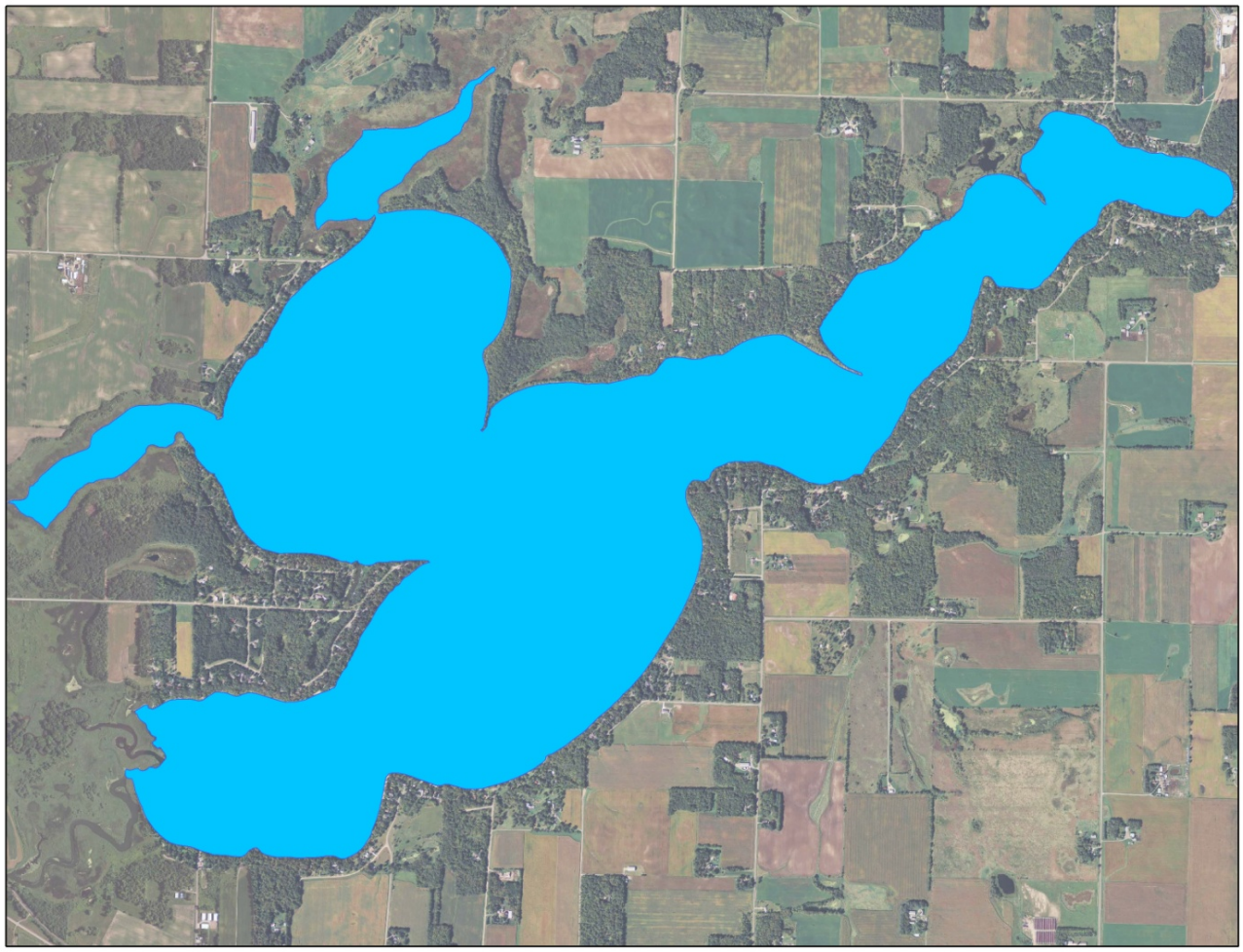
Rice Lake (73 - 0196 - 00)



Aquatic Vegetation Survey

RMB
Environmental Laboratories, Inc.
22796 County Highway 6
Detroit Lakes, MN 5650
(218) 846-1465
www.rmbel.info

Lake: Rice Lake | **DOW Number**: 73-0196-00 | **Date of inspection:** June 24, 2014

County: Stearns | **Observers**: Emelia Hauck and Savannah Fritz

Author of report: Emelia Hauck | **Date of report**: June 27, 2014

Introduction

Rice Lake (DOW 73-0196-00) is a large 1,509 acre lake located 5 miles east of Paynesville MN, in Stearns County. Rice has a maximum depth of 41 feet and contains a littoral area of about 55.8 percent which permits light penetration and allows plant growth.

Rice Lake is classified as a eutrophic lake with moderate water clarity as measured over the past 13 years by mean Secchi depth of approximately 6.3 feet. Continual annual monitoring allows for statistical trend analysis on the lake's water quality. Currently, the lake's water quality is stable, with no trends in water quality. Total phosphorus and chlorophyll-a (values that provide a measure of the amount of algae in the water) are considered high with mean values 61.5 and 26.8 ug/L at the primary site Rice Lake.

Table 1. Water quality means over the last 8 years for Rice Lake.

