

Oconto County Lakes Project

UNDERWOOD LAKE STUDY SUMMARY REPORT 2020

*University of Wisconsin-Stevens Point and
Oconto County Staff and Citizens*

Oconto County Lakes Project Reports:

**State of the
Oconto County
Lakes**

**Lake Study
Summary
Reports**

**Operational Strategy and
Plan for Surface Water
Management and
Protection**

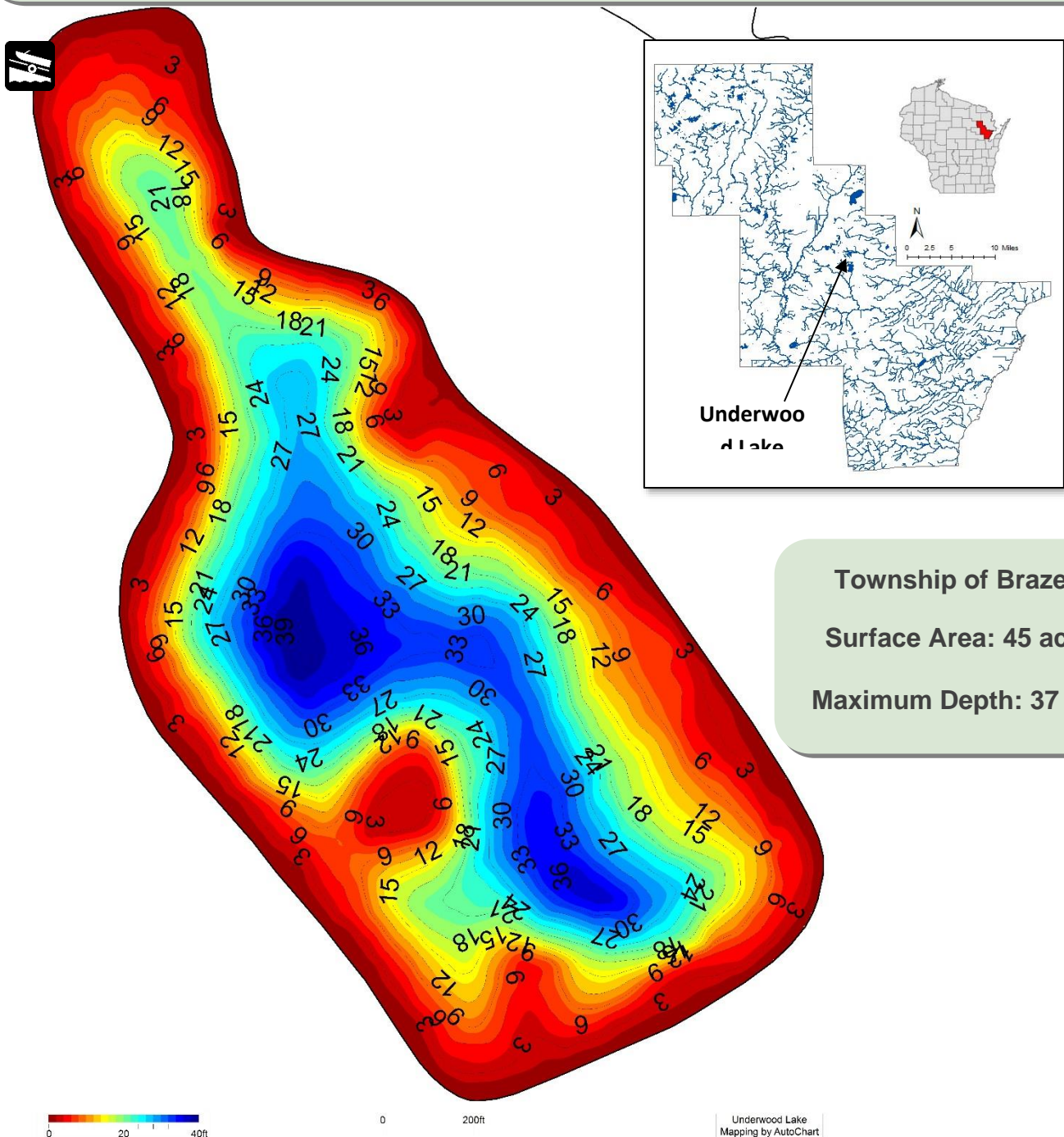
**Lake
Management
Plans**



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

Background

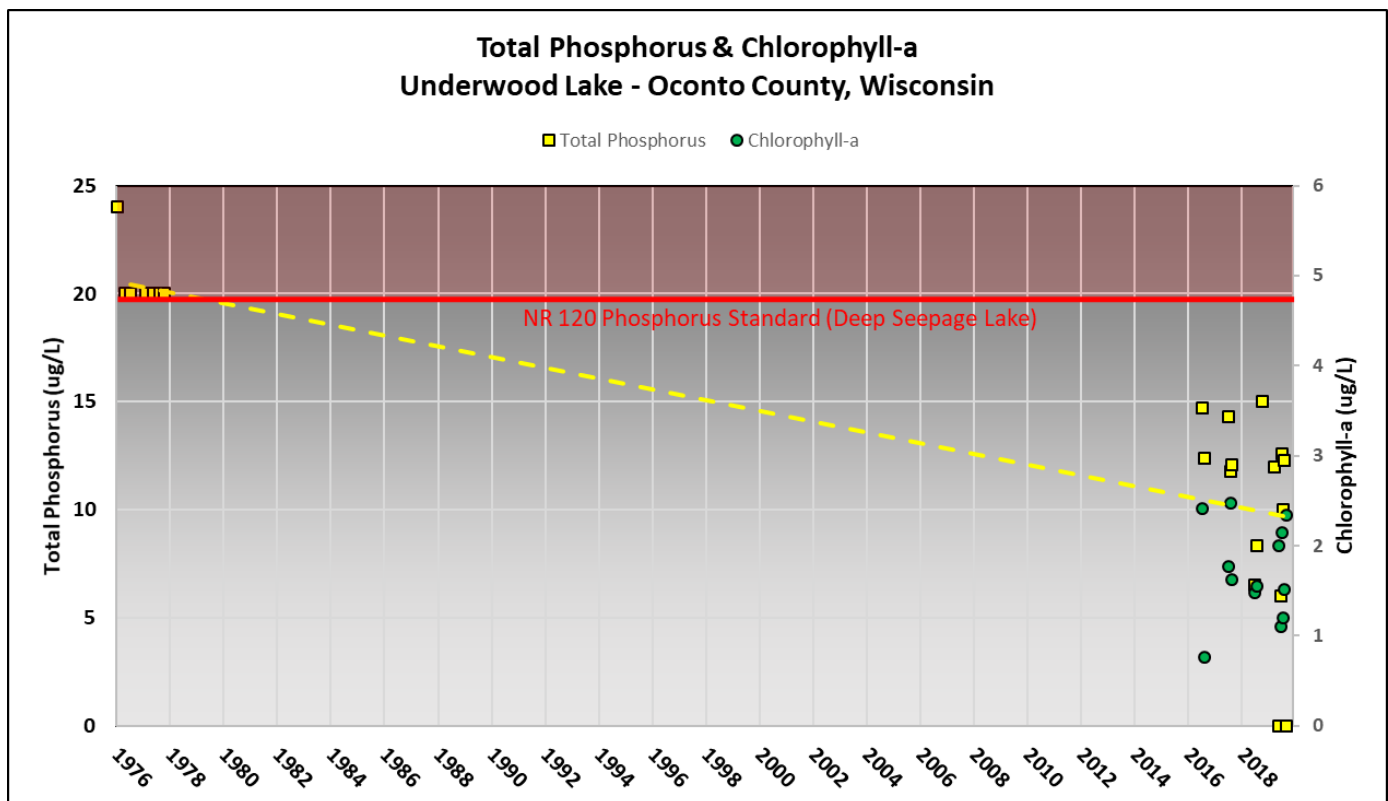
- Underwood Lake is a 45-acre seepage lake in northern Oconto County with a maximum depth of 37 feet.
- Most water enters and leaves Underwood Lake via groundwater. When water is high enough it can drain via a small outlet stream leading to Leigh Flowage. Surface water runoff and direct precipitation also contribute water.
- Visitors have access to the lake from one public boat landing located on the lake's northwest side.
