

Oconto County Lakes Project

PORCUPINE LAKE STUDY

SUMMARY REPORT

2024

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**

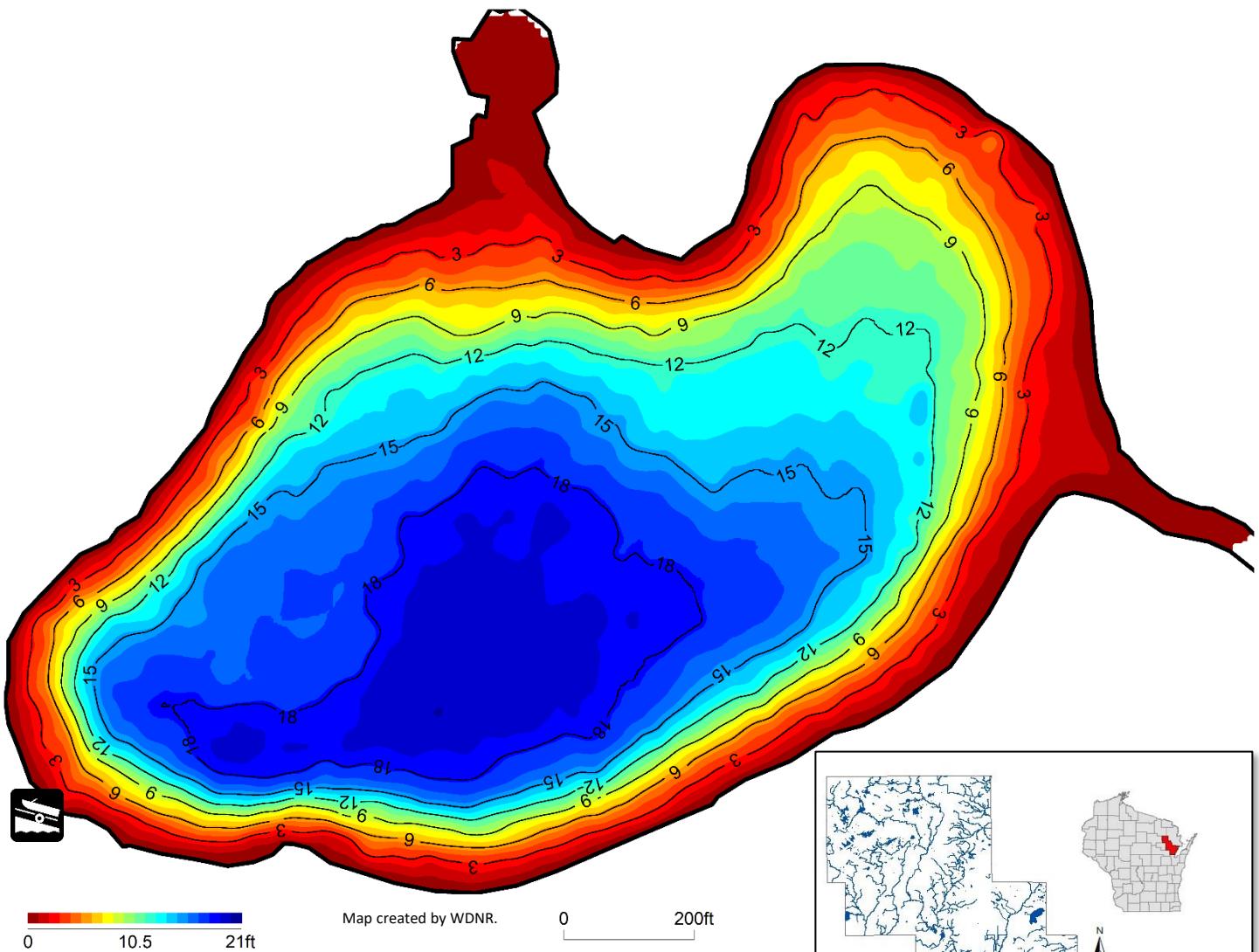
Lake
Management
Plans



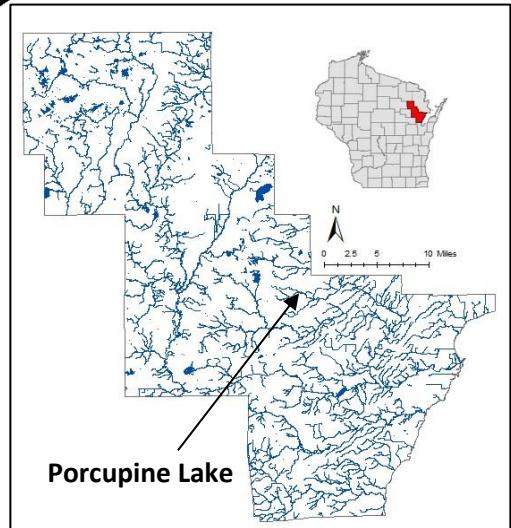
Center for Watershed Science and Education
College of Natural Resources
University of Wisconsin-Stevens Point

Background

- Porcupine Lake is a 32-acre drainage lake in southwest Oconto County with a maximum depth of 20 feet.
- Most water enters and leaves Porcupine Lake through the North Branch Little River which enters on the north and leaves on the lake's east side. Direct precipitation and surface runoff also contribute water.
- Visitors have access to the lake from one public boat launch located on the lake's west side.
- This report summarizes data collected during the 2022-2023 lake study.



