North Lakeland Discovery Center

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Enriching lives and inspiring an ethic of care for Wisconsin's Northwoods through the facilitation of connections among people, nature, and community.

2020 Town Aquatic Invasive Species Partnership Report

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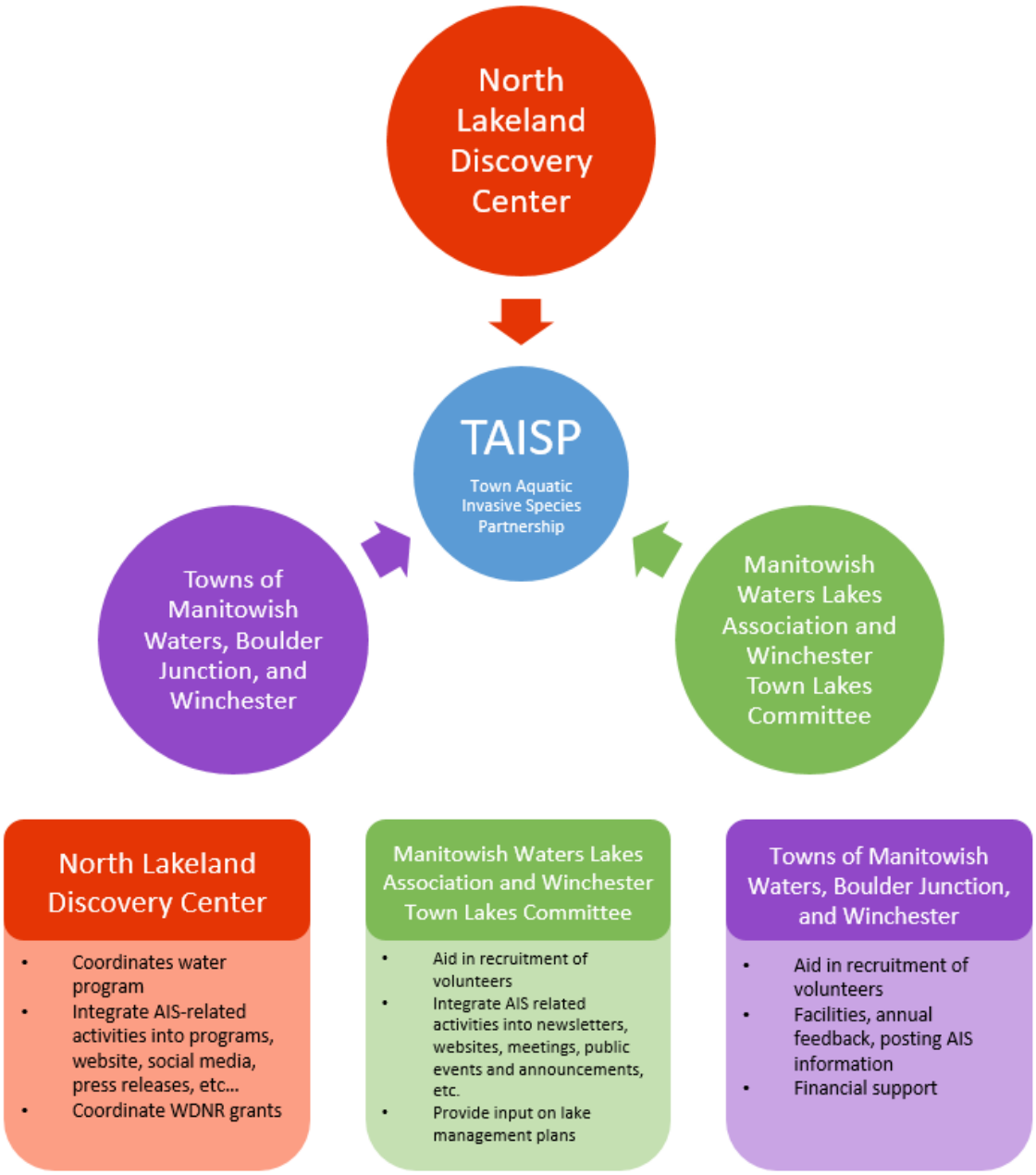

Figure 1. Model of the Town Aquatic Invasive Species Partnership (TAISP), consisting of the North Lakeland Discovery Center, Manitowish Waters Lakes Association, Winchester Town Lakes Committee, and the Towns of Manitowish Waters, Boulder Junction, and Winchester.

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Background of TAISP Partnership

The Town Aquatic Invasive Species Partnership (TAISP, Figure 1), consisting of the North Lakeland Discovery Center (NLDC), the Manitowish Waters Lakes Association (MWLA), the Winchester Town Lakes Committee (WTLC), and the Towns of Manitowish Waters, Boulder Junction, and Winchester, undertook efforts in 2020 to prevent introduction, minimize spread, and manage existing populations of aquatic invasive species (AIS) in area waters and wetlands. 2020 was a very successful year, with all goals and objectives of Town Agreements met or exceeded.

NLDC coordinated the Water Program with staffing of Emily Heald, Water Program Coordinator, and Jarod Scheff, Water Program Assistant. Funding was provided by the Towns of Manitowish Waters, Boulder Junction, and Winchester, and through grants received from the Wisconsin Department of Natural Resources (WDNR). All grants awarded through the WDNR require a match from the TAISP in the form of either cash match or volunteer hours, with each grant usually utilizing a combination of both.

