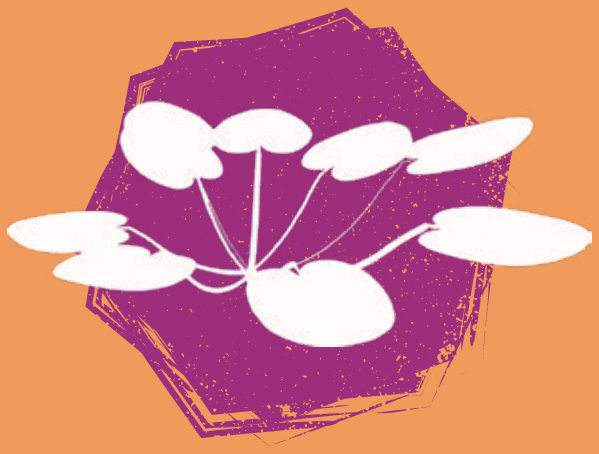
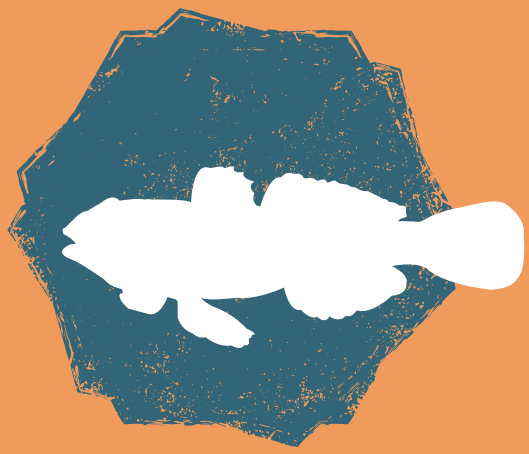
Michigan Invasive Species Program

2019 Annual Report





On the Cover

Feral swine

Feral swine are prolific breeders and extremely destructive to habitat and agriculture. Michigan has an established breeding population.

European frogbit

European frogbit is established on Michigan's east coast and was recently detected in west Michigan. Fast growing mats of frog-bit choke out native species and impede recreational use.

Round goby

The mighty little round goby has a voracious appetite and an agressive nature which allows them to dominate over native species.

"The state of Michigan defines "invasive species" as those that are not native and whose introduction causes harm, or is likely to cause harm to Michigan's economy, environment, or human health."

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Preface

Michigan's Invasive Species Program is a joint effort of the Michigan departments of Agriculture and Rural Development (MDARD), Natural Resources (DNR) and Environment, Great Lakes, and Energy (EGLE). The Michigan Invasive Species 2019 Annual Report highlights the program's goals and accomplishments regarding invasive species prevention, management and outreach; the status of prohibited and restricted species in Michigan; and recommendations for furthering Michigan's Invasive Species Program.

This report is submitted by the DNR in compliance with Michigan's Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, MCL 324.41323 and by EGLE in compliance with NREPA 324.3104(3).

Timeframe

This report covers the activities of fiscal year 2019:

October 1, 2018 through September 30, 2019.

Invasive Species Program Goals

As defined by the Invasive Species Program Charter signed by department directors in January 2015, the program has four goals:

1. **Prevent** new invasive species introduction into Michigan.
2. **Limit** the dispersal of established invasive species populations throughout Michigan.
3. **Develop** a statewide interagency invasive species Early Detection and Response Program to address new invasions.
4. **Manage** and control invasive species to minimize harmful environmental, economic and public health effects resulting from established populations.

The following highlights represent achievements toward the Michigan Invasive Species Program's goals, through the efforts of state staff, grantees and the program's many federal, state, local and university collaborators.

Invasive Species Core Team representation:

- EGLE Water Resources Division
- DNR Fisheries Division
- DNR Forest Resources Division
- DNR Law Enforcement Division
- DNR Parks and Recreation Division
- DNR Wildlife Division
- MDARD Animal Industry Division
- MDARD Environmental Stewardship Division
- MDARD Pesticide and Plant Pest Management Division
- MDOT Project Planning Division

Invasive Species Program overview

Invasive species are those that are not native and whose introduction causes harm, or is likely to cause harm to Michigan's economy, environment or human health. Michigan's economy and ecosystems experience significant negative impacts from plants, animals and pathogens that are introduced into the environment and flourish without natural predators to restrain them. The economic effects of invasive species include significant consequences to property values, tourism, recreation, utilities and industry. Ecological impacts of invasive species include reduction of native species, habitat degradation and altered food webs. Some species even can threaten public health. While the invasive species present in the state already cause substantial harm, the state's land and water are constantly threatened by the introduction of new invasive species.

Michigan's Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, Part 413 outlines the roles and responsibilities of state departments in relation to prohibiting and restricting invasive species. In 2014, Michigan's governor and Legislature designated $5 million in ongoing funding, beginning in fiscal year 2015, to manage the impact of invasive species. This support substantially enhanced Michigan's Invasive Species Program for aquatic organisms and initiated a formal program for terrestrial species. This support also initiated the Michigan Invasive Species Grant Program, providing $3.6 million in awards annually to agencies, universities and nonprofit organizations to assist with prevention, detection, eradication and control of aquatic and terrestrial invasive species.

The Michigan departments of Agriculture and Rural Development (MDARD), Natural Resources (DNR) and Environment, Great Lakes, and Energy (EGLE) share responsibility for invasive species policy, legislation, regulation, education, monitoring, assessment, management and control. These departments provide oversight and guidance for the aquatic invasive species (AIS) and terrestrial invasive species (TIS) core teams in alignment with the priorities of the administration and the department directors. The AIS and TIS core teams communicate internally and externally to ensure a cohesive program.

> "The AIS and TIS core teams develop projects and make recommendations to the departments' leadership based on AIS and TIS priorities. "

The AIS and TIS core teams develop projects and make recommendations to the departments' leadership based on AIS and TIS priorities. The AIS core team implements Michigan's Aquatic Invasive Species State Management Plan through both internal and collaborative activities and projects. The TIS core team implements Michigan's Terrestrial Invasive Species State Management Plan to guide efforts in prevention, detection and control in collaboration with local, state and federal partners.

