



A map of Wisconsin showing its 9 counties. Lincoln County is highlighted in blue. The counties shown are: Douglas, Bayfield, Ashland, Iron, Vilas, Florence, Burnett, Washburn, Sawyer, Pricke du Lac, Forest, Marquette, Polk, Barron, Rusk, Taylor, Lincoln, Langlade, Marathon, Oneida, Shawano, Pierce, Dunn, Chippewa, Eau Claire, Clark, Wood, Portage, Waupaca, Outagamie, Brown, Pepin, Buffalo, Trempealeau, Jackson, Adams, Winnebago, Manitowish, Waushara, Green Lake, Fond du Lac, Sheboygan, Waubesa, Crawford, Richland, Sauk, Columbia, Dodge, Washington, Ozaukee, Vernon, Monroe, Juneau, Marquette, Jefferson, Winnebago, Manitowish, Grant, Lafayette, Green, Rock, Waushara, Racine, Kenosha.



*Michele Sadauskas, County Conservationist
Stephanie Boismenu, AIS Coordinator
Jonna Stephens Jewell, Program Assistant*

*Oneida County Courthouse
P O Box 400, Rhineland, Wisconsin 54501
Phone (715) 369-7835 Fax (715) 369-6268*

Thunder Lake AIS Monitoring and Water Clarity Report

Field Date: June 29, 2022
WBIC: 1618100
Previous AIS Findings: Chinese Mystery Snails, Banded Mystery Snails
New AIS Findings: No new AIS found.
Field Crew: Aubrey Nycz, AIS Lead Program Assistant, and Madeline Hetland, AIS
Project Assistant, Oneida County Land and Water Conservation
Department
Report By: Madeline Hetland

Purpose: Water is Wisconsin's most precious resource. It provides an essential lifeline between wildlife, recreation, public trust resources, agriculture, industry, health and safety, and environmental, urban and rural interests throughout the state. With a growing population and a treasured supply of fresh water, the protection of water for designated and beneficial uses is of paramount importance.

Each year, the Oneida County Aquatic Invasive Species (AIS) Program staff conducts AIS early detection monitoring and baseline water quality monitoring in Oneida County waterbodies. In addition, staff conducts AIS monitoring at boat landings, rivers, streams, wetlands, roadsides, culverts, and Organisms in Trade. Monitoring takes place from June through September of each year.

AIS early detection monitoring is the most effective approach to locating pioneer populations of WI Chapter NR 40 regulated AIS, species not widely established, and newly introduced species to Wisconsin. Early detection of AIS is crucial for rapid response, containment, management, preventing their spread, and reducing management costs. Implementation of rapid response activities is vital in maintaining the stability of a waterbodies ecosystem services, habitats, fisheries, recreational opportunities, property values, economy, and human health.

Water quality monitoring provides information on the physical, chemical, and biological characteristics of water. Monitoring aims at assessing the environmental state, detecting trends, and identifying potential problems in the water or watershed. The state of water quality is the result of complex natural and manmade conditions and the consequent of those interactions over time. Evaluating trends determines whether water quality is changing relative to land use and natural conditions. Water quality data provides important and useful information to lake groups, local and regional resource managers, community stakeholders, and provides guidance

with protecting and enhancing our waters, watersheds and development to new approaches to water quality management.

Our monitoring program is in collaboration with the DNR, UW Extension's Citizens Lake Monitoring Network Program, and Great Lakes Indian Fish Wildlife Commission. All AIS staff are trained in the in the DNR's AIS monitoring, identification, collection, verification, reporting, and decontamination protocols.

Data Collected: AIS identification, live specimens, photos, population densities, distribution, locations and GPS coordinates. Other observations may include species size, characteristics, and impact to native habitat. Water quality data includes Secchi disc, dissolved oxygen, temperature, water characteristics, and GPS coordinates.

Areas Observed: Perimeter of whole lake's littoral zone, including beaches and boat landings, inlets and outlets, under and around docks and piers, and other areas identified as most vulnerable to the introduction of AIS.

Methodology: Searching for AIS in the water and along the shoreline is achieved by slowly canoeing around the entire lake's littoral zone, meandering between shallow and maximum rooting depth or 100' from shore (whichever comes first). Additionally, targeted sites considered high risk of invasive species introductions, such as boat landings, access points, parks, beaches, and inlets receive comprehensive AIS monitoring. Several methods and tools are utilized to achieve the survey: survey from the canoe, walking along the shoreline and shallows, using aqua view scopes, snorkeling to examine underwater solid surfaces, sifting through vegetation, and analyzing plant rake samples, veliger tows, and D-net sediment samples.

Targeted Chapter NR40 Invasive Species Include: Asian clams, banded mystery snails, Chinese mystery snails, Faucet Snails, New Zealand mudsnail, quagga mussels, zebra mussels, rusty crayfish, spiny waterfleas, Eurasian watermilfoil, curly leaf pondweed, flowering rush, non-native phragmites, purple loosestrife, yellow iris, and variegated reed manna grass (*Glyceria Maxima* 'Variegated').

