Oconto County Lakes Project

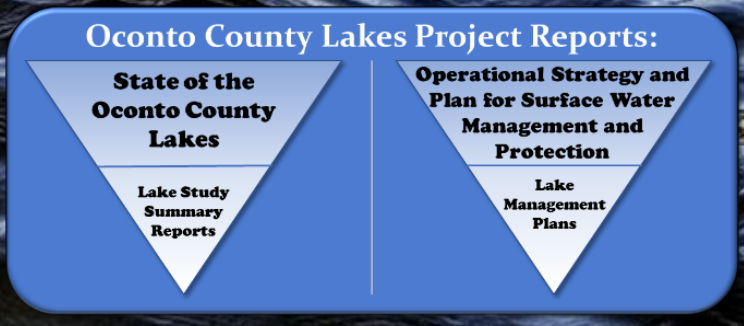
ANDERSON LAKE STUDY

SUMMARY REPORT

2019

University of Wisconsin-Stevens Point and

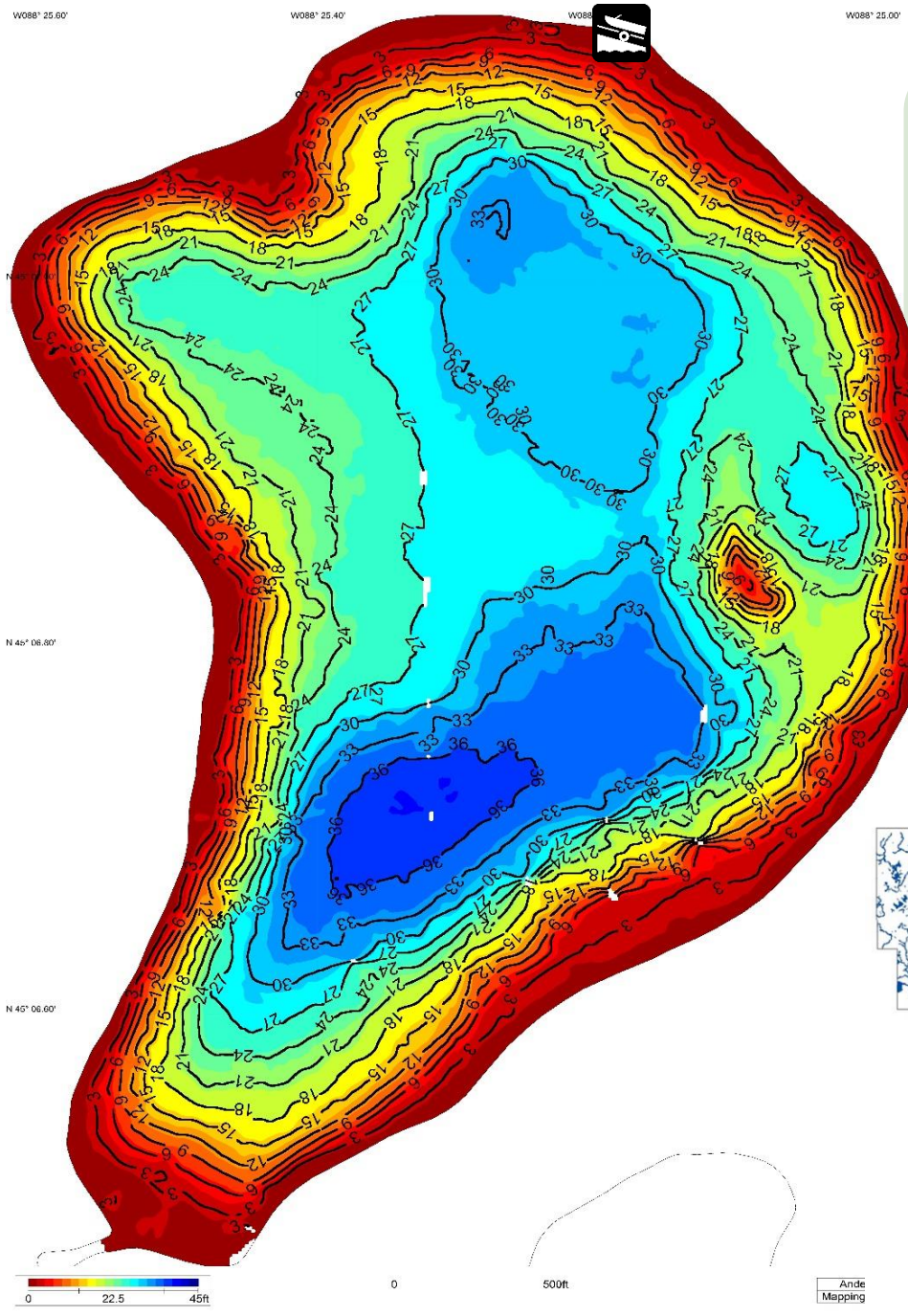
Oconto County Staff and Citizens



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

Background

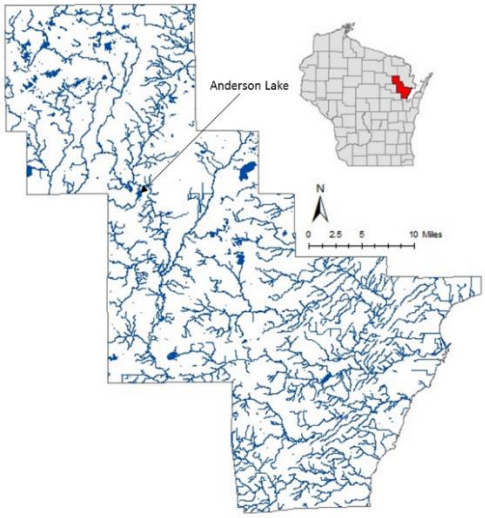
- Anderson Lake is a 177-acre drainage lake in northern Oconto County with a maximum depth of 40 feet.
- Water enters Anderson Lake from Weso Creek on the south side of the lake (and groundwater) and leaves via a short reach of creek feeding the Oconto River to the north. Surface water runoff and direct precipitation also contribute water.
- Visitors have access to the lake from one public boat landing located on the lake's north side.
- This report summarizes data collected during the 2017-2018 lake study.



