

Oconto County Lakes Project

WHITE LAKE STUDY SUMMARY REPORT 2021

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**

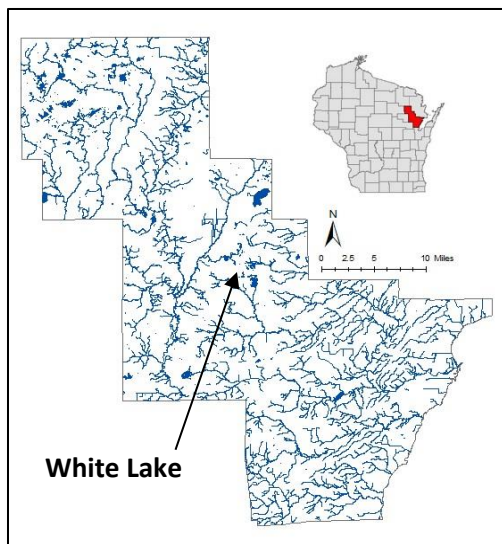
**Lake
Management
Plans**



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

Background

- White Lake is a 50-acre drainage lake in central Oconto County with a maximum depth of 49 feet.
- Most water enters White Lake via groundwater and a small inlet stream from Pecor Lake on the north side. Most water leaves via a small outlet stream that is a tributary to Kelly Brook so the south. Surface water runoff and direct precipitation also contribute water.
- Visitors have access to the lake from one public carry-in access located on the lake's southeast side.
- This report summarizes data collected during the 2019-2020 lake study.