- This report summarizes data collected during the 2018-2019 lake study.



Water Quality

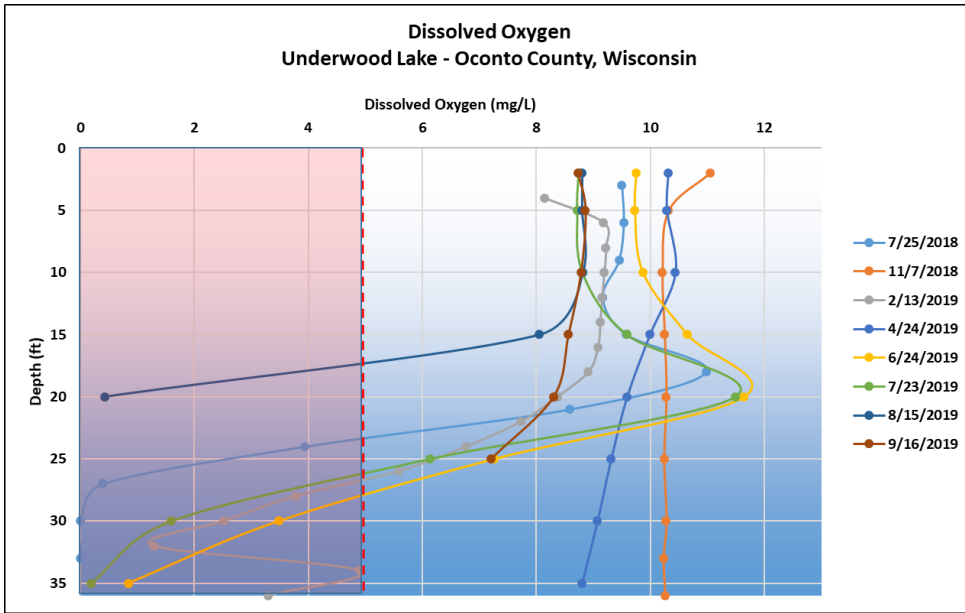
Nutrients such as phosphorus and nitrogen are what feed aquatic plants and algae in a lake. Excessive amounts of nutrients delivered to a lake will result in abundant plant and algae growth. Disturbance within a watershed combined with the landscape's inability to infiltrate and filter runoff is what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

- ◆ Total Phosphorus was consistently **below** the Wisconsin state standard of 20 ug/L for deep seepage lakes during the two-year study. The long-term trend (based on summer samples) suggests a decreasing average concentration.
- ◆ Inorganic nitrogen remained below the threshold of 0.3 mg/L when algal blooms increase.
- ◆ Chlorophyll-a, an indirect measure of algae, was consistently below the threshold of 6 ug/L. Not enough data is available to determine a trend.