Townships of Breed and Mountain

Surface Area: 177 acres

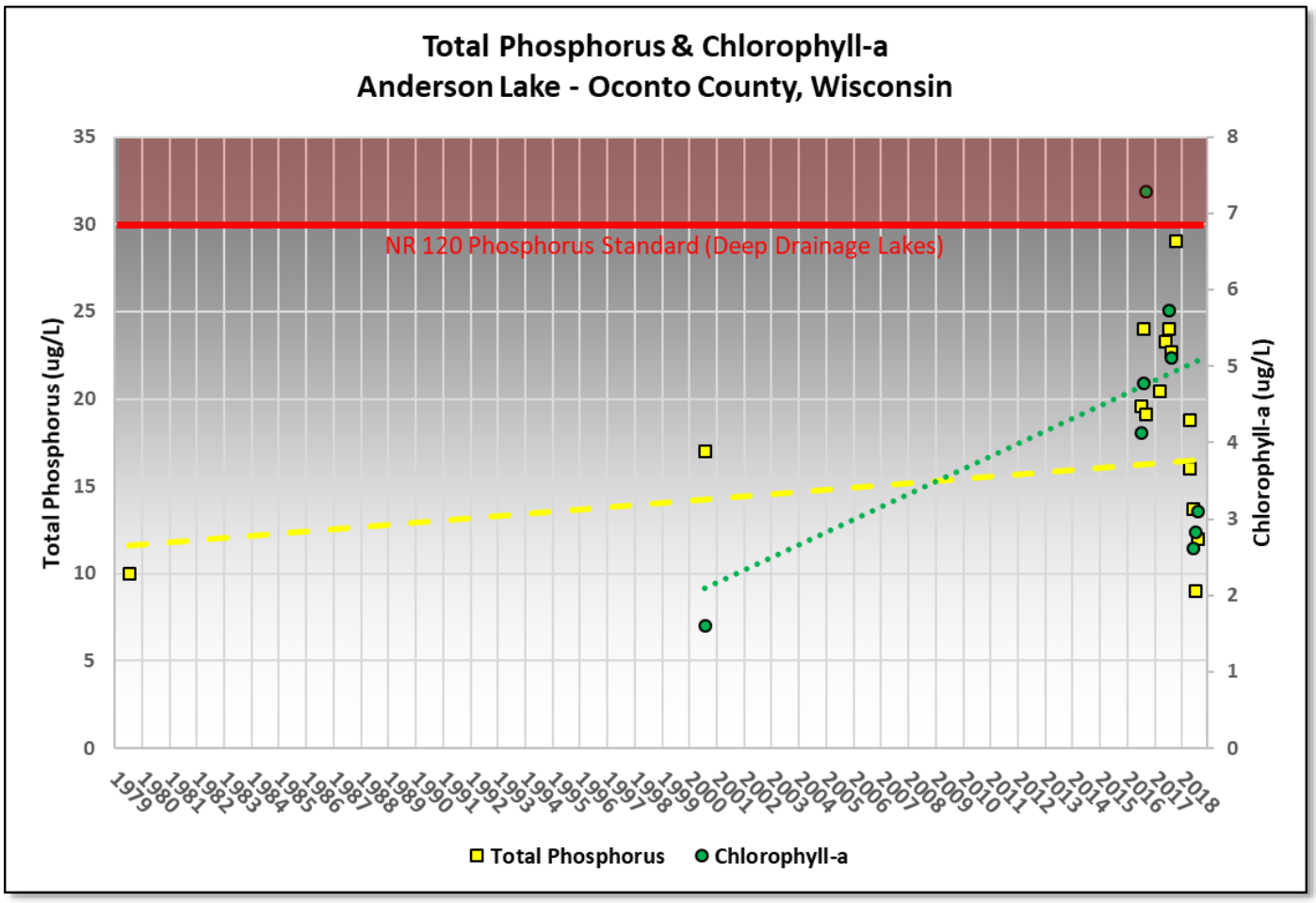
Maximum Depth: 40 feet



Water Quality

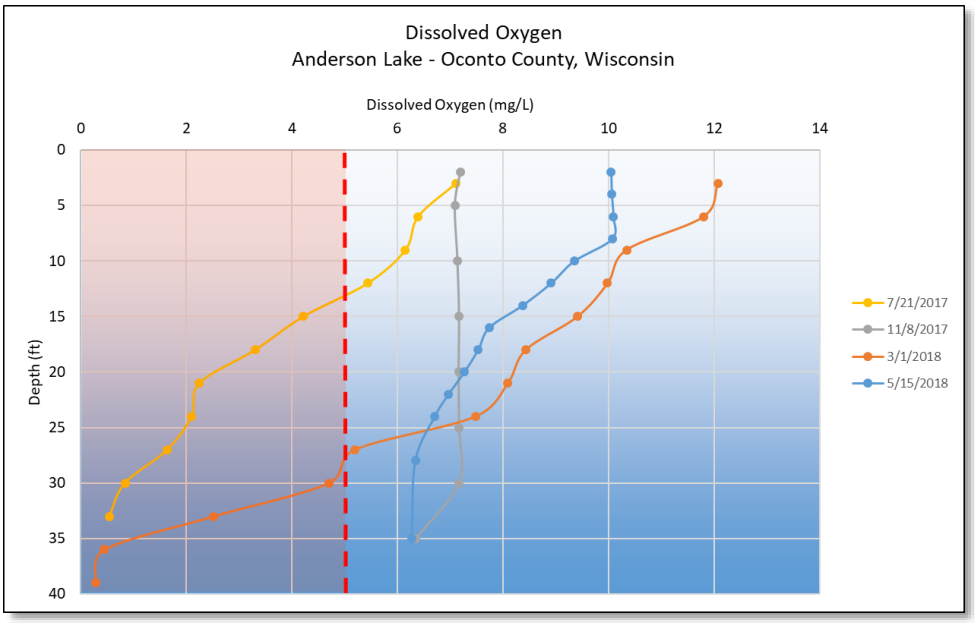
Nutrients such as phosphorus and nitrogen are what feed aquatic plants and algae in a lake. Excessive amounts of nutrients delivered to a lake will result in abundant plant and algae growth. Disturbance within a watershed combined with the landscape's inability to infiltrate and filter runoff is what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

- Total Phosphorus was 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 slightly increasing average concentration.
- Inorganic nitrogen remained below the threshold of 0.3 mg/L when algal blooms increase.
- Chlorophyll-a, an indirect measure of algae, periodically exceeds the threshold of 6 ug/L and appears to be increasing over the long term.



