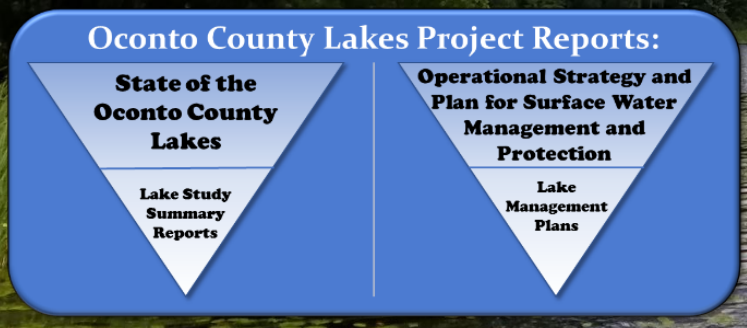
Oconto County Lakes Project

BEAR PAW LAKE STUDY

SUMMARY REPORT

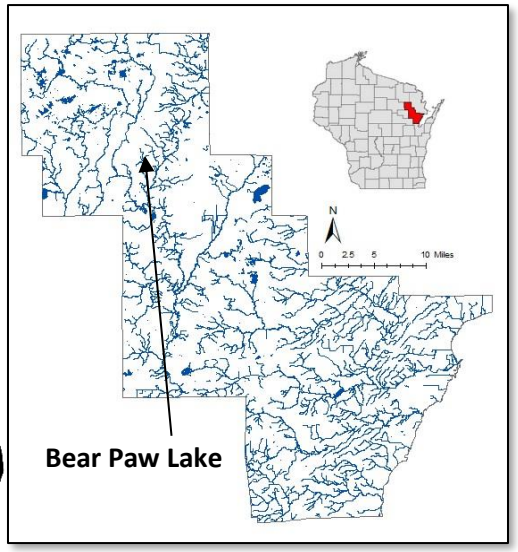
2021

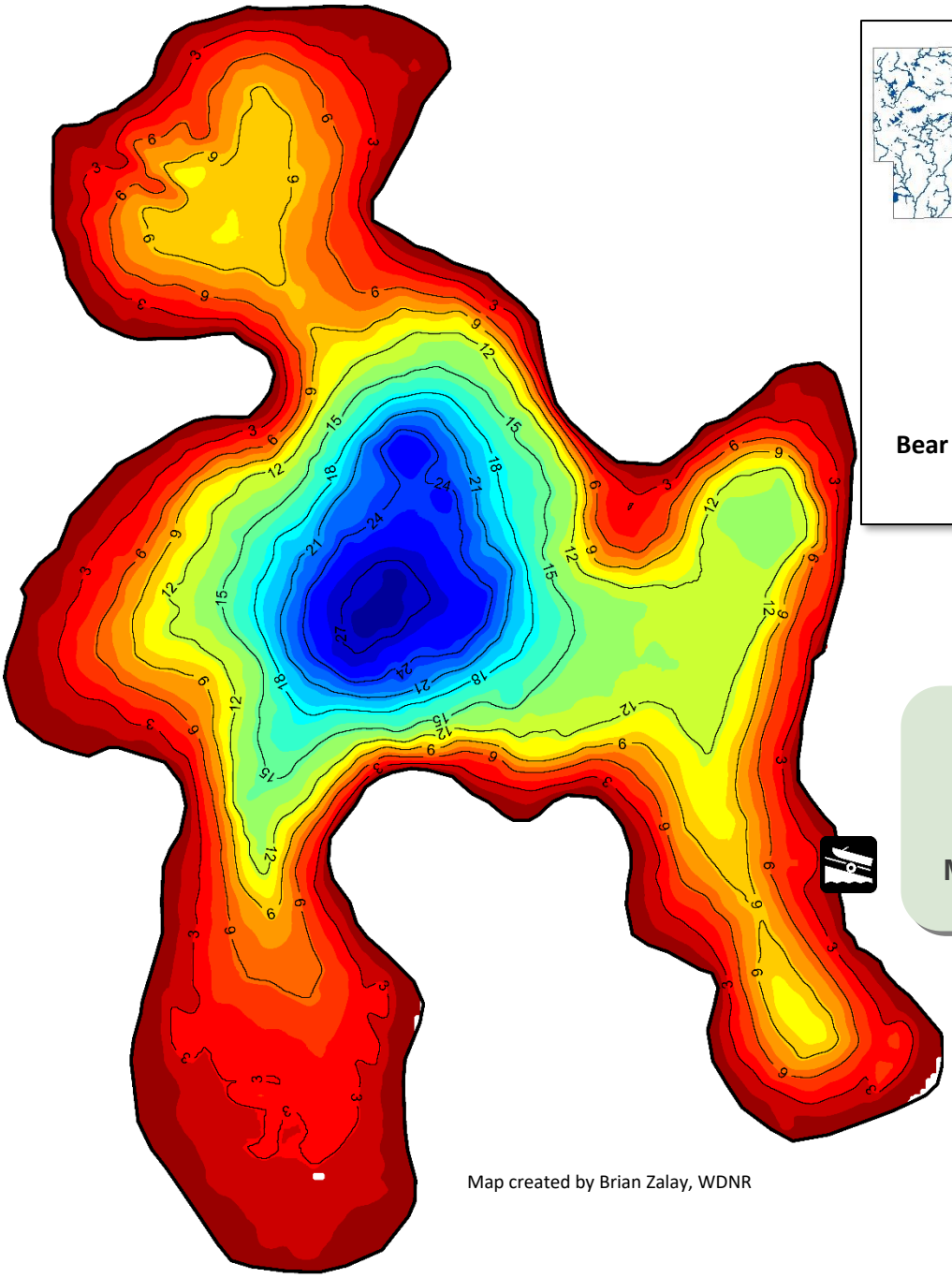


Center for Watershed Science and Education
College of Natural Resources
University of Wisconsin-Stevens Point

Background

- Bear Paw Lake is a 47-acre seepage lake in northern Oconto County with a maximum depth of 20 feet.
- Most water enters Bear Paw Lake via groundwater. 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 southeast side.
- This report summarizes data collected during the 2019-2020 lake study.





