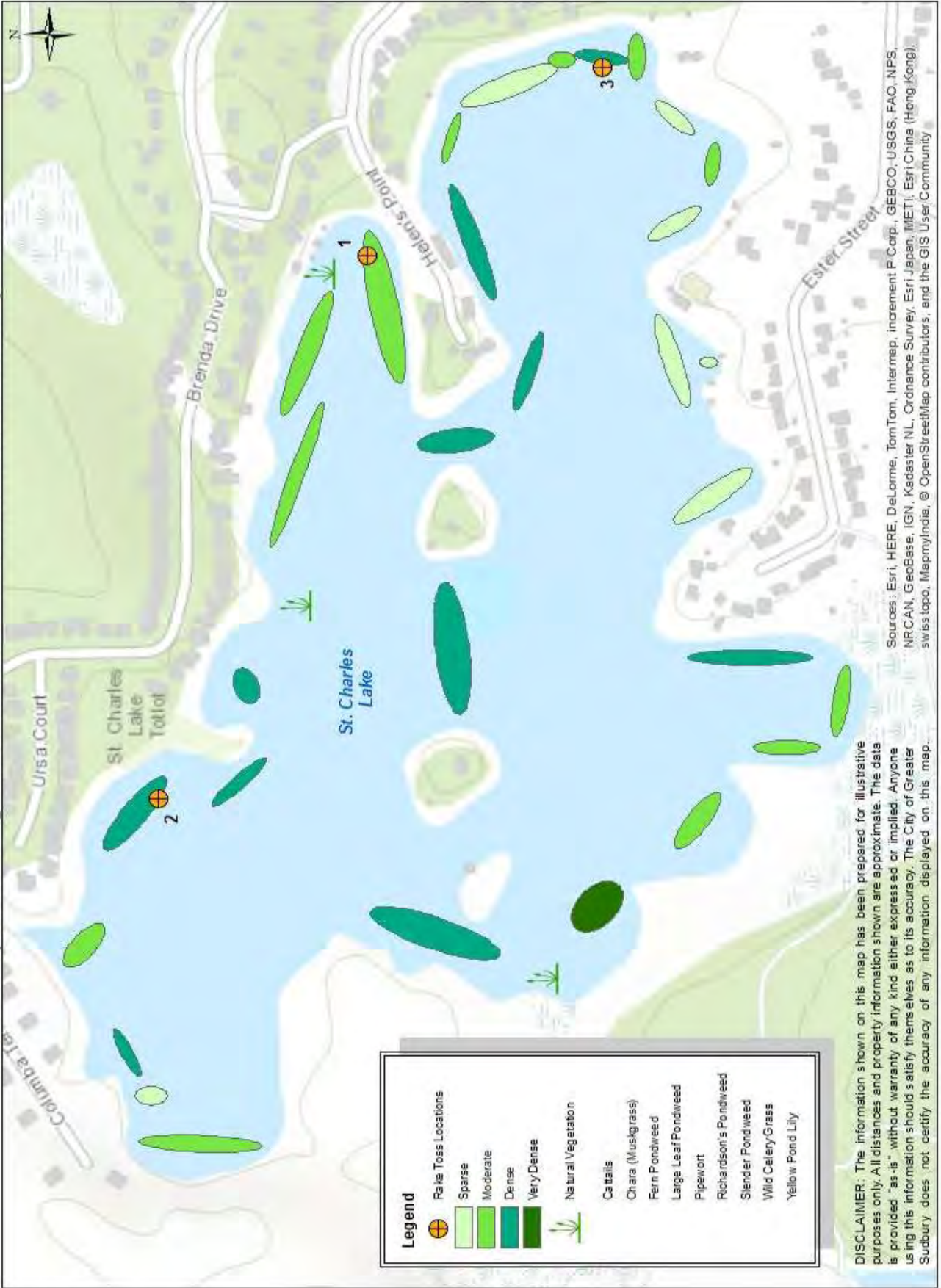
Richard Lake Native Aquatic Vegetation and Eurasian Milfoil Survey 2014

Richard Lake Map



St. Charles Lake Map

St. Charles Lake Native Aquatic Vegetation and Eurasian Milfoil Survey 2014



Lake Water Quality Program

City of Greater Sudbury

705-674-4455, ext. 4604

lakewaterquality@greatersudbury.ca

www.greatersudbury.ca/lakes