Other priority species include: red swamp crayfish, Japanese knotweed, Japanese hops, European frog-bit, yellow floating heart, water chestnut, Brazilian waterweed, Hydrilla, fanwort, parrot feather, water, hyacinth, water lettuce, and rock snot.

Thunder Lake Data: Thunder Lake, located in the Town of Three Lakes, Oneida County, is a 1794-acre drainage lake with a maximum depth of 10.5 feet (Figure 1.). There are two public boat landings on Thunder Lake located off of Rice Lake Road and County Hwy A. (Figure 2). The substrate is 60% sand, 15% gravel, 5% rock, and 20% muck. Along with reporting the depth and substrate, the Wisconsin Department of Natural Resources (DNR) reports that the lake has panfish, largemouth bass, northern pike, and walleye.

Field Notes (weather): The weather while conducting research on Thunder Lake was mostly sunny. The air temperature was fair. There was not a lot of wind which made it easy to see into the water.

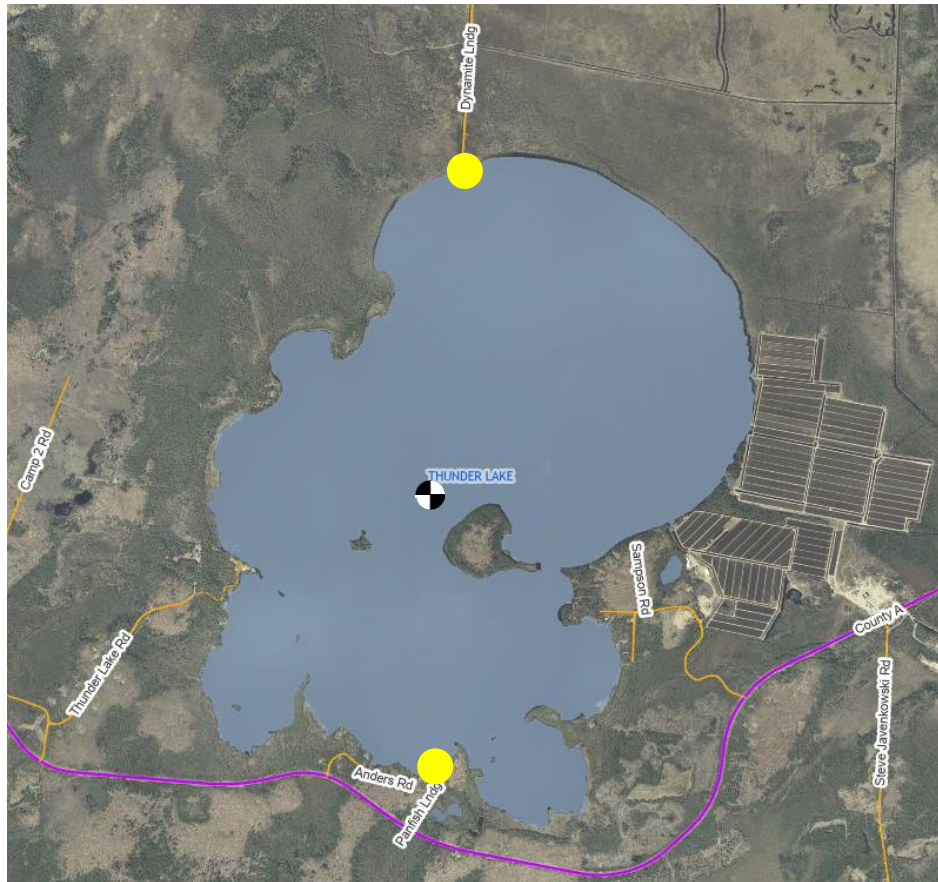
Field Notes (AIS monitoring): We completed a visual meander survey around the entire lake's perimeter, searching both sides of the boat, and moving in and out between various water depths. Polarized sunglasses were used to aide in looking at the bottom substrate. We looked both in the water and along the shoreline and made note of the plants and animals we observed in the process (see table 1).

Field Notes (water quality monitoring): To observe the water clarity and quality on Thunder Lake, we used a depth finder and maps indicating where data had been collected in the past to locate the deep hole. After locating the deep hole, we used a Secchi disk to measure water clarity and a dissolved oxygen meter to measure water quality. Oxygen is needed for a healthy fish population, and also for plants to respire at night. The measurements from the dissolved oxygen meter can tell us if the organisms in the lake are under stress. The dissolved oxygen measurements on Thunder Lake were at healthy levels, and the water is well oxygenated. These measurements can be found in table 2. The Secchi disk reading was at 5 feet out of a maximum depth of 10.5 feet.

Figure 1. Map of Oneida County, WI with Thunder Lake circled in red.



Figure 2. Map of Thunder Lake.



Map Key



Boat Landings








Location of dissolved oxygen and Secchi disk reading

Latitude: 45.787341

Longitude: -89.219707

Table 1. Common plants found in Thunder Lake while monitoring.