Map created by Brian Zalay, WDNR

Township of Mountain

Surface Area: 47 acres

Maximum Depth: 20 feet

0 14.5 29ft

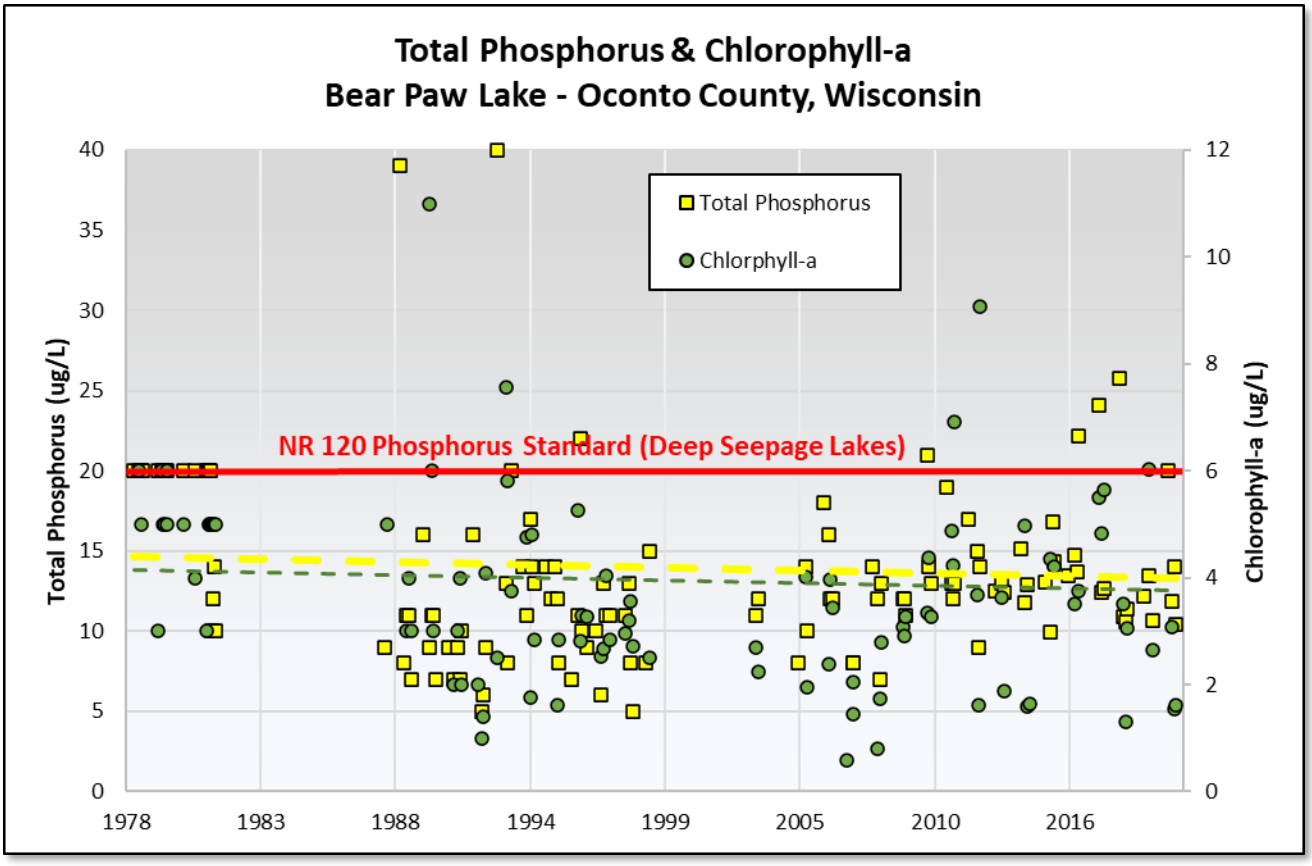
0 200ft

Bear Paw Lake
Mapping by AutoChart

Water Quality

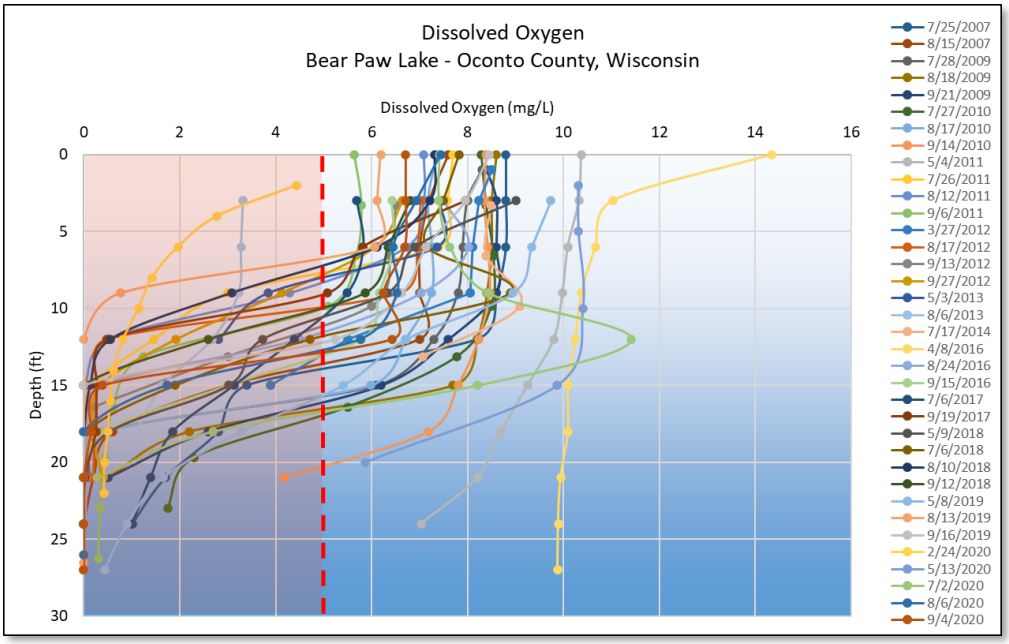
Nutrients such as phosphorus and nitrogen are what feed aquatic plants and algae in a lake. Excessive amounts of nutrients delivered to a lake will result in abundant plant and algae growth. Disturbance within a watershed combined with the landscape's inability to infiltrate and filter runoff is what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