Lake	Trophic State	Mean Secchi depth (ft)	Phosphorus (ug/L)	Chlorophyll a (ug/L)
Rice Lake	Eutrophic	6.3	61.5	26.8

Objectives of Survey

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

1) Vegetation data to include; sample point number, depth, 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) Combined frequency of all aquatic plants found
5) Estimation of maximum depth of submersed vegetation
6) Estimation of abundance of species sampled using MN DNR ranking system
7) Distribution map for common species
8) Determination of any invasive aquatic plants

Methods:

The point-intercept survey followed methodology described by Madsen (1999). Geographic Information System (GIS) software was used to generate sample points across the littoral zone surface in 120 meter by 120 meter grid, resulting in a total of 237 potential survey points on Rice Lake. In the field, all points were sampled and vegetation was not found beyond 15 feet in depth. 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 1 and 2) 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 1 and 4; 1 being rare (≤ 1/3 of the rake head covered), 2 being scattered (>1/3 but ≤ 2/3 of the rake head covered), 3 being common (> 2/3 of the rake head covered), and 4 being abundant (plants over top of rake head). Plant identification followed Blickenderfer (2007).

Figures 1 and 2. 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. Frequency was calculated for all sampled locations as well as locations 18 feet or less. The average number of native submersed 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 5 depth zones for analysis. Depth zones included less than 3 feet, 4 to 6 feet, 7 to 10 feet, and 11 to 15 feet (Figure 7).

Summary

On June 24 and 25, 2014, 237 locations were observed and sampled for a point intercept survey of aquatic vegetation (Figure 3). Twelve different types of native plants were found across the lake, as well as the invasive plant; Curly-leaf pondweed. All of the 237 sites were sampled for aquatic vegetation (Figure 3). The weather was decent for the survey with clear skies on the 24th and temperatures reaching 64 degrees and wind speeds up to 15 mph. The 25th was cooler, cloudier, and calmer with temperatures reaching 58 degrees and little wind. Water temperatures on the 24th were between 76.1 and 76.4 degrees throughout the lake.

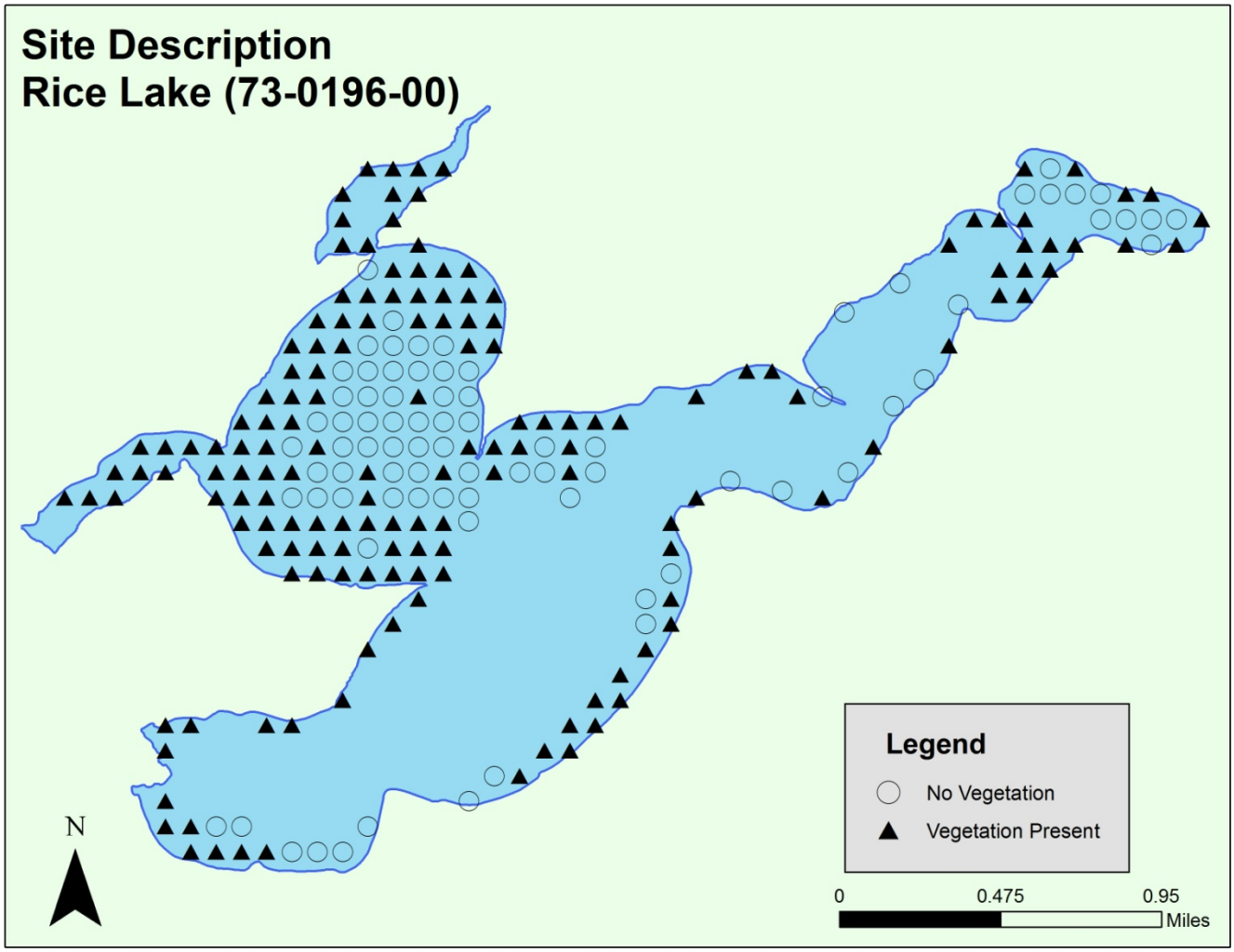


Figure 3. Rice Lake Point-Intercept Survey with site description, June 24, 2014.

