

Michigan
Invasive Species Program

2017
Annual Report



“ Michigan’s
Invasive Species Program
is a joint effort of
Michigan’s Quality
of Life departments.”



These departments share responsibility for invasive species policy, legislation, regulation, education, monitoring, assessment, management and control.

Invasive Species Steering Committee

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Preface

Michigan’s Invasive Species Program is a joint effort of Michigan’s Quality of Life departments: Agriculture and Rural Development (MDARD), Environmental Quality (DEQ), and Natural Resources (DNR). The departments are pleased to submit the 2017 annual report to Governor Snyder, the Legislature and the citizens of Michigan. The report provides an overview of the program; its goals and accomplishments in the areas of prevention, management and outreach; the status of prohibited and restricted species in Michigan; and recommendations for the furtherance of Michigan’s Invasive Species Program.

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

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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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Timeframe

This report covers the activities of fiscal year 2017:

October 1, 2016 through September 30, 2017.

Goals

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

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

Invasive Species Program

Overview

Michigan's economy and ecosystems experience significant negative impacts from plants, animals and pathogens that don't belong here. These unwelcome guests are invasive species. 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 can even 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 a new invasive species.

Michigan's Natural Resources and Environmental Protection Act, 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 the Legislature designated \$5 million in ongoing funding, beginning in fiscal year 2015, to combat 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 assist with prevention, detection, eradication and control of aquatic and terrestrial invasive species.

Michigan's Invasive Species Program is a joint effort of Michigan's Quality of Life departments: Agriculture and Rural Development (MDARD), Environmental Quality (DEQ), and Natural Resources (DNR). The departments share responsibility for invasive species policy, legislation, regulation, education, monitoring, assessment, management and control.

The Quality of Life Invasive Species Steering Committee provides 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 Invasive Species Steering Committee 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 is developing a Terrestrial Invasive Species State Management Plan to guide efforts in prevention, detection and control in collaboration with local, state and federal partners.

Goal 1: PREVENTION

Prevent new invasive species introductions into Michigan

Seeking innovation to stop invasive carp

In January 2017, Governor Rick Snyder announced the Great Lakes Invasive Carp Challenge, a Michigan-sponsored \$1 million search for innovative solutions to prevent invasive bighead and silver carp from entering the Great Lakes. Hosted by InnoCentive, a leader in global crowdsourcing, the challenge garnered over 350 entries from 27 countries. Semi-finalists will be selected by a panel of expert judges to present their solutions to a live audience of entrepreneurs, researchers and investors in 2018 for the opportunity to win cash prizes and have their solutions put to work in the fight against invasive carp.



Developing tools for educators

Supported by a grant from the Michigan Invasive Species Grant Program, Wayne State University and Michigan Technological Institute teamed up to boost invasive species education in the classroom by providing free educator workshops across the state. Over 100 educators were introduced to key invasive species, including regulated pets and plants that can be purchased over the internet. Teachers learned how to identify these species and how to achieve Michigan science standards using invasive species lessons. All participants were challenged to develop new lessons and share them online in a special educators' forum designed to encourage networking and classroom innovation.



Connecting with private forest landowners

Michigan's Forestry Assistance Program (FAP), overseen by MDARD's Environmental Stewardship Division, provides assistance to private landowners in 50 counties across the state. Twenty professional foresters in the FAP program work to increase the active management of non-industrial private forest lands through landowner outreach and technical assistance.



In 2017, FAP foresters held over 400 outreach activities, providing over 17,000 landowners with information on identifying and managing invasive species, including oak wilt and hemlock woolly adelgid, on private forest lands. Foresters also made over 2,000 site visits to provide management assistance and invasive species information to private forest landowners.

Intercepting infested tree stock

Multi-state collaboration led to the discovery of 16 shipments of Eastern hemlock from a firm in Tennessee to Michigan in violation of the state's hemlock woolly adelgid exterior quarantine. Officials in New York discovered a hemlock shipment from the same supplier was contaminated with hemlock woolly adelgid and quickly communicated their findings to other midwest states. With help from the Tennessee State Plant Regulatory Official, MDARD Pesticide and Plant Pest Management Division staff was able to track and investigate the Michigan shipments and assure the proper disposal of all 2,538 trees. Many of the customers reported the trees they received were dead or in poor condition. All willingly surrendered the potentially contaminated plants. Only one shipment showed symptoms of hemlock woolly adelgid. Fines have been levied against the Tennessee firm, which has signed a settlement agreement with MDARD.



Goal 2: DETECTION

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

Hunting down red swamp crayfish

Vigilant and knowledgeable citizens reporting “suspicious” looking crayfish to the DNR Fisheries Division led to confirmation of the first red swamp crayfish infestations in Michigan. Reports like these show the effectiveness of broad-scale communication efforts and stress the continued importance of raising awareness about invasive species and how to report them. Following the discovery, a statewide press release requesting help from the public resulted in more than 100 additional reports to the DNR. These led to the confirmation of other infestations in the Novi and Farmington Hills areas in southeastern Michigan. The DNR and Michigan State University are now attempting to contain and eradicate these infestations where feasible.



Stopping Japanese stiltgrass

A homeowner’s report of Japanese stiltgrass in Scio Township near Ann Arbor was confirmed in July 2017 as the first known location of the invasive grass in Michigan. In other states, this highly destructive annual grass has taken over areas of disturbed soil along stream banks, roadways and woods, altering habitat and leaving areas prone to erosion. A response team organized by the DNR Wildlife Division used chemical treatments and hand pulling to remove all plants from several sites on the initial property and neighboring properties. Press coverage of the newly detected species led to the identification of Japanese stiltgrass infestations in Niles, Berrien County and near Brooklyn in Jackson County. The DNR is working with the Southwest by Southwest Cooperative Invasive Species Management Area to manage these sites.