Water Quality

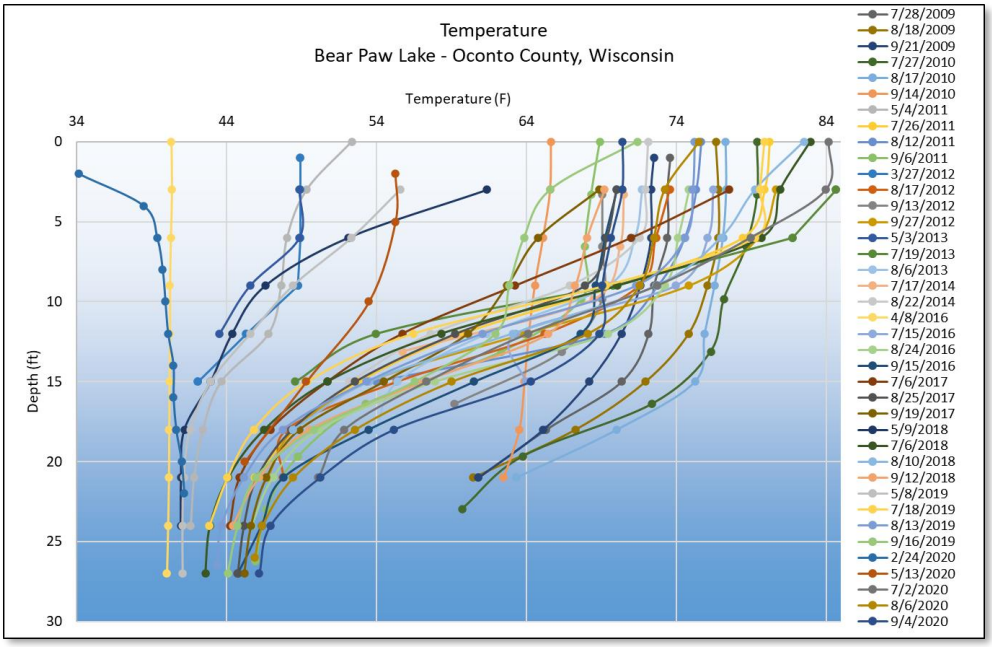
Sufficient **dissolved oxygen** in lake water is essential to the survival of aquatic organisms. The amount of dissolved oxygen present within a lake varies by season and depth. It is determined by the biological activity that consumes or produces oxygen, by water mixing through wind, changes in temperature,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



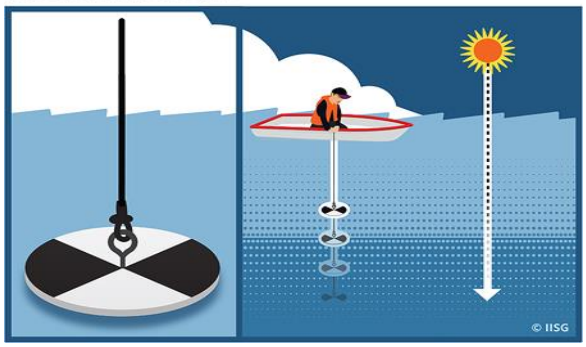
- With a couple exceptions, sufficient oxygen is available in the top 8-10 feet of the water column of Bear Paw Lake throughout the year.
- Algae blooms at depth, near the thermocline, are common in late summer.

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

- The temperature gradient in Bear Paw Lake shows a clear thermocline throughout the growing season, typical of a deep, stratified lake.

