Wisconsin Department of Natural Resources

Invasive Species Interim Performance Report

Prepared by the DNR's Invasive Species Team

July 1, 2016 – June 30, 2017

Cover Photo. Lesser celandine (Ranunculus ficaria) infestation in southern Wisconsin.

Introduction

Purpose of Report

The Department of Natural Resources (department) is required by *Wisconsin Statutes* to submit a biennial report to the legislature, governor, and Wisconsin Invasive Species Council detailing Wisconsin's invasive species programs, the state's progress in controlling invasive species, current expenditures, and future needs. The report is due by October 1 in even numbered years. An interim performance report must be submitted by October 1 of odd-numbered years. This report meets the interim reporting requirement and covers the period of July 1, 2016 through June 30, 2017.

What Are Invasive Species?

The legislature has officially defined invasive species in *Wisconsin Statutes* as "nonindigenous species whose introduction causes or is likely to cause economic or environmental harm or harm to human health." These species can be aquatic or terrestrial weeds, insect pests, nuisance animals, or disease-causing organisms. They can occur in all types of habitats and affect urban and rural areas throughout the state.

Invasive Species and Wisconsin's Economy

Invasive species have a wide range of adverse effects on Wisconsin's environment and citizens including negative impacts to natural resources, costs to control damaging species, alteration of aesthetic values, and harm to wildlife and human health. Unfortunately, the costs to manage and control invasive species once they are established represent money that could be spent on something else, or not spent at all, if invasions were prevented in the first place. The following are examples from recent years, including estimates of the economic scope of what is at stake.

- Aquatic invasive species such as the zebra mussel financially impact industries that use water for cooling and municipalities that rely on lakes for drinking water. Zebra and quagga mussels cost the U.S. economy up to $1 billion annually. The $7 billion Great Lakes fishery has been adversely impacted by pathogens including viral hemorrhagic septicemia (VHS) and invasive fish species like white perch, round goby, and sea lamprey. Costs from invasive species that originate in the ballast water of ocean-going vessels visiting the Great Lakes have been estimated at $138 million annually, but could be as much as $800 million annually.

- Invasive species, including weeds, pests, and diseases, also negatively impact Wisconsin's $59 billion agriculture industry (350,000 jobs) by increasing production costs and reducing crop yields. For example, Canada thistle, a major agricultural pest, costs tens of millions of dollars in direct crop losses annually and additional millions in control costs.
- Wisconsin's forestry industry, a $28 billion industry (66,000 jobs), is impacted by oak wilt, gypsy moth, and more recently, the emerald ash borer and beech bark disease, which damage and kill trees. Costs to respond to the emerald ash borer in our region, including treatment, removal, and replacement of millions of ash trees, has a current annual effect of $280.5 million on municipal budgets, a figure that does not include the value of trees on private property. This insect also negatively affects electrical utility budgets with the removal of dead trees that could fall onto utility lines.
- Natural regrowth of tree seedlings, especially of the sugar maple, our state tree, is being limited by invasive plants and non-native earthworms. Over the long term, this will change the composition of our forests and the economic benefits they provide.
- Terrestrial invasive species, such as garlic mustard and wild parsnip, invade and degrade our forests and grasslands and reduce enjoyment of our trails and parks. Eurasian water milfoil and other invasive aquatic plants harm our lakes and rivers. Chemical herbicides used to control Eurasian water milfoil can cost from $200 to $2,000 per acre. Mechanical control methods range from $300 to $600 per acre and must be repeated all summer.
- Outdoor recreation is one of the top reasons visitors come to our state. In 2016, Wisconsin visitor numbers reached 107.7 million and visitor spending created an estimated $20 billion impact on the state's economy. As invasive species continue to change our environment and negatively impact the use and beauty of our lakes, forests, and hiking trails, Wisconsin may lose valuable visitor spending.

Program Administration

Invasive species impact Wisconsin citizens and habitats of every type–from power companies to municipal foresters to holiday boaters, from meandering rivers to state parks to citizens' back-yards and gardens. As a result, invasive species management has grown as a state priority over recent decades. Working with numerous partners, the department has been engaged in work to prevent the arrival of new invasive species, detect new infestations, respond to invasions, and control invasive species populations. During the recent reporting period, the department and its partners have continued to make progress across the state.

Department Invasive Species Team

The Department Invasive Species Team ensures a cohesive "one DNR" response by bringing together staff from the divisions of Fish, Wildlife and Parks, Forestry, and Environmental Management, as well as the Law Enforcement program. This interdisciplinary team works to identify common priorities, establish consistent policies, coordinate the department's outreach on invasive species, and ensure uniform enforcement of the Invasive Species Identification, Classification, and Control rule (ch. NR 40, Wis. Adm. Code). The team is coordinated by the statewide Invasive Species Coordinator in the Bureau of Natural Heritage Conservation under the sponsorship and direction of agency administration. During the current reporting period, the team has focused efforts on engaging partners in invasive species early detection, management, and control developing a coordinated response framework, updating the state's aquatic invasive species (AIS) strategic plan, and providing training and outreach for businesses and other stakeholders. This work supports and supplements the ongoing, on-the-ground and in-the-water work by the department and its partners.

Wisconsin Invasive Species Council

The department works closely with the Wisconsin Invasive Species Council (Council), which provides guidance and recommendations to the department regarding invasive species programs and regulations. Created by the legislature in 2001, the Council includes governor-appointed representatives from state agencies, industry, academia, and nongovernmental organizations. The department's Statewide Invasive Species Coordinator provides staff support to the Council, and the director of the Bureau of Natural Heritage Conservation serves as the department's representative as one of the twelve members of the Council.

Wisconsin Statutes charge the Council with making recommendations to the department regarding:

- A system for classifying invasive species.
- A procedure for awarding cost sharing grants to control invasive species.

The Council also conducts studies of issues related to controlling invasive species including:

- The effect of the state's bait industry on the introduction and spread of invasive species.
- The effect of the state's pet industry on the introduction and spread of invasive species.
- The acquisition of invasive species through mail order and Internet sales.
- Other issues as determined by the council.

Finally, the Council serves as a resource to the public and interested stakeholders by making information available through its website and recognizing significant efforts to prevent and control invasive species. During the reporting period, the Council's website was updated to include a page listing government agencies and private foundations that provide funding to control and prevent the spread of invasive species (Figure 1). Drop-down boxes help users find grants for which they are eligible. Once assistance opportunities are identified, users are provided with website links for additional information or are given an email address for the appropriate contact person. Wisconsin Statutes allow local units of government to annually require the destruction of all noxious weeds within their jurisdictions. The Council's website now includes a "Local Ordinances" page that provides example ordinances adopted by Wisconsin municipalities (Figure 1). The Council also works to honor Wisconsin citizens and organizations--both volunteer and professional--for their significant contributions to the prevention, management, education, or research related to invasive species through its annual Invader Crusader awards (see page 32).

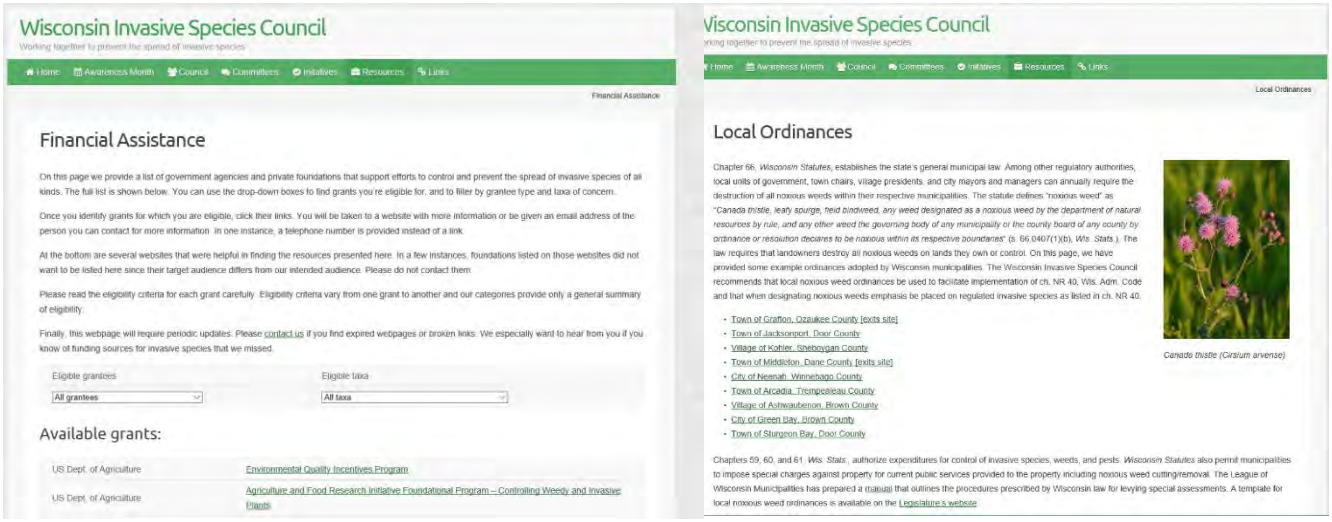

Figure 1. Screenshots of the Wisconsin Invasive Species Council's financial assistance and local ordinances webpages.

Additional information is available on the Council's website at http://invasivespecies.wi.gov/.

