Oconto County Lakes Project

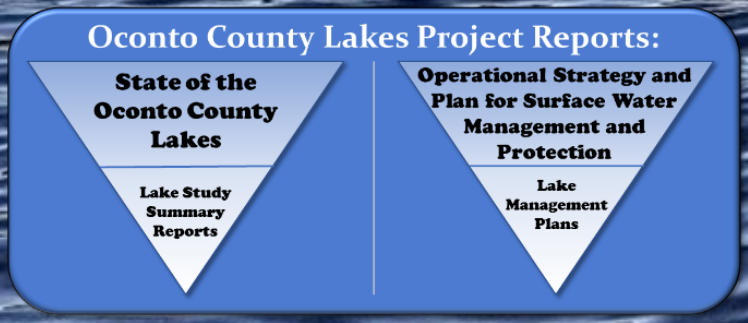
LAKE JOHN STUDY

SUMMARY REPORT

2019

University of Wisconsin-Stevens Point and

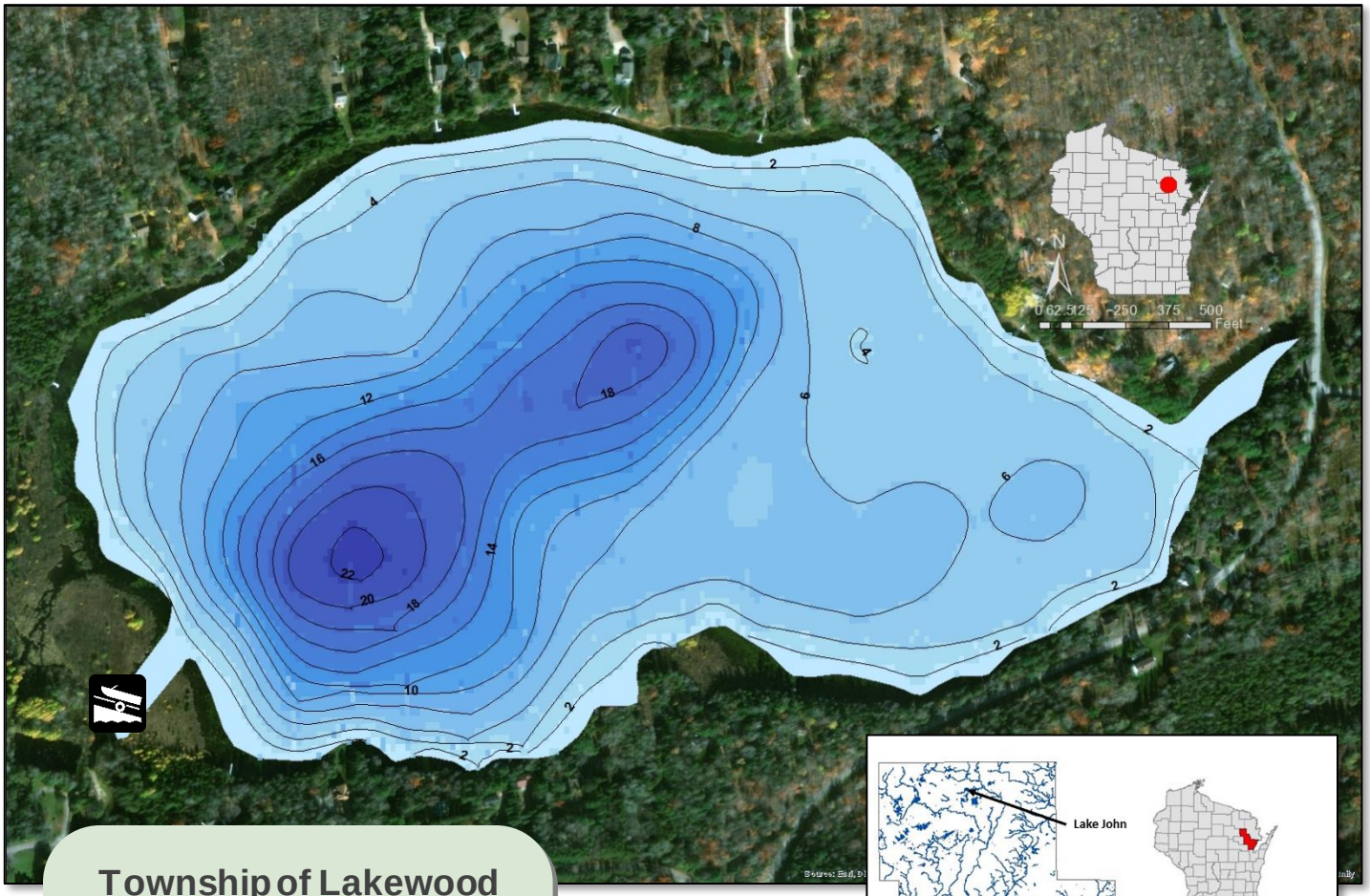
Oconto County Staff and Citizens



Center for Watershed Science and Education
College of Natural Resources
University of Wisconsin-Stevens Point

Background

- Lake John is a 99-acre drainage lake in northern Oconto County with a maximum depth of 23 feet.
- Most water enters the lake from a stream draining Munger Lake to the south and leaves via a tributary stream of the North Branch Oconto River on the lakes east side. Surface water runoff, direct precipitation, groundwater and other tributaries also contribute water to lesser extents.
- Visitors have access to the lake from one public boat landing located on an inlet on the lake's southwest side.
- This report summarizes data collected during the 2017-2018 lake study.

