Land & Water Conservation Department

Hemlock Lake

Oneida County, Wisconsin

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Hemlock Lake AIS Monitoring and Water Clarity Report

WBIC:	989200
Previous AIS Findings:	None
New AIS Findings:	None
Field Date:	June 11, 2020
Field Crew:	Aubrey Nycz, AIS Lead Program Assistant, and Rachel Cook, AIS Project Assistant, Oneida County Land and Water Conservation Department
Report By:	Aubrey Nycz

Purpose of lake monitoring: 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.

The Oneida County AIS program monitors Oneida County waterbodies for the presence of aquatic invasive plants, animals, and organisms and obtains baseline water quality data. Early detection of AIS is crucial for rapid response, containment, and management. Obtaining baseline water quality data provides an indicator of each lake's current health and documents changes in water quality over time. Lake monitoring is in collaboration with the Department of Natural Resources, UW Extension's Citizens Lake Monitoring Network Program, and Great Lakes Indian Fish Wildlife Commission. The AIS Team follows the DNR's monitoring protocols and collected data is entered into the DNR's statewide database.

Data Collected: Suspected invasive species samples, AIS high-risk areas, Secchi disk readings, dissolved oxygen, water temperature, water column appearance, water color, and perception of water quality, shoreline and woody habitat notes, 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.

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 are used to achieve the survey: survey from the canoe, walking along the shoreline and shallows, using aqua view scopes, sifting through vegetation, examining underwater solid surfaces, and analyzing rake tows and D-net samples.

Target 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, and yellow iris.

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.

Facts and figures about Hemlock Lake: Hemlock Lake, located in the Town of Woodruff, Oneida County, is a 38 acre seepage lake with a maximum depth of 25 feet (Figure 1). There is one public carry in landing on Hemlock Lake located on Woodruff Road (Figure 2). The substrate is 65% sand, 20% gravel, 5% rock, and 10% muck. Along with reporting the depth and substrate, the Wisconsin Department of Natural Resources (DNR) reports that the lake has panfish, largemouth bass, and walleyes.

Notes from the field (weather): The weather while conducting research on Hemlock Lake was ideal. The outside temperature was 65 degrees Fahrenheit, the sun was shining, and there was little wind. This made canoeing around the lake enjoyable.

Notes from the field (aquatic invasive species monitoring): We completed a visual meander survey around the entire lake perimeter, searching both sides of the canoe, 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). On the northern side of the lake, we discovered a single Yellow Iris plant. We recorded the invasive that we found on our GPS unit and collected samples of the plant to report to the DNR (figure 2).

Notes from the field (water quality monitoring): To observe the water clarity and quality on Hemlock 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 Hemlock Lake were comparable to those in years' past. These measurements can be found in table 2. The Secchi disk reading was at 15 feet out of a maximum depth of 25 feet.

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

Figure 2. AIS boat launch and shoreline surveillance monitoring location.

Public Boat Landing

Secchi disk reading

Coordinates where the dissolved oxygen and Secchi disk data was collected:

Latitude: 45.88

Longitude: -89.65

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

Blue Flag Iris *(Iris versicolor)* **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. **Status:** Native *Photo Credit: Wisconsin Department of Natural Resources*	
White Water Lily *(Nymphaea odorata)* **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. **Status:** Native *Photo Credit: Stephanie Boismenue*	

Northern Arrowhead *(Sagittaria cuneata)*

Description: Submergent leaves are 1-5cm wide, up to 60cm long, and have a prominent midvein. Floating leaves when present are arrow-shaped with two short lobes. Flowers are white with 3 petals.
Status: Native
Photo Credit: vancouverislandgrows.com

Large Purple Bladderwort *(Utricularia purpurea)*
Description: long stems up to several feet long, often forming large patches. Leaves fine, arranged in whorls of 5-7, with scattered tiny bladders on the tips of the leaves. Flowers are purple, 5-parteed, 2-lipped, the lower lip having three lobes and a yellow spot.
Status: Native
Photo Credit: Shirley Denton

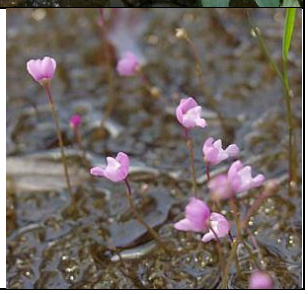


Table 2. Dissolved oxygen levels and temperatures at the deep hole.

