ONEIDA COUNTY LAND AND WATER CONSERVATION DEPARTMENT

Buffalo Lake, Oneida County

Land & Water Conservation Department

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Buffalo Lake AIS Monitoring and Water Clarity Report

Field Date:	August 20, 2021
WBIC:	974200
Previous AIS Findings:	Rusty Crayfish, Purple Loosestrife, Yellow Iris (Yellow Iris was observed in 2020, and is currently awaiting verification from the DNR)
Field Crew:	Stephanie Boismenue, AIS Coordinator, and Aubrey Nycz, AIS Lead Program Assistant, Oneida County Land and Water Conservation Department
Report By:	Aubrey Nycz

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, and 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.

Buffalo Lake Data: Buffalo Lake, located in the Town of Woodruff, Oneida County, is a 105-acre seepage lake with a maximum depth of 27 feet (Figure 1.). The water level appeared low on this lake, as we recorded 23 feet when we were at the reported deep hole. There is one boat landing on Buffalo Lake located off of Buffalo Lake Road (Figure 2). A State Park & Forest vehicle admission sticker is required to use this boat launch. The substrate is 60% sand, 25% gravel, 10% rock, and 5% muck. Along with reporting the depth and substrate, the Wisconsin Department of Natural Resources (DNR) reports that the lake has panfish, smallmouth bass, largemouth bass, and walleye.

Field Notes (weather): The weather while conducting research on Buffalo Lake was fair. The air temperature was 79 degrees Fahrenheit, and there were few clouds. We experienced at nine miles per hour which made maneuvering our canoe difficult at times.

Field Notes (AIS monitoring): We completed a visual meander survey around half of the lake's perimeter, searching both sides of the canoe, and moving in and out between various water depths. Polarized sunglasses and aquascopes were used to aide in looking at the bottom substrate. While monitoring, we stopped and dug out all purple loosestrife plants that we observed. We made sure to put all purple loosestrife plants in sealed garbage bags for proper disposal. Throughout our monitoring, we made note of the plants and animals we observed (see table 1).

Field Notes (water quality monitoring): To observe the water clarity and quality on Buffalo 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 Buffalo Lake were typical for this time of year. These measurements can be found in table 2. The Secchi disk reading was at 15 feet out of a maximum depth of 27 feet. This reading is also typical for this time of the year.