Two submersed native species made up the majority of plants sampled in Rice Lake. Sago Pondweed (*Potamogeton pectinatus*) was sampled at 62.9% of all sites and 65.6% of sites less than 15 feet and Coontail (*Ceratophyllum demersum*) was sampled at 31.2% of all sites and 32.6% of sites less than 15 feet (Figures 6 and 7 and Table 2). Curly-leaf pondweed was also found on Rice Lake at 16.5% of all sites and 17.2% of sites less than 15 feet (Figure 4).

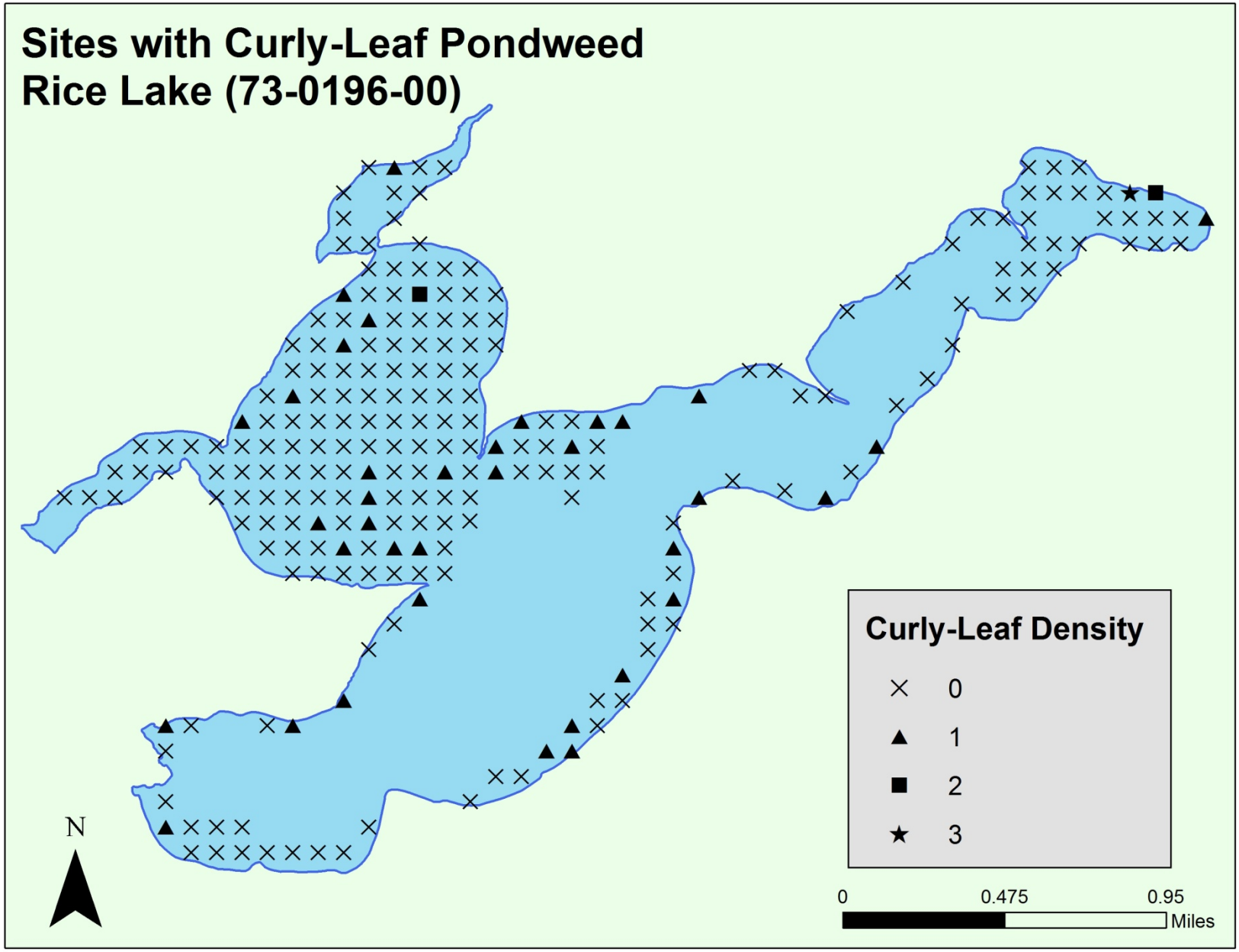


Figure 4. Sampled locations with Curly-leaf pondweed present, Rice Lake, Stearns County, MN: June 24, 2014.