Water Quality

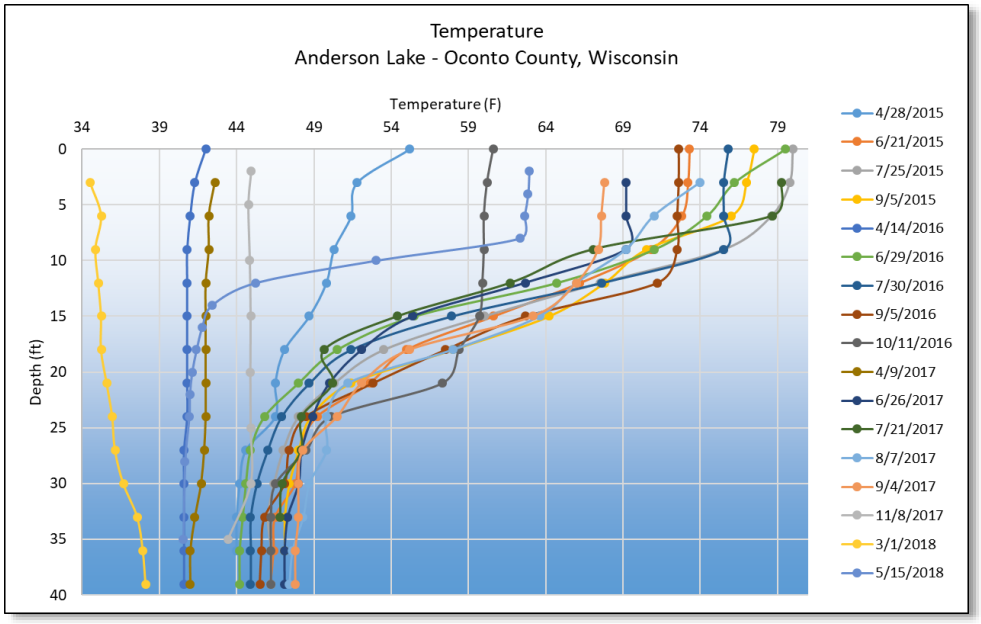
Sufficient **dissolved oxygen** in lake water is essential to the survival of aquatic organisms. The amount of dissolved oxygen present within a lake varies by season and depth. It is determined by the biological activity that consumes or produces oxygen, by water mixing through wind, changes in temperature,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



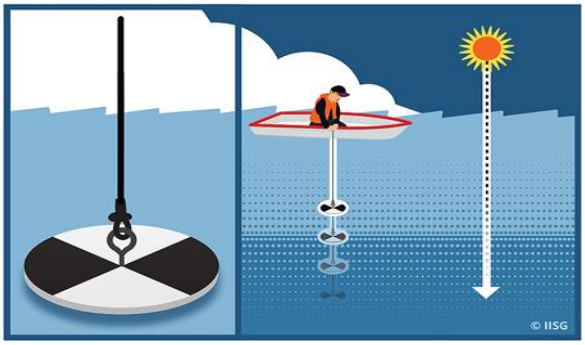
- Sufficient oxygen is available in the water column of Anderson Lake throughout the year. The lowest concentrations were observed in mid-summer when only the top 13 feet has enough oxygen to support most fish species.
- No algae blooms are evidenced by the observed oxygen profiles.

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

- The temperature gradient in Anderson Lake exhibits a clear thermocline between 10 and 20 feet during the growing season that separates warmer oxygen-rich water at the top from colder oxygen-poor water below.