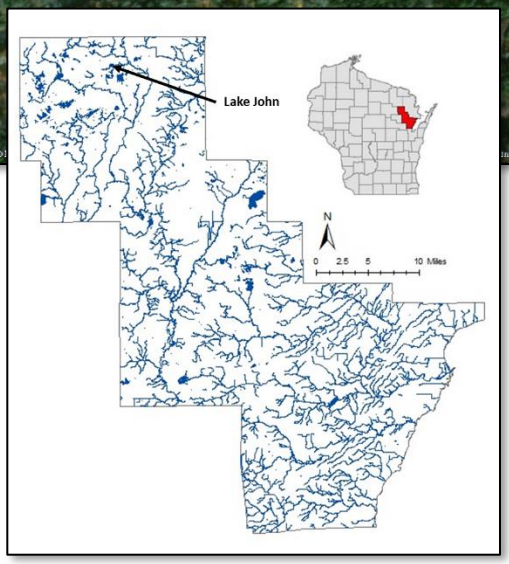


Township of Lakewood

East of Highway 32

Surface Area: 99 acres

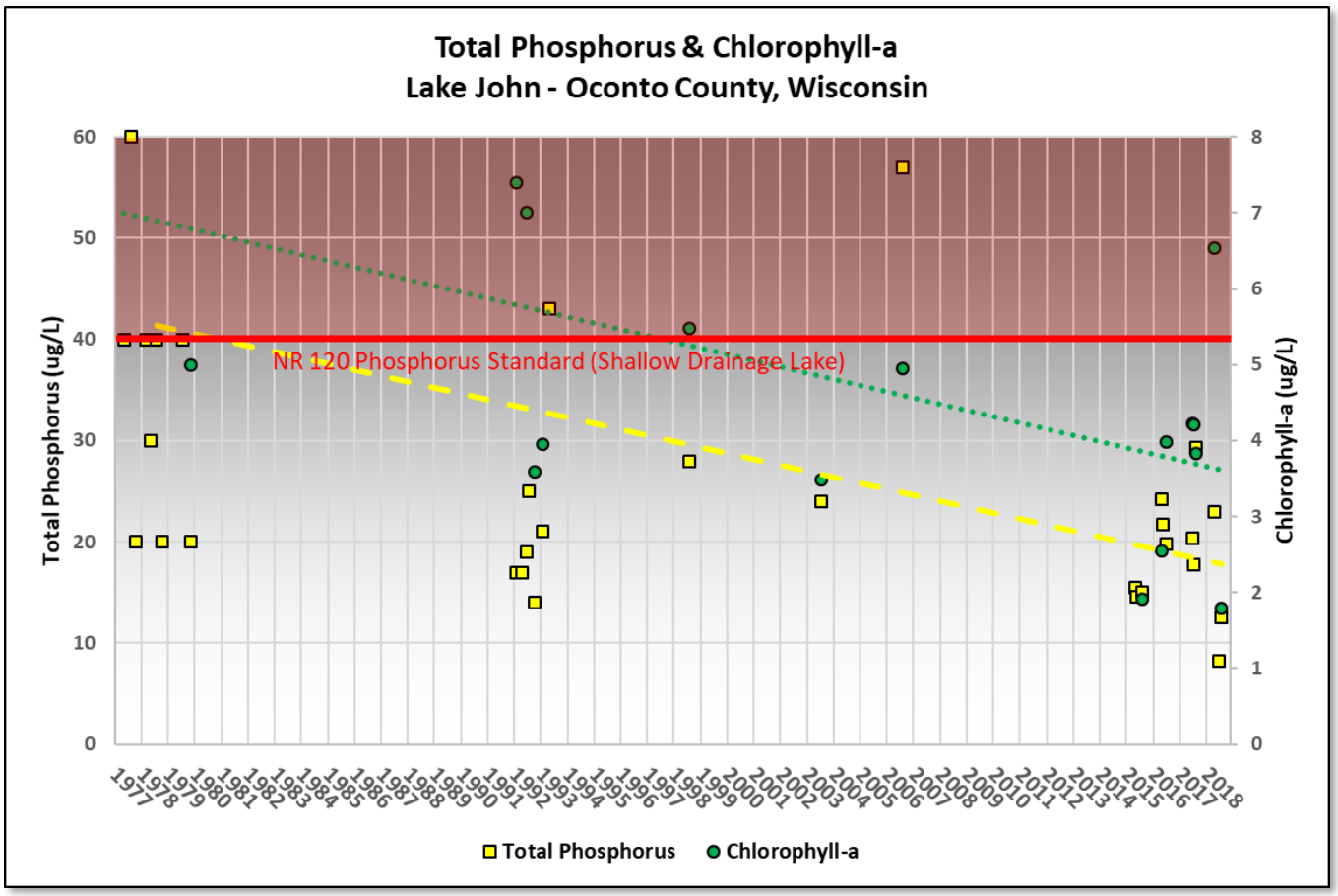
Maximum Depth: 23 feet



Water Quality

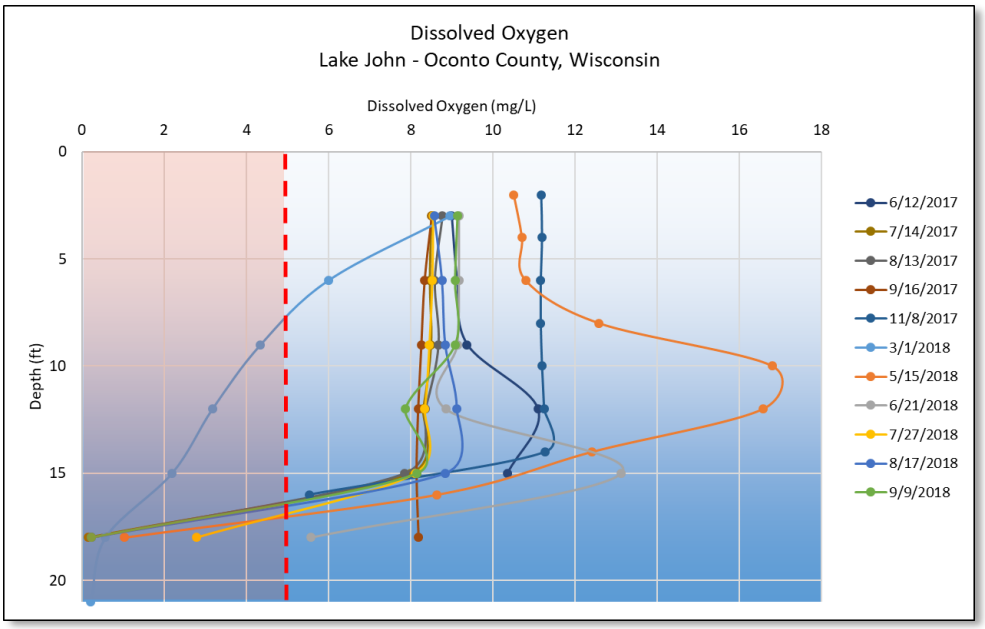
Nutrients such as phosphorus and nitrogen are what feed aquatic plants and algae in a lake. Excessive amounts of nutrients delivered to a lake will result in abundant plant and algae growth. Disturbance within a watershed combined with the landscape's inability to infiltrate and filter runoff is what primarily delivers nutrients to a lake.