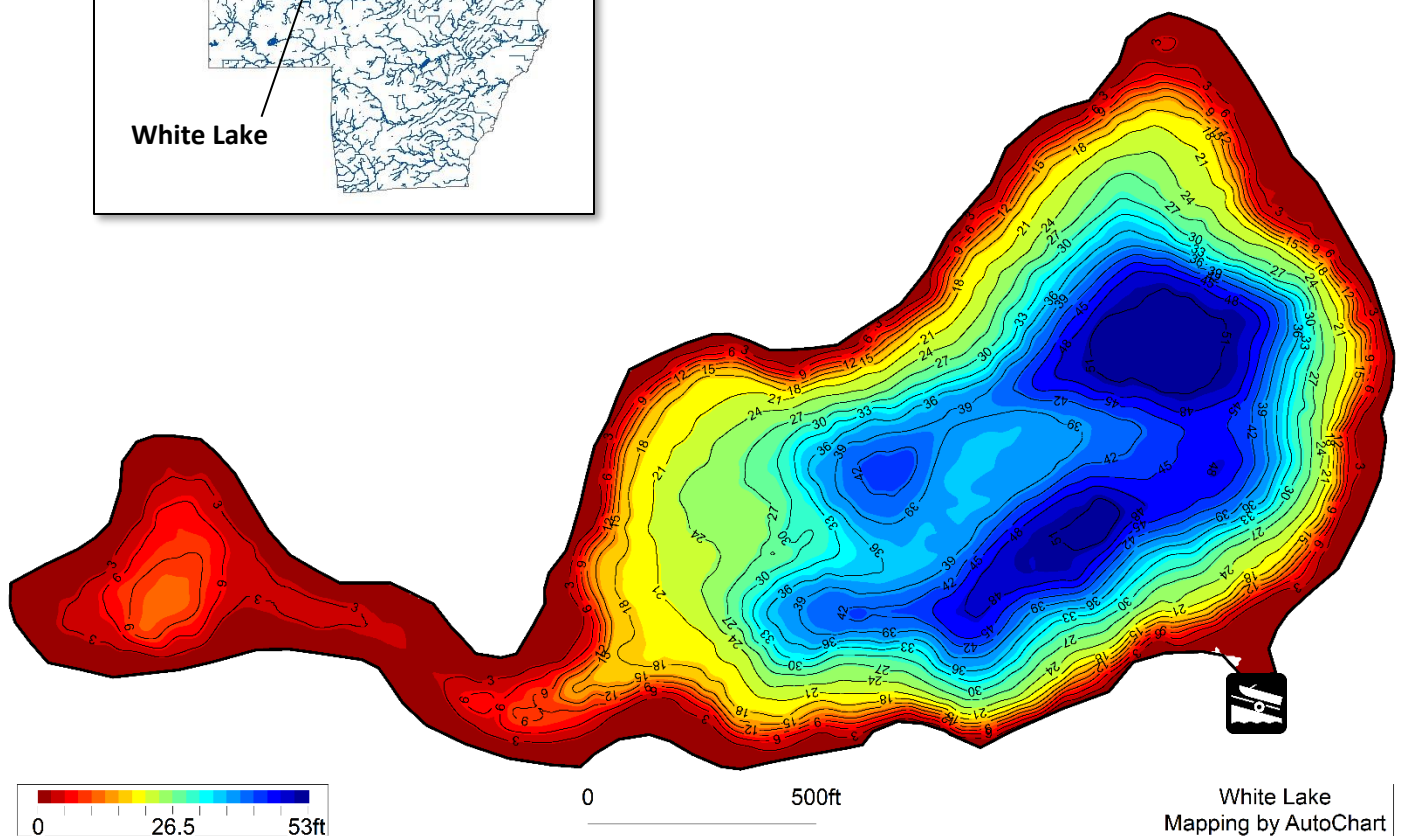


White Lake

Township of Bagley

Surface Area: 50 acres

Maximum Depth: 49 feet



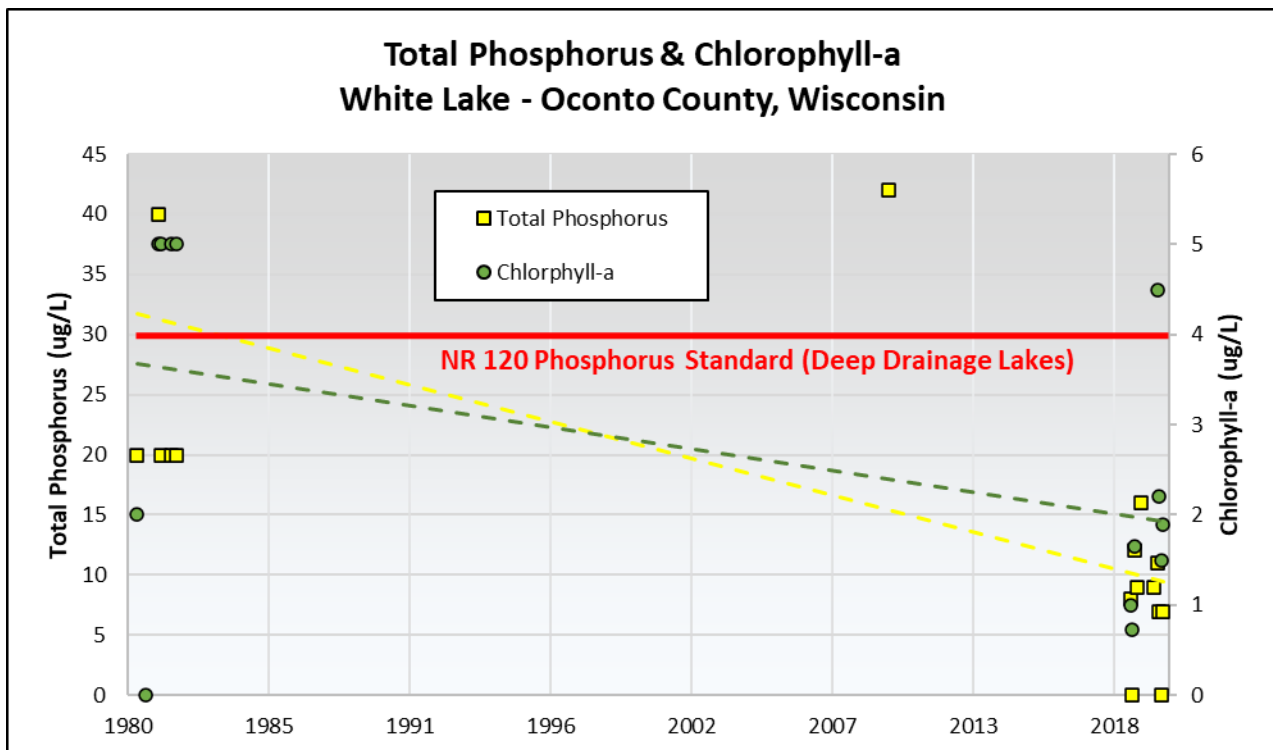
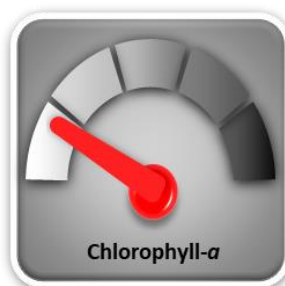
White Lake
Mapping by AutoChart

Map created by Brian Zalay, WDNR.