Teaming up to fight hemlock woolly adelgid

Response to multiple hemlock woolly adelgid infestations continues in locations scattered along the eastern Lake Michigan shore area from Oceana County to the north and Allegan County to the south. Five Michigan State



Parks are among the infested sites, which range from single properties with small numbers of infested trees to multiple properties with hundreds of infested trees. Property owners and land managers have begun treating trees with insecticide. The Michigan Hemlock Woolly Adelgid Coordinating Committee, comprised of representatives from the DNR, MDARD, USDA-Forest Service, Michigan State University and Ottawa County Parks and Recreation, completed a statewide strategy document prioritizing actions and identifying long-term funding mechanisms to provide a framework for a managed response to hemlock woolly adelgid in Michigan. With assistance from 2017 USDA Farm Bill funds, MDARD's Pesticide and Plant Pest Management Division conducted ten training sessions, reaching 620 tree care professionals asked to assist in statewide early detection efforts for hemlock woolly adelgid, Asian longhorned beetle and other high-priority invasive forest pests and diseases threatening Michigan.

Mapping progress on watch list aquatic plants

The state's aquatic invasive plant early detection and response team, led by the DEQ's Water Resources Division, tackles newly-detected invasions of watch list plants across the state. Using early detection and response principles, the team assesses the risk posed by the invading plant, reviews response options and, if feasible, plans and implements a response tailored to the situation. A large infestation, such as the widespread areas of European frogbit along the Lake Huron shoreline, may require multiple partners like Cooperative Invasive Species Management Areas, volunteers and contracted pesticide applicators working together over time to manage it. A smaller discovery, like the 2017 detection of yellow floating heart in a landscape pond at Lansing Community College, may provide the opportunity to eradicate the plant from the area with local assistance - in this case, campus staff. A new online interactive map, Aquatic Invasive Species – Early Detection, identifies detection locations and tracks management progress for aquatic invasive plants on Michigan's watch list.



Using genes to detect invasive carp

DNR Fisheries Division continued its collaboration with the U.S. Fish and Wildlife Service (USFWS) to implement an innovative genetic method for monitoring for bighead and silver carp in Great Lakes waters. The collaboration began in 2013 and has since used environmental DNA (eDNA) to collect thousands of samples at numerous high priority Great Lakes tributaries to implement an early detection program for the two high-risk invasive carp species. Priority sampling locations are selected by DNR and USFWS based on preferred spawning and nursery habitats of bighead and silver carp. To date there is no evidence from eDNA sampling that would suggest bighead and silver carp have established populations in the Great Lakes. Since the inception of the sampling program there has been only one of thousands of samples that resulted in a positive detection of invasive carp



eDNA, and that was in the Kalamazoo River in 2014. The one positive result is thought to have stemmed from a contamination source, perhaps a boat from an infested location containing invasive carp genetic material, and not from a live fish. Intensive eDNA sampling following the positive detection has not resulted in the presence of invasive carp genetic material in any additional samples.



Goal 3: CONTROL & MANAGEMENT

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

Protecting historic oaks on Belle Isle

When oak wilt – a disease deadly to trees in the red oak family – was discovered in fall 2016 in trees at Belle Isle Park, DNR Parks and Recreation Division staff quickly drafted a plan to contain and manage the disease to protect the historic forest and some of the state’s last remaining Shumard’s oaks. In late December 2016, crews completed the first management phase, severing the roots between infected and healthy trees using a plow outfitted with a special cutting blade. In February 2017, 112 dead oaks were cut down and removed by helicopter to prevent damage in the rare flatwoods forest habitat. More than 180 selected oaks in or near areas of known oak wilt were injected with a fungistat to prevent infection. The DNR will continue to monitor for infected trees throughout the year.

Improving management through smart monitoring

The Michigan Department of Transportation (MDOT) is an important partner in the fight against invasive species. Understanding the dangers to visibility and risk of fire posed by invasive phragmites, staff now integrates invasive species surveys into drive time, using a collector app to mark beginning and end points of phragmites stands in road rights-of-way. For 2017, this work resulted in mapping more than 3,500 locations of phragmites and treating of more than 3,000 patches totaling 180 acres of phragmites statewide. Emerging issues with Japanese knotweed, which can undermine asphalt and concrete structures such as roads and bridges, led to the incorporation of this plant into roadway surveys. Nearly 100 locations of knotweed were mapped in 2017. Approximately three acres, including patches near Houghton and along U.S. 131 near Grand Rapids, were treated.

Returning beech trees to Ludington

Beech bark disease was first discovered in Michigan in Ludington State Park in 2000. Since then, the disease has taken its toll in 32 Michigan counties as well as the lakeshore park’s Beechwood and Pines campgrounds, requiring the removal of hundreds of dead trees that posed hazards to campers and visitors. Since 2002, the DNR’s Forest Resources Division and Michigan State University researchers have been working with the U.S. Forest Service’s Northern Research Station in Delaware, Ohio to identify and propagate American beech trees resistant to beech bark disease. Seeds and scions of surviving trees were harvested from Ludington

State Park, tested for resistance and grown in the lab. In 2017, 250 of these disease-resistant American beech tree saplings were brought back to the park and planted by staff and volunteers. The event marks a milestone in Michigan's fight against invasive species. The successful development of a disease-resistant strain of American beech signals the beginning of the process of restoration for Michigan's mesic and bottomland forests in the 32 counties known to be affected with beech bark disease.