- Total phosphorus was consistently below the Wisconsin State phosphorus standard of 40 ug/L for shallow drainage lakes during the two-year study. The 14-year trend is decreasing (based on July data).
- Inorganic nitrogen was very low (0.03 mg/L), well below the threshold of 0.3 mg/L when algal blooms increase.
- Chlorophyll-a, an indirect measure of algae, remained consistently below the threshold of 6 ug/L and appears stable over the long term.



Water Quality

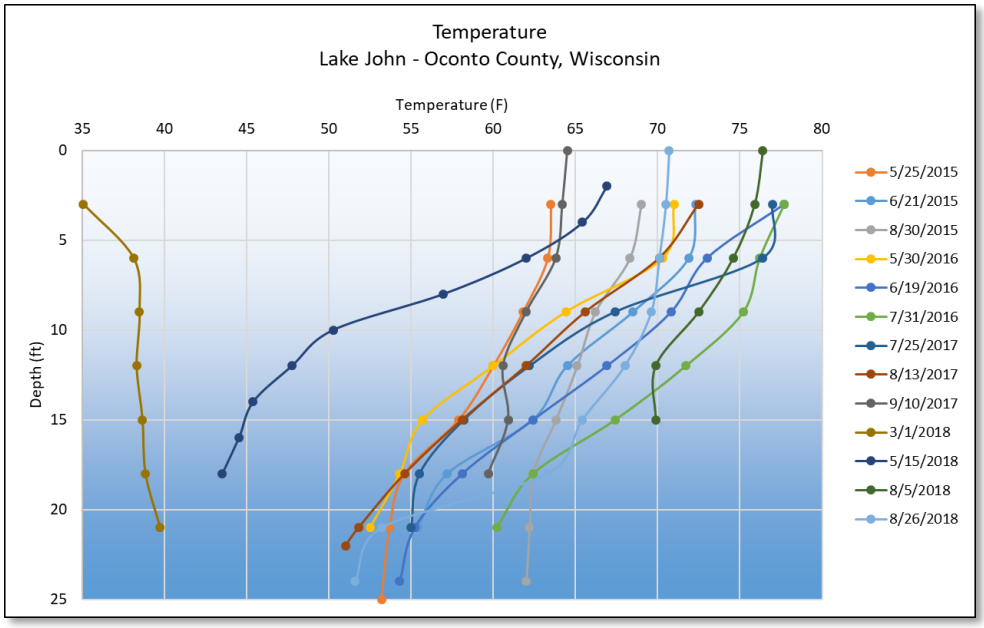
Sufficient **dissolved oxygen** in lake water is essential to the survival of aquatic organisms. The amount of dissolved oxygen present within a lake varies by season and depth. It is determined by the biological activity that consumes or produces oxygen, by water mixing through wind, changes in temperature, and inputs of surface and groundwater. Generally, at least 5 mg/L oxygen is required for fish.



- During most of the year, sufficient oxygen is available in Lake John throughout the water column. Oxygen is depleted during the winter while the lake is ice covered, however, with the only the upper 7 feet having enough to support fish.
- Bumps in dissolved oxygen concentrations at 9-15 feet suggest mild algal activity.

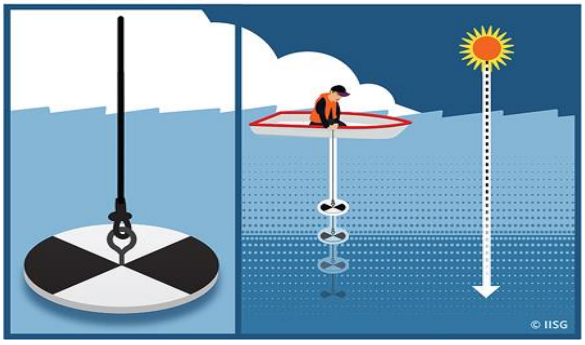
Lake water **temperature** has a significant impact on water chemistry, spatial distribution of fish, microbial growth and oxygen content.

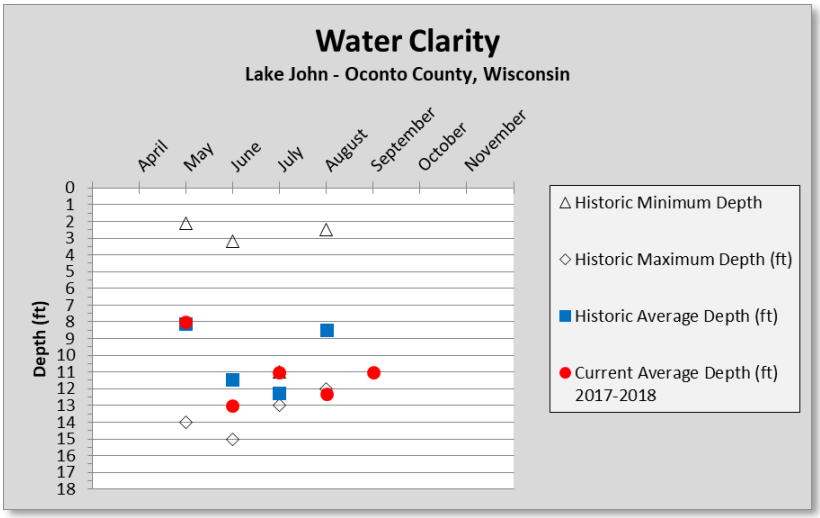
- The temperature gradient in Lake John is relatively straight most of the year, typical of a shallow, mixed lake.