Water Quality

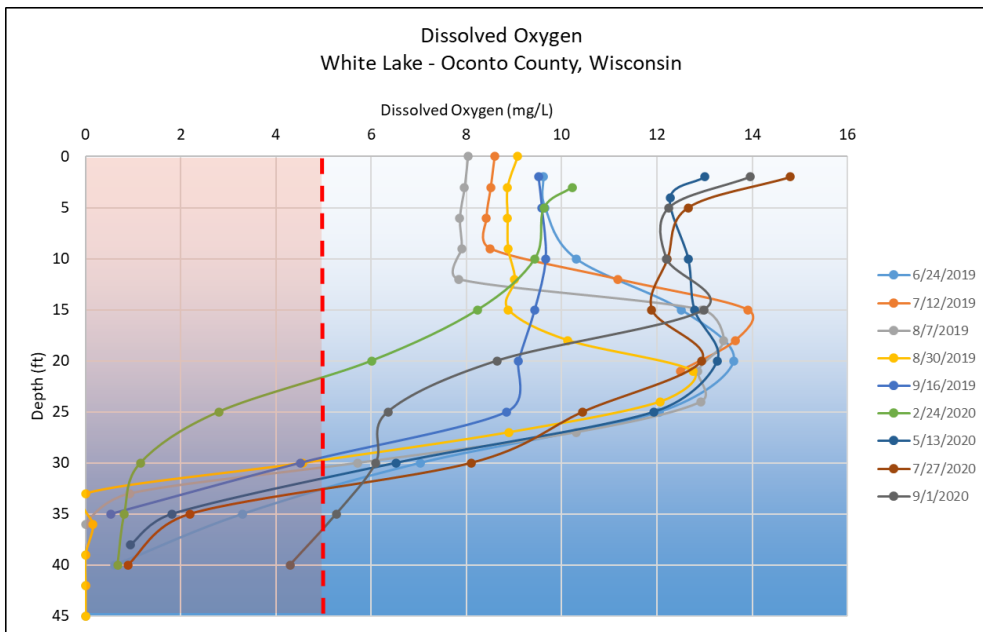
Nutrients such as phosphorus and nitrogen are what feed aquatic plants and algae in a lake. Excessive amounts of nutrients delivered to a lake will result in abundant plant and algae growth. Disturbance within a watershed combined with the landscape's inability to infiltrate and filter runoff is what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

- Total Phosphorus was consistently below the Wisconsin state standard of 30 ug/L for deep drainage 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, remained below the threshold of 6 ug/L. Limited historic data suggests a decreasing trend.



Water Quality

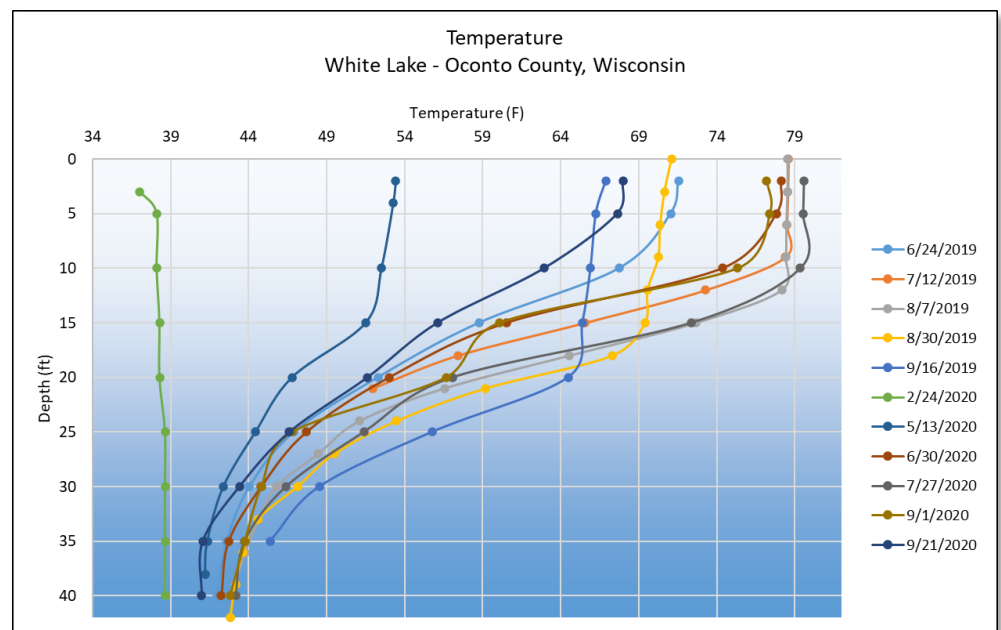
Sufficient **dissolved oxygen** in lake water is essential to the survival of aquatic organisms. The amount of dissolved oxygen present within a lake varies by season and depth. It is determined by the biological activity that consumes or produces oxygen, by water mixing through wind, changes in temperature,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



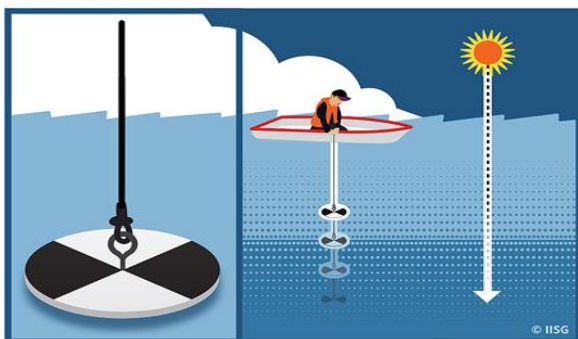
- Sufficient oxygen is available in the water column of White Lake throughout the year. The lowest concentrations were observed in late winter when only the top 20 feet has enough oxygen to support most fish species.
- Algae blooms at depth (between 15 and 25 feet) were indicated by the profiles.

