Oconto County Lakes Project

RANCH LAKE STUDY

SUMMARY REPORT

2019

University of Wisconsin-Stevens Point and

Oconto County Staff and Citizens

Oconto County Lakes Project Reports:

State of the Oconto County Lakes

Lake Study Summary Reports

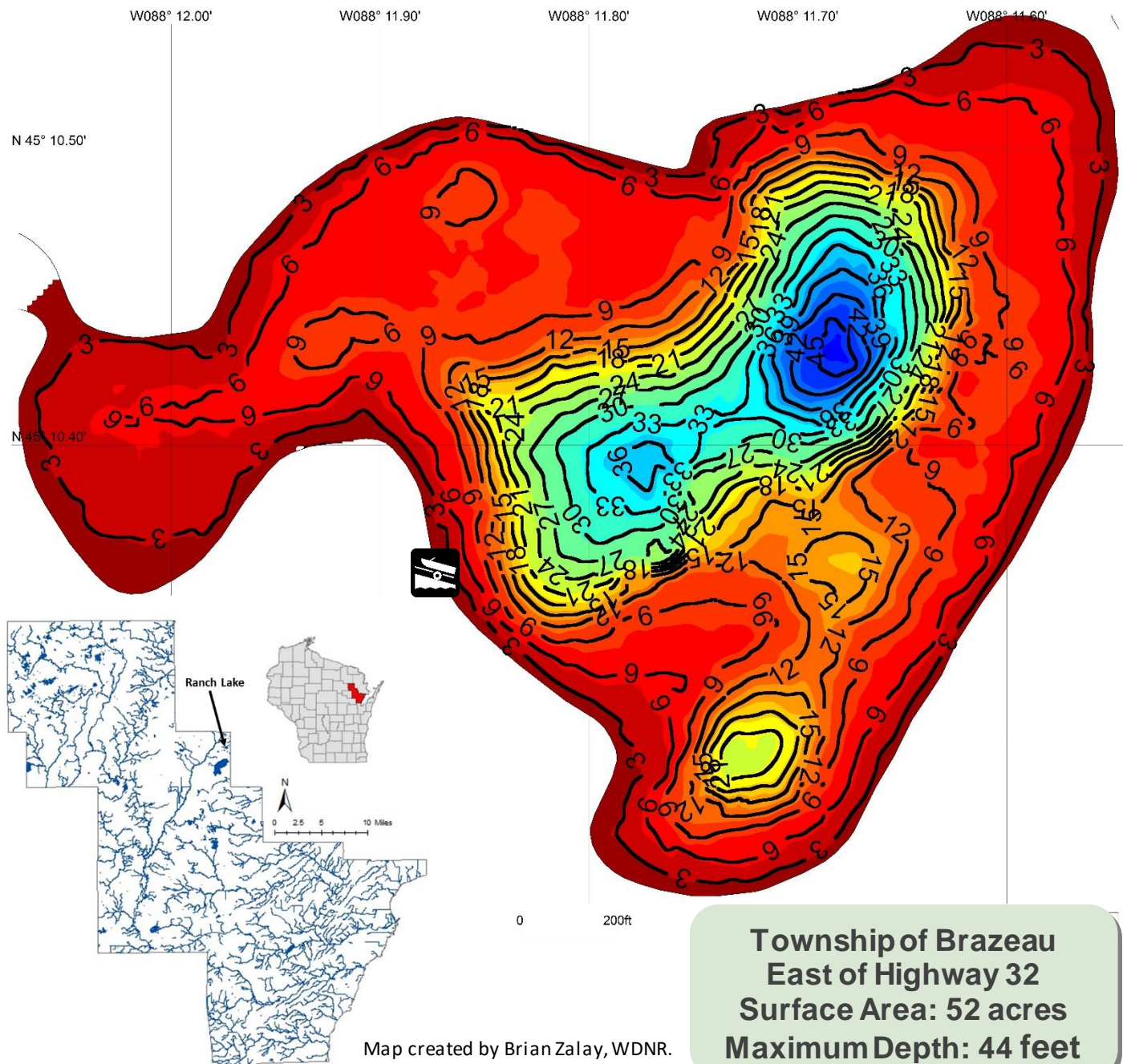**Operational Strategy and Plan for Surface Water Management and Protection**

Lake Management Plans

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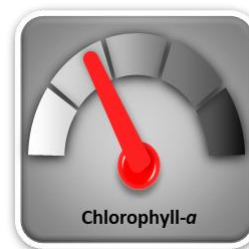**College of Natural Resources**
University of Wisconsin-Stevens Point

- Ranch Lake is a 52-acre seepage lake in northern Oconto County with a maximum depth of 44 feet.

- Most water enters Ranch 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 west side.

- This report summarized data collected during the 2017-2018 lake study.

Map created by Brian Zalay, WDNR.