Reducing sea lamprey reproduction

In a step toward potentially eradicating invasive sea lamprey from Michigan's Inland Waterway, U.S. Geological Survey staff from the Hammond Bay Biological Station released nearly 4,000 sterilized male sea lamprey in the Pigeon, Sturgeon and Maple rivers during May and June of 2017. Preliminary monitoring in fall 2017 showed sterile males nesting with females, resulting in no eggs or dead eggs at the surveyed locations. If the project is successful in reducing the sea lamprey population, it may eliminate the need for future lampricide treatments at a cost of \$400,000 every four years. Decreasing both sea lamprey and the use of lampricide will improve sport fish populations in the Inland Waterway and permit the removal of some deteriorating dams currently kept in place to limit sea lamprey migration.

Homing in on feral swine

Feral swine cause major damage to property, crops, livestock, native species and ecosystems. Thirty years ago, there were no sightings or evidence of feral swine in Michigan. By the end of 2014, sightings of more than 473 feral swine had been reported in 76 of Michigan's 83 counties. USDA Wildlife Services, in partnership with DNR, launched an intensive feral swine removal project in 2015 with funding from the Michigan Invasive Species Grant Program. Aerial surveys of counties in the Saginaw Bay area and in the central Upper Peninsula were coupled with tracking "Judas pigs" – feral swine captured and fitted with GPS collars. To date, the project has led to contacts with over 150 landowners and the elimination of eight swine. Intensive survey efforts indicate fewer feral swine in Michigan than previously thought. In August 2017, the USDA Wildlife Services Feral Swine Elimination Plan for Michigan was finalized, outlining a partnership with the state to reach the goal of eradicating feral swine. The plan employs aerial surveys, feral swine removal efforts in the Upper Peninsula, and continued collaboration, outreach and education.



Goal 4: EDUCATION & OUTREACH

Limit dispersal of established invasive species populations throughout Michigan

Volunteering for clean waters

The 2017 Landing Blitz once again highlighted Aquatic Invasive Species Awareness Week, July 2-8, 2017. The outreach event was held at 62 boat landings around the state. The DEQ's Water Resources Division coordinated the event and partnered



with over 100 local volunteers to assist boaters in preventing the spread of harmful aquatic invasive species and complying with current AIS-related laws and regulations. Over 5,000 boaters learned about Michigan's laws requiring the removal of aquatic plants from boats and equipment before launching, the need to drain live wells and bilges, proper disposal of unused bait and preventing fish transfer to new water bodies. Volunteers and staff also shared best practices for

water protection including Clean, Drain, Dry for all crafts and gear used in the water, proper disinfection with a bleach solution, and proper disposal of debris and plant material in waste receptacles

Targeting online audiences

Michigan's invasive species program increased its online presence by producing five short videos. Timed to reach fall waterfowl hunters, a special video message regarding habitat loss due to phragmites launched in October, encouraging hunters to identify and report the invasive grass and to avoid using it to construct blinds. The DEQ Water Resources Division initiated a new YouTube series, the MDEQ Minute, to help raise awareness about invasive species. Upbeat and accessible, each video features a single species and provides tips on identification, reporting and the threat posed to the environment, economy and human health. New Zealand mudsnail, yellow floating heart and red swamp crayfish were tackled in 2017, resulting in nearly 6,000 online views. The DNR Fisheries Division also contributed with a visual catalog of exotic fish captured in Michigan waters – illustrating why aquarium pets should not be released into the wild. Additional videos are on schedule for release in 2018.

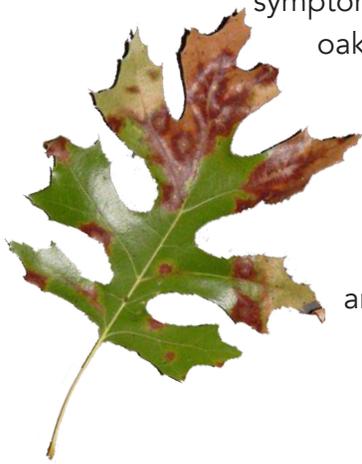
Reaching boaters where they launch

The Benzie Conservation District used Michigan Invasive Species Grant Program funds to purchase a new Hydro-Tek T-200 boat wash unit to initiate its Aquatic Invasive Species Pathways Project in summer 2017. Staff and volunteers spent the summer weeks at public boat launches across Benzie, Leelanau and Manistee counties to demonstrate ways to prevent the spread of aquatic invasive species.

Over 1,600 people received information while the crew washed 660 boats ranging from kayaks to charter fishing vessels. Benzie staff employed media outreach and used public forums to further spread the word about protecting recreational water resources from aquatic invaders including the New Zealand mudsnail, which was identified in the Manistee River in 2017.

Recruiting industry to battle oak wilt

The Arboricultural Society of Michigan hosted workshops across the state to inform landowners and landscape and tree professionals about oak wilt, a deadly fungus that attacks red oaks and can kill a tree within a matter of weeks after the first symptoms are evident. Participants learned how to identify and report oak wilt and what can be done to prevent the spread of the disease to healthy trees, including the use of fungicide injections and severing root grafts. A Michigan Invasive Species Program grant assisted the Arboricultural Society in developing and holding the workshops, building an informational website for the Michigan Oak Wilt Coalition and piloting the state's first oak wilt identification and treatment certification program for tree professionals.



Program Metrics

	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

Public Act 537 of 2014

Became effective on April 1, 2015, requiring the DNR to develop a permitted aquatic species list to support Michigan’s existing laws preventing new introductions of invasive species. This legislation requires a review of all aquatic plants and animals to determine if they should be permitted for possession or trade within the state. For consultation on this new legislation, 30 key industry and government representatives were invited to a workshop hosted by the DNR and MDARD. There was consensus among industry and government representatives that the laws pertaining to the permitted species list could be improved. The initial estimate of the number of aquatic species currently in trade in Michigan is approximately 20,000.

Due to concerns conveyed by industry and government representatives, Public Act 477 of 2016 was passed extending the deadline for the permitted species list to April 1, 2019. This extension has allowed government staff to collaborate with industry representatives on improving mechanisms to implement aquatic invasive species laws related to organisms in trade. In 2018, industry and government representatives will work with legislators to modify laws regulating the organism in trade industry while maintaining important protections and prevention mechanisms.