Strategic Plans

In the spring of 2013, the department published *Looking Forward: A Statewide Strategic Plan for Invasive Species* to guide Wisconsin state agencies and partners in responding to the threat of

invasive species. The strategic plan was developed by the Council in cooperation with the department and numerous stakeholders across the state. The full plan, an executive summary, and supporting appendices can be found on the Wisconsin Invasive Species Council website. Over the past biennium, the Department Invasive Species Team has used the statewide strategic plan to help guide its work.

The aquatic invasive species (AIS) program is updating Wisconsin's statewide AIS strategic management plan, which is expected to be completed in 2018. The previous plan prepared in 2003 focused on building and funding an AIS program. Wisconsin has one of the most established AIS programs in the country and has a network of partners throughout the state who are working on AIS issues. The new AIS strategic plan will shift focus from not just building an AIS program, but maintaining the program that exists while positioning the department and partners to address emerging AIS issues.

A core team including representatives from various department programs, the University of Wisconsin-Extension, Wisconsin Lakes, River Alliance of Wisconsin, and Great Lakes Indian Fish and Wildlife Commission met throughout the biennium to lead the process. Multiple meetings and communications with stakeholders across the state assisted the team in developing a rough draft of the plan. The plan will need to be approved by the Aquatic Nuisance Species Task Force for the state to remain eligible for federal funding for its implementation.

Invasive Species Rule (ch. NR 40)

In 2009, Wisconsin established a comprehensive Invasive Species Identification, Classification, and Control rule (ch. NR 40, Wis. Adm. Code) to regulate some of the most threatening invasive species. The rule establishes a comprehensive, science-based system with criteria to classify invasive species into "Prohibited" and "Restricted" categories. With certain exceptions, the possession, transport, transfer and introduction of Prohibited species is banned. Restricted species are also subject to bans on transport, transfer and introduction, but possession is allowed, with the exceptions of fish and crayfish. The department may issue permits for research or public display of any listed invasive species. For species other than invasive fish and crayfish, permits may also be issued for other purposes. The Natural Resources Board adopted updates and revisions to ch. NR 40 in December 2014. The revised rule took effect May 1, 2015 after review and approval by the governor and several legislative committees. The revised rule and a complete list of regulated invasive species is available on the department's website.

The department's Invasive Species Team has worked with businesses and other partners to ensure voluntary compliance with the rule when feasible and stepped enforcement when appropriate. The team has conducted extensive outreach and provided numerous training sessions for stakeholders

and the public to ensure that each citizen in Wisconsin is aware of what they can do on their own land, lake, or park. For example, the team collaborated with the Department of Agriculture, Trade and Consumer Protection to provide registered nurseries, nursery suppliers, and seed distributors with information about regulated species, phase-out periods included in the rule, and steps these businesses can take to ensure compliance. Staff also conducted outreach to biological supply houses and K-12 and university educators to ensure compliance and provide alternatives to regulated species.

The Invasive Species Coordinator serves as the single public point of contact for permitting and enforcement under ch. NR 40. The department's Invasive Species Team members and program staff draft NR 40 permits, monitor compliance, and carry out enforcement when needed. During the reporting period, four new permits were issued covering four species. All permits were issued for educational or research purposes.

Rapid Response Framework

The department's Invasive Species Team developed a comprehensive response framework as an internal protocol for responding to newly detected populations of suspected invasive species. This framework assists agency managers in responding thoroughly, professionally, and effectively to the many challenges that result from new invasions. This framework is used when: 1) an invasive species is found in a county where it is listed as Prohibited, or 2) an invasive species is discovered in an area of the state where it has not been previously documented and legal access is granted for entry onto the property the species is found on. This framework is not used in cases of white nose syndrome, emerald ash borer or gypsy moth as Wisconsin already has species-specific plans in place for these species.

The department purposefully did not prepare detailed response plans for individual species that have not yet invaded the state since responses must be guided by case-specific facts. Factors which determine how a species invades, including their initial number, population density and distribution, proximity to other known invasions, time of year, land or water use, etc. determine what actions are not only possible but useful. Some pre-planning efforts for future invasions can be very valuable, but there is a limit to the level of response planning that is useful until an invasion occurs. For example, an understanding of the species' biology, habitats invaded, possible actions and real constraints is very helpful in advance of an invasion. Similarly, establishing communication networks with potential partners and stakeholders ahead of an invasion can be useful.

Active and Coordinated Partnerships

Partnerships with other agencies and citizens' groups throughout the state leverage our efforts and keep us all moving forward. The department's work on invasive species is greatly enhanced by collaborative work of our many partners. In the world of aquatic invasive species (AIS), the Wisconsin Lakes Partnership, River Alliance of Wisconsin, and regional and county AIS coordinators provide a foundation of cooperation across the state (Figure 2). As of June 2017, there are counties, hundreds of lake organizations, and thousands of volunteers actively participating in AIS prevention, detection, containment, and control efforts. For terrestrial species, regional Cooperative Invasive Species Management Areas (CISMAs, also sometimes called cooperative weed management areas or CWMAs) provide local focal points for invasive species work. As of June 2017, there are eleven larger established CISMAs ranging in size from one to nine counties (Figure 3). There are many more CISMA's that focus on smaller regions such as Madeline Island and the Mukwonago River watershed. Three more CISMAs are in the works, covering seven counties. In total, CISMAs encompass 56 counties and include thousands of volunteers. The department provides information and technical support to these partnerships.

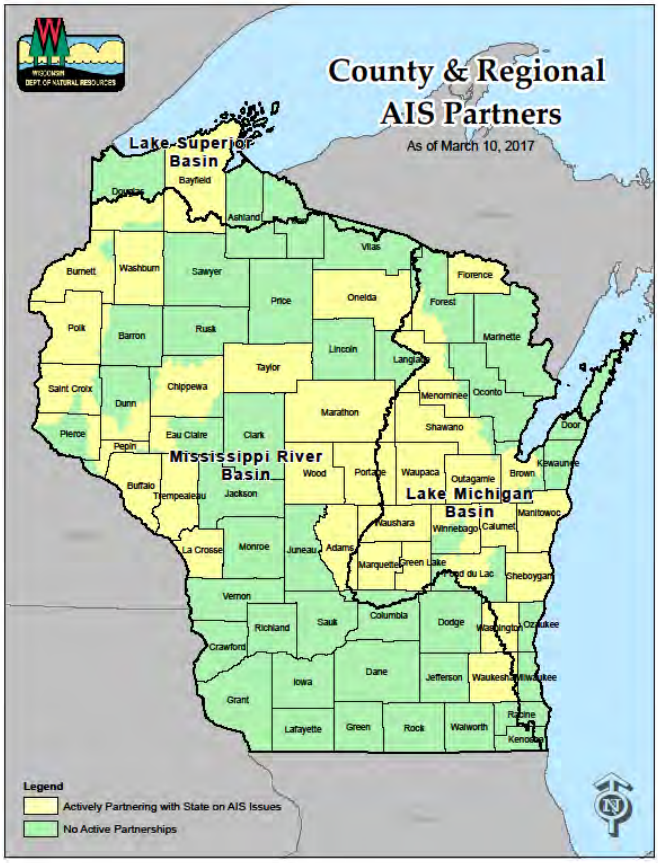

Figure 2. County and Regional Aquatic Invasive Species (AIS) Partners.

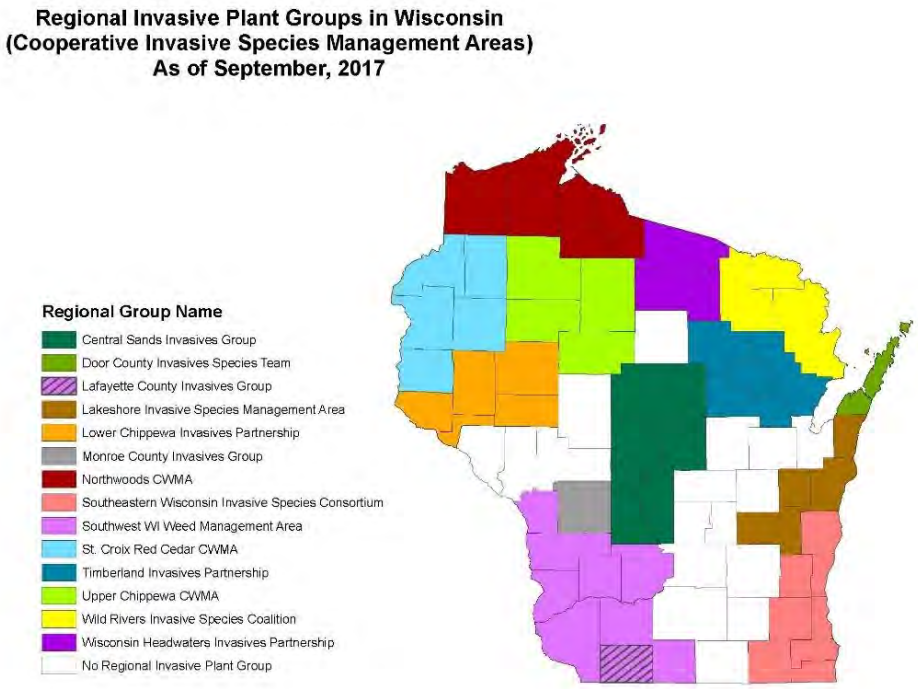

Figure 3. Cooperative Invasive Species Management Areas in Wisconsin.

Funds from the Weed Management Area grant, a part of the Wisconsin Forest Landowner Grant Program, have allowed the department to provide small amounts of funding to several existing and start-up CISMAs.