Depth (Feet)	Dissolved Oxygen Levels (mg/L)	Percent of Dissolved Oxygen	Temperature (°F)
2	8.15	94.3	67.6
4	8.16	94.5	67.6
6	8.23	95.1	67.4
8	8.47	97.5	67.0
10	9.15	104.1	66.0
12	9.73	108.7	64.4
14	9.61	104.9	62.4
16	8.86	94.7	60.6
18	7.86	83.0	59.5

Resources:
https://dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=989200&page=facts

Hemlock Lake AIS Monitoring and Water Clarity Report

Field Date:	June 21st, 2017
WBIC:	989200
Previous AIS Findings:	Purple Loosestrife
New AIS Findings:	None
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 June 21, 2017, Aubrey and I went to Hemlock Lake to implement AIS monitoring along with water clarity and quality assessments. Hemlock Lake is a small 38 acre oligotrophic lake located in Oneida County, and has one public boat launch. Also, the entire shoreline of Hemlock Lake is a part of the American Legion State Forest, and is widely open to the public. The lake has a maximum depth of 25ft, and the substrate is reported to be 10% sand, 0% gravel, 0% rock, and 90% muck. Along with reporting the depth and substrate, the Wisconsin Department of Natural Resources also reports that the lake has largemouth bass, walleye, and panfish present. We observed this firsthand as bluegill, crappie, perch, and largemouth bass were seen in large quantities along the shoreline.

The weather while conducting research on Hemlock Lake was very well. The outside temperature was 70 degrees Fahrenheit, the sky was partly cloudy, little to no wind, and the water clarity was very good. There was no adverse weather to impede our measurements in any way.

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. When possible we got in the water and used the aquascopes to have a closer look at the bottom composition. A weed rake was also used at a random location to have a closer look at the bottom vegetation.

To observe the water clarity and quality of Hemlock 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 clarity and a dissolved oxygen meter to measure water health. Oxygen is needed for a healthy fish population, and also 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, and thankfully both of these measurements were relatively average in nature, and there should be no concern for the health of Hemlock Lake. The Secchi disk reading was 16 feet, and the dissolved oxygen readings can be found in table 2. Graphs displaying water quality can also be viewed below (graphs 1-3).

Aubrey and I did not find any invasive species on Hemlock Lake. We were glad to see that no invasive species are present at this time. The lake seems to be healthy, and many native plants were present and thriving. The 4 most common native plants we observed were Pickerel Weed, Blue Flag Iris, Bullhead Pond Lily, and Large Purple Bladderwort. These plants can be seen below in table 1.

Findings: Taken 11 a.m. – 1 p.m. June 21, 2017

Aquatic Invasive Species: We did not find any new invasive species along the perimeter of Hemlock Lake.

Secchi: The Secchi reading on this lake was 16 feet out of a 25 foot maximum depth. The water color was a bluish color, and appeared clear when glancing across the lake.

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

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

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

Public boat landing

Deep hole & location of Secchi disk reading

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

Rake Location

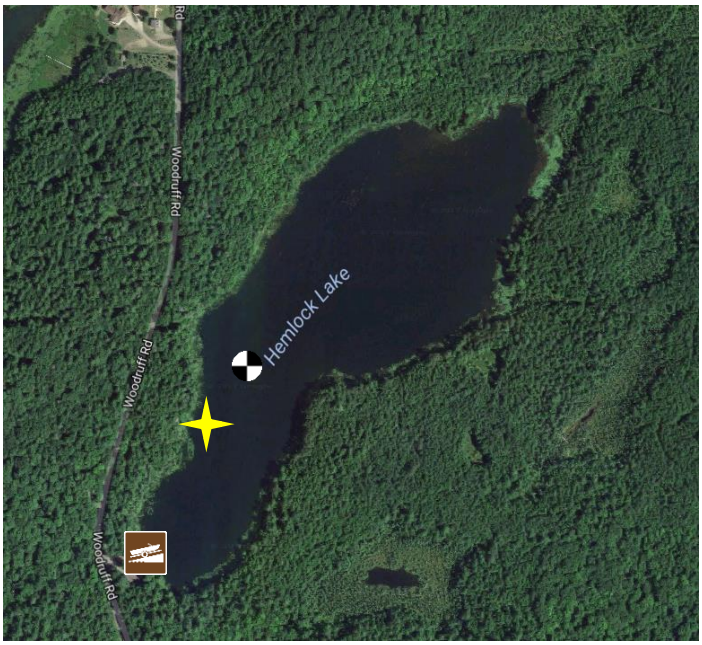


Table 1. Plants found in Hemlock Lake when monitoring.

