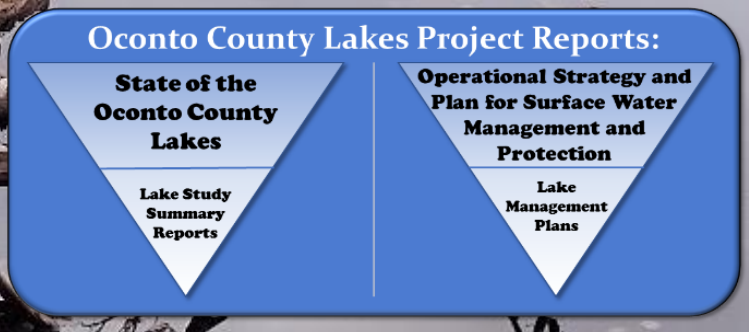
Oconto County Lakes Project

BOUNDARY LAKE STUDY

SUMMARY REPORT

2025



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

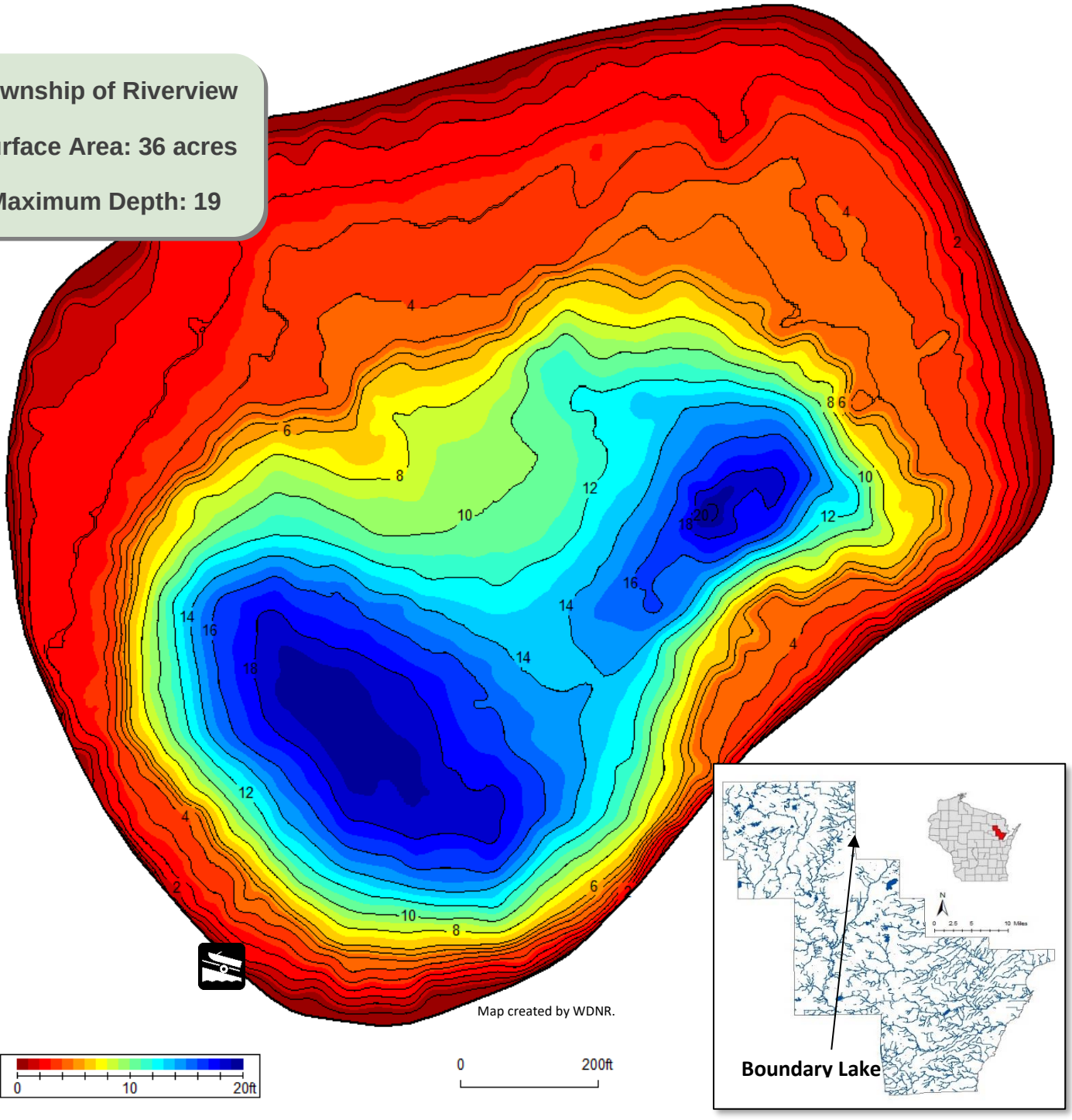
Background

- Boundary Lake is a 36-acre drainage lake in northeast Oconto County with a maximum depth of 19 feet.
- Most water enters Boundary Lake through groundwater and leaves via a small unnamed drainage to the northeast. Direct precipitation and surface runoff also contribute water.
- Visitors have access to the lake from one public boat launch located on the lake's southwest side.
- This report summarizes data collected during the 2023-2024 lake study.