AIS coordinators and CISMAs are critical partners for locating, reporting and stopping the spread of high priority invasive species before they become widespread and abundant. Both provide local outreach about invasive plants, animals and pests to landowners, local units of governments, and interested individuals and organizations in their counties. CISMA volunteers provide invaluable 'on-the-ground' support, often leading control efforts for new or expanding invasive species populations (see the Program Highlights elsewhere in this report). Twice each year, the department and members of UW-Extension coordinate an in-person meeting of all county and regional AIS coordinators. Annually the AIS coordinators meet jointly with representatives of the CISMAs. The joint meetings provide opportunities for these partners to meet others working on invasive species issues in their region, share information and resources, and plan for cooperative efforts.

The department also works closely with other state and federal agencies and tribal organizations on invasive species issues to ensure a coordinated statewide approach without overlapping regulatory pressure. Throughout the reporting period the department partnered extensively with the Wisconsin departments of Transportation and Agriculture, Trade and Consumer Protection and the U.S. Department of Agriculture, U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, and the U.S. Army Corps of Engineers on invasive species prevention and control efforts (see the Program Highlights elsewhere in this report).

Organisms In Trade

Focusing on invasive species in the market place, the department's Organisms In Trade (OIT) efforts provide outreach and education to those distributors, wholesalers, and retailers most likely to be selling and distributing species that are regulated under ch. NR 40. These education and outreach efforts constitute a critical part of the department's efforts in early detection, rapid response, and control that help ensure that invasive species are prevented from entering Wisconsin's environment, found quickly if present, and controlled effectively when located. During the reporting period, approximately 95 pet/aquarium shops were visited as part of a targeted outreach and education campaign. These businesses are unregulated, thus the outreach to them is ongoing as they are identified.

Using the stepped enforcement approach, DNR staff responded to several complaints about regulated species in the market place. Compliance was achieved in each occurrence.

Large audiences were targeted by outreach efforts that explained the NR40 rules and regulations. Letters were sent to biological supply companies and nursery suppliers known to conduct business in Wisconsin, and to seed labelers and licensed nurseries throughout Wisconsin. DNR staff continues to maintain a list of distributors who ship regulated species into Wisconsin for future outreach. Nurseries that were documented by DATCP in 2016 as selling Prohibited species were sent follow-up letters early in 2017, reminding them of the regulation and thanking them for their efforts to gain compliance.

Outreach to community Farmers Markets continues. Coordinators of the markets are contacted when DNR staff identifies regulated plants offered for sale at the markets. There are plans to develop an informational handout specific to regulated species that may be offered for sale at a farm market. The handout will be produced in both English and Hmong.

Aquatic Invasive Species (AIS) Grants

Sustaining an effective AIS program in Wisconsin largely depends upon our partners who help implement statewide campaigns and programs. To date this partnership has been supported by grants that have effectively provided funding for implementing local programs to prevent, contain and control AIS. The demand for the grants, however, has exceeded funding capacity causing a "now you see it now you don't" phenomenon which results in the rise and fall of effort around the state. To counterbalance the discrepancies in funding, the department hopes to move to a contract or agreement-based system that enables its partners to provide a core list of services.

The AIS grants program has been oversubscribed by approximately one million dollars each year. Since available funding may never meet the demand, prioritization must be carefully applied in selection of worthy projects. The federal funding available for AIS (Great Lakes Restoration Initiative and ANS Plan Implementation) has been a tremendous boon to the state, especially the Great Lakes Basin; however, these sources may diminish or disappear. Continued collaboration with neighboring states continues to be a programmatic need to ensure consistent messaging. Continued support for regional planning and partnerships will increase efficiency and effectiveness.

Invasive Species Program Highlights

Terrestrial Invasive Species

Suppression Grant Program

The suppression grant program is used to control especially troublesome invasive plants on both private and public lands throughout Wisconsin. These plants include those listed as 1) Prohibited under NR 40, 2) split-listed under NR 40, which are Prohibited in some counties and Restricted in others, 3) Restricted species under NR 40 that are found in new areas, and 4) early detection species, which are those species that are known as invasive in neighboring states but are not yet listed under NR 40.

The suppression grant program helps landowners with Prohibited species comply with NR 40 as it does not allow possession, transfer or introduction of those species. In contrast, possession of Restricted species is allowed but transfer and introduction are not.

The department's Division of Forestry and Bureau of Natural Heritage Conservation (NHC) awarded grants to private ecological restoration companies and Cooperative Invasive Species Management Areas to control invasive plants in Wisconsin. Forestry funding is used to control invasive plants in forests while Natural Heritage Conservation funding is used to control them in other terrestrial

ecosystems. Each year Forestry and Natural Heritage Conservation commit $20,000 and approximately $5000 to the program, respectively. During the reporting year, a $20,000 grant from the U. S. Forest Service Cooperative Lands grant program doubled the funding available for controlling invasive plants in forests, with the department's Forestry funding used as match.

The grants are used for a variety of purposes that contribute to the control and eradication of invasive plants. The bulk of the funds pays for control measures for invasive plants. In addition, small grants are used to contact landowners to explain the invasive species law (NR 40), inform them about suitable control measures and available assistance, and secure their cooperation.

During 2016-2017, suppression grants assisted 41 private landowners, six municipal or county properties, six public road sides, two commercial properties, two properties owned by non-profit organizations, two university properties, and one department property in controlling invasive plants. These properties covered more than 17,000 acres, with the actual treatment area including just over 425 acres.

The grant awards contributed to the control of 13 species of invasive plants (Table 1). Seven are Prohibited species that have limited distributions in Wisconsin and have a good chance of being eradicated. Three species are split-listed, one is Restricted, and two are early detection species.

The control and eradication of invasive plants is a multi-year endeavor involving many partnerships. Because of these partnerships, several invasive species have been successfully controlled or eradicated, and plans for additional cooperation are underway for 2018.

Table 1. Plants controlled because of *the suppression grant program.*

Common name / Classification*	Scientific name	Counties	Number of properties
Amur cork tree / P	*Phellodendron amurense*	Adams, Dunn	6
Giant hogweed / P	*Heracleum mantegazzianum*	Sheboygan	3
Japanese wisteria / P	*Wisteria floribunda*	Adams	1
Lesser celandine / P	*Ranunculus ficaria*	Kenosha, Milwaukee, Racine, Walworth	17
Policeman's helmet / P	*Impatiens glandulifera*	Dane, Shawano	2
Porcelain berry / P	*Ampelopsis brevipedunculata*	Dane	2
Princess tree P	*Paulownia tomentosa*	Iowa, Sauk	2
Black swallow-wort / S	*Vincetoxicum nigrum*	Walworth and Waukesha	5
Hairy willowherb / S	*Epilobium hirsutum*	Racine	1
Japanese hedge parsley / S	*Torilis japonica*	Dane	1
Wild chervil / S	*Anthriscus sylvestris*	Chippewa, Columbia, Dunn, Milwaukee, Oneida, Ozaukee, Waukesha	11
Tree of heaven / R	*Ailanthus altissima*	Sauk	5
Yellow archangel/ ED	*Lamiuastrum galeobdolon*	St. Croix	1
Yellow bestraw/ ED	*Galium verum*	Waukesha	1

*P = Prohibited, R = Restricted, S = split-listed (Prohibited and Restricted among Counties), ED = early detection, not yet listed under NR 40.

Amur Cork Tree and Wild Chervil Management

One of the department's partners, the Lower Chippewa Invasives Partnership, using donated time and funding from our Forestry Division, the Bureau of Natural Heritage Conservation, and matching grants funds from the U.S. Forest Service, completed surveys of two counties for populations of wild chervil and Amur cork tree. They have trained county and township roadside managers and provided herbicide, allowing the managers to mow and spray the chervil to contain its spread. They are working with private and public landowners to remove cork trees, using the DNR funds as cost-share. By working cooperatively with local people, they have successfully controlled these plants in numerous sites.

Beech Resistant to Beech Bark Disease Identified in Door County

Beech bark disease (BBD) is the result of wounds created by feeding by the non-native scale insect. The wounds are then used as entryways by the *Nectria* fungus, which establishes and kills the tree.

From 1% to 5% of American beech trees are resistant to the scale and therefore are not susceptible to BBD. Field assays of beech scale resistance were conducted in Door County in 2016-2017. Three potentially resistant trees were discovered in the stand where beech scale was first found in 2009, where most other trees became infested with scale and died. The control trees were challenged with 500 scale eggs placed on foam pads and sealed onto the bark with house wrap to force interaction of the scales with the tree. Pads were placed on each potentially resistant tree and three nearby control trees. These control trees were infested with scale prior to the assay and were for that reason known to be susceptible. In summer 2017, the pads on both candidate and control beech were inspected for the presence of scales. No scales survived on the candidate resistant beech while all three control trees had scales living beneath the pads. Samples were taken to the USDA Forest Service research station where they will be grafted, tested more thoroughly, and eventually entered in to the breeding program to develop a strain of BBD resistant beech.

Continued Slow Spread of Emerald Ash Borer (EAB)

In 2017, EAB was discovered in six additional counties in Wisconsin. It is important to note, however, that five of these new counties were surrounded or largely bordered by counties where this pest was already established (Figure 4). The detection in Chippewa County is believed to be the result of long distance movement by people. Although it is difficult to determine if outreach and education to the public about reducing the spread of EAB was responsible, the fact that Chippewa County was the only disconnected county found in this survey is hopeful.

Within the quarantined area, EAB was confirmed in more communities, primarily surrounding those already known to be infested, in southeastern counties, north and south of Madison, and along the Mississippi River Valley from Crawford to Buffalo counties (Figure 5). Ash mortality is still concentrated in the southeast where EAB has been established the longest.

