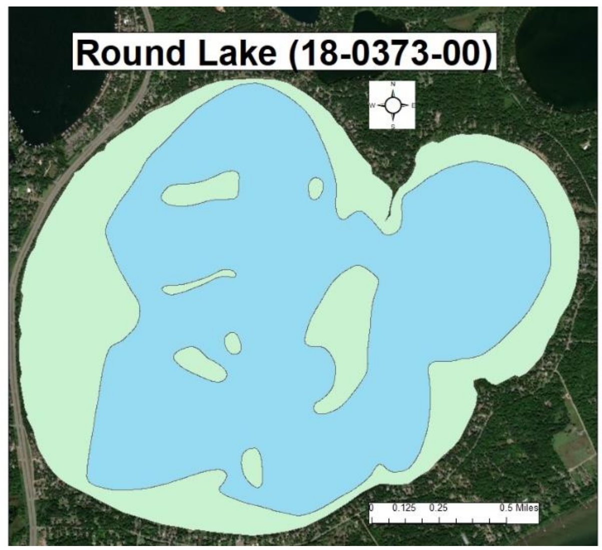
Round Lake 18-0373-00 CROW WING COUNTY

Aquatic Vegetation Point-intercept Survey

Survey Date 12 & 13 August 2020
Observers Ellie Kriese, Casey Jenson
Date of Report 2 August 2020
Report Author Ellie Kriese

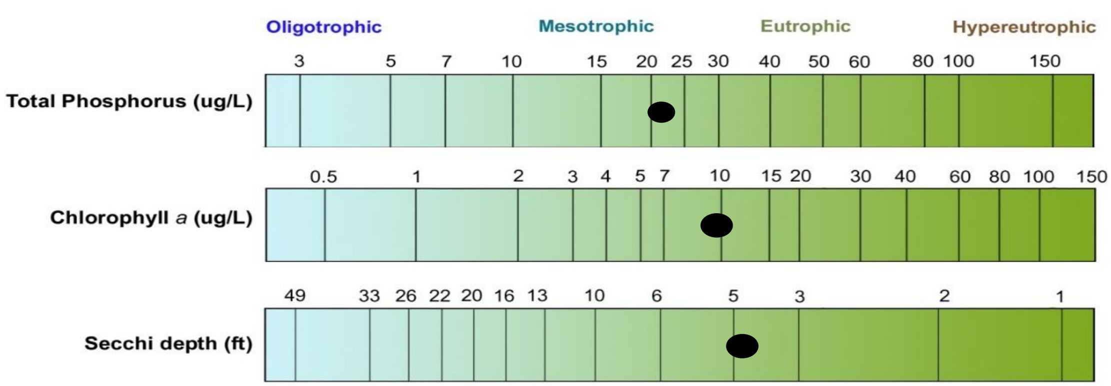
Lake Summary



Round Lake (DOW 18-0373-00) is a large 1,644 acre lake located 11 miles north of Brainerd MN, in Crow Wing County. Round Lake has a maximum depth of 51 feet and contains a littoral area of about 627 acres or 38 percent of the lakes total area. The littoral area is considered the part of the lake that is 15 feet deep or less, which permits light penetration and allows plant growth.

Round Lake is classified as a mesotrophic lake with water clarity as measured for 23 years by mean secchi depth of approximately 13 feet. Continual annual monitoring can help track trends in water quality in the lake. Total phosphorus and chlorophyll-a (values that provide a measure of the amount of algae in the water) are within the expected ecoregion range for the northern lakes and forests region, with mean values 20.0 and 7.0 ug/L at the primary site of Round Lake. Water chemistry statistics were collected from the Minnesota Pollution Control Agency's online database.

WATER QUALITY STATISTICS						
MPCA primary site	**Years with Data**	**Mean Secchi depth (feet)**	**Mean Phosphorous (μg/L)**	**Mean Chlorophyll-a (μg/L)**	**Mean TSI**	**Trophic State**
203	1993-2019	13	20.0	7.0	46	Mesotrophic



Objectives of the Survey

This survey describes the aquatic plant community of Round Lake including:

1. Plant taxa observed and the estimated abundance of each taxon
2. Identification of taxa to the level of species when possible
3. Frequency of occurrence of each taxon found, stating the number of points used as the denominator for the calculations
4. Frequency of all aquatic plants found
5. Estimation of abundance of species sampled using MN DNR ranking system
6. Distribution map for common species
7. Determination of any invasive aquatic plants

Methods

The aquatic plant survey followed our RMBEL Standard Operating Procedure and the methodology described by Madsen (1999). Geographic Information Systems (GIS) software was used to generate sample points across the littoral zone surface in a 80-meter by 80-meter grid on Round Lake, resulting in a total of 394 potential survey points, with additional rakes being thrown in areas any invasive species was found. In the field, all points were sampled, and vegetation was not found beyond 19 feet in depth. In areas that were not accessible by boat, staff observed and recorded emergent vegetation. A Global Positioning System (GPS) unit was used to navigate the boat to each sample point. Water depths at each site were recorded in 1-foot increments using an electronic depth finder.

A double-headed, weighted garden rake attached to a rope (Figure 2 and 3) was used to survey vegetation. Vegetation that was found under the surface by use of the double-headed garden rake was assigned a number between 0 and 3; 0 being absent, 1 being sparse (≤ 25% of the rake head covered), 2 being common (>25% but ≤ 75% of the rake head covered), 3 being abundant(>75% of the rake head covered), and Plant identification followed Blickenderfer (2007) and Skawinski (2019).

Figure 1 and 3: Double-headed, weighted garden rake, attached to a rope used to survey aquatic vegetation.

Frequency of occurrence was calculated for each species as the number of sites in which a species occurred divided by the total number of sample sites. The average number of plants per rake sample was calculated as the total number of plants sampled divided by the number of sample locations.

Sampling points were also grouped by water depth and separated into five depth zones for analysis. Depth zones included less than 3 feet, 3-5, 6-8, 9-15 and over 15 feet.

Survey Results

On August 12th and 13th 2020, 394 points were observed and sampled for aquatic vegetation. The weather was rainy with overcast skies, temperatures ranging in the low 60's and 70's. Little to no wind was observed. Water temperatures were in the mid to high 70s.

Sampling occurred to a maximum depth of 20 feet; however, no plants were found to be growing beyond 19 feet of water. Plant abundance was greatest between three and eight feet of water. As depths increased beyond that range, the presence of vegetation decreased and became less dense (Figure 4).