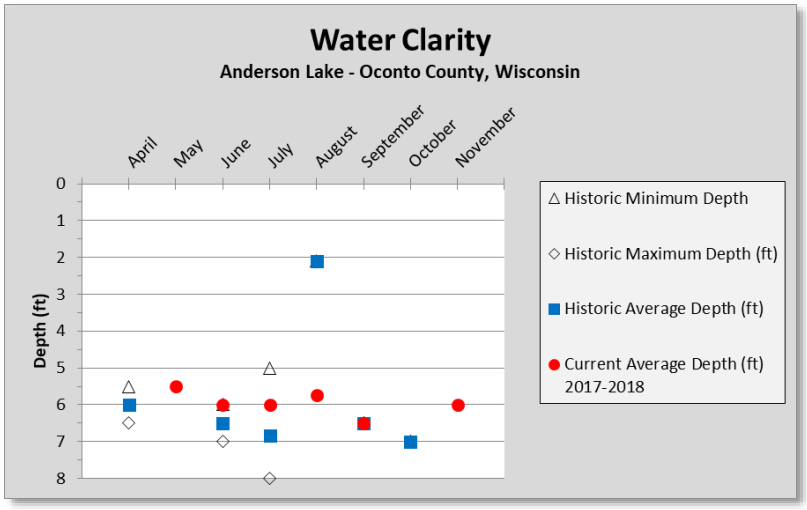


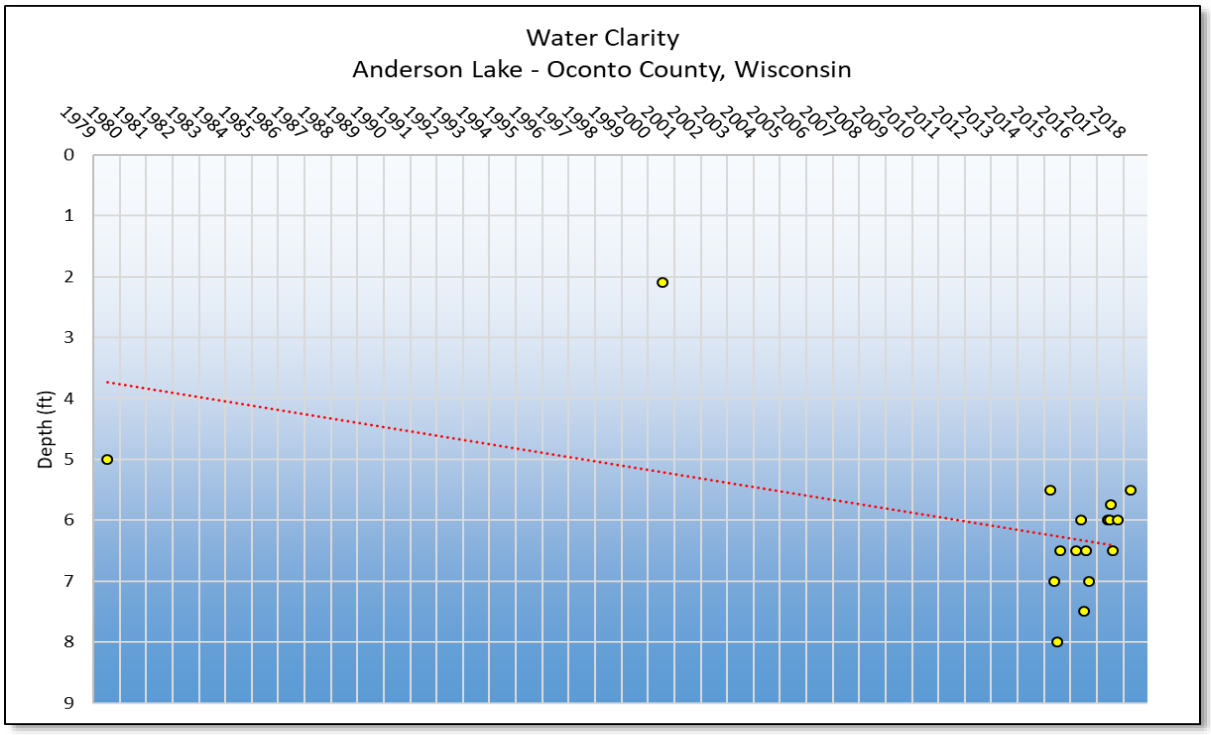
Water Quality



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 2017-18, on average, the poorest water clarity in Anderson Lake was in May and the best was in September. This is consistent with previous observations and demonstrates a slightly increasing trend over the long term.





Water Quality

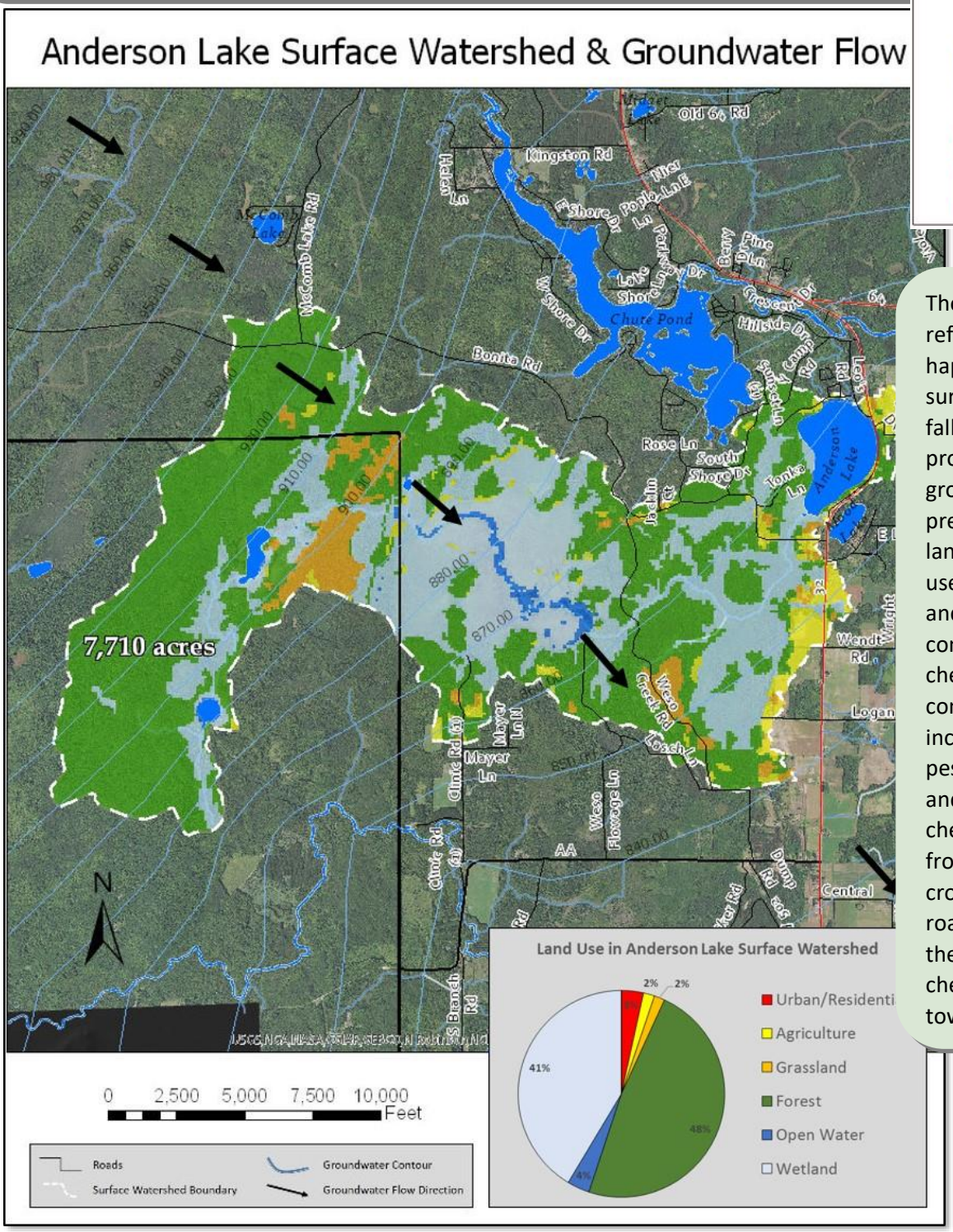
Other chemistry data was collected from lake water samples, such as basic cations, pollutants and acid rain input, and physical parameters. Results of such analyses can provide insights into a variety of other potential impacts to the lake. While concentrations of these compounds in lake water is usually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