Water Quality

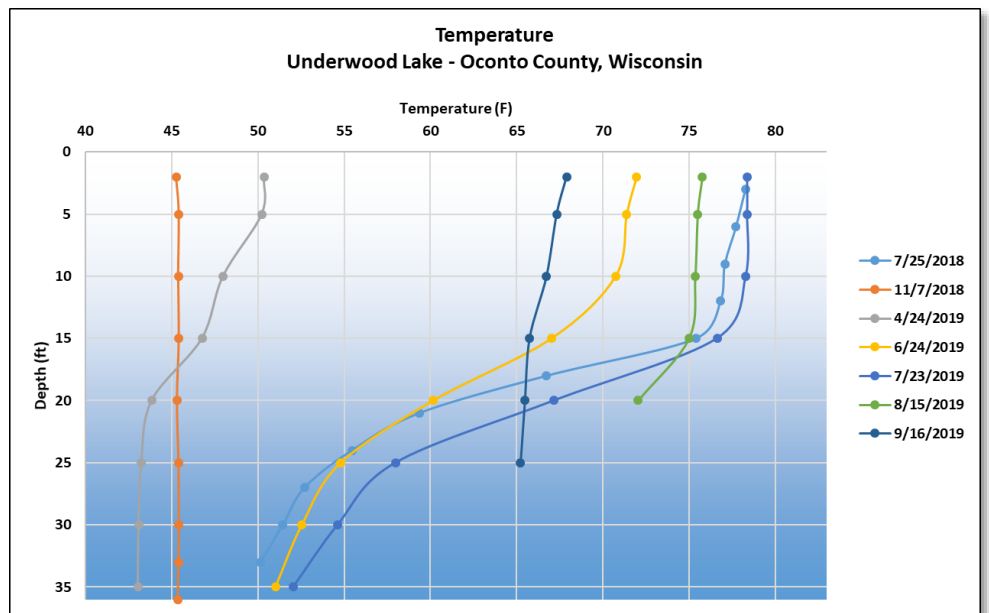
Sufficient **dissolved oxygen** in lake water is essential to the survival of aquatic organisms. The amount of dissolved oxygen present within a lake varies by season and depth. It is determined by the biological activity that consumes or produces oxygen, by water mixing through wind, changes in temperature,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



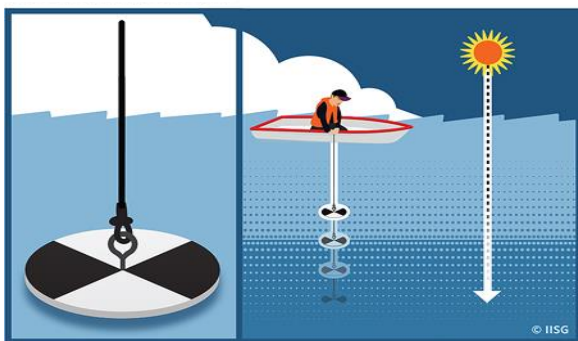
- Sufficient oxygen is available in the water column of Anderson Lake throughout the year. The lowest concentrations were observed in late summer when only the top 17 feet has enough oxygen to support most fish species.
- Bumps in dissolved oxygen concentrations at depth (15-20 feet) are indicative of algae blooms in early to late summer.

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

- The temperature gradient in Underwood Lake exhibits a clear thermocline between 15 and 25 feet during the growing season that separates warmer oxygen-rich water at the top from colder oxygen-poor water below.