**Township of Brazeau
East of Highway 32
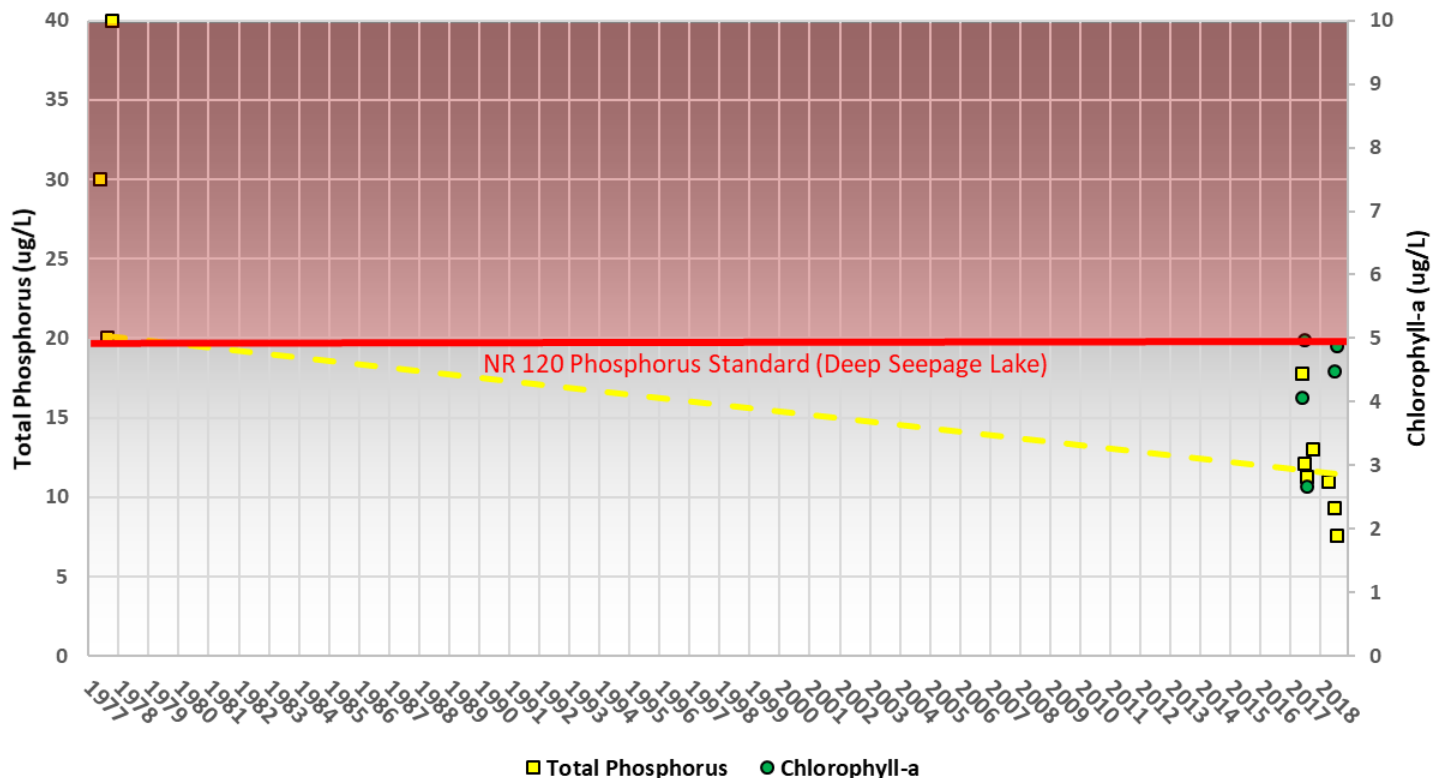Surface Area: 52 acres
Maximum Depth: 44 feet**

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 phosphorus standard of 40 ug/L for shallow drainage lakes during the two-year study. The 40-year trend is decreasing (based on July data).

- Inorganic nitrogen was very low (0.18 mg/L), well below the threshold of 0.3 mg/L when algal blooms increase.

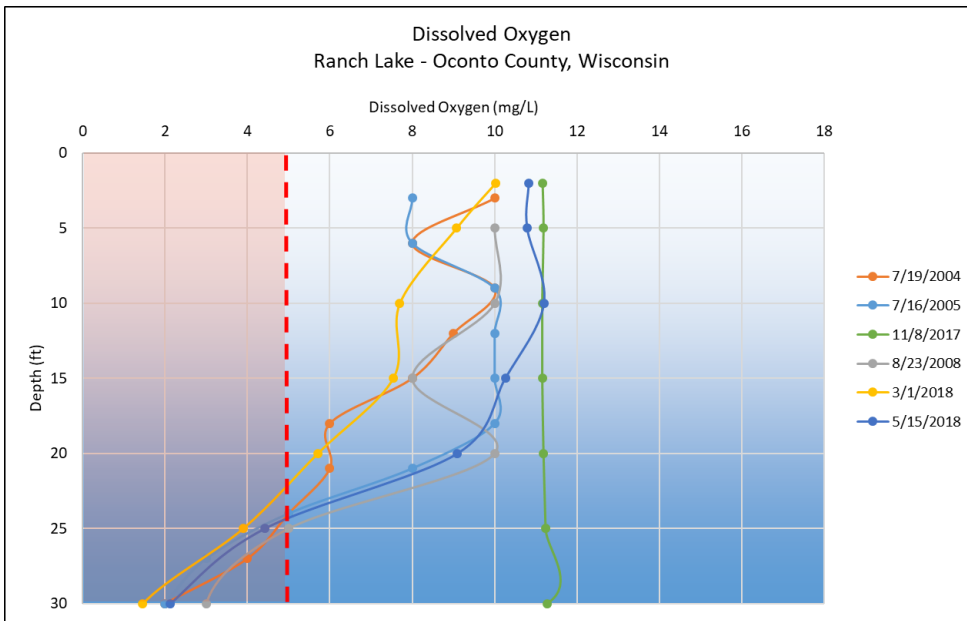- Chlorophyll-a, an indirect measure of algae, remained consistently below the threshold of 6 ug/L.