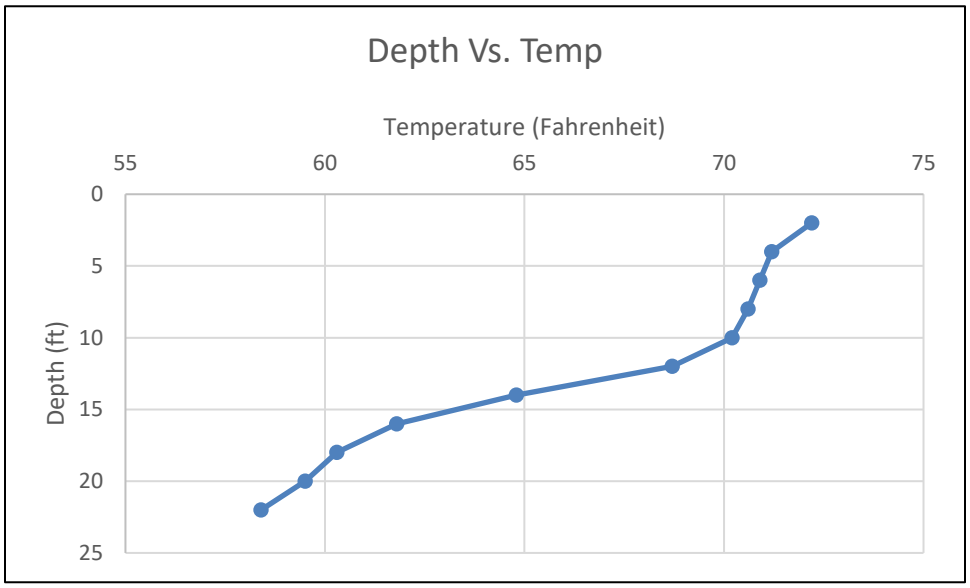
Scientific Plant Name	Common Plant Name	Image
Pontederia cordata	Pickerel Weed	
Iris versicolor	Blue Flag Iris	

Nuphar variegata	Bullhead Pond Lily (Spatterdock)	
Utricularia purpurea	Large Purple Bladderwort	

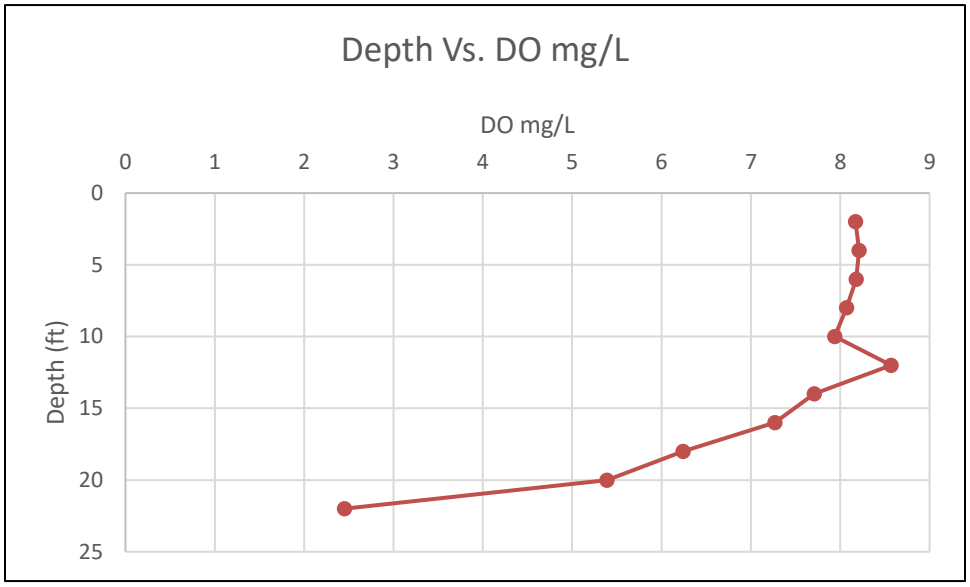
Table 2. Dissolved oxygen levels and temperatures at the deep hole.