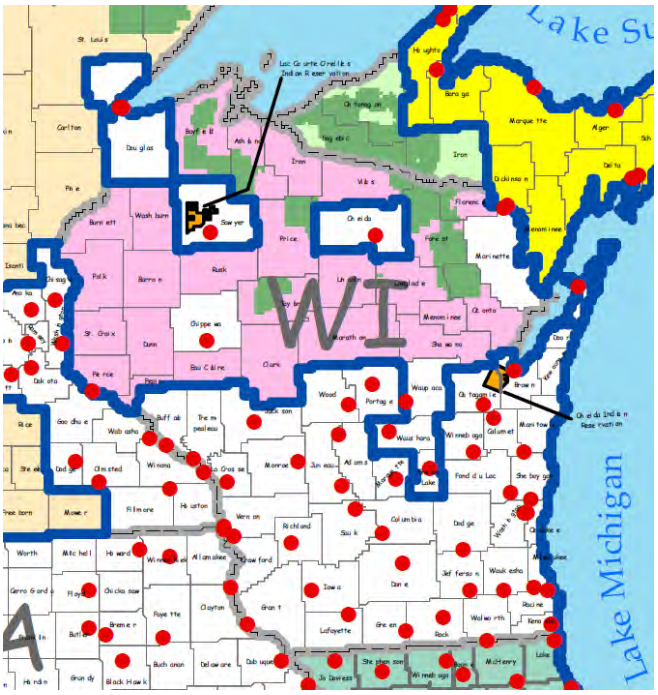

Figure 4. Map of areas quarantined for emerald ash borer. Counties in WI that are white are under state quarantine. Areas bordered in blue are under federal quarantine which follows state regulation. Red dots indicate where EAB was first found in a count

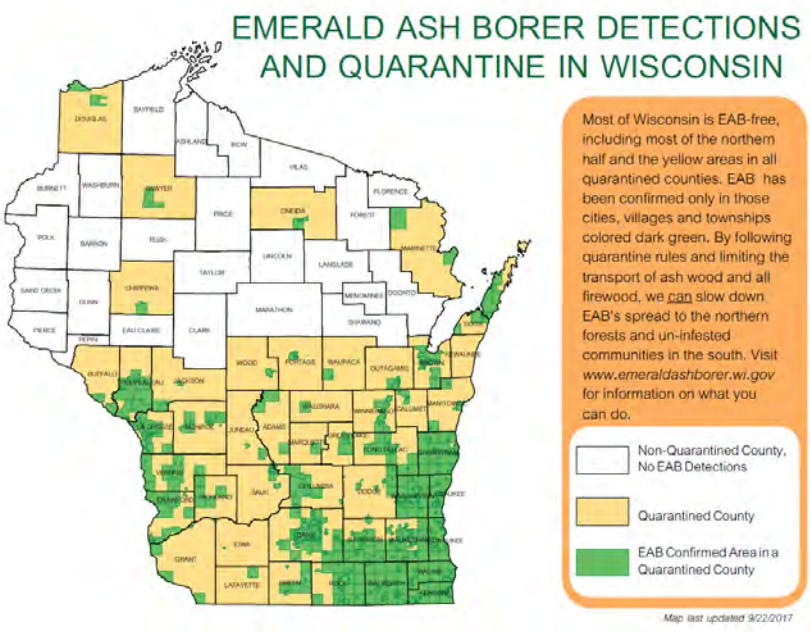

Figure 5. Emerald ash borer detections and quarantine in Wisconsin.

Progress in establishing natural enemies of emerald ash borer (EAB)

Four species of non-native specialist parasitoid wasps are being introduced as part of an integrated pest management approach for EAB. These parasitoids are tiny, the size of gnats or a grain of rice, and are incapable of stinging people (Figure 6). All four species were rigorously tested for specificity before being released in North America. Parasitoids are supplied by the USDA APHIS's Plant Protection and Quarantine program at no cost to the state.

Figure 6. T. planipennisi wasps recovered in Walworth County. This species attacks EAB larvae beneath the bark. Photo by Bill McNee

Tetrastichus planipennisi, a parasitoid that attacks EAB's larval stage, was recovered by DNR staff at introduction sites in Ozaukee, Washington, Milwaukee, Racine, Walworth and Kenosha Counties, confirming that this species had successfully established. Tree bark samples were also collected and incubated to recover *Oobius agrili* but this species has not yet been detected. Further surveys are planned at release sites starting two to three years after introductions are made to allow the populations of the introduced parasitoids to increase to detectable levels.

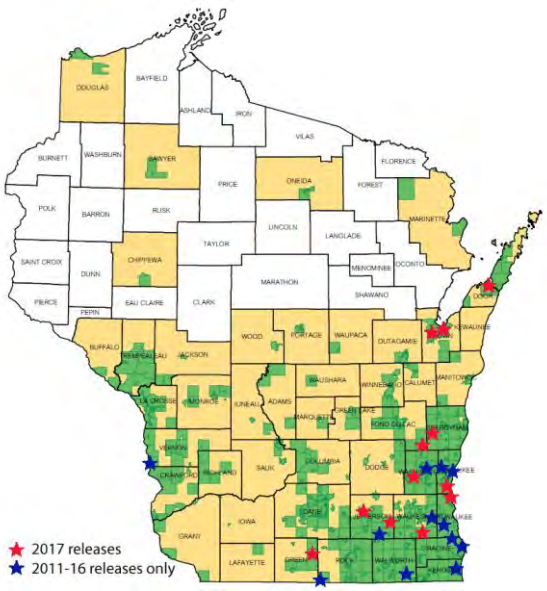

Figure 7. Map of locations where parasitoids of EAB have been released 2011-2017. Yellow tinted counties are quarantined for EAB and it has been confirmed in municipalities colored green.

Feral Pig Response

The department continues to maintain an online reporting system that the public can use to report any feral pig sightings or activity. Reported sightings are shared with the local DNR county biologist as well as the USDA-Wildlife Services Feral Swine Specialist. The USDA-WS specialist takes the lead in investigating any reported sightings.

USDA-Wildlife Services has been involved in more than a dozen feral swine investigations over the past year. The USDA-WS personnel work closely with DNR personnel as well as other state, local and federal agencies to thoroughly investigate all reports. Most of these reports have been about pet potbelly pigs that likely outgrew their home or an escaped/released domestic pig. If the owner can be located, he or she is provided information about fencing requirements and options for removal.

An Inter-Agency Feral Pig Task Force comprised of representatives from the DNR, USDA APHIS, DATCP, and the domestic swine industry monitors for feral pigs on the landscape as well as management activities.

White-Nose Syndrome

White-nose syndrome is a disease that develops in bats infected with the cold-loving fungus *Pseudogymnoascus destructans (Pd).* Infected bats display a white fungal growth on their face, arms, legs, wings, and/or tail membrane. Infected bats exhibit atypical behavior such as daytime activity during winter hibernation, which rapidly depletes stored energy reserves. Wing damage and emaciation are also common effects of the disease.

Since the discovery of white-nose syndrome in 2006 in New York, at least six million bats have died. The disease has been found in 31 states and five Canadian provinces.

Bats play an important role in Wisconsin's ecosystems and economy and our state has one of the highest concentrations of hibernating bats in the Midwest. Bats feed voraciously on insects, and a 2011 North American study estimated that bats save Wisconsin's agriculture industry between $658 million to $1.5 billion annually in pesticide costs.

The results of the 2017 winter bat survey indicate that white-nose syndrome has spread to nearly all the known bat hibernating sites in Wisconsin. Visual surveys and genetic tests conducted this winter found white-nose syndrome or the fungus that causes it is present in 24 of 28 counties that have known bat hibernacula. Numbers of bats declined 40 to 60 percent at two of the state's largest sites, which combined accounted for two-thirds of Wisconsin's known bat population only a few years back. Some sites have declined even more. DNR surveyors found only 16 bats compared to a previous population of 1,200 at a Grant County site where the fungus was first detected.

Department biologists worked with researchers from the University of California – Santa Cruz

in winter 2017 to understand the efficacy of environmental decontamination in one mine (results are pending). The department has also been involved with the U.S. Geological Survey's (USGS) National Wildlife Health Center and UW-Madison in the research and development of a vaccine that would protect bats from white-nose syndrome.

Over the last decade, Wisconsin has undertaken several actions that have helped delay the arrival of the disease and may have slowed its spread, including:

- added four cave bat species to the state's threatened species list in 2011,
- worked with private landowners to keep the disease out of caves and mines,
- required cave users to decontaminate their gear between caves,
- enlisted volunteers to help track bat populations,
- established volunteer agreements with hibernacula owners,
- conducted research concerning the transmission and prevention of WNS,
- developed statewide roost and acoustic monitoring projects,
- consulted with the U.S. Geological Survey and Fish and U.S. Fish and Wildlife Service, and
- implemented an education and outreach program.

New Invasive Plant Discoveries

Lesser celandine (Ranunculus ficaria)

Lesser celandine is a low growing invasive buttercup, which blooms in April and spreads rapidly, completely covers the ground and crowds out woodland wildflowers. By mid-summer the above ground portion of the plant dies and leaves bare soil that is subject to increased erosion. Working with a regional CISMA, control work began on several small urban populations and two larger populations of the plan, each several acres in size, on the Milwaukee and Root River floodplains. A driving survey found what appears to be dozens of properties and probably over 100 acres infested with lesser celandine on the north shore of Lake Geneva (see cover photo). Due to the large number of landowners involved, many of whom are not year-round residents, the department and its partners will be making extensive landowner contacts, providing guidance on control of this prohibited plant.

