

# Oconto County Lakes Project

## PECOR 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**

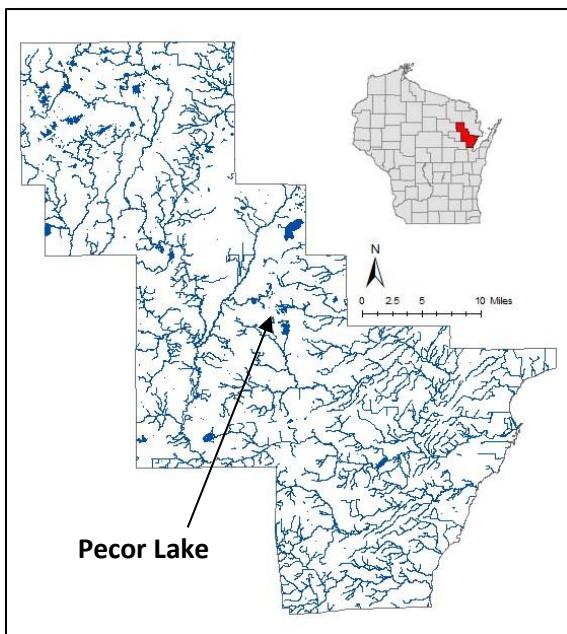
Lake  
Management  
Plans

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

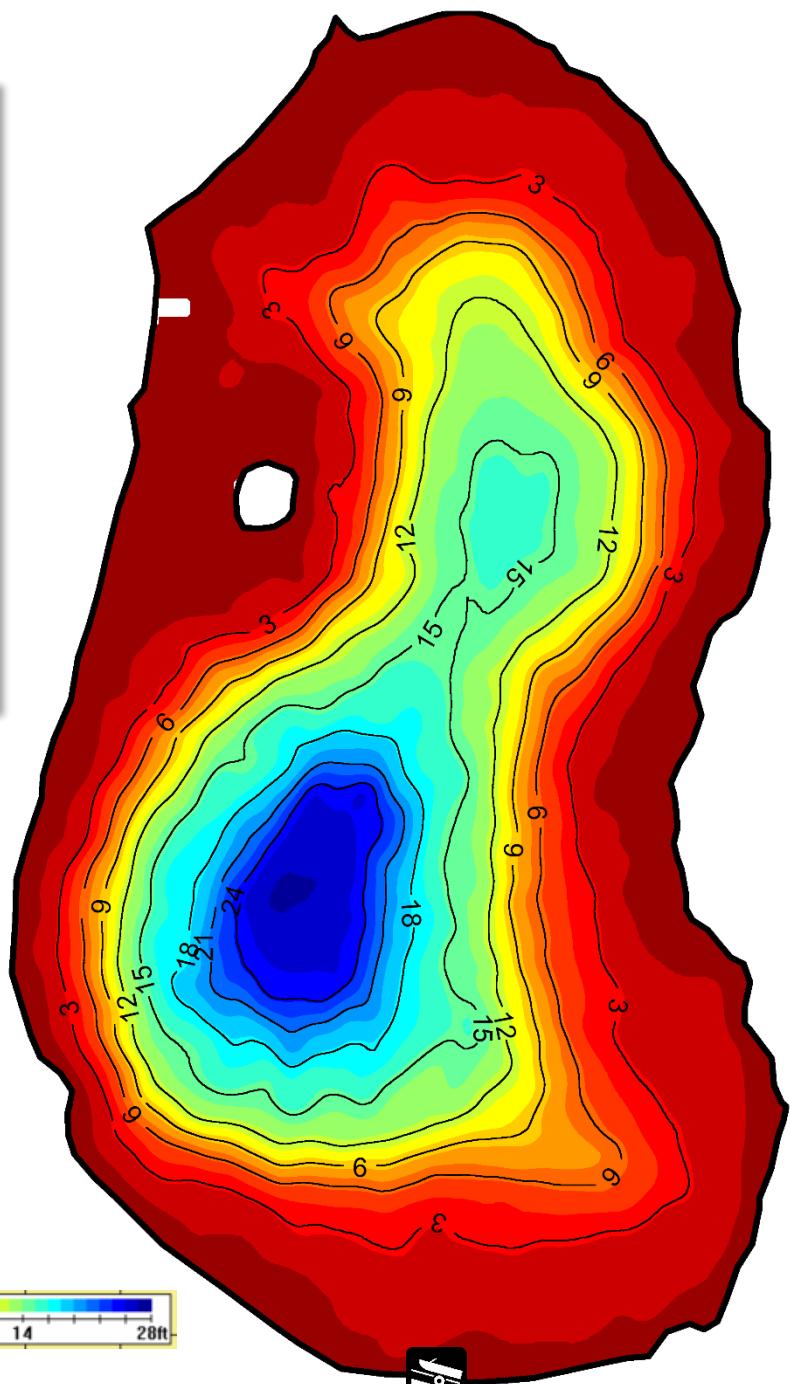


# Background

- Pecor Lake is a 19-acre drainage lake in central Oconto County with a maximum depth of 28 feet.