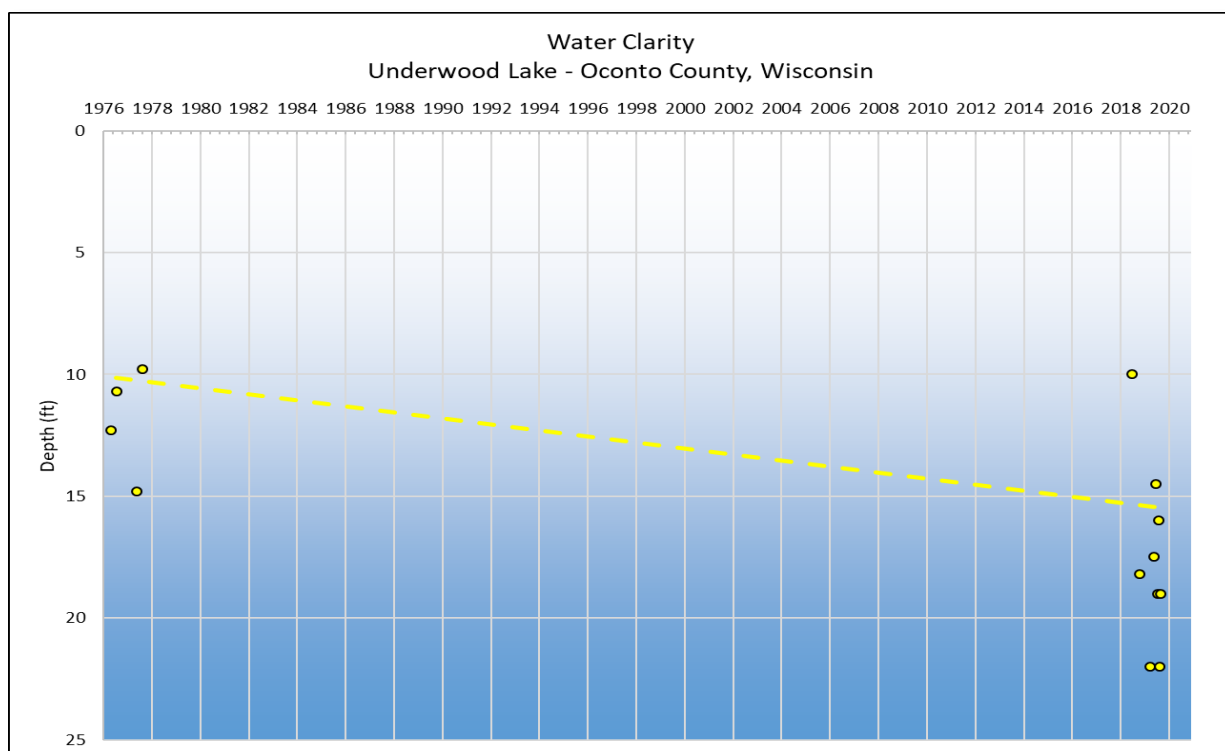
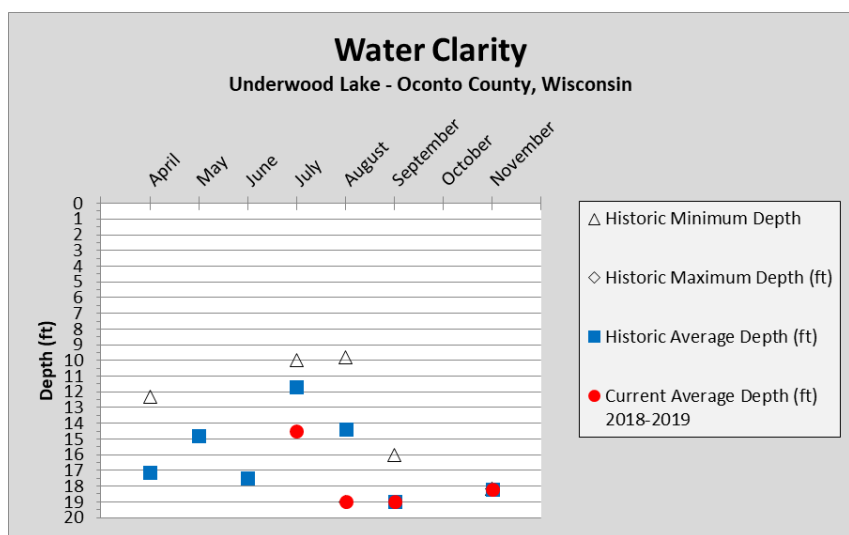


Water Quality



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 graph below shows water clarity measurements taken between April and November.
- During 2018-19, on average, the poorest water clarity in Underwood Lake was in July and the best was in August-September. Limited data suggests a slightly increasing trend over the long term.



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 (0.616 mg/L), chloride (2.2 mg/L) and sodium (1.1 mg/L) were all very 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 Underwood Lake is soft (46 mg/L CaCO_3), having a relatively low level of dissolved minerals and little 'buffering' ability for phosphorus.



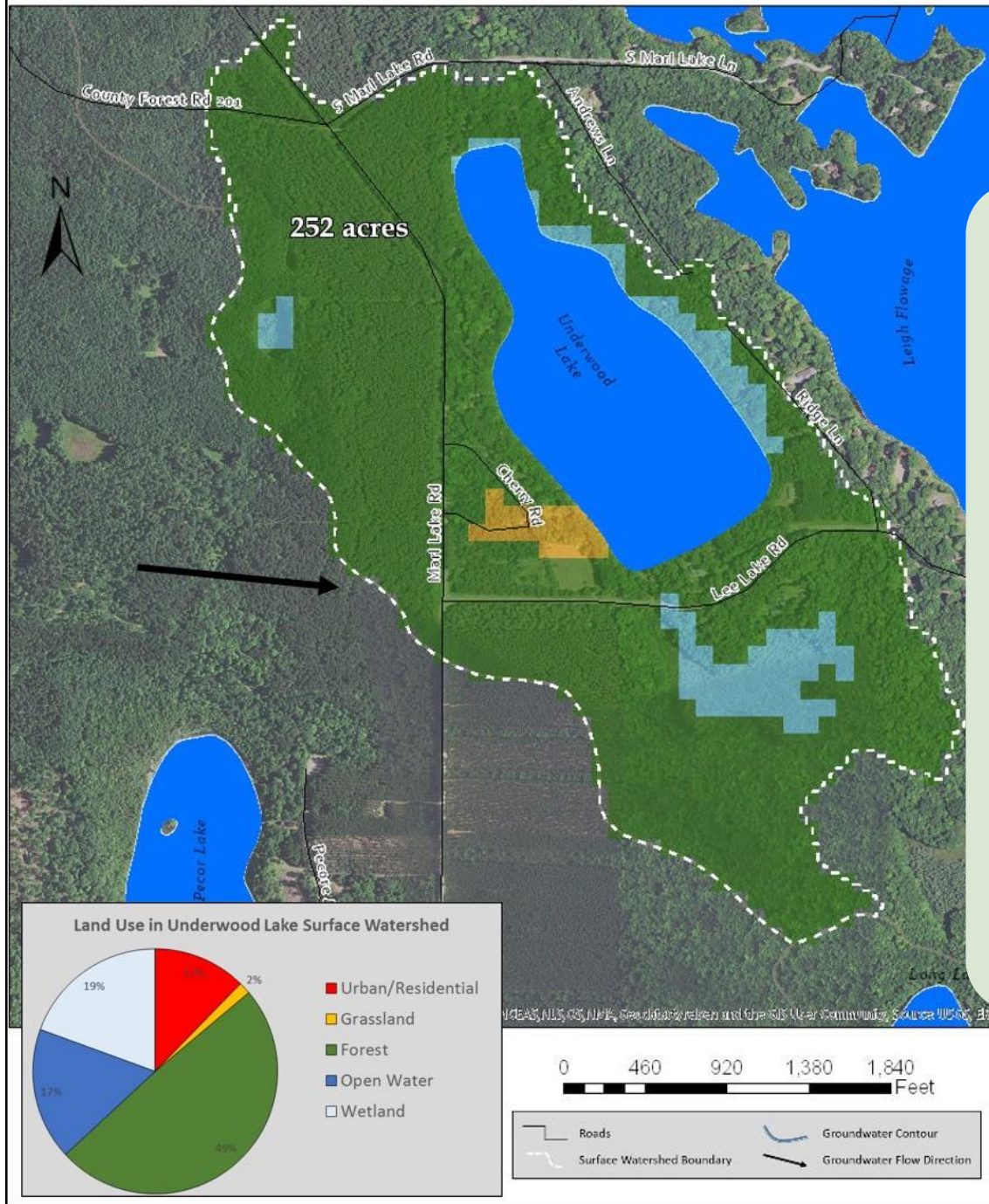
For more information on how to interpret your lake's water quality data, please refer to the "State of the Oconto County Lakes Report" that is on file with Oconto County.

