Oneida COUNTY
Land & Water Conservation Department

Bear Lake

Oneida County, Wisconsin

Page 1: **July 5, 2022** Aquatic Invasive Species Monitoring and Water Quality Report

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Bear Lake AIS Monitoring and Water Clarity Report

Field Date:	July 5, 2022
WBIC:	1527800
Previous AIS Findings:	Chinese Mystery Snails, Purple Loosestrife, Rusty Crayfish
New AIS Findings:	Yellow Iris
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 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.

Bear Lake Data: Bear Lake, located in Oneida County, is a 295-acre spring lake with a maximum depth of 20 feet **(Figure 1**.). There is one public boat landing on Bear Lake located off of Fork Road near the northeastern corner of the lake (**Figure 2**). The substrate is 50% sand, 10% gravel, 15% rock, and 25% muck. Along with reporting the depth and substrate, the Wisconsin Department of Natural Resources (WDNR) reports that the lake has panfish, largemouth bass, northern pike and walleye.

Field Notes (weather): The weather while conducting research on Bear Lake was fair and partly cloudy. The air temperature was 78 degrees Fahrenheit, and there was 60% humidity. The wind was blowing at 7 miles per hour from the northwest.

Field Notes (AIS monitoring): We completed a visual meander survey around the entire 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. Throughout our monitoring, we made note of the plants and animals we observed in the process (see **Table 1**). Invasive Yellow Iris was found along the shoreline, which has been observed but not yet verified by the DNR. Information about Yellow Iris, as well as the previous AIS findings in this waterbody (Chinese Mystery Snails, Purple Loosestrife, and Rusty Crayfish), can be found in the *AIS Quick Guide* in **Appendix A.**

Field Notes (water quality monitoring): To observe the water clarity and quality on Bear 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 Bear Lake looked healthy. The top 14 feet were well oxygenated. These measurements can be found in **Table 2**. The Secchi disk reading was at 5.5 feet out of a maximum depth of 20 feet.

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

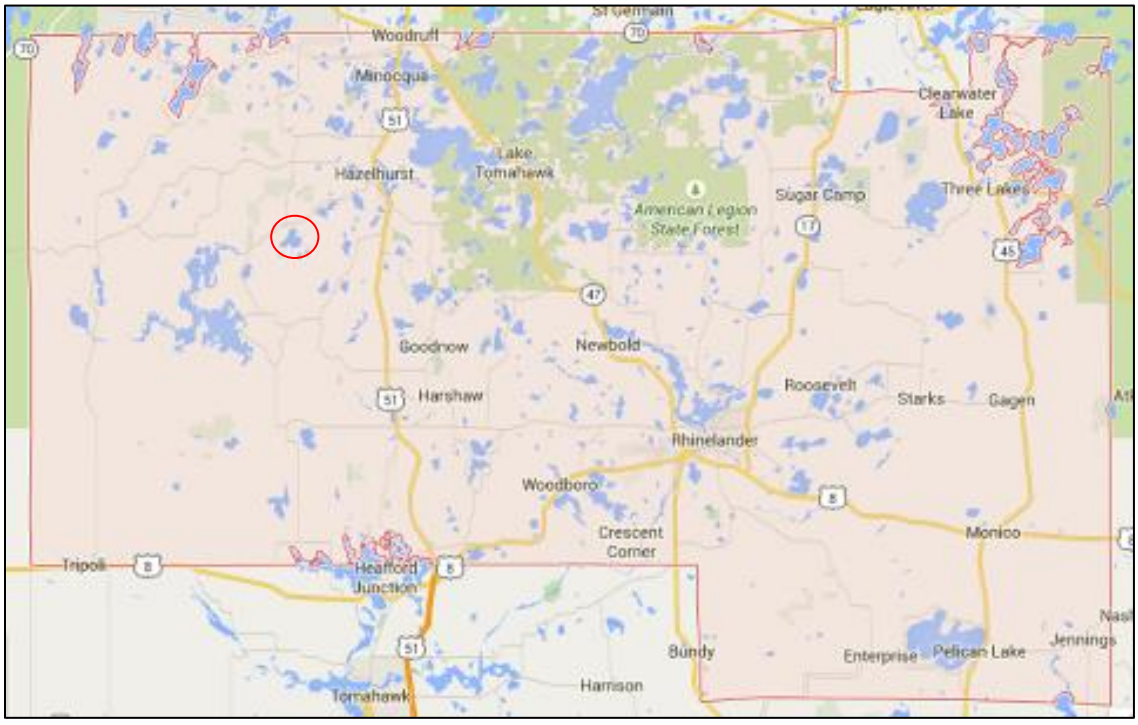

Figure 2. Map of Bear Lake.