Water Quality

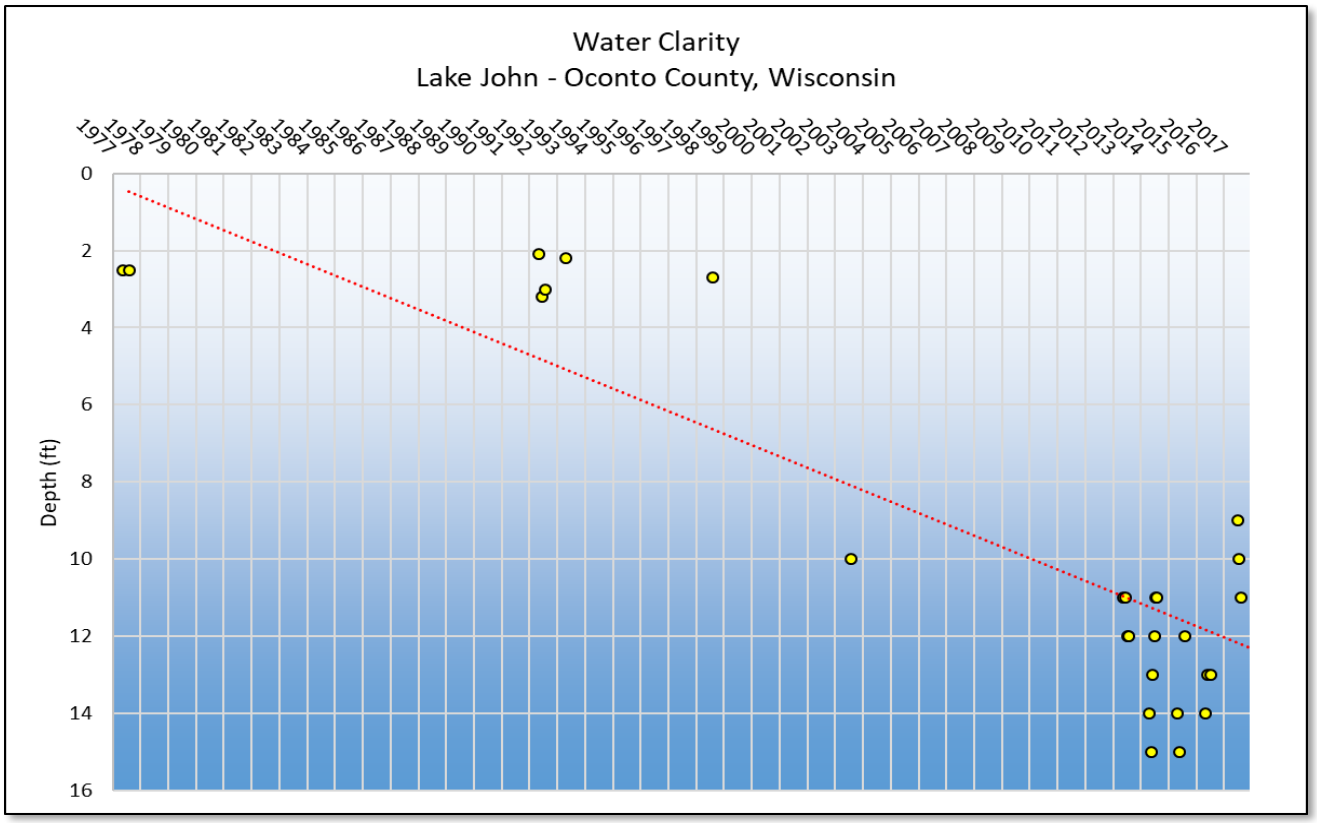
Secchi Disk





Water clarity is a measure of how deep light can penetrate (Secchi depth). Clarity is affected by water color, turbidity (suspended sediment), and algae. Water clarity helps determine where rooted aquatic plants can grow. It is typical for water clarity to vary throughout the year.

- The graph below shows water clarity measurements taken between May and September. It is typical for water clarity to vary throughout the year.
- During 2017-18, on average, the poorest water clarity in Lake John was in June and the best was in September. This is consistent with previous observations and demonstrates a slightly increasing trend over the past 14 years.



Water Quality

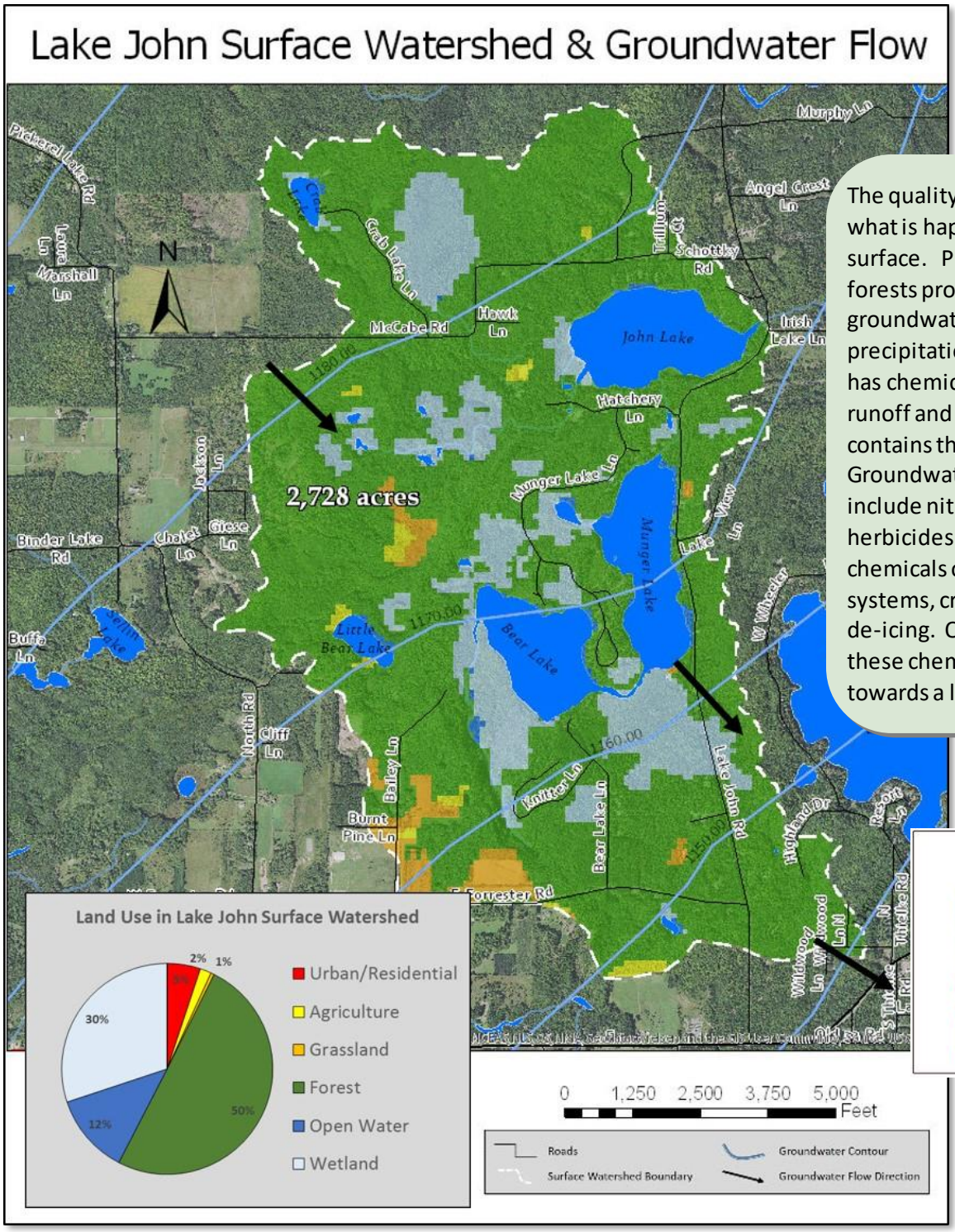
Other chemistry data was collected from lake water samples, such as basic cations, pollutants and acid rain input, and physical parameters. Results of such analyses can provide insights into a variety of other potential impacts to the lake. While concentrations of these compounds in lake water is usually low, higher concentrations can be indicators of other potential issues.