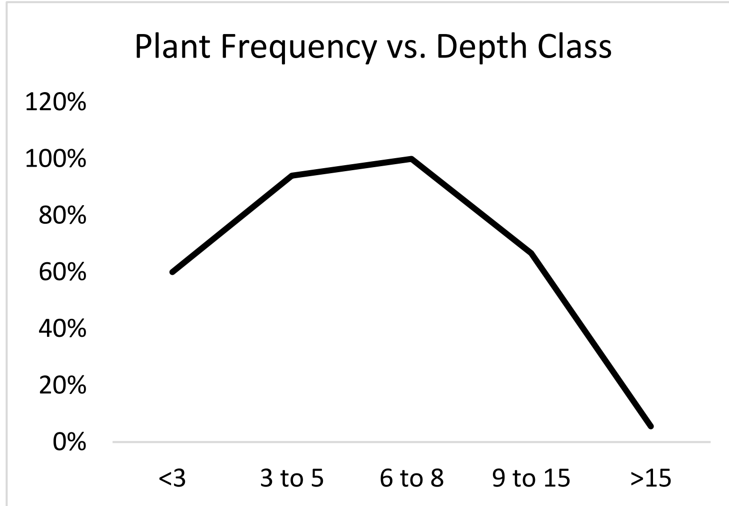


Figure 4: Plant frequency for each depth zone in Round Lake.

Twenty two different types of native plants were found across the sampling area, and no invasive plants were found (Figures 6). Seven was the maximum number of species found at a specific point (Figure 5).

Of the 385 sampled locations in Round Lake, 64 had no vegetation present. No invasive plant species were located throughout the survey. The most abundant native plant species were; Bulrush (Scirpus acutus), Water Celery (*Valisneria americana*), and Bushy Pondweed (*Najas flexilis*) (Figures 7, 8, and 9).

The average number of plants per rake sample on Round Lake was 1.26 for all sampled depths and 1.46 for points with depth less than 14 feet.

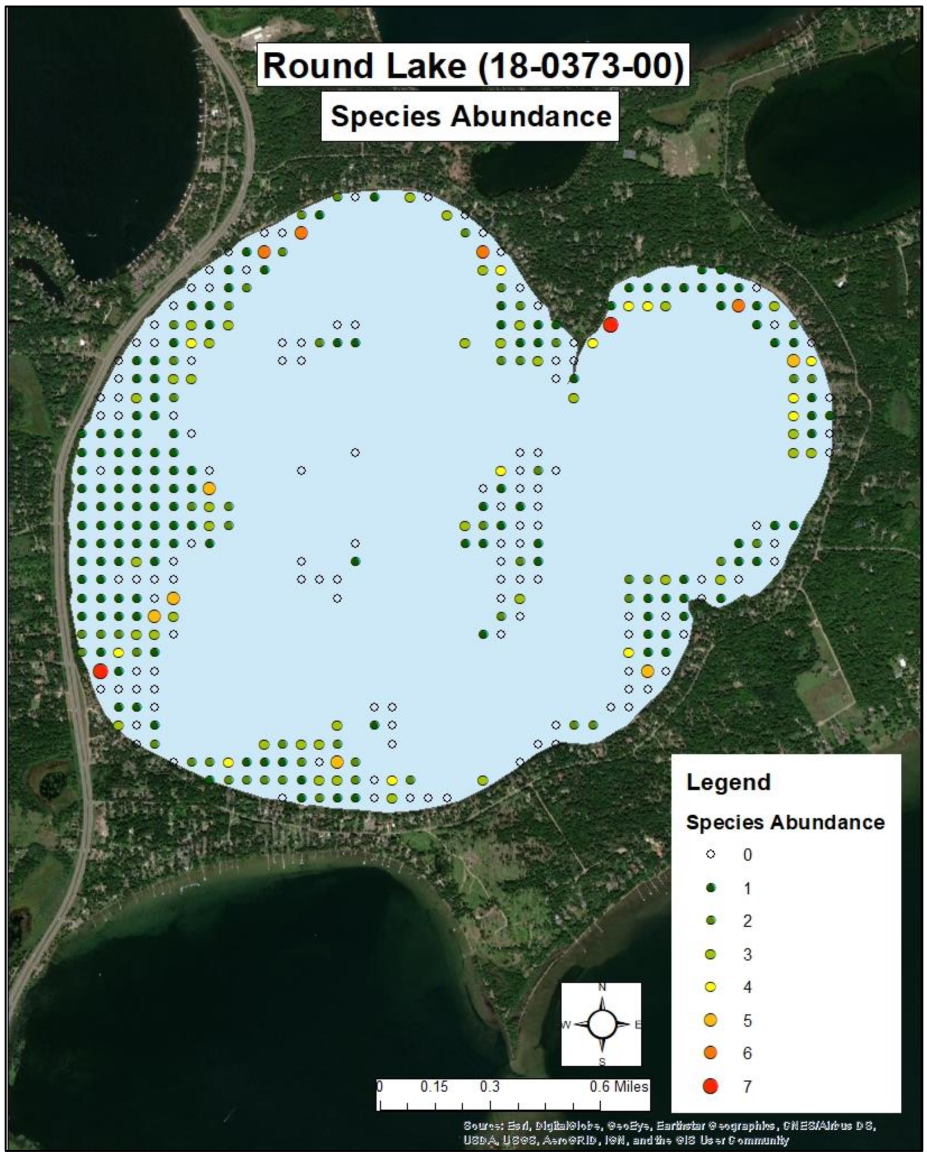


Figure 5: Aquatic plant species abundance in Round Lake.