Michigan Department of Agriculture & Rural Development

DEPARTMENT OF NATURAL RESOURCES DNR MICHIGAN

EGLE MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

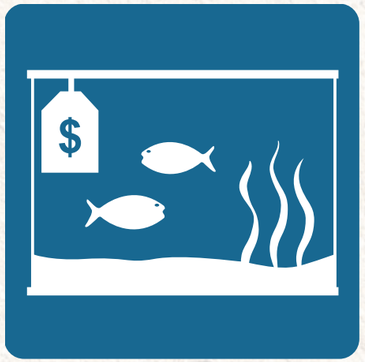
GOAL 1

Prevention

Prevent new invasive species introductions into Michigan

Prevention is the most effective step in managing invasive species. Prevention involves both keeping unwanted organisms out of Michigan and stopping the spread of newly introduced species. Michigan's Invasive Species Program targets pathways that can bring invasive species into the state and those that can move them from place to place.

Registering aquatic organism sellers



Beginning in March 2019, pet shops, nurseries and other businesses or individuals selling live, non-native aquatic species are required to register annually with the DNR and report species sold by March of the following year. These requirements, included in the 2018 amendment to NREPA (Act 451, P.A. 1994), allow the state to track the types of live aquatic species being sold in Michigan. This can help identify potential invasive species threats that could result from releasing unwanted pets or other aquatic organisms available in trade into Michigan's waters. Sellers can both register and report online at *Michigan.gov/SellAquatics*. The DNR provided nearly 400 registration certificates to vendors in 2019.

Recruiting paddle stewards

Targeting users of the state's rapidly developing system of water trails, Michigan Sea Grant launched MI Paddle Stewards, a campaign to enlist paddlers in protecting their favorite waterways from invasive species. A series of workshops initiated in 2019 trained paddling groups and other volunteers across the state to detect and report invasive species they spot while paddling and to clean their crafts to avoid spreading invasive species to new locations. Participants received materials and cleaning tools and were encouraged to share their knowledge with other paddlers. Ten training workshops were completed in 2019, each including a paddle experience on one of Michigan's water trails. Additional workshops are planned for 2020.

Keeping our waters great

The Southwest by Southwest Corner Cooperative Invasive Species Management Area (CISMA) partnered with Cass County Parks Department to install "Clean, Drain, Dry" informational signs at all county-operated boat access sites to help boaters understand new invasive species laws. While in the process of installing signs, CISMA staff encountered anglers who noted difficulty in complying with the requirement of responsibly disposing of bait – not dumping it in the water. The CISMA was able to work with the parks department to install and maintain trash cans, giving anglers responsible alternatives to bait disposal and thereby preventing the potential spread of fish disease.

Creating floating classrooms

The Cooperative Invasive Species Management Area serving Genesee, Lapeer, Livingston and Shiawassee counties, GiLLS CISMA, has discovered that kayaking is a great way to engage the public in invasive species education. A series of guided kayak tours was designed to get participants immersed in the beauty of local waterways while they learned about the threats invasive species pose to recreation and the environment. This hands-on approach allows people to see and sometimes touch invasive species while directly witnessing their effects on local waterways – a lesson that resonates far beyond the classroom and instills a level of stewardship that encourages participants to adopt prevention measures.

Encouraging travelers to Play, Clean, Go

The Mid-Michigan CISMA is reaching out to residents and visitors alike as they hit the road to enjoy Michigan's campgrounds, parks and trails – reminding them do their part to prevent the spread of invasive species. The CISMA collaborated with the Michigan Department of Transportation and the DNR to design and produce signs for 106 rest areas throughout the state. The signs, illustrating how to "stop invasive species in your tracks" by removing mud and debris from gear, staying on designated trails, and using certified or local firewood, are part of the national "Play, Clean, Go" campaign encouraging recreational users to protect the landscapes they love from the threat of invasive species.

Play Clean Go

STOP INVASIVE SPECIES IN YOUR TRACKS.

PlayCleanGo.org

GOAL 2

Limit dispersal

Limit the spread of established invasive species populations

People who work or play in areas where invasive species are already established can unknowingly aid in their spread to new areas. Arming these audiences with information to identify the invaders they encounter and to take steps to avoid carrying "hitchhikers" to new locations will have important long-term effects in reducing invasive species populations.

Educating about new boater laws

In March 2019, legislation became effective through amendments to NREPA (Act 451, P.A. 1994) requiring Michigan boaters to actively aid in preventing the introduction and spread of aquatic invasive species. Boaters now are required to remove drain plugs, drain all water from bilges, ballast tanks, and live wells and remove aquatic organisms and plants from boats and trailers before transport. The Michigan Invasive Species Program initiated several efforts to educate the public about these new requirements.

AIS boating enforcement plan

The DNR Law Enforcement Division initiated a statewide AIS boating enforcement plan, dedicating 3,184 enforcement hours to state-owned boating access sites. As with any new law, officers use the first year of enactment to help educate the public on the new requirements, so enforcement actions are reserved for only the most egregious cases. Officers worked these sites, many times in conjunction with fellow stakeholder groups, to share the "Clean, Drain, Dry" message. The DNR boating enforcement plan is supported by funds from the Great Lakes Restoration Initiative.

Aquatic Invasive Species Awareness Week in Michigan

Governor Whitmer proclaimed June 28 to July 7, 2019, Aquatic Invasive Species Awareness Week in Michigan. To celebrate, EGLE sponsored the sixth annual AIS Landing Blitz, partnering with local volunteers, the DNR and MDARD at more than 79 boating access sites to give boaters tips to prevent the spread of harmful species and comply with recently updated laws. With support from the Great Lakes Commission, the AIS Landing Blitz became a regional Great Lakes effort in 2019, with events held in eight Great Lakes states and Ontario and Quebec.