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

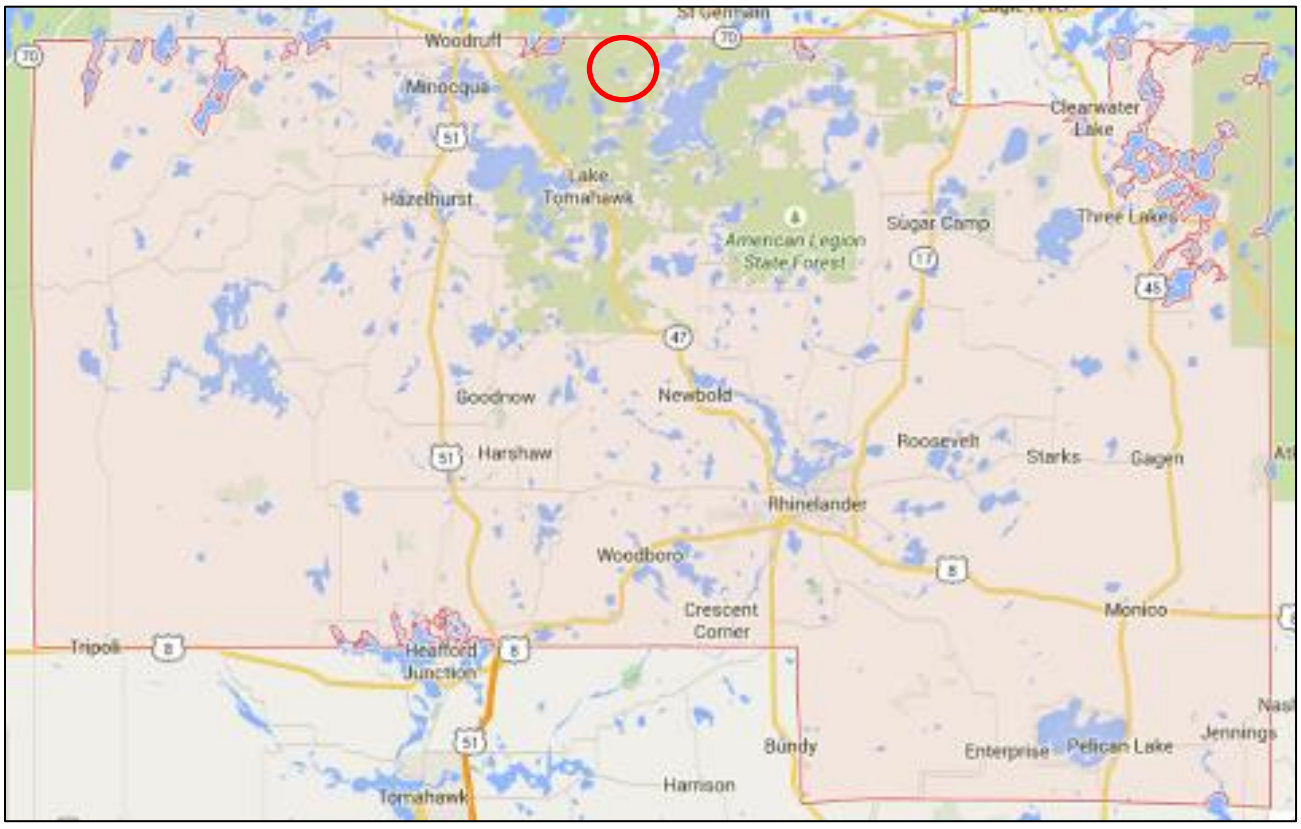
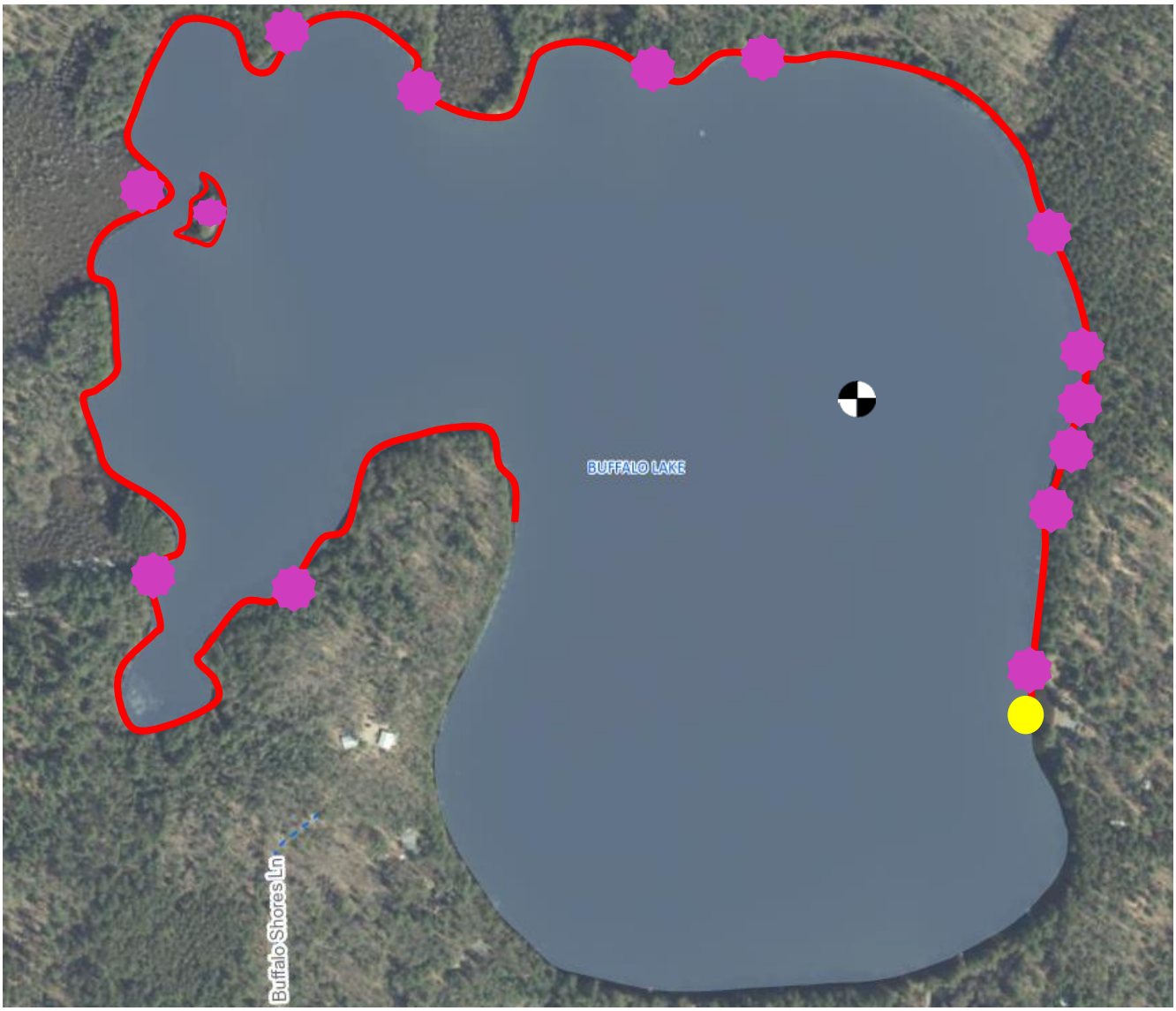