Total Phosphorus   **Inorganic Nitrogen**   **Chlorophyll-a**

Total Phosphorus & Chlorophyll-a
Ranch Lake - Oconto County, Wisconsin

NR 120 Phosphorus Standard (Deep Seepage Lake)

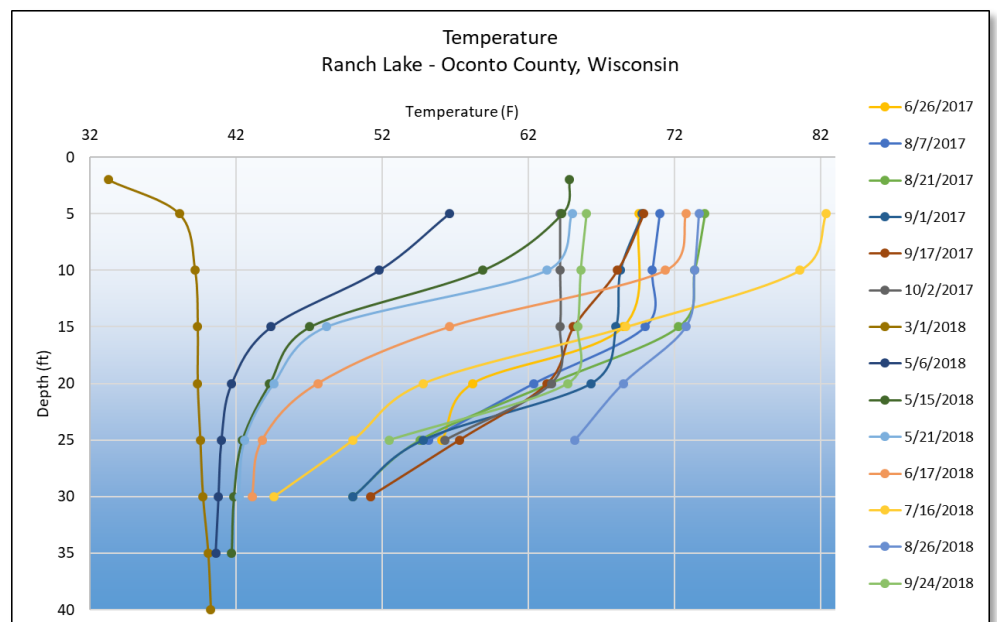□ Total Phosphorus   ● Chlorophyll-a

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.

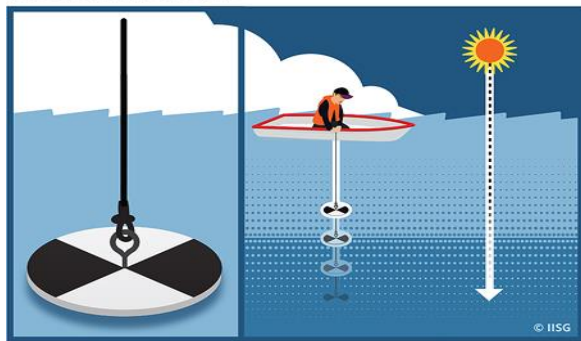Dissolved Oxygen
Ranch Lake - Oconto County, Wisconsin

- During most of the year, sufficient oxygen is available in Ranch Lake throughout the water column to about 23 feet in depth.
- Bumps in dissolved oxygen at depth (10 feet and 20 feet) suggest mild algal activity.