- Concentrations of potassium (1.436 mg/L), sodium (2.129 mg/L) and chloride (1 mg/L) were all low. This suggests minimal impact from septic systems, road salt, animal waste and fertilizers.
- DACT, a screening tool to determine if your lake is being impacted by pesticides, was not detected.
- Water in Lake John is hard (133 mg/L CaCO3), having an elevated level of dissolved minerals. Hard water lakes tend to produce more fish and aquatic plants than soft water lakes and have clearer water as the minerals tend to bind with phosphorus making it unavailable to algae blooms.

For more information on how to interpret your lake's water quality data, please refer to the "State of the Oconto County Lakes Report" that is on file with Oconto County.

Watershed

Groundwater provides water to lakes in Oconto County throughout the entire year. Hard surfaces on the landscape prevent water from soaking into the ground and becoming groundwater. This results in less water flowing to the lake during snowmelt and rain events. Water that does not infiltrate to groundwater becomes **surface runoff** flowing across the surface of the landscape where it can move sediment and contaminants to the lake from within its watershed.



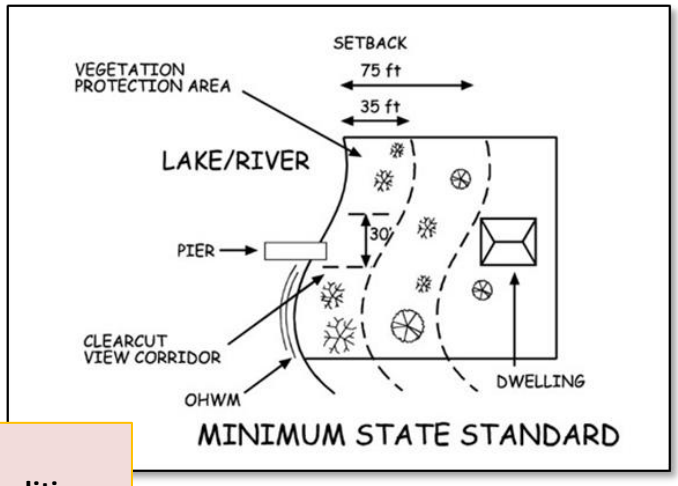
The quality of lake water reflects what is happening on the land surface. Precipitation falling on forests produces clean groundwater, whereas precipitation falling on land that has chemical use can produce runoff and groundwater that contains these chemicals. Groundwater contamination may include nitrogen, pesticides, herbicides and other soluble chemicals originating from septic systems, crops, barnyards, and road de-icing. Once in the groundwater, these chemicals move slowly towards a lake or river.

Shorelands

Shoreland vegetation is critical to a healthy lake's ecosystem. It provides habitat for many aquatic and terrestrial animals including birds, frogs, turtles, and many small and large mammals. It also helps to improve the quality and quantity of the runoff that flows across the landscape towards the lake. Healthy shoreland vegetation includes a mix of tall, native grasses/flowers, shrubs and trees.

Shorelands around Lake John were surveyed in July 2017. Much of Lake John's shoreland is healthy, but some stretches are in need of restoration. Restoration would benefit the lake.

Total lakefront footage	No. Riparian lots	Total allowable (NR115) disturbed shoreland-feet	Total allowable (NR115) disturbed shoreland-%	Measured shoreland disturbance-feet	Measured shoreland disturbance-%
10,295	58	1,740	17%	2,049	20%



State Shoreland Zoning Ordinance
NR 115 Wisc. Adm. Code for Unincorporated Municipalities

