



MICHIGAN  
INVASIVE  
SPECIES  
PROGRAM

ANNUAL  
REPORT  
2016

# 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 2016 annual report to Governor Snyder, the Legislature and the citizens of Michigan. The report provides an overview of the program; its goals, outcomes, 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 also is submitted by the DEQ in compliance with NREPA MCL 324.3104(3).



# CONTENTS

Preface . . . . .	1
Overview . . . . .	3
Finances . . . . .	4
Goal 1: Prevention . . . . .	5
Goal 2: Early Detection and Response . . . . .	7
Goal 3: Management and Control . . . . .	9
Goal 4: Education and Outreach . . . . .	11
Spotlight: Invasive Carp . . . . .	13
CISMAs . . . . .	15
Prohibited and Restricted Species . . . . .	16
Recommendations to the Legislature . . . . .	19
Appendix A – Status of Michigan’s Prohibited and Restricted Species . . . . .	20

## INVASIVE SPECIES STEERING COMMITTEE MEMBERS

### **GINA ALESSANDRI**

Pesticide & Plant Pest Management Division Director, Department of Agriculture & Rural Development

### **JIM DEXTER**

Fisheries Division Chief, Department of Natural Resources

### **RICK HOBRLA**

Great Lakes Management Unit Chief, Office of the Great Lakes

### **TAMMY NEWCOMB**

Senior Water Policy Advisor, Department of Natural Resources

### **WILLIAM O’NEILL**

Forest Resources Division Chief, Department of Natural Resources

### **TERESA SEIDEL**

Water Resources Division Director, Department of Environmental Quality



# INVASIVE SPECIES PROGRAM OVERVIEW

**“...A JOINT EFFORT OF MICHIGAN’S QUALITY OF LIFE DEPARTMENTS.”**

Michigan’s economy is negatively affected by plants, animals, and pathogens that don’t belong here. These unwelcome guests are known as invasive species. Economically, invasive species can hurt property values, tourism, recreation, utilities and industry. Ecologically, they can degrade habitat, alter food webs and even threaten public health. While the invasive species present in Michigan already cause substantial harm, the state’s land and water resources are under constant threat of the introduction of 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 initiated Michigan’s Invasive Species Program addressing both terrestrial and aquatic organisms.

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 efforts of 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 and collaborate both internally and externally to ensure a cohesive program.

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.

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 that will guide efforts in prevention, detection and control in collaboration with local, state and federal partners.

As identified 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 - DEVELOP A STATEWIDE INTERAGENCY INVASIVE SPECIES EARLY DETECTION AND RESPONSE PROGRAM TO ADDRESS NEW INVASIONS.**
- 3 - LIMIT THE DISPERSAL OF ESTABLISHED INVASIVE SPECIES POPULATIONS THROUGHOUT MICHIGAN.**
- 4 - MANAGE AND CONTROL INVASIVE SPECIES TO MINIMIZE HARMFUL ENVIRONMENTAL, ECONOMIC AND PUBLIC HEALTH EFFECTS RESULTING FROM ESTABLISHED POPULATIONS.**