NLDC integrated AIS-related activities into programming, website content, social media, press releases, and via other appropriate activities and venues. The Towns aided in the recruitment of volunteers, provided other support such as facilities, provided feedback to partners regarding management plans, posted AIS information on bulletin boards, boat landings, and other Town-owned facilities, and disseminated information at appropriate venues. The Manitowish Waters Lakes Association and Winchester Town Lakes Committee (and associated lake associations) aided in the recruitment of volunteers, and integrated AIS-related activities into their newsletters, websites, meetings, and public announcements.

A Special Note on COVID-19

Due to the ongoing effect of the COVID-19 virus on the safe and ethical conduct of NLDC programming on both staff and the community, the NLDC Executive Committee and Executive Director, with guidance from the Vilas County Health Department, made the difficult decision to allow for only one seasonal Water Program staff in summer 2020, our Water Program Assistant, Jarod Scheff. Because the Water Program normally functions with 3 interns, plus a Water Program Coordinator, our usual programming needed to be modified. Most of our educational programming was cancelled or modified to be an online format. We created two online virtual learning series. Discover at Home was our free mini-series. During quarantine, we posted 2, free, Discover at Home videos per week. People were able to view these videos on Facebook and YouTube. Since May these videos have been one per week. We also created longer 1-hour videos, our Discover on Demand series, where we explored specific topics in depth. We also created an online AIS identification training in lieu of our usual in-person trainings. Although this is not as ideal as an in-person training where participants are able to hold and view specimens in person, we believe it is certainly better than nothing. We also placed a cooler outside the main office, where people were able to drop off suspect plan specimens for identification in a no-contact method. To maintain contact with local lake groups and associations, we attended virtual meetings (usually utilizing Zoom or other similar methods).

Because our hired seasonal Water Program Assistant was a Water Monitoring Intern in 2019, no training was required, and our 2-person water staff were able to achieve almost all of the workload normally completed by 4 staff members. It required long days and additional hours, but we are proud of the work we were able to accomplish in this unprecedented year.

Curly-Leaf Pondweed Update

Towns of Manitowish Waters and Boulder Junction

Each year NLDC monitors the Chain and associated inflowing/outflowing rivers with the goal of mapping current populations of AIS, and to look for any new infestations. Curly-leaf pondweed has been the main AIS of concern, but NLDC also treats and maps purple loosestrife infestations, and monitors for other AIS such as Eurasian-water milfoil, spiny waterflea, rusty crayfish, mystery snails, and yellow iris.

A timeline of significant curly-leaf pondweed (CLP) detection and treatment events in the Manitowish Waters Chain of Lakes is as follows:

2010: CLP first detected on Island Lake and Rice Creek by NLDC volunteers and staff.

2011: CLP detected in the Spider-Island Lake Channel, Rice Creek population mapped by NLDC and Vilas County staff, Onterra, LLC surveyed Rice Creek, Island Lake, Spider Lake, Spider-Island Channel, and Spider Lake (>500 total acres of CLP).

2012: NLDC received grant funding for treatment and additional surveys, chemical treatment of Island Lake and the Spider-Island channel was unsuccessful due to use of low concentrations of endothall treatments, few plants found in Spider and Stone Lakes by NLDC staff and volunteers, NLDC hand pulled small areas of CLP.

2013: Detected CLP in Manitowish Lake (few plants) and the Rest-Stone channel (3.9 acres total), received grant funding for treatment and surveys, chemical treatment of Island Lake and the Spider-Island channel successful with higher endothall concentrations, NLDC continued to hand pull small areas, NLDC increased education to include presentations to chambers, libraries, lake associations, clubs, and schools.

2014: Received grant funding for surveys, chemical treatment, and professional hand harvesting, continued to hand pull small areas, continued community education.

2015: Received grant funding for surveys, chemical treatment, and professional hand harvesting, continued to hand pull small areas, continued community education.

2016: Received grant funding for surveys, chemical treatment, and professional hand harvesting, continued to hand pull small areas, continued community education.

2017: Received grant funding for surveys, professional hand harvesting, continued to hand pull small areas, continued community education. No chemical treatment. After several years of chemical treatments, it was recommended to take an "observation" year to provide more insight into the turion seed bank. NLDC continued locally-based efforts, including AIS species monitoring through the "Captain and Deckhand" program and watercraft inspections. Onterra recommends professional hand harvesting in future years, as well as continued partnership with NLDC and volunteers to monitor and hand harvest CLP.

2018: We did not apply for state funding assistance for 2018, as 2017 was the final grant year to complete the 5-phase Manitowish Chain project. With some remaining grant funding in addition to Town contributions, we continued professional hand harvesting, NLDC hand pulling of small CLP areas, and continued community education.

2019: We did not apply for state funding assistance for 2019. With some remaining grant funding in addition to Town contributions, we continued professional hand harvesting, NLDC hand pulling of small CLP areas, and continued community education.

2020: We did not apply for state funding assistance in 2020. With some remaining grant funding in addition to Town contributions, we continued monitoring and hand harvesting, as well as coordinated volunteer efforts to monitor.