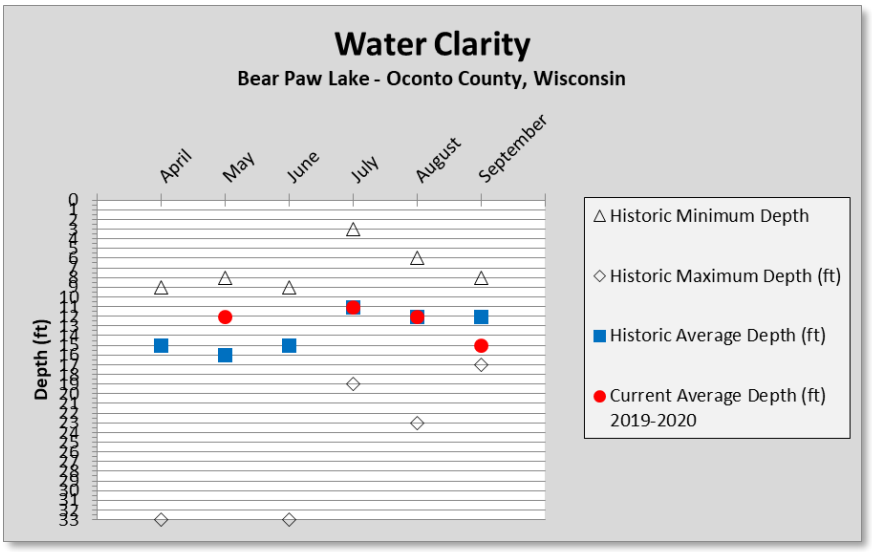


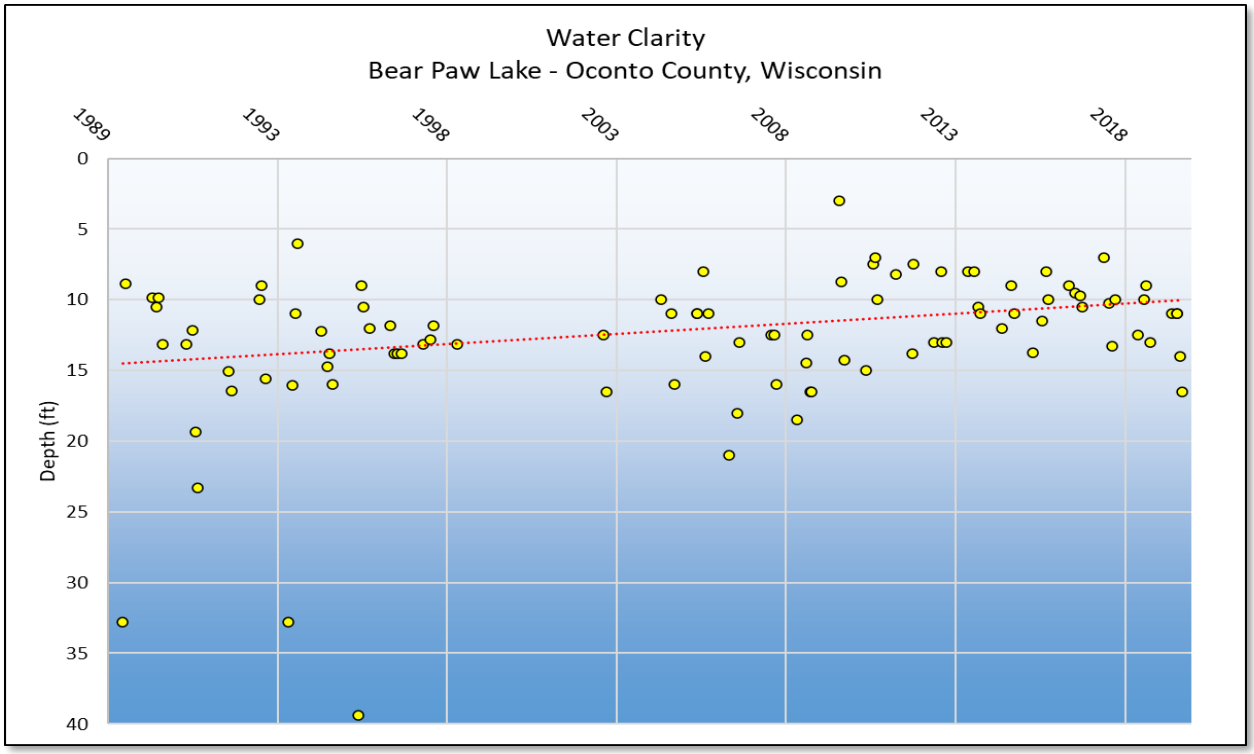
Water Quality



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 April and September.
- During 2019-20, the average water clarity measurements were consistent with previous observations and demonstrates a slight decreasing trend over the long term.





Water Quality

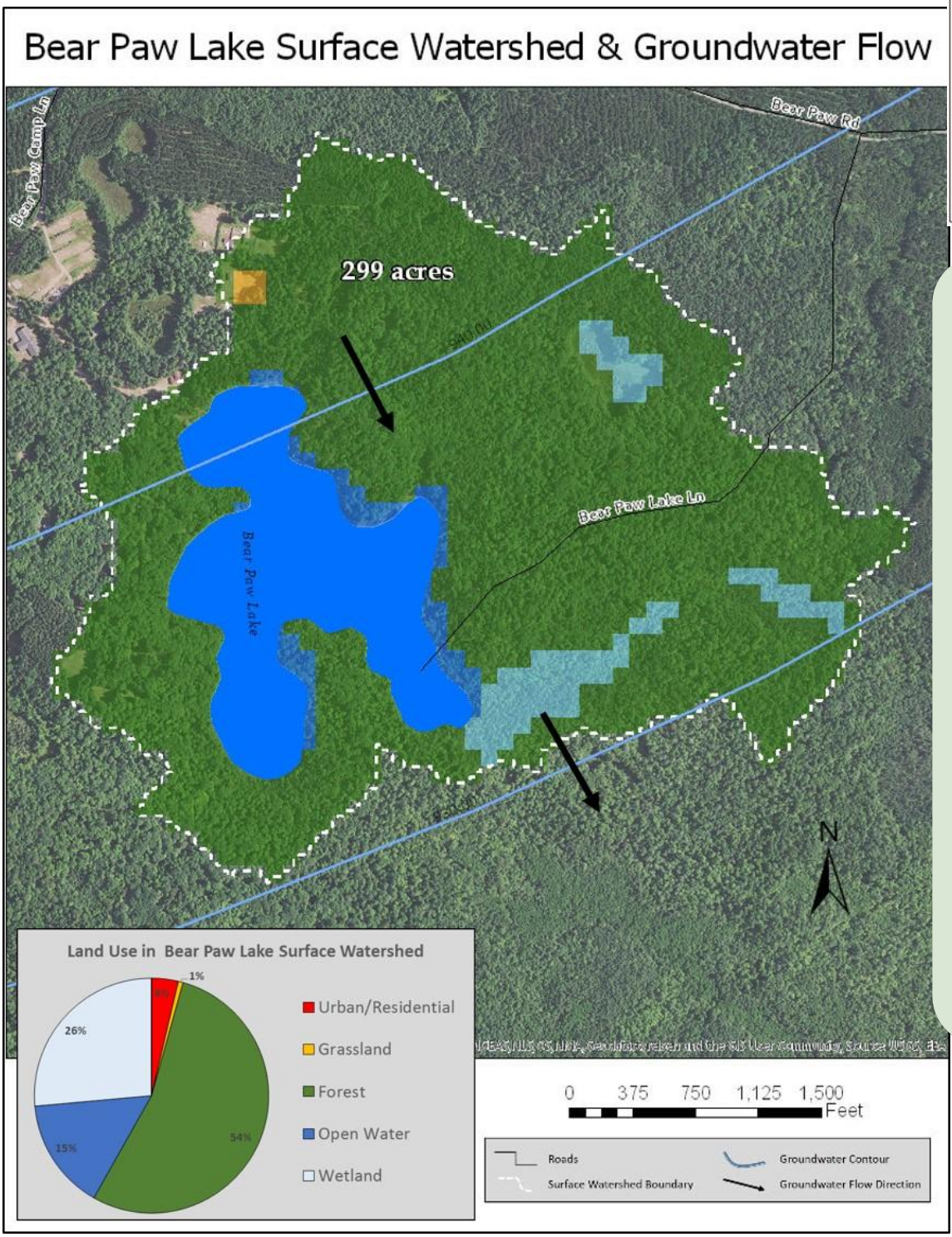
Other chemistry data was collected from lake water samples, such as basic cations, pollutants and acid rain input, and physical parameters. Results of such analyses can provide insights into a variety of other potential impacts to the lake. While concentrations of these compounds in lake water is usually low, higher concentrations can be indicators of other potential issues.