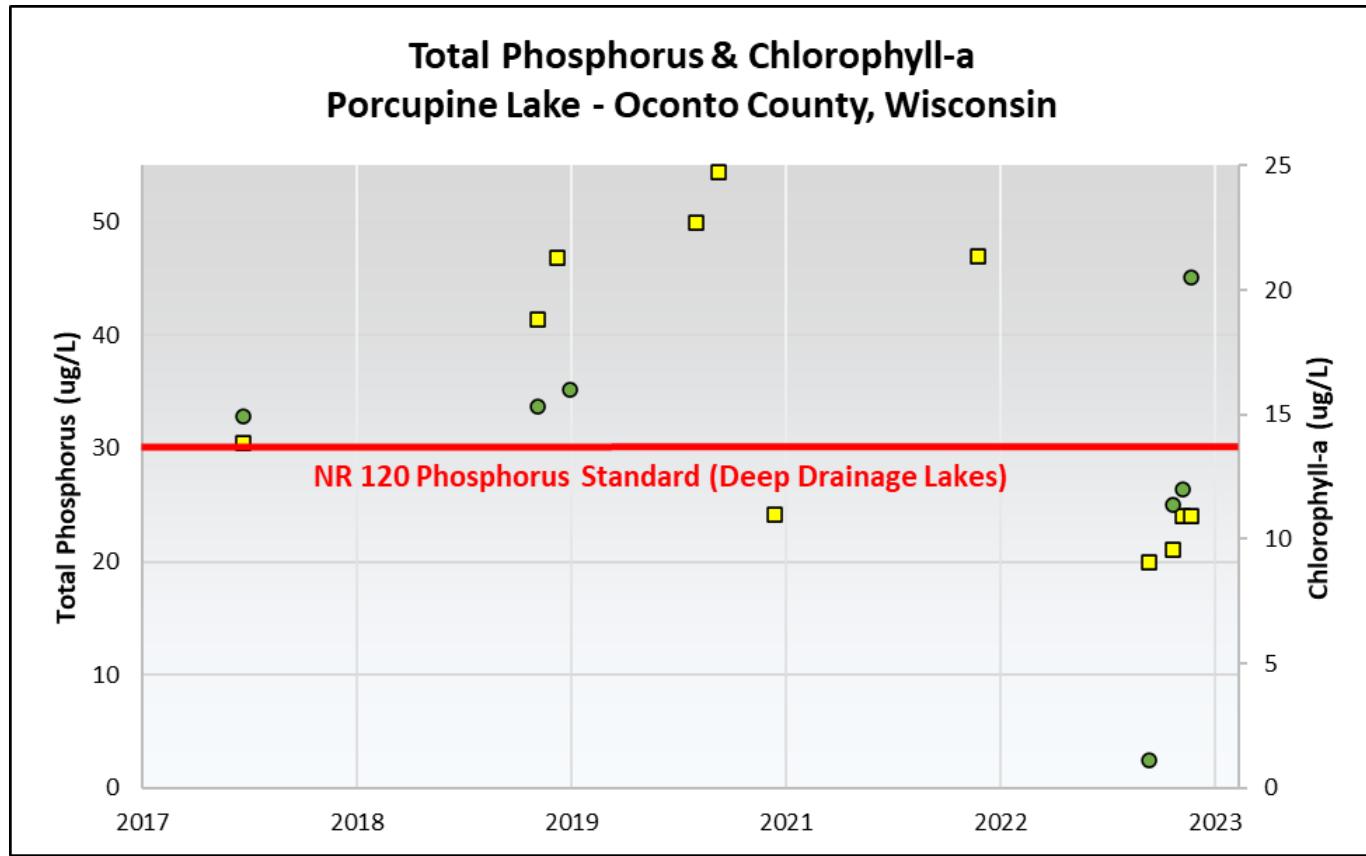
Township of Spruce
Surface Area: 32 acres
Maximum Depth: 20 feet