Giant hogweed (Heracleum mantagazianum)

In 2016, a new population of giant hogweed was found in Sheboygan. The department's rapid response was in time to prevent the plants from producing seed. After extensive media coverage, people throughout the area reported what they believed to be hogweed. Of the hundreds of reports submitted, only one proved correct, and that was on a property located a few miles away from the original find. No new populations were found in 2017.

There were several new reports of detections of plants split-listed as prohibited in a part of the state, and restricted elsewhere. Many of these are being controlled locally, including populations of wild chervil, European marsh thistle, poison hemlock, hairy willow herb, tall mannagrass, Japanese hops, Japanese hedge parsley and black swallow-wort. Many of these populations are being controlled through use of early detection suppression funds from either the department's Forestry and Natural Heritage Conservation programs, from federal grants, or through local partners or landowners.

Wetland Invasive Species

Managing Wetland Invasive Plants

Invasive plants are one of the biggest threats to Wisconsin's remaining wetlands. The department's Invasive Species Team has several large-scale control projects underway, but to combat this threat many partners must work together. Fortunately, this basic fact has been acknowledged by increasing numbers of government agencies and by the public. This recognition has resulted in an increasing number of federal grants to the department to address the problem. There are many more examples. For instance, the state has benefited from the Wisconsin Department of Transportation treatment of invasive phragmites plants on state and federal rights-of-way, and from the actions of hundreds of citizens who reared beetles for biocontrol of purple loosestrife. The department recognizes, however, that ultimate success requires more research to generate additional, non-chemical control.

Phragmites (Phragmites australis) Control

The control of the invasive exotic plant *Phragmites australis* in the Lake Michigan basin continues to be a successful undertaking for the department. In late summer 2016, over 1,500 individual phragmites treatment sites, covering over 450 acres, were marked for new treatment, additional control, and monitoring efforts under a federal Great Lakes Restoration Initiative (GLRI) grant. In 2017, the Lakes and Rivers Section received a grant from the U.S. Environmental Protection Agency (EPA) for $551,000 to continue control of phragmites and other invasive species in the Lake Winnebago watershed. With this new funding, U.S. Fish and Wildlife Service treatment priorities were shifted to control within the western Lake Michigan basin and northeastern counties (Marinette, Oconto, and Shawano) to protect the northern lakes and to complement existing control actions taken by our partners in Michigan. The goal for USFWS funding is to target control of 88 acres by October 2017.

Purple Loosestrife (Lythrum salicaria) Biocontrol

Along with University of Wisconsin – Extension, the department continued the highly successful Purple Loosestrife Biocontrol Project in which volunteers and organizations raise and release *Galerucella* biocontrol beetles on sites where purple loosestrife control is needed. The beetles weaken the loosestrife plants so native wetland plants can out-compete and replace them. Participants include a wide range of citizens statewide (cooperators) as well as CISMAs and both government and non-governmental organizations.

In late summer 2016, project partners released at least 76,000 new adult beetles at sites throughout the state. Previously trained independent cooperators produced 300,000 more beetles, raising the estimated total to over one million beetles. Of special note is the Wisconsin Department of Correction's McNaughton Correctional Facility in Oneida County. Inmates at the facility raised beetles and distributed them free of charge to many individuals for sites throughout northern Wisconsin. In early 2017, 26 additional cooperators were recruited to raise more beetles for dispersal in the next fiscal year. Participants were supplied with equipment and over 6,000 hand-collected starter insects. Many loosestrife infestations are now well controlled with this method, and a new emphasis on filling the resulting open niche spaces with native wetland plant species is being developed.

Reed Sweet Mannagrass (Glyceria maxima) control

Discoveries of reed sweet mannagrass are increasing throughout the Lake Michigan and Mississippi River watersheds. Information from the Great Lakes and Mississippi River Interbasin Study (GLMRIS) indicated that reed sweet mannagrass had a more limited distribution. Only 45 locations were verified during the study in the Lake Michigan basin, all of which were focused around the Milwaukee metropolitan area. Field reconnaissance conducted by department staff and partners combined with aerial interpretation of affected counties has revealed that reed sweet mannagrass has a much wider distribution. Current estimates place the total acreage infested with reed sweet mannagrass at over 80 acres, mainly within emergent wetlands and riparian areas in southeastern Wisconsin with a large outlier area in Calumet County.

In late September 2016, an experiment to control reed sweet mannagrass began on four acres in eastern Dane County. Three solutions (2%, 2.5%, and 3%) of imazapyr, a growth inhibiting herbicide, were applied to areas of reed sweet mannagrass infestation. Early results in 2017 showed high mortality within treated areas for all herbicide concentrations. However, remaining roots and rhizomes rapidly reoccupied the experimental site. Further experimental treatments have been planned and may incorporate other management techniques to help ensure complete mortality.

Invasive Species Archive

The Invasive Species Archive (Archive) is a database containing records of reported invasive species locations throughout Wisconsin. During the reporting year, the Archive was updated with new data that were collected between April 2016 and May 2017. Data collected in the Archive generated new reports previously unavailable to department staff. This novel information led to additional field surveys and confirmation of new occurrences invasive species within the state. The Archive was also updated with additional spatial data including information on affected wetlands. Distribution and use of the Archive has increased since its initial creation. Many CISMAs use the Archive to conduct additional reconnaissance, develop management plans, and create proposals for invasive species control work. Updates to the Archive are planned for regular six month intervals, making the most of support from work study students.

Aquatic Invasive Species

Wisconsin's Ballast Water Permitting Program

Wisconsin has required a ballast water discharge permit for commercial cargo vessels operating in its waters since 2010. This permit program was developed to address aquatic invasive species (AIS) introductions into the Great Lakes, the spread of AIS within the Great Lakes, seawater discharges and any potential biocides used to treat ballast water discharges.

The department settled a contested case with the Lake Carriers Association regarding a requirement in the 2015 reissued ballast water permit for installation of ballast water treatment systems on Great Lake vessels in addition to oceangoing vessels. The permit was modified according to the stipulation order that now requires Great Lakes vessels to meet the best management practice requirements in the Vessel General Permit rather than those of the International Maritime Organization's ballast water discharge standard.

Ocean-going vessels are working to have ballast water treatment systems installed as they are type approved by the U.S. Coast Guard for use in fresh water. The ballast water staff attended a status test on the first cargo vessel to sail on the Great Lakes with an active ballast water treatment system.

The department conveyed coverage or reissued coverage to over 50 vessels and now covers a total of over 80 ship-owning companies with over 275 vessels under the general permit.

Although some other Great Lake states have ballast water permit programs, Wisconsin is the only Great Lake state with an inspection program. The department has two field inspectors who inspected 67 vessels in 2016-2017. After inspection, each vessel received a follow-up letter, which often included recommendations to improve ballast water management plans or best management practices relevant to AIS issues. At the end of the shipping season, inspectors reviewed arrival logs

and sent Notices of Noncompliance to companies that operated without permits. Department staff sent an annual newsletter to all permittees which included any new AIS information, best management practices and permit information.

The department continues to participate in the Great Lakes Commission and works with the Saint Lawrence Seaway Development Corporation, International Joint Commission, the shipping industry and other state and federal regulators on regional ballast water and invasive species issues. As in past years, department staff will remain available to assist with local and regional research efforts aimed at characterizing AIS in ballast water, identifying AIS release risks and developing ballast water treatment technologies such as those in progress at the Great Ships Initiative in Superior. The department also continues to support peer projects related to ship-mediated invasive species.

Decontamination/Disinfection Manual Code

Aquatic Invasive Species move between bodies of water on boats, trailers and a wide variety of equipment. Department staff are aware of the risk everyday monitoring and management actions have in moving invasive species. To ensure that department staff are not transporting AIS the department updated its Decontamination/Disinfection Manual Code to reflect changes in AIS present and available technology. The updated code demonstrates the department's commitment to being part of the solution and not part of the problem. The code is significantly more demanding than the required prevention steps for the public, which is appropriate due to the wide variety of department actions and equipment used every day.

Asian Carp

The following image (Figure 8) summarizes where Asian carp have been captured along our western boundary. Asian carp have not been discovered in any inland waters in Wisconsin but continue to threaten the Great Lakes through the Illinois River and the Chicago Area Waterway System. The department works with the U.S. Fish and Wildlife Service to sample Asian carp environmental DNA (eDNA) in both the Milwaukee and Fox rivers. There was no evidence of Asian carp discovered in either river in 2017. Sampling results can be found at: https://www.fws.gov/midwest/fisheries/eDNA/results/michigan/2017-08-24/2017-08-24.html

Department staff participate on the Chicago Area Waterway System Advisory Committee to help guide implementation of control methods that prevent Asian carp and other AIS from moving between the Great Lakes and the Mississippi River basins.