Please see Onterra management plan reporting for details more specific to each year.

NLDC used GPS data gathered from early-season 2020 AIS surveys to guide professional hand harvesters from Aquatic Plant Management (APM, Minocqua, WI) in hand harvesting CLP on Fawn Lake using diver assisted suction (DASH). Please see APM dive reports for specific harvest information. APM spent two days on Fawn Lake and removed 10.5 cubic feet of CLP. We plan to apply for another permit to conduct DASH on Fawn again in 2021, if needed. Once we complete the 2021 early-season AIS surveys, we will determine if we need to use DASH again, or if we will return to solely hand removal.

We did not locate any new, established locations of CLP. We did find a single, floating fragment of CLP on the southwest side of Alder Lake. The fragment did not have roots attached. We have not found CLP on this lake before. We thoroughly searched Alder Lake and the Trout River south of Alder in search of rooted plants, but found none. The fragment was reported to the DNR, but the fragment does not qualify as a new established population due to lack of rooted plants. While it is possible the fragment came from a boater from a different part of the Chain, we still plan to be highly vigilant of any potential CLP on Alder in the future.

The remainder of located CLP was hand removed by NLDC:

- Island Lake: 20+ plants, located in small clumps (8 person hours)
- Spider-Island Channel: 20+ single, sparse plants (6 person hours)
- Fawn Lake: Few, scattered plants in small clumps north of DASH area (4 person hours)
- Stone Lake: One small clump of plants on the northern part of the lake, several plants found in western 2019 location (6 person hours)
- Rest-Stone Channel – Manitowish River: Small clumps of plants (3.5 person hours)

Several smaller populations of CLP continue to exist in Rice Creek, feeding into Island Lake. The CLP in Rice Creek was mapped again this year, and does not appear to be moving from Rice Creek into Island Lake. We will continue to monitor this population for potential spread into Island Lake.

Town of Winchester

Harris Lake is the only known lake in the Town of Winchester containing populations of CLP. The Harris Lake Association (HLA) contracted with Onterra in the fall of 2008 to develop a strategy for CLP management. After the monitoring and assessment surveys in 2009 and 2010, herbicide was applied on approximately 10.4 acres in the spring of 2011. CLP was treated again in 2012 (4.1 acres) and 2013 (2 acres). Smaller patches of CLP not treated with herbicide were hand pulled by HLA volunteers. CLP was not found in 2014. In 2015, Harris Lake joined Onterra and NLDC in the first phase of the Town of Winchester Lake Management Planning Project. CLP was not found in 2015. Onterra located and removed 3 small plants in 2016. In 2017, NLDC Water Program Coordinator located several more plants in the same area as 2016. NLDC staff and volunteers removed the plants.

In 2018, NLDC staff located CLP on Harris Lake in the same area as 2017. The plants were considerably shorter than 2017, suspected to be growing short due to unusually late ice-out followed by rapid increases in surface water temperature. NLDC staff hand pulled CLP.

In 2019 we located CLP again in the same bay on Harris Lake. There was only one, short plant. It was removed. We also located CLP in a new area on Harris Lake in the bay just north of the 2017 and 2018 locations. The infested area was approximately 10x10 feet. NLDC spent a total of 12 person hours removing CLP on Harris Lake.

In 2020 we located CLP in the same bay as 2017 and 2018. We revisited this site, as well as the newer northern location several times this summer. No CLP was found in the northern-most bay. We spent a total of 8 person hours removing CLP on Harris.

We also located a single, small, floating fragment of CLP on the southern end of the lake. We thoroughly searched and snorkeled the area in search of rooted plants, but found none. It is possible

the fragment came from the northern part of the lake, or was moved to the area via watercraft, but we still plan to be highly vigilant in this area in the future. At the end of August, a volunteer located a larger floating clump of CLP in the same area. We spoke with the WTLC and the Harris Lake Association, and have decided to "double survey" the lake next year. NLDC will complete a survey, and so will Onterra.

Purple Loosestrife Update

Purple loosestrife is a hardy, rapidly spreading wetland invasive species that causes sharp declines in biodiversity, and can dramatically disrupt water flow in rivers and waterways. One single purple loosestrife plant produces up to 2.7 million pinhead-sized seeds that are easily spread by wind, water, and human activity. Our focus with this ongoing project is to combat purple loosestrife in the most natural ways possible, by using biocontrol method of *Galerucella* beetles, rather than using non-selective herbicide treatments that could potentially harm other plants and organisms.

Each spring, the NLDC collaborates with the MWLA and the North Lakeland School teachers to lead 7th graders in beginning our biocontrol beetle rearing project. However, this year due to COVID-19, the project was not able to be completed as usual. On June 2, the two water program staff collected about 500 beetles to directly release onto purple loosestrife infestation sites. Due to the lower than usual number of beetles (since we did not rear them), we released the beetles onto areas of highest infestation: Wild Rice Lake and Rice Creek.

Towns of Manitowish Waters and Boulder Junction

Our extensive purple loosestrife surveys on the Manitowish Waters Chain of Lakes and incoming/outflowing rivers and wetlands helped us to identify several known areas of concern. Rice Creek flowing into Island Lake, Wild Rice Lake, and the Manitowish River from the intersection of Highways H and K flowing into Island Lake, are the two most heavily infested locations. Each location required several days of flower head clipping and manual plant removal.