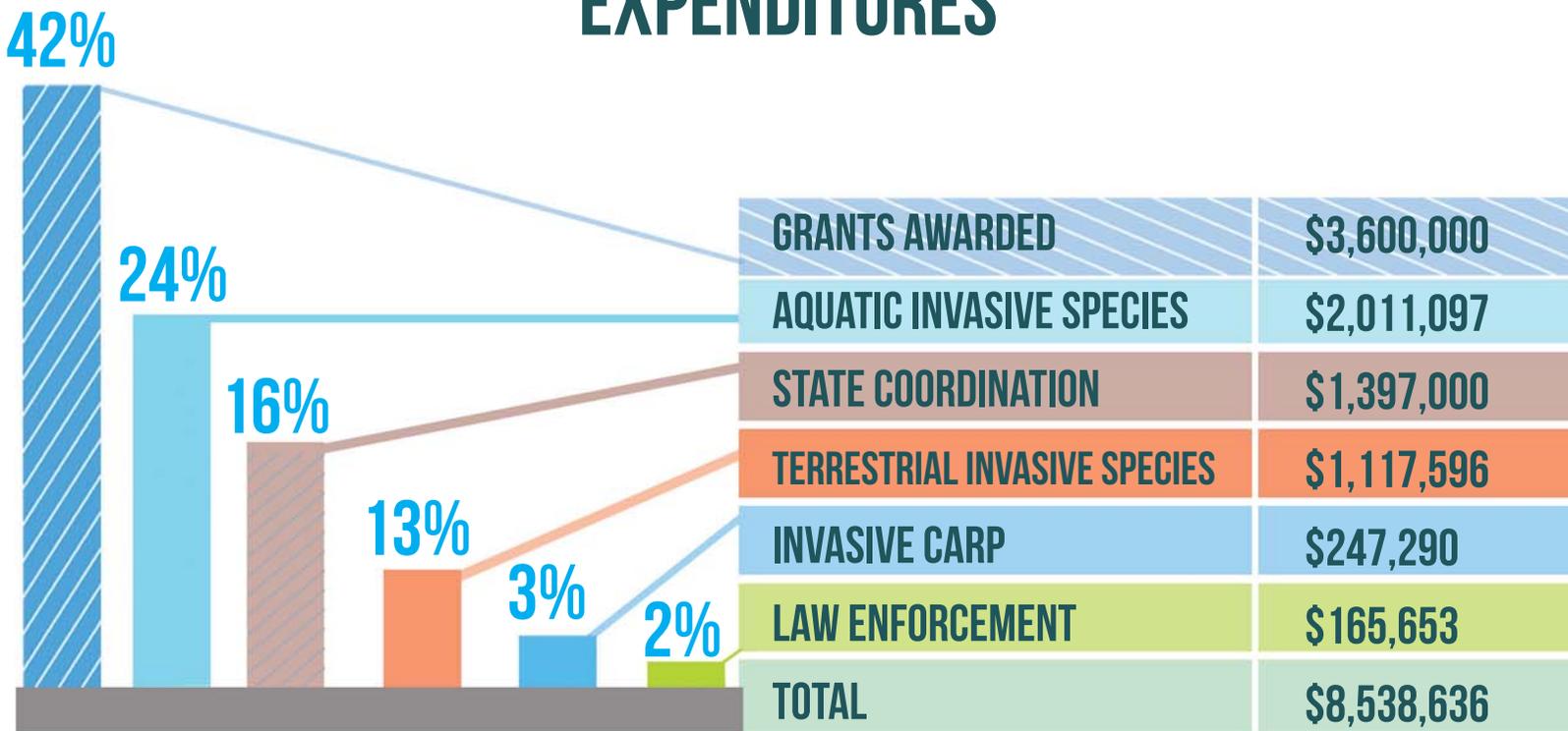
# PROGRAM FINANCES

THIS REPORT COVERS THE ACTIVITIES OF FISCAL YEAR 2016: OCT. 1, 2015 THROUGH SEPT. 30, 2016.

## FUNDING

STATE APPROPRIATIONS	\$5,149,654
FEDERAL FUNDS	\$1,815,195
DNR	\$675,816
DEQ PERMIT FEES	\$647,161
MDARD	\$87,670
LICENSE PLATE FEES	\$39,379
INVASIVE SPECIES FUND	\$20,017
TOTAL	\$8,434,892

## EXPENDITURES



# GOAL

# 1

## PREVENTING NEW INVASIVE SPECIES INTRODUCTIONS INTO MICHIGAN

Prevention is the most effective step in managing invasive species. Prevention involves 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 which can move them from place to place. Pathways most commonly coincide with human movement, shipping and construction activities. Education and regulation enforcement are the primary tools for several program-supported prevention actions.