Figure 2. Map of Buffalo Lake.



Map Key

- Boat Landing
- Area of shoreline that was monitored
- Location of dissolved oxygen and Secchi disk reading
  Latitude: 45.879226
  Longitude: 89.56755
- Purple Loosestrife plants observed and removed

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

Joe Pye Weed *(Eupatorium maculatum)* **Description:** Pink to purplish flowerheads in a flat cluster 3-5 inches across. Leaves are whorled in groups of 3-6, coarsely toothed, and pointed on both ends. Stems are usually green or purplish with purple spots. **Status:** Native *Photo Credit: Beth Zimmer*	
Yellow Iris *(Iris pseudacorus)* **Description:** A flowering plant with dark green or blue-green leaves and yellow petals. This plant grows to be 3-5 feet tall. The center of the leaves are thick. **Status:** INVASIVE *Photo Credit: Stephanie Boismenue*	
Purple Loosestrife *(Lythrum salicaria)* **Description:** A flowering plant with a square or 6-sided stem and smooth leaves. Flowers tend to be a pinkish purple with 6 petals. **Status:** INVASIVE *Photo Credit: Dave Britton*	
Common Bladderwort *(Utricularia macrorhiza)* **Description:** A submerged aquatic plant. Leaves contain small sacks that trap small invertebrates. This plant usually has unrooted stems that easily tangle with other plants, and tends to look cloudy underwater. **Status:** Native *Photo Credit: frenchhill.org*	

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

Depth (Feet)	Temperature (°F)	Percent of Dissolved Oxygen	Dissolved Oxygen (mg/L)
1	77.0	101.3	8.38
2	76.9	101.2	8.37
3	76.9	101.0	8.37
4	76.6	100.8	8.37
5	76.3	100.6	8.37
6	76.1	100.1	8.43
7	76.0	101.1	8.44
8	75.8	100.5	8.41

9	75.7	99.7	8.35
10	75.7	99.7	8.35
11	75.5	100.0	8.39
12	75.2	98.4	8.28
13	75.0	97.6	8.23
14	74.1	95.5	8.13
15	73.5	93.5	8.01
16	72.2	87.7	7.62
17	69.3	70.9	6.36
18	66.5	57.3	5.29
19	63.8	25.5	2.43
20	61.9	9.6	0.94
21	62.7	7.8	0.75
22	58.4	4.3	0.44
23	56.9	0.4	0.05