Water Quality

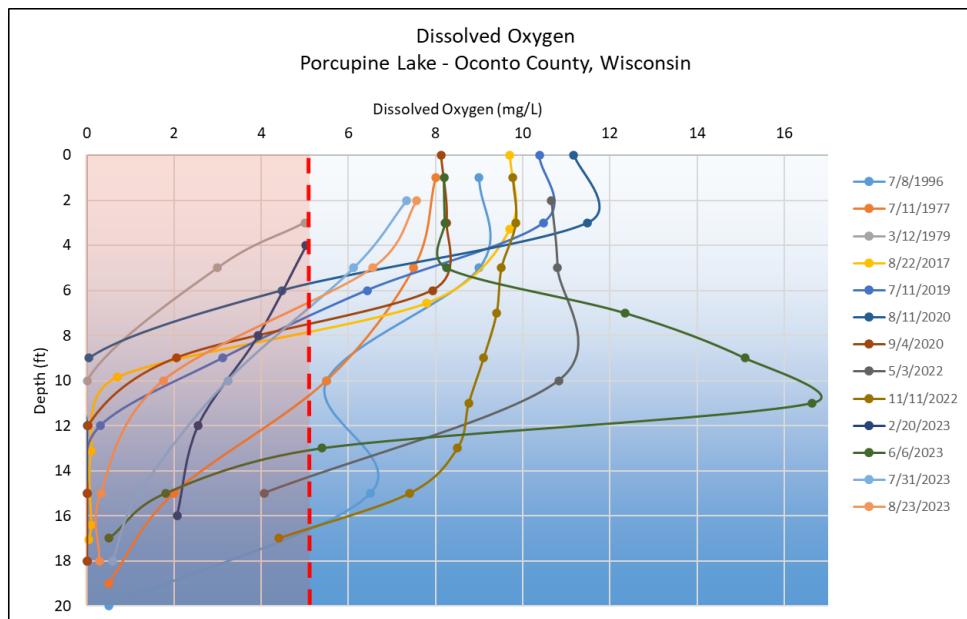
Nutrients such as phosphorus and nitrogen are what feed aquatic plants and algae in a lake. Excessive amounts of nutrients delivered to a lake will result in abundant plant and algae growth. Disturbance within a watershed combined with the landscape's inability to infiltrate and filter runoff is what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

- Total Phosphorus was periodically above the Wisconsin state standard of 30 ug/L for deep seepage lakes during the two-year study. Limited data suggests this average concentration is coming down.
- Inorganic nitrogen remained below the threshold of 0.3 mg/L when algal blooms increase.
- Chlorophyll-a, an indirect measure of algae, reached the threshold of 6 ug/L in one sample during the study.



Water Quality

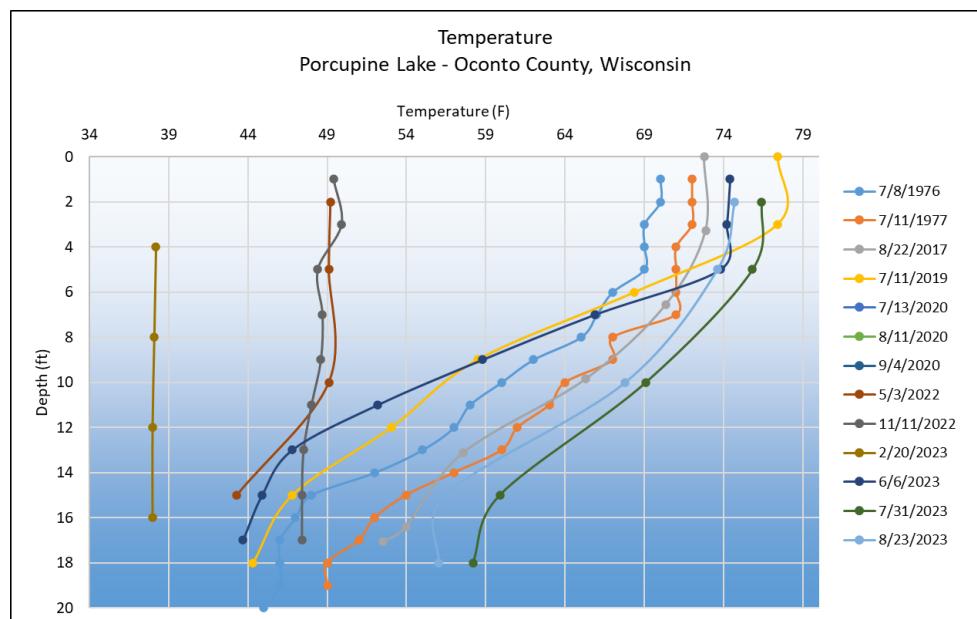
Sufficient **dissolved oxygen** in lake water is essential to the survival of aquatic organisms. The amount of dissolved oxygen present within a lake varies by season and depth. It is determined by the biological activity that consumes or produces oxygen, by water mixing through wind, changes in temperature,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