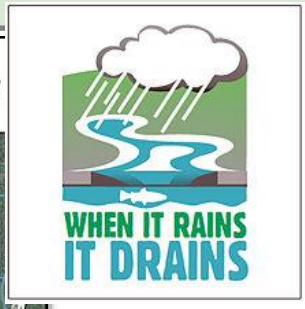
- Concentrations of potassium (1.63 mg/L), chloride (4.6 mg/L) and sodium (3.10 mg/L) were all low. This suggests minimal impact from septic systems, road salt, animal waste and fertilizers.
- DACT, a screening tool to determine if your lake is being impacted by pesticides, was not detected.
- Water in Anderson Lake is moderately hard (73 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.

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 Anderson Lake were surveyed in June 2017. Some of Anderson Lake's shoreland is healthy, but many stretches are in need of restoration.

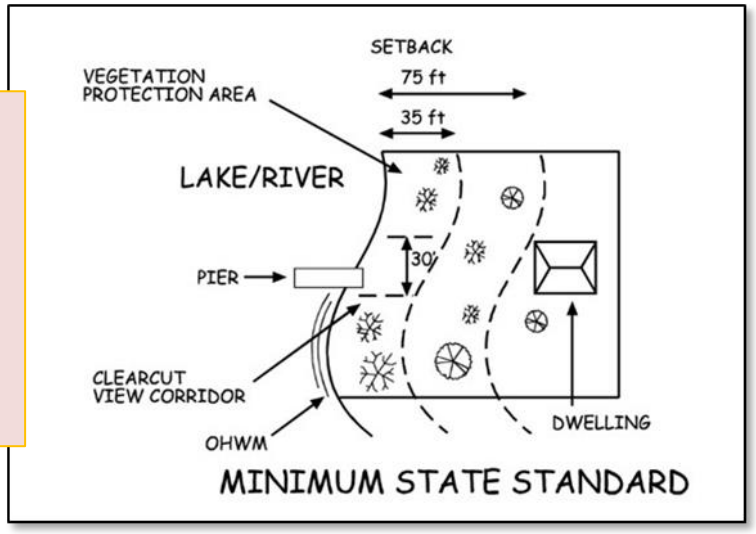
Total lakefront footage	No. Riparian lots	Measured shoreland disturbance (feet)	Measured shoreland disturbance (%)
12,681	90	8,378	66%

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:

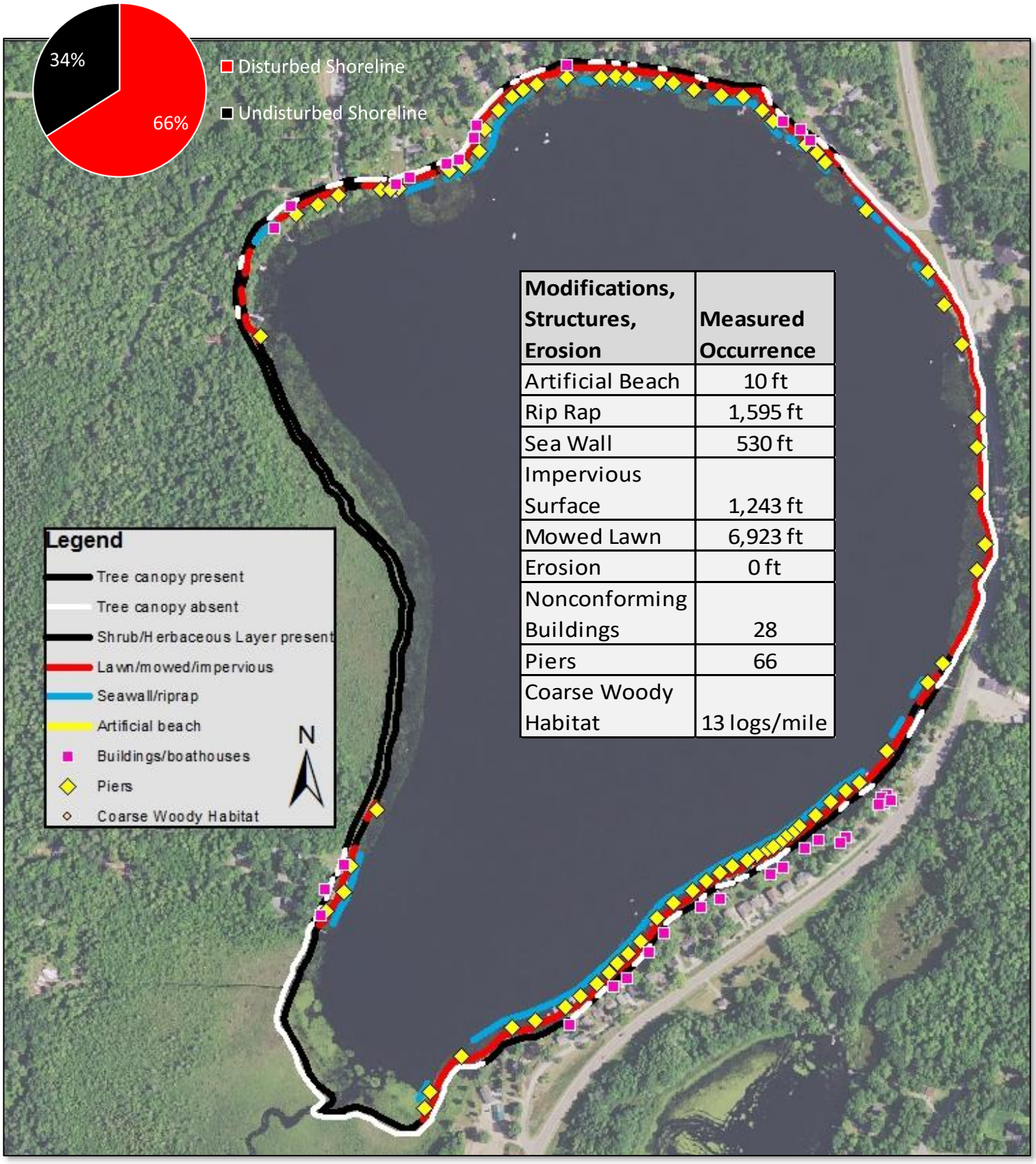
- Up to 30% of shoreline may be removed of shrubs and trees for a view corridor
- A mowed or constructed pedestrian path up to 5 feet wide to access lake