Spotlight

Collaboration in the Great Lakes

The Asian Carp Regional Coordinating Committee



comprised of state and federal representatives, has the mission of preventing the spread of Asian carp into the Great Lakes. Michigan has played an active role in this group since 2010 and supports regional initiatives described in the annually developed Asian Carp Action Plan to ensure that invasive carp don't spread to the Great Lakes. In recent years the focus of such efforts has included advancing control technologies to deter fish from moving upstream and increasing removal and monitoring activities in areas of known establishments - primarily the Illinois River. These activities are completely funded through federal Great Lakes Restoration Initiative (GLRI) funding, and Michigan has worked with Congress to ensure continued support to protect the Great Lakes from this detrimental invader.

The Great Lakes Phragmites Collaborative

supports coordinated, efficient and strategic approaches to managing invasive Phragmites, which has spread to shorelines, wetlands and roadsides across the Great Lakes region. Led by the Great Lakes Commission, the collaborative has developed the Phragmites Adaptive Management



Framework, or PAMF, providing managers with a standard protocol for monitoring, a central database for phragmites location and treatment data, and a predictive model that uses collected data to prioritize management alternatives for various conditions and locations. As partners in the collaboration's efforts, Michigan's Quality of Life departments contribute data to PAMF and are assisting invasive species program grantees in utilizing PAMF for treatment options.

The Invasive Mussel Collaborative



Invasive Mussel Collaborative

seeks to advance scientifically sound control technologies for zebra and quagga mussels in the Great Lakes region and beyond. Led by the Great Lakes Commission, the collaborative involves a diverse group of federal, state, provincial and tribal agencies, industries, and environmental and recreational organizations with shared concerns about the impact of invasive mussels. As members of the



steering committee, the DEQ and DNR aid in communicating the needs of resource managers to supporting science communities to produce measurable ecological and economic benefits.

The Starry Stonewort Collaborative

Source: Roberta Hill, VLMP © 2007



is a Great Lakes Restoration Initiative effort to find ways to prevent and control this aquatic invasive macroalgae currently spreading through the region's inland lakes. Over the next two years, the collaborative will review research and management strategies to determine gaps and develop or refine control methods. The collaborative is also working to develop communications strategies amongst all stakeholders, including research communities, lake managers, lake associations and recreational users.

The Invasive Crayfish Collaborative

was recently launched by the Illinois-Indiana Sea Grant to better understand and manage the risk of invasive crayfish in the Great Lakes region. Organizers will bring together stakeholders from agencies, universities, industry and the public to prioritize research and outreach needs and evaluate and refine management techniques for both established species such as rusty crayfish and new invaders like the red swamp crayfish recently detected in Michigan.



Great Lakes and St. Lawrence Governors and Premiers AIS Task Force

reestablished in 2013, has pioneered a Mutual Aid Agreement outlining protocols for cooperation and leveraging communication and information amongst the eight states and two provinces to better respond to serious AIS threats in the basin. The 2013 Governors and Premiers' "least wanted" list of 16 high threat species has resulted in more than 40 state and provincial actions to stop the movement of high-risk species into the region. During their 2017 Leadership Summit in Detroit and Windsor, the Governors and Premiers renewed and expanded their resolution to enhance regional protections against aquatic invasive species. The membership resolved

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to explore opportunities to collaborate on enforcement of aquatic invasive species laws including better coordination on investigations, and to expand the “least wanted” aquatic invasive species list. In addition, Michigan, Ontario and Ohio will continue a pilot project to harmonize aquatic invasive species efforts by increasing collaboration, developing consistent messaging, sharing information across key conservation groups and strengthening public-private partnerships.

An Interstate Early Detection and Response project



supported by a Great Lakes Restoration Initiative grant from the USFWS to Michigan, aims to increase coordinated aquatic invasive species early detection and response between Great Lakes states and provinces, Canadian and U.S. federal agencies, The Nature Conservancy (TNC), the Great Lakes Commission and researchers. TNC led the development of a Great Lakes surveillance plan, mapping hotspots for potential new introductions of priority species. An interstate response plan, also drafted by TNC, provides a framework for communication and coordinated response actions. In 2017, the group tested the response plan through mock exercises; developed aquatic invasive plant early detection monitoring techniques for the Great Lakes and connecting channels, and sampled three priority sites in Wisconsin, Michigan, and Ohio waters. The Great Lakes Commission is taking the lead on exploring pathways by which invasive aquatic plants can enter the Great Lakes basin, classifying associated risk levels and identifying gaps in prevention efforts.

The Great Lakes Panel on Aquatic Nuisance Species

was established in 1991 and is legislatively mandated to: identify aquatic invasive species priorities for the Great Lakes region; assist and make recommendations to the federal Aquatic Nuisance Species Task Force; coordinate aquatic invasive species program activities in the region; and advise public and private interests on prevention and control efforts. Membership is drawn from U.S. and Canadian federal agencies, the eight Great Lakes states and the provinces of Ontario and Québec, regional agencies, user groups, local communities, tribal authorities, commercial interests, and the university and research community.



The panel currently has active committees focused on identifying research priorities, preventing grass carp and developing a species risk assessment clearinghouse.

Other 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 in 2017 for Prohibited or Restricted Species

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

In 2017, 47 permits were granted to partner agencies, universities and other entities such as consulting firms, zoos, nature centers and other educational institutions.