Depth (Feet)	Dissolved Oxygen Levels (mg/L)	Temperature (F)	Percent Dissolved Oxygen
2	8.17	72.2	99.6%
4	8.21	71.2	99.0%
6	8.18	70.9	98.3%
8	8.07	70.6	96.7%
10	7.94	70.2	94.7%
12	8.57	68.7	100.7%
14	7.71	64.8	86.6%
16	7.27	61.8	78.9%
18	6.24	60.3	66.5%
20	5.39	59.5	56.9%
22	2.45	58.4	25.5%

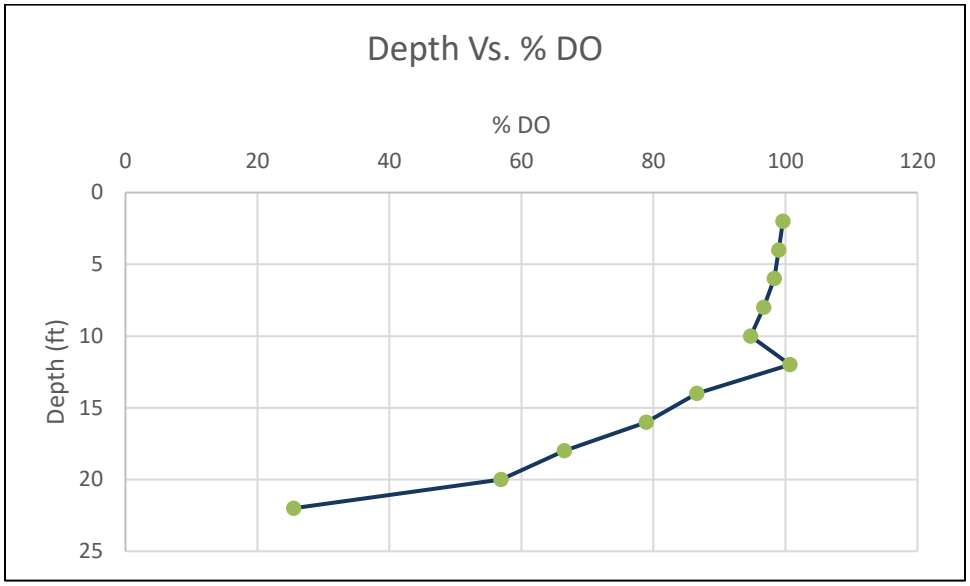
Graph 1



Graph 2



Graph 3



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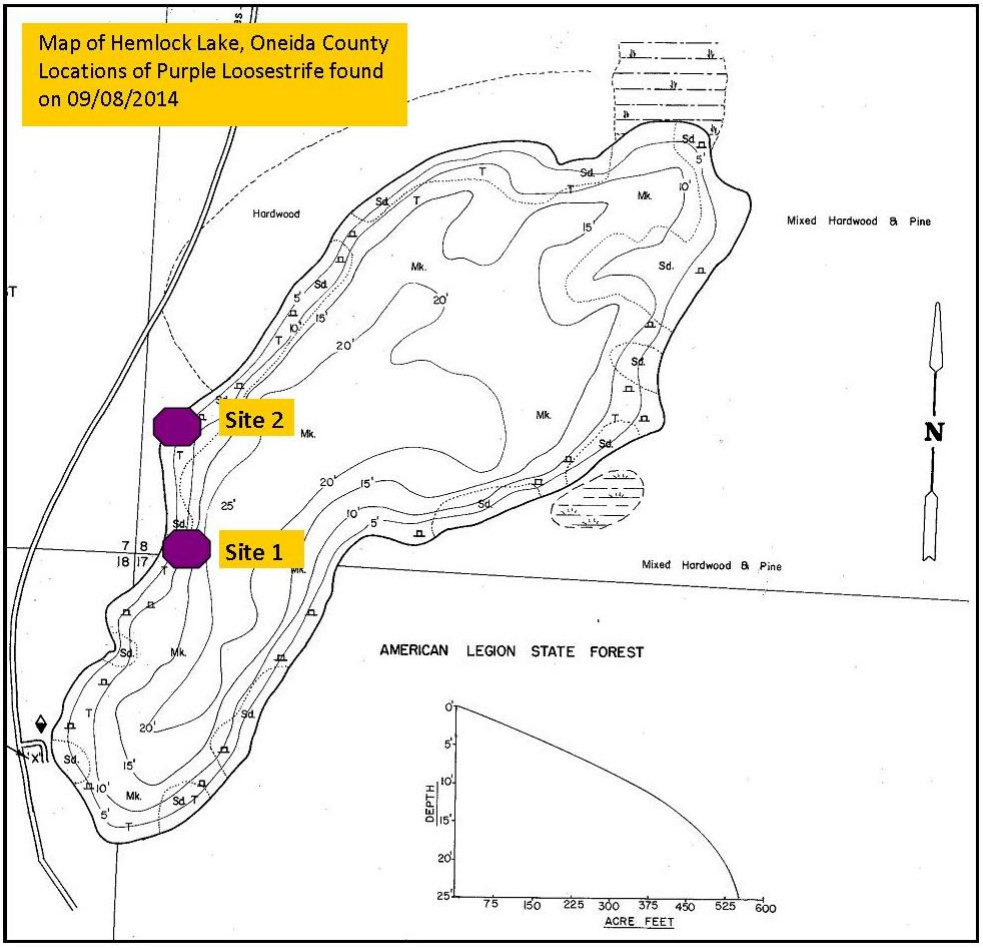
Hemlock Lake Purple Loosestrife and Large Purple Bladderwort Monitoring