What Can You Do To Help Anderson 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

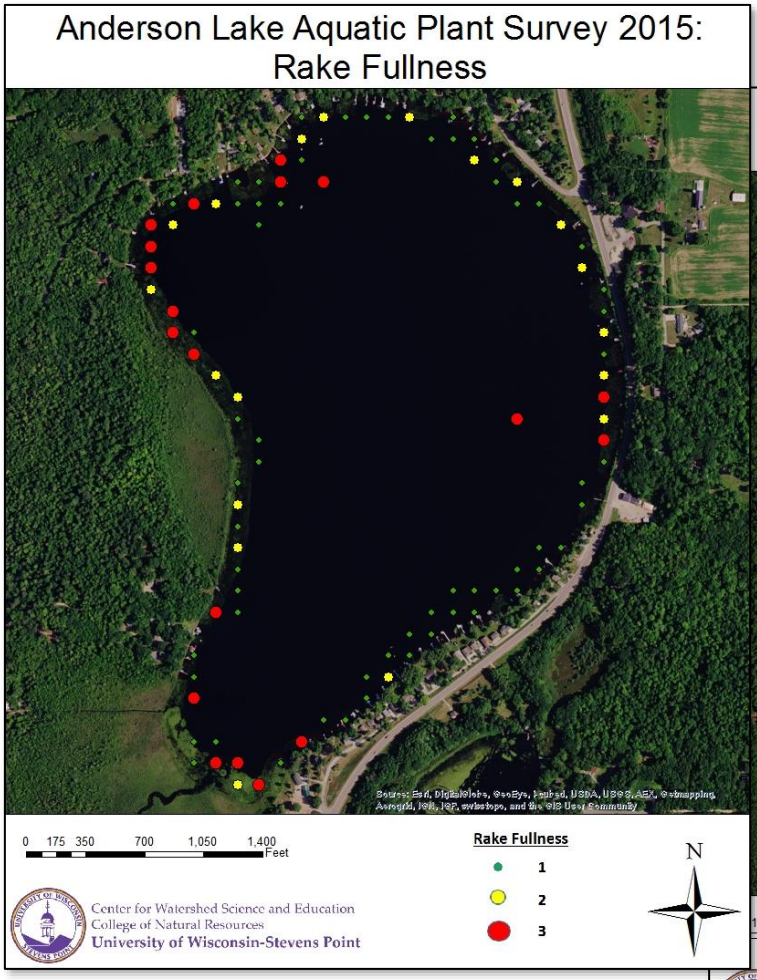


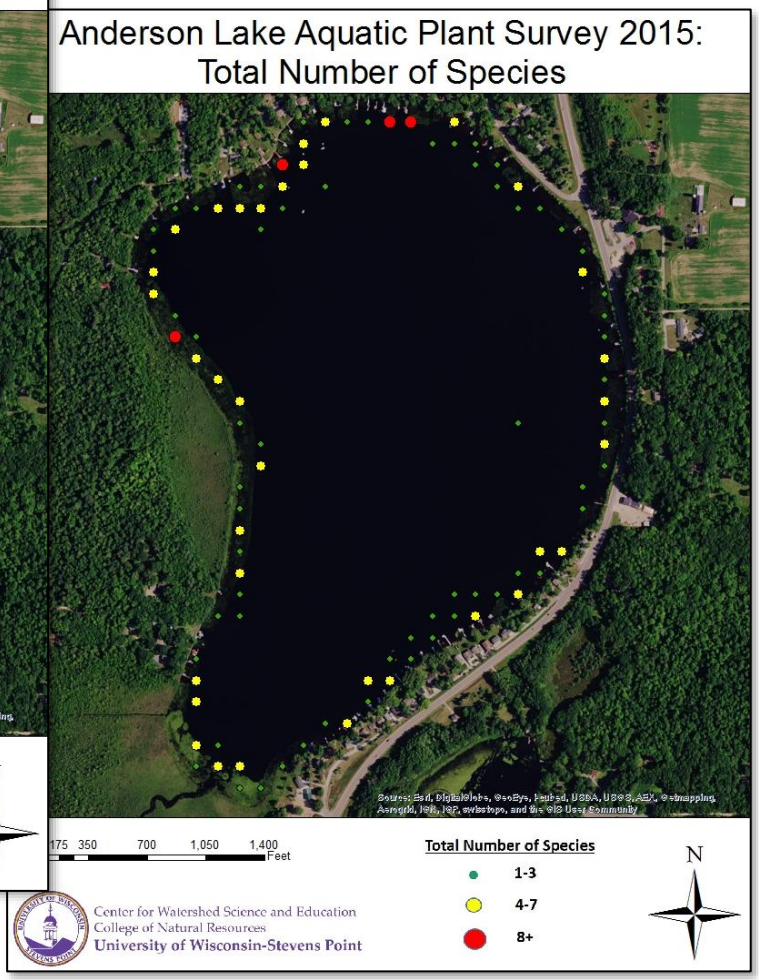
Modifications, Structures, Erosion	Measured Occurrence
Artificial Beach	10 ft
Rip Rap	1,595 ft
Sea Wall	530 ft
Impervious Surface	1,243 ft
Mowed Lawn	6,923 ft
Erosion	0 ft
Nonconforming Buildings	28
Piers	66
Coarse Woody Habitat	13 logs/mile