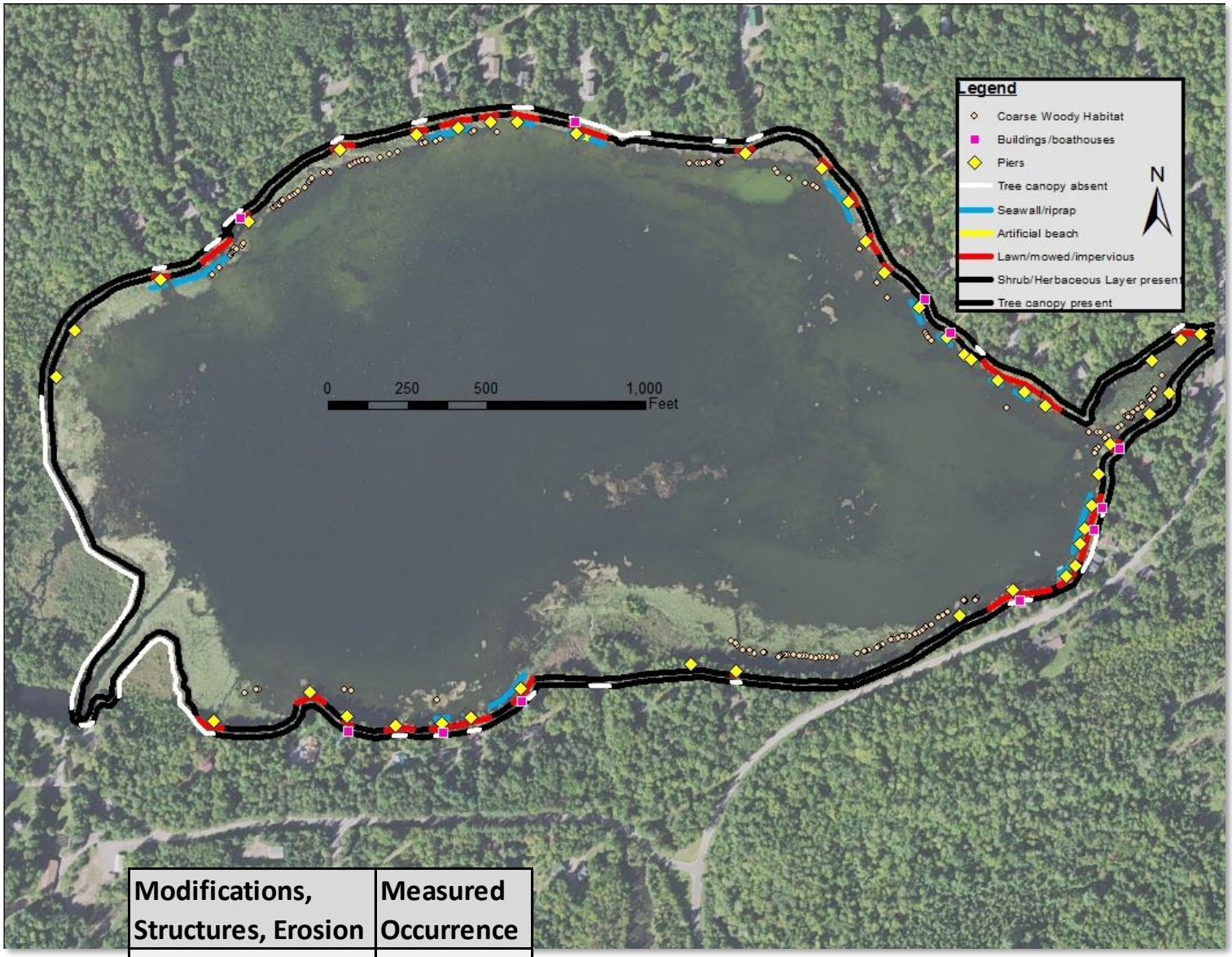
No vegetation within 35 feet of the lake's edge shall be removed except for:

- Up to 30% of shoreline may be removed of shrubs and trees for a view corridor
- A mowed or constructed pedestrian path up to 5 feet wide to access lake

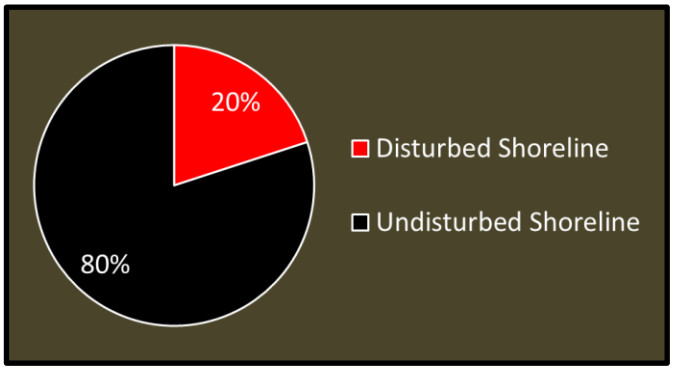
What Can You Do To Help Lake John?

- ✓ Leave natural shoreland vegetation in place or restore if it has been removed.
- ✓ Learn invasive plants and animals and know who to contact if found.
- ✓ Do not purchase prohibited and restricted species. Purchase native plants when possible.
- ✓ Never transplant water garden or aquarium plants into lakes, streams or wetlands. Properly dispose of them.
- ✓ Remove invasive exotic plants from your landscape and replace them with native plants or non-invasive exotics. Scout regularly for new invasive plants.
- ✓ Avoid using garden plants from other regions whose invasive potential is poorly understood.