- Most water enters Pecor Lake via groundwater and leaves via a small outlet stream leading to White Lake with a retention time of 1-2 years. 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 south side.
- This report summarizes data collected during the 2019-2020 lake study.



**Township of Bagley**  
**Surface Area: 19 acres**  
**Maximum Depth: 28 feet**

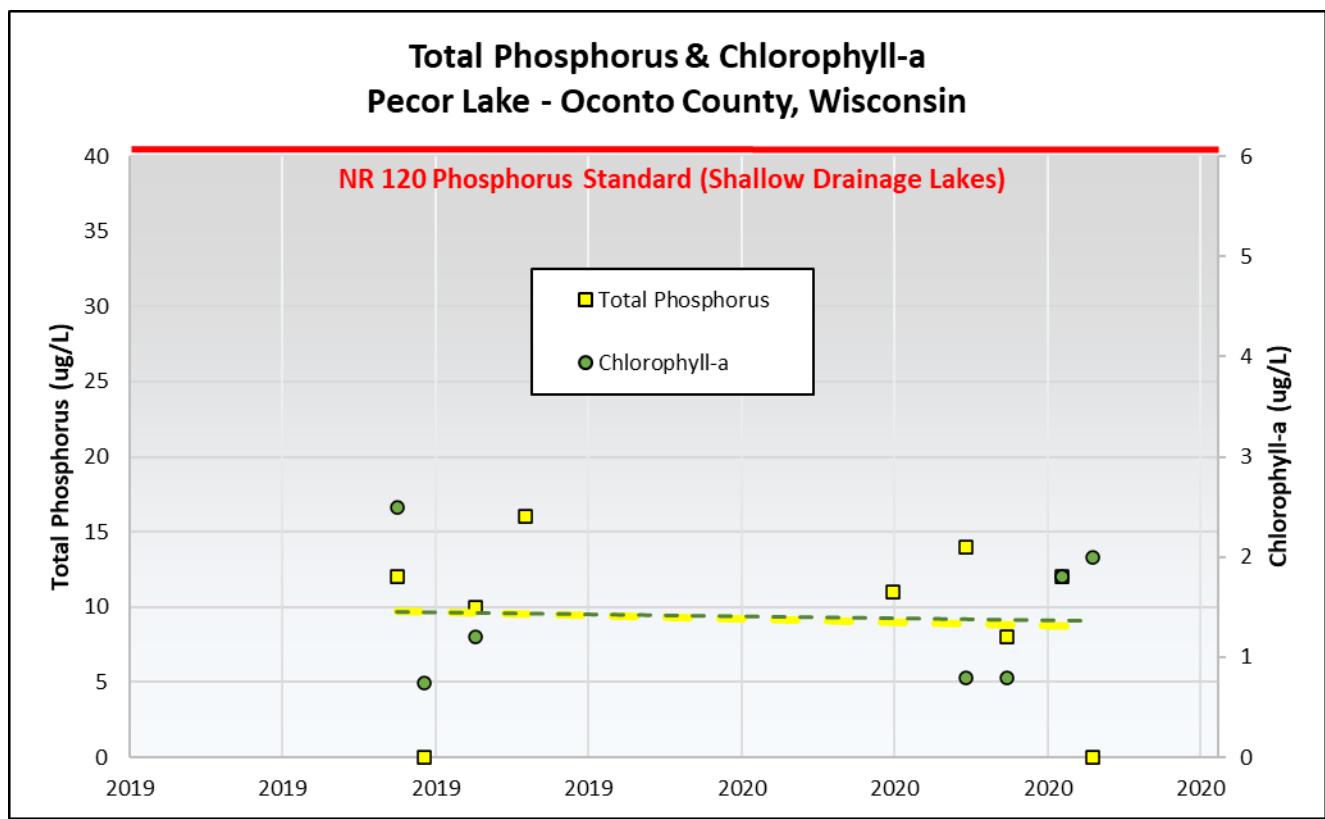


Map created by Brian Zalay, WDNR.