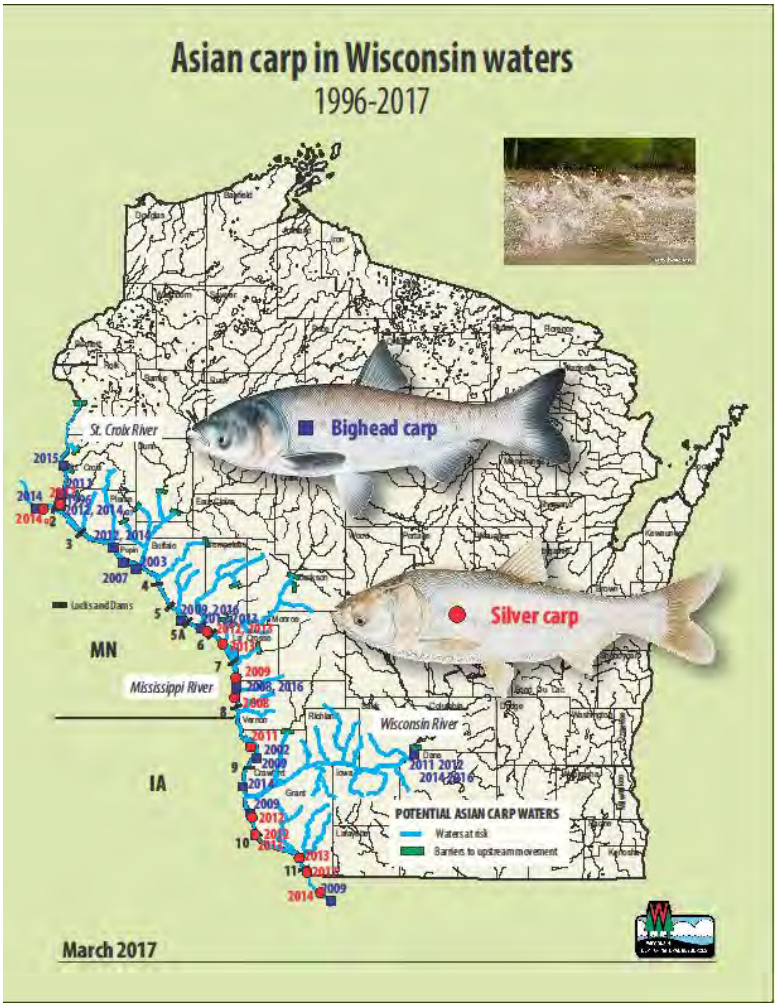

Figure 8. Distribution of Asian carp in Wisconsin waters.

Round Goby (Neogobius melanostomus)

The round goby is a small invasive fish native to the Caspian and Black Seas which was transported to the Great Lakes in the ballast water of ocean going vessels. Since arriving they have quickly moved throughout the Great Lakes and now threaten Lake Winnebago. The Round Goby is a very aggressive species capable of displacing native fish and impacting sport fish by eating their eggs. To prevent their movement into Lake Winnebago, the Fox River Navigation System Authority (FRNSA) closed the Menasha Lock. Recognizing the impact this action has on the recreational users of the area, FRNSA has been actively working with the department to find a way to operate the lock without allowing the round goby to move into Lake Winnebago. The department has been working with partners to educate boaters and anglers of the importance of preventing the spread of round

gobies and all AIS into the Winnebago system. The department is using Great Lakes Restoration Initiative funding to develop hand-held environmental DNA assays for round gobies. The work is will be implemented in fall 2017.

Great Lakes and Mississippi River Interbasin Study

The U.S. Army Corps of Engineers released the Great Lakes and Mississippi River Interbasin Study (GLMRIS) in 2014. This report serves as a comprehensive summary of options and technologies available to prevent the movement of AIS between the Great Lakes and the Mississippi River basins via aquatic pathways. Since the report's release, the department's focus for the area has been to refine technologies and devise ways to prevent upstream movement of AIS at the Brandon Road location on the Des Plaines River (in Illinois). In August 2017, the U.S. Army Corps of Engineers released the "GLMRIS – Brandon Road Draft Integrated Feasibility Study and Environmental Impact Statement – Will County, Illinois." This report evaluated alternatives for controlling upstream transfer of AIS from the Mississippi River Basin into the Great Lakes Basin via the Chicago Area Waterway System (CAWS), and examined the impact of those alternatives on waterway uses and users. The study is will evaluate structural and nonstructural options and technologies near the Brandon Road Lock and Dam site.

While the Brandon Road report is an important step in reducing the threat of AIS in the Mississippi River Basin from entering the Great Lakes Basin, it is apparent that steps also need to be taken to prevent the downstream movement of AIS in the Great Lakes Basin from entering the Mississippi River Basin.

Department staff are actively engaged in these discussions and continue to seek solutions that will protect the Great Lakes, Mississippi River, and Wisconsin's inland waters.

Baseline Statewide Early Detection Lake Monitoring

Wisconsin DNR completed a five-year project to monitor 200 lakes annually to evaluate the rate of AIS spread (Table 2). During the project, more than half of Wisconsin's 1,600 lakes were monitored for AIS. Data from the project found no change in the rate of spread during the five-year period. To determine the rate of spread, this project also found that 75% of lakes contained at least one invasive species. Several pioneer populations of prohibited species were found, including Asian clams (*Corbicula fluminea*), Faucet snails *(Bithynia tentaculata*), and yellow floating heart (*Nymphoides peltata*), among others, and early rapid response efforts were initiated. Moving forward, early detection monitoring protocols were implemented at lakes with high risk to invasive species introduction. In addition, these protocols were integrated into routine water quality monitoring on lakes.

Baseline Statewide Early Detection Stream Monitoring

Wisconsin has been monitored for invasive species on streams since 2011. A pilot project completed in 2015 found invasive species in nearly 70% of streams. It appears that the use of urban land results in a greater occurrence of riparian invasive species; however, recreational use had no measurable influence. Early detection monitoring protocols were implemented on streams with high risk of invasive species introduction. In addition, these protocols were also integrated into all routine water quality monitoring (i.e. Natural Community Stratified Random (NCSR), targeted watershed assessments, 319 Project Funds, etc.). Data collected on NCSR sites will be used to detect changes in the rate of AIS spread in streams.

Wetland Pilot Project

The department tested its wetland monitoring protocol on 33 sites in fall 2016 and spring 2017. Protocols revised in summer 2017 were implemented by DNR and contractors.

Table 2. Counts of new aquatic invasive species discoveries during 2016 monitoring events. Description of statuses may be found on the DNR website (https://dnrx.wisconsin.gov/swims/downloadDocument.do?id=127413817).

Status	Banded Mystery Snail	Bighead Carp*	Chinese Mystery Snail	Curly-Leaf Pondweed	Eurasian Water-Milfoil	Faucet Snail	Flowering Rush	Freshwater Jellyfish	Hybrid Eurasian / Northern Water-Milfoil	Japanese Hops	Japanese Knotweed	Japanese Mystery Snail	Java Waterdrop / Vietnamese Water Celery	New Zealand Mudsnail	Ornamental water lilies (non-native Nymphaea sp.)	Phragmites (non-native)	Purple Loosestrife	Reed Manna Grass	Round Goby	Rusty Crayfish	Spiny Waterflea	Starry Stonewort	Yellow Iris	Zebra Mussel	Grand Total
Observed	1		5	19			1									28	10	2		10	1		9	5	91
Verified	11	4	17	23	12	5	3	4	6	4	5	3	1		2	19	33	2	12	37		3	7	3	216
Verified and Vouchered	5			6	1		3		1				1	4		3	11	5		10		4	2	3	59
Grand Total	**17**	**4**	**22**	**48**	**13**	**5**	**7**	**4**	**7**	**4**	**5**	**3**	**2**	**4**	**2**	**50**	**54**	**9**	**12**	**57**	**1**	**7**	**18**	**11**	**366**

**Asian carp are known to be present in the Mississippi River in very low numbers.*

Aquatic Invasive Species State Grants

Wisconsin is fortunate to have citizens who are fully engaged on AIS. Over 90% of boaters are aware of the steps needed to prevent the spread of AIS. Hundreds of lake and river organizations, counties and environmental groups work to educate the public, monitor for AIS and actively manage invasive populations. The department financially supports these organizations through grants that can be used for prevention, containment and control activities. Figure 9 summarizes the number of grants that have been awarded per year. For more information on the Wisconsin AIS grants please visit: http://dnr.wi.gov/lakes/grants/

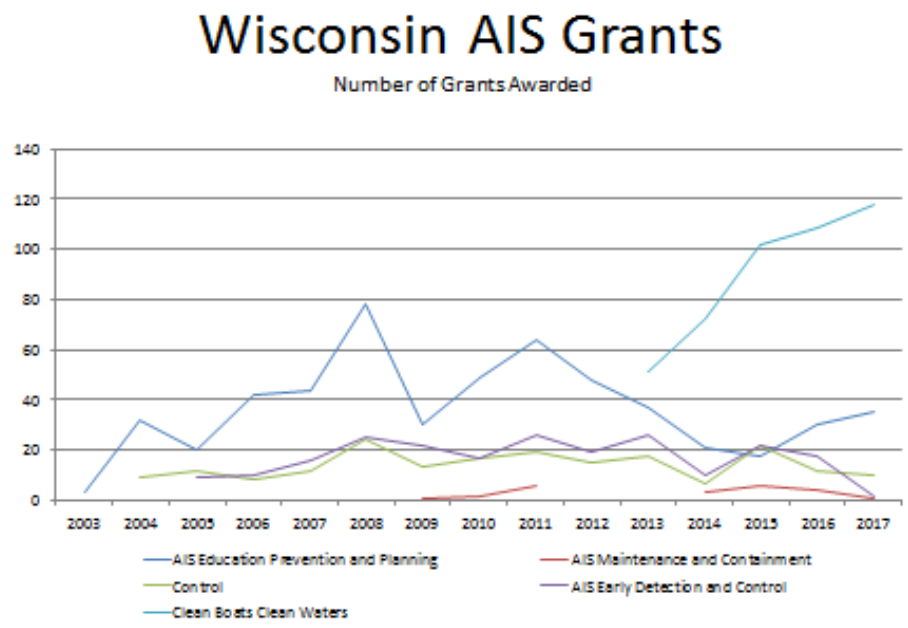

Figure 9. Aquatic Invasive Species grants awarded by the WI Department of Natural Resources between 2003 and 2017.