Township of Riverview

Surface Area: 36 acres

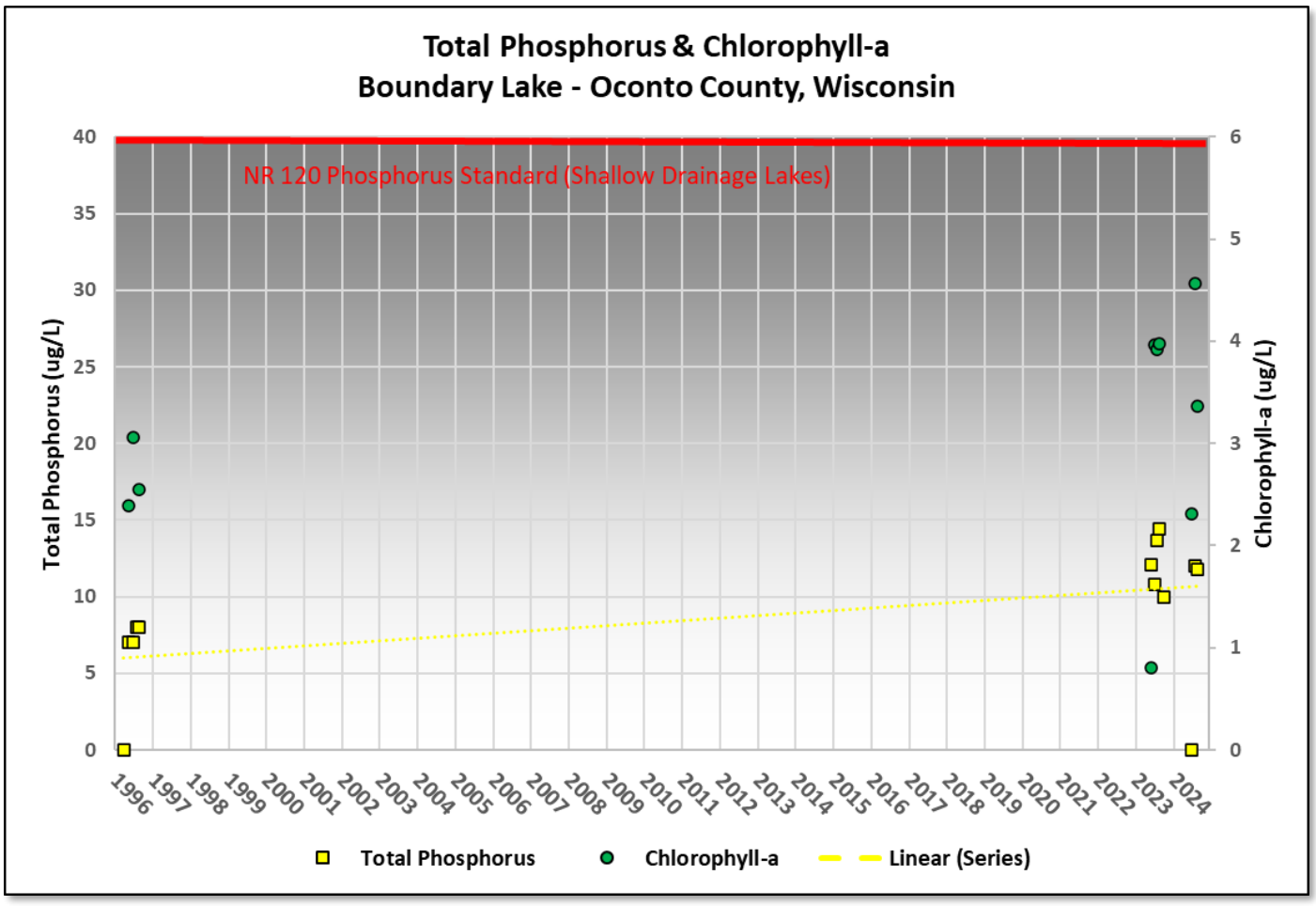
Maximum Depth: 19



Water Quality

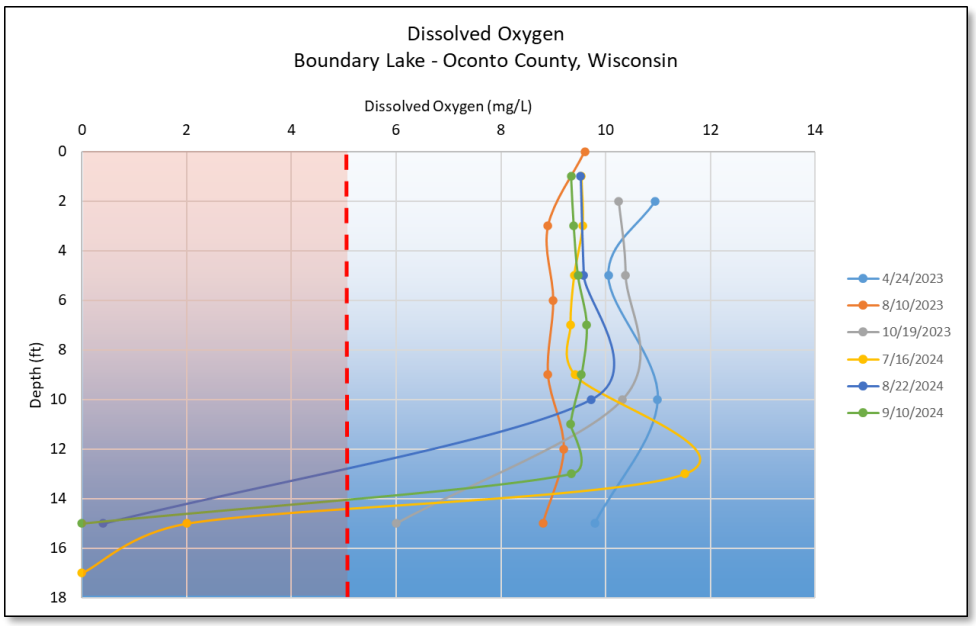
Nutrients such as phosphorus and nitrogen are what feed aquatic plants and algae in a lake. Excessive amounts of nutrients delivered to a lake will result in abundant plant and algae growth. Disturbance within a watershed combined with the landscape's inability to infiltrate and filter runoff is what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