We discovered a new population of purple loosestrife on the intersections of Highway 51 and County Road H, on the east side of the road. We dug up and removed about 5 plants. We will continue to monitor this location in future years.

We also locate and clipped purple loosestrife on Vance Lake, a wetland on the western side of Rest Lake, Stone Lake, Stepping Stone Lake number 1, the Spider-Manitowish channel, Wild Rice Lake, and Manitowish Lake (on the island).

Town of Winchester

There was a small patch of purple loosestrife located in close proximity to South Turtle Lake, but volunteers removed it in 2016. Volunteers had not observed any purple loosestrife near South Turtle Lake since then, until this year. We dug up and removed about 5 mature plants, indicating the plants were likely growing small in this location in prior years but not flowering. We plan on monitoring this location more thoroughly in future years.

There is a very small population of purple loosestrife near the Birch Lake boat landing in a wetland across the street. A volunteer clipped flowers from the small plants in 2017. Plants were found in the same location in 2018, and hand removed by an NLDC intern. In 2019, only a single purple loosestrife plant was found in 2019, and it was hand removed. In 2020 we dug up and removed 4 small plants. These small plants are likely the result of an established seed bank in this area, and we will maintain a close watch on the location in the future. A small population of purple loosestrife was also located and clipped on Lake Adelaide. No populations of loosestrife in Winchester are large enough to warrant a beetle release, and NLDC will continue to monitor.

Spiny Water Flea

Spiny waterfleas are a type of invasive zooplankton that reproduce asexually, so only one individual is needed to start a new population. Spiny waterfleas also lay resting eggs in the fall, which are contained in lake sediment. They are very durable. The resting eggs are often the problem, because many lake users do not know to keep mud off anchors and equipment while moving from lake to lake. Because they are only a quarter of an inch in size, and translucent, finding them can be like finding a needle in a haystack. It makes sense to expect a lag time between when an invasive species such as spiny waterflea establishes until it is detected.

Spiny waterflea is only in 11 inland Wisconsin lakes. In Vilas: Plum Lake (2019), Trout (2014), Star (2013), Stormy (2007), Ike Walton (2015), and Butternut (2014). They are also in the Gile Flowage (2003) in Iron County and the Madison Chain of Lakes in Dane County (2009).

Spiny waterfleas eat native zooplankton that graze on algae, and can therefore change food web dynamics in lakes. If the algae-eaters decline, more algae is expected. Lake Mendota in Madison has seen a loss of nearly 3 feet in water clarity that has been attributed to spiny waterflea.

There is currently no known method to control spiny waterflea. Prevention and education are key. Per Wisconsin law, boaters are required to inspect boats and equipment for plants and animals, remove what they find, drain all water, and never move live fish. While not required by state law, letting your boat dry for at least 6 hours will effectively kill adult and resting egg spiny waterfleas.

Towns of Manitowish Waters and Boulder Junction

In 2018, we dredge-sampled all lakes in the Manitowish Waters Chain. Lake bottom sediment is sifted through to search for spiny waterflea broken spines. All samples were returned negative. With the lakes all "on a level playing field" we now sample the lakes on a rolling basis. In 2020 we collected spiny waterflea samples from Rest, Island, Spider, and Wild Rice Lakes. Wild Rice will be sampled each year, as it is connected by the Trout River to Trout Lake, which is infested with spiny waterfleas. In 2021 we will sample Stone, Fawn, Alder, and Wild Rice.

Town of Winchester

This summer we collected dredge samples from North Turtle and Circle Lily. Next year we will collect samples from Harris, Birch, and South Turtle.

Yellow Iris

Town of Winchester

The waters of Winchester are some of the most pristine in the state of Wisconsin. While Winchester is predominantly free of AIS, an exception to this is the presence of yellow iris, and aquatic invasive species, on the Turtle Chain (South Turtle, North Turtle, and Rock Lakes). Yellow iris is a garden escapee that was once sold in nurseries, and is now widespread in Wisconsin. Yellow iris is capable of spreading rapidly and growing in dense mats. It can grow so densely that wildlife cannot access the shoreline from the water. Large mats of yellow iris compact soil and alters the surrounding hydrology. It can dry out the surrounding habitat and inhibit water flow. All parts of the plant are poisonous and therefore the plant does not act as a host/habitat for other wildlife. Yellow iris spreads through seeds and rhizomes. As a part of the management planning process on the Turtle Chain, locations of yellow iris were mapped, resulting in about 60 locations with yellow iris – many locations have multiple plants. Yellow iris is especially widespread on Rock Lake. The Turtle Lakes Chain Association (TLCA) partnered with NLDC to develop and implement a removal plan for yellow iris. The TLCA mailed letters to each property owner with yellow iris outlining why yellow iris is a problem, and included with it a post card for property owners to indicate whether they would like to remove their own,

or if they wanted assistance from NLDC with removal. The response rate was over 80%, with 19 asking for removal assistance.

Water Program Assistant, Jarod Scheff, removed thousands of pounds of yellow iris from the Turtle Chain. He spent about 60 hours removing the iris from the properties that requested assistance. These locations will require monitoring in the future, as it is likely that tuber pieces remain in the soil and could resprout.