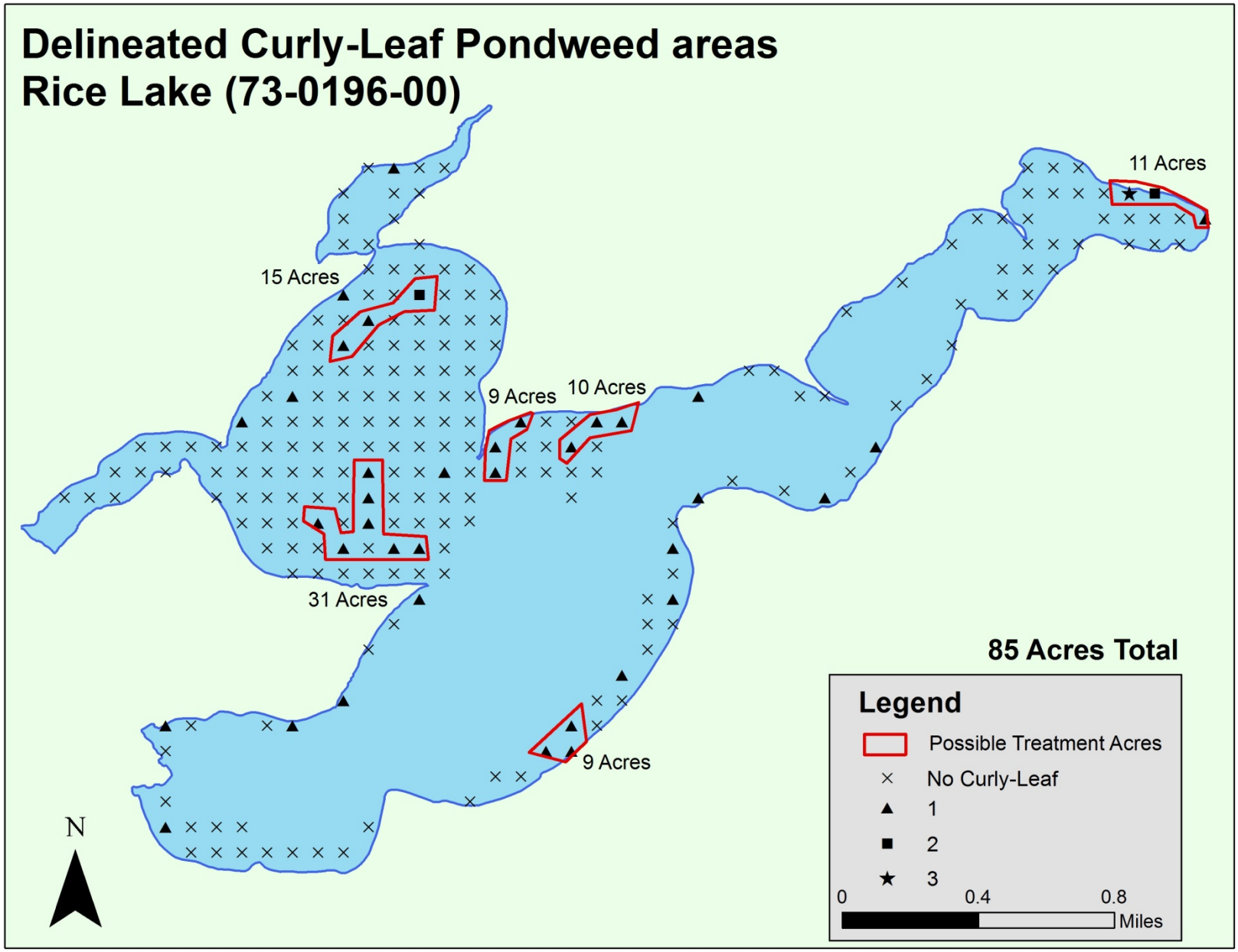


Figure 5. Possible treatment areas for Curly-leaf pondweed, Rice Lake, Stearns County, MN: June 24, 2014.