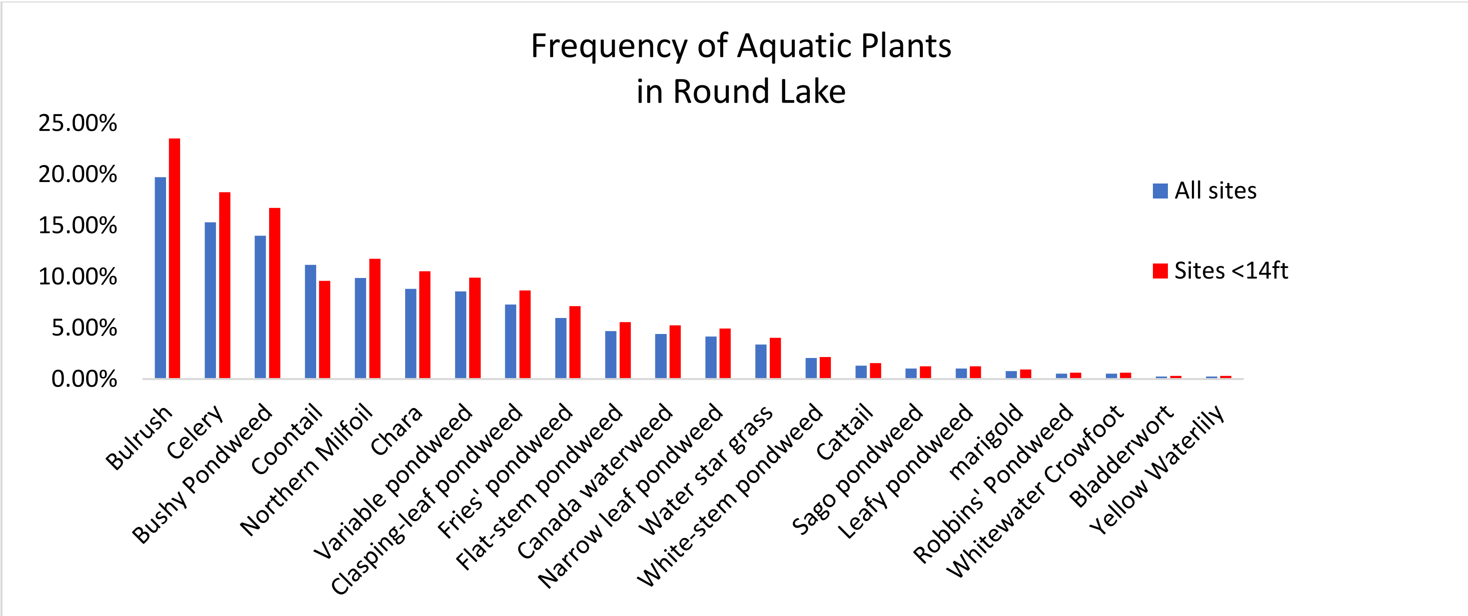


Figure 6: Frequency of aquatic plant species in Round Lake.

Table 2. Aquatic plants surveyed from Round Lake, Crow Wing County, MN: 12 & 13 August 2020.

Round Lake				**All sampled sites**	**Sites <14 feet**
Life Form	**Common Name**	**Scientific Name**	**Count**	**Frequency (%)**	**Frequency (%)**
SUBMERGED – ANCHORED – These plants grow primarily under the water surface. Upper leaves may float near the surface and flowers may extend above the surface. Plants are often rooted or anchored to the lake bottom.	Chara	*Chara sp.*	34	9%	11%
	Coontail	*Ceratophyllum demersum*	43	11%	10%
	Clasping-leaf Pondweed	*Potamogeton richardsonii*	28	7%	9%
	Robbin's Pondweed	*Potamogeton robbinsii*	4	0.5%	1%
	Canada waterweed	*Elodea canadensis*	17	4%	5%
	Water Marigold	*Bidens beckii*	3	1%	1%
	Northern milfoil	*Myriophyllum sibiricum*	38	10%	12%
	Flat-stem pondweed	*Potamogeton zosteriformis*	18	5%	6%
	Fries Pondweed	*Potamogeton friesii*	23	6%	7%
	White-stem pondweed	*Potamogeton praelongus*	8	2%	2%
	Bushy Pondweed	*Najas flexilis*	54	14%	17%
	Narrow leaf Pondweed	*Potamogeton sp.*	16	4%	5%
	Sago Pondweed	*Potamogeton pectinatus*	4	1%	1%
	Water star grass	*Zosterella dubia*	13	3%	4%
	Variable Pondweed	*Potamogeton gramineus*	33	9%	10%
	Greater Bladderwort	*Utricularia vulgaris*	1	<0.5%	<0.5%
	Leafy Pondweed	*Potamogeton foliosus*	4	1%	1%
	Water Celery	*Valisneria americana*	59	15%	18%
	Whitewater Crowfoot	*Ranunculus flabellaris*	2	0.5%	1%
	Robbins' Pondweed	*Potamogeton robbinsii*	4	0.5%	1%
FLOATING – LEAF – These plant leaves float on water and are anchored to the bottom of the lake.	Yellow Water Lily	*Nuphar variegata*	1	<0.5%	<0.5%
EMERGENT – These plants extend above the water surface and are found in shallow water.	Cattail	*Typha sp.*	5	1%	2%
	Bulrush	*Scirpus acutus*	76	20%	24%
Total number of plants (species diversity for the lake)			24		
Total number of plant occurrences			221		
Total number of sites			385		
Total number of sites <14			323		