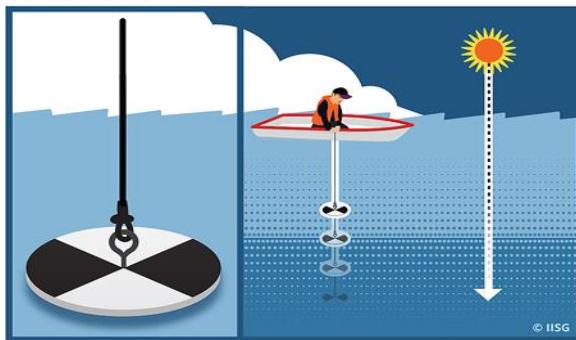
- Sufficient oxygen is available in the water column of Porcupine Lake through most of the year in at least the upper three feet, but may become anoxic in late winter.
- Spikes in DO concentrations around 10-12 feet are indicative of algae blooms at depth..

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

- Temperature profiles in Porcupine Lake show stratification during the growing season with a thermocline developing between 6 and 14 feet, typical of a deep lake.
- Overturn events, where temperature is consistent with depth, can also be seen.

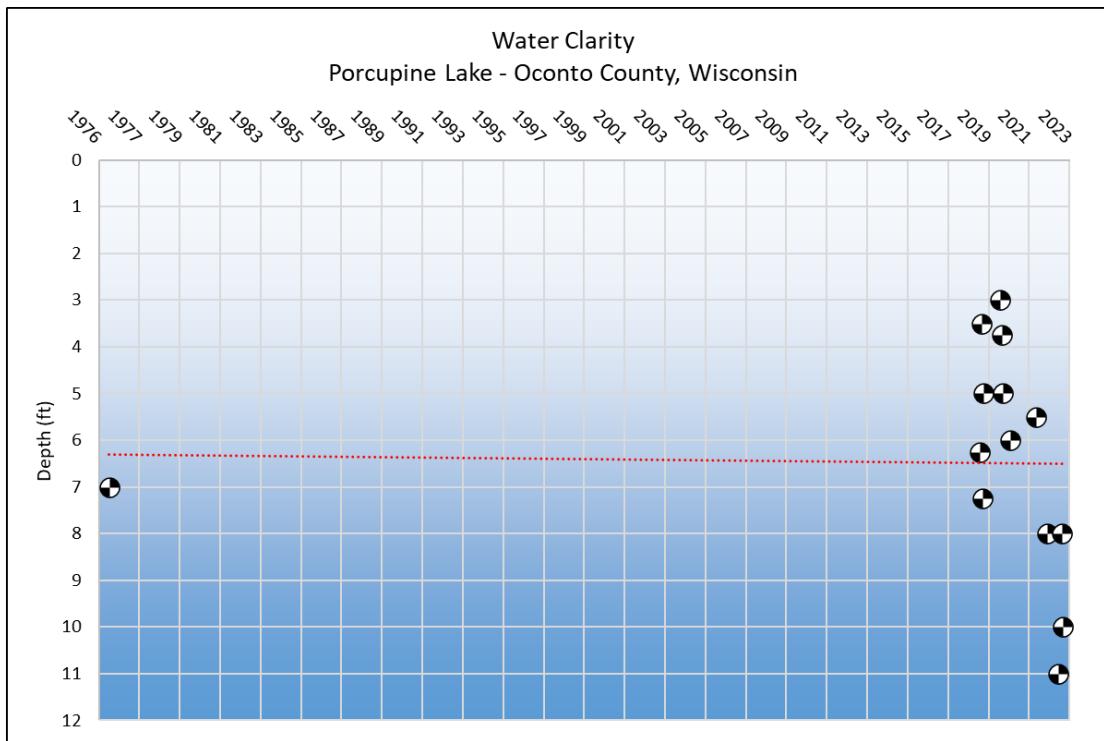
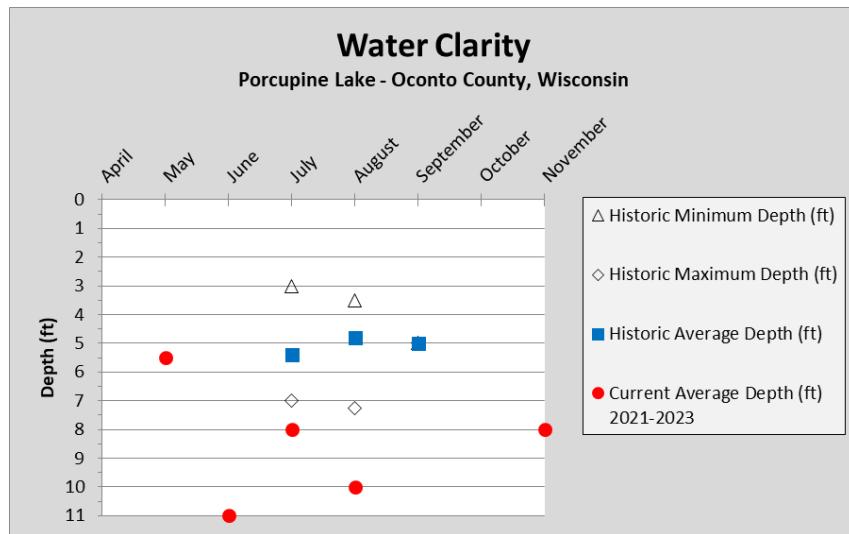