# Water Quality

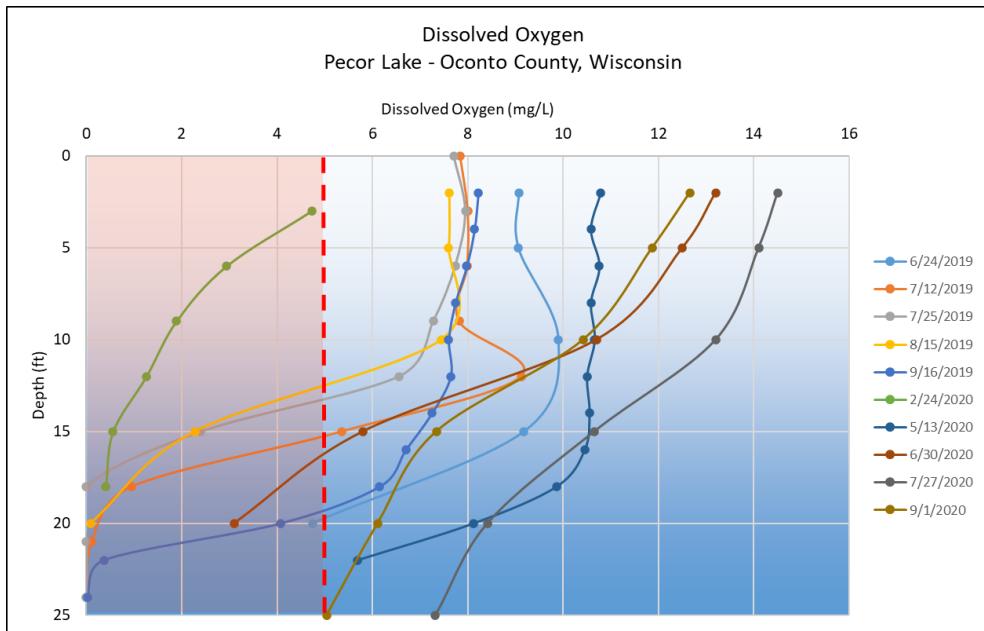
**Nutrients** such as phosphorus and nitrogen are what feed aquatic plants and algae in a lake. Excessive amounts of nutrients delivered to a lake will result in abundant plant and algae growth. Disturbance within a watershed combined with the landscape's inability to infiltrate and filter runoff is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

- Total Phosphorus was consistently below the Wisconsin state standard of 40 ug/L for shallow drainage lakes during the two-year study. The two-year trend is stable.
- Inorganic nitrogen remained below the threshold of 0.3 mg/L when algal blooms increase.
- Chlorophyll-a, an indirect measure of algae, stayed well below the threshold of 6 ug/L.

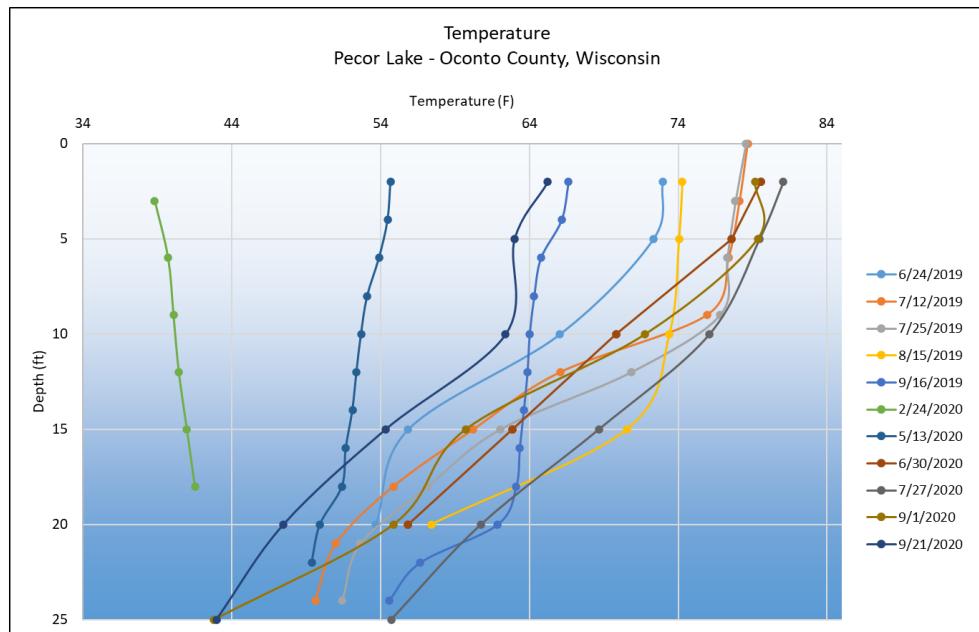


# Water Quality

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.