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

- The temperature gradient shows a clear thermocline between 10-25 feet during summer months, typical of a stratified, deep lake.
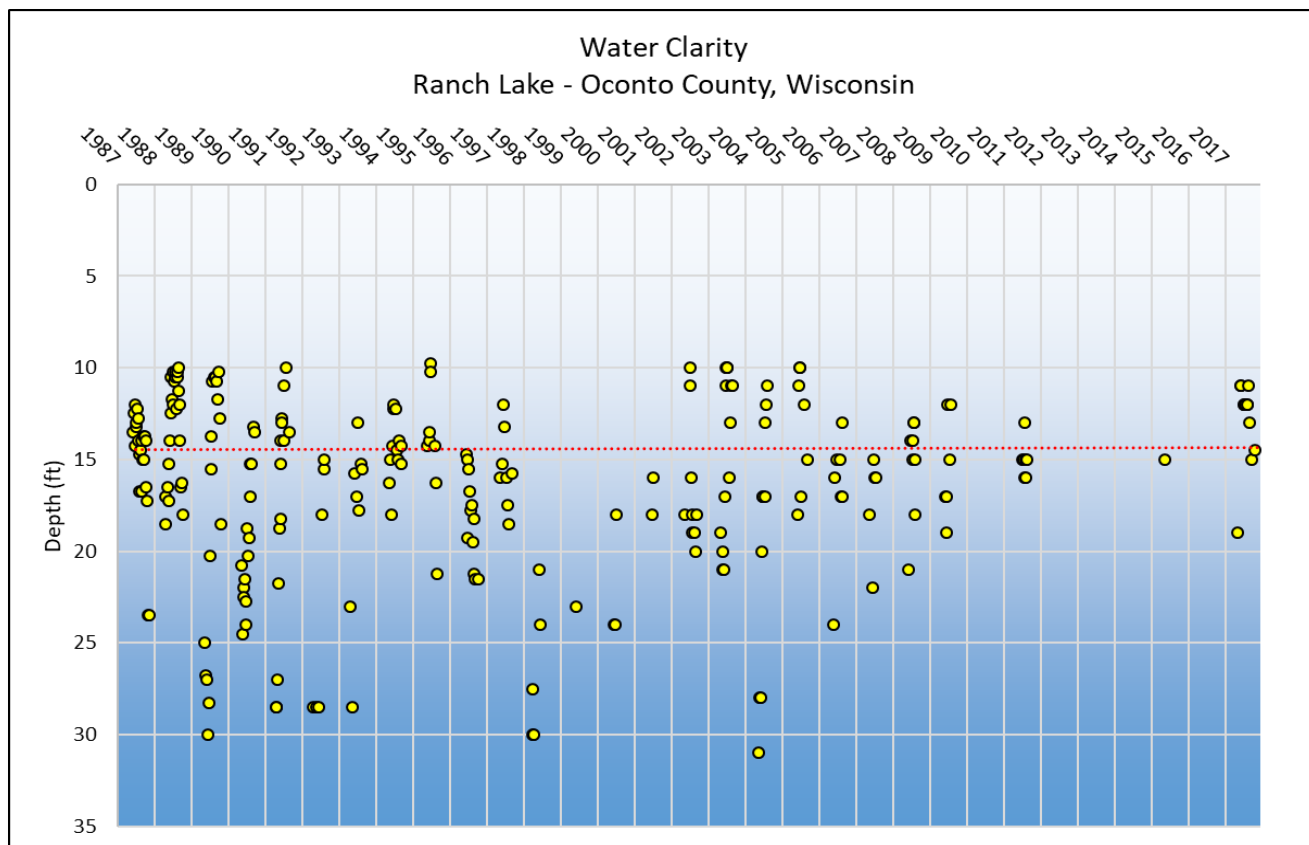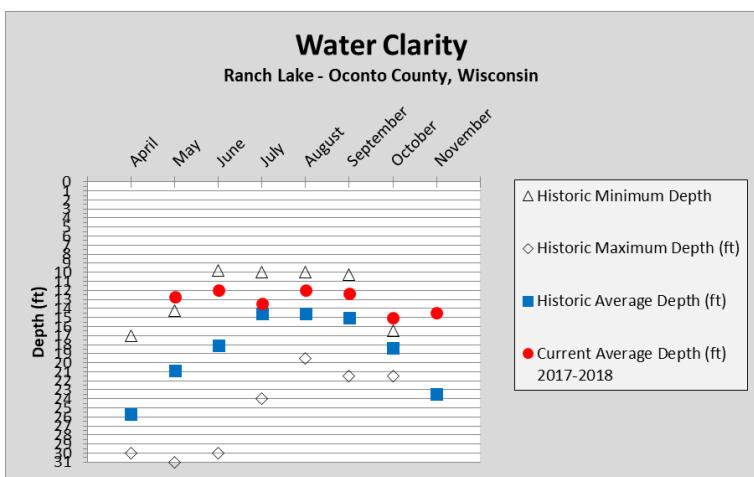

Temperature
Ranch Lake - Oconto County, Wisconsin

Secchi Disk

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.

- The graph below shows water clarity measurements taken between April and November. It is typical for water clarity to vary throughout the year.

- During 2017-18, on average, the poorest water clarity in Ranch Lake was in June and the best was in September. This is consistent with previous observations and demonstrates a slightly increasing trend over the past 14 years.

Water Clarity
Ranch Lake - Oconto County, Wisconsin

△ Historic Minimum Depth
◇ Historic Maximum Depth (ft)
■ Historic Average Depth (ft)
● Current Average Depth (ft) 2017-2018

Water Clarity
Ranch Lake - Oconto County, Wisconsin

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.
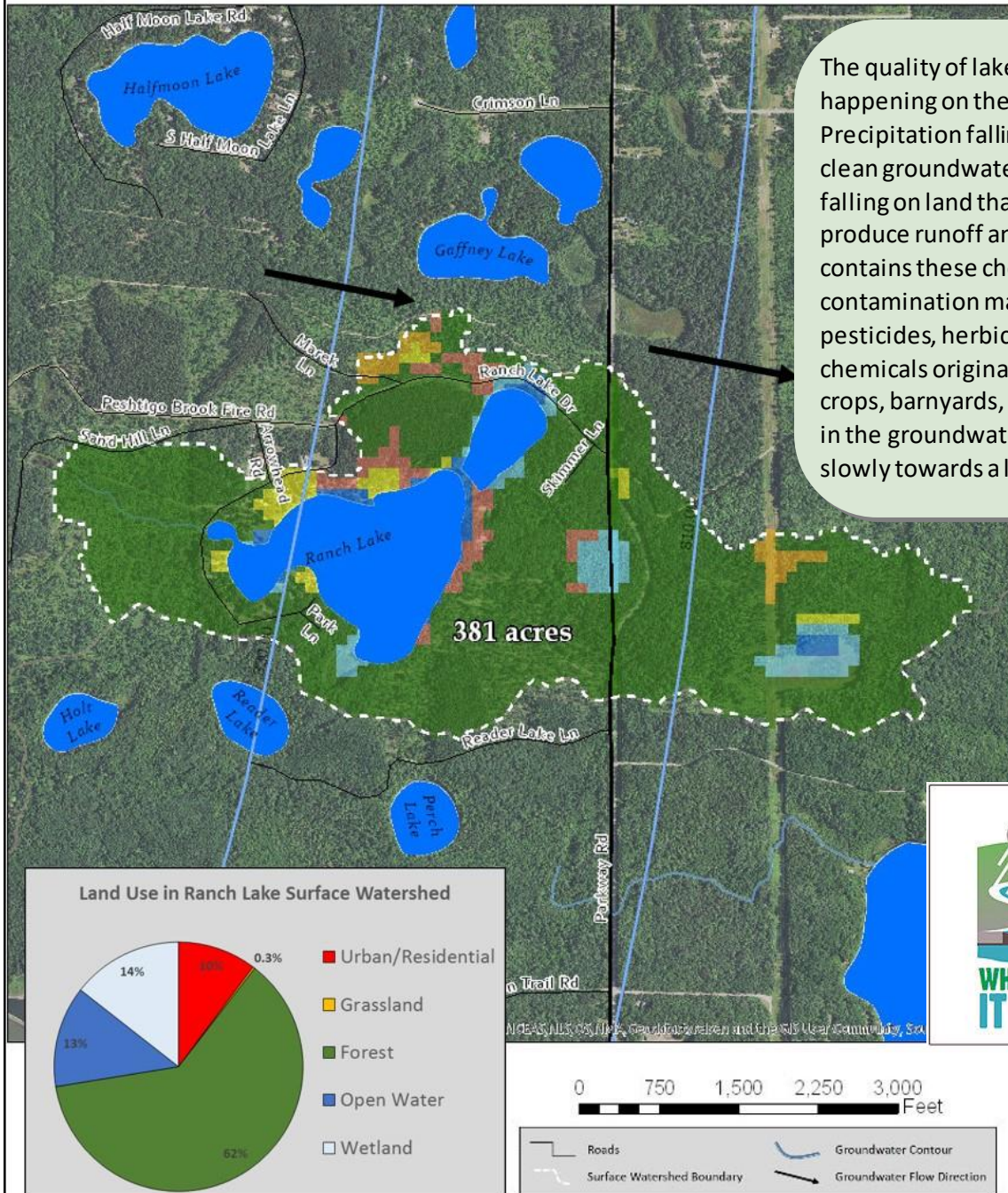
- Concentrations of potassium (0.56 mg/L), sodium (1.268 mg/L) and chloride (1 mg/L) were all low. This suggests minimal impact from septic systems, road salt, animal waste and fertilizers.