Public outreach efforts

Throughout 2019, the Michigan Invasive Species Program expanded public outreach efforts on several fronts to increase awareness of new boater laws. EGLE and DNR produced a flier explaining the new law, designed for inclusion in every boater registration mailing sent from the Secretary of State – an effort that will continue through 2021 to encompass the three-year registration cycle. Additional actions included updating boat launch signs and making new signs available at no cost to municipal and private launches, initiating access ramp stenciling with "Clean, Drain, Dry" messaging at all paved ramps at state-owned access points, and increasing social and traditional media outreach efforts. Signs and boat launch stencils are available to municipal and private launches at no cost through a partnership with the Michigan Lakes and Streams Association and the Michigan Waterways Alliance.

GOAL 3

Early detection and response

Develop a statewide interagency invasive species early detection and response program to address new invasions

Successful early detection and response to new infestations require widespread monitoring efforts, rapid communication and well-prepared personnel to respond. A statewide approach involves coordinated efforts among agencies, cooperative invasive species management areas (CISMAs), industry professionals, researchers and citizens to detect, report, verify and treat emerging invasive species.

Responding to aquatic plants on the watch list

The state's aquatic invasive plant early detection and response initiative was launched in 2011 to address aquatic "watch list" species. With support from the Great Lakes Restoration Initiative, the team conducts investigations and responds to positively identified detections by assessing the risk posed by the invading plant, reviewing response options and, if feasible, planning and implementing a response.

Achieving local eradication of yellow floating heart

In 2019, the early detection and response team successfully eradicated two known infestations of yellow floating heart. The aquatic invasive plant, which forms dense mats that prohibit native plant growth, was first detected in 2015 in the reflection pond at the Clara Ford Rose Garden on the University of Michigan – Dearborn campus. A second, smaller infestation was found in a small pond at the Red Oaks Nature Center in Madison Heights in 2016. Following manual removal of the plants in 2015 and 2016 at the Clara Ford Rose Garden and 2016 at the Red Oaks Nature Center location with assistance from site staff, no yellow floating heart plants have been observed at either site during monitoring efforts in 2017, 2018 and 2019. An invasive aquatic plant is considered eradicated when a site is free of the species for three consecutive years. The initiative is working to eradicate the plant from eight other locations in the state.

Tackling new infestations of European frog-bit

Two new infestations of European frog-bit, a fast-spreading aquatic plant that can impede recreational use, were confirmed in late summer 2019. Discovery of a widespread infestation along a 6-mile stretch of the Lower Grand River in July was followed by a detection in Pentwater Lake in August. These locations near Lake Michigan represent the westernmost known detections of European frog-bit in the Great Lakes region. Following extensive surveys in the fall to determine the extent of the plant population, Michigan's early detection and response initiative staff is working with the West Michigan CISMA, Gun Lake Tribe, Michigan State University Extension and other partners to develop a plan to address the infestations and engage the public in preventing spread.

Harvesting escaped water lettuce

Water lettuce, a free-floating plant with a rosette of leaves resembling an open head of lettuce, was discovered in 2019 in Ruddiman Lagoon, which outlets into Muskegon Lake. Though water lettuce is allowable for sale and cultivation in Michigan, it is on Michigan's watch list because escaped plants have quickly multiplied and spread in lakes and rivers across the state. Dense mats of water lettuce reduce oxygen levels, block sunlight and prevent growth of submerged vegetation. The aquatic invasive plant early detection and response team and West Michigan CISMA staff hand-removed over 1,000 pounds of water lettuce from the infested area. The plants were flowering but did not appear to be seeding. Follow-up monitoring by the CISMA two weeks after the removal found a few remaining plants. The location will be monitored annually for signs of new plant growth.

Reducing impacts of red swamp crayfish

Michigan State University and the DNR are working together to find the most effective ways to reduce populations of red swamp crayfish, first detected in Michigan in 2017. These crayfish aggressively compete with native crayfish, and their deep burrows can damage infrastructure. There are 19 known locations of red swamp crayfish in southeast Michigan, primarily in man-made retention basins and private ponds in Novi and Farmington Hills, and one location in Kalamazoo County, on Sunset Lake in Vicksburg. Traditional traps and electrofishing are being supplemented with pulsed, high-frequency sound and experimental trap designs in attempts to increase capture rates. The crew also is evaluating harvesting at night when crayfish are more active. By focusing on "epicenters," or locations with high population concentrations, technicians removed nearly 35,000 crayfish in 2019. Ponds where intensive trapping took place in 2018 showed a marked population reduction in 2019, indicating that management efforts can outpace reproduction.

GOAL 3

Early detection and response
continued

Tracking down grass carp in Lake Erie

Fertile grass carp were discovered in the Lake Erie in 2012, triggering increased bi-national response. Grass carp feed excessively on plants, destroying spawning and nursery beds used by native fish. Success in locating and capturing grass carp in the Western Lake Erie Basin is improving through new knowledge of the fish's spawning and movement patterns paired with refinement of capture techniques. Ongoing studies tracking tagged grass carp in the basin have shown consistent movement toward tributaries for spawning during high-water events. The discovery of grass carp eggs in the Sandusky River in 2019 helped pinpoint productive spawning locations. These advances, coupled with results from experiments with various combinations of nets and electrofishing techniques in different river habitats, have allowed partners in the Lake Erie Committee's Grass Carp Initiative to deploy crews to specific locations during peak spawning times with the right gear to maximize grass carp removal efforts. Using this knowledge, a three-day coordinated response on the Sandusky River in 2019 involving universities and federal, state and Canadian agencies resulted in the capture of 20 grass carp.

Grass carp

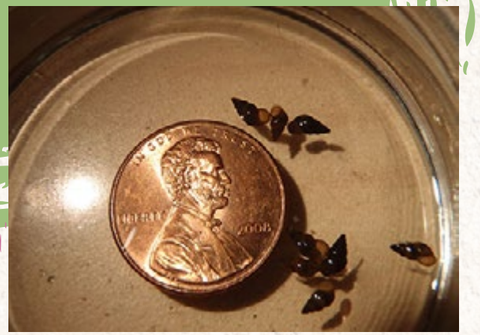
European frog-bit

Michigan's invasive species watch list

represents those species identified as an immediate or potentially significant threat to Michigan's economy, environment or human health. Watch list species either never have been confirmed in the wild in Michigan or have a limited known distribution.