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.

Underwood Lake Surface Watershed & Groundwater Flow

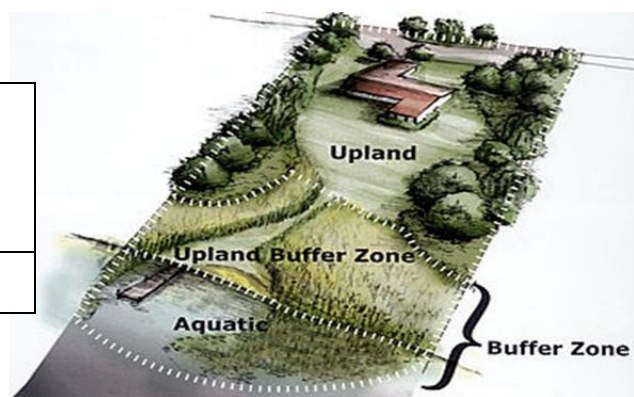


Shorelands

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 Underwood Lake were surveyed in July 2018. Much of Underwood Lake's shoreland is healthy, but some stretches are in need of restoration.

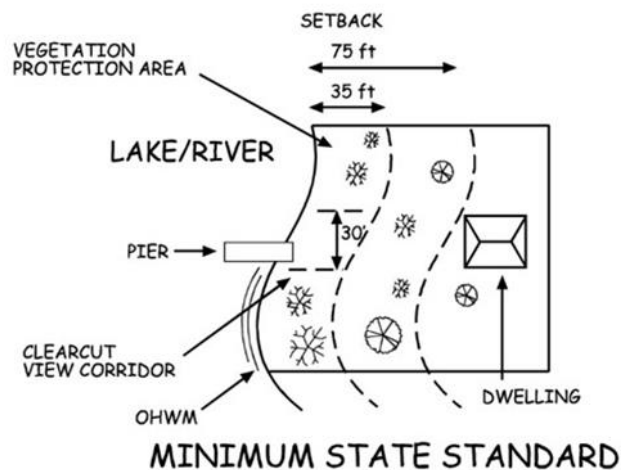
Total lakefront footage	No. Riparian lots	Measured shoreland disturbance (feet)	Measured shoreland disturbance (%)
6,620	55	1,986	30%