WBIC:	989200
Previous AIS Findings:	Possible Purple Loosestrife
New AIS Findings:	Purple Loosestrife
Field Date:	September 8, 2014
Field Crew:	Stephanie Boismenue, AIS Project Assistant, Oneida County Land and Water Conservation Department
Report by:	Stephanie Boismenue

On Monday September 8, 2014, I revisited Hemlock Lake, located in the Town of Woodruff, Oneida County, by canoe and made the following observations. Of note, my initial site visit was on Wednesday August 13, 2014 (refer to the Hemlock Lake Monitoring Summary by Alyssa Nycz).

1. **Purple Loosestrife:** I found Purple Loosestrife growing in two new locations along the west shoreline. Beetle activity was not present on any of the plants. Therefore, I remove all of the plants, including the roots, and disposed of them. Unfortunately, I did not have a GPS with, but I did make notation of their general locations, which I have indicated on the map below.
    a. Site 1 had one plant. I removed the entire plant and its root mass
    b. Site 2 had two large plants. I removed both plants plant and root mass

2. **Large Purple Bladderwort:** At the time of the initial visit on August 13, 2014, Alyssa and I reported that the Large Purple Bladderwort was floating in dense mats, approximately 4-5 feet in diameter, and spaced an average of 50 feet apart along the entire shoreline. However, during today's visits, I was surprised to find the bladderwort has grown significantly and now covers' the entire shoreline - in just 3 ½ weeks.



Source: Wisconsin Department of Natural Resources 608-266-2621. Hemlock Lake – Oneida County, Wisconsin DNR Lake Map

Date – Sep 1981 - Historical Lake Map - Not for Navigation.

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Hemlock Lake AIS Monitoring and Water Clarity Report

WBIC:	989200
Previous AIS Findings:	None
New AIS Findings:	Possible Purple Loosestrife
Field Date:	August 13, 2014
Field Crew:	Stephanie Boismenue and Alyssa Nycz, AIS Project Assistants, Oneida County Land and Water Conservation Department
Report by:	Alyssa Nycz

Stephanie and I monitored Hemlock Lake on Wednesday, August 13th. The lake does not have a public boat landing, but it does have a carry-in only access, which we used to put our canoe in the water. Right away, we discovered large clumps of large purple bladderwort floating along the shoreline. We estimate that there is at least one cluster of large purple bladderwort every 50 feet along the shoreline of the entire lake. These clusters are approximately 4 to 5 feet in diameter.

When we first entered the lake, we were told by three people kayaking that there is purple loosestrife along the northwest shoreline. We do not have prior documentation of purple loosestrife findings on Hemlock Lake, so Stephanie and I went to see what they were referring to. We found a total of three plants along this stretch of shoreline that share features with purple loosestrife. However, the flowers are too light of a purple color, and both the stem and leaves are fuzzy. Additionally, three sides of the square stem are red, and the fourth is green. We mapped coordinates of these plants and took pictures of their features, but we are almost certain they are not purple loosestrife. We plan to take samples of the plant to the Department of Natural Resources to be identified, since we are unsure of what exactly this plant is.

After making note of the unidentified plant, we canoed to the lake's deep hole, which our depth finder read as 21 feet deep. After anchoring, we recorded a Secchi disk reading of 14 feet. Just as we began to take our dissolved oxygen measurements (Table 1), the depth finder read a depth fluctuating between 26 and 27 feet. Since we were still anchored at this point, and the depth finder was attached to the middle of the canoe, it is likely that the back end of the canoe shifted. Therefore, there was over a six foot difference in depth beneath the middle of

the canoe and the front of the canoe! Regardless, these deeper depth readings allowed us to conclude that we were indeed at the lake's deepest site.