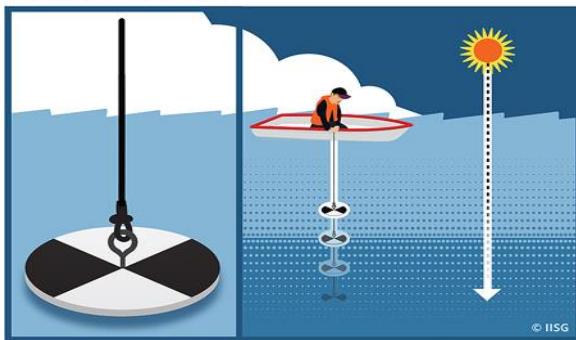
- Sufficient oxygen is available in the water column of Pecor Lake most of the year, however, by late winter, concentrations can be very low, indicating this lake may be susceptible to fish kills.
- Some algae blooms at depth (~10 feet) in summer are shown by these profiles.



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

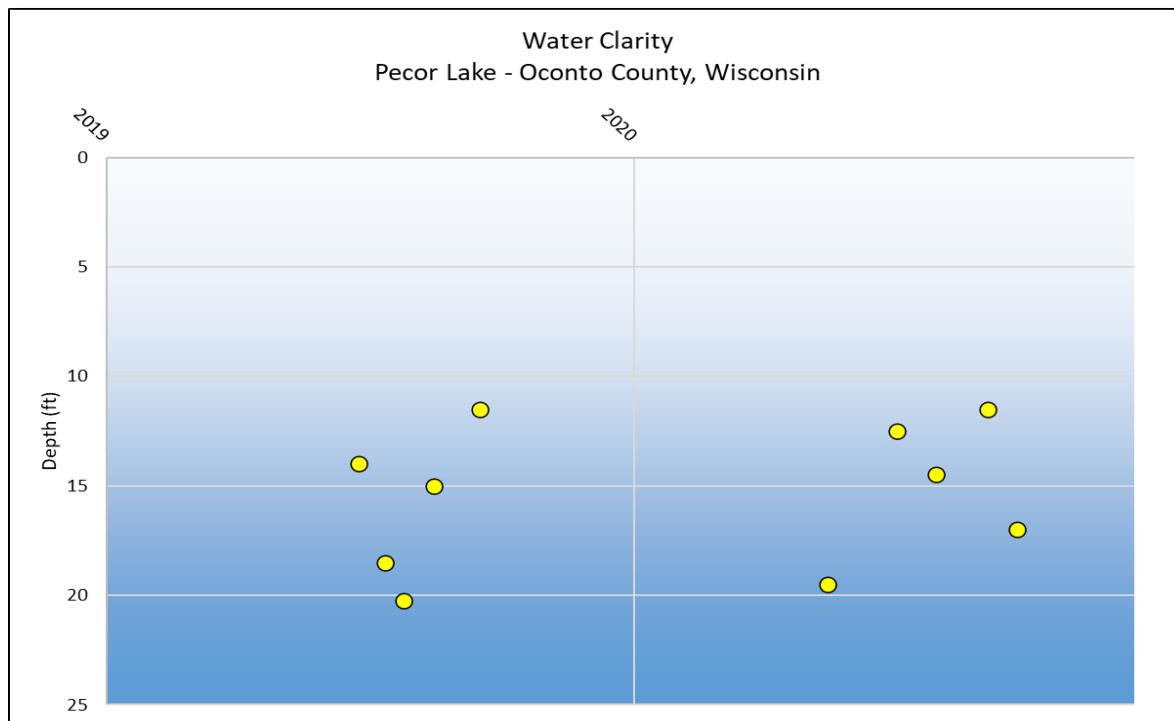
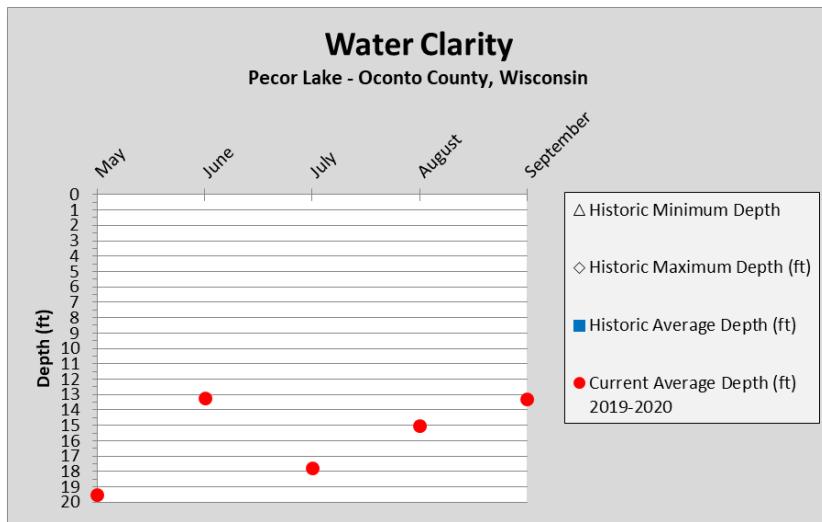
- The temperature gradient in Pecor Lake shows some light stratification during the hot part of summer but is often mixed.