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

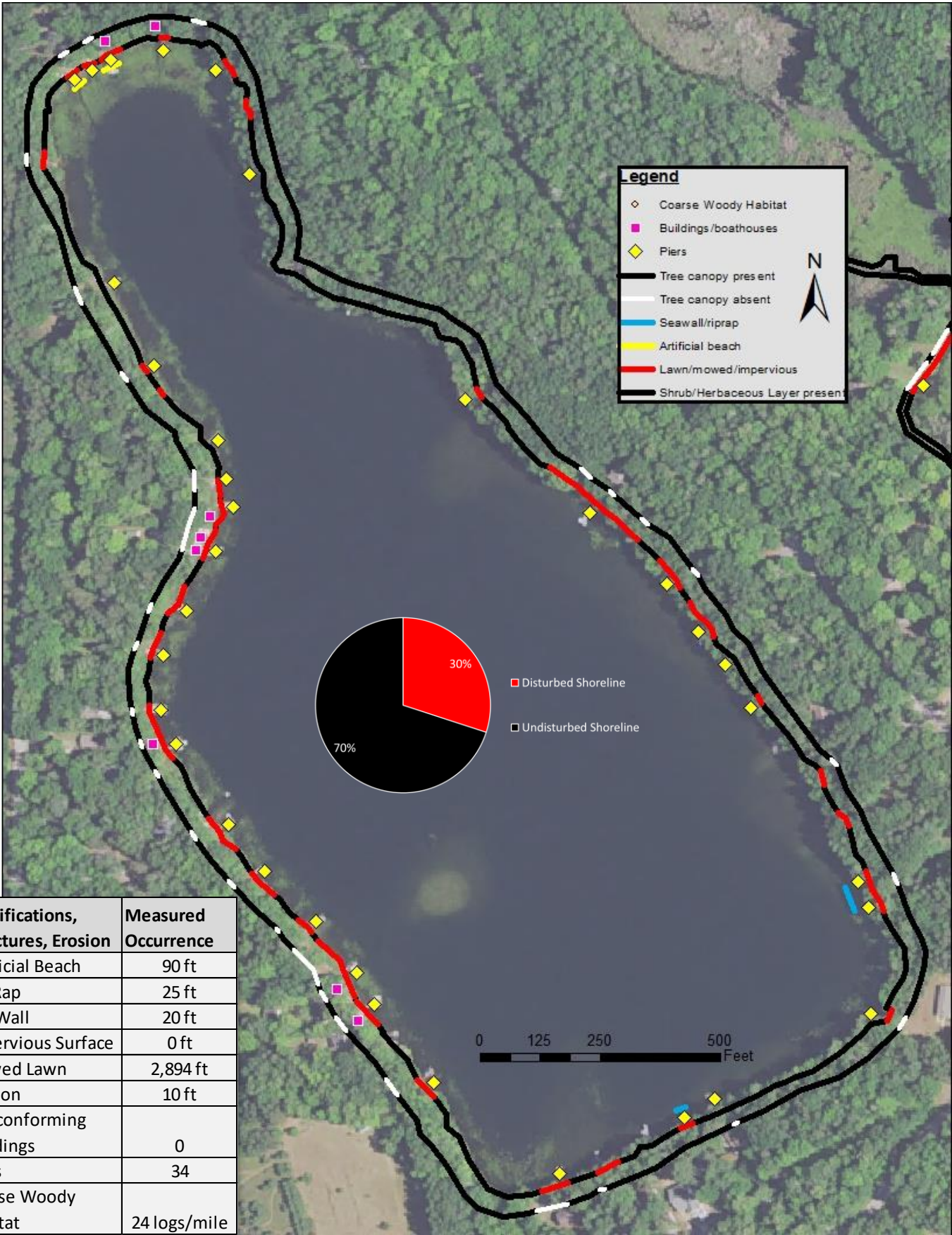
No vegetation within 35 feet of the lake's edge shall be removed except for:

- 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 Underwood 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.