Of the 30 species on Michigan's watch list, 13 have been detected in limited areas of Michigan or Michigan waters:

- Grass carp
- Chinese yam
- European frog-bit
- European water clover
- Hemlock woolly adelgid
- Himalayan balsam
- Japanese stiltgrass
- Kudzu
- New Zealand mudsnail
- Parrot feather
- Red swamp crayfish
- Water lettuce
- Yellow floating heart



New Zealand mudsnails

Chinese yam

Himilayan balsam

Water lettuce

GOAL 4

Minimize harmful effects:

Manage and control invasive species to minimize harmful environmental, economic and public health effects resulting from established populations

Established or widespread infestations can change the makeup of whole ecosystems. The negative effects on native plant and animal populations include displacement, diminishing food and habitat, and species reduction. The recreational value of lakes, dunes and forests is degraded by the presence of invasive species. Invasive species also are taking a toll on Michigan's fisheries, agriculture and timber industries. Both large-scale management efforts and innovative treatment methods are needed to manage invasive species populations in the state.

Supporting aquatic invasive plant control

EGLE awarded $12,300 under the Aquatic Invasive Plant (AIP) Control Grant Program for 13 projects to control aquatic invasive plant species using chemical or physical methods. The AIP grant, new in 2019, was created by the 2018 approval of Part 414, Aquatic Invasive Species, of NREPA (Act 451, P.A. 1994). The grants to lake associations and local governments in 12 counties reimburse permit fees for these inland lake projects, one of the four statewide priorities listed in Part 414. The AIP grant program will continue in 2020.

Boosting action with annual CISMA support

In 2017 the Michigan Invasive Species Grant Program initiated annual baseline funding for CISMAs to support operations and actions defined in each CISMA's strategic plan. These community-driven organizations are the heart of Michigan's invasive species program, providing local action and leadership on a regional basis to all 83 counties in the state. In 2019, Michigan's 21 CISMAs used some baseline funding to conduct surveys on nearly 37,000 acres of land and water and manage 3,892 acres for species including phragmites, Japanese knotweed, European frog-bit and other regional priorities. CISMAs also actively promote landowner management of invasive species through workshops and hands-on training in chemical application and manual removal methods. Many CISMAs have additional programs such as tool lending and cost-share opportunities to further enable landowners to tackle invasive species on their own properties.

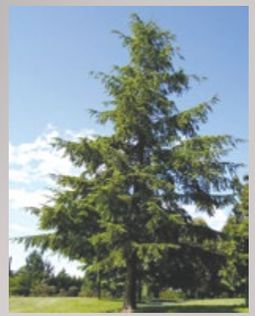
Hitting the road together

County road commissions are discovering the benefits of working with CISMAs to manage invasive plants in road rights-of-way. The Oakland County CISMA manages contracts, permits and public outreach for the Road Commission of Oakland County's phragmites treatment program. In 2019, the partnership was able to secure local funding to expand roadside phragmites management to the entire county. Likewise, the Barry, Calhoun and Kalamazoo CISMA, in partnership with the Barry County Road Commission, announced a new program that will support right-of-way management of phragmites and Japanese knotweed. In the Upper Peninsula, CISMAs are working with road commissions to time mowing to limit the spread of invasive wild parsnip. To encourage similar collaborations, the County Road Association of Michigan brought together road commissions and CISMAs in October 2019 to hear about the cost savings and management improvements made possible by these growing partnerships.

Releasing wasps to protect island forests

Since 2011, residents and conservationists have worked to protect islands in the Beaver Island Archipelago in northwest Michigan from invasion by the emerald ash borer. Unfortunately, a single borer was trapped in both 2017 and 2018, and by 2019, approximately 30 of the insects were discovered in traps on both Beaver Island and nearby Garden Island. In response, community leaders enacted a local wood movement ordinance and took other immediate actions in concert with MDARD, DNR, EGLE, MSU and USDA's Animal and Plant Health Inspection Service to protect the islands' ash resources. Teams created trap trees by removing patches of bark from several ash trees in infested areas to attract existing beetles. Select trees received chemical injections to kill beetle larvae. In addition, three species of East Asian parasitoid wasps were released in infested ash stands, where the hope is that the wasps will kill young beetles by laying their eggs on or in beetle larvae. All three wasp species exclusively target emerald ash borer and have been approved by state and federal agencies for release. In fact, the wasps are reared at a federal lab in Brighton, Michigan. Adult parasitoid wasps will be collected from release sites by local volunteers in summer 2020 to determine if reproduction was successful in establishing wasp communities.

Spotlight - hemlock woolly adelgid



Hemlock woolly adelgid (HWA), an invasive insect that can kill hemlock trees, has infested areas of Allegan, Ottawa, Muskegon and Oceana counties. Hemlocks are an important component of forest ecosystems, providing shelter for deer and nesting birds and keeping forest streams cool and clean.

Because certain insecticides are effective in treating trees with HWA, it is possible to save hemlocks that have been infested. Currently, management efforts are focused on detecting new infestations and containing existing populations with the goal of eradicating the species from Michigan. Treatment is progressing southward from the northern infestation edge in Oceana County.

Though over 35,000 acres were surveyed in Michigan in 2019, no new HWA infestations were found within or outside of the core infestation area.

2019 management actions

State parks

The DNR is surveying state parks on or near the Lake Michigan shoreline and those near lakeshores in the Upper Peninsula. The Michigan Civilian Conservation Corps Forest Health Crew is treating HWA in Mears, Silver Lake, Muskegon, P. J. Hoffmaster, Saugatuck Dunes and Holland state parks – spanning the shoreline along the four affected counties. Crews surveyed 10,675 acres and treated 10,892 trees in 2019. This work is being undertaken with funding from the DNR and U.S. Forest Service.

Other state and federal Land

Other state and federal land within 20 miles of known HWA infestations or within 5 miles of Lake Michigan is being surveyed by DNR Forest Health Program staff.