- Total Phosphorus remained well below the Wisconsin state standard of 40 ug/L for drainage lakes during the two-year study. Limited data suggests this average concentration is stable.
- Inorganic nitrogen remained below the threshold of 0.3 mg/L when algal blooms increase.
- Chlorophyll-a, an indirect measure of algae, remained below the threshold of 6 ug/L during the study.



Water Quality

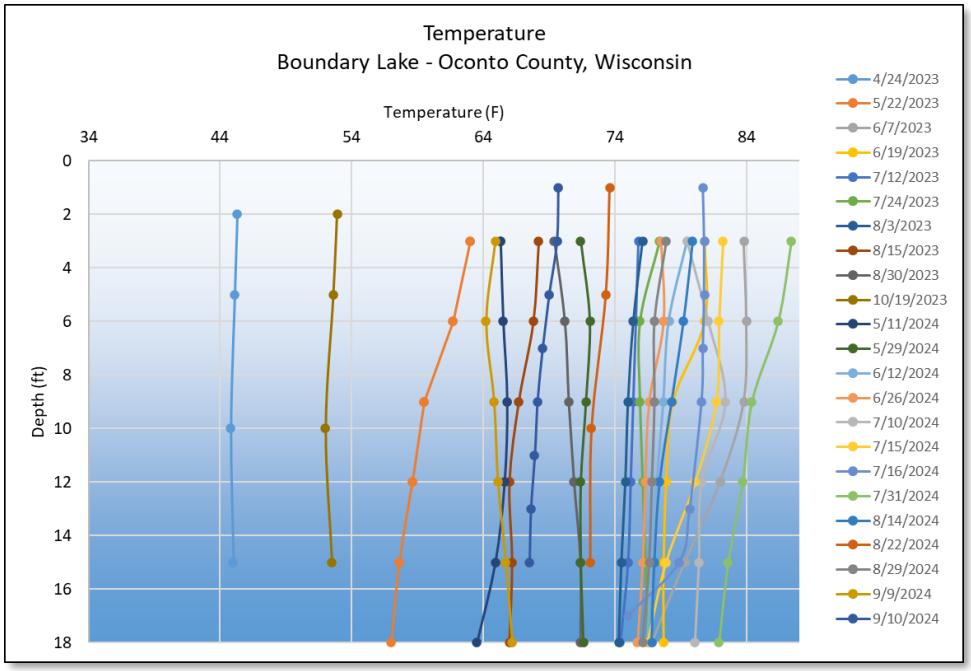
Sufficient **dissolved oxygen** in lake water is essential to the survival of aquatic organisms. The amount of dissolved oxygen present within a lake varies by season and depth. It is determined by the biological activity that consumes or produces oxygen, by water mixing through wind, changes in temperature,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



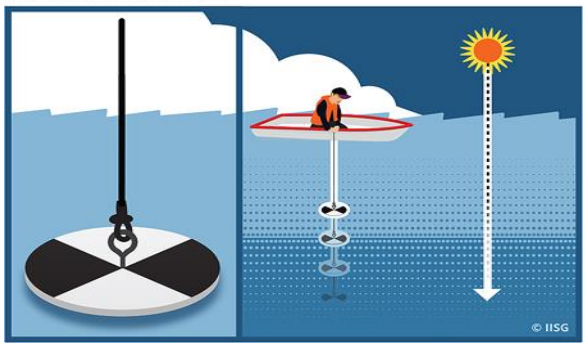
- Sufficient oxygen is available in the water column of Boundary Lake throughout the year. At least the top 13 feet of water column contains enough oxygen to support most fish species.
- Spike in DO concentration in July at depth is indicative of an algae bloom.

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

- Temperature profiles in Boundary Lake show similar temperatures with depth at each sampling event, indicative a shallow, mixed lake.