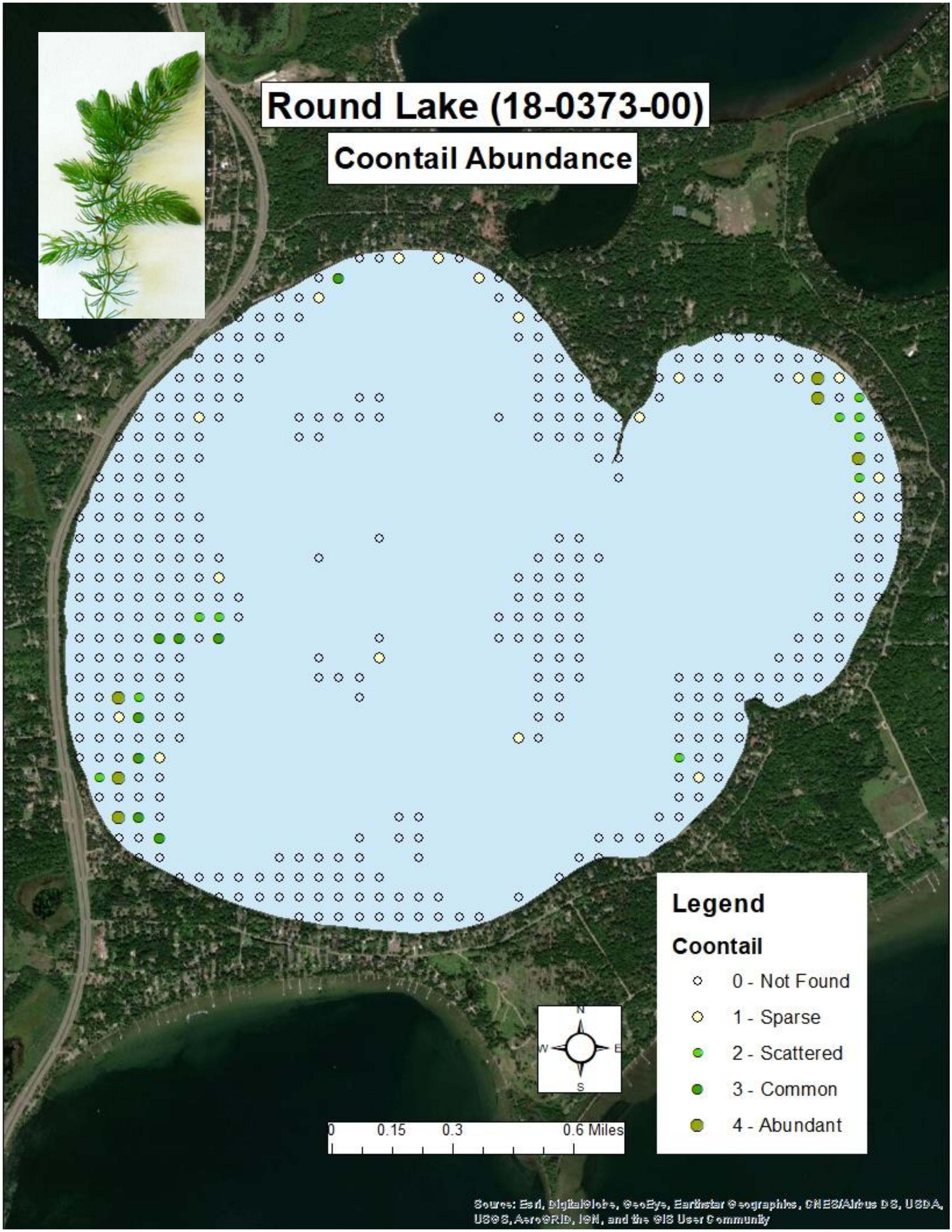


Figure 7: Density of coontail (Ceratophyllum demersum) at sample points in Round Lake.

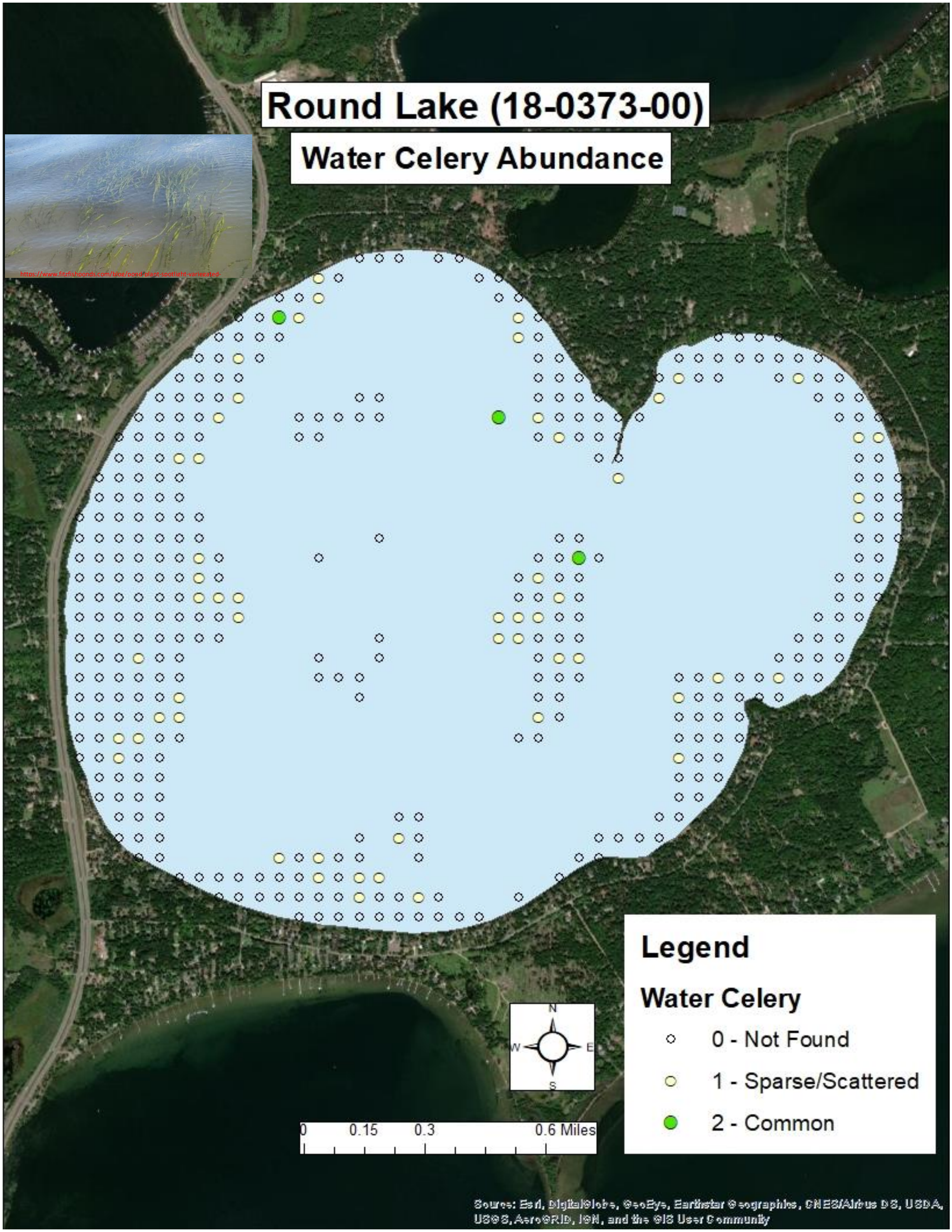


Figure 8: Density of Water Celery (Valisneria americana), at sample points in Round Lake.