Allegan, Ottawa, Muskegon and Oceana counties

Infestations on private and municipal lands are being surveyed and managed by the West Michigan CISMA, supported by funding from the Great Lakes Restoration Initiative, the Michigan Invasive Species Grant Program and Ottawa County. Current efforts are focused on the leading edge of the infestation in Oceana County. In 2019, CISMA staff surveyed 1,690 acres and treated 21,383 hemlock trees on private and municipal properties.

Berrien, Van Buren, Mason, Manistee, Benzie, Leelanau, Grand Traverse, Antrim, Charlevoix and Emmet counties

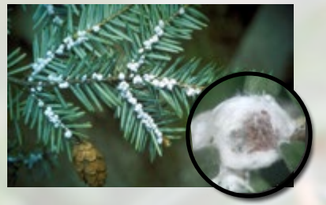
In west coast counties outside the infested area, hemlock stands within 5 miles of the Lake Michigan shoreline are being surveyed through a collaborative effort between the Nature Conservancy, the Michigan Dune Alliance and CISMAs serving these counties. In 2019, crews completed surveys on 325 unique sites, totaling 867 acres. Survey efforts are supported by the Michigan Invasive Species Grant Program.

Mackinac, Schoolcraft, Delta and Menominee counties

In the Upper Peninsula, hemlock surveys will begin in 2020 along Lake Michigan, conducted by multiple CISMAs under the direction of the Alger Conservation District and Lake to Lake CISMA. Survey efforts are supported by the Michigan Invasive Species Grant Program.

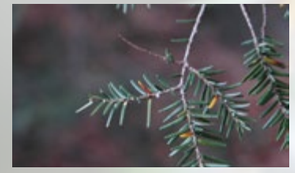
Hemlock Woolly Adelgid (HWA)

HWA is an invasive species that infests the eastern hemlock. In spring and fall, adults spin ovisacs resembling the tips of cotton swabs to protect their eggs.



Distinctive round, white ovisacs of HWA are found at the base of hemlock needles on the underside of branches. One or many HWA ovisacs will be found at the needle base on a single twig.

Outside of their ovisacs, hemlock woolly adelgid aphids are nearly impossible to see without a magnifier. HWA targets soft new growth, located where the needles meet the twigs.



HWA feeds on the tree's stored starches, which are critical to the tree's growth and long-term survival. In trees with heavy infestations, needles become dry and grayish or brown, and drop off. Over time, HWA causes tree death.

Program outcomes

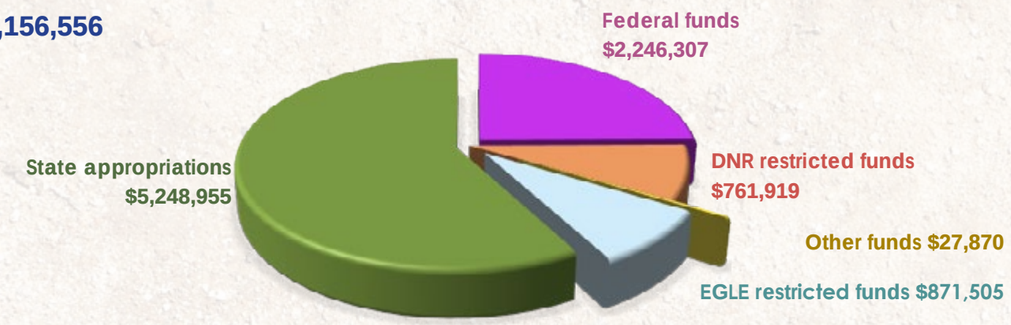
The following outcomes were established to direct the use of state funding to further the goals of the Michigan Invasive Species Program.

- Establishing Cooperative Invasive Species Management Areas (CISMAs) to ensure statewide coverage.
- Responding to 90 early detection sites.
- Providing outreach to 750,000 citizens to enlist them in detecting and responding to emerging invasive species before they become established.
- Managing and controlling 6,000 acres for terrestrial and aquatic invasive species.

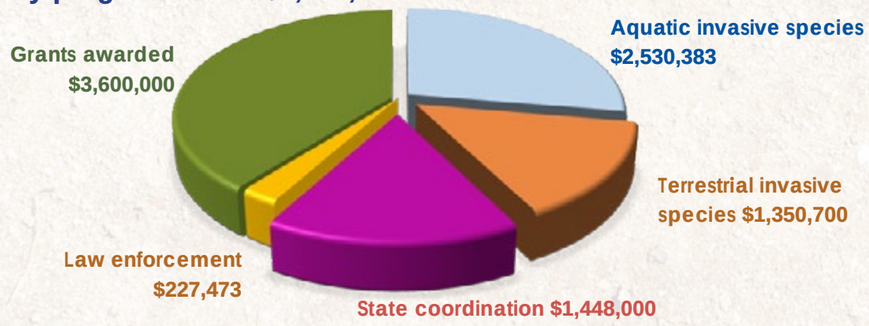
	CISMA statewide coverage by county	Early detection responses	Outreach impressions	Control acres
Program Goal	**83**	**90**	**750,000**	**6,000**
2015	65	355	1,495,800	8,369
2016	77	175	5,037,627	8,710
2017	77	194	5,090,658	9,370
2018	83	58	4,274,867	9,410
2019	83	24	6,265,359	12,313

Program finances - fiscal year 2019

Funding - $9,156,556



Expenditures by program area - $9,156,556



Michigan's prohibited, restricted and problematic species

Michigan laws limit the import, sale and possession of 55 prohibited and restricted species including plants, animals, fish, mollusks and crayfish. A current list is provided at the end of this report. If a species is prohibited or restricted, it is unlawful to possess, introduce, import, sell or offer that species for sale as a live organism, except with a valid permit. Michigan's Natural Resources Commission, in consultation with MDARD, or the Commission of Agriculture and Rural Development, in consultation with the DNR, may add to the list of prohibited and restricted species.

The term "prohibited" is used for species that are not widely distributed in the state. Often, management or control techniques for prohibited species are not available. The term "restricted" is applied to species that are established in the state. Management and control practices are usually available for restricted species.