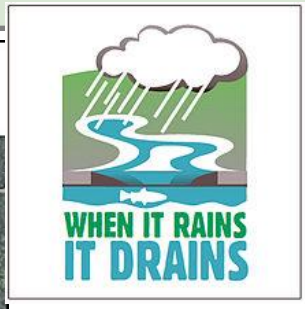
- Concentrations of potassium (0.57 mg/L), chloride (0.84 mg/L) and sodium (0.83 mg/L) were all low. This suggests minimal impact from septic systems, road salt, animal waste and fertilizers.
- DACT, a screening tool to determine if your lake is being impacted by pesticides, was not detected.
- Water in Bear Paw Lake is soft (24.5 mg/L CaCO3), having a low level of dissolved minerals. Soft lakes tend to have more biological activity.

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.





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.

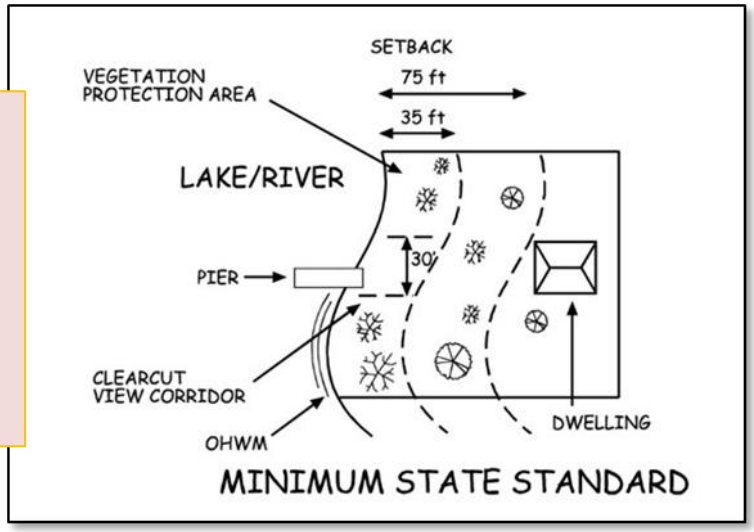
- Shorelands around Bear Paw Lake were surveyed in July 2019. Most of Bear Paw Lake's shoreland is healthy, but some stretches are in need of restoration.

Total lakefront footage	No. Riparian lots	Measured shoreland disturbance (feet)	Measured shoreland disturbance (%)
9,626	2	1,353	14%

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:

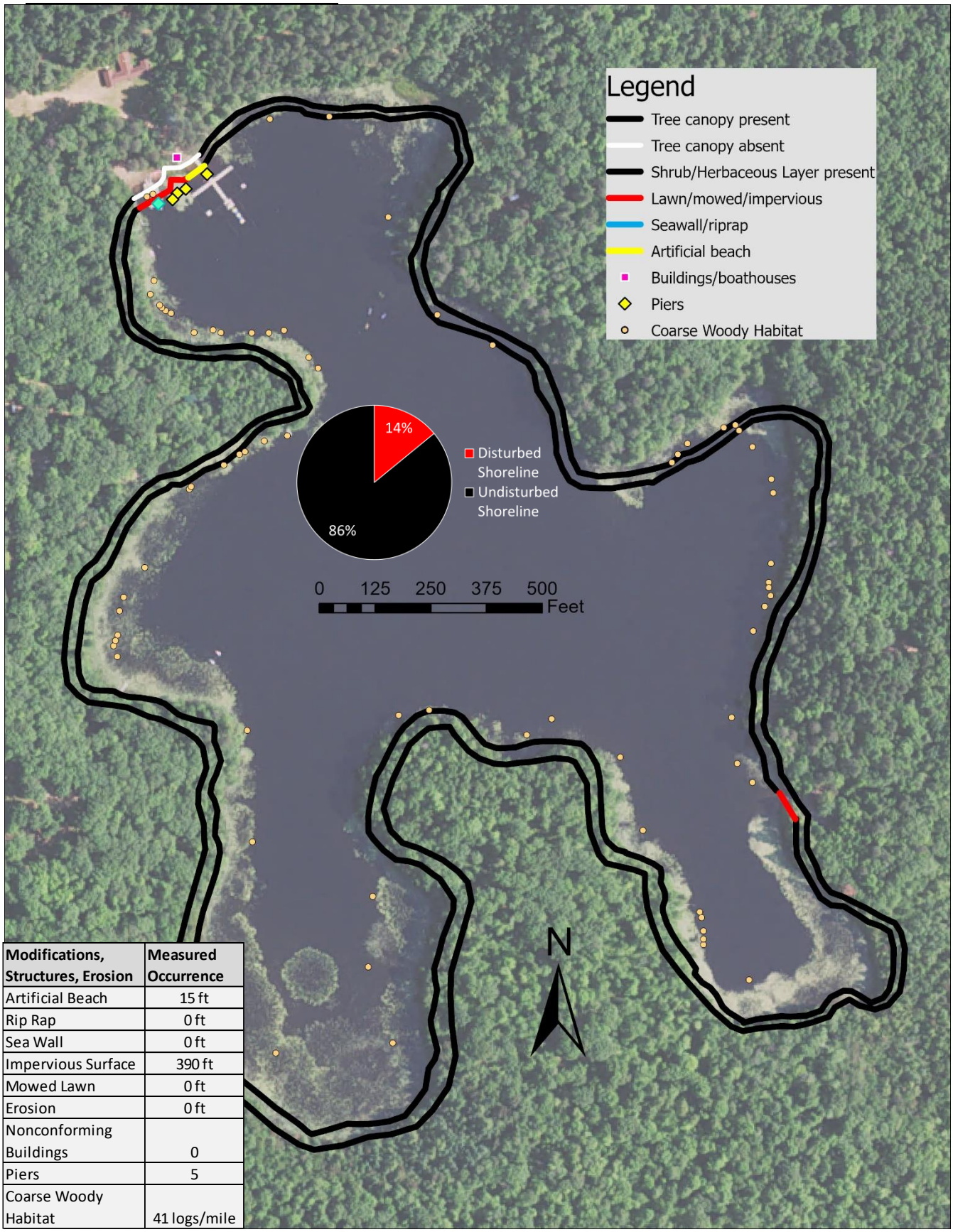
- Up to 30% of shoreline may be removed of shrubs and trees for a view corridor
- A mowed or constructed pedestrian path up to 5 feet wide to access lake