Once we recorded all necessary water clarity and water chemistry measurements, we canoed around the majority of Hemlock Lake to check for the presence/absence of AIS (Figure 1). We did not find any aquatic invasive species; however, we did take pictures and video clips of some of the large purple bladderwort clusters. The lake is completely uninhabited by private residences, so there were no docks or piers to check under for the possible presence of any invasive snail or mussel species.

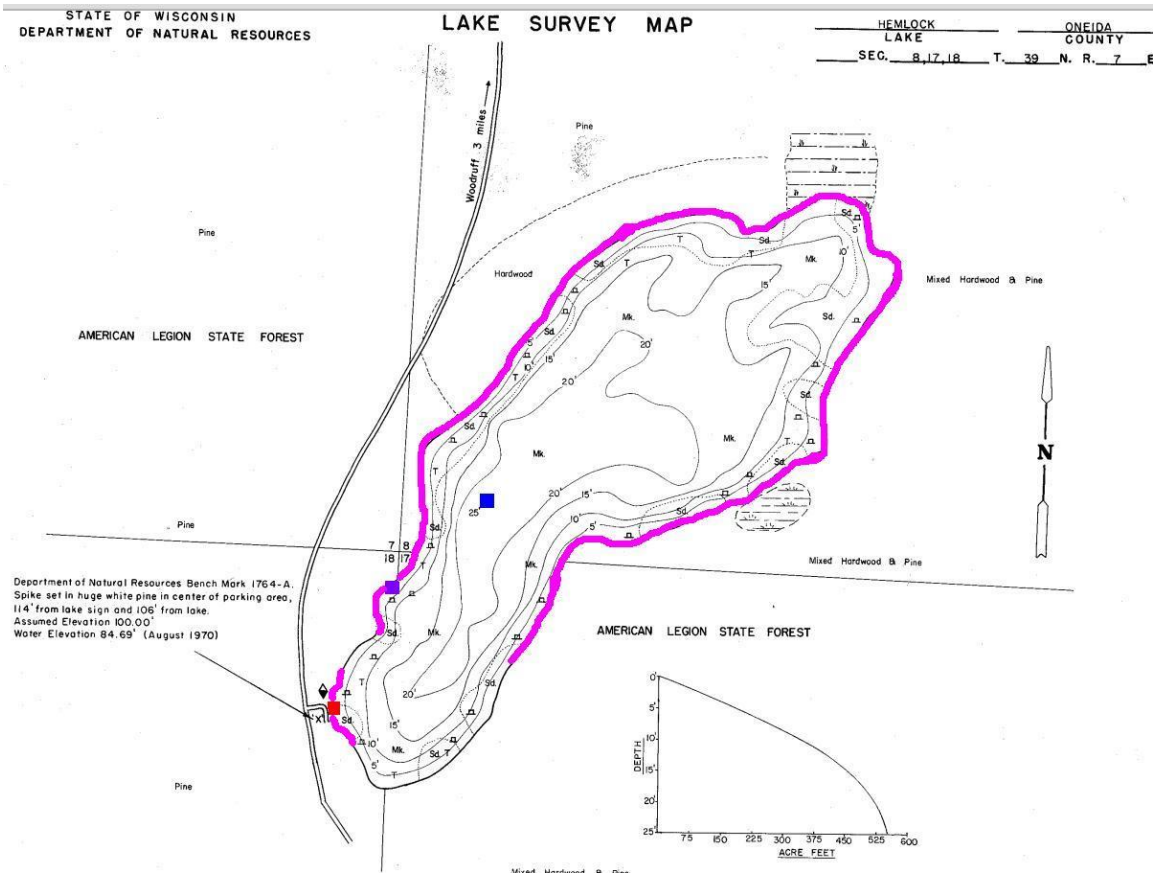

Figure 1. A map of Hemlock Lake: the red square marks the carry-in only access, the purple square marks where we saw two of the three plants that share characteristics with purple loosestrife, and the blue square marks the deep hole site. We visually monitored the majority of the lake's shoreline, as represented by the pink lines.

Table 1. Our dissolved oxygen and temperature readings were recorded at a depth fluctuating between 26 and 27 feet. As indicated by the table, the dissolved oxygen levels began to drop sharply after a depth of 13 feet.

Depth	Dissolved Oxygen Level	Temperature Reading
1’	8.08 mg/L	73.7°F
4’	8.03 mg/L	73.7°F
7’	7.97 mg/L	73.7°F
10’	7.91 mg/L	73.5°F
13’	7.58 mg/L	73.2°F
16’	3.56 mg/L	70.8°F
19’	0.37 mg/L	66.8°F