Table 1 – Prohibited and Restricted Species Permits Issued in 2017

Species	Status	Number of Permits Issued	Permittees
Rusty crayfish	Restricted	8	6 universities, 1 partner, 1 other
Zebra mussels	Restricted	5	1 universities, 2 partners, 2 other
Quagga mussels	Restricted	6	5 universities, 1 partner
Round goby	Prohibited	13	7 universities, 2 partners, 4 other
New Zealand mudsnails	Prohibited	1	1 university
Red swamp crayfish	Prohibited	1	1 university
Tubenose goby	Prohibited	1	1 university
Aquatic plants	Prohibited or Restricted	7 new, 5 renewed	3 universities, 9 partners

Status of 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 2017 for the prohibited, restricted or other problematic species listed below:

Hemlock woolly adelgid



MDARD established a Hemlock Woolly Adelgid Interior Quarantine in July 2017 to protect the state's 170 million hemlock trees from a pest which has killed trees across North America. The quarantine follows an increasing number of detections of this exotic pest in west Michigan. MDARD attributes the infestations to shipments of infested nursery stock which were brought into Michigan from infested eastern states prior to 2001 when the state's exterior quarantine was first put into effect.

The Hemlock Woolly Adelgid Interior Quarantine regulates the movement of hemlock nursery stock and hemlock forest products including hemlock yard waste within and out of Allegan, Muskegon, Oceana and Ottawa counties. Hemlock logs, lumber and firewood without any attached twigs or branches are exempt.

Red swamp crayfish

Red swamp crayfish were detected in Sunset Lake in Vicksburg and in multiple private ponds in the Novi and Farmington Hills areas in July 2017 after being reported by the public. These are the first confirmed detections of the prohibited species in Michigan. DNR Fisheries Division staff used traps and site surveys in the Vicksburg and Novi areas to confirm and evaluate distributions of this highly invasive crayfish. A combination of monitoring and outreach uncovered 14 confirmed infestation locations within the Novi and Farmington Hills epicenter. A response plan is being implemented in collaboration with Michigan State University. Chemical control measures for red swamp crayfish currently being evaluated by the U.S. Geological Survey will inform control options for this invader in 2018. To date the source of these infestations is unknown, but likely sources include release of specimens used in K-12 classrooms, release during live crayfish boils and release of unused bait. Possession of red swamp crayfish is prohibited in Michigan.



Thousand cankers disease

MDARD proposed a revision of the state's Thousand Cankers Disease of Walnut Quarantine in September 2017 to expand the regulated areas to encompass all states where the disease has been detected. Thousand cankers disease is not known to exist in Michigan but has caused significant tree death elsewhere in North America.



The quarantine generally prohibits the shipment of walnut nursery stock, certain walnut timber products and hardwood firewood into Michigan from infested states. Walnut furniture, veneer, kiln dried walnut lumber without bark, and walnut nuts and nutmeats are exempt.

Japanese stiltgrass

The first detection of Japanese stiltgrass in Michigan was confirmed on private property in Scio Township in Washtenaw County in June 2017. Japanese stiltgrass, an invasive plant originating in Asia, has been on Michigan's invasive species watch list since 2015 due to its presence in nearby states including Indiana, Illinois and Ohio. Stiltgrass takes hold in areas of disturbed soil along banks, roadways and woods and quickly blankets the soil, leaving little room for native plants and trees to sprout. A press release about the discovery led to identification of the grass at two locations near the state's southern border – Niles and Brooklyn. The DNR is working with landowners and regional invasive species managers to treat and remove the plants.

Emerald Ash Borer

In November 2016, results of the USDA Animal and Plant Health Inspection Services' emerald ash borer trapping program confirmed that Baraga County in the western Upper Peninsula was infested with emerald ash borer. Baraga was added to the state's quarantine in February 2016 because of its proximity to other infested counties. Gogebic, Iron and Ontonagon counties remain un-quarantined. The movement of regulated articles, including all hardwood firewood, from the quarantined counties in the Upper Peninsula into Gogebic, Iron and Ontonagon counties and from the Lower Peninsula into the Upper Peninsula is prohibited without an MDARD-issued compliance agreement.



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

Recommendation:

Develop a funding mechanism to support emergency response activities.

Establish a fund to support emergency response activities for invasive species. A lack of identified funding can lead to delayed response, which may enable further spread of new invasive species infestations and missed opportunities for eradication. Quick access to an emergency response fund 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 Quality of Life departments, would be able to accrue funding without lapsing at the end of the fiscal year, and would be strictly applied to immediate responses to contain or eradicate high-threat species while long-term funding is sought.

Recommendation:

Explore updates and improvements in Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, Part 413.