What Can You Do To Help Bear Paw 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

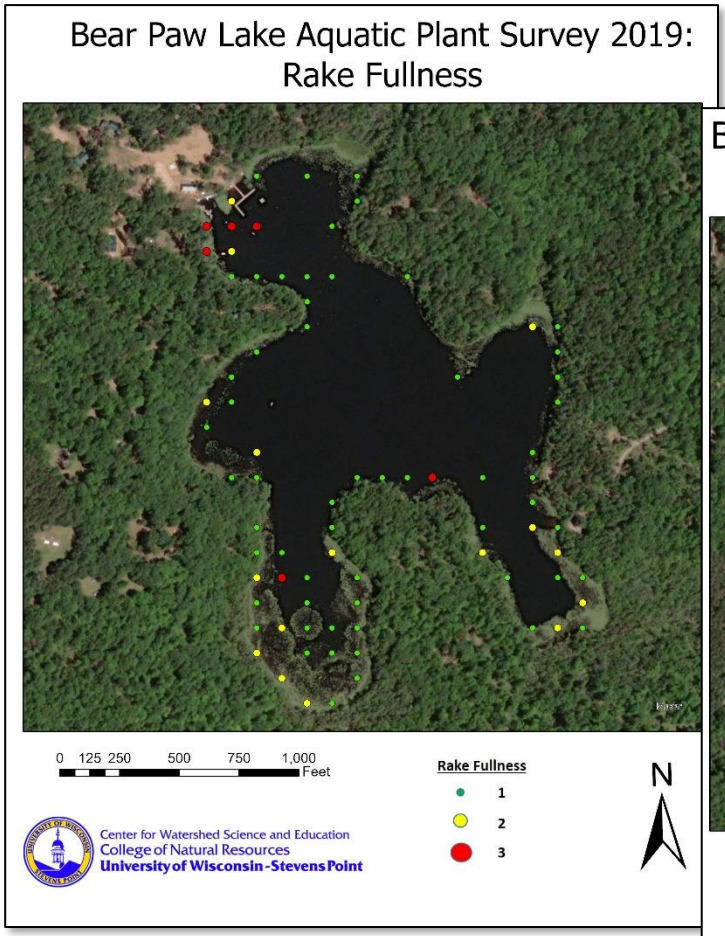


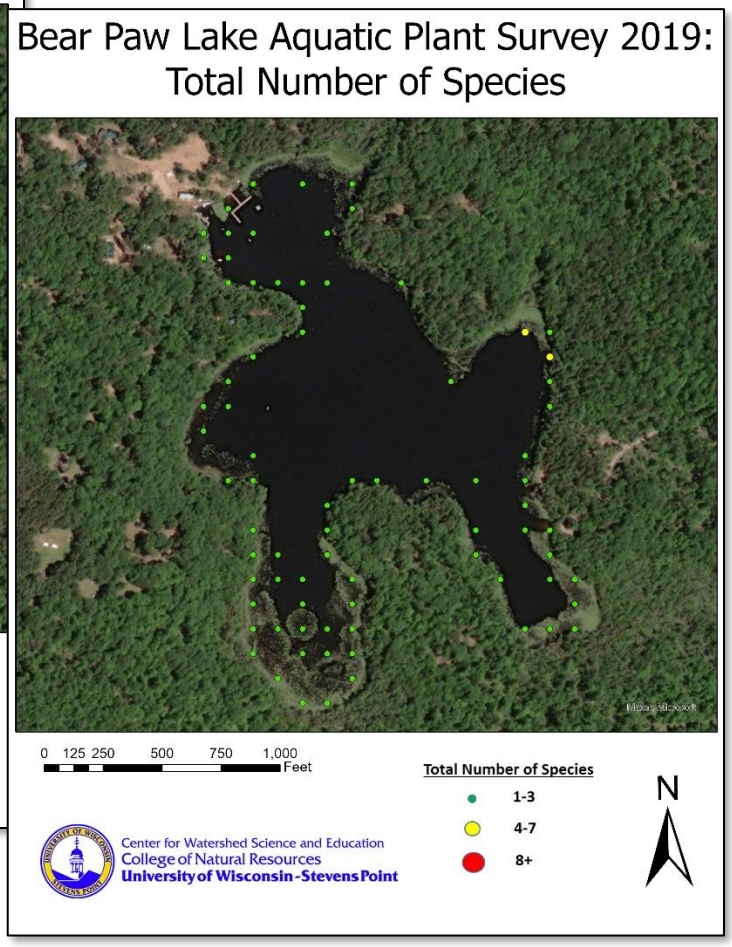
Modifications, Structures, Erosion	Measured Occurrence
Artificial Beach	15 ft
Rip Rap	0 ft
Sea Wall	0 ft
Impervious Surface	390 ft
Mowed Lawn	0 ft
Erosion	0 ft
Nonconforming Buildings	0
Piers	5
Coarse Woody Habitat	41 logs/mile