Internship Program

In most years, the NLDC hosts 3 water monitoring interns each summer to assist with monitoring surveys, removal work, and education. Interns are absolutely essential in completing AIS work. This internship opportunity is extremely well rounded, as interns are exposed to: identification and treatment of multiple types of invasive species; talking with people of different educational backgrounds, ages, and interests; formal and informal educational events; use and towing of boats; fundraising; and the inner workings of an environmental non-profit.

Unfortunately, this year due to COVID-19, NLDC Board and Executive Director made the difficult decision to allow for only one seasonal staff. The water program was lucky to hire Jarod Scheff back for his second summer at NLDC. He was a water monitoring intern in 2019, and was rehired for summer 2020 as the Water Program Assistant.

Lake Business Owner Outreach Initiative

After hearing many concerns from community members about the spread of AIS via lake business owners, NLDC has partnered with Vilas County, Vilas County Lakes and Rivers Association, the Lac du Flambeau Tribe, Oneida County, and Oneida County Lakes and Rivers Association on a business outreach initiative. Each AIS Coordinator (from NLDC, Vilas County, Oneida County, and Lac du Flambeau) will be choosing three businesses to work with in 2021. These businesses are any business that utilizes lakes and rivers: bait shops, fishing guides, rental companies, dock installers/removers, boat dealers, etc. We will work with each business to teach them best practices to avoid spreading AIS, specific to their business.

Fulfillment of Town Agreement Goals and Objections

Please see Appendix I for an all-inclusive list of educational activities

1. **Prevent AIS Infestations through Education**
    a. Provided a multitude of opportunities for AIS and general lake ecology education to the public
    b. Created a multitude of online learning opportunities: https://www.youtube.com/channel/UCjSi1ss2L4lX0muAlIHtDew/videos
    c. In-person AIS identification trainings were replaced with an online training. A cooler for no-contact plant ID drop off was placed outside the main office.
    d. Conducted spontaneous AIS trainings for walk-in visitors to the NLDC
    e. Identified aquatic plants and invertebrates for walk-in visitors and volunteers who brought samples to the NLDC
    f. Improved and maintained NLDC Nature Nook and Tadpole Classroom public AIS displays and activities through a touch tank, fish tank, interpretive signage, and additional informational displays
    g. Educational outreach booths at community events such as the Manitowish Waters 4th of July celebration, MWLA Annual Meeting, the Musky Jamboree, Cranarama and

Winchester Picnic in the Park – these events were cancelled this year. We provided video educational materials in lieu of in-person events where appropriate.

h. Provided educational AIS booths and materials for inclusion in packets at fishing tournaments.
i. Attended the Wisconsin Lakes Convention, April 2-3, 2020 (virtual), providing mediation and presentations, attended statewide AIS Coordinator meetings throughout the year
j. Provided news interviews to Newswatch 12 out of Rhinelander about AIS

2. **Prevent AIS Infestations through Lake, Connected River, and Wetland Monitoring**
    a. Promoted volunteer monitoring in workshop trainings and through various communications (website, social media, lake association newsletters and websites, flyers, etc), and the WDNR Citizen Lake Monitoring Network
    b. Trained 2 new volunteers into the secchi disk water clarity monitoring program
    c. Maintained contact with volunteers, and frequently reported new findings
    d. NLDC staff and volunteers identified and GPS-mapped AIS infestations
    e. Submitted all collected data to the WDNR statewide database Surface Water Integrated Monitoring System (SWIMS)

Towns of Manitowish Waters and Boulder Junction

a. Monitored all shorelines, and wetlands, targeting areas considered most suitable for AIS on the entire Manitowish Waters Chain of Lakes, and associated river sections and wetlands (river sections connecting lakes on the Chain, Manitowish River below the Rest Lake dam to the Highway 51 wayside, the Trout River from Highway H to Wild Rice Lake, the wetland on northern Wild Rice Lake, wetlands west of Rest Lake, the Manitowish River from Hwys H/K into Island Lake, Rice Creek from Hwy K into Island Lake, and Stepping Stones 1-3)
    i. Identified a single floating fragment of CLP on Alder Lake
b. Hand pulled populations of CLP on Fawn, Stone, the Manitowish River between Rest and Stone, Island, and the Spider-Island channel

Town of Winchester

a. Monitored all shorelines and wetlands, targeting areas considered most suitable for AIS on Harris, Hiawatha, Rainbow, Birch, Tamarack, South Turtle, North Turtle, Rock, Pardee, Circle Lily, Helen and Adelaide Lakes
a. Hand pulled populations of CLP on Harris Lake, hand pulled PL near Birch Lake, hand pulled PL off Highway W near South Turtle Lake, clipped PL on Lake Adelaide
b. Identified a floating fragment of CLP on the south end of Harris – no rooted plants located