- DACT, a screening tool to determine if your lake is being impacted by pesticides, was not detected.

- Water in Ranch Lake is moderately hard (76 mg/L CaCO3), having an elevated level of dissolved minerals. Hard water lakes tend to produce more fish and aquatic plants than soft water lakes and have clearer water as the 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.

Ranch 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.

Land Use in Ranch Lake Surface Watershed

- Urban/Residential
- Grassland
- Forest
- Open Water
- Wetland

WHEN IT RAINS IT DRAINS

| 0 | 750 | 1,500 | 2,250 | 3,000 |
Feet

Roads
Surface Watershed Boundary
Groundwater Contour
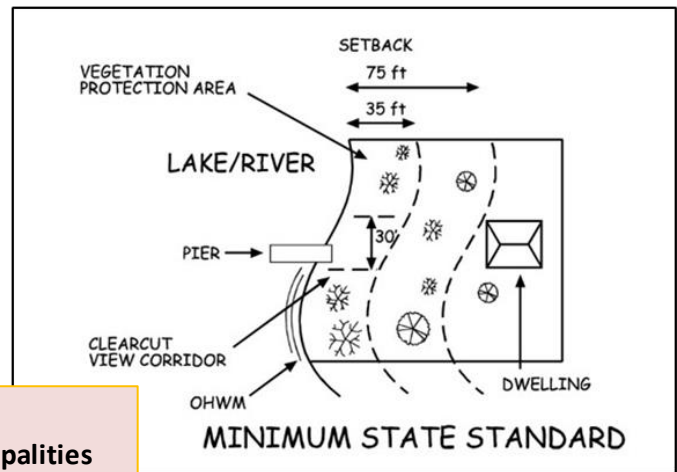Groundwater Flow Direction

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 of the runoff that is flowing across the landscape towards the lake. Healthy shoreland vegetation includes a mix of tall grasses/flowers, shrubs and trees.

Shorelands around Ranch Lake were surveyed in July 2017. Much of Ranch Lake's shoreland is healthy, but some stretches are in need of restoration. Restoration would benefit the lake.

Total lakefront footage	No. Riparian lots	Total allowable (NR115) disturbed shoreland-feet	Total allowable (NR115) disturbed shoreland-%	Measured shoreland disturbance-feet	Measured shoreland disturbance-%
7,203	40	1,200	17%	2,547	35%