# 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 September.
- During 2019-20, on average, the poorest water clarity in Pecor Lake was in June and September; the best was in May.



# 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 Pecor Lake is hard (123 mg/L CaCO<sub>3</sub>), having an elevated level of dissolved minerals. These minerals tend to bind with phosphorus making it unavailable to algae blooms.

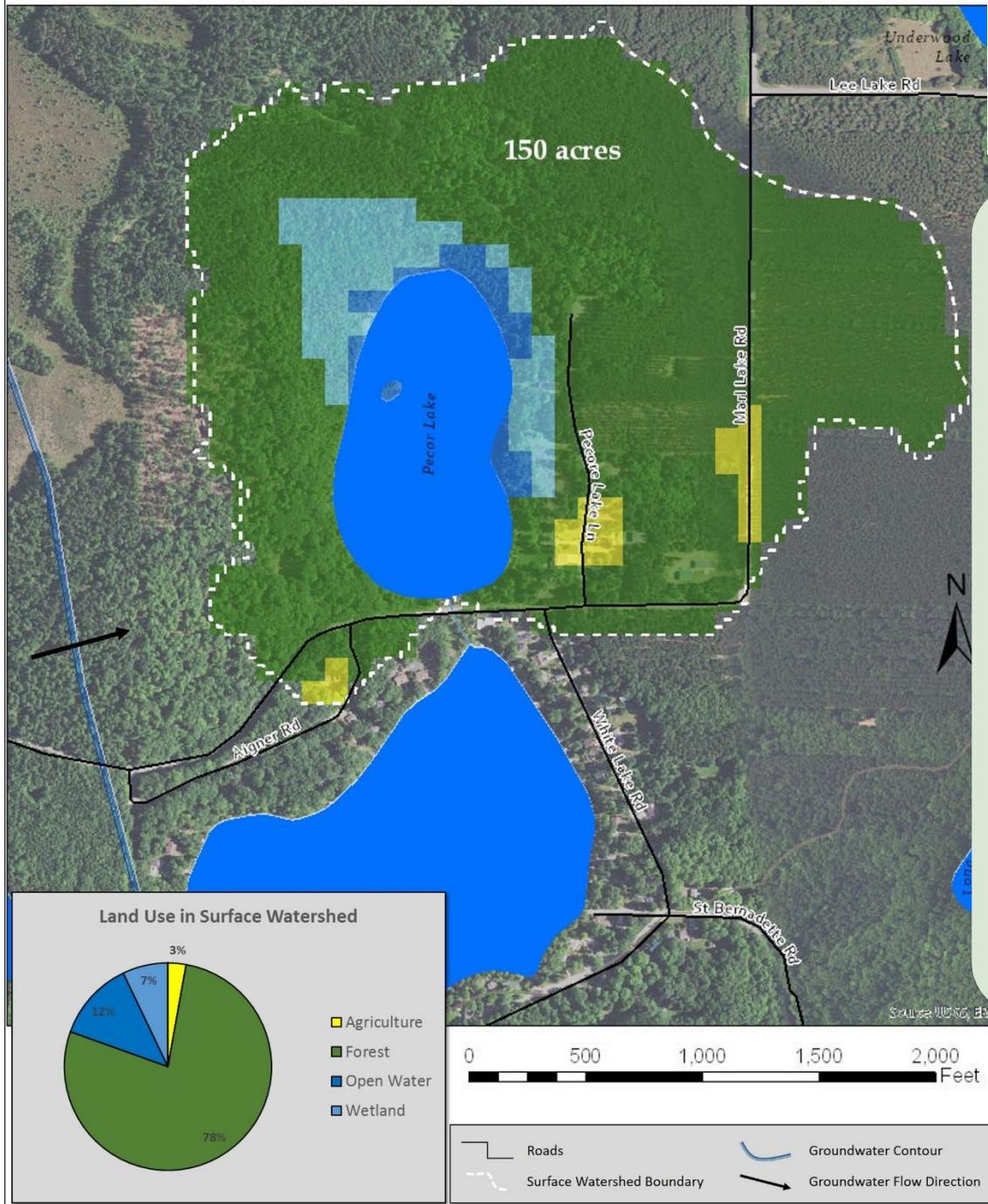


*For more information on how to interpret  
your lake's water quality data, please refer to  
the "State of the Oconto County Lakes  
Report" that is on file with Oconto County.*