3. **Prevent AIS Infestations through Boat Landing Inspections**
    a. Applied for and obtained funding through the WDNR Clean Boats Clean Waters (CBCW) Program for Rest and Clear Lakes in Manitowish Waters. Completed a combined total of 106 (200 hours in 2019) boat inspection hours, where interns inspected watercraft for invasive species and educated boaters on Wisconsin statutes as they related to invasive species. We spoke with 386 boats (387 in 2019) and 924 people (681 in 2019)
    b. Entered all inspection data into the SWIMS database
4. **Prevent AIS Infestations through Communication and Public Relations**
    a. Maintained frequent contact with TAISP members and involved lake associations through NLDC public programs, websites, displays, email updates, libraries, and virtual presentations at lake association meetings

b. Provided reports and updates at each MWLA and WTLC meeting, as well as several Town Board presentations for Manitowish Waters, Boulder Junction, and Winchester
c. Supplied and updated AIS printed materials to the Chambers of Commerce and Libraries throughout the season for distribution to visitors of the area
d. Designed and produced AIS materials such as pamphlets, flyers, backboard display materials, and interpretive signage
e. Inspected boat landing signs in Manitowish Waters, Winchester, and Boulder Junction to ensure signs were current and in good repair.
f. Participated in WDNR statewide programs: Bait Shop Program, Ice Your Catch Initiative, Drain Campaign, and Landing Blitz
g. Provided newsletter articles and information for lake associations
h. Provided frequent updates and informational nuggets on Facebook and Instagram (social media)
i. Maintained NLDC's Aquatic Invasive Species website section: https://discoverycenter.net/programs-events/aquatic-invasive-species/

5. **Manage Infestations through Action and Rapid Response Plans for CLP and Purple Loosestrife**

Town of Manitowish Waters

a. Surveyed all shorelines on the entire Manitowish Waters Chain of Lakes, associated river sections, and river sections leading into/out of the chain for CLP and purple loosestrife. Please see Appendix I for dates of monitoring and prior sections for results of surveys
b. Updated statewide inventories of purple loosestrife and CLP infestations
c. Coordinated and deployed purple loosestrife and CLP control methods
d. Purple loosestrife *Galerucella* beetles were released on Rice Creek and Wild Rice Lake. Flower heads were clipped at these locations, as well as Rest, Stone, Spider, Fawn, Island, and Manitowish lakes.
e. CLP was pulled by professional divers on Fawn Lake. NLDC pulled CLP on Rest, the Rest-Stone channel, Stone, Fawn, the Spider-Island Channel, and Island Lake.
f. Coordinated project planning, tracking, and reporting for grants
g. Actively engaged partners to encourage collaboration on the issue of AIS

Town of Winchester

a. Surveyed all shorelines areas on Harris, Hiawatha, Birch, Rainbow, Tamarack, South Turtle, North Turtle, Rock, Helen, Adelaide, Pardee, and Circle Lily Lakes for CLP and purple loosestrife. Please Appendix I for dates of monitoring
b. Updated statewide inventories of purple loosestrife and CLP infestations
c. Coordinated and deployed purple loosestrife and CLP control methods
d. Populations of purple loosestrife in Winchester are not large enough to warrant beetle release, but known populations have been hand harvested on South Turtle, in a wetland near Birch Lake, and on Adelaide Lake.
e. CLP was hand pulled by NLDC staff on Harris Lake
f. Obtained WDNR grants, assisted in grant writing, project planning, tracking, and reporting
g. Actively engaged partners to encourage collaboration on the issue of AIS

Town of Boulder Junction

a. We located and removed about five PL plants from the eastern side of the intersection of Highway 51 and H.

6. **Conduct Lake Level Monitoring**

The NLDC, in partnership with volunteer concerned citizens and other area scientists, formed a 38-lake level monitoring network in 2008 designed to monitor lake levels via citizen science. Now in its 10th year, the network has provided standardized data collection that is vital for understanding the effects of climate change on lakes in the Northern Highland Lake District region. Lake level monitoring projects are therefore listed on the WI-CBM Priority Programs List.

This long-term monitoring project partners with several groups, including the Lac du Flambeau Tribal Natural Resources Department (assists in lake gauge installation and monitoring), and UW Madison Trout Lake Research Station (technical guidance and data analysis). The project also works with Vilas County Lakes and Rivers Association, individual lake associations, and many dedicated volunteers. The partnership formed after concerns for record low lake levels spurred local citizens to form the citizen scientist lake level monitoring network, spearheaded by the NLDC. This monitoring network was the first of its kind in Wisconsin, addressing a lack of long-term lake level data. NLDC has since managed a data-rich program that gathers empirical data, and compares how different lake types respond to precipitation events, both spatially and temporally. An established, highly standardized monitoring network committed to consistent monitoring and statistically sound data collection allows scientists to develop and test lake level models, and to examine the differences between lake types over time. Consistent and continual monitoring will lead to a valuable data set that could be used to inform adaptive management decisions influencing water resources into the future.

The University of North Carolina, with funding provided by NASA, is using lake level information from both Wisconsin and North Carolina to relate high quality satellite imagery to total lake water volume. By understanding changes in lake height (the information volunteers collect) and changes in lake surface area (collected via satellite imagery) researchers can understand how the volume of water in a given lake changes over time. They are hoping to use information collected from Wisconsin, Minnesota, Washington, the New England area, along with Bangladesh, France, India, and Pakistan.

Researchers from the Wisconsin DNR and University of Wisconsin are also using lake level data to create models to predicate lake levels using precipitation information from years prior. They have also interestingly found that northern lakes exhibit opposite patterns from southern lakes in Wisconsin. While the north has experienced drought and low lake levels, the south was very wet with high water levels.