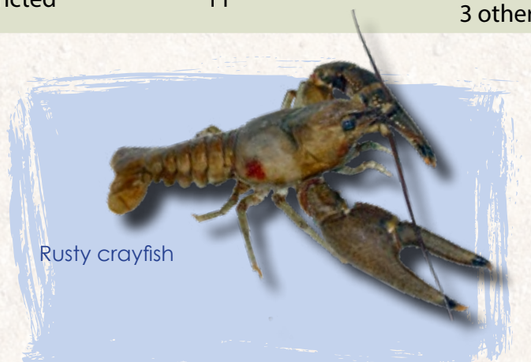
Scientific permits issued for prohibited or restricted species in 2019

The issuance of permits for the possession of prohibited or restricted species is provided by NREPA Part 413 for MDARD (for plants and insects) and the DNR (for fish or any other species) following an application and review process.

In 2019, 50 permits were granted to partner agencies, universities and other entities such as consulting firms, zoos, nature centers and other educational institutions in 2019.

Prohibited and Restricted Species Permits Issued in 2019

Species	Status	Number of Permits Issued	Pemittees
Rusty crayfish	Restricted	12	8 universities, 1 partner, 1 other
Zebra mussels	Restricted	7	4 universities, 1 partner, 2 others
Quagga mussels	Restricted	8	7 universities, 1 other
Round goby	Prohibited	10	8 universities, 2 others
Red swamp crayfish	Prohibited	2	1 university, 1 partner
Terrestrial and aquatic plants	Prohibited or restricted	11	2 universities, 6 partners, 3 others



Michigan's prohibited, restricted and problematic species *continued*

Additions or deletions to Michigan's prohibited and restricted species lists

There were no changes to Michigan's prohibited and restricted species lists in 2019

Status of Michigan's prohibited, restricted and other problematic species

The current distribution of prohibited and restricted species in Michigan, based on best available knowledge, is provided in Appendix A. Some of these species are not yet known to be present within the state, while others have been present in certain parts of the state for decades, causing significant, ongoing management and control costs. In cases where distribution is listed as absent, this may mean a species is truly not present at all in Michigan or that no confirmed detections have been made. Detection and/or specific management actions occurred in 2019 for the prohibited, restricted or other problematic species listed below:

European frog-bit

EGLE confirmed the presence of European frog-bit in the Lower Grand River in late July 2019 and in Pentwater Lake in early August 2019. European frog-bit was first detected in southeast Michigan in 1996 and has since spread along the coastal areas of lakes Erie and Huron up to the eastern Upper Peninsula. In 2016, the plant was discovered in Reeds and Fisk lakes in East Grand Rapids, and response efforts are underway to eradicate this population. Inland spread was found by the Oakland County CISMA in numerous detention ponds and drainages. Michigan's Invasive Species Program staff is working with the West Michigan CISMA, Oakland County CISMA, Gun Lake Tribe, Michigan State University Extension and other partners on surveillance and response and raising public awareness to prevent further spread of the invasive plant.

Yellow floating heart

Two locations of yellow floating heart in Michigan were successfully eradicated in 2019. Both infestations were in small, artificial ponds – one at the University of Michigan, Dearborn and one at the Red Oaks Nature Center in Madison Heights. Staff members at both locations collaborated with state of Michigan employees to remove over 1,000 pounds of plant material from the sites in 2016. Regular monitoring from 2017 to 2019 revealed no new plant growth, indicating that the species was eradicated from these locations. Infestations at an additional eight sites in Michigan are being managed with the goal of eradication.

Emerald ash borer

Effective Oct. 1, 2018, MDARD repealed its emerald ash borer (EAB) interior quarantine. Michigan's quarantine helped to slow the spread of EAB, but by 2018, the tree-killing pest had been found in all but four of Michigan's 83 counties. Without the quarantine in effect, ash logs, ash lumber and hardwood firewood can be moved within Michigan, freeing businesses and individuals handling these products from the requirement of compliance agreements with MDARD. Because the federal quarantine remains in place, businesses or travelers moving articles regulated by the federal EAB quarantine out of Michigan must continue to work with the United States Department of Agriculture to meet interstate requirements. MDARD, DNR and EGLE still ask people not to move firewood as it can carry other pests and diseases such as oak wilt and beech bark disease to new areas.

Boxwood blight

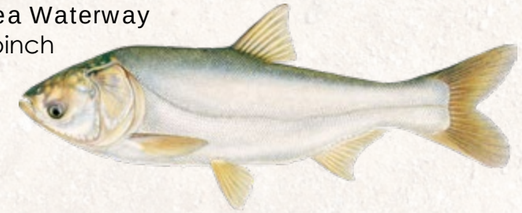
In late 2018, boxwood blight, a serious fungal disease that attacks the popular landscape shrub boxwood, was detected for the first time in Michigan. The disease was found in Oakland County in three separate locations: a landscape firm, a homeowner's yard and in holiday wreaths being sold at a retail store. Since then, boxwood blight has been detected in four more counties across the Lower Peninsula. MDARD restricts from sale any boxwood nursery stock found to be infected with boxwood blight and issues a disposal order. The nationally recognized Boxwood Blight Cleanliness Program, available for growers and dealers, greatly reduces risk of new introductions. Several firms in Michigan are enrolled in the program. In North America, boxwood blight has been reported in 31 states and three Canadian provinces.

Spotted lanternfly

Though spotted lanternfly has not been detected in Michigan, infested areas continue to expand in eastern Pennsylvania and neighboring states including Delaware, New Jersey, Maryland and Virginia. This invasive insect feeds on many economically significant plants including grapevines, fruit trees, hardwoods and hops. To prepare for the possibility of infestation in Michigan, the Spotted Lanternfly Response Group, a collaborative effort between MDARD, USDA-APHIS, MSU and MSU Extension, has organized to gather data and resources and establish lines of communication in the event that response is necessary. Initial actions include plans for mapping Michigan locations of tree of heaven – also an invasive species and a preferred spotted lanternfly host. In Pennsylvania, managers survey tree of heaven locations to gage the spread of the invasive lanternfly. In infested areas, tree of heaven is treated with insecticide to kill lanternflies that land on or suck sap from the trees.