State Shoreland Zoning Ordinance
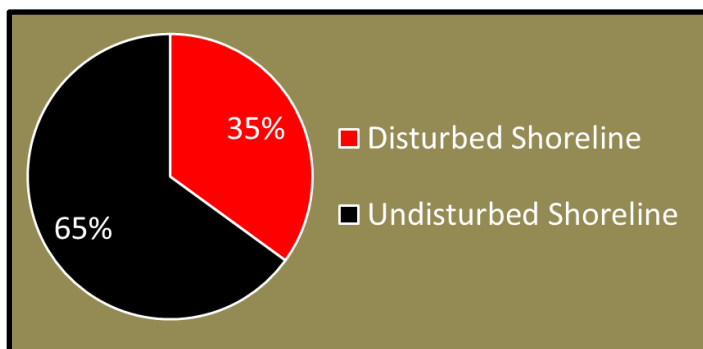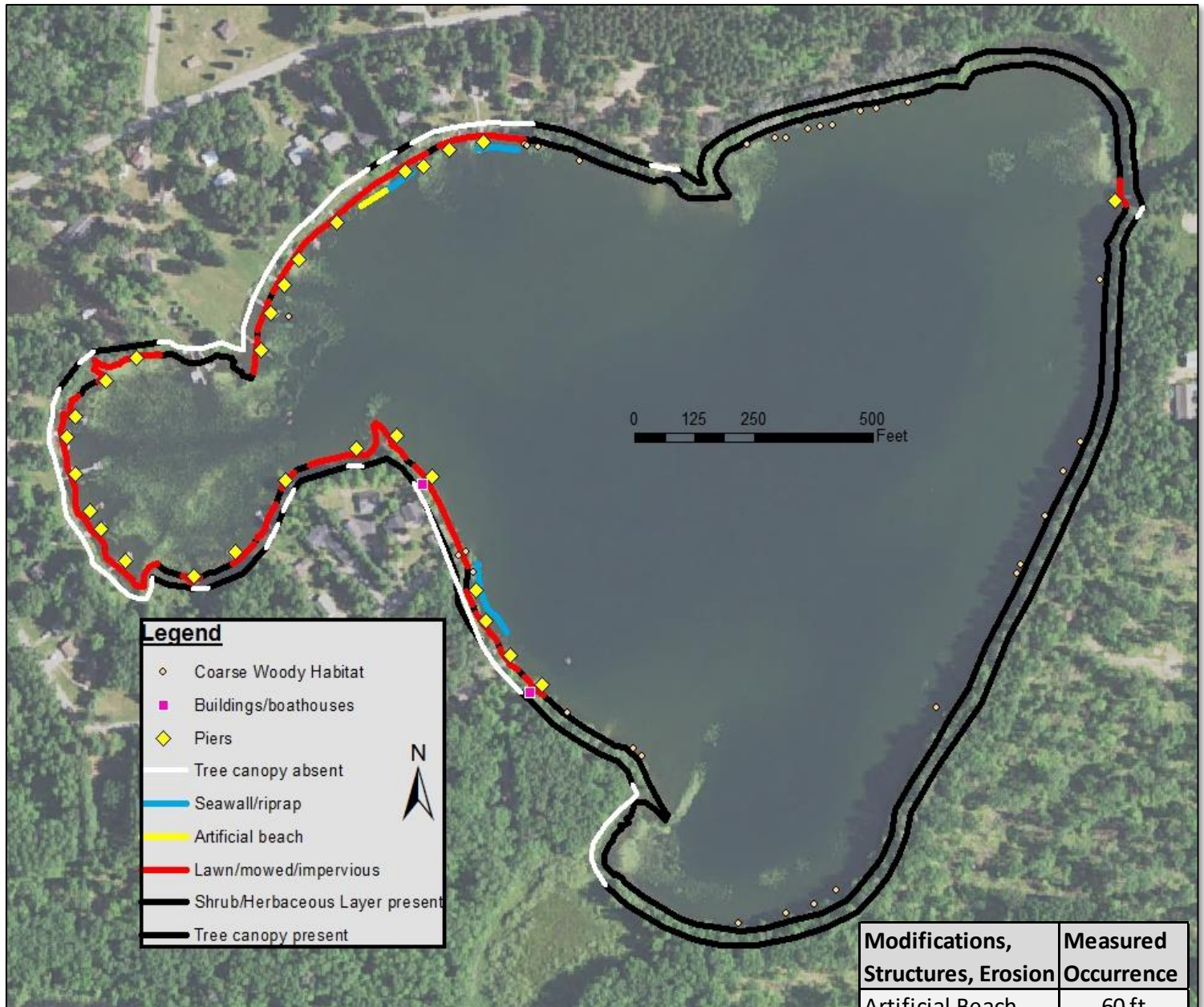NR 115 Wisc. Adm. Code for Unincorporated Municipalities
No vegetation within 35 feet of the lake's edge shall be removed except for:
- Up to 30% of shoreline may be removed of shrubs and trees for a view corridor
- A mowed or constructed pedestrian path up to 5 feet wide to access lake

What Can You Do To Help Ranch Lake?

- ✓ Leave natural shoreland vegetation in place or restore if it has been removed.
- ✓ Learn 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.
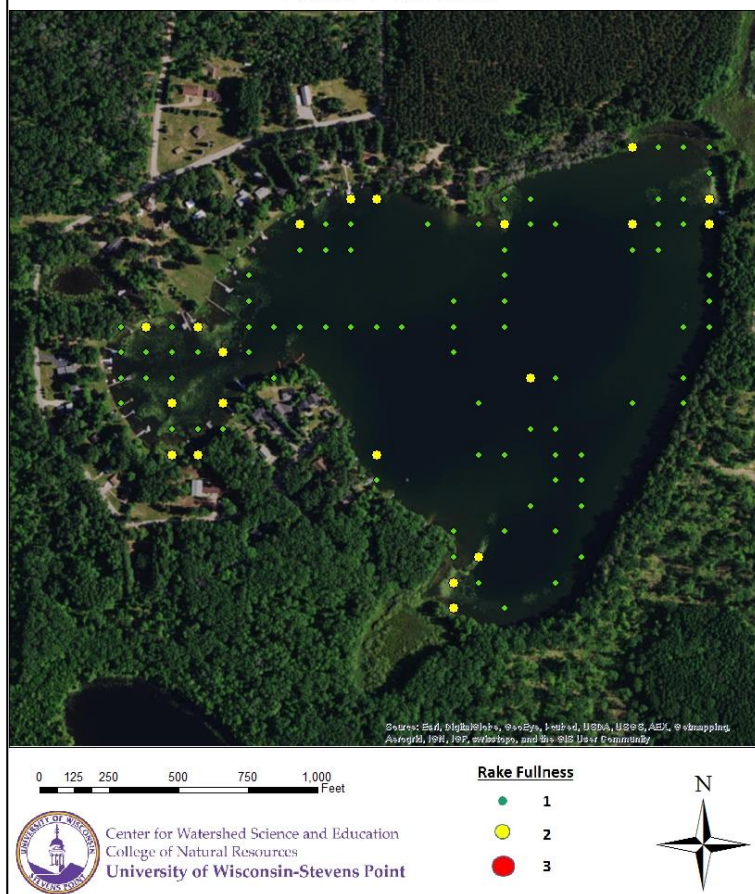
Legend