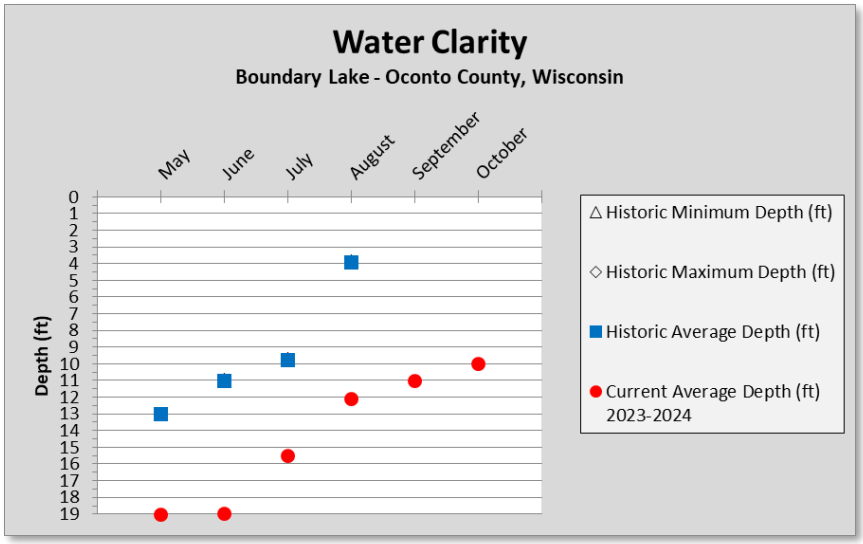


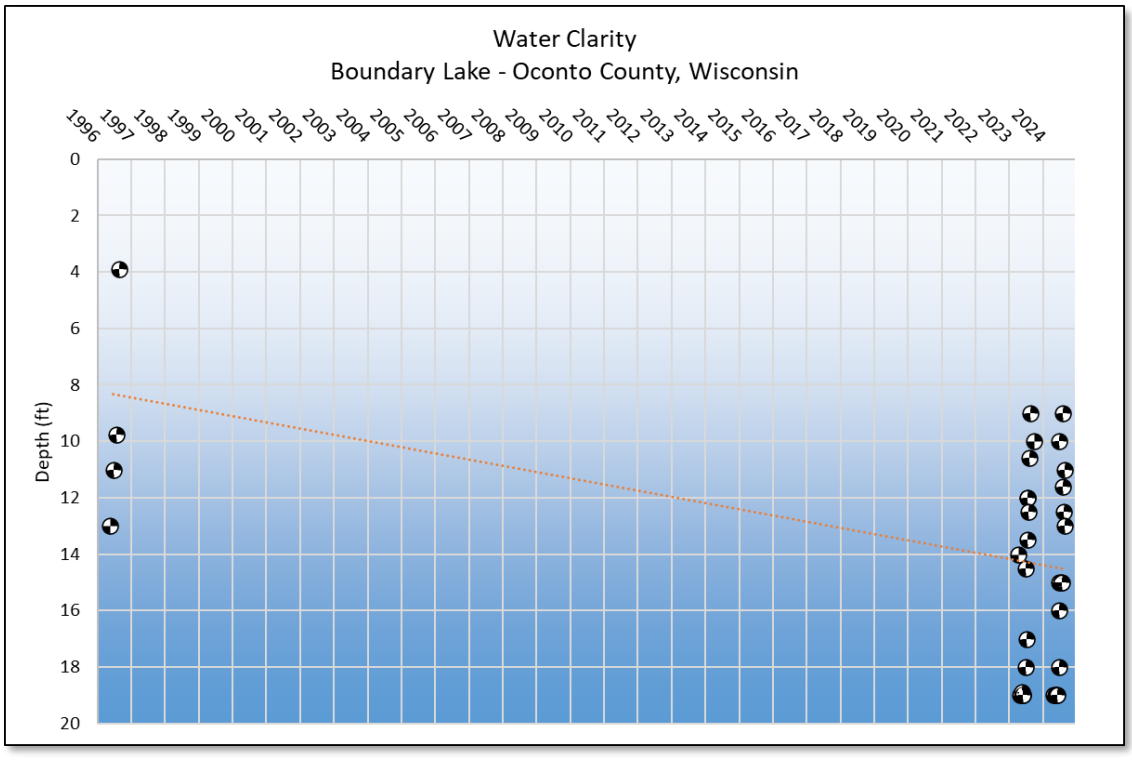
Water Quality



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 graphs below show water clarity measurements taken between May and October.
- During 2023-24, water clarity was best in May/June and worst in October. These averages are generally better than historical averages.





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.