Invasive Asian carp

While no live bighead, silver, or black carp, (known as a group as "Asian carp") have been found in the Great Lakes, they are close enough to warrant the label of an imminent threat. Bighead and silver carp populations have expanded rapidly up the Mississippi, Missouri, Ohio, and Illinois rivers and continue to colonize other waterways in new locations. The U.S. Army Corps of Engineers has developed a system of structural and non-structural control measures designed for the Brandon Road Lock and Dam in the Chicago Area Waterway System near Joliet, Illinois. Brandon Road is a critical pinch point for keeping bighead, silver and black carp out of the Great Lakes. Supporting Illinois' role as non-federal sponsor of the Brandon Road project, Michigan has committed $8 million towards the project design, the next critical step in the process.



Recommendations

Proposals regarding legislation and funding to carry out and otherwise further the purposes of Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, Part 413, MCL 324.41323 include:

Recommendation 1

Continue funding for and support of Michigan's Invasive Species Program, pursue base funding for Cooperative Invasive Species Management Areas (CISMAs) and establish an invasive species urgent response fund.

Continued support of Michigan's Invasive Species Program. Each year, metrics for outreach, response and control are met or exceeded, and annual requests for grant funding are sometimes more than triple the funding available. The program has made great strides in using state funding to leverage additional federal funding, leading to success in phragmites control, grass carp eradication efforts and response to hemlock woolly adelgid.

Base funding for Cooperative Invasive Species Management Areas. The state has met the original goal of providing grassroots support for invasive species prevention, detection and management through local and regional CISMAs. Experience from the last five years has proven that base funding to support continuity in programming and service provides the best assurance of success. Approximately half of the invasive species General Fund appropriation of $3.6 million for grants supports CISMAs. If an alternative, sustainable funding mechanism was available to support the CISMAs, more grant funds would be available to provide on-the-ground treatment and to pursue development of more efficient approaches for treating and managing invasive species.

Urgent response funds. EGLE, DNR and MDARD currently lack stable funding to support emergency response to high-threat invasive species. Quick access to a stable source of funding would enable coordinated, short-term response actions while long-term solutions are planned. An ideal invasive species response fund would be available to all three departments and would be applied strictly to immediate responses to contain or eradicate high-threat species while long-term funding is sought.

Recommendation 2

Support more stringent regulations regarding the movement of potentially infested and diseased wood to protect Michigan's forest and landscape resources from the spread of oak wilt and other devastating pests and diseases.

Michigan currently has an interior quarantine for hemlock woolly adelgid and exterior quarantines for thousand cankers disease and balsam woolly adelgid. Ensuring compliance with these quarantines is critical to the future of Michigan's forests and landscape trees. Expanding the channels of communication about these regulations to include all levels of law enforcement as well as tourism information networks will encourage broader compliance.

Recommendation 3

Continue to work with industries to identify, report and manage invasive species causing harm to Michigan's resources and the industries that rely on them.

Forest professionals, lake managers, agricultural operators and recreational outfitters are among those who have a stake in the health of Michigan's natural resources. Their daily activities put them in key positions to identify, report and, in some cases, manage invasive species populations. Sharing information with industry leaders and associations regarding identification and reporting tools, best management practices and emerging research can expand the reach and effectiveness of the state's invasive species program.

Recommendation 4

Increase assistance for identification and treatment of invasive species on private lands.

Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, Part 413 provides penalties for transporting or possessing prohibited or restricted species but does not prevent maintaining or cultivating invasive species on private lands, even if the species are spreading onto neighboring properties. Attempts by CISMAs and state park and state forest managers to eradicate invasive species populations are sometimes thwarted by neighboring private landowners' unwillingness to treat populations along property lines or those that may easily spread to adjacent properties. Raising awareness about invasive species and the harm they cause has encouraged some landowners to appropriately manage infestations. Providing more assistance in treatment, including low-cost or no-cost options, also may encourage better management.


Sea lamprey


Oak wilt

Appendix A – Species listed as prohibited or restricted under Part 413

Plants

Species	Part 413 Status	Distribution in Michigan	Comments
African oxygen weed *(Lagarosiphon major)*	Prohibited	Absent	
Autumn olive *(Elaeagnus umbellate)*	Prohibited	Widespread	Common and widespread statewide.
Brazilian waterweed *(Egeria densa)*	Prohibited	Absent	Isolated populations in Illinois, Indiana, Minnesota and Ohio.
Curly leaf pondweed (Potamogeton crispus)	Restricted	Widespread	Common, especially in the Lower Peninsula.
Cylindro *(Cylindropermopsis raciborskii)*	Prohibited	Isolated	Recorded in several drowned river mouths in the Lake Michigan Basin.
Eurasian watermilfoil *(Myriophyllum spicatum)*	Restricted	Widespread	Common, especially in the Lower Peninsula.
European frogbit *(Hydrocharis morsus-ranae)*	Prohibited	Locally abundant	Locally abundant in southeast Lower Peninsula and Saginaw Bay; isolated populations in Alpena, Bay, Chippewa, Kent, Oceana, and Ottawa counties.
Fanwort *(Cabomba caroliniana)*	Prohibited	Locally abundant	Locally abundant in Lower Peninsula; present in Illinois, Indiana, Ohio and Ontario.
Flowering rush *(Butomus umbellatus)*	Restricted	Locally abundant	Common in southeast Michigan, both inland and coastal; also identified in Indiana, Illinois, Ohio, Wisconsin and Ontario.
Giant hogweed *(Heracleum mantegazzianum)*	Prohibited	Isolated	Patchy distribution throughout the Lower Peninsula and western Upper Peninsula; some occurrences have been controlled.
Giant salvinia *(Salvinia molesta, auriculata, biloba or herzogii)*	Prohibited	Absent	
Hydrilla *(Hydrilla verticillata)*	Prohibited	Absent	Isolated populations in Indiana, Wisconsin and Ohio.
Japanese knotweed *(Fallopia japonica)*	Prohibited	Widespread	Patchy distribution throughout Lower and Upper peninsulas.
Parrot feather *(Myriophyllum aquaticum)*	Prohibited	Isolated	Active management of isolated populations in Wayne, Washtenaw, Calhoun, and Jackson counties; isolated populations in Illinois, Indiana, New York, Ohio and Pennsylvania.
Phragmites or common reed *(Phragmites australis)*	Restricted	Widespread	Common and established in coastal and inland areas of southern Lower Peninsula; somewhat less abundant from south to north. Treatment has reduced populations in the Upper Peninsula.
Purple loosestrife *(Lythrum salicaria)*	Restricted	Widespread	Biological control is stabilizing population statewide.
Starry stonewort *(Nitellopsis obtusa)*	Prohibited	Locally abundant	Recorded in over 100 inland waterbodies, mostly in Lower Peninsula.
Water chestnut *(Trapa natans)*	Prohibited	Absent	Observations in New York, Pennsylvania and Ontario.
Water soldier *(Stratiotes aloides)*	Prohibited	Absent	Isolated population in Ontario.
Yellow floating heart *(Nymphoides peltata)*	Prohibited	Isolated	Isolated populations in Illinois, Indiana, Ohio, Wisconsin and Ontario. Active management of isolated populations in Wayne, Kent, Ottawa, Ingham, and Oakland counties in Michigan.