Map Key

Boat Landing

Location of dissolved oxygen and Secchi disk reading
Latitude: 45.765450
Longitude: -89.798817

Table 1. Common plants found in Bear 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*	
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*	
Coontail (Ceratophyllum demersum) **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. **Status:** Native *Photo Credit: illinoiswildflowers.info*	
Pickerel Weed *(Pontederia cordata)* **Description:** An aquatic plant with thin, bright green leaves. Emergent leaves tend to be arrow shaped with 6 parted, blue flowers. **Status:** Native *Photo Credit: asapaquatics.com*	
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. **Status:** Native *Photo Credit: Shannon Sharp*	

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*	
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 is thick and pointy. **Status:** INVASIVE *Photo Credit: Stephanie Boismenue*	

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

Depth (Feet)	Temperature (°F)	Percent of Dissolved Oxygen	Dissolved Oxygen Levels (mg/L)
1	74.3	111.7%	9.02
2	74.1	111.7%	9.05
3	73.9	111.9%	9.07
4	73.8	111.9%	9.09
5	73.7	112.1%	9.11
6	73.6	112.0%	9.13
7	73.5	111.6%	9.08
8	73.4	110.7%	9.02
9	73.4	110.4%	8.98
10	73.3	107.7%	8.79
11	73.2	104.6%	8.55
12	72.9	98.3%	8.00
13	72.5	86.6%	7.02
14	72.1	60.6%	5.07
15	71.7	41.5%	3.44
16	71.5	34.1%	2.82
17	71.4	29.2%	2.43
18	71.2	20.5%	1.71
19	70.4	2.8%	0.22

Resources: https://dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=1527800&page=facts

Appendix A

Golden Sands Resource Conservation & Development Council, Inc.

Aquatic Invasive Species Quick Guide

Yellow Iris (*Iris pseudacorus* L.)

Description: Yellow Iris is a non-native, perennial aquatic plant in the family Iridaceae that grows from rhizomes. Large, sword-like leaves are light-dark green, and sheath each other at the base. Several large, yellow flowers are held on a round or slightly flattened stalk. Each flower has three large, drooping sepals and three shorter petals. Plants grow in wet soil or emerge from shallow water, and reach 2-6 feet tall.

North American Distribution: Yellow Iris has been reported across most of the northern United States and Canada.

Yellow Iris produces many large, yellow flowers on a rigid stalk.

Long fruit capsules produce dozens of tan-brown, circular seeds.

Dispersal Vectors: Yellow Iris was introduced from Eurasia as an ornamental plant for water gardens and other wet sites. It spreads locally by rhizomes and by large, round seeds. Dislodged fragments of the rhizome can also produce new plants. Muskrats may transport yellow Iris short distances to build their huts, and waterfowl hunters may contribute to spread by using it in construction of hunting blinds. Yellow Iris is still sold in some nurseries and internet stores.

Ecological Impacts: Populations can spread quickly by rhizomes and seeds, crowding out valuable native plant species and decreasing plant and animal diversity. A study by Raven and Thomas in 1990 noted a large population of yellow Iris that had excluded all other vegetation, even cattails. Yellow Iris is unpalatable to wildlife and livestock due to high levels of glycosides.

Control Options: Manual removal of yellow Iris is difficult, because of its strong rhizome network. Removal of small clumps is easier in areas of soft, water-logged substrates, and these clumps should be grasped as far down the stem as possible and pulled straight up to have the best chance of removing the entire rhizome. Digging is also an option—care should be taken to get underneath the entire rhizome without breaking it, and removal of native species must be minimized. All plant material must be removed from the site and disposed of away from water bodies. Yellow Iris can cause skin irritation, so gloves should be worn when working with this species.

Yellow Iris can be controlled by glyphosate-based herbicides. Plants growing near standing water should be treated with an herbicide approved for aquatic use to minimize harm to amphibians.

Large stands of yellow Iris in shallow water of a lake.

No effective biological control agent is known at this time.

Additional Information:

Jacobs, J. et al. 2010. Ecology and management of yellowflag Iris (*Iris pseudacorus* L.). Invasive Species Technical Note No. MT-28. United States Department of Agriculture, Natural Resources Conservation Service. 6pp.