- ◇ Coarse Woody Habitat
- ■ Buildings/boathouses
- ◇ Piers
- — Tree canopy absent
- — Seawall/riprap
- — Artificial beach
- — Lawn/mowed/impervious
- — Shrub/Herbaceous Layer present
- — Tree canopy present

N

Pie chart:
- 35% Disturbed Shoreline
- 65% Undisturbed Shoreline

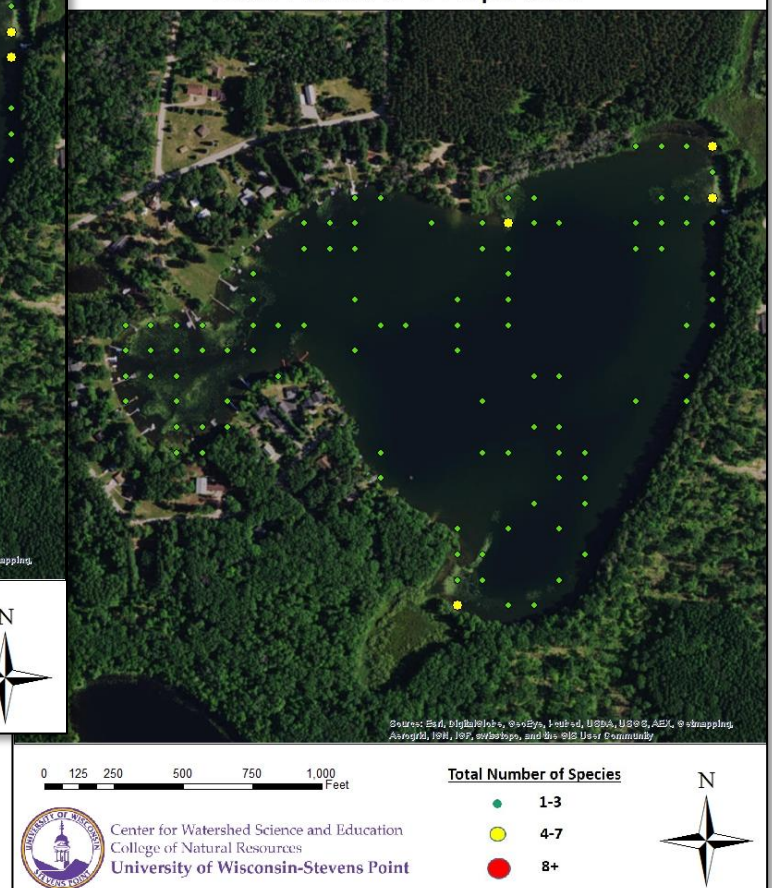| Modifications, Structures, Erosion	Measured Occurrence
Artificial Beach	60 ft
Rip Rap	0 ft
Sea Wall	195 ft
Impervious Surface	37 ft
Mowed Lawn	2,371 ft
Erosion	25 ft
Nonconforming Buildings	2
Piers	27
Coarse Woody Habitat	23 logs/mile

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 Ranch Lake is characterized by an average diversity of plant species when compared to other lakes in the Oconto County Lakes Project, with a total of 23 species in the 2017 survey.
- During the 2017 aquatic plant survey of Ranch Lake, 40% of the sites had vegetative growth. The maximum depth of vegetation was 32 feet.
- The most frequently encountered plant species were slender naiad (32%), variable pondweed (31%), and white water lily (20%). All three species are native to Wisconsin.
- No invasive species were observed.
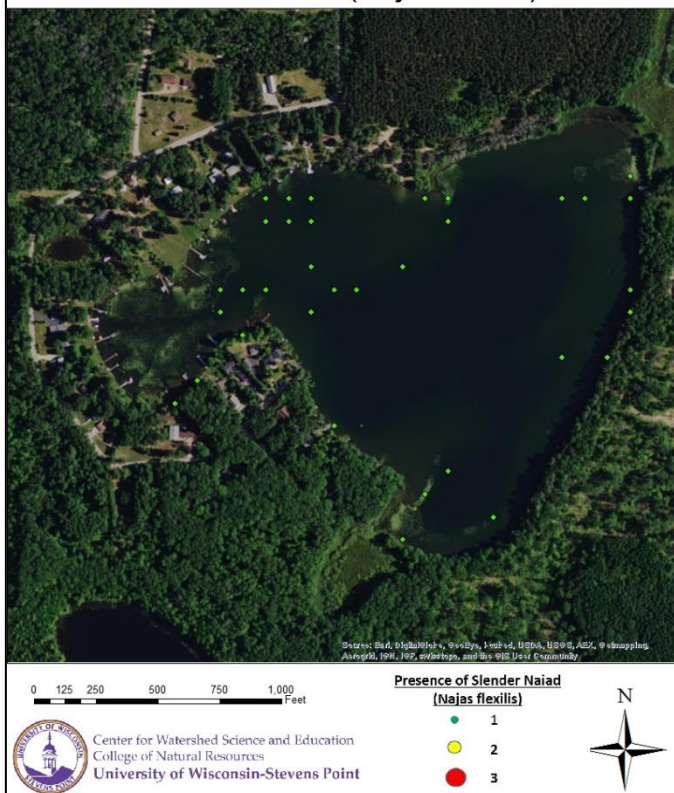