In spring of 2019, the DNR tied all of the benchmarks on current lake level monitoring lakes to sea level to ensure they can be compared to lakes around the world.

Town of Winchester

There are volunteer lake level monitors on Hiawatha, Harris, Birch, Rainbow, Tamarack, and Pardee Lakes. The dataset must be continued in order to obtain long-term data necessary to draw scientific conclusions. For now, lake levels clearly reflect annual changes in precipitation and beaver activity.

7. **Administer AIS Program Efficiently and Effectively**

   a. Continued work with the TAISP on management recommendations for the Manitowish Waters Chain of Lakes and Winchester Lakes through planning documents and strategic planning meetings
   b. Administer grants and track volunteer hours, financial tracking
   c. Submit reimbursement requests and biannual activity reports to the WDNR
   d. Acts as a liaison to contracted lake management planning group (Onterra, LLC)
   e. Provides diverse opportunities for AIS education to the public

Appendix I. Water Program-Related Activities, Education/Outreach and Monitoring: January 1, 2020-December 31, 2020

January 2, 2020
Knowledge at Noon: Otters. Includes discussion of preservation of otter habitat.

January 6, 2020
Attended meeting with Vilas County regarding changes in NR 193 code.

January 23, July 17, August 27 2020
Attended Winchester Town Lakes Committee meeting to provide updates and answer questions.

January 28, 2020
Attended Boulder Junction Town Meeting to provide updates and secure funding.

January 29, 2020
Attended meeting about the Turtle River management planning in Mercer. This river runs through Winchester.

February 3, 2020
Attended Winchester Town Meeting to provide updates and secure funding.

February 4, 2020
Attended University of Wisconsin Steven's Point career fair to recruit applicants for summer internship program.

February 5, 2020
Attended meeting at Trout Lake Station on lake level monitoring and converting units to sea level.

February 13, 2020
Attended Land and Water County meeting to secure NR 193 funding.

February 18, 2020
Initial meeting for Manitowish Waters Groundwater Initiative, a new initiative to educate landowners on the water quality of their wells.

February 26-28, 2020
Interviews for summer internship program.

March 15, 2020
Manitowish Waters Groundwater Initiative meeting with UW Steven's Point.

March 19, 2020
Work from home started due to Wisconsin quarantine.

March 23, 30, April 6, 13, 20, 27, May 4, 11, 18, May 25, 2020
Educational program meeting to provide online programming during quarantine.

April 2 and 3, 2020
Attended Wisconsin Lakes Convention. Moderated two two-hour segments, provided presentation on Dragonflies (included discussion on healthy shorelines).

April 10, 2020
Attended webinar – "Willingness to pay for AIS."

April 16, 2020
Created and posted Discover at Home – Dragonflies.

April 21, 2020
Attended webinar – "Watershed Monitoring Groups in time of COVID-19."

April 22, 2020
Conference call for Manitowish Waters Groundwater Initiative.

April 22, 2020
Meeting with Tim Hoyman (Onterra) to complete first draft of Winchester Townwide Management Plan.

April 23, 2020
Wisconsin AIS Partnership meeting day 1.

April 24, 2020
Attended webinar on new protocols for spiny waterflea monitoring.

April 27, June 10, September 14, October 26, 2020
Attended Vilas County Lakes and Rivers Association board meeting.

April 28, 2020
Created and posted Discover at Home – Fish.

April 29, 2020
Attended webinar "Wetlands in Wisconsin."

April 30, 2020
Wisconsin AIS Partnership meeting day 2.

May 6, 7, 14 2020
Lake gauge installation and calibration.

May 12, 2020
Created and posted Discover at Home – Bogs.

May 12, 2020
Manitowish Waters Groundwater Initiative meeting.

May 18, July 20, August 17, September 21, 2020
Attended Manitowish Waters Lakes Association to provide updates.

May 20, 2020
Interview with Newswatch 12 regarding AIS and boating behavior.
Attended webinar "Changes in Lake Ice."

May 21, 2020
Created and provided video "Secchi Disk Monitoring" for Bird and Wildlife Festival.
Attended webinar "Lake Organizations and COVID-19."

May 22, 2020
Created and provided "Hidden Lake Creatures Part 1 and 2" for Discover on Demand series.
Attended webinar on hybrid watermilfoil.

May 27, 2020
Attended AIS Trainer webinar.
Attended AIS ID webinar.

May 28, 2020
Attended Photo and Verification webinar.

June 1, 2020
Collected cella beetles for purple loosestrife biocontrol.

June 3, 2020
Distributed cella beetles on Wild Rice Lake, Rice Creek.
Provided CLMN secchi disk training for 2 new local volunteers.

June 4, 2020
Scouted Fawn Lake to determine CLP growth.

June 9, 2020
Pulled CLP on Harris – 2 people, 3 hours = 6 person hours.

June 11, 2020
Scouted Fawn and Stone Lakes to determine CLP growth.

June 12, 13 2020
Completed early season AIS survey on Turtle Chain in Winchester.
Wonders of Wildlife: Dragonflies (educational program).

June 15, 2020
Onterra meeting with Manitowish Waters Lakes Association re: finalized implementation plan.