Water Quality



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 November.
- During 2022-23, water clarity was best in June and worst in May. These averages are generally better than previous 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 (2.9 mg/L) were low, but chloride (18.8 mg/L) and sodium (7 mg/L) were elevated. This suggests some degree of impact from human activity such as septic systems, road salt, animal waste or fertilizers.
- DACT, a screening tool to determine if your lake is being impacted by pesticides, was not detected.
- Water in Porcupine Lake is very hard (282 mg/L CaCO₃), having a high level of dissolved minerals. These minerals tend to bind with ions like phosphorus making it unavailable to algae blooms.

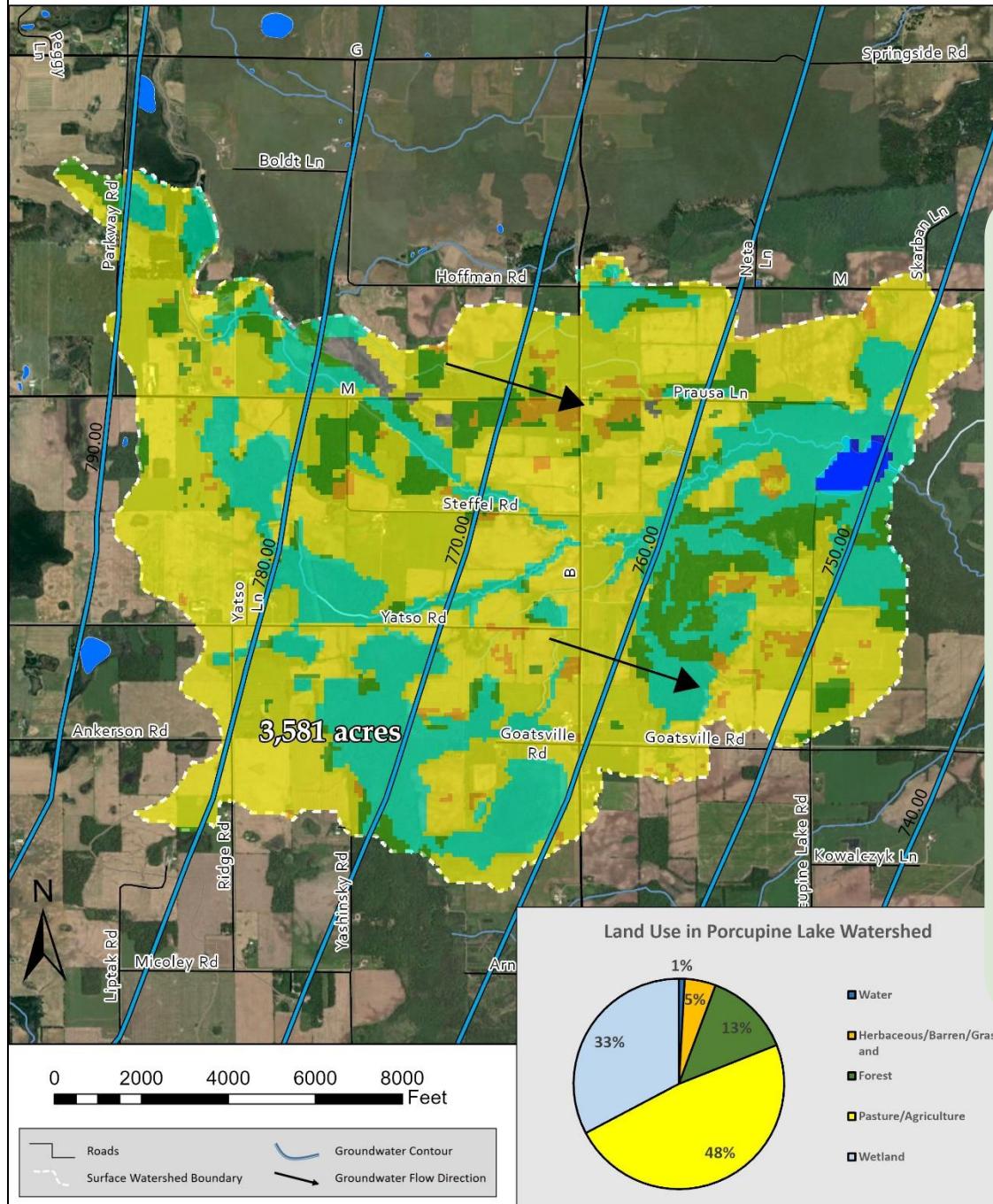


For more information on how to interpret your lake's water quality data, please refer to the "State of the Oconto County Lakes Report" that is on file with Oconto County.