Ranch Lake Aquatic Plant Survey 2017: Rake Fullness

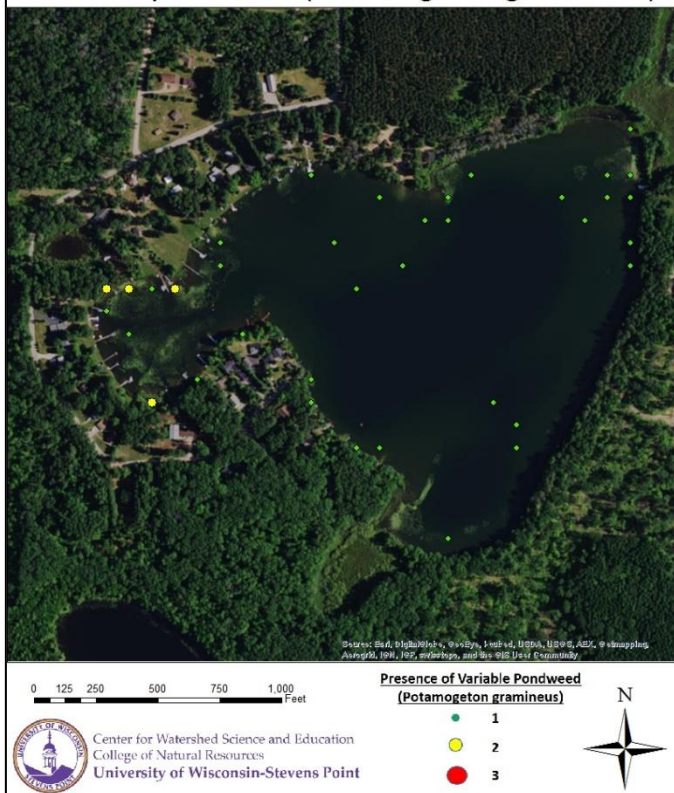Ranch Lake Aquatic Plant Survey 2017: Total Number of Species

Aquatic Plants

Ranch Lake Aquatic Plant Survey 2017: Slender naiad (Najas flexilis)

0 125 250   500   750   1,000 Feet

Presence of Slender Naiad (Najas flexilis)
- 1
- 2
- 3

N

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

Slender naiad has glossy, finely toothed leaves appearing as whorls near the end of stems. Also known as the water-nymph, the whole plant is eaten by waterfowl and provides shelter for small fish and insects.

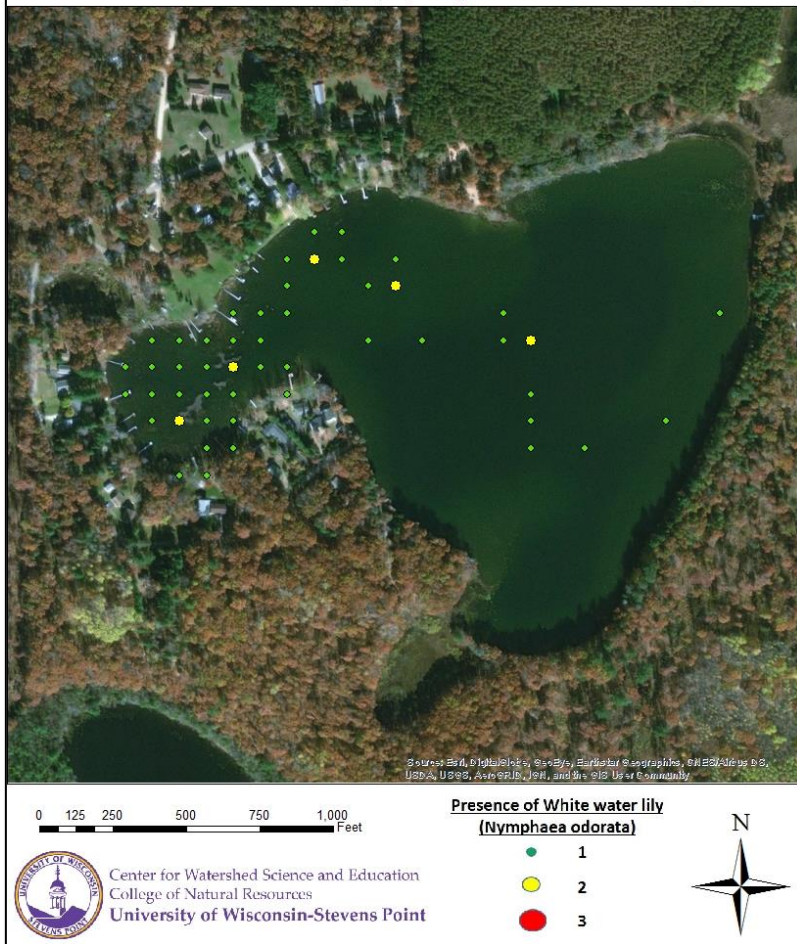### Ranch Lake Aquatic Plant Survey 2017: Variable pondweed (Potamogeton gramineus)

0 125 250   500   750   1,000 Feet

Presence of Variable Pondweed (Potamogeton gramineus)
- 1
- 2
- 3

N

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

Variable pondweed has both floating and submersed leaves, which provide food and habitat for fish.

(C) Paul Skawinski, 2009

Ranch Lake Aquatic Plant Survey 2017:
White water lily (Nymphaea odorata)

Presence of White water lily (Nymphaea odorata)
- 1
- 2
- 3

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

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.

(C) Paul Skawinski, 2009

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 lake ecosystem.

✓ No invasive species were observed during the 2017 aquatic plant survey.