Resources: https://dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=974200

Buffalo Lake AIS Monitoring and Purple Loosestrife Removal Report

Field Dates:	July 13th, 2020
WBIC:	974200
Previous AIS Findings:	Chinese Mystery Snail, Purple Loosestrife, Yellow Iris
New AIS Findings:	None
Field Crew:	Stephanie Boismenue, AIS Coordinator, Aubrey Nycz, AIS Project Leader, and Rachel Cook, AIS Project Assistant, Oneida County Land and Water Conservation Department
Report By:	Rachel Cook

On July 13th, 2020, Stephanie, Aubrey and I went to Buffalo Lake to monitor for Purple Loosestrife and other aquatic invasive species. After Aubrey and I monitored Buffalo Lake in June (reported below), we decided that the lake would benefit from further hand removal of the purple loosestrife. The plant was seen to be covering a majority of the shoreline, and while we dug many plants up in June, we could not get to all of the plants around the whole perimeter in the time allotted. With more hands and more time, we were able to complete the entire shoreline of Buffalo Lake and remove all plants that were seen. This plant continues to be a concern for the residents of the lake, and the WDNR may need to consider chemical treatment or continued high removal of Purple Loosestrife on the lake within the immediate years. The Oneida County AIS team will continue to monitor its status on this lake this year and in the coming years.

While Aubrey and I were monitoring in June, we also found two yellow iris plants on the southwest corner of the lake, which we dug out manually. Yellow iris had not previously been reported on this lake, so we had hoped that the early detection and removal will prevent its spread in coming years. During our monitoring of Buffalo Lake on July 13th, 2020, fortunately, we did not see any more yellow iris plants around the shoreline. We will also continue to monitor for this plant, in hopes that it was eradicated with the digging from the last trip.

Buffalo Lake AIS Monitoring and Water Clarity Report

Field Dates:	June 15th and June 16th, 2020
WBIC:	974200
Previous AIS Findings:	Chinese Mystery Snail, Purple Loosestrife
New AIS Findings:	Yellow Iris
Field Crew:	Aubrey Nycz, AIS Project Leader, and Rachel Cook, AIS Project Assistant, Oneida County Land and Water Conservation Department
Report By:	Rachel Cook

On June 15th, 2020, Aubrey and I went to Buffalo Lake for AIS monitoring and to assess water clarity and quality. Buffalo Lake is a small 105 acre oligotrophic lake in Oneida County. It has one public boat landing located at the state campground. The shoreline of Buffalo Lake is mostly occupied by the American Legion State Forest, along with the state campground and some homes at the southern end of the lake. The lake has a maximum depth of 27ft, and the substrate is reported to be 60% sand, 25% gravel, 10% rock, and 5% muck. Along with reporting the depth and substrate, the Wisconsin Department of Natural Resources also reports that the lake has largemouth bass, smallmouth bass, walleye, and panfish present.

The weather while conducting research on Buffalo Lake was not ideal. The outside temperature was 65 degrees Fahrenheit, the sky was very cloudy and dark due to storms coming in from the west, it was fairly windy, and the water clarity was impaired due to the darkness and wind. We began monitoring on the southern shoreline before exiting the water due to storms. In this brief time, we noted many purple loosestrife plants and mechanically removed them.

We returned to Buffalo Lake on June 16th, 2020. The outside temperature was 74 degrees Farenheit, and it was sunny and fairly windy. Aubrey and I did a complete shoreline scan while meandering in and out with the canoe between different depths. We looked on the shoreline itself and also in the water, noting the plants and animals we had observed in the process.

To observe the water clarity and quality of Buffalo Lake, Aubrey and I went to the deep hole towards the middle of the lake. After locating the deep hole with our sonar unit, we used a Secchi disk to measure water clarity and a dissolved oxygen meter to measure water health. Oxygen is needed for a healthy fish population, and 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. Both of these measurements were comparable to previous results, and there should be no concern for the water health on Buffalo Lake. The Secchi disk reading was 12 feet, and the dissolved oxygen readings can be found in table 2.