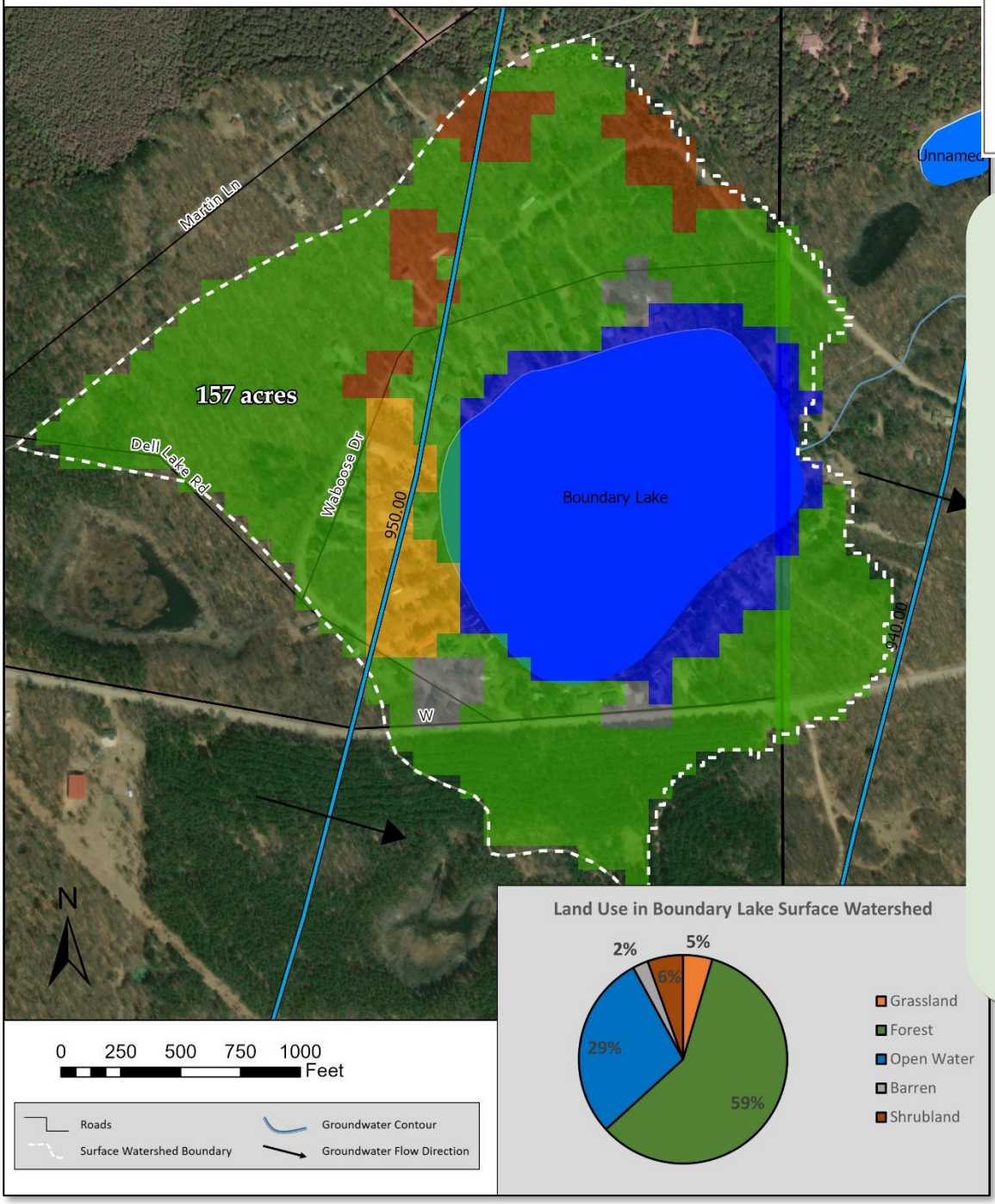
- Concentrations of potassium (0.774 mg/L), chloride (2.5 mg/L) and sodium (3.046 mg/L) were low. This suggests minimal impacts from human activity such as septic systems, road salt, animal waste and fertilizers.
- DACT, a screening tool to determine if your lake is being impacted by pesticides, was not detected.
- Water in Boundary Lake is moderately hard (119 mg/L CaCO3), having a slightly elevated level of dissolved minerals. These 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.

Boundary Lake Surface Watershed & Groundwater Flow



WHEN IT RAINS IT DRAINS

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.

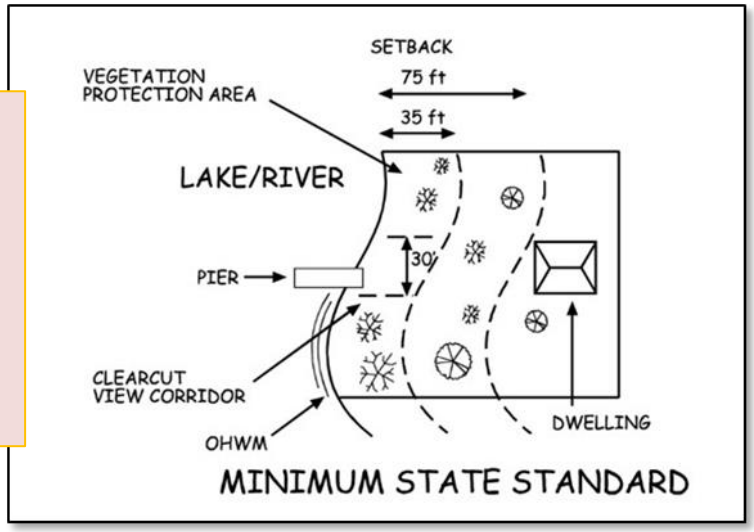
- Shorelands around Boundary Lake were surveyed in June 2023. Some of Boundary Lake's shoreland is healthy, but most sections are in need of restoration.

Total lakefront footage	No. Riparian lots	Measured shoreland disturbance (feet)	Measured shoreland disturbance (%)
4,830	52	3,452	72%

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:

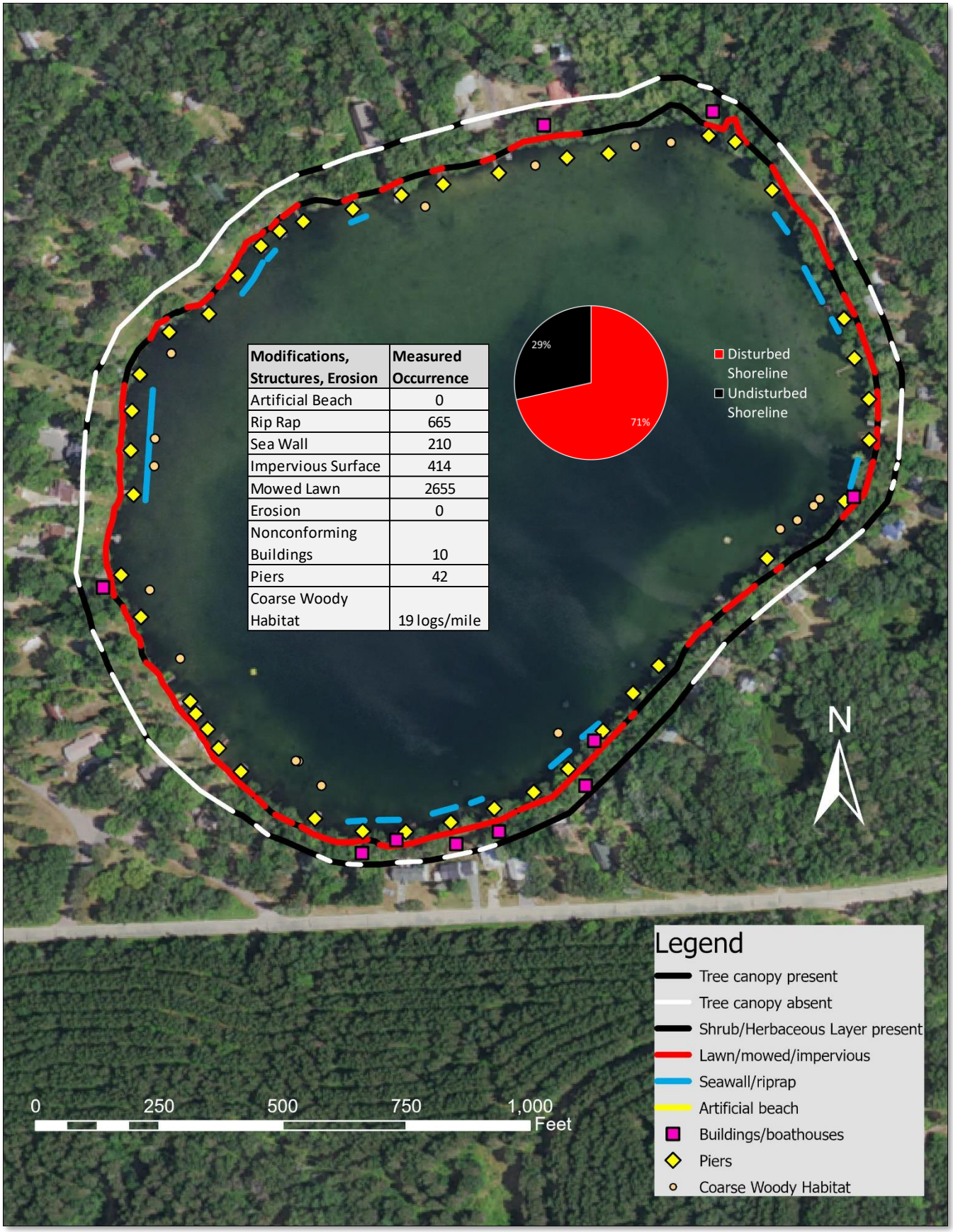
- Up to 30% of shoreline may be removed of shrubs and trees for a view corridor
- A mowed or constructed pedestrian path up to 5 feet wide to access lake



What Can You Do To Help Boundary Lake?

- ✓ Leave natural shoreland vegetation in place or restore if it has been removed.
- ✓ Learn to identify and look for 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.