Emerging Challenges

New Zealand Mud Snail (Potamopyrgus antipodarum)

New Zealand mudsnails (NZMS) are a small freshwater snail that can grow to astounding numbers, displacing other freshwater organisms that provide important functions in Wisconsin streams, especially trout streams. Following the discovery of NZMS in Black Earth Creek, Dane County, in October 2013, the department implemented a project to determine its distribution and prevent its spread. Working with a neighboring state, the department coordinated a multistate monitoring effort to initiate an environmental DNA (eDNA) pilot project, and conducted statewide monitoring to determine the snail's distribution. Results from this 2014 monitoring effort showed that NZMS were limited to Black Earth Creek. In 2017, NZMSs were found in Badger Mill Creek, Dane County. The department worked with partner groups to notify stakeholders and educate them about preventative steps. The Upper Sugar River Watershed received a DNR AIS Early Detection grant to support monitoring and outreach activities. These efforts included partnering with the River Alliance of Wisconsin, Trout Unlimited, and multiple organizations to sponsor grants to provide outreach about precautions needed when wading and angling, construct wash stations, post signs, and provide presentations.

Faucet Snail (Bithynia tentaculata)

Faucet snails are native freshwater snails that are sometimes infected with a parasitic flatworm (*Sphaeridiotrema globulus/pseudoglobulus*) harmful to waterfowl. Faucet snails were identified in Elton Creek, Langlade County, in December 2014. Following the initial discovery and verification, Department staff conducted reconnaissance but did not observe faucet snails outside Elton Creek. Future statewide monitoring will include routine benthic sampling and the services of Snapshot Day volunteers. Stakeholders and partners including Trout Unlimited and the Menominee Tribe were notified of the find, and then acted to contain and control the population.

Starry Stonewort (Nitellopsis obtusa)

Starry stonewort is a macroscopic alga that grows attached to the sediment. It grows very thick, shading out native aquatic plants, reducing plant diversity and the quality of our lakes. First discovered in Little Muskego Lake, Waukesha County, in September 2014 by department staff, starry stonewort has subsequently been discovered in six additional southeastern Wisconsin inland lakes and several locations in Lake Michigan along Door County, including Sturgeon Bay. Figure 10 depicts the movement of boaters after leaving waters infested by Starry Stonewort. The map shows the potential for SSW movement if prevention steps are not taken before leaving a launch.

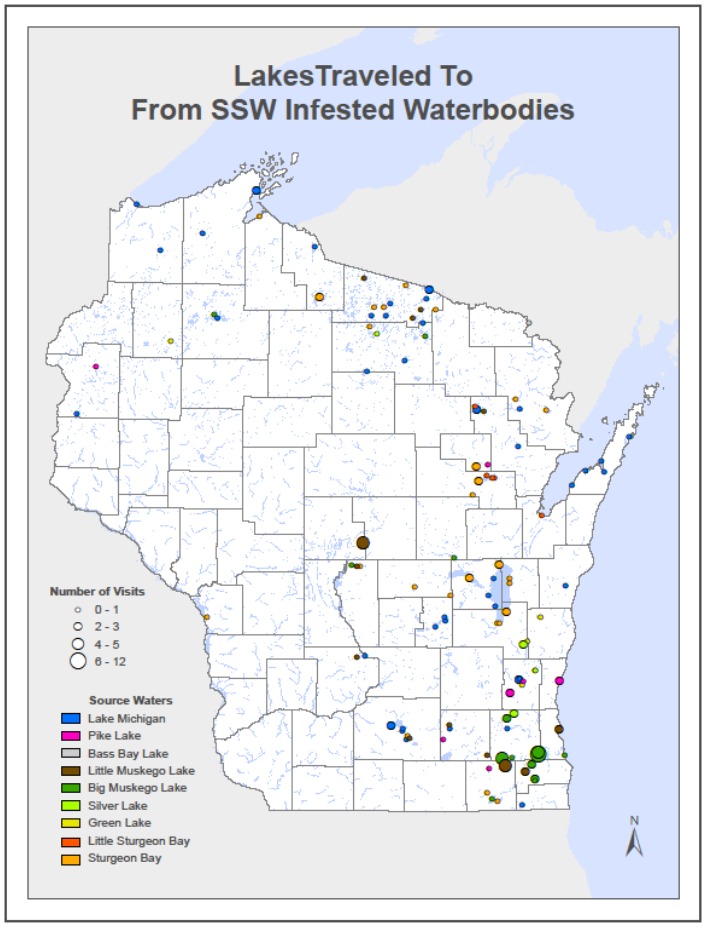

Figure 10. Boater movement from starry stonewort infested waters.

The department is collaborating with other states in the Midwest to investigate control techniques that will be effective against SSW without damaging native vegetation.

Water Hyacinth (Eichhornia crassipes) and Water Lettuce (Pistia stratiotes)

Efforts continue to monitor for water hyacinth and water lettuce that had been released in the Mississippi River, Lake Onalaska and Lake Winneconne. Few plants were observed in 2016.

Education and Outreach

Landing Blitz and Drain Campaign

Figure 11. Ice pack with AIS prevention message for anglers.

The DNR continues its partnership with UW-Extension. Together, the two agencies lead coordinated statewide efforts to educate boaters about how to prevent the spread of AIS in Wisconsin. The Drain Campaign, which is targeted at anglers, takes place in early June. Surveys suggested that anglers do not fully understand laws related to draining water for AIS prevention. One common problem is when anglers transport live fish home, even though Wisconsin's invasive species law prohibits both the transport of water and live fish. To address these incidents, the DNR has purchased reusable ice packs (Figure 11) to distribute to anglers on the Drain Campaign weekend. The ice packs provide an alternative method to transporting live fish in water and serve as a reminder to the angler on every subsequent fishing trip. During the Drain Campaign's fifth year, 10,000 ice packs were distributed at 276 boat landings by 141 partners across Wisconsin. Complementary educational pieces, including press releases and posts to social media, reached thousands more on that weekend

While the Drain Campaign focuses on a specific behavior, the Fourth of July Landing Blitz targets recreational boaters in general. The Fourth of July is always one of the busiest boating weekends of the summer, enticing not only regular boaters to get on the water but infrequent boaters and out-of-state visitors as well. To connect with this large number of boaters, the DNR coordinated the 8th annual Landing Blitz. Clean Boat, Clean Waters volunteers across the state spent the Fourth of July weekend educating boaters on AIS laws and how to prevent the spread of AIS. During the 2016 Landing Blitz, 33,588 people were contacted and nearly 15,000 boats were inspected. Additionally, over 10,000 Stop Aquatic Hitchhiker! towels were distributed to boaters already taking AIS prevention steps.

Both efforts are examples of how the DNR works effectively with partners across the state to help protect Wisconsin's waters from the impacts of AIS. These two examples also demonstrate how Wisconsin is a leader in AIS prevention across the Great Lakes region.

Waterfowl Hunter Campaign

Identifying, understanding, and addressing invasion pathways in addition to addressing the issues presented by traditional boaters and anglers are key to protecting Wisconsin from new invasions. Waterfowl hunters are another concern, especially since their boating season falls outside of when many watercraft inspectors are active. Since the waterfowl hunters are a group that has not been previously targeted by AIS staff, the DNR, UW-Extension, and local partners worked together to create surveys and develop outreach materials, and then pilot them throughout the state.

The statewide survey of waterfowl hunters revealed that most (92%) of waterfowl hunters have heard of AIS, but a smaller percentage (70%) knew that hunting gear can transport AIS. Waterfowl hunters also appear to be at least as transient as the general boating community, with 50% of waterfowl hunters using multiple waters within a five-day period.

Based on the survey, UW Extension and DNR staff created a pilot waterfowl outreach campaign modeled after Clean Boats, Clean Waters. Led by the DNR Water Guards and local teams consisting of county AIS coordinators and DNR wildlife staff, the campaign targeted five well-known waterfowl hunting areas on opening weekends. More than 500 waterfowl hunters were contacted in person and an estimated10,000 more individuals were contacted through newsletters and other media. Reports from pilot campaign participants suggested that the effort was well received by waterfowl hunters and that useful contacts were made during the event. Feedback from the event will be used to refine the 2017 effort.

Habitatattitude

The Department has begun efforts to prevent new AIS introductions resulting from pet release and aquarium dumping. The Habitattiutde campaign provides general advice on responsible pet ownership while outlining alternatives to pet release to owners and potential owners. The Habitattitude campaign is a national program developed through partnerships with industry, government, and academia that has been shown to raise awareness of invasive species issues to pet owners.

The DNR partners with UW-Extension and the University of Wisconsin Sea Grant Institute to better utilize the Haitattitude campaign in Wisconsin. Two pet amnesty events were hosted through the Green Bay Habitattitude Surrender Network during the reporting period in which nearly 50 animals were rehomed. Habitattude educational booths were hosted by two pet expos where nearly 2,000 contacts were made. Habitattitude outreach materials are made available to the Wisconsin AIS Partnership thanks to a GLRI grant through Wisconsin Sea Grant. An online Habitattitude teacher training module will soon be

available to educate teachers on invasive species and alternatives to using invasive species in the classroom. Lastly, work is currently being done to complete an online Habitattitude teacher training module that will educate teachers on invasive species and alternatives to using invasive species in the classroom. This will be completed during the next reporting period.