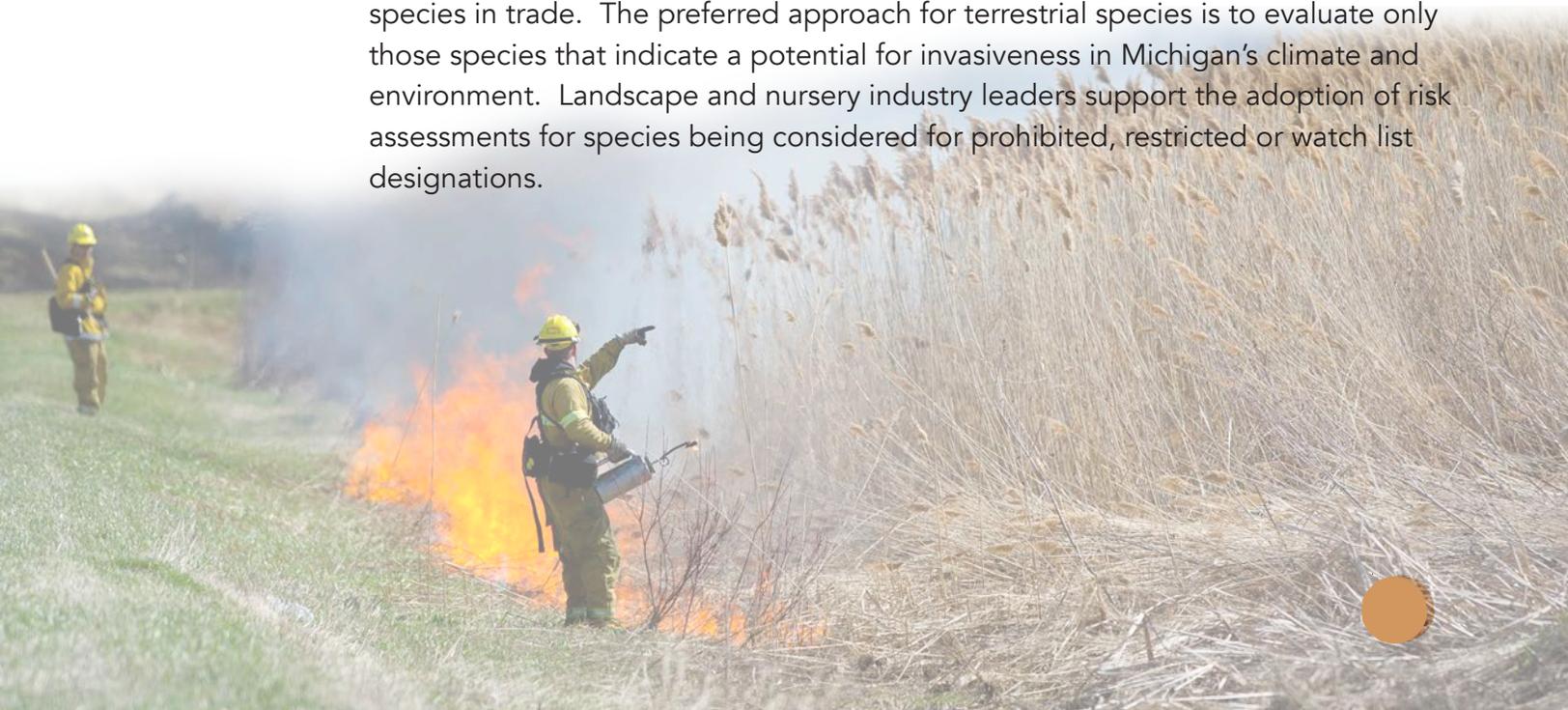
Review effectiveness of regulatory mechanisms for prohibited and restricted species violations. Michigan has hundreds of facilities such as pet stores and retail food markets engaged in the sale of live species, considered "organisms in trade." Providing inspection authority to law enforcement for any facility handling organisms in trade would create a mechanism for identifying such businesses and enhance law enforcement's ability to locate, identify and track invasive species, resulting in better prevention of prohibited species and protection of Michigan's resources.

Review regulatory mechanisms for boats or boating equipment with aquatic plants attached. Part 413 currently requires that only aquatic plants - not animals or other species - be removed before placing a watercraft or trailer in the water. The expansion of this requirement to include removal of animals (snails, mussels, etc.), mud and other attached organic debris would better protect Michigan's water bodies from existing, new and potential aquatic invasive species threats. Requiring removal actions upon exiting a boating access site instead of at the time of launch (as currently expressed) may provide better protection since anything

removed upon exiting will be left at the waterbody where it came from, rather than potentially contaminating a new waterbody. Currently, requirements regarding the movement of water and fish that have implications for aquatic invasive species prevention are established via DNR Fisheries Order 245 - Fish Disease Control and are not reflected in Part 413. Consolidating these aquatic invasive species regulations for boating and recreation into one location is advantageous from an enforcement perspective and provides easier access to information by the public and enforcement officers.

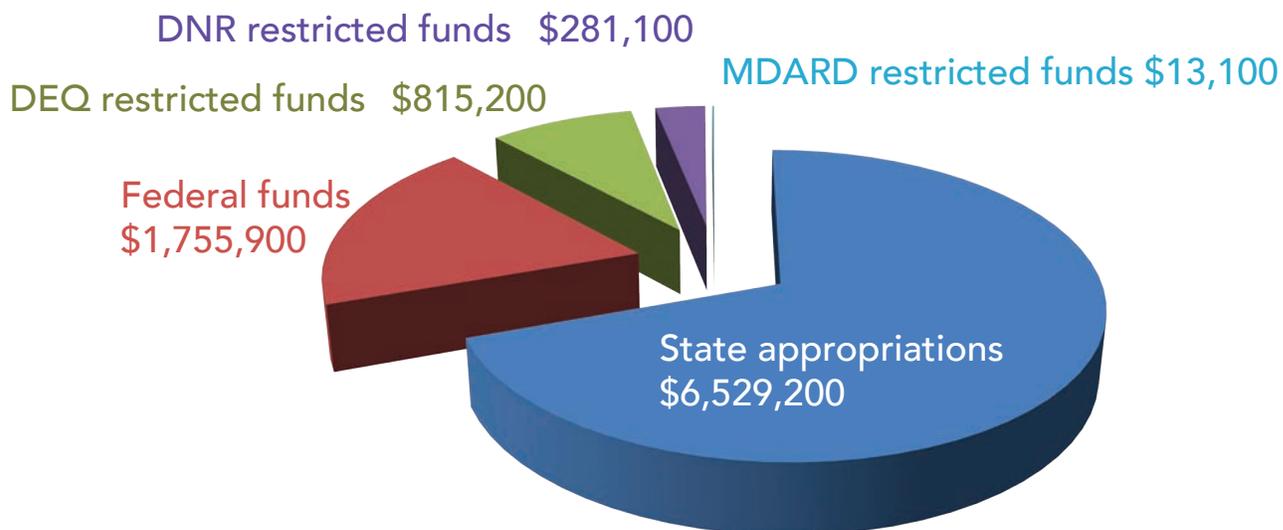
Support more stringent regulations regarding the movement of infested and diseased wood to protect Michigan's forest and landscape resources from the spread of oak wilt and other devastating pests and diseases. Michigan currently has interior quarantines for emerald ash borer and hemlock woolly adelgid, and exterior quarantines for thousand cankers disease and balsam woolly adelgid. Encouraging 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.