Aquatic Plants

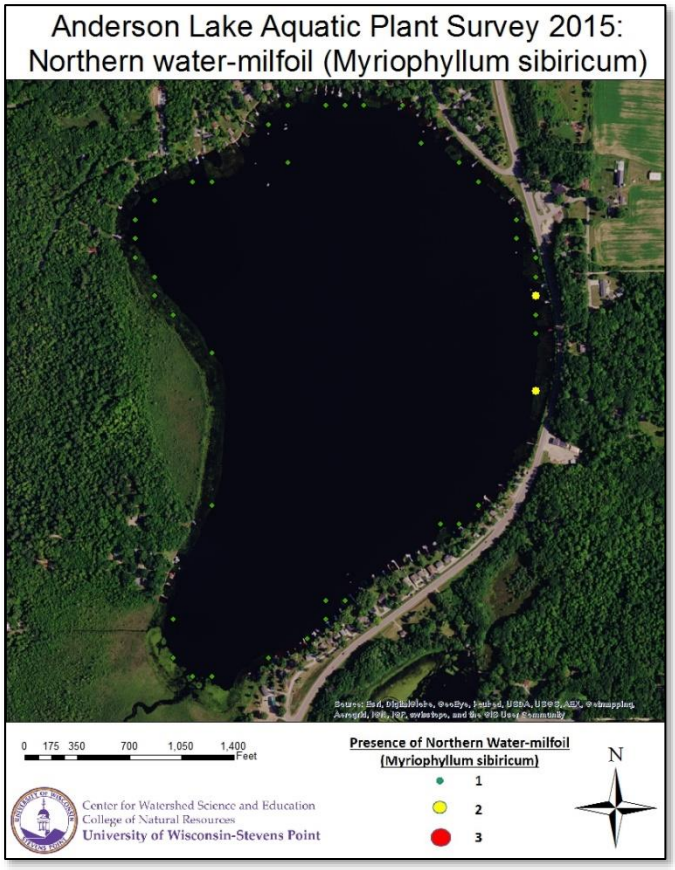
Aquatic plants are the forest landscape within a lake. They provide food and habitat for terrestrial and aquatic creatures such as fish, ducks, turtles, invertebrates and other animals. They increase oxygen levels in the water and utilize nutrients that would otherwise be used by algae. A healthy lake 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 Anderson Lake is characterized by above-average diversity of plant species when compared to other lakes in the Oconto County Lakes Project, with a total of 31 species in the 2015 survey.
- During the 2015 aquatic plant survey of Anderson Lake, 22% of the sites (90% of littoral area) had vegetative growth. The maximum depth of vegetation was 11 feet.
- The most frequently encountered plant species were northern water-milfoil (41%), water stargrass (39%), water marigold (30%) and wild celery (28%). All four species are native to Wisconsin.
- The exotic invasive Eurasian watermilfoil was observed at one location.

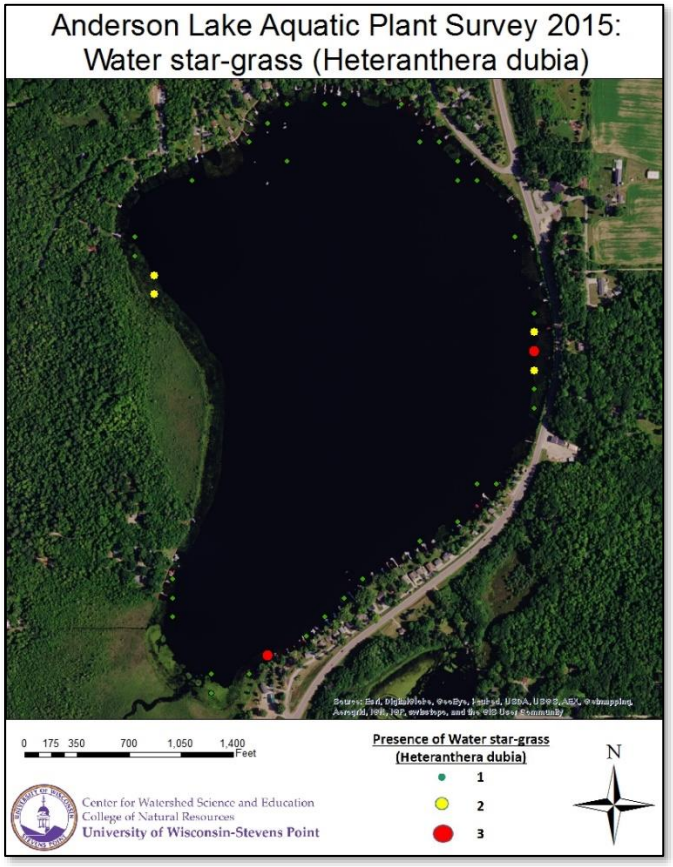




Aquatic Plants

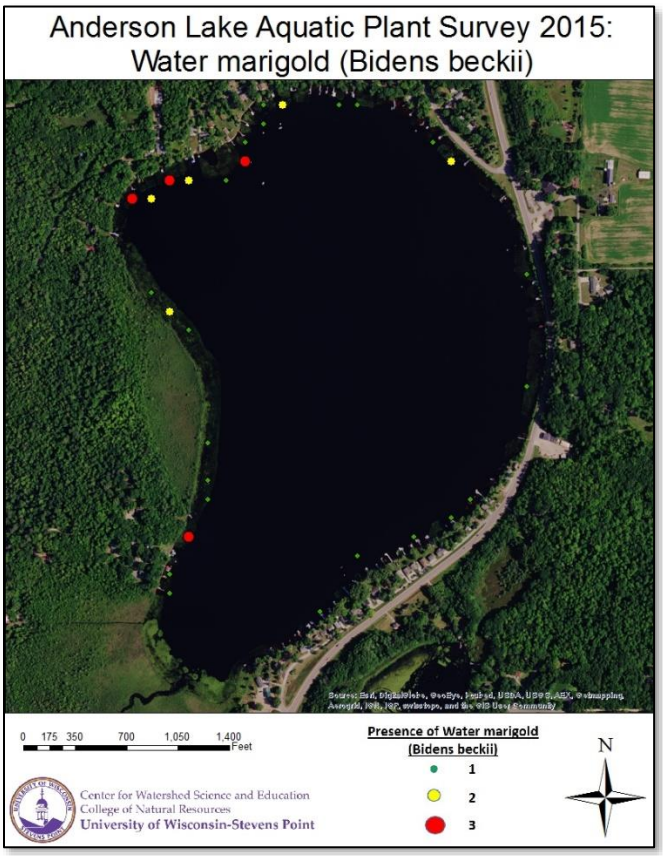


Northern water-milfoil is important forage and cover for aquatic animals and an important food source for waterfowl.