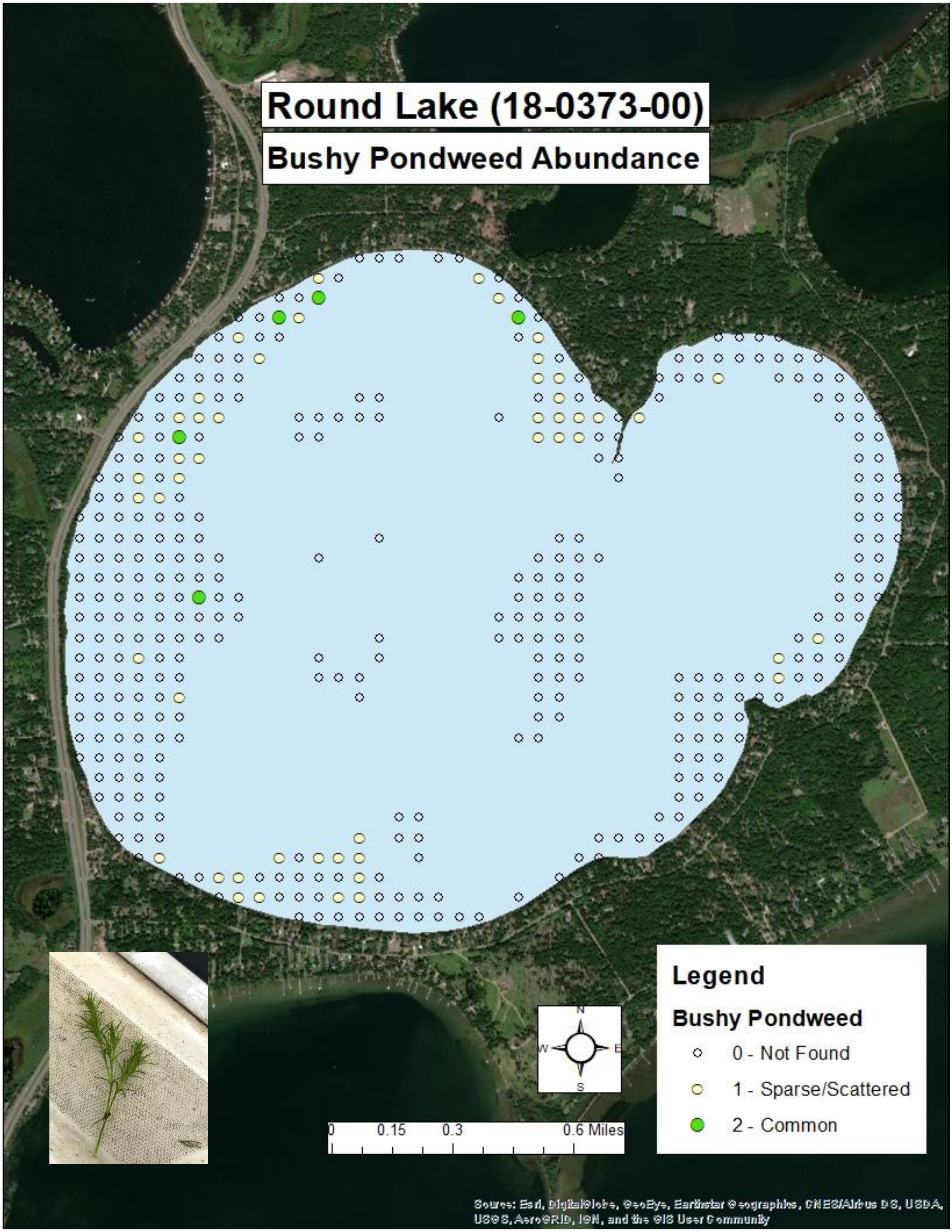


Figure 9: Density of Bushy Pondweed (Najas flexilis) at sample points in Round Lake.