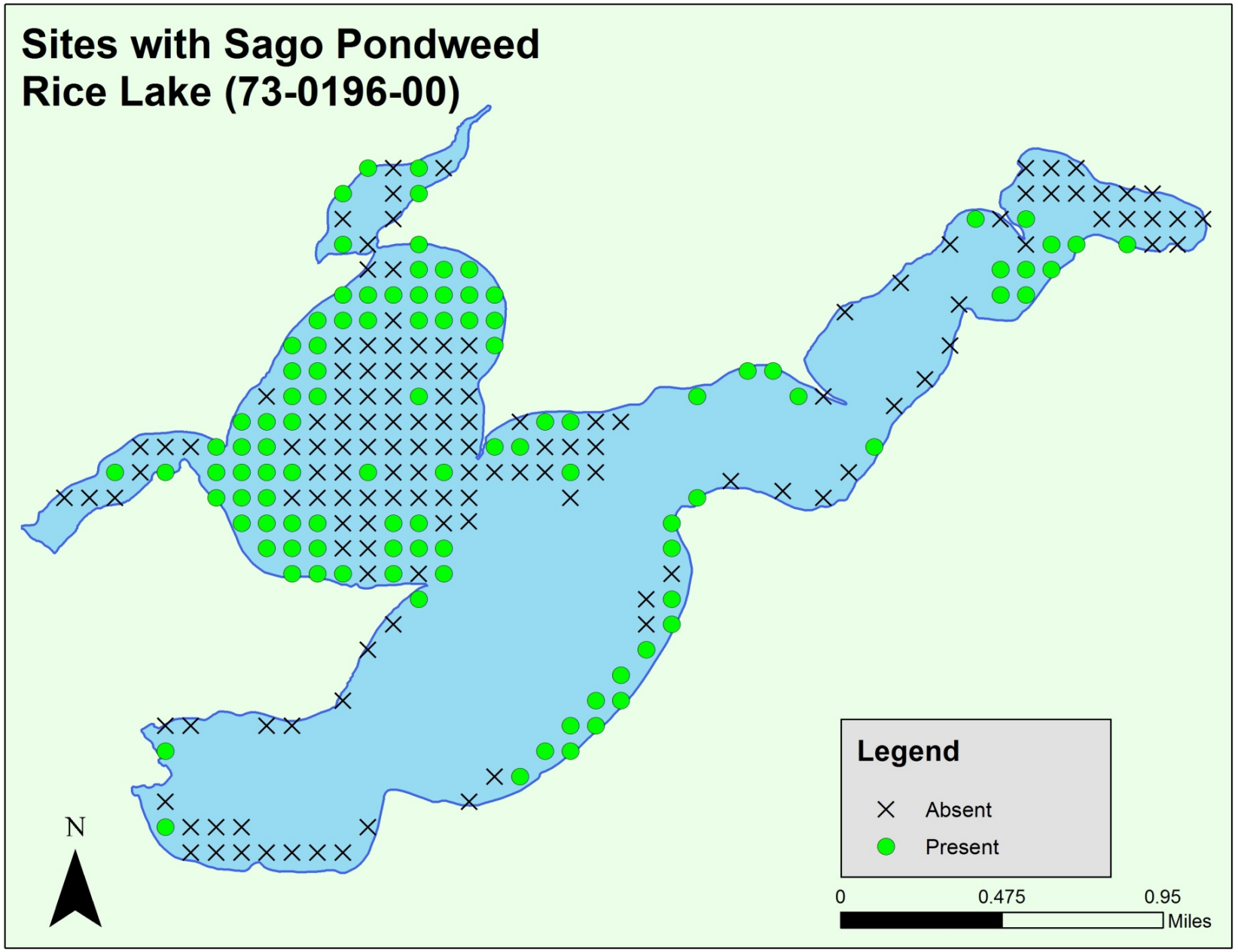


Figure 6. Sampled locations with Sago Pondweed present, Rice Lake, Stearns County, MN: June 24, 2014.

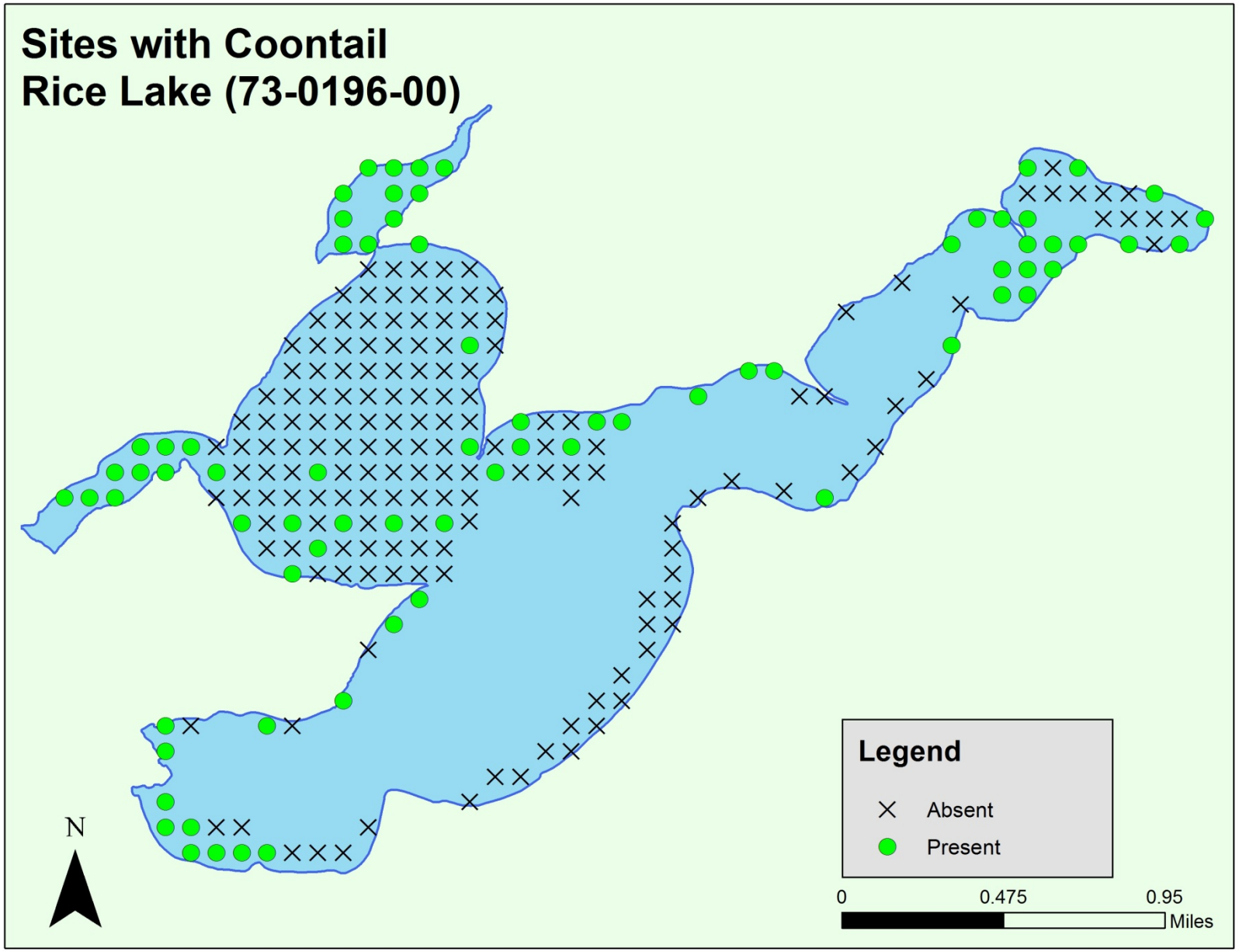


Figure 7. Sampled locations with Coontail present, Rice Lake, Stearns County, MN: June 24, 2014.

Table 2. Aquatic plants surveyed from Rice Lake, Stearns County, MN, June 24 and 25, 2014.