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

- The temperature gradient in White Lake shows a clear thermocline (~10-20 ft) during the growing season, typical of a deep, stratified lake.

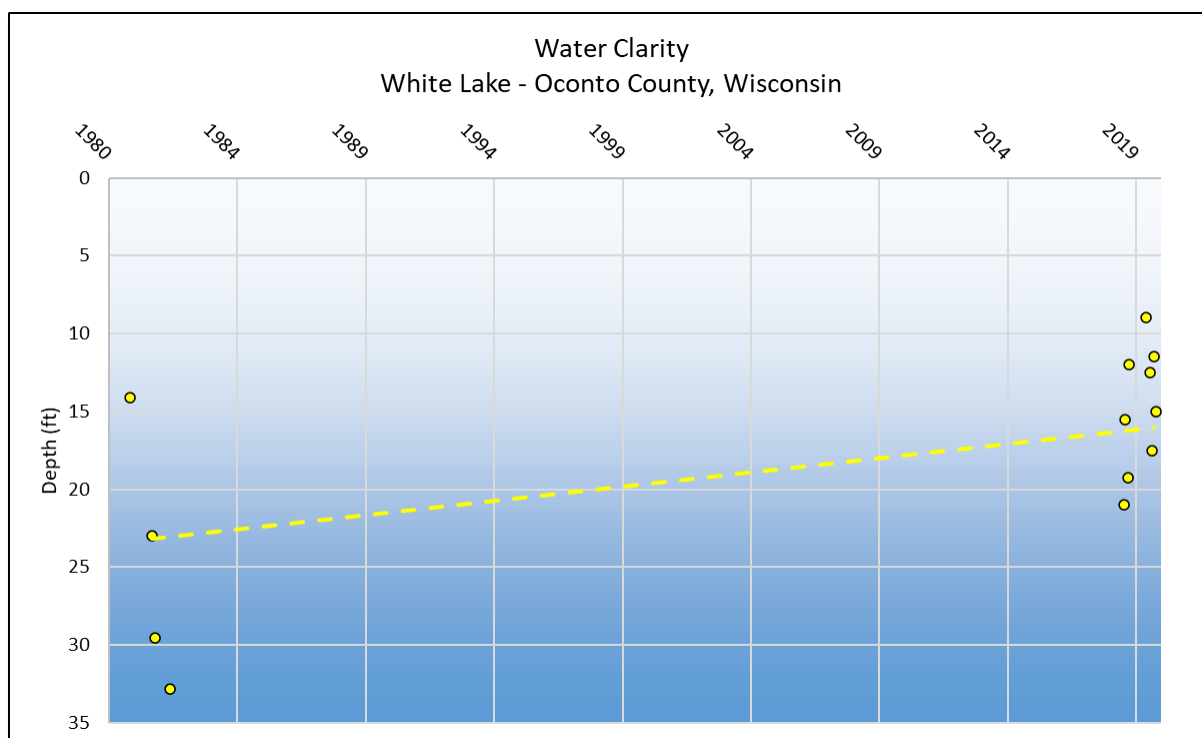
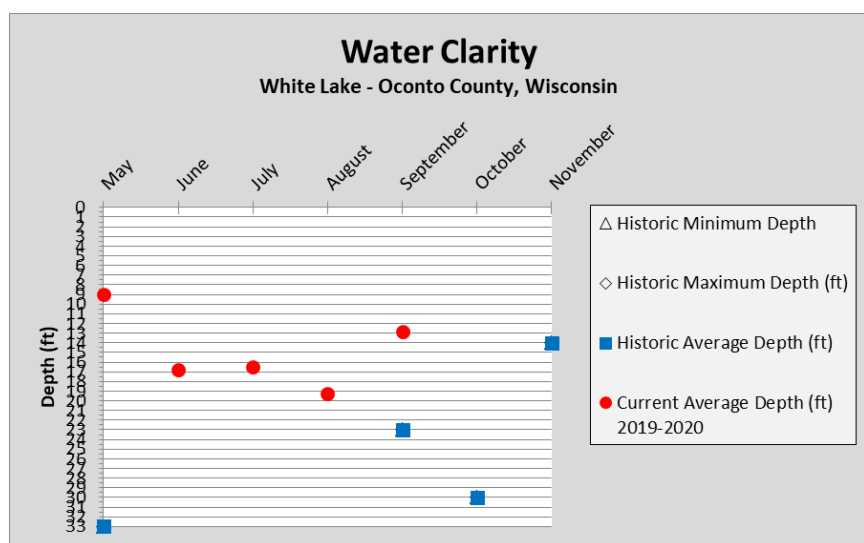