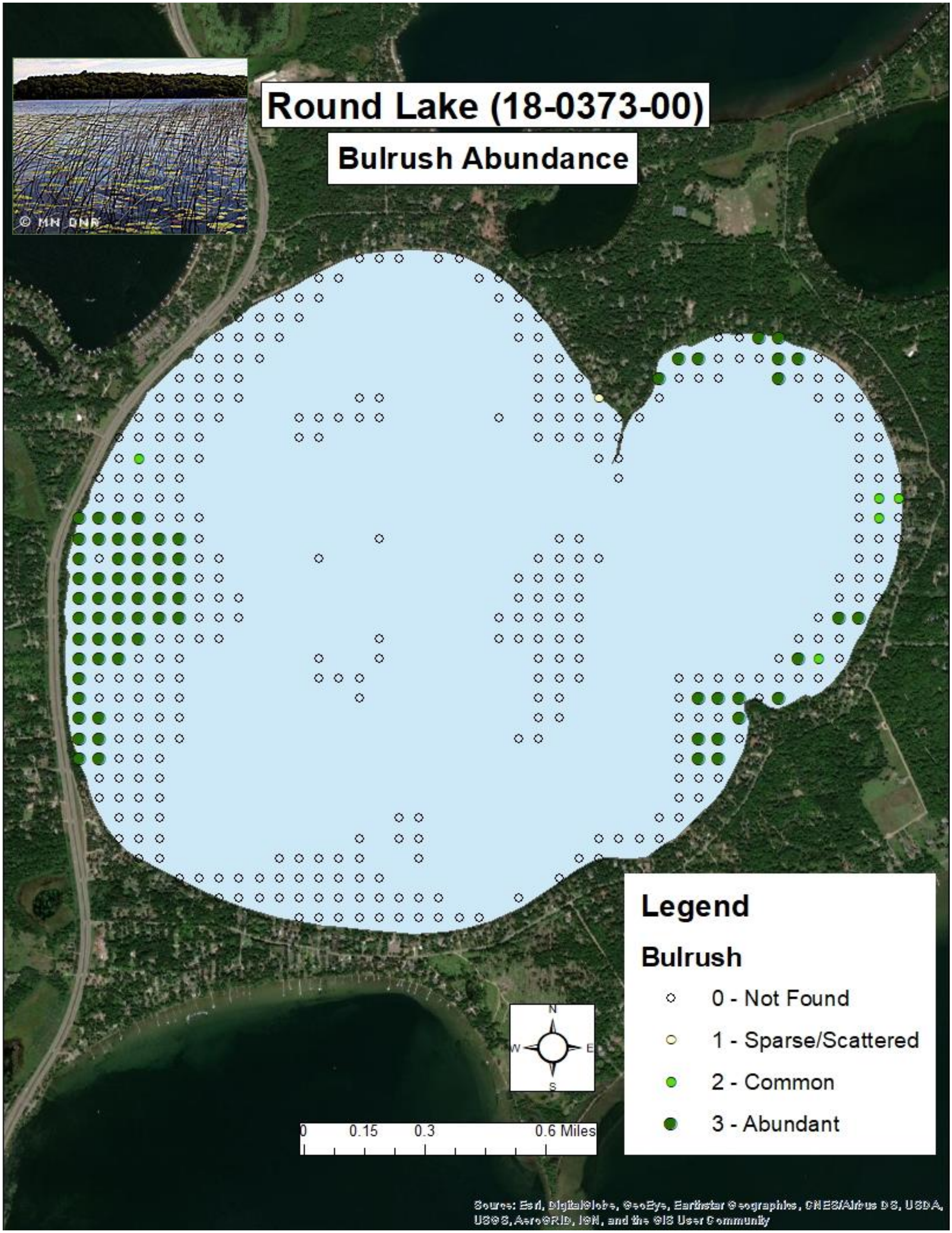


Figure 10: Density of Bulrush (Scirpus acutus), at sample points in Round Lake.

Discussion

Round Lake is a shallow lake located in Crow Wing County Minnesota. The presence of plants and the depth at which one finds them is related to the water clarity. In areas where the sunlight does not reach the lake's bottom, there typically will not be plants present. Round Lake has an average clarity of 13 feet, this directly corresponds with where the plants were most abundant in the lake. Round Lake has several very healthy dense stands of emergent plants, most of which are bulrush. These plants help protect the lake because they help to stabilize the sediment of the lake bottom as well as provide habitat for fish and other wildlife on the lake.

The Minnesota DNR lists the littoral area of Round Lake to be approximately 38% of the total surface area, and the findings of this plant survey support these findings. In general, the littoral area is approximated as the area of the lake that is 15 feet deep or less; in this plant survey, no plants were found deeper than 19 feet.

No invasive plant species were found on Round Lake. Monitoring should continue in future years to help catch any invasive aquatic plants that enter the lake early on, before becoming widespread. One suggestion would be to monitor areas that experience heavy traffic by conducting a localized delineation. Examples of suggested areas would be public accesses and boat launches near resorts; both are common areas for aquatic plants to enter the lake.

Aquatic plant communities are important to a body of water because of their ability to maintain water clarity and good fish habitat. Plants in all lakes lock up nutrients in their tissues which limit algae growth keeping lakes clear and healthy. Aquatic plants produce oxygen throughout the water column as a byproduct of photosynthesis, which oxygenates the water column. Plants also help to keep the sediments stable at the bottom of the lake and prevent it from mixing into the water column. Tiny invertebrates called zooplankton eat algae and use plants as a hiding place from predators such as perch, sunfish, and crappies.

Unfortunately, if a lake is not taken care of, the water can become green and murky (switch to the turbid state). If large areas of plants are removed, the sediments can get churned up and nutrients are released. If there are fewer plants to use the nutrients, the algae will use the nutrients and multiply. Once the water is "green" with dense algae, these lakes have mostly muck on the bottom instead of plants because the sunlight cannot get through the dense algae to the bottom of the lake. Algae-dominated shallow lakes typically do not provide as high of quality habitat for fish and wildlife. If the plants are gone there is no place for aquatic animals to hide. The natural state of the littoral area in lakes is to have abundant aquatic vegetation and clear water.

Survey Photos

Bushy Pondweed found on Round Lake, 2020

Chara found on Round Lake, 2020

Northern watermilfoil found on Round Lake, 2020

Various aquatic plants observed after a rake toss found on Round Lake , 2020

Variable pondweed found on Round Lake, 2020

Lake Learning

Aquatic Plants – Good or Bad?

If you've spent any length of time at your favorite Minnesota lake, chances are you're no stranger to aquatic plants. Maybe you've cast into lily pads looking for bass, watched minnows dart to safety in plant beds, pulled in an anchor covered with green vegetation, or waded through a few plants while swimming.

Figure 2. Native beneficial aquatic plants.

Unfortunately, most people see aquatic plants as problems. They perceive lakes or lakeshores with lots of so-called "weeds" as messy and in need of cleaning. But what a cabin owner sees as a weedy mess is an essential part of a lake's or river's ecosystem (MN DNR).

Aquatic plant communities are important to a body of water because of their ability to maintain water clarity and good fish habitat. Plants in all lakes lock up nutrients in their tissues which limit algae growth keeping lakes clear and healthy. Aquatic plants produce oxygen throughout the water column as a byproduct of photosynthesis, which oxygenates the water column. Plants also help to keep the sediments stable at the bottom of the lake and prevent it from mixing into the water column. Tiny invertebrates (zooplankton and aquatic insects) eat algae and use plants as a hiding place from predators such as perch, sunfish and crappies.

The presence of plants and the depth at which one finds them is related to the water clarity. In areas where the sunlight does not reach the lake's bottom (usually deep areas), there won't be plants present.

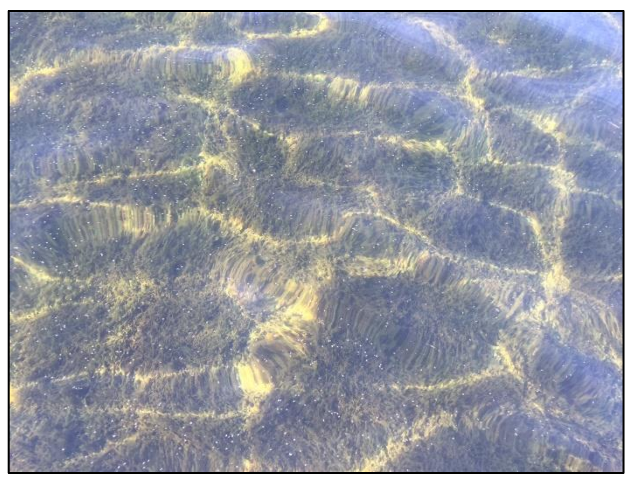


Figure 3. A Muskgrass (Chara) meadow in clear water.

Minnesota is home to about 150 species of aquatic plants, most of which are native species. Certain native plants can be water quality indicators. Muskgrass (*Chara*) is found more often in lakes with good water clarity. Though it gives off a 'musky' odor when brought to the surface, it is a great bottom stabilizer and slows the suspension of sediments; therefore, large communities of it can greatly benefit water quality and clarity. This plant is also wonderful habitat for fish and is a favorite food for waterfowl.