Aubrey and I did observe some Chinese Mystery Snails in Buffalo Lake, however, this invasive was already known to have been established here. Similar to previous reports, Purple Loosestrife seemed to still be occupying much of the shoreline. Aubrey and I manually removed as many plants as we could within our time there by digging the plants from the ground. This plant continues to be a concern for the residents of the lake, and the WDNR may need to consider chemical treatment or continued high removal of Purple Loosestrife on the lake within the immediate years. We also found two yellow iris plants on the southwest corner of the lake, which we dug out manually. Yellow iris has not previously been reported on this lake, so we hope that the early detection and removal will prevent its spread in coming years.

Besides these three invasives being present, Buffalo Lake still had many native plants and animals present and thriving. The four most common plants we observed were Jo-Pye-Weed, Pickerel Weed, Broad-Leaf Cattail, and Purple Loosestrife. These plants can be seen below in table 1.

Findings: Taken 10:00 a.m. – 2 p.m. on June 16th, 2020

Aquatic Invasive Species:
Purple Loosestrife was found along 80% of the shoreline on Buffalo Lake. Two yellow iris plants were found in the southwest corner of the lake on the shoreline.

Secchi: The Secchi reading on this lake was 12 feet out of a 25 foot maximum depth. The water looked clear and a blue/gray color, and the surface was a little wavy due to some wind.

Dissolved Oxygen: These measurements can be seen in Table 2.

Figure 1. Map of Oneida County, WI with Buffalo Lake circled in red (approximate location)

Figure 2. Map of Buffalo Lake with boat landing and location of Secchi disk reading labeled.

Deep hole & location of Secchi disk reading

Boat Landing

Purple Loosestrife

Table 1. Plants found in Buffalo Lake when monitoring.

Common Name Scientific Plant Name	Description	Image
Pickerel Weed *Pontederia cordata*	An aquatic plant with thin, bright green leaves. Emergent leaves tend to be arrow shaped with 6 parted, blue flowers. This plant is native.	 Photo Credit: ediblewildfood.com
Broad-Leaf Cattail *Typha latifolia*	An herbaceous plant with leaves greater than 12 mm wide. The pollen that this plant contains is shed in clusters of four grains. This plant is native.	 Photo Credit: www.nwplants.com
Purple Loosestrife *Lythrum salicaria*	A flowering plant with a square or 6-sided stem and smooth leaves. Flowers tend to be a pinkish purple with 6 petals. This plant is invasive!	 Photo Credit: Dave Britton
Joe Pye Weed *Eupatorium maculatum*	Pink to purplish flowerheads in a flat cluster 3-5 inches across. Leaves are whorled in groups of 3-6, coarsely toothed, and pointed on both ends. Stems are usually green or purplish with purple spots. This plant is native.	 Photo Credit: Beth Zimmer

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

Depth (Feet)	Dissolved Oxygen Levels (mg/L)	Temperature (F)	Percent Dissolved Oxygen
2	9.19	68.6	106.7
4	9.18	68.1	106.0
6	9.20	67.9	106.1
8	9.41	67.8	108.4
10	9.22	67.6	105.8
12	9.22	67.4	105.7
14	11.34	61.3	121.3
16	11.44	57.1	116.3
18	11.34	55.8	113.5
20	11.20	54.5	111.1
22	11.29	53.4	108.0
24	2.51	51.3	23.7

Buffalo Lake AIS Monitoring and Water Clarity Report

Field Date:	August 2nd, 2017
WBIC:	974200
Previous AIS Findings:	Chinese Mystery Snail
New AIS Findings:	Purple Loosestrife
Field Crew:	Aubrey Nycz, AIS Project Leader, and Thomas Boisvert, AIS Project Assistant, Oneida County Land and Water Conservation Department
Report By:	Thomas Boisvert

On August 2nd, 2017, Aubrey and I went to Buffalo Lake to implement AIS monitoring along with water clarity and quality assessments. Buffalo Lake is a small 105 acre oligotrophic lake located in Oneida County, and has one public boat launch located at the state campground. Besides the campground, Buffalo Lake's shoreline is composed of the American Legion State Forest, and a small number of homes along the Southern portion of the lake. The lake has a maximum depth of 27ft, and the substrate is reported to be 60% sand, 25% gravel, 10% rock, and 5% muck. Along with reporting the depth and substrate, the Wisconsin Department of Natural Resources also reports that the lake has largemouth bass, smallmouth bass, walleye, and panfish present. During our time on the lake though, very few fish were spotted.