Aquatic Plants

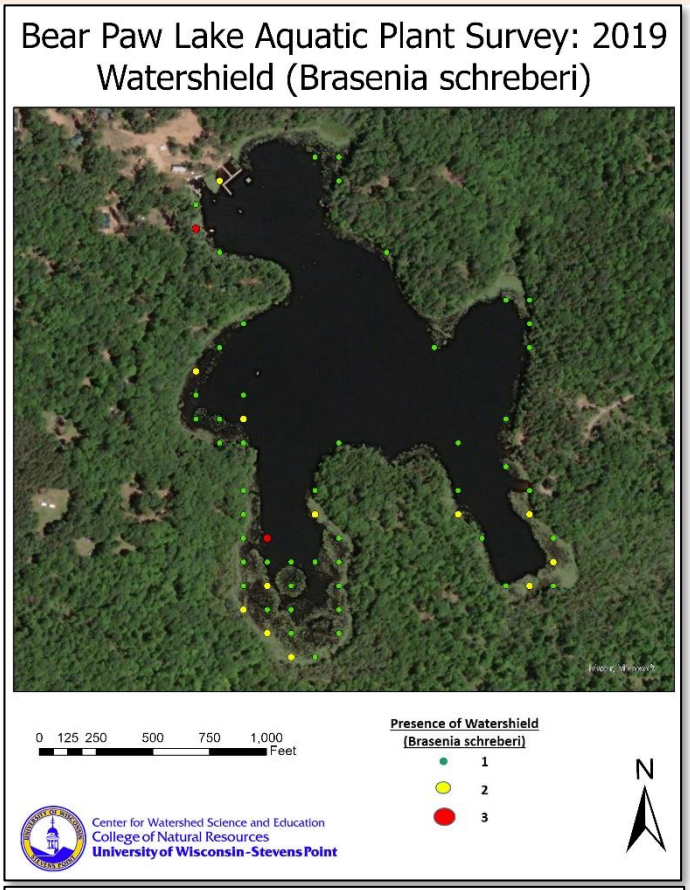
Aquatic plants are the forest landscape within a lake. They provide food and habitat for terrestrial and aquatic creatures such as fish, ducks, turtles, invertebrates and other animals. They increase oxygen levels in the water and utilize nutrients that would otherwise be used by algae. A healthy lake 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 Bear Paw Lake is characterized by average diversity of plant species when compared to other lakes in the Oconto County Lakes Project, with a total of 19 species in the 2019 survey.
- During the 2019 aquatic plant survey of Bear Paw Lake, 43% of visited sites had vegetative growth. The maximum depth of vegetation was 10 feet.
- The most frequently encountered plant species were watershield (63%), chara (19%) and creeping bladderwort (14%). All three species are native to Wisconsin.
- The invasive species Eurasian watermilfoil was observed at 7 locations.