# 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.

## Pecor 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 Pecor Lake were surveyed in July 2019. Much of Pecor Lake's shoreland is healthy, but some stretches are in need of restoration.

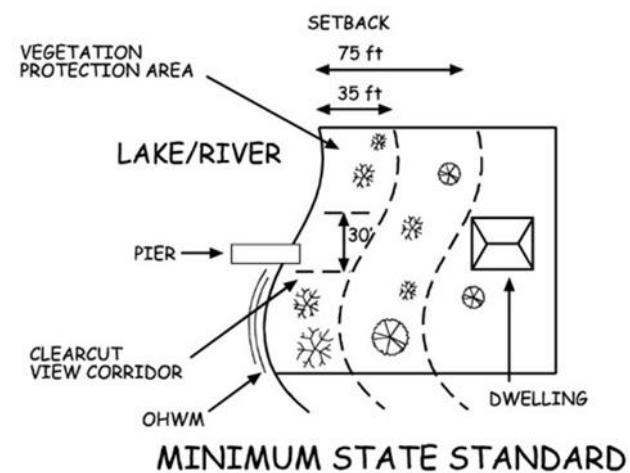
Total lakefront footage	No. Riparian lots	Measured shoreland disturbance (feet)	Measured shoreland disturbance (%)
3,832	12	576	15%



## 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:

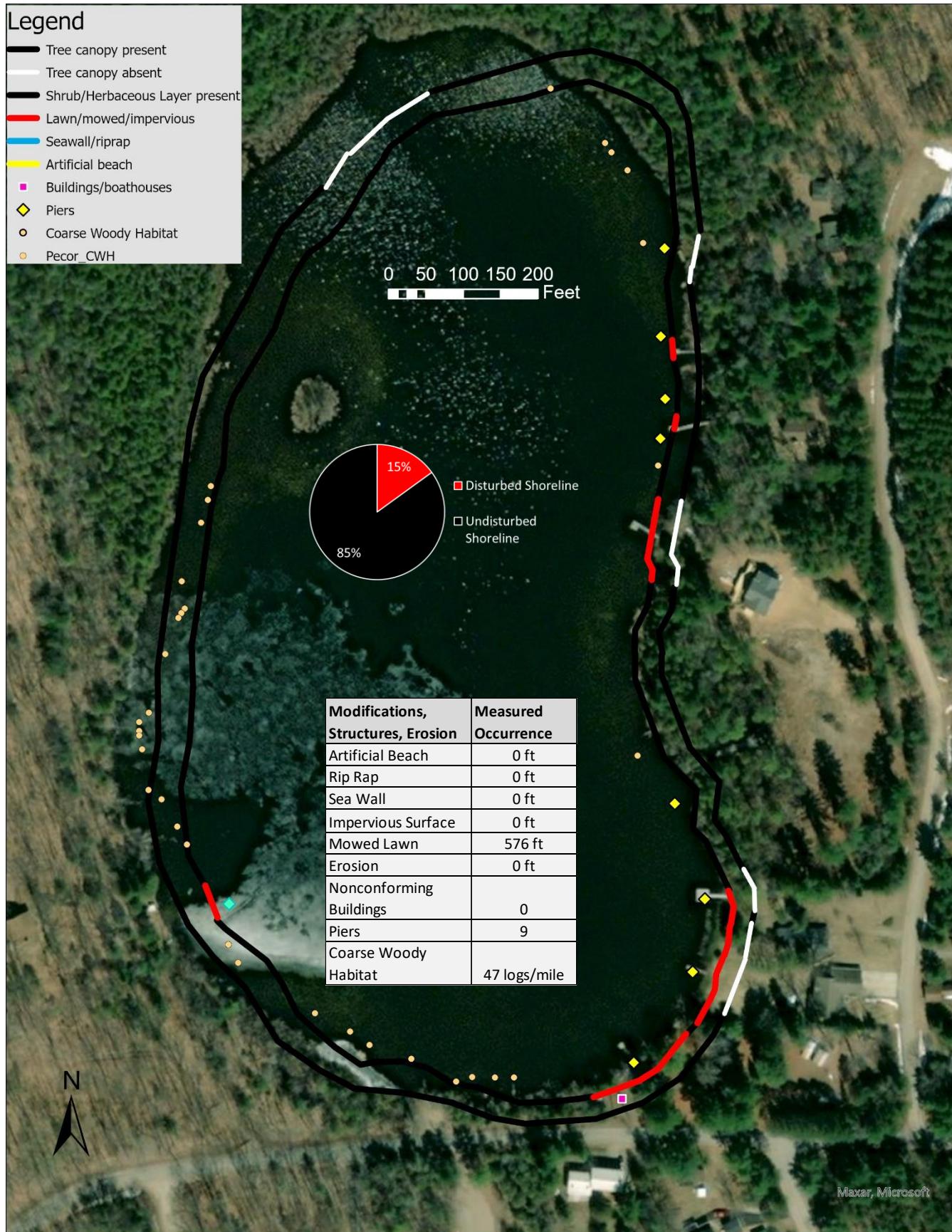
- Up to 30% of shoreline may be removed of shrubs and trees for a view corridor
- A mowed or constructed pedestrian path up to 5 feet wide to access lake