Bladderwort is a very interesting native aquatic plant. It is carnivorous and captures small invertebrates with its bladder-like traps. Despite their small size, the traps are extremely sophisticated. The prey brush against trigger hairs connected to the trapdoor. The bladder, when "set", is under negative pressure in relation to its environment so that when the trapdoor is mechanically triggered, the prey, along with the water surrounding it, is sucked into the bladder. Once the bladder is full of water, the door closes again, the whole process taking only ten to fifteen milliseconds

Bulrush is very important to a lake for many reasons. It provides spawning habitat for crappies, filters the water, and helps to prevent shoreline erosion by acting as a wave break. It is imperative to protect bulrush beds in lakes for these reasons. Larger leave plants, such as the pondweeds, are important spawning and hiding areas for panfish.

Figure 4. Bladderwort, a carnivorous aquatic plant that is common in Minnesota lakes.

Homeowners should be careful not to cut or remove large areas of native plants in the lake. When aquatic plants are uprooted, the lake bottom is disturbed, and the phosphorus in the water column gets used by algae instead of plants. This contributes to “greener” water and more algae blooms. Protecting native aquatic plant beds will ensure a healthy lake and healthy fishery. If a swimming area is necessary in front of people’s docks, clear only a small area of plants. Clearing a whole 100 foot frontage is not necessary and can contribute to additional algae blooms. The natural, healthy state of shallow lakes and bays is to have clear water and abundant native plant growth.

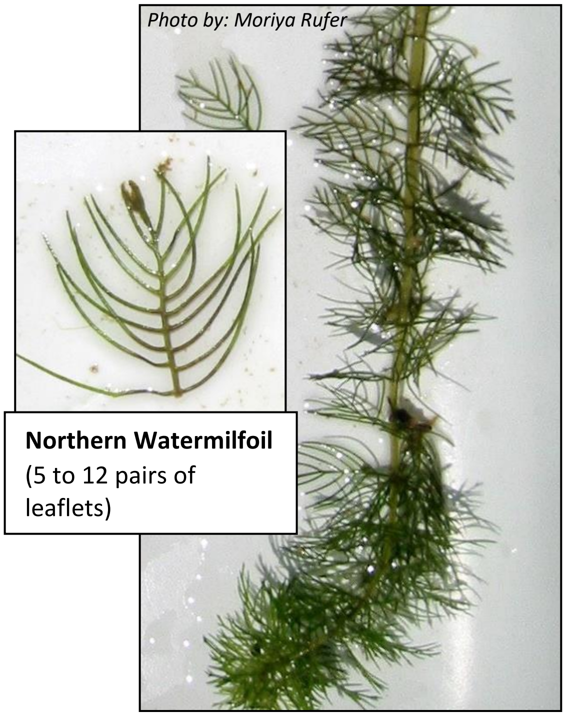
Some aquatic plants in Minnesota are not native and they may cause problems. Control of these species may be done to reduce interference with boating or swimming, to reduce the risk of spread of invasive species to un-infested water-bodies, or in some situations to attempt to produce ecological benefits such as increases in native plant communities. A DNR permit is needed for removal of aquatic plants including aquatic invasive species, and also for plant control devices such as weed rollers.

Resources
DNR Guide to Aquatic Plants: https://www.dnr.state.mn.us/shorelandmgmt/apg/index.html
Permits to control aquatic plants: https://www.dnr.state.mn.us/shorelandmgmt/apg/permits.html
DNR AIS Specialists: https://www.dnr.state.mn.us/invasives/ais/contacts.html
AIS permits: https://www.dnr.state.mn.us/invasives/training_permits.html

Enjoy the lakes! This article was written and shared by Moriya Rufer at RMB Environmental Laboratories as part of continuing education for their Lakes Monitoring Program (218-846-1465, lakes@rmbel.info). To learn more, visit www.rmbel.info.

Aquatic Plants In Minnesota Lakes

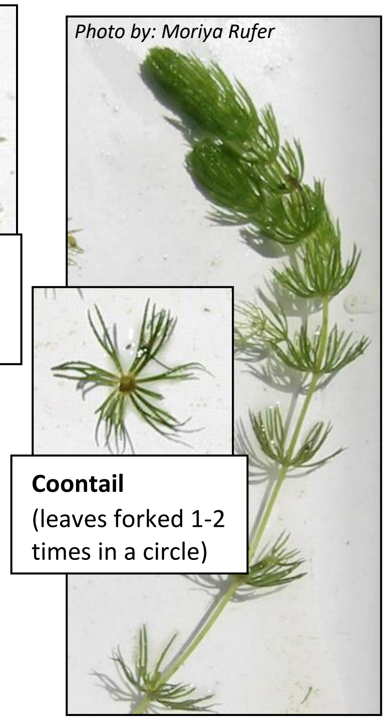
Compiled by Emelia Hauck Jacobs and Moriya Rufer, RMB Environmental Laboratories, Inc, 218-846-1465, rmbel.info



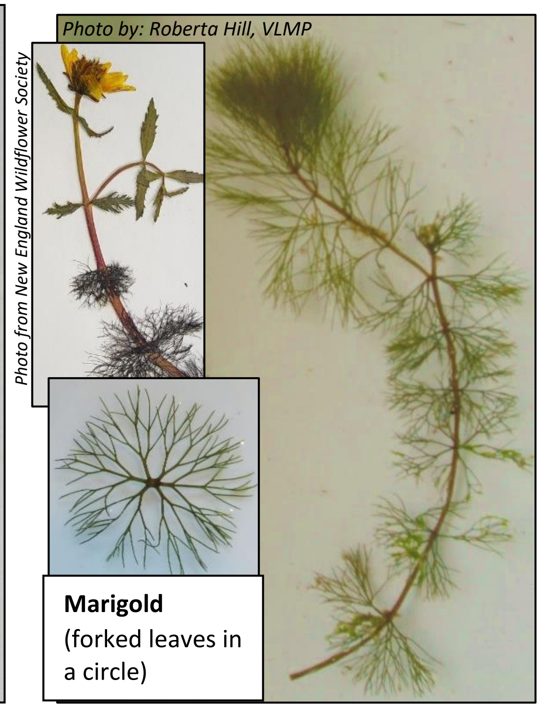
Northern Watermilfoil
(*Myriophyllum sibiricum)*