Water Quality



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 graph below shows water clarity measurements taken between May and November.
- During 2019-20, the poorest average water clarity was in May and best was in August. Limited historic data suggests a decreasing trend.



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.

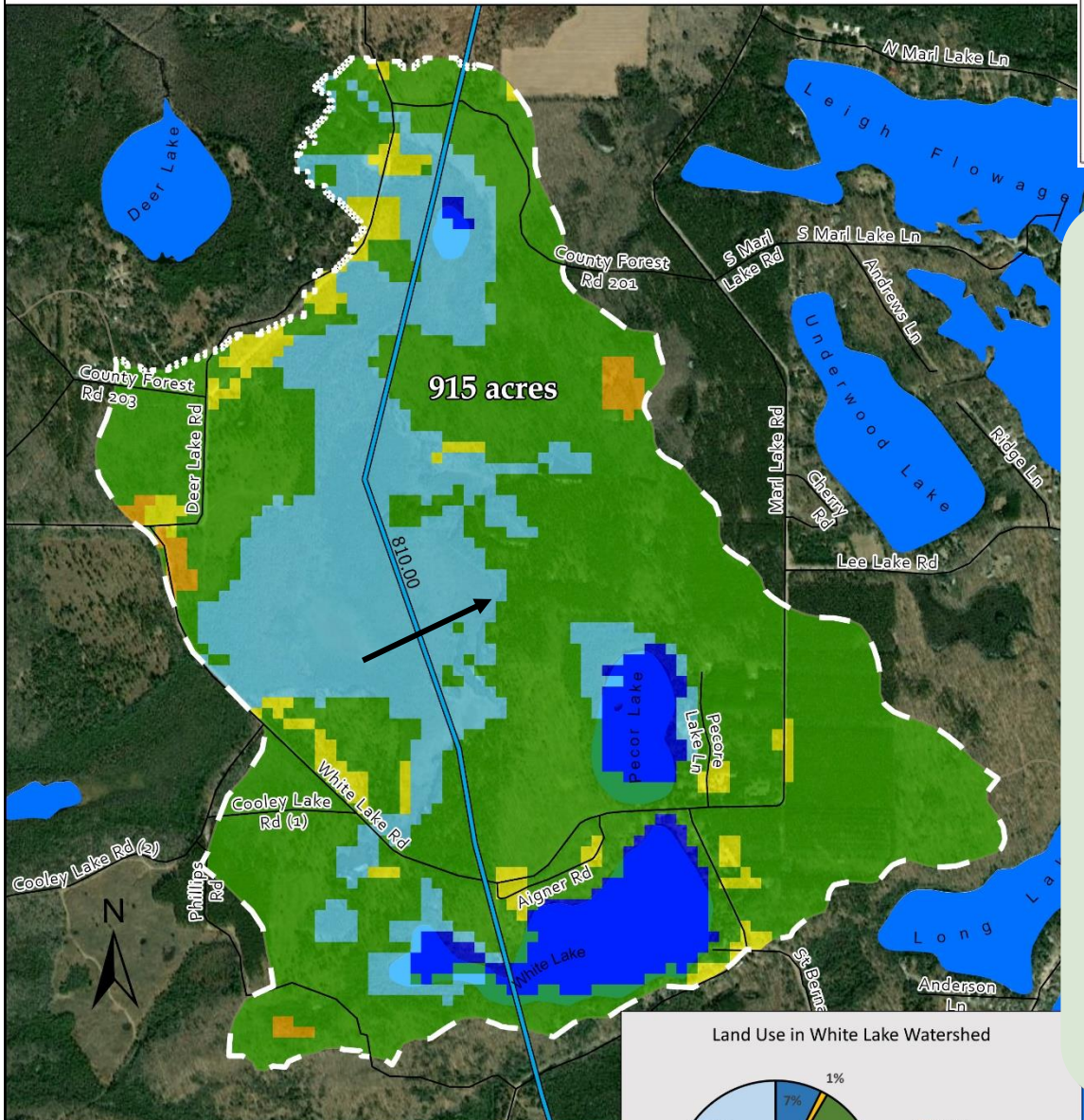
- Concentrations of potassium (1.07 mg/L), chloride (5.7 mg/L) and sodium (3.3 mg/L) were all low. This suggests minimal impact from septic systems, road salt, animal waste and fertilizers.
- DACT, a screening tool to determine if your lake is being impacted by pesticides, was not detected.
- Water in White Lake is hard (153 mg/L CaCO₃), having an 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.