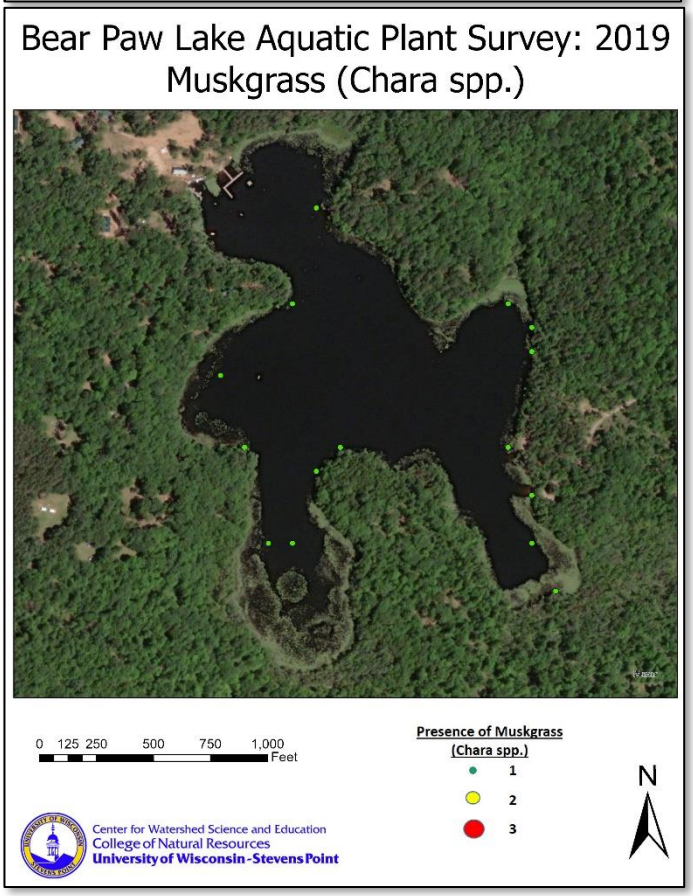




Aquatic Plants

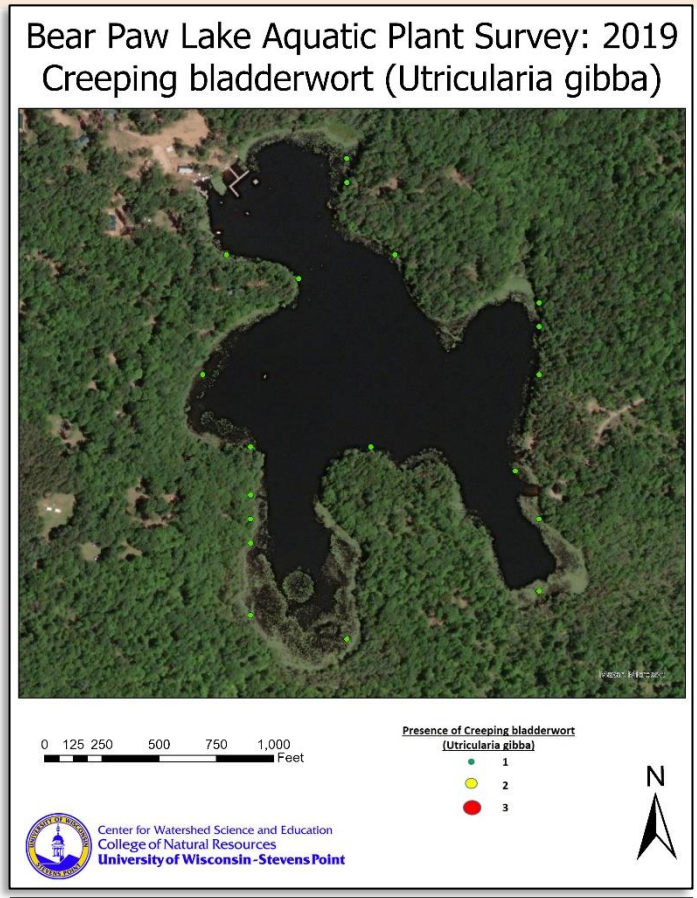


Watershield has floating leaves with their distinctive jelly-like slime on the undersides and stems. While providing shade and shelter for aquatic animals and food for waterfowl, the plants secrete a number of chemicals that kill or inhibit growth of bacteria, algae, and other plants. Native Americans reportedly ate its tuberous roots.

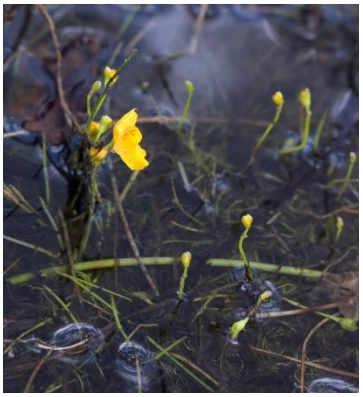


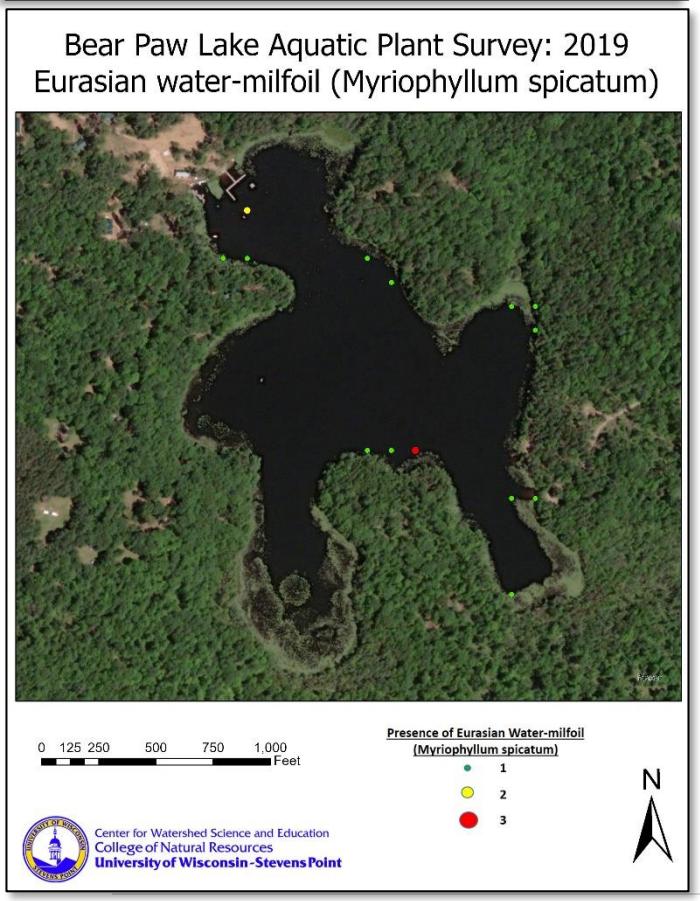
Chara is a type of macro algae that grows attached to muddy lake bottoms and has a musky odor. Muskgrass, as it is known, filters the lake water and is helpful in preventing the establishment of invasive species.

Aquatic Plants



Creeping bladderwort is a carnivorous plant with underwater 'sacs' that trap insects and other small animals. Without roots, it has slender stems which may be floating, submerged or creeping along the substrate.





Eurasian watermilfoil is one of the most common invasive aquatic plants in Wisconsin. It can from 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 first documented in Bear Paw Lake in 2007. It was observed in 7 locations during the 2019 survey.
- ✓ Banded mystery snail (2013) and phragmites (2017) have also been previously documented in Bear Paw Lake.

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

Phragmites, or common reed grass, creates tall, dense stands that crowd out native plants, degrades wildlife habitat and reduces access. It spreads through underground growth and takes aggressive treatment to control.

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 & Water 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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