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.

Porcupine 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 Porcupine Lake were surveyed in September 2019. Most of Porcupine Lake's shoreland is healthy, but some sections are in need of restoration.

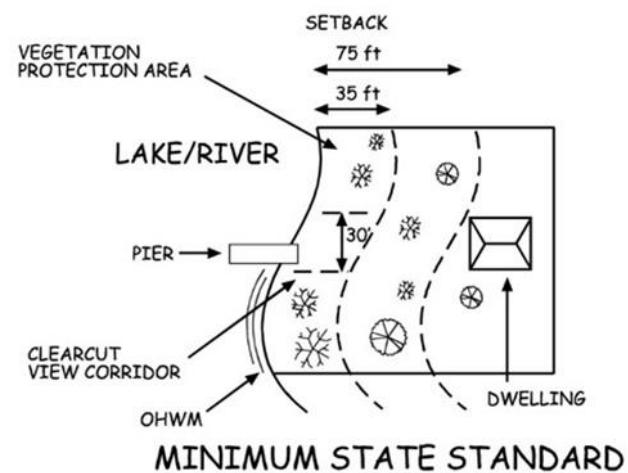
Total lakefront footage	No. Riparian lots	Measured shoreland disturbance (feet)	Measured shoreland disturbance (%)
6,354	4	12	0.35%



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:

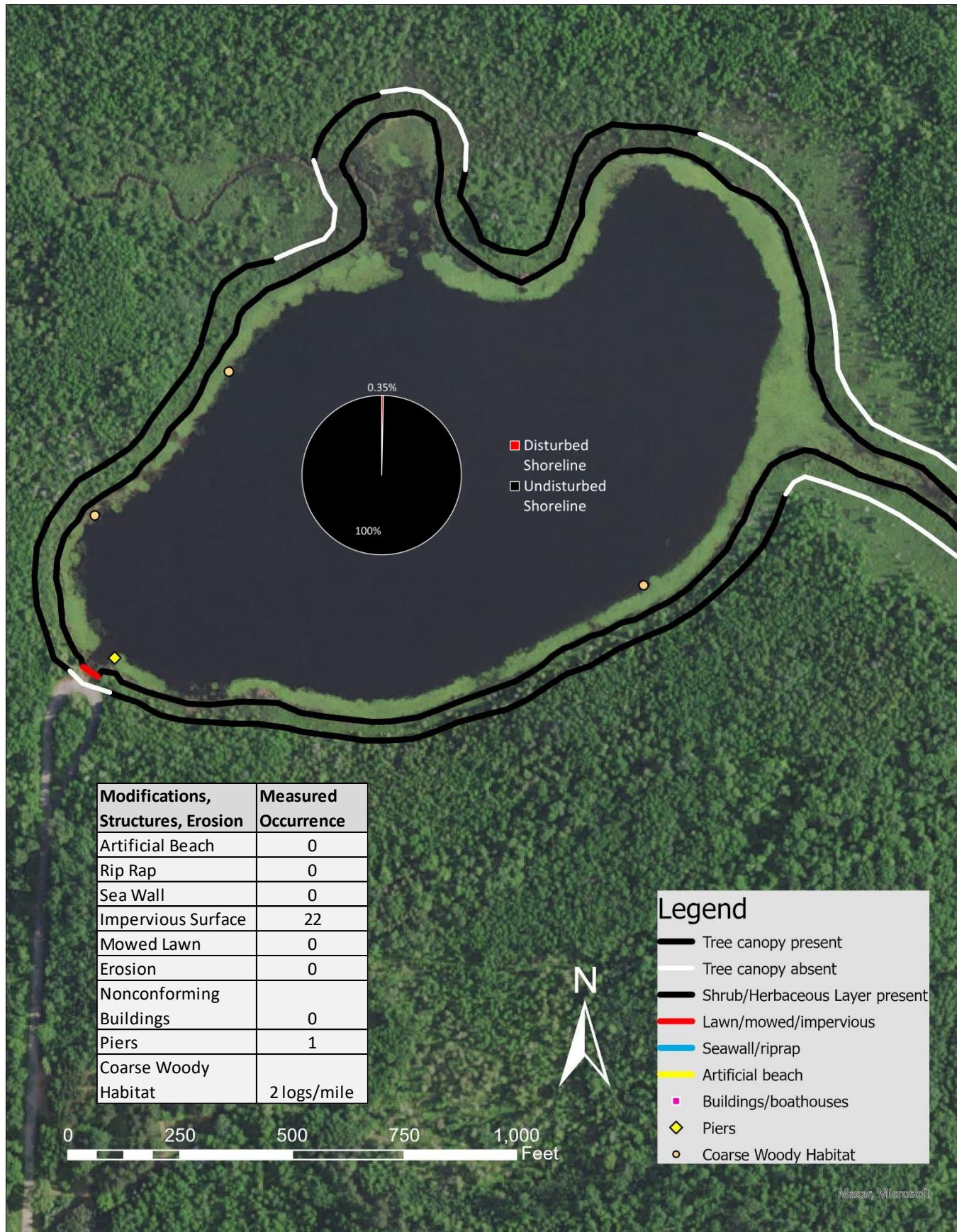
- Up to 30% of shoreline may be removed of shrubs and trees for a view corridor
- A mowed or constructed pedestrian path up to 5 feet wide to access lake