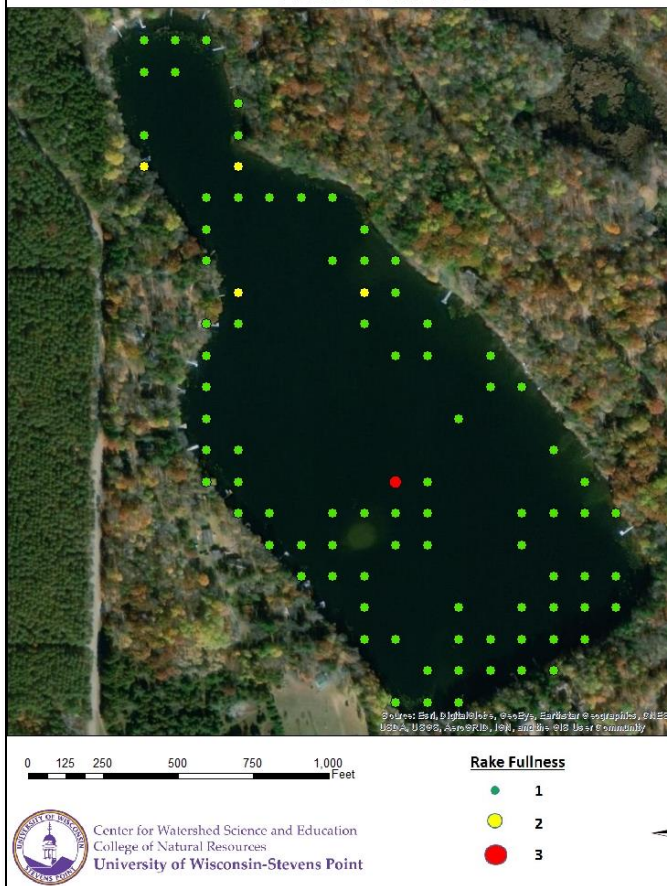


Aquatic Plants

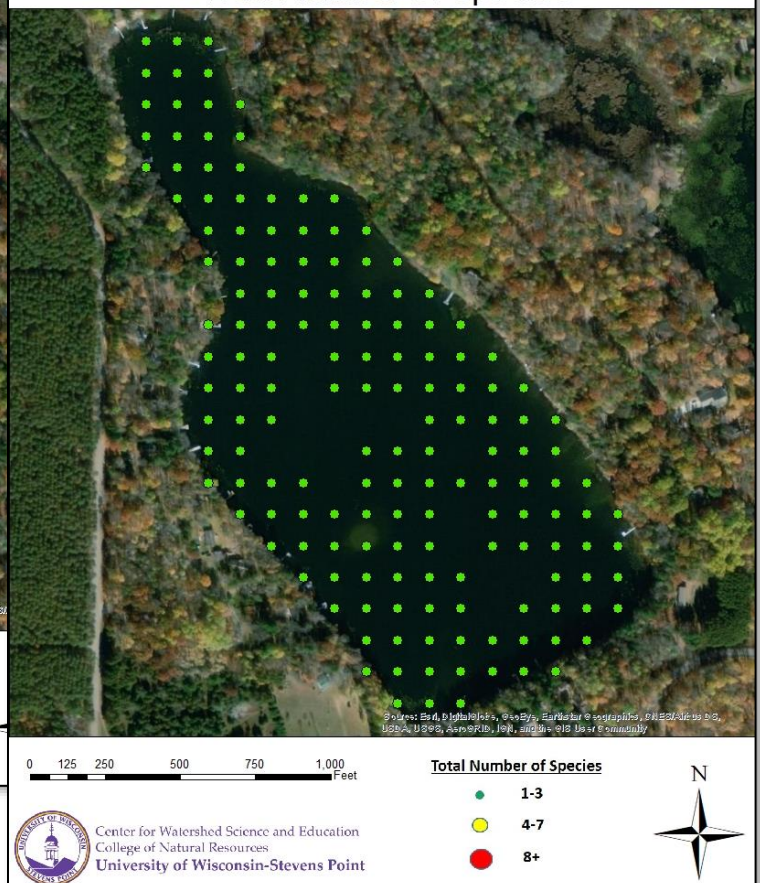
Aquatic plants are the forest landscape within a lake. They provide food and habitat for terrestrial and aquatic creatures such as fish, ducks, turtles, invertebrates and other animals. They increase oxygen levels in the water and utilize nutrients that would otherwise be used by algae. A healthy lake 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 Underwood 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 15 species in the 2018 survey.
- During the 2018 aquatic plant survey of Underwood Lake, 46% of visited sites had vegetative growth. The maximum depth of vegetation was 28 feet.
- The most frequently encountered plant species were southern naiad (36%), dwarf watermilfoil (25%) and variable pondweed (23%). All three species are native to Wisconsin.
- The invasive species Eurasian watermilfoil was observed at one location.

Underwood Lake Aquatic Plant Survey 2018:
Rake Fullness

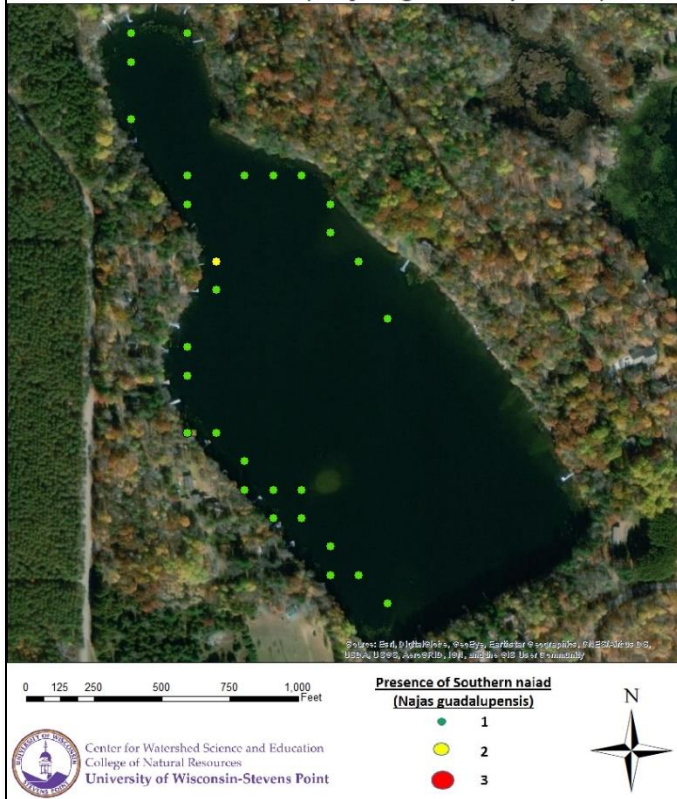


Underwood Lake Aquatic Plant Survey 2018:
Total Number of Species

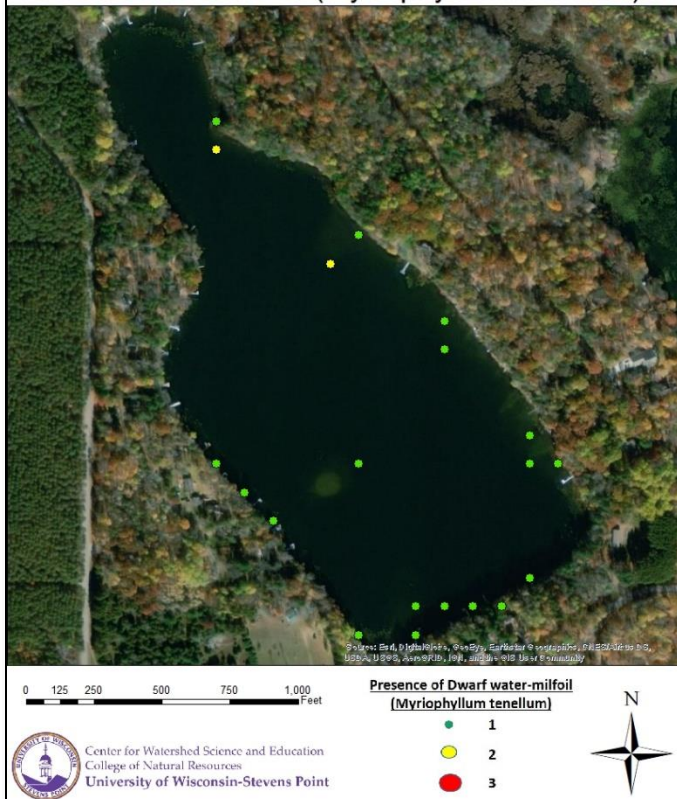


Aquatic Plants

Underwood Lake Aquatic Plant Survey 2018: Southern naiad (*Najas guadalupensis*)



Southern naiad, also called bushy pondweed, is a primary food source for ducks and provides habitat for many invertebrates.