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.

White Lake Surface Watershed & Groundwater Flow



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 White Lake were surveyed in August 2019. Some of White Lake's shoreland is healthy, but most stretches are in need of restoration.

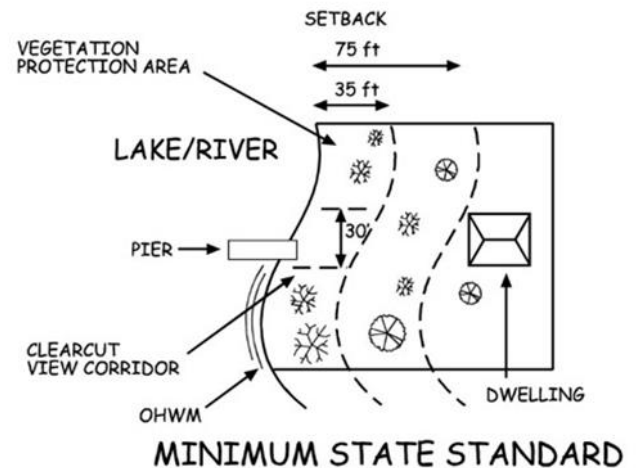
Total lakefront footage	No. Riparian lots	Measured shoreland disturbance (feet)	Measured shoreland disturbance (%)
1,171	20	1,110	95%



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

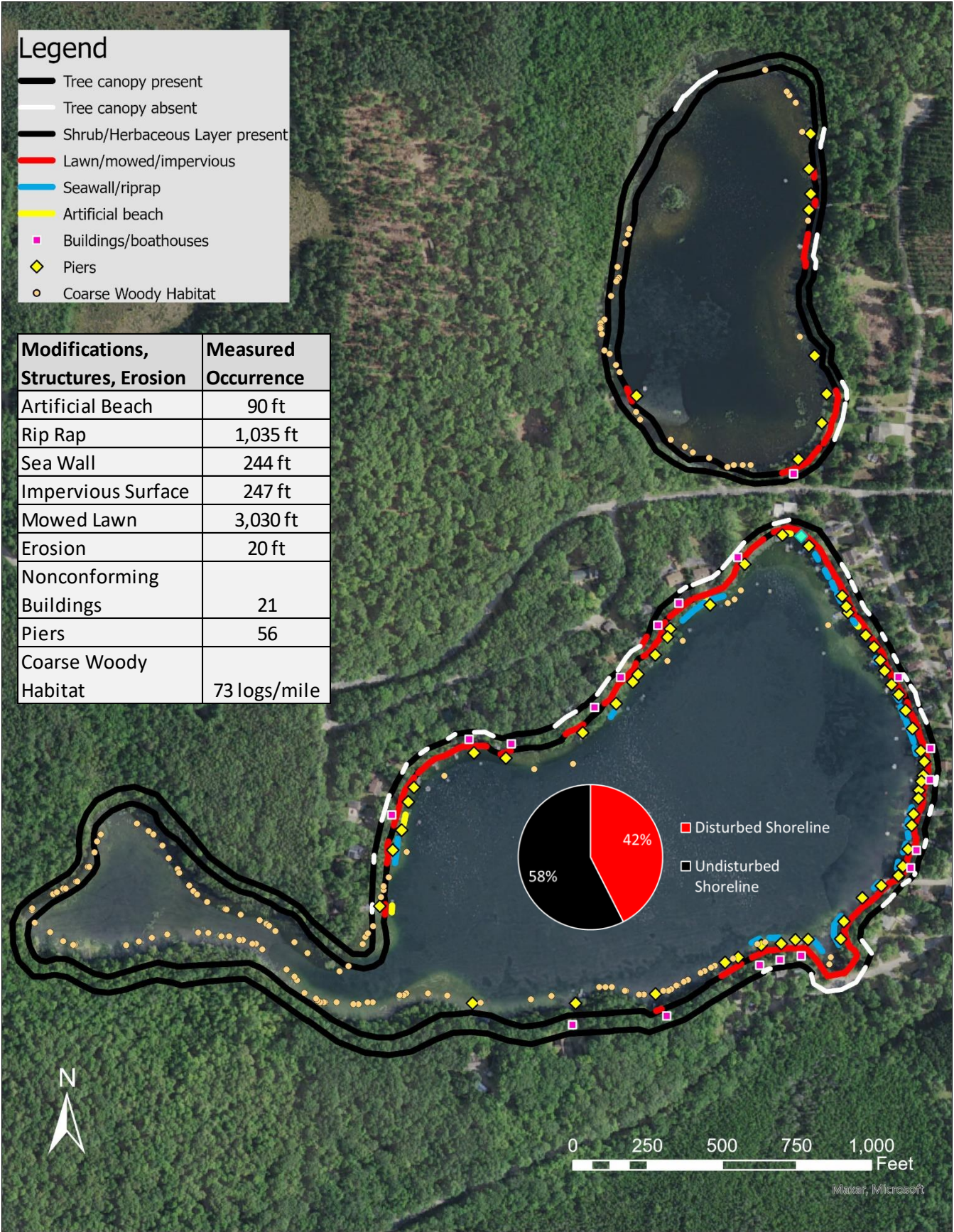
No vegetation within 35 feet of the lake's edge shall be removed except for:

- 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 White 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.

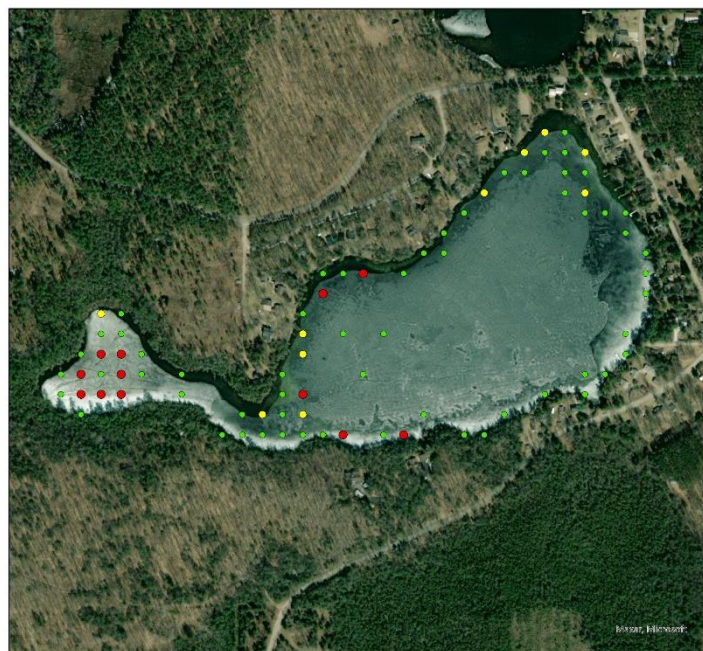


Aquatic Plants

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 White Lake is characterized by average diversity of plant species when compared to other lakes in the Oconto County Lakes Project, with a total of 18 species in the 2019 survey.
- During the 2019 aquatic plant survey of White Lake, 36% of visited sites had vegetative growth. The maximum depth of vegetation was 28 feet and the Floristic Quality Assessment (FQI) was 24.
- The most frequently encountered plant species were chara (72%), slender naiad (17%) and wild celery (14%). All three species are native to Wisconsin.
- No invasive species were observed.

White Lake Aquatic Plant Survey 2019: Rake Fullness



0 125 250 500 750 1,000
Feet



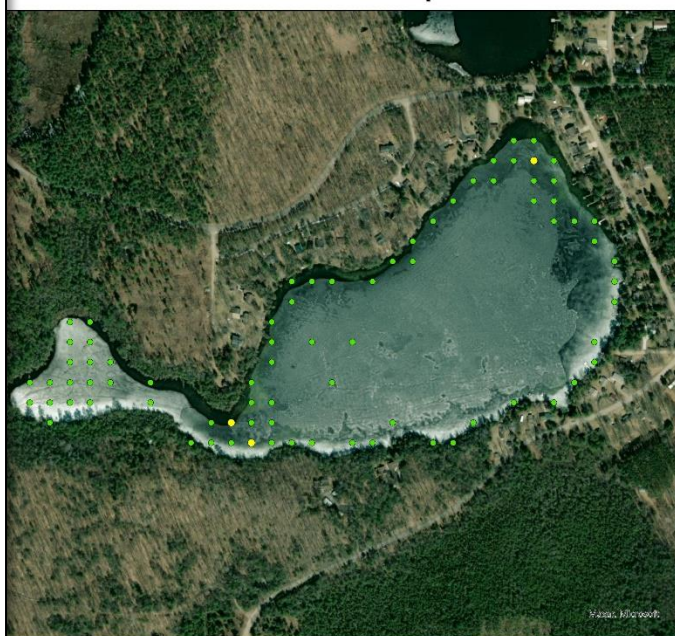
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Rake Fullness