Shorelands



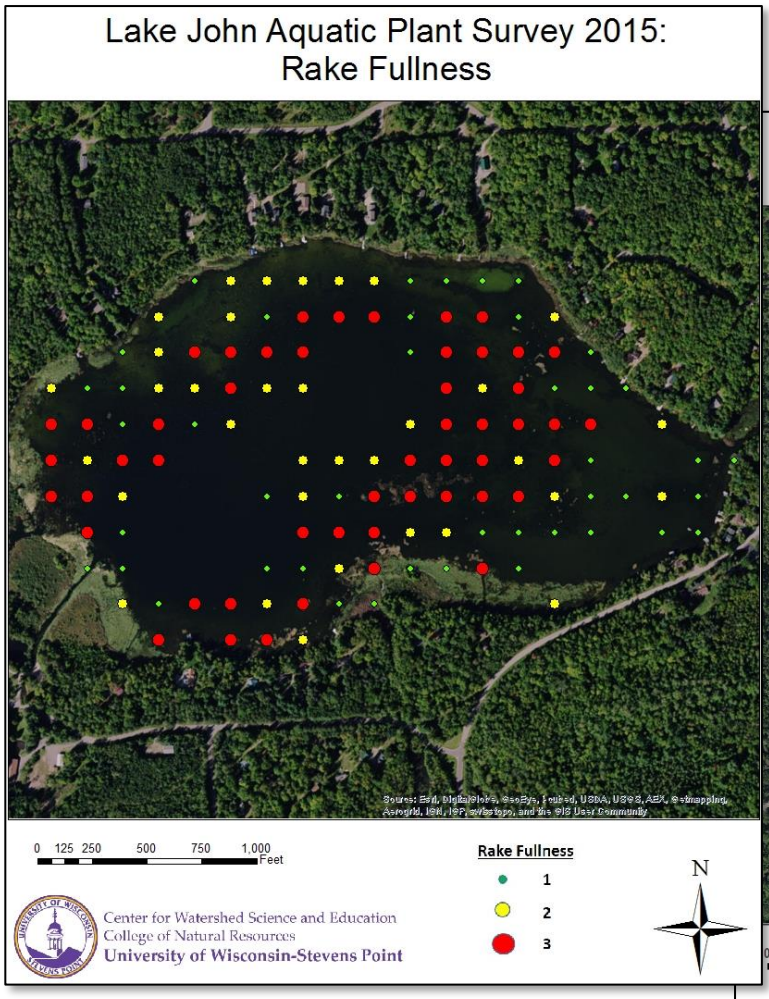
Modifications, Structures, Erosion	Measured Occurrence
Artificial Beach	15 ft
Rip Rap	867 ft
Sea Wall	65 ft
Impervious Surface	0 ft
Mowed Lawn	2,033 ft
Erosion	0 ft
Nonconforming Buildings	11
Piers	44
Coarse Woody Habitat	82 logs/mile

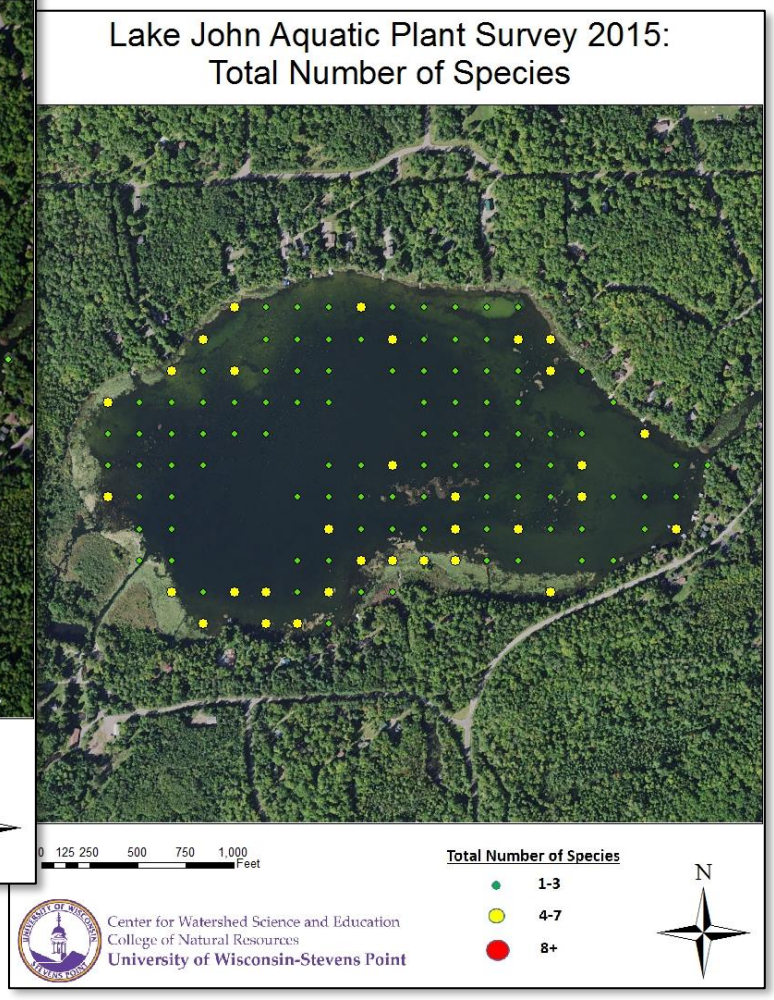


Aquatic Plants

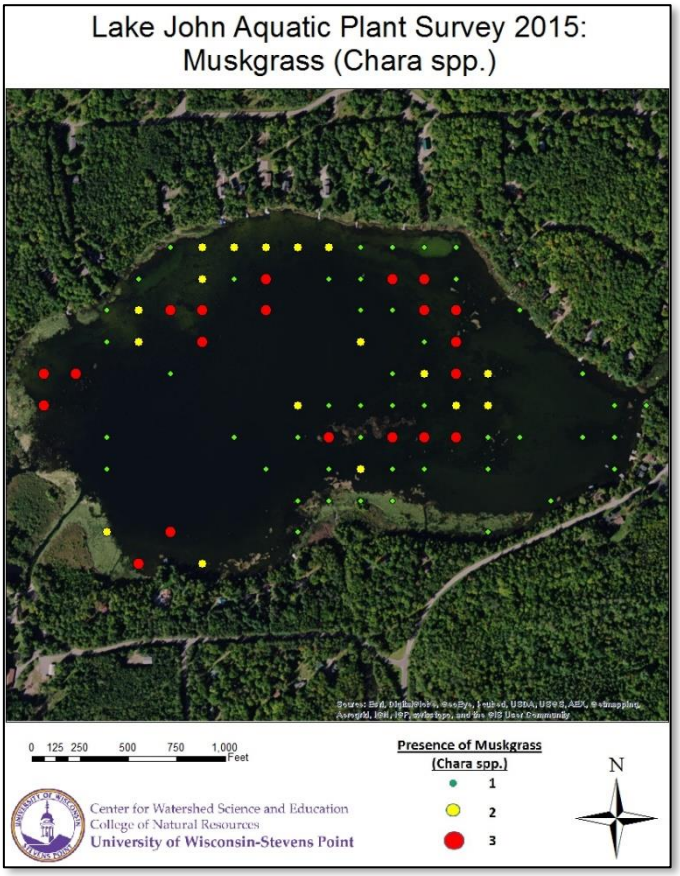
Aquatic plants are the forest landscape within a lake. They provide food and habitat for terrestrial and aquatic creatures such as fish, ducks, turtles, invertebrates and other animals. They increase oxygen levels in the water and utilize nutrients that would otherwise be used by algae. A healthy lake typically has a variety of aquatic plant species creating diversity that can help to prevent the establishment of aquatic invasive species.