Support the development of risk assessments for terrestrial invasive species. A risk assessment is a thorough review of what is known about a species' habit, adaptability to Michigan's climate and environments, and its potential for invasive behavior that could cause harm if introduced to the state. Risk assessments provide a scientific basis for determining whether a species should be recommended for prohibition or restriction in Michigan as well as the appropriate response for early detection. Public Act 537 of 2014 calls for evaluation of all 20,000 aquatic plant species in trade. The preferred approach for terrestrial species is to evaluate only those species that indicate a potential for invasiveness in Michigan's climate and environment. Landscape and nursery industry leaders support the adoption of risk assessments for species being considered for prohibited, restricted or watch list designations.

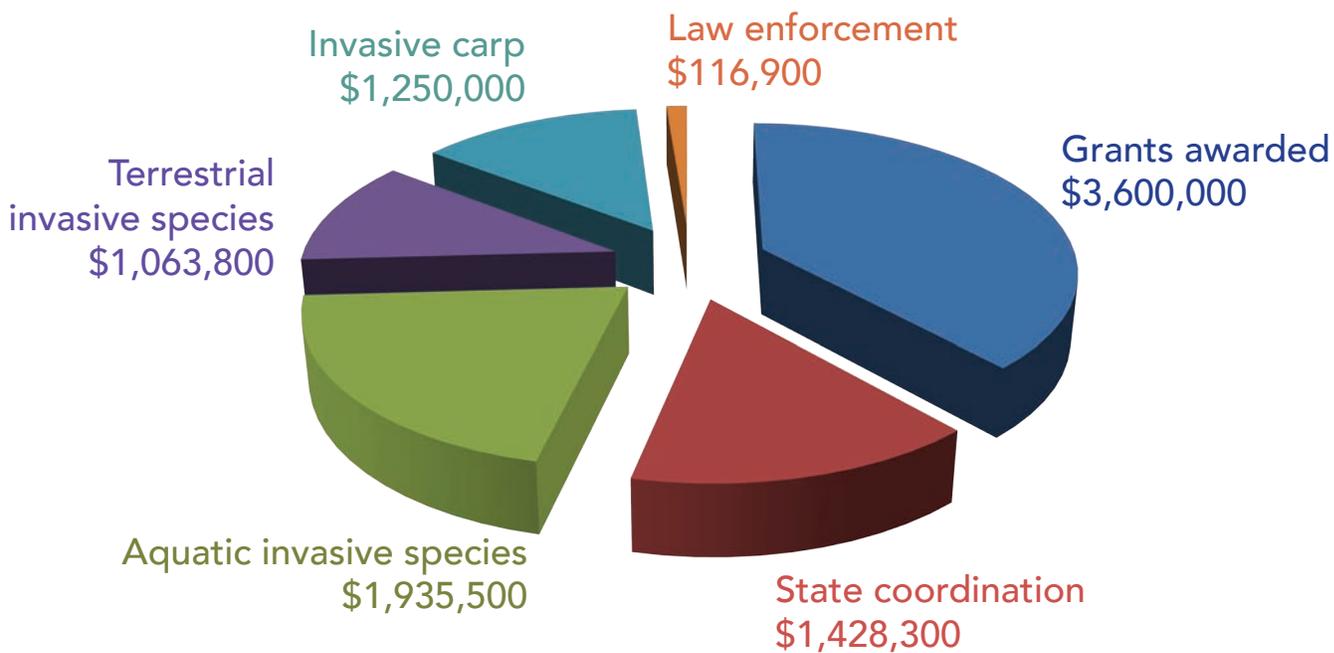


Program Finances - Fiscal Year 2017

Funding - **\$9,394,500**



Expenditures by Program Area - **\$9,394,500**



Appendix A – Species Listed as Prohibited or Restricted under Part 413

Species	Part 413 Status	Distribution in Michigan	Comments
Plants			
African oxygen weed - <i>Lagarosiphon major</i>	Prohibited	Absent	
Autumn olive - <i>Elaeagnus umbellata</i>	Prohibited	Widespread	Common and widespread throughout Southern Lower Peninsula, widespread else where statewide.
Brazilian waterweed - <i>Egeria densa</i>	Prohibited	Absent	Isolated populations in IL, IN, MN and OH
Curly leaf pondweed - <i>Potamogeton crispus</i>	Restricted	Widespread	Common, especially in the Lower Peninsula.
Cylindro - <i>Cylindropermopsis raciborskii</i>	Prohibited	Isolated	Recorded in several drowned river mouths in the Lake Michigan Basin.
Eurasian watermilfoil - <i>Myriophyllum spicatum</i>	Restricted	Widespread	Common, especially in the Lower Peninsula.
European frogbit - <i>Hydrocharis morsusranae</i>	Prohibited	Locally abundant	Locally abundant in SE Lower Peninsula; isolated populations in Saginaw Bay, Kent County, Alpena County and Chippewa County.
Fanwort - <i>Cabomba caroliniana</i>	Prohibited	Locally abundant	Locally abundant in Lower Peninsula; present in IL, IN, OH and ONT.
Flowering rush - <i>Butomus umbellatus</i>	Restricted	Locally abundant	Common in southeast Michigan, both inland and coastal; also identified in IN, IL, MN, OH, WI and ONT.
Giant hogweed - <i>Heracleum mantegazzianum</i>	Prohibited	Isolated	Patchy distribution throughout the Lower Peninsula and western Upper Peninsula; some occurrences have been controlled.
Giant salvinia	Prohibited	Absent	
<i>Salvinia molesta, auriculata, biloba or herzogii</i>			
Hydrilla - <i>Hydrilla verticillata</i>	Prohibited	Absent	Isolated populations in IN, WI and OH.
Japanese knotweed - <i>Fallopia japonica</i>	Prohibited	Widespread	Patchy distribution throughout Lower and Upper Peninsulas.
Parrot feather - <i>Myriophyllum aquaticum</i>	Prohibited	Isolated	Active management of isolated populations in Wayne, Washtenaw and Jackson Counties; isolated populations in IL, IN, NY, OH and PA.
Phragmites or common reed - <i>Phragmites australis</i>	Restricted	Widespread	Common and established in coastal and inland areas of southern Lower Peninsula; somewhat less abundant from south north; common in western UP.
Purple loosestrife - <i>Lythrum salicaria</i>	Restricted	Widespread	Biological control is reducing population statewide.
Starry stonewort (Nitellopsis obtusa)	Prohibited	Locally abundant	Recorded in over one hundred inland waterbodies, mostly in Lower Peninsula.
Water chestnut (Trapa natans)	Prohibited	Absent	Observations in NY, PA and ONT.
Water soldier (Stratiotes aloides)	Prohibited	Absent	Isolated population in ONT.
Yellow floating heart (Nymphoides peltata)	Prohibited	Isolated	Isolated populations in IL, IN, OH, WI and ONT. Active management of Isolated populations in Wayne, Kent, Ottawa, Ingham and Oakland Counties in Michigan.