What Can You Do To Help Porcupine 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

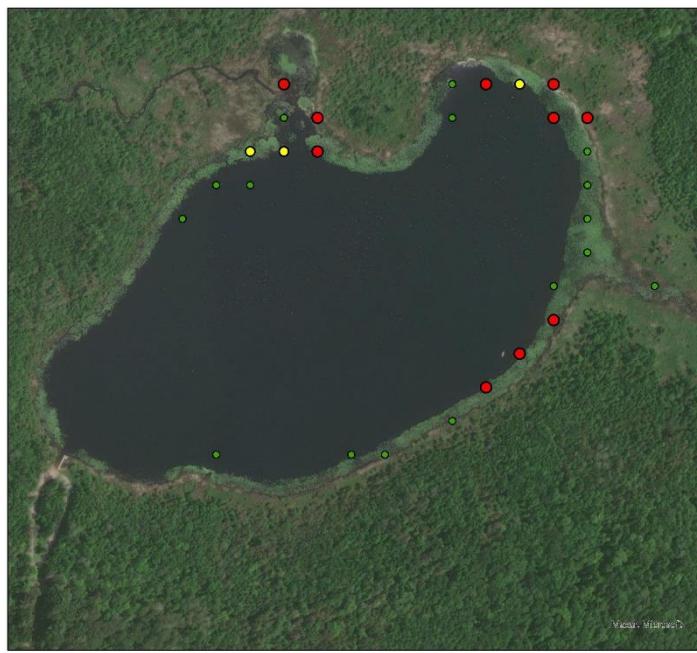


Aquatic Plants

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 Porcupine 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 10 species in the 2019 survey.
- During the 2019 aquatic plant survey of Porcupine Lake, 22% of visited sites had vegetative growth. The maximum depth of vegetation was 9 feet and the Floristic Quality Assessment (FQI) was 15.5.
- The most frequently encountered plant species were coontail (72%), spatterdock (35%), and Eurasian water-milfoil (28%).
- Eurasian water-milfoil was observed in 8 locations.

Porcupine Lake Aquatic Plant Survey 2019:
Rake Fullness



0 125 250 500 750 1,000
Feet
Center for Watershed Science and Education
College of Natural Resources
University of Wisconsin-Stevens Point

Rake Fullness
● 1
● 2
● 3



Porcupine Lake Aquatic Plant Survey 2019:
Total Number of Species



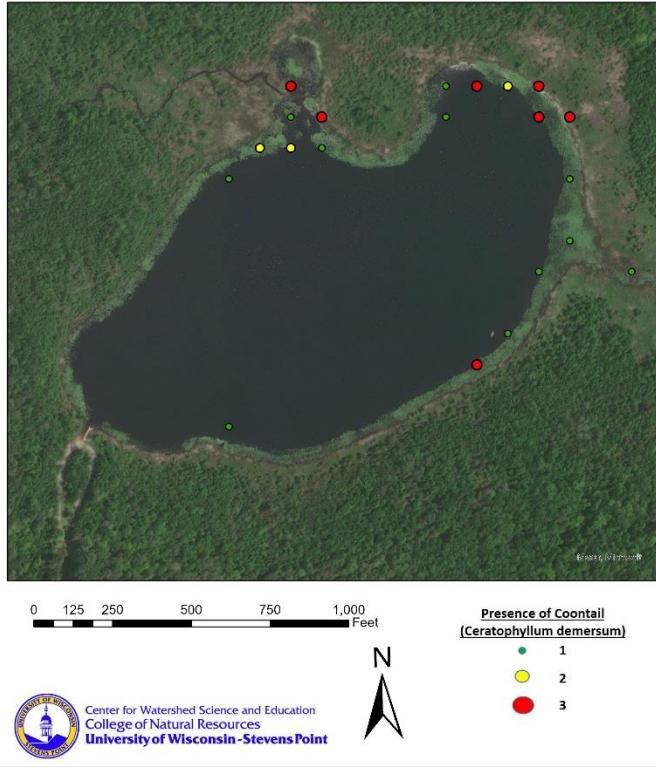
0 125 250 500 750 1,000
Feet
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Total Number of Species
● 1-3
● 4-7
● 8+