June 16, 2020
Early season AIS survey on Clear and Little Star Lakes.

June 17, 18 2020
Early season AIS survey on Alder Lake and Trout River. Found a single floating fragment of CLP on Alder, did not locate rooted plants.

June 18, 19 2020
Early season AIS survey on Wild Rice Lake.

June 19, 2020
Pulled CLP on Harris Lake. 2 people for 1 hour = 2 person hours.

June 23, 24, 2020
Aquatic Plant Management using DASH on Fawn Lake.

June 23, 2020
Virtual class with Center for Conservation Leadership (usually in person) on watersheds.

July 24, 2020
Early season AIS surveys on Birch and Tamarack Lakes.

June 30, 2020
Pulled CLP on Spider-Island channel, Rest-Stone channel, and Island Lake. 3 people for 10 hours = 30 person hours.

July 1, 2020
Pulled CLP on Spider-Island channel (double check), Rest-Stone channel (double check), Island (double check), Fawn, and Stone. 2 people for 8 hours = 16 hours

July 2, 2020
Early season AIS survey on Manitowish River below the Rest Lake dam.

July 3, 4, 2020
Participated in the CBCW Landing Blitz/Drain Campaign weekend at Rest Lake boat landing.

July 7, 2020
Early season AIS survey on Rainbow and Circle Lily Lakes

July 8, 2020
Early season AIS survey on Pardee Lake

July 9, 2020
View aquatic plant identification training.

July 10, 2020
Attended virtual Vilas County Lakes and Rivers online conference. Attended board meeting afterwards as active board member.

July 22, 2020
Attended webinar “Surface Water Grant Program Applicant Webinar.”

July 23, 2020
Canoe trip on Wild Rice Lake, covering AIS and other general lake ecology topics.

July 28, 2020
Pulled and clipped PL from Stepping Stone Lakes.

July 31, 2020
Met with Vilas County AIS Coordinator and Lac du Flambeau AIS coordinator to discuss 2021 plans for lake business outreach.

August 4, 2020
Delivered “Discovering Dragonflies” program virtually to Washburn 4-H.

August 5-6, 2020
Point-intercept survey on Statehouse Lake.

August 5, 2020
Attended Surface Water Grant Applicant Webinar: County Addition.

August 6, 2020
Webex meeting with Winchester Town Lakes Committee and Onterra regarding townwide management plan.

August 11, 2020
PL surveys and clipping on Rest, Stone, Fawn, and Manitowish Lakes. Snorkel survey of Manitowish, Clear, and Little Star.

August 12, 2020
PL surveys and clipping on Spider, Island, Rest. SWF sediment collection on Island and Spider. PL clipping on Rice Creek.

August 13, 2020
PL surveys and clipping on Wild Rice. SWF sediment collected from Wild Rice.

August 14, 2020
PL surveys and clipping below the Rest Lake Dam.

August 15, 2020
Participated in annual Snapshot Day, surveying Boulder Junction Lakes: Jag, Day, Oswego, Street, and Lost Canoe.

August 18, 19, 2020
PL clipping on Rice Creek.

August 20, 2020
PL survey and clipping on Manitowish River from highways H/K into Island Lake.
Provided interview to Newswatch 12 on lake level monitoring.

August 21, 2020
PL clipping on Manitowish River near Island Lake boat landing.

August 22, 25 2020
PL clipping on Rice Creek.

August 29, 2020
Jarod Scheff, water program assistant, last day of work.

August 31, 2020
Submitted spiny water flea samples for analysis to DNR.

September 8, 2020
Meeting with program staff at NLDC on winter and spring educational programming.

September 17, 2020
Dragonfly presentation for Michigan Inland Lakes Conference.

September 21, 2020
Discover at Home: Lake Turnover.

September 22-24, 2020
Attended Minnesota Aquatic Invasive Species Research Center annual research update conference.

September 22, 2020
Attended Boulder Junction town meeting to provided 2020 update and request funding for 2021.

October 1, 2020
Attended invasive fish identification workshop.

October 5, 2020
Attended Winchester town meeting to provide 2020 update and request funding for 2021.

October 12, 2020
Wild Rice presentation for women's outdoor adventure group.

October 22, 2020
Attended Wisconsin AIS partnership meeting.

October 23, 2020
Attended Vilas County annual lakes partnership update meeting.

October 27-29, 2020
Removed lake level monitoring gauges.

November 10, 2020
Attended Manitowish Waters annual meeting of the electors to provide AIS program overview.

December 1, 2020
Discover on Demand: Wild Rice.

Appendix II: Photographs of AIS monitoring, control, and education work

Water Program Assistant, Jarod Scheff, assisting with a Eurasian water milfoil research project with Vilas County Conservation Department on Buckatabon Lake.

Jarod Scheff with a van full of freshly removed yellow iris from the Turtle Chain in Winchester.

An example of the deep, extensive tuber system formed by yellow iris.

Jarod Scheff and Emily Heald removing CLP from the Rest-Stone channel in Manitowish Waters.

Early-season AIS monitoring.

Collecting the cella beetles to later release onto PL infestation sites.

An example of the damage cella beetles cause to PL plants.

No-contact plant identification drop off station.

The DASH boat used to remove CLP from Fawn Lake.