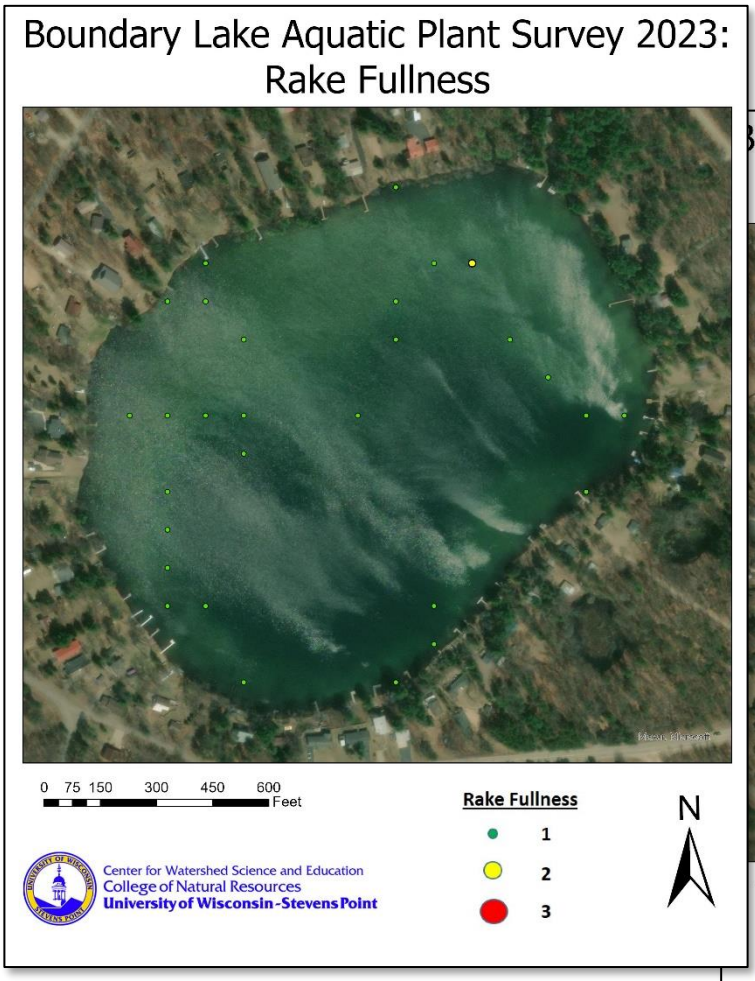
Shorelands

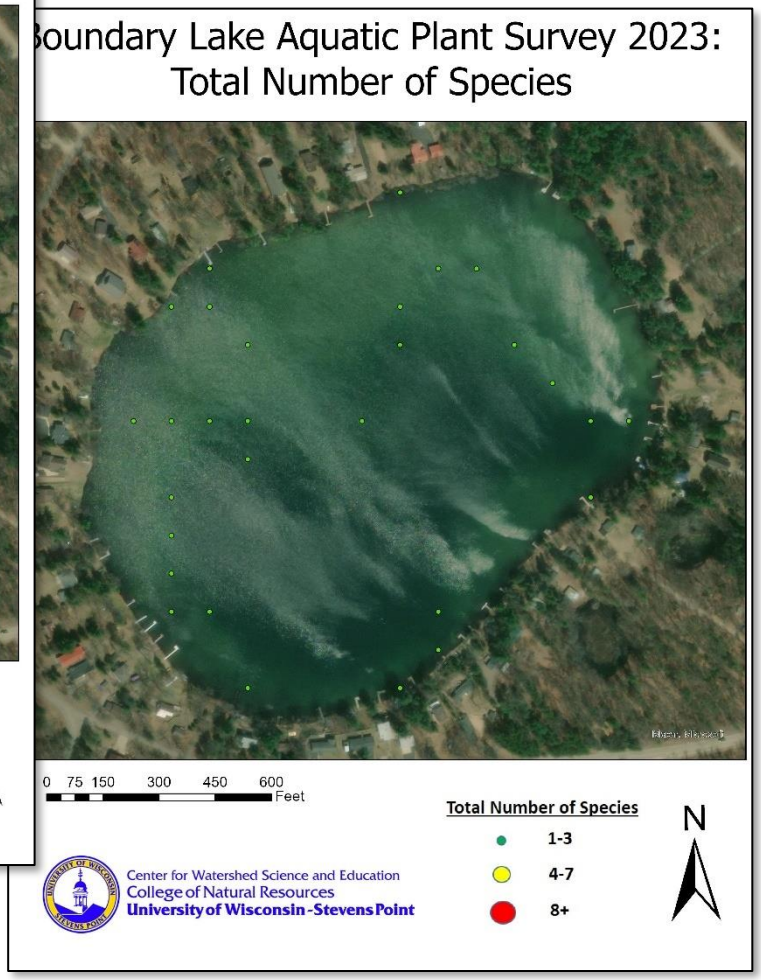

Modifications, Structures, Erosion | Measured Occurrence
Artificial Beach | 0
Rip Rap | 665
Sea Wall | 210
Impervious Surface | 414
Mowed Lawn | 2655
Erosion | 0
Nonconforming Buildings | 10
Piers | 42
Coarse Woody Habitat | 19 logs/mile
29%
71%
Disturbed Shoreline
Undisturbed Shoreline
N
0
250
500
750
1,000
Feet
Legend
Tree canopy present
Tree canopy absent
Shrub/Herbaceous Layer present
Lawn/mowed/impervious
Seawall/riprap
Artificial beach
Buildings/boathouses
Piers
Coarse Woody Habitat

Aquatic Plants

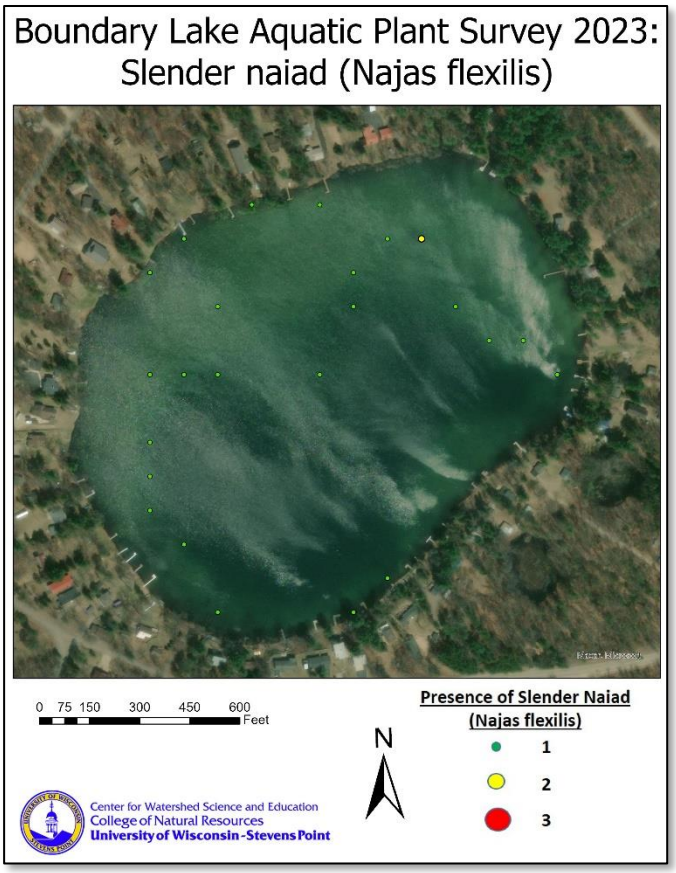
Aquatic plants are the forest landscape within a lake. They provide food and habitat for terrestrial and aquatic creatures such as fish, ducks, turtles, invertebrates and other animals. They increase oxygen levels in the water and utilize nutrients that would otherwise be used by algae. A healthy lake 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 Boundary Lake is characterized by below average diversity of plant species when compared to other lakes in the Oconto County Lakes Project, with a total of 8 species in the 2023 survey.
- During the 2023 aquatic plant survey of Boundary Lake, 25% of visited sites had vegetative growth. The maximum depth of vegetation was 18 feet and the Floristic Quality Assessment (FQI) was 18.
- The most frequently encountered plant species were slender naiad (72%), variable pondweed (31%), and chara (7%).
- No invasive species were observed.