## What Can You Do To Help Pecor 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

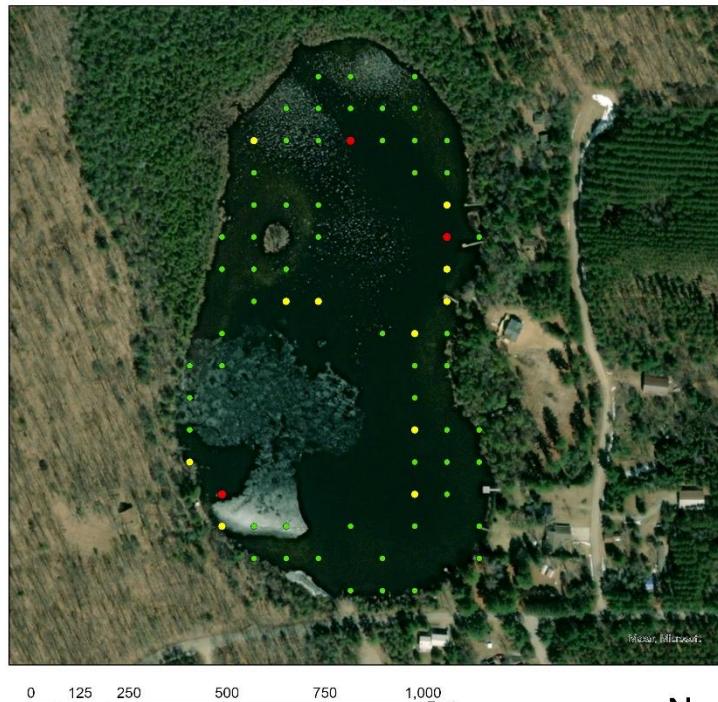


# Aquatic Plants

**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 Pecor Lake is characterized by average diversity of plant species when compared to other lakes in the Oconto County Lakes Project, with a total of 20 species in the 2019 survey.
- During the 2019 aquatic plant survey of Pecor Lake, 54% of visited sites had vegetative growth. The maximum depth of vegetation was 10 feet.
- The most frequently encountered plant species were chara (66%), slender naiad (49%) and white water lily (26%). All three species are native to Wisconsin.
- No invasive species were observed.