Eurasian Watermilfoil
(*Myriophyllum spicatum)*

Bladderwort
(*Utricularia vulgaris*)



Coontail
(Ceratophyllum demersum)



Water Marigold
(Bidens beckii)

Aquatic Plants In Minnesota Lakes

Compiled by Emelia Hauck Jacobs and Moriya Rufer, RMB Environmental Laboratories, Inc, 218-846-1465, rmbel.info

Curly-leaf Pondweed
Serrated edges,
Branched veins
Curly leaves
Round leaf tip

Curly-leaf Pondweed
(*Potamogeton crispus*)

Whitestem Pondweed
Leaf ‘clasps’ the stem,
Straight edges,
Parallel veins
‘Bowled’ leaf tip

Whitestem Pondweed
(*Potamogeton praelongus*)

Claspingleaf Pondweed
Leaf ‘clasps’ the stem,
Straight edges,
Parallel veins
Pointed leaf tip

Claspingleaf Pondweed
(*Potamogeton richardsonii*)

Robbin’s Pondweed
Finely serrated edges,
Pointed leaf tip,
Leaf ‘clasps’ the stem

Robbin’s Pondweed
(*Potamogeton robinsii*)

Aquatic Plants In Minnesota Lakes

Compiled by Emelia Hauck Jacobs and Moriya Rufer, RMB Environmental Laboratories, Inc, 218-846-1465, rmbel.info

Chara
Gritty feel,
Musky odor,
Short branches,
Branchlets do not fork

Chara
(*Chara spp.*)

Starry Stonewort
White, star-shaped bulbils,
Smooth stem,
Branchlets in whorls of 5-8; many forked

Starry Stonewort
(*Nitellopsis obtuse)*

Sago Pondweed
Leaves are alternating,
Doesn't have spines,
Leaves are round and pointed at the tip

Sago Pondweed
(*Potamogeton pectinatus)*

Brittle Naiad
Has spines,
Leaves are flat,
Leaves are opposite

Brittle Naiad
(*Najas minor)*

Aquatic Plants In Minnesota Lakes

Compiled by Emelia Hauck Jacobs and Moriya Rufer, RMB Environmental Laboratories, Inc, 218-846-1465, rmbel.info

Brazilian Elodea
4-7 leaves per whorl
Leaves are 2-4 cm long

Brazilian Elodea
(Egeria densa)

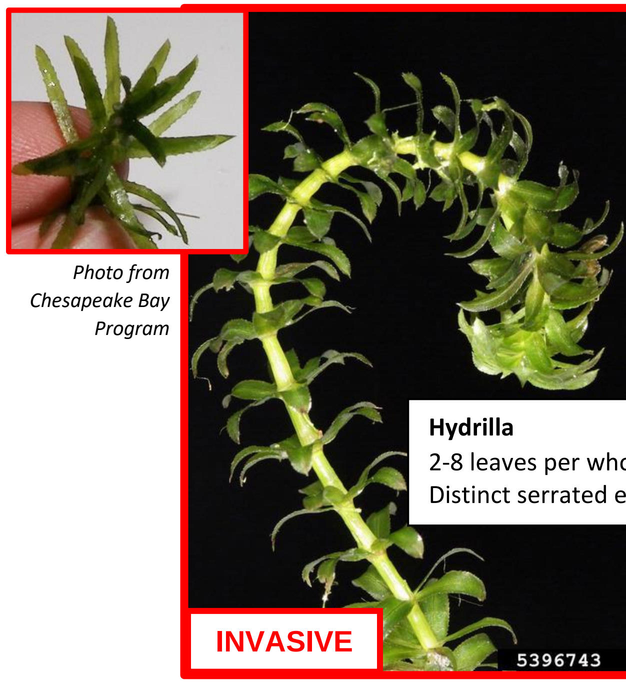


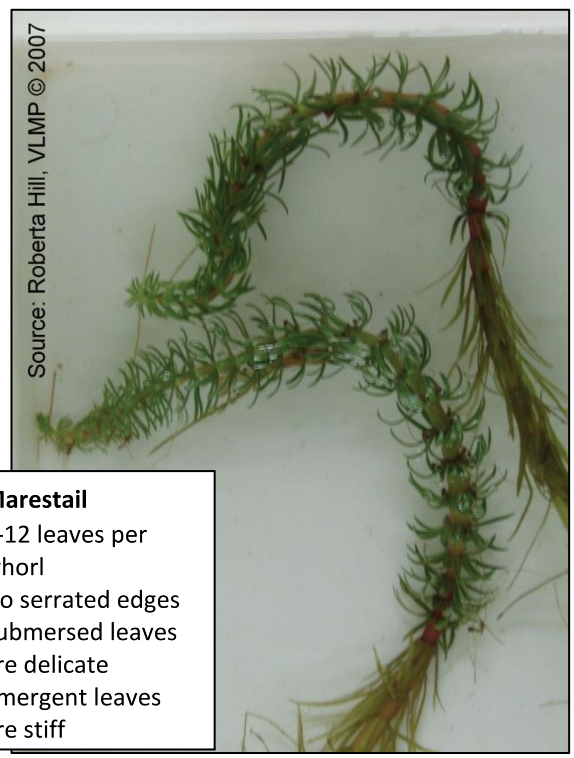
Photo from Chesapeake Bay Program

Hydrilla
2-8 leaves per whorl
Distinct serrated edges

Hydrilla
(*Hydrilla verticillata*)

Canada Waterweed
2-3 leaves per whorl
Leaves up to 4.5 cm long
No serrated edges

Canada Waterweed
(Elodea canadensis)



Marestail
8-12 leaves per whorl
No serrated edges
Submersed leaves are delicate
Emergent leaves are stiff

Marestail
(*Hippuris vulgaris*)

Literature Cited

Blickenderfer, Mary. 2007. A Field Guide to Identification of Minnesota Aquatic Plants. University of Minnesota Extension.

Borman, Susan et. al. 1997. Through the Looking Glass…a Field Guide to Aquatic Plants. University of Wisconsin Extension.

Madsen, J. D. 1999. Point intercept and line intercept methods for aquatic plant management. *APCRP Technical Notes Collection* (TN APCRP-M1-02). U.S. Army Engineer Research and Development Center, Vicksburg, MS. www.wes.army.mil/el/aqua

Water chemistry data collected from: https://webapp.pca.state.mn.us/surface-water/impairment/18-0373-00