- The aquatic plant community in Lake John is characterized by an average diversity of plant species when compared to other lakes in the Oconto County Lakes Project, with a total of 21 species in the 2015 survey.
- During the 2015 aquatic plant survey of Lake John, 82% of the sites had vegetative growth. The maximum depth of vegetation was 18 feet.
- The most frequently encountered plant species were chara (65%), northern water-milfoil (54%), coontail (30%), and flat-stem pondweed (30%). All four species are native to Wisconsin.
- No invasive species were observed.

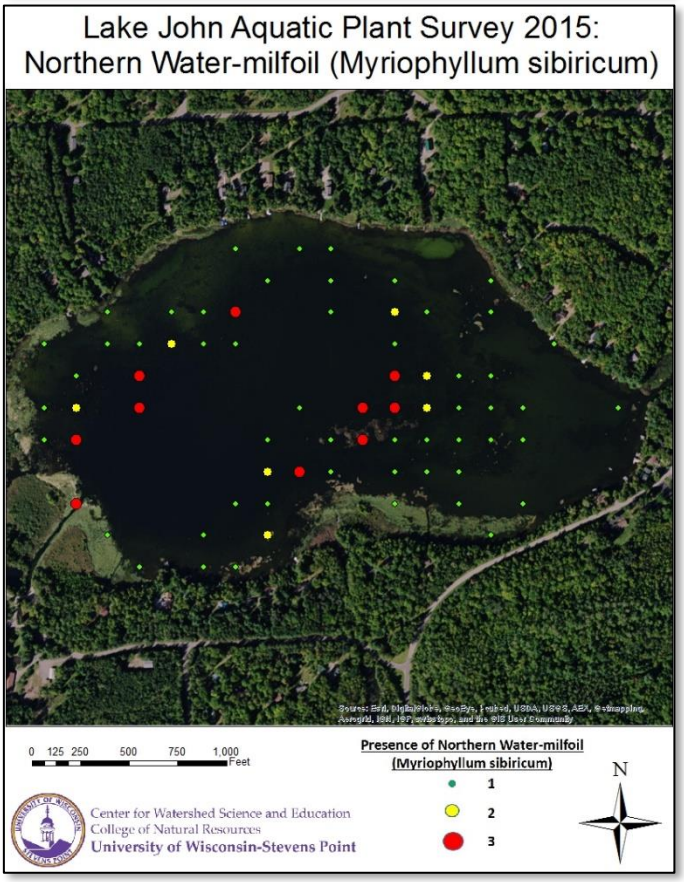




Aquatic Plants

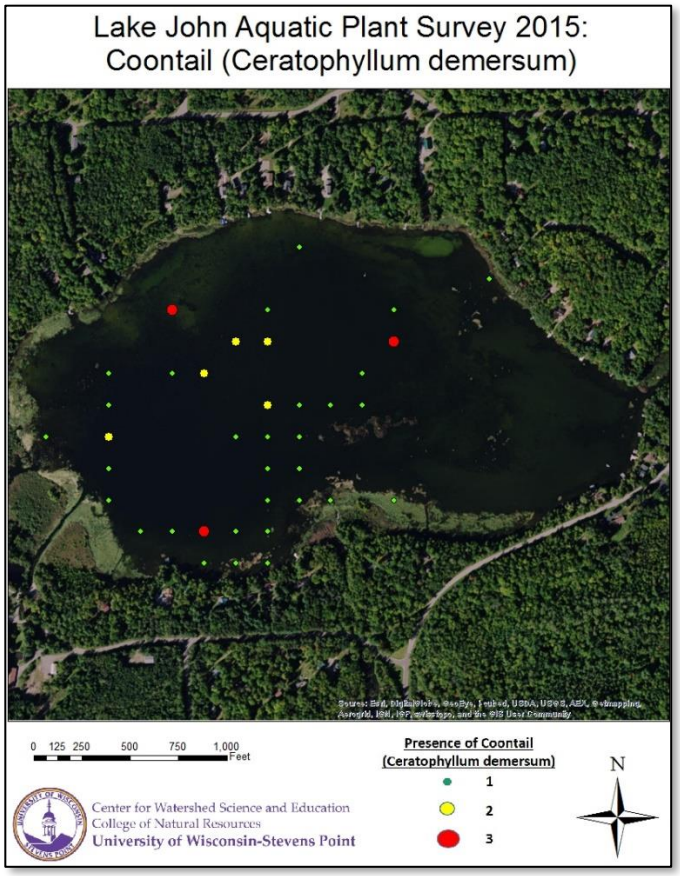


Chara is a type of macro algae that grows attached to muddy lake bottoms and has a musky odor. Muskgrass, as it is known, filters the lake water and is helpful in preventing the establishment of invasive species.



Northern water-milfoil is important forage and cover for aquatic animals and an important food source for waterfowl.

Aquatic Plants



Coontail lacks roots and can form dense mats just below the surface. It is usually in calm, nutrient-rich water and provides habitat for young fish and other aquatic animals. Waterfowl will eat the seeds and foliage.

Aquatic **invasive species** are non-native aquatic plants and animals that are most often unintentionally introduced into lakes by lake users. In some lakes, aquatic invasive plant species can exist as a part of the plant community, while in other lakes populations explode, creating dense beds that can damage boat motors, make areas non-navigable, inhibit activities like swimming and fishing, and disrupt the lake ecosystem.

- ✓ No invasive species were observed during the 2015 aquatic plant survey.
- ✓ Banded mystery snail (2015) has been previously documented in Lake John.

Banded mystery snails compete with native snails for food and habitat, can serve as a host for parasites and may invade largemouth bass nests.

Acknowledgments

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Acknowledgments

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