The weather while conducting research on Buffalo Lake was not ideal. The outside temperature was 70 degrees Fahrenheit, the sky was overcast, there was moderate wind, and the water clarity was impaired due to waves. The weather at times proved difficult for maneuvering our canoe, and also keeping the secchi disk and Dissolved Oxygen meter vertical in the water column.

When conducting our AIS lake survey, Aubrey and I did a complete shoreline scan while meandering in and out between different depths. We looked on the shoreline itself and also in the water, noting the plants and animals we had observed in the process.

To observe the water clarity and quality of Buffalo Lake, Aubrey and I went to the deep hole on the northeast side of the lake towards the middle. After locating the deep hole with our sonar unit, we used a Secchi disk to measure water clarity and a dissolved oxygen meter to measure water health. Oxygen is needed for a healthy fish population, and for plants to respire at night as well. The measurements from the dissolved oxygen meter can tell us if the organisms in the lake would be under stress. Thankfully, both of these measurements were relatively average in nature, and there should be

no concern for the water health on Buffalo Lake. The Secchi disk reading was 13 feet, and the dissolved oxygen readings can be found in table 2.

Aubrey and I did observe some Chinese Mystery Snails in Buffalo Lake, however, this invasive was already known to have been established here. Unfortunately we did find a new invasive species on Buffalo Lake. Aubrey and I noticed that Purple Loosestrife appeared to be taking over Buffalo Lake. Aubrey and I estimate that 80% of the shoreline is composed of Purple Loosestrife. This is very concerning, and the WDNR should consider high removal of Purple Loosestrife on the lake within the immediate years. While on the lake, Aubrey and I did clip all visible flowers and remove some of the larger patches.

Besides these two invasives being present, Buffalo Lake still had many native plants and animals present and thriving. The three most common plants we observed were Pickerel Weed, Broad-Leaf Cattail, and Purple Loosestrife. These plants can be seen below in table 1.

Findings: Taken 11:00 a.m. – 1 p.m. on August 2nd, 2017

Aquatic Invasive Species:
Purple Loosestrife was found along 80% of the shoreline on Buffalo Lake.

Secchi: The Secchi reading on this lake was 13 feet out of a 27 foot maximum depth. The water color was a grayish color, and was hard to see down with the waves on the lake.

Dissolved Oxygen: These measurements can be seen in Table 2.

Figure 1. Map of Oneida County, WI with Buffalo Lake circled in red (approximate location)

Figure 2. Map of Buffalo Lake with boat landing and location of Secchi disk reading labeled.

Deep hole & location of Secchi disk reading

Secchi Disk Readings:
Buffalo Lake - Deep Hole
Coordinates - Not Available

Boat Landing

Purple Loosestrife

Table 1. Plants found in Buffalo Lake when monitoring.

Common Name Scientific Plant Name	Description	Image
Pickerel Weed *Pontederia cordata*	An aquatic plant with thin, bright green leaves. Emergent leaves tend to be arrow shaped with 6 parted, blue flowers. This plant is native.	 Photo Credit: ediblewildfood.com
Broad-Leaf Cattail *Typha latifolia*	An herbaceous plant with leaves greater than 12 mm wide. The pollen that this plant contains is shed in clusters of four grains. This plant is native.	 Photo Credit: www.nwplants.com
Purple Loosestrife *Lythrum salicaria*	A flowering plant with a square or 6-sided stem and smooth leaves. Flowers tend to be a pinkish purple with 6 petals. This plant is invasive!	 Photo Credit: Dave Britton

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

Depth (Feet)	Dissolved Oxygen Levels (mg/L)	Temperature (F)	Percent Dissolved Oxygen
2	8.11	75.9°	102.1%
4	8.18	76.5°	103.7%
6	7.93	76.6°	100.5%
8	7.91	76.7°	100.5%
10	7.89	76.8°	100.3%
12	7.64	73.9°	94.2%
14	7.85	66.9°	89.7%
16	4.86	60.9°	51.8%
18	0.14	56.2°	1.4%