Rice Lake				All sampled sites	All sites less than 15 feet
Life Form	**Common Name**	**Scientific Name**	**Count**	**Frequency (%)**	**Frequency (%)**
SUMBMERGED - 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.	Star Duckweed	*Lemna triscula*	1	0.4%	0.4%
	Bushy Pondweed	*Najas flexillis*	1	0.4%	0.4%
	Chara	*Chara sp.*	12	5.1%	5.2%
	Canada Waterweed	*Elodea canadensis*	1	0.4%	0.4%
	Northern water milfoil	*Myriophyllum sibiricum*	2	0.8%	0.9%
	Curly Leaf Pondweed*	*Potamogeton crispus**	39	16.5%	17.2%
	Greater Bladderwart	*Utricularia vulgaris*	2	0.8%	0.9%
	Sago Pondweed	*Potamogeton pectinatus*	149	62.9%	65.6%
	Whitestem Pondweed	*Potamogeton praelongus*	5	2.1%	2.2%
	Water Celery	*Vallisneria americana*	1	0.4%	0.4%
	Coontail	*Ceratophyllum demersum*	74	31.2%	32.6%
FLOATING - LEAF -These plant leaves float on water and are anchored to the bottom of the lake.	Yellow Waterlily	*Nuphar variegata*	1	0.4%	0.4%
	White Waterlily	*Nymphaea odorata*	8	3.4%	3.5%
EMERGENT - These plants extend well above the water surface and are usually found in shallow water, near shore.	No Emergent Detected		0	0%	0%

Total number of plants (species diversity for the lake)	13
Total number of plant occurrences	296
Total number of sites	237
Total number of sites <15 feet	227

*Invasive species

Sampling occurred to a maximum depth of 20 feet; however, no plants were found to be growing beyond 15 feet of water. Plant abundance was greatest between three and nine feet of water. As depths increased beyond that range, the presences of vegetation decreased and became less dense (Figure 8).

Of the 237 sampled locations in the Rice Lake, 81 sites had no vegetation present. A total of 227 sites were observed at locations with depths of 15 feet or less.

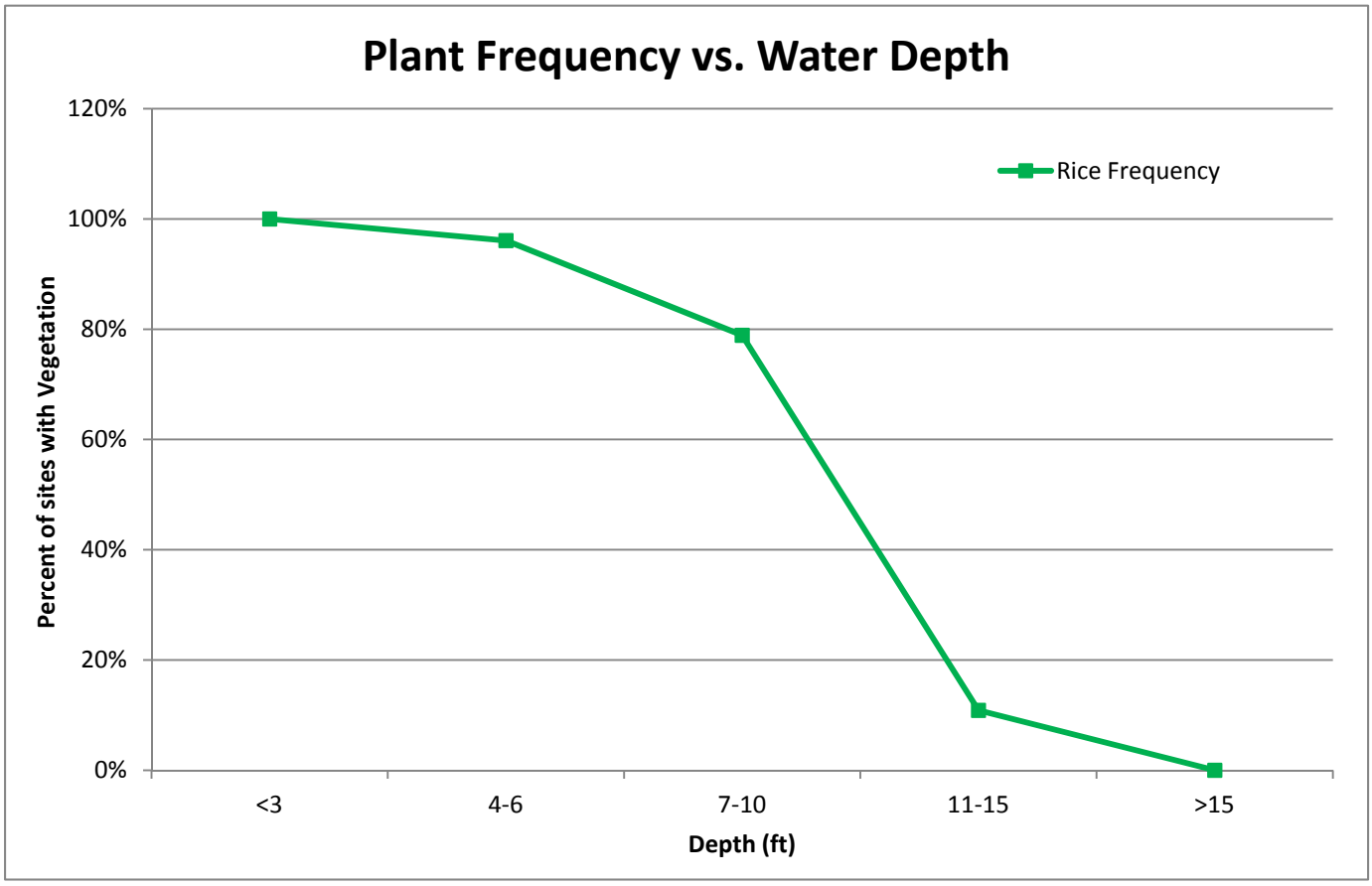


Figure 8. Frequency of vegetation vs. water depth, Rice Lake, Stearns County, MN: June 24, 2014.