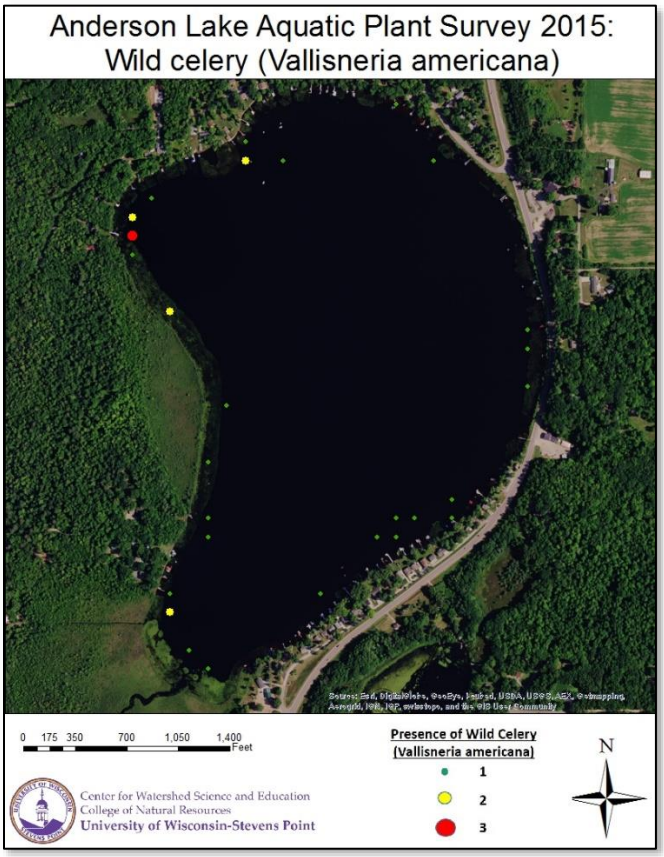


Water stargrass has long, thin, ribbon-like leaves that can grow up to 6 feet long and form floating colonies. It provides habitat for many micro and macro invertebrates and is consumed by ducks and wading birds.

Aquatic Plants



Water marigold prefers shallow lakes or slow-moving channels and is typically nestled in amongst other emergent vegetation. The seeds are preferred by wood ducks.

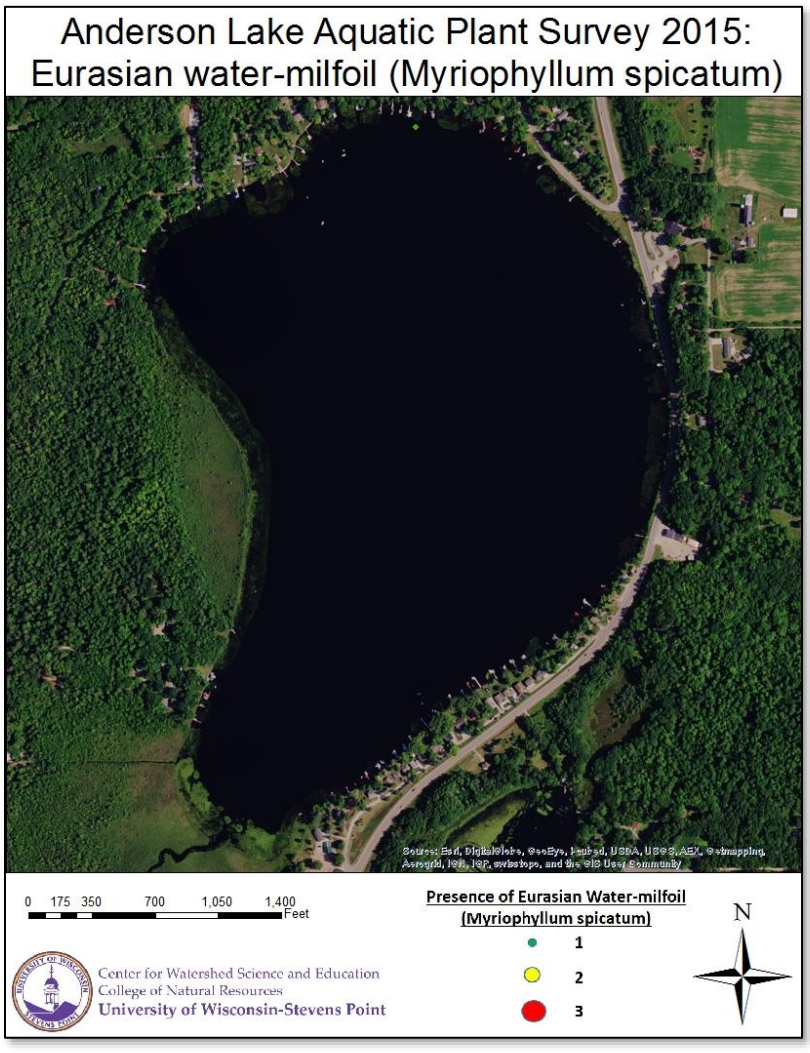


Wild celery has long, thin, ribbon-like leaves that are commonly up to four feet long. The seeds, roots and leaves are consumed by ducks and other waterfowl. Water celery provides excellent habitat for fish.

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 water-milfoil was observed at one location during the 2015 survey.
- ✓ Banded mystery snail (2016), Chinese mystery snail (2016), and rusty crayfish have been documented in Anderson Lake.



Eurasian water-milfoil 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.

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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Acknowledgments

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