## Pecor Lake Aquatic Plant Survey 2019: Rake Fullness



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

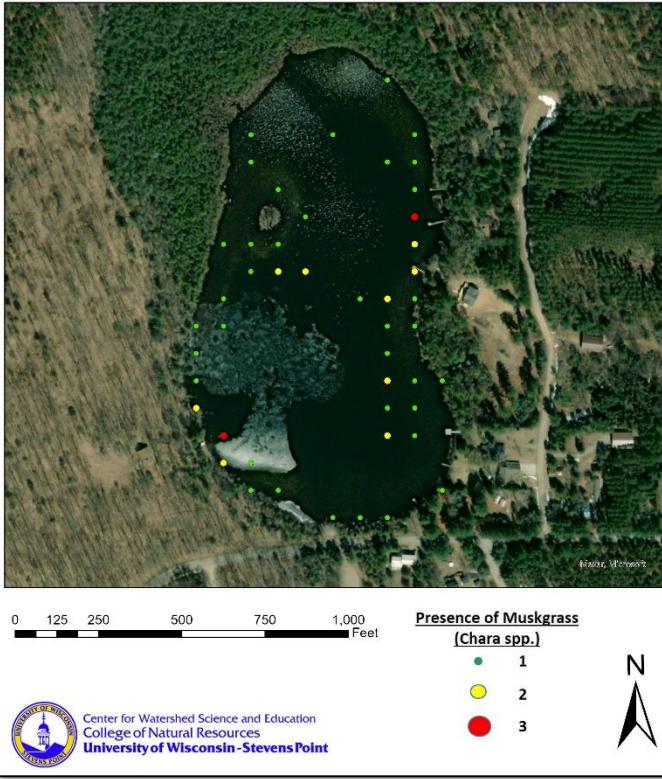
## Pecor Lake Aquatic Plant Survey 2019: Total Number of Species



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

# Aquatic Plants

## Pecor Lake Aquatic Plant Survey: 2019 Muskgass (Chara spp.)



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



## Pecor Lake Aquatic Plant Survey: 2019 Slender naiad (Najas flexilis)

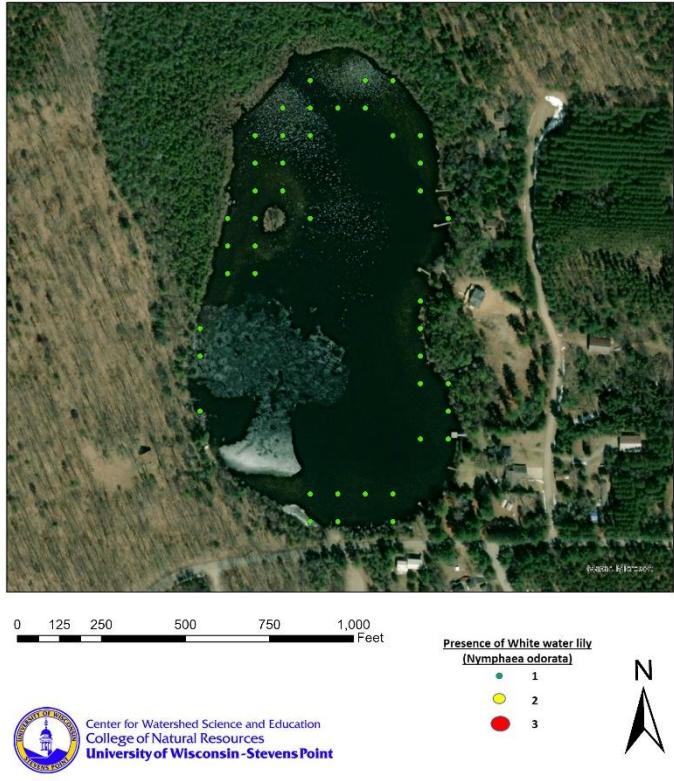


**Slender naiad**, also called nodding water-nymph, is a primary food source for waterfowl and provides habitat for many invertebrates.



# Aquatic Plants

## Pecor Lake Aquatic Plant Survey: 2019 White water lily (*Nymphaea odorata*)



**White water lily** has round stalks that grow up from a rhizome in the sediment connecting to large round floating leaves. By mid-summer, white flowers also float at the surface. Lilies are important cover for fish, are food by many species, and help prevent erosion by slowing wave action.



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.
- Chinese mystery snail (2015) and Banded mystery snail (2019) have been previously documented in Pecor 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.



**Banded mystery snails** are born as fully formed snails that seem to appear from nowhere. Native to southeast US, they have the potential to serve as hosts for parasites and outcompete native snails for food 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.

## Primary Authors

Ryan Haney and Paul McGinley

## Acknowledgments

We are grateful to our project partners for supporting this project by providing insight, enthusiasm, and funding:

Oconto County Lakes and Waterways Association

Oconto County Land Conservation Department – Ken Dolata

Oconto County Staff and Citizens

UW Extension-Oconto County – Dale Mohr

Wisconsin Department of Natural Resources – Brenda Nordin

Wisconsin Department of Natural Resources Lake Protection Grant Program

UW-Stevens Point Water and Environmental Analysis Lab



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