Raven, P.H. and J.H. Thomas.. 1970. *Iris pseudacorus* in western North America. Madrono. 20:390-391

Photo credit: Paul Skawinski

Developed by Golden Sands Resource Conservation & Development (RC&D) Council, Inc. as part of an aquatic invasive species (AIS) education program, supported by an AIS grant from the Wisconsin Department of Natural Resources.

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Aquatic Invasive Species Quick Guide

Purple Loosestrife (*Lythrum salicaria* L.)

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Description: Purple loosestrife is a perennial wetland plant in the Lythraceae family, growing to about 8 feet tall. Stems are woody, and 4-sided (rarely 6-sided in very large plants). Leaves are opposite or occasionally in whorls of 3, with smooth margins and no leaf stalk. Each flower has six petals, and many whorls of these flowers bloom at the same time. Large plants may have many pink-purple flower spikes. Fruit capsules contain thousands of seeds each.

North American Distribution: Nearly all U.S. states and the southern Canadian provinces. Reported as far north as 65°N latitude.

Purple loosestrife flowers have six wrinkled, pink-purple petals.

Purple loosestrife produces tall flower spikes and stands up to 8 feet tall.

Dispersal Vectors: Purple loosestrife seeds probably arrived in North America from Europe, in heaps of soil used for ship ballast. It also may have been intentionally imported for ornamental use, medicinal use, or use by beekeepers. Large purple loosestrife plants can produce over two million wind-dispersed seeds per year.

Ecological Impacts: Purple loosestrife can rapidly colonize new areas, displacing native vegetative communities. In many wetlands, purple loosestrife has become the dominant species. Nesting habitat quality can decrease as the result of purple loosestrife introduction, reducing the waterfowl and shorebird communities. Some cultivars of purple loosestrife can also hybridize with our native winged loosestrife (*Lythrum alatum*), reducing the native's genetic integrity.

Control Options: Manual removal of small stands of purple loosestrife can be very effective. Plants in moist, soft substrate can often be pulled out by hand, including the roots. Very large plants may require some digging to remove the entire plant. Cutting flowerheads or seedheads can prevent seed dispersal in the short term, but plants will re-sprout from the roots and may produce new flower spikes.

Glyphosate or 2,4-D-based herbicides can be used; they should be approved for aquatic use to avoid unnecessary harm to the ecosystem. For scattered plants, herbicide is best applied with a small bottle and a wicking tip that can be used to "paint" herbicide onto the plants. Cutting the stem near the base and "painting" the cut stem is often effective. Most states require chemical use permits for any herbicide treatments in standing water or wetland situations.

Purple loosestrife stems are woody and nearly square.

Biological control of purple loosestrife is a widely used, effective method of control. *Galerucella* beetles feed on purple loosestrife without negatively affecting native wetland plants. Many states and organizations offer free assistance to volunteers looking to raise *Galerucella* beetles for local release into infested wetlands.

Additional Information:

Mai, T.K., Lovett-Doust, J., Lovett-Doust, L., and Mulligan, G. A. 1992. The biology of Canadian weeds. 100. *Lythrum salicaria*. Can. J. Plant Sci. 72: 1305-1330

Wisconsin Department of Natural Resources. Purple loosestrife biocontrol. http://dnr.wi.gov/topic/invasives/loosestrife.html

Photo credit: Paul Skawinski

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Aquatic Invasive Species Quick Guide

Rusty Crayfish (*Orconectes rusticus* Girard)

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Description: The rusty crayfish is a large crayfish of the family Cambaridae. Adults can reach six inches in length, including the claws. Most of the body is tan to light brown, but each side of the carapace has a rusty brown spot. Claws are large and typically have brightly colored tips above dark bands. Rusty crayfish are omnivores, feeding primarily on aquatic plants, snails, and other small invertebrates. They can commonly be found hiding under rocks, logs, and other debris. Rusty crayfish typically live 3-4 years.

North American Distribution: Rusty crayfish are most abundant in the western Great Lakes states, but have been documented from Minnesota and Iowa eastward to Maine, and in northern New Mexico.

Rusty crayfish are mostly light brown, with bright claw tips.

Each side of the carapace has a rusty brown spot.

Dispersal Vectors: Rusty crayfish are native to the Ohio River Basin, and were likely transported to the Midwest United States as bait by fishermen. Rusty crayfish quickly colonize lakes and streams by producing several hundred eggs per female each season. Eggs are protected under the female's tail until they hatch.