- 1
- 2
- 3



White Lake Aquatic Plant Survey 2019: Total Number of Species



0 125 250 500 750 1,000
Feet



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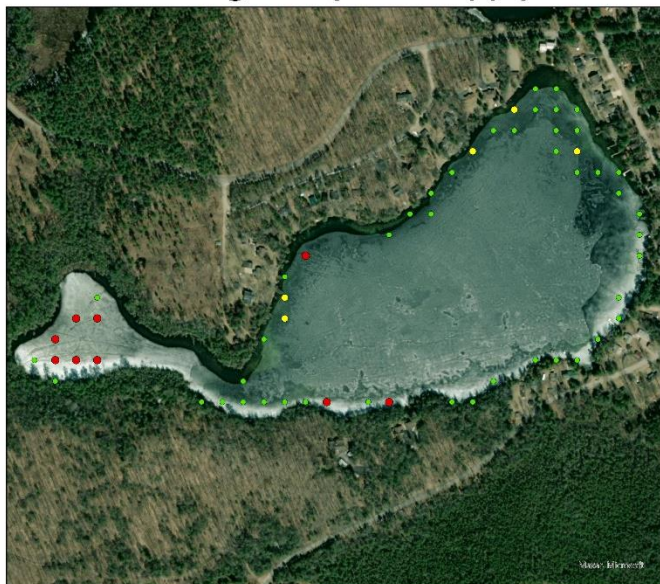
Total Number of Species

- 1-3
- 4-7
- 8+



Aquatic Plants

White Lake Aquatic Plant Survey: 2019 Muskgrass (*Chara* spp.)



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.



White Lake Aquatic Plant Survey: 2019 Slender naiad (*Najas flexilis*)

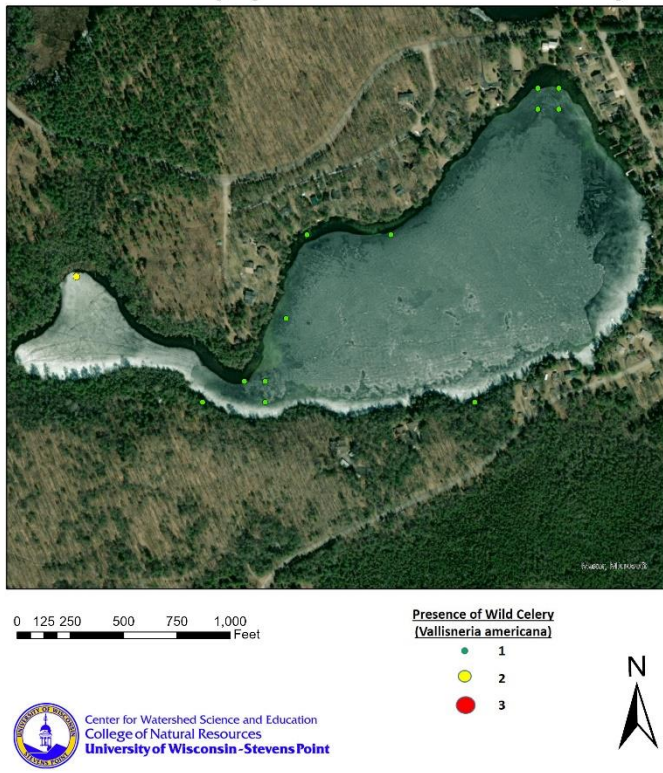


Slender naiad, also called nodding water-nymph, is a primary food source for waterfowl and provides habitat for many invertebrates.

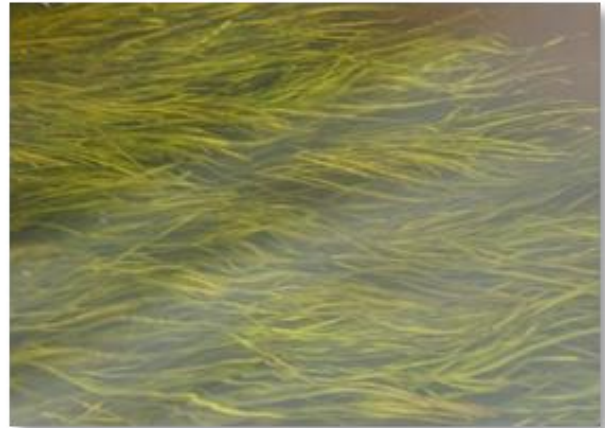


Aquatic Plants

White Lake Aquatic Plant Survey: 2019 Wild celery (*Vallisneria americana*)



Wild celery has long, thin, ribbon-like leaves that are commonly up to four feet long. The seeds, roots and leaves are consumed by ducks and other waterfowl. Water celery provides excellent habitat for fish.



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.

- No invasive species were observed during the 2019 aquatic plant survey.



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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