Aquatic Plants

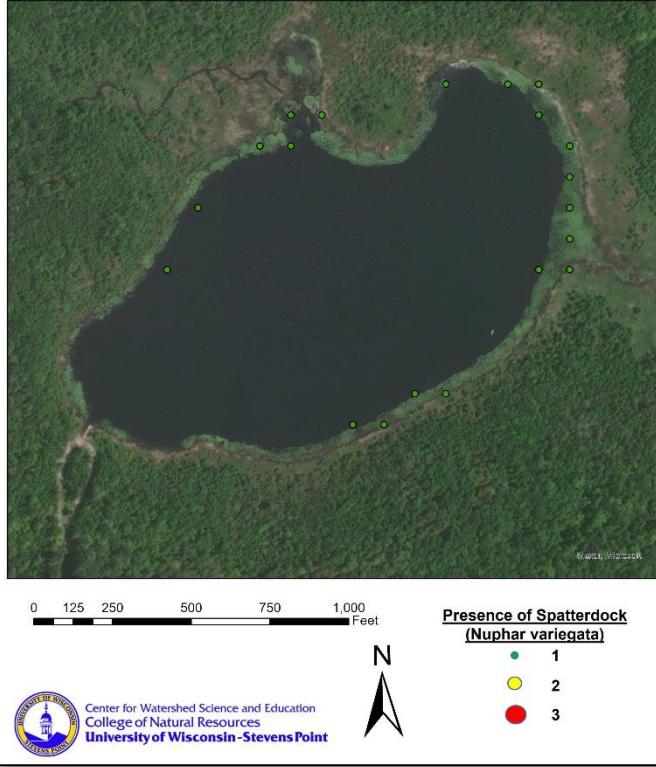
Porcupine Lake Aquatic Plant Survey 2019: Coontail (*Ceratophyllum demersum*)



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.



Porcupine Lake Aquatic Plant Survey 2019: Spatterdock (*Nuphar variegata*)

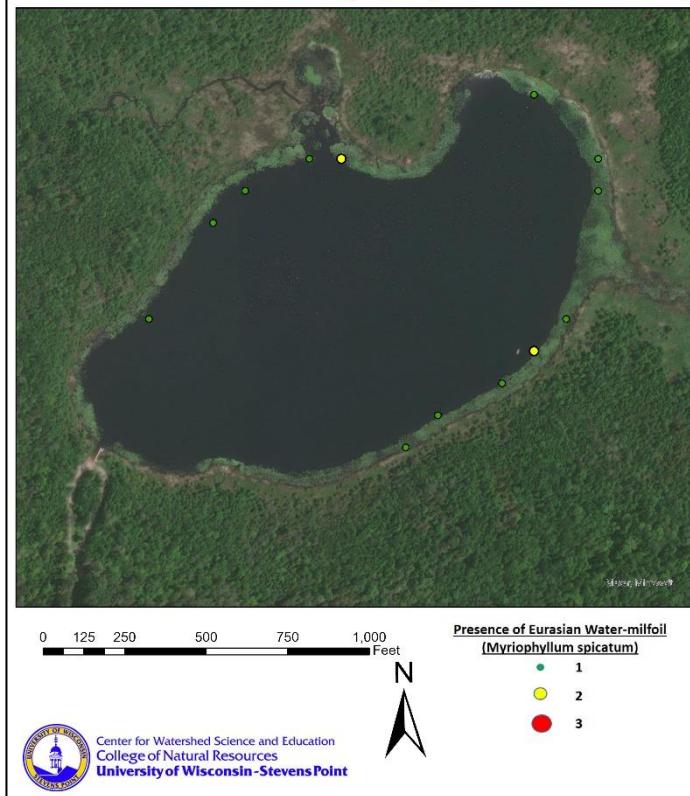


Spatterdock is a perennial herb that produces yellow, rounded flowers. It prefers soft sediment and can grow in water up to 6 feet deep.



Aquatic Plants

Porcupine Lake Aquatic Plant Survey 2022: 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.



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 water-milfoil was observed in eight locations during the 2019 survey.
- Purple loosestrife (2016) was previously documented in Porcupine Lake.

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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