The average number of plants per rake sample on Rice Lake was 1.2 for all sampled depths and 1.3 for depths less than 15 feet. Four was the maximum number of species sampled at one location in Rice Lake while values of one and two species were sampled regularly (Figure 9).

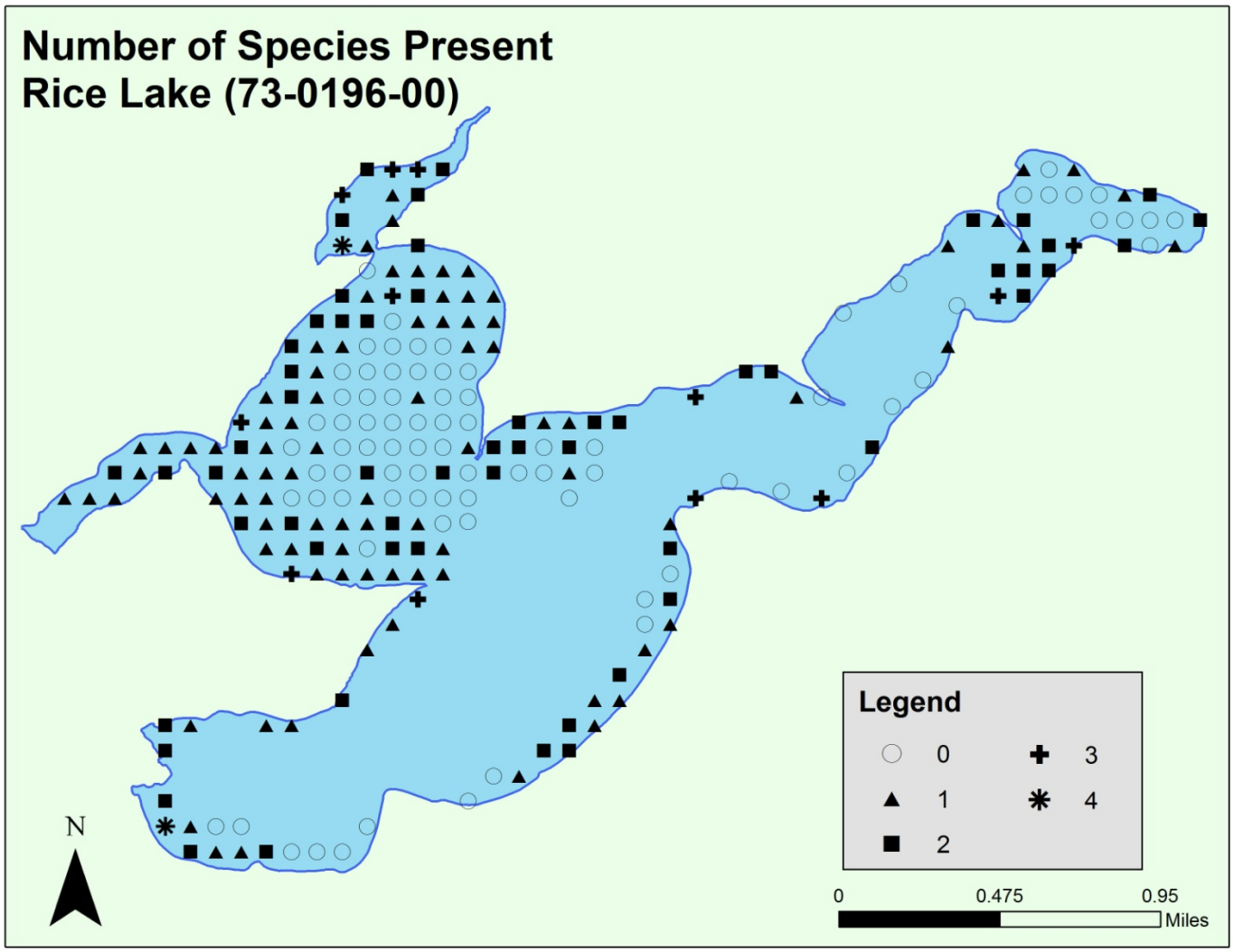


Figure 9. Number of species present per site, Rice Lake, Stearns County, MN.

Other native plants sampled in Rice: Star Duckweed (*Lemna triscula*), Chara (*Chara sp.)*, Canada Waterweed (*Elodea canadensis*), Northern water milfoil (*Myriophyllum sibiricum*), Bushy Pondweed (*Najas flexillis*), Coontail (*Ceratophyllum demersum*), Greater Bladderwart (*Utricularia vulgaris*), Sago Pondweed (*Potamogeton pectinatus*), Whitestem Pondweed (*Potamogeton praelongus*), Water Celery (*Vallisneria Americana*), White Waterlily (*Nymphaea odorata*), and Yellow Waterlily (*Nuphar variegata*) (Figure 10).