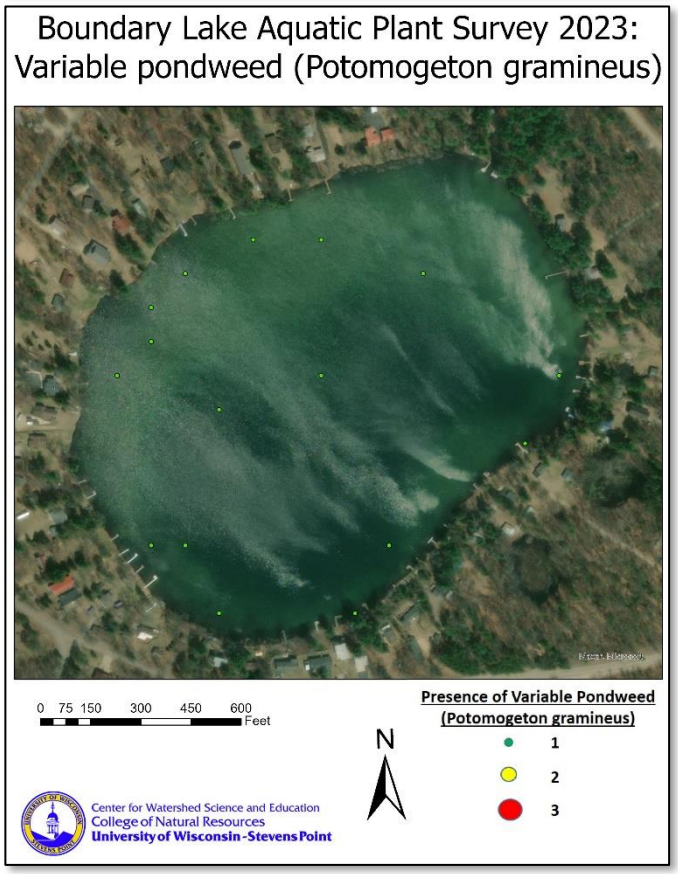




Aquatic Plants

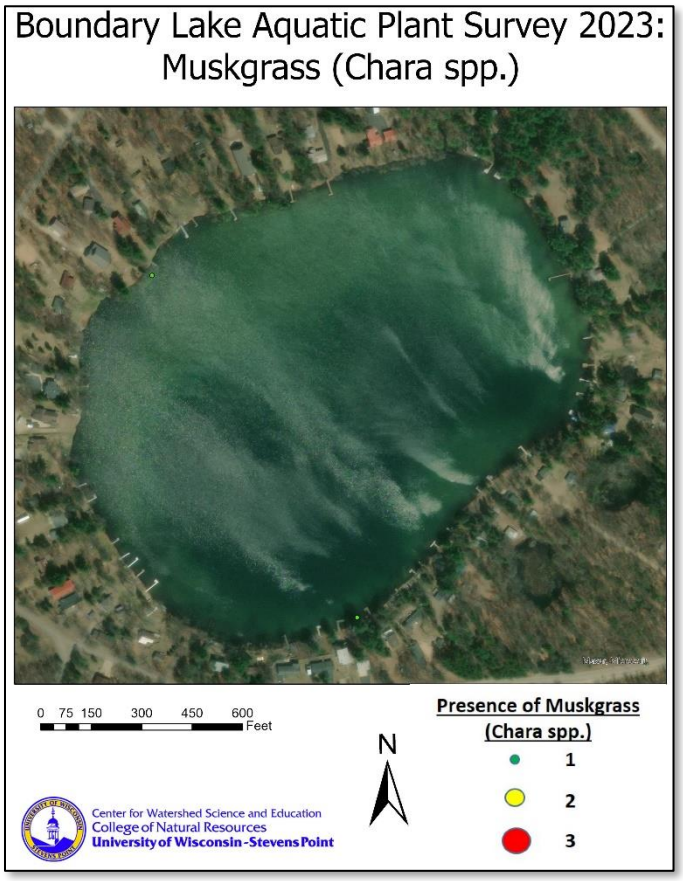


Slender naiad has glossy, finely toothed leaves appearing as whorls near the end of stems. Also known as the water-nymph, the whole plant is eaten by waterfowl and provides shelter for small fish and insects.



Variable pondweed has both floating and submersed leaves which provide food and habitat for fish.

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.

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 lakes' ecosystems.

- Banded mystery snail (2012), ornamental water lilies (2017) and phragmites (2017) have been previously documented in Boundary Lake.

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

Ornamental water lilies, or yellow floating heart, tend to cover the surface, shading out native vegetation and decreasing dissolved oxygen levels.

Phragmites, a restricted species in Wisconsin, invades moist areas and can alter hydrology and choke out native species and wildlife habitat.

Acknowledgments

This report was prepared as an appendix to the **Oconto County State of the Lakes Report**, which is on file with the Oconto County Land Conservation Department.
Written and prepared by the Center for Watershed Science and Education at the University of Wisconsin-Stevens Point.

Primary Authors

Ryan Haney and Paul McGinley

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