<p>Blue Flag Iris (<i>Iris versicolor</i>)</p> <p>Description: A semi-aquatic to emergent perennial. Flowers are deep blue to purple, 6 parted, 6-8 cm wide. Sepals may have greenish-yellow markings at the base surrounded by a white zone. Leaves are narrow, sword-like; arranged in flattened, fan-like clusters. Flowers stalks (20-80 cm high) are taller than the leaves.</p> <p>Status: Native</p> <p><i>Photo Credit: Wisconsin Department of Natural Resources</i></p>	
<p>Bullhead Pond Lily (<i>Nuphar variegata</i>)</p> <p>Description: An aquatic plant with heart shaped leaves up to 40cm long, floating on surface. Has a cup-shaped yellow flower, often with dark patches at the base of each petal. Leaves originate from a thick, spongy rhizome, which can be uprooted.</p> <p>Status: Native</p> <p><i>Photo Credit: Jomegat's Weblog</i></p>	
<p>Coontail (<i>Ceratophyllum demersum</i>)</p> <p>Description: An aquatic plant that is heavily branched and light green to brown in color. This plant grows to be 2 m tall, has whorled leaves that branch once or twice, and is bushy at the tip.</p> <p>Status: Native</p> <p><i>Photo Credit: illinoiswildflowers.info</i></p>	
<p>Pickereel Weed (<i>Pontederia cordata</i>)</p> <p>Description: An aquatic plant with thin, bright green leaves. Emergent leaves tend to be arrow shaped with 6 parted, blue flowers.</p> <p>Status: Native</p> <p><i>Photo Credit: asapaquatics.com</i></p>	
<p>White Water Lily (<i>Nymphaea odorata</i>)</p> <p>Description: An aquatic plant that has large, round leaves that can grow to be 12 inches in diameter. White water lilies also have large, white flowers with many petals.</p> <p>Status: Native</p> <p><i>Photo Credit: Stephanie Boismenu</i></p>	

Large Leaf Pondweed (*Potamogeton amplifolius*)

Description: A submerged aquatic plant. Submergent leaves are very broad (4-7 cm wide and 8-20 cm long), arched and slightly folded. Floating leaves are 2-23cm long, with a petiole longer than the leaf blade.

Status: Native

Photo Credit: Paul Skawinski



Water Shield (*Brasenia schreberi*)

Description: An aquatic plant with stems up to 2 meters long. This plant has small floating leaves and reddish purple flowers that have 6-8 petals. Stems and underside of leaf are usually covered in a clear, slimy coating.

Status: Native

Photo Credit: Shannon Sharp



Clasping-leaf pondweed (*Potamogeton richardsonii*)

Description: A submerged aquatic plant. Leaves are wavy and smooth with pointed tips. Leaves clasp (partially wrap around) the stem.

Status: Native

Photo Credit: Paul Skawinski



Floating Bur-reed (*Sparganium fluctuans*)

Description: An emergent plant. Stem is usually submerged can be up to 5 feet long. Leaves are flat, spear-like, and can grow 40 inches long. Flowers are small and are in globular clusters.

Status: Native

Photo Credit: science.halleyhosting.com



Slender Naiad (*Najas flexilis*)

Description: A submersed plant. Stems grow from a thin rootstalk and are finely branching. Leaves are 1 - 4 cm long, slender, taper to a point, and have very finely toothed edges.

Status: Native

Photo Credit: IUCNredlist.org



Variable Leaf Pondweed *Potamogeton gramineus*

Description: Submergent leaves with 3-7 veins and floating leaves with 11-19 veins. Leaves may be small and clustered, large and singular, or both leaf forms may occur on the same plant. Can be found growing at various water depths.

Status: Native

Photo Credit: outdooralabama.com



Broad-leaved Cattail (*Typha latifolia*)

Description: An emergent plant. Leaves are sword-like (10-23 mm wide, 1 – 3 m tall). The flower resembles a hotdog on a stick. The pollen that this plant contains is shed in clusters of four grains. Broadleaf cattail will often cross with narrow-leaf cattail to form the hybrid, *Typha x glauca*.

Status: Native

Photo Credit: www.nwplants.com



Wild Celery (*Vallisneria americana*)

Description: An aquatic plant with ribbon-like leaves that are dark-green. This plant grows below the water surface and then blankets the surface. This plant produces small, whitish-yellow flowers.

Status: Native

Photo Credit: Jacqueline Donnelly



Table 2. Dissolved oxygen levels and temperatures at the deep hole.

Depth (Feet)	Dissolved Oxygen Levels (mg/L)	Percent of Dissolved Oxygen	Temperature (°F)
1	8.98	103.1%	68
2	8.98	103.2%	68
3	8.99	102.8%	67.6
4	8.92	101.9%	67.4
5	8.84	100.9%	67.4
6	8.5	97.4%	67.2
7	8.44	95.9%	67.0
8	8.36	94.9%	66.8

Resources: <https://dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=1618100&page=facts>