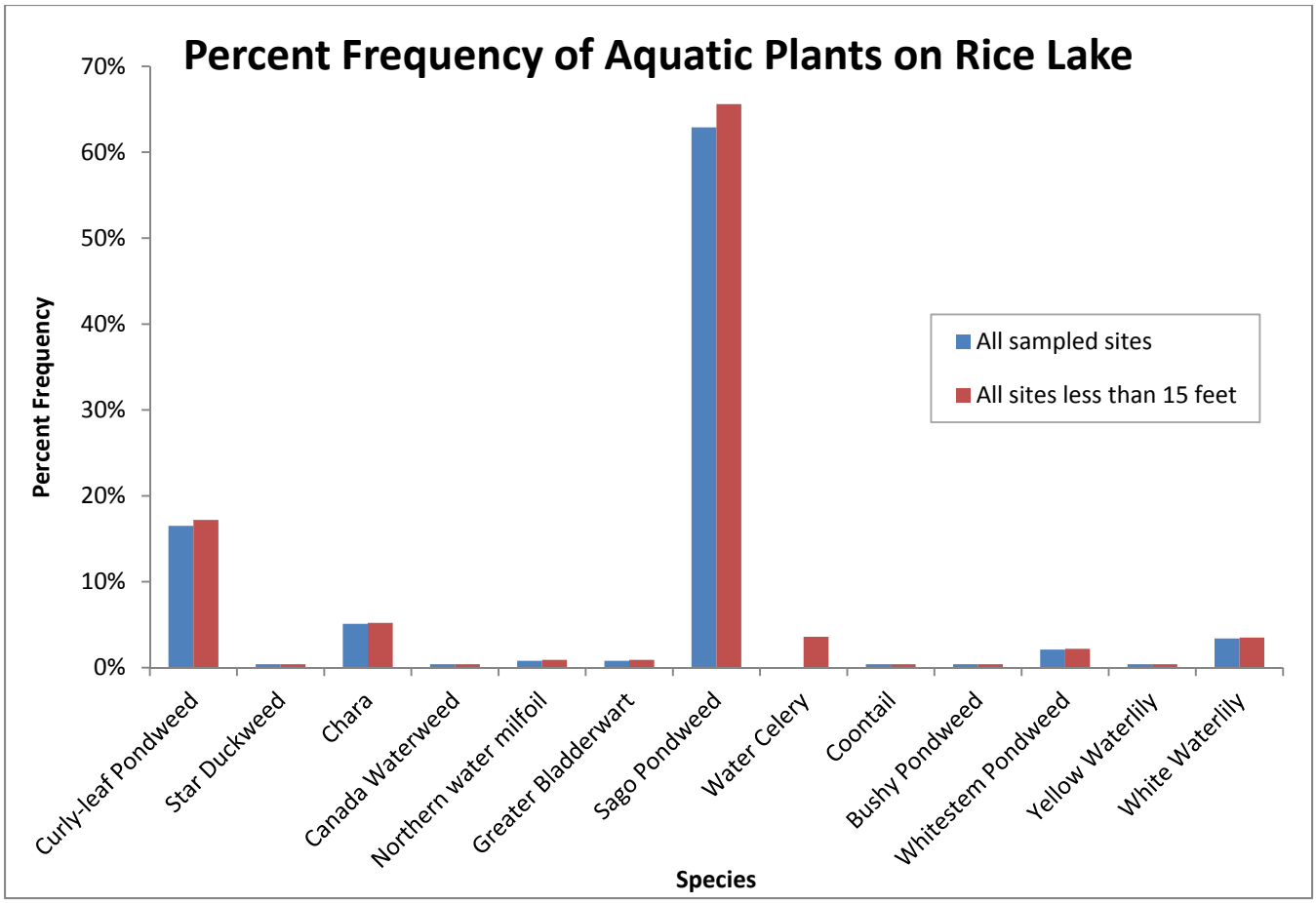


Figure 10. Frequency of occurrence for aquatic plant species in Rice Lake, Stearns County, MN

Discussion

Rice Lake was found to be a moderately shallow lake for central 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 won't be plants present. Rice Lake has an average clarity of 9 feet, and plant abundance was greatest between 3 and 9 feet of water.

Curly-leaf pondweed was found in Rice Lake, at 16.5% of all sites and 17.2% of sites less than 15 feet. The curly-leaf was smaller than expected, which may be due to the abnormally harsh winter. Curly-leaf pondweed uses sunlight streaming through the ice to start its growth during the winter months, but because of an unusually heavy snowfall this winter, which didn't allow much sunlight to penetrate through the ice, its growth may have been stunted.

In addition, after ice-out, the weather and water remained cold for a couple weeks before a quick warm-up the last week of May, so the Curly-leaf pondweed did not grow up very quickly. Due to the abundance of native plants found, curly-leaf pondweed could have been out-competed by native plants this year since it grew up late.

The Minnesota DNR lists the littoral area of Rice Lake to be approximately 72% 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 15 feet.

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.

If a shallow lake or bay isn't 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 can't get through the dense algae to the bottom of the lake. Algae-dominated shallow lakes are also not 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.

RMB May 2014 Survey Photos:

Figure 11 and 12. Curly-leaf pondweed turion (wintering bud) (left), and young Curly-leaf pondweed plant from Rice Lake beginning to curl (right).

Figure 13. Foggy morning on Rice Lake, Stearns County, MN on June 25, 2014

Figure 14. Rake with Coontail, and Yellow Waterlily on Rice Lake, Stearns County, MN on June 25, 2014

Literature Cited

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