Crustaceans

Species	Part 413 Status	Distribution in Michigan	Comments
Rusty crayfish *(Orconectes rusticus)*	Restricted	Widespread	Widespread and breeding in inland waters.
Red swamp crayfish *(Procabarus clarkii)*	Prohibited	Isolated	Isolated population in Sunset Lake in Vicksburg. Other isolated populations exist in private waters near Novi and Farmington Hills.
Yabby *(Cherax destructor))*	Prohibited	Absent	
Killer shrimp *(Dikerogammarus villosus)*	Prohibited	Absent	

Fish

Bighead carp *(Hypopthalmichthys nobilis)*	Prohibited	Absent	
Bitterling *(Rhodeus sericeus)*	Prohibited	Absent	
Black carp *(Mylopharyngodon piceus)*	Prohibited	Absent	
Eurasian ruffe *(Gymnocephalus cernuus)*	Prohibited	Locally abundant	Patchy distribution in Great Lakes; absent in inland waters.
Grass carp *(Ctenopharyngodon idellus)*	Prohibited	Isolated	Suspected limited natural reproduction in Ohio waters of Lake Erie; isolated detections reported in the St. Joseph and Kalamazoo rivers and Paw Paw Lake.
Ide *(Leuciscus idus)*	Prohibited	Absent	
Japanese weatherfish *(Misgurnus anguillicaudatus)*	Prohibited	Isolated	Single breeding population in the Shiawassee River.
Round goby *(Neogobius melanostomus)*	Prohibited	Widespread	Widespread and established in Lakes Michigan, Huron and Erie; isolated collection in Lake Superior near Marquette; isolated but established populations in inland waters
Rudd *(Scardinius erythrophthalamus)*	Prohibited	Absent	Isolated collections on the Ontario side of Lake St. Clair.
Silver carp *(Hypophthalmichthys molitrix)*	Prohibited	Absent	
Any fish from the snakehead family *(Channidae)*	Prohibited	Absent	
Stone moroko *(Pseudorasbora parva)*	Prohibited	Absent	
Tench *(Tinca tinca)*	Prohibited	Absent	
Tubenose goby *(Proterorhinus marmoratus)*	Prohibited	Isolated	Isolated, established populations in the St. Clair River, Lake St. Clair, Detroit River and western Lake Erie. Documented in northern Lake Huron.
Wels catfish *(Silurus glanis)*	Prohibited	Absent	
Zander *(Sander lucioperca)*	Prohibited	Absent	

Mollusks

Species	Part 413 Status	Distribution in Michigan	Comments
Brown garden snail *(Helix aspersa)*	Prohibited	Absent	Two Michigan detections in the past - both eradicated.
Carthusian snail *(Monacha cartusiana)*	Prohibited	Locally abundant	Wayne County
Giant African snail (Achatina fulica)	Prohibited	Absent	
Girdled snail *(Hygromia cinctella)*	Prohibited	Locally abundant	Wayne County
New Zealand mudsnail *(Potamopyrgus antipodarum)*		Isolated	Established in Lake Ontario and Lake Erie and present in Lake Superior. Established populations in the Pere Marquette, Au Sable, Manistee and Boardman rivers.
Golden mussel *(Limnoperna fortunei)*	Prohibited	Absent	
Wrinkled dune snail *(Candidula intersecta)*	Prohibited	Locally abundant	Wayne County
Quagga mussel *(Dreissena bugensis)*	Prohibited	Widespread	Found in all of the Great Lakes, although limited in Lake Superior; isolated inland occurrences in the Great Lakes basin.
Zebra mussel *(Dreissena polymorpha)*	Restricted	Widespread	Widespread in inland and Great Lakes waters of the Lower Peninsula; patchy distribution in inland waters of the Upper Peninsula and Lake Superior.

Mammals

Feral Swine *(Sus scrofa Linnaeus)*	Prohibited	Widespread	Historically reported in 72 of 83 counties; occurrences presently limited to localized areas in 12-15 counties, with reports becoming more common in the central Upper Peninsula; reduced occurrences in the central Lower Peninsula due to active management.
Nutria *(Myocastor coypus)*	Prohibited	Absent	Farmed in Michigan in the 1930s.

Birds

Eurasian collared dove *(Streptopelia decaocto)*	Prohibited	Isolated	First observed in Michigan in 2002; since documented in Kalamazoo, Traverse, Berrien, Alger and Mason counties..

Insects

Asian longhorned beetle *(Anoplophora glabripennis)*	Prohibited	Absent	Not detected in Michigan; infestations currently active in New York, Massachusetts, Ohio and Ontario; eradicated from Illinois and New Jersey.
Emerald ash borer *(Agrilus planipennis)*	Prohibited	Widespread	Widespread throughout Lower Peninsula; patchy distribution across Upper Peninsula.

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