Ecological Impacts: Rusty crayfish are larger and more aggressive than most native crayfish, and are able to outcompete native species for food and habitat. Rusty crayfish consume large amounts of aquatic invertebrates, small fish, fish eggs, tadpoles, native crayfish, plants, and other aquatic life. They can hasten spread of Eurasian watermilfoil and other aggressive plants by cutting the stems, which then take root elsewhere.

Control Options: Manual trapping is effective for rusty crayfish. Always follow local trapping regulations. Modification of size limits of predator fish species can be effective. Walleye, smallmouth bass, largemouth bass, and yellow perch will consume young rusties. This strategy combined with trapping of large adults can reduce rusty crayfish populations.

An effective, safe pesticide for rusty crayfish has not been found. Although crayfish-selective pesticides exist, they are also harmful to native crayfish species.

An effective biological control agent has not been found. A parasite called *Microphallus* infects rusty crayfish (and other crayfish species), and is currently being researched. Lakes with abundant rusty crayfish are often found to have no *Microphallus* present.

Eggs and newly hatched young are held under the female's tail for protection.

Additional Information:

Hein, C.L., Roth, B.M., Ives, A.R., and M. Jake Vander Zanden. 2006. Fish predation and trapping for rusty crayfish (*Orconectes rusticus*) control: a whole-lake experiment. Can. J. Fish. Aquat. Sci. 63: 383-393.

Wisconsin Department of Natural Resources. Potential impacts to rusty crayfish (*Orconectes rusticus*) populations from a parasite, *Microphallus* sp.

Photo Credit: Paul Skawinski

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Aquatic Invasive Species Quick Guide

Chinese Mystery Snail (*Cipangopaludina chinensis* Reeve)

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Description: Chinese mystery snails are often large, up to nearly 3 inches tall. Shells are typically dark brown, and may have some dark vertical ridges near the opening. The lowermost whorl of the shell is usually much wider than the rest of the shell. At the opening of the shell, a thick, hardened plate called an operculum is able to seal the shell against predators or harmful chemicals in the water. Chinese mystery snails are capable of grazing algae from surfaces and filter-feeding on suspended algae particles.

North American Distribution: Scattered across North America, but they are most abundant in the eastern and central United States.

The Chinese mystery snail can be nearly 3 inches tall.

Chinese mystery snails have a tough plate called an operculum covering the shell opening.

Dispersal Vectors: Native to eastern Asia, Chinese mystery snails were first imported to the U.S. in the late 1800s as a food item in oriental markets. It is believed that some people may have "seeded" these snails into local waterways for later harvest. Chinese mystery snails are also introduced to water gardens for the purpose of clarifying the water and grazing algae from hard surfaces. At any time during summer and fall, each female may contain dozens of small snails at different stages of development. She occasionally gives birth to small batches of live young, complete with shells.

Ecological Impacts: Chinese mystery snails likely compete for food and resources with native snails and other grazers or filter-feeders. Some research studies suggest that impacts to native species may be insignificant. Chinese mystery snails serve as a secondary host for a trematode parasite that has been killing large numbers of waterfowl in the Midwestern U.S. Some larger animals like turtles or muskrats may occasionally feed on Chinese mystery snails.

Control Options: Manual removal of Chinese mystery snails remains the only effective method of control. Of course, the effect on the population depends on the number removed and the total population size. These snails prefer mucky, organic sediments, so manual removal is likely to be a difficult option in many areas.

Chemical control efforts tend to be unsuccessful and have unintended consequences to native snails and/or other animals. Chinese mystery snails can seal up their shells with their operculum, protecting them from unfavorable conditions like chemical pesticides. Most North American snails do not have this ability and would be harmed.

Juvenile Chinese mystery snails, just minutes old.

Additional Information:

Dillon, R. T. Jr., M. Ashton, M. Kohl, W. Reeves, T. Smith, T. Stewart & B. Watson 2013. *The freshwater gastropods of North America*. http://www.fwgna.org.

Global Invasive Species Database. *Bellamya chinensis*. http://www.issg.org/database/species/ecology.asp?si=1812&fr=1&sts=sss&lang=EN

Photo credit: Paul Skawinski

Developed by Golden Sands Resource Conservation & Development (RC&D) Council, Inc. as part of an aquatic invasive species (AIS) education program, supported by an AIS grant from the Wisconsin Department of Natural Resources. CMS-1-14