Arboreta and Botanical Gardens

As key partners in promoting botanical awareness, arboreta and botanical gardens throughout the state have received letters introducing them to NR 40 and providing contact information for further correspondence. DNR staff have started visiting key gardens which are targeted for additional outreach.

Other Outreach Activities

Department staff delivered outreach presentations focused on invasive species in the marketplace and NR40 in general at the Lakes Convention, Northern Great Lakes Visitor Center (as part of ISAM), UW-Stevens Point Invasive Species course (guest lecture), and FISTA (Forest Industry Safety Training Association) trainings.

UW-Extension Master Gardeners are viewed as strong partners in spreading information about NR40 to the public. To facilitate this effort, a newsletter article and online blog were provided to the UW-Extension Master Gardeners state wide program.

Invasive Species Awareness Month

Each year in Wisconsin, June is recognized as Invasive Species Awareness Month (ISAM). ISAM is a way to promote the involvement and education of the public on invasive species issues and prevention. In June, 2017, the Wisconsin Invasive Species Council celebrated Wisconsin's 13th Annual Invasive Species Awareness Month and the 13th annual Invader Crusader Awards following their regular Council meeting at the DNR's MacKenzie Center.

Invader Crusader Awards

Each year, the Wisconsin Invasive Species Council requests nominations for individuals, groups, or organizations to be recognized for their exemplary efforts at addressing issues surrounding terrestrial and aquatic invasive species, including plants, pests, animals and disease-causing organisms. The 13th annual Invader Crusader Awards were presented on June 8, 2017 at the DNR's MacKenzie Center in Poynette, WI following the Invasive Species Council's summer meeting.

2017 Invader Crusader Award Recipients

Below are the 2017 Invader Crusader Award winners and descriptions of their work on invasive species issues in Wisconsin.

Professional Individuals Category

- For the past four years, **Christa Schaefer** has served as President of the Invasive Plants of Wisconsin (IPAW) board. As president, she has worked tirelessly to combat invasive species in Wisconsin. She has encouraged greater communication and support for Wisconsin's Cooperative Invasive Species Management Areas (CISMAs). Christa has overseen IPAW educational displays, serves on the Upper Midwest Invasive Species Conference advisory committee, is a board member for the National Association of Invasive Plant Councils, and has been involved in the U.S. Green Building Council. In addition, as an employee of the Wisconsin Department of Transportation (WisDOT), Christa has consistently advocated for preventing the spread of invasive species on roadsides by setting up a program to allow volunteers to control invasive species on state highway corridors, training state and county maintenance staff, ensuring that Prohibited species are controlled on state highways, and many other efforts. For several years, she has chaired the Council's Education Committee that oversees ISAM. Christa's hard work and dedication to fighting invasive plants in Wisconsin has made a significant contribution to the management and awareness of invasive species in Wisconsin.
- **Jeff Epping**, the Director of Horticulture at Madison's Olbrich Gardens, has influenced invasive plant management through his efforts encouraging gardeners to use native and well-behaved non-native plants. He regularly appears on Wisconsin Public Radio's Garden Talk show and frequents garden expos across the upper Midwest. In addition, Jeff has assisted in developing management plans and conducting studies on control of invasive plants and jumping worms in collaboration with state agencies, horticulturalists, and researchers. He has repeatedly advocated for measures to prevent the spread of invasive species, fighting for the removal of invasive species before there were any signs that the species might become invasive. In the past, he has addressed numerous established invasive populations. Jeff's dedication to educating gardeners and preventing the spread of invasive species has been vital to combating the effects of these species.
- **Jared Urban** serves as coordinator of the Department of Natural Resource's State Natural Areas SNA) volunteer program. Since joining the DNR in 2011, Jared has developed a structured volunteer program for citizens interested in helping to manage Wisconsin's SNAs. This program began in southern Wisconsin and has since expanded to other parts of the state. Jared's SNA volunteer program actively recruits, trains, and supports volunteers and, consequently, has significantly increased the quality and efficiency of volunteer work. As of 2016, the program included more than 250 volunteers in 29 groups. Jared oversees the work that the groups do by visiting sites to prioritize projects for the upcoming year and providing suggestions and assistance coordinating DNR tools and supplies throughout the year. In addition to his hands-on work with SNA volunteers, Jared created a handbook to help the lead volunteers to recruit, train, and retain

other volunteers. Jared's enthusiasm and dedication to restoration efforts and invasive species control has helped to manage invasive species in many of Wisconsin's SNAs.

Volunteer Individuals Category

- Robert and Dorothy Moe have worked tirelessly to control purple loosestrife in the areas surrounding Bear Lake, protecting the Bear Lake Sedge Meadow State Natural Area and the lake's wild rice populations from the effects of the invasive plant. The Moes have donated many hours of volunteer work and the use of their pontoon boat and equipment to the Barron County Department of Land Services to control purple loosestrife on Bear Lake. Additionally, each year they have surveyed the lake and provided the department with detailed information regarding the locations and amount of purple loosestrife, then developed a plan on where to distribute *Galerucella* beetles raised on their property to best control purple loosestrife. Furthermore, the Moes are passionate about educating other Bear Lake residents on the impacts of invasive species. Their dedication to invasive species control and education has helped to ensure the health of the Bear Lake ecosystem for years to come.
- Pam Nelson has been involved with invasive species management on Horseshoe Lake, ever since Eurasian water milfoil was discovered on the lake 9 years ago. Initially serving on the committee to collaborate with the DNR and investigate possible control methods for the invasive species, she later took on the role of Invasive Species Coordinator for the lake association, spearheading a plan to control milfoil and maintain the lake's ecosystem. Currently, the Horseshoe Lake Improvement Association regularly monitors the lake for invasive species, has scuba divers that pull milfoil found on the lake, and regularly applies chemicals in collaboration with a lake management firm and the DNR to mitigate the milfoil. Additionally, Pam has helped to organize educational initiatives at events reaching people of all ages, involving residents in ecosystem management.
- Daniel Pawlak has served as a volunteer parent at Eagleville Elementary Charter School for the past four years. When he began volunteering, Dan started an afterschool science club which now has about 30-40 students each year. From 2014-2015, he focused on invasive species, educating students in grades 1-6 about the impacts of invasive species on the local ecosystem, focusing on Jericho Creek, a nearby tributary of the Mukwonago River. With Dan's mentorship, students have learned to identify, monitor, and prevent the spread of invasive species. One of his projects involved the invasive Asiatic clam; with his help, students searched the creek for native and invasive clams. No Asiatic clams have yet been found, but Dan plans to continue this in the future to monitor the area. Through Dan's mentorship, countless students have become more aware of

invasive species in their area and have gained a greater appreciation for the natural world around them. Dan's hard work has paved the way for the next generation of environmental stewards.

- Mark Acherman has worked to educate his 5th, 6th, and 7th grade classes on invasive species, especially aquatic invasive species, and has influenced the next generation to be responsible stewards of the environment. He and his more than 50 students each year have created posters intended to educate students and community members on the importance of invasive species control, and by doing so have reached many individuals throughout the community. He is an active fisherman and will take students fishing on occasion, often taking the opportunity to explain more about invasive species and strategies that can be used to prevent their spread. In addition to educating his students, Mark has raised biocontrol beetles to prevent the spread of purple loosestrife at various sites, including Yellowstone Lake. Through his dedication to invasive species awareness and management Mark has brought awareness and action to many young people.

Volunteer Group Category

- The Friends of the Eau Claire Lakes Area (FOTECLA) and the Town of Barnes Aquatic Invasive Species Committee (TOBAISC) are recognized for their commitment to prevention, management, and education related to invasive species in the surrounding lakes and rivers. With substantial funding from FOTECLA, ToBAISC was able to research and build a Diver Assisted Suction Harvester (DASH) boat, which allows for much more effective and efficient removal of invasive plant species in lakes and waterways. They are the first organization in the region to independently develop and build their own boat. In addition to the DASH boat, the two organizations have also collaborated to develop the Lake Ecology Education Program, or LEEP. Downloadable as a full curriculum from their website, LEEP has been used as a program for approximately 30 Drummond 7th graders each year. This program educates students on natural resource conservation, integrating invasive species education, as well.

Video Contest

As part of Invasive Species Awareness Month, the Council hosted a video contest, which it called, "Protect the Places Where You Play – Keep Invasives Out!" The video contest was open to anyone and provided citizens with an opportunity to let their inner director out, showcase their acting skills, and create a short video illustrating why they care about invasive species and how easy, and even fun, invasive species prevention can be.

The goal of the Video Contest is to increase awareness of invasive species that invade our favorite areas to play and to teach people how to prevent the spread of invasive species in these habitats. People enjoy

these outdoor areas by boat and canoe, while hunting, by walking the trails and shorelines, and much more. With these enjoyments comes the responsibility of everyone to protect our natural areas from invasive species.

Participants submitted a short (less-than-two-minute) video showing how to "protect the places they play" to the Wisconsin DNR Facebook page in late March 2017. Visitors to the Facebook page voted on their favorite video, and the video with the most votes was selected as the winner. The first-place winner's video was shown at the Invader Crusader Award Ceremony and the winner was presented with a certificate. The winning video was created by students in Ms. Tess Engelland's class. They called their video, "Breaking News: Invasive Brazilian Waterweed!"