Crustaceans			
Rusty crayfish (Orconectes rusticus)	Restricted	Widespread	Widespread and breeding in inland waters.
Red swamp crayfish (Procambarus clarkii)	Prohibited	Isolated	Isolated population in Sunset Lake in Vicksburg, MI. Other isolated populations exist in private waters near Novi and Farmington Hills in Michigan.
Yabby (Cherax destructor)	Prohibited	Absent	
Killer shrimp (Dikerogammarus villosus)	Prohibited	Absent	
Fish			
Bighead carp (Hypophthalmichthys 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 (<i>Ctenopharyngodon idellus</i>)	Prohibited	Isolated	Suspected limited natural reproduction in Ohio waters of Lake Erie and isolated detections have been reported in the St. Joseph and Kalamazoo rivers and Paw Paw Lake.
Ide (<i>Leuciscus idus</i>)	Prohibited	Absent	
Japanese weatherfish (<i>Misgurnus anguillicaudatus</i>)	Prohibited	Isolated	Single breeding population in the Shiawassee River.
Round goby - <i>Neogobius melanostomus</i>)	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 (<i>Scardinius erythrophthalmus</i>)	Prohibited	Absent	Isolated collections on the Ontario side of Lake St. Clair.
Silver carp (<i>Hypophthalmichthys molitrix</i>)	Prohibited	Absent	
Any fish from the snakehead family (<i>Channidae</i>)	Prohibited	Absent	
Stone moroko (<i>Pseudorasbora parva</i>)	Prohibited	Absent	
Tench (<i>Tinca tinca</i>)	Prohibited	Absent	
Tubenose goby (<i>Proterorhinus marmoratus</i>)	Prohibited	Isolated	Isolated, established populations in the St. Clair River, Lake St. Clair, Detroit River and western Lake Erie.
Wels catfish (<i>Silurus glanis</i>)	Prohibited	Absent	
Zander (<i>Sander lucioperca</i>)	Prohibited	Absent	
Mollusks			
Brown garden snail (<i>Helix aspersa</i>)	Prohibited	Absent	Two Michigan detections in the past - both eradicated.
Carthusian snail - <i>Monacha cartusiana</i>)	Prohibited	Locally abundant	Wayne County
Giant African snail (<i>Achatina fulica</i>)	Prohibited	Absent	
Girdled snail (<i>Hygromia cinctella</i>)	Prohibited	Locally abundant	Wayne County
Heath snail (<i>Xerolenta obvia</i>)	Prohibited	Locally abundant	Lapeer County/SE MI
New Zealand mudsnail (<i>Potamopyrgus antipodarum</i>)	Prohibited	Isolated	Established in Lake Ontario and Lake Erie and present in Lake Superior. Established populations in the Pere Marquette, Au Sable, Boardman and Manistee Rivers.
Golden mussel (<i>Limnoperna fortunei</i>)	Prohibited	Absent	
Wrinkled dune snail (<i>Candidula intersepta</i>)	Prohibited	Locally abundant	Wayne County
Quagga mussel (<i>Dreissena bugensis</i>)	Restricted	Widespread	Found in all of the Great Lakes, although limited in Lake Superior; isolated inland occurrences in the Great Lakes basin.
Zebra mussel (<i>Dreissena polymorpha</i>)	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 (<i>Sus scrofa</i> Linnaeus)	Prohibited	Widespread	Historically, feral swine have been reported in 72 of 83 counties, however; occurrences are presently limited to localized areas in 12-15 counties with reports becoming more common in the central Upper Peninsula. Active management has reduced occurrences in the central Lower Peninsula. Farmed in Michigan in the 1930's.
Nutria (<i>Myocastor coypus</i>)	Prohibited	Absent	
Birds			
Eurasian collared dove (<i>Streptopelia decaocto</i>)	Prohibited	Isolated	First observed in Michigan in 2002, has since been documented in Kalamazoo, Traverse, Berrien, Alger and Mason counties.
Insects			
Asian longhorned beetle - <i>Anoplophora glabripennis</i>	Prohibited	Absent	Not detected in MI; ALB infestations currently active in NY, MA, OH and Ontario; ALB eradicated from IL and NJ.
Emerald ash borer (<i>Agrilus planipennis</i>)	Prohibited	Widespread	Widespread throughout Lower Peninsula; isolated or patchy distribution across Upper Peninsula.



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