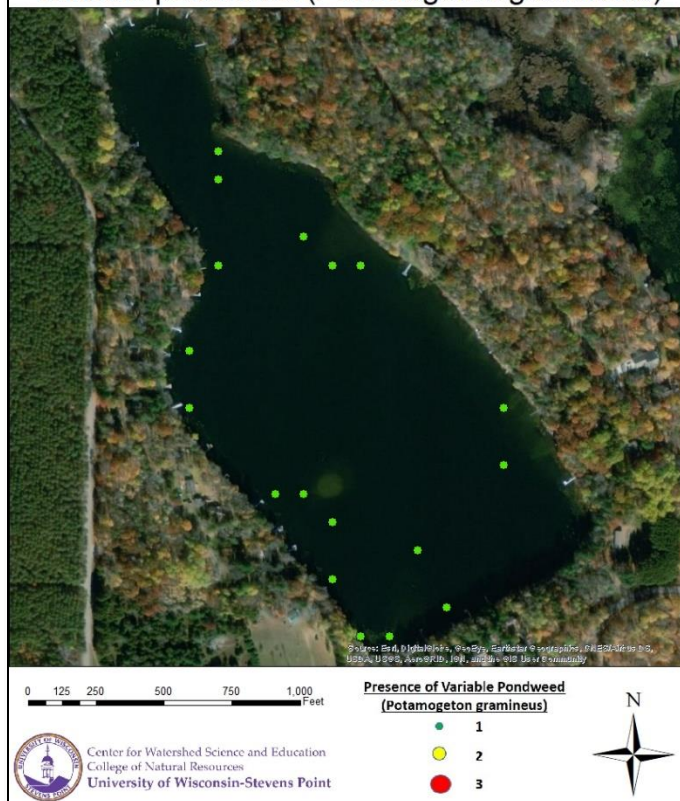
Underwood Lake Aquatic Plant Survey 2018:
Dwarf water-milfoil (*Myriophyllum tenellum*)

Dwarf watermilfoil grows in dense clusters of thin, unbranched stems from rhizomes in sandy soil. The fruit is eaten by waterfowl that often rises above the water surface in shallow areas.



Aquatic Plants

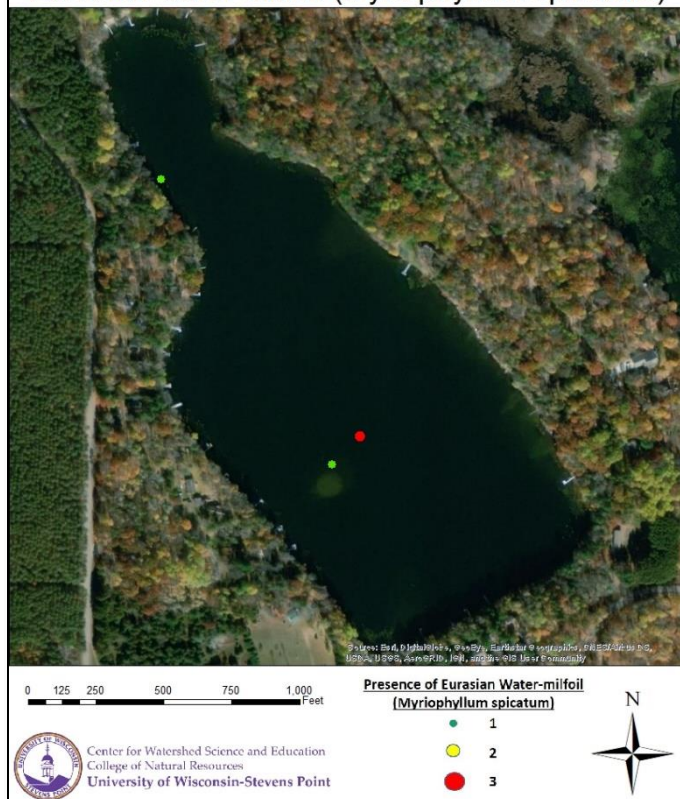
Underwood Lake Aquatic Plant Survey 2018:
Variable pondweed (*Potamogeton gramineus*)



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



Underwood Lake Aquatic Plant Survey 2018:
Eurasian water-milfoil (*Myriophyllum spicatum*)



Eurasian watermilfoil is one of the most common invasive aquatic plants in Wisconsin. It can form dense mats that choke out native plants and inhibit navigation. New plants can grow from stem fragments that root on contact with the substrate.



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.

- ✓ Eurasian watermilfoil was observed at one location during the 2018 survey.
- ✓ Eurasian watermilfoil (2002), Chinese mystery snail (2011), and purple loosestrife (2018) have been documented in Underwood Lake.

Chinese mystery snails

have the potential to be a vector for the transmission of parasites and disease and have also been known to clog the screens of water intake pipes.



Eurasian watermilfoil is one of the most common invasive aquatic plants in Wisconsin. It can form dense mats that choke out native plants and inhibit navigation. New plants can grow from stem fragments that root on contact with the substrate.



Purple loosestrife prefers moist areas where it crowds out native species and 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.*

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