### Michigan's Watch List



Invasive species on the watch list have been identified as being an immediate or potential threat to Michigan's economy, environment or human health. These species either never have been confirmed in the wild in Michigan or have a limited known distribution. Early detection and timely reporting of these species will increase the likelihood of preventing establishment and limiting negative effects.

### Pathway: Ballast Water

Conservatively, at least 55% of the non-native aquatic species established in the Great Lakes are attributed to ballast water discharges. The Michigan Invasive Species Grant Program (MISGP) is supporting research by the University of Toledo to update a dynamic, spatial model of how ballast water is dispersed in the Great Lakes. The transport model will assess how different ballast water management scenarios may influence the spread of aquatic invasive species.



**RIPPLE**  
REDUCE INVASIVE  
PET & PLANT ESCAPES

### Pathway: Organisms in Trade

An MISGP award to Michigan State University encourages aquarium and pond enthusiasts to Reduce Invasive Pet and Plant Escapes (RIPPLE). The RIPPLE campaign connects with aquarium and pond suppliers to spread the word about the potential environmental impact of releasing unwanted exotic pets and plants into the wild. RIPPLE encourages careful management of plants in outdoor water features, proper disposal of unwanted plants, and returning unwanted fish, reptiles or other pets to reputable dealers.



# Pathway: Water-based Recreation

DNA evidence indicates that some of the New Zealand mudsnails in Michigan, discovered in 2015, are the same strain as those found in western states, suggesting they likely were transferred by traveling anglers. Preventing the spread of the New Zealand mudsnail to more of Michigan's rivers and streams requires the help of anglers and boaters. Conservation partners like Trout Unlimited are assisting the DNR and DEQ in placing signs and wader wash stations at public access points along the Au Sable and Pere Marquette river systems to remind users of the importance of cleaning gear before heading to their next destination.

# Pathway: Wood Products

DNR Law Enforcement Division (LED) joined with United States Fish and Wildlife Service (USFWS) officers and inspectors in examining a shipment of live organisms imported from the Philippines. Twenty-seven pallets of aquatic organisms destined for the pet trade were inspected at Detroit Metro Airport. No violations were found in the Philippine shipment; however, the inspection revealed larvae in the same family as the emerald ash borer in a wood pallet containing auto parts from Bulgaria. The specimen was collected by USFWS inspectors and positively identified in their lab. The shipment was returned to Bulgaria.



# Regulatory Compliance

Efforts to prevent violations of the state's Natural Resources and Environmental Protection Act (Part 413 of Act 451) include annual compliance inspections to assure that prohibited and restricted species are not traded or sold in Michigan. In 2016, MDARD staff inspected 1,033 plant dealers and 1,321 plant growers as part of routine communication with the nursery industry to maintain awareness of and compliance with state and interstate quarantines.

LED conducted 386 inspections of retail and wholesale pet, bait and aquaculture outlets in 2016. LED officers inspecting retail live food markets in 2015 found three businesses illegally importing and marketing red swamp crayfish, a prohibited species in Michigan. The cases are ongoing in 2016 and involve multiple jurisdictions. The efforts brought to light the need for continuing work and dedicated resources in the fight against invasive species.

# GOAL

# 2

## DEVELOPING A STATEWIDE INTERAGENCY INVASIVE SPECIES EARLY DETECTION AND RESPONSE PROGRAM TO ADDRESS NEW INVASIONS

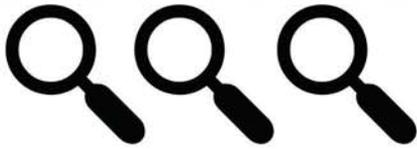
Successful early detection and response to new infestations requires a widespread monitoring effort, rapid communication and well-prepared personnel. In 2016, the statewide Early Detection and Response (EDR) program expanded its capacity in each of these areas, working with Cooperative Invasive Species Management Areas (CISMAs), industry professionals, researchers and citizen scientists to detect, report, verify and treat emerging invasive species threats.

### BENCHMARK

Respond to 90 new detections of Watch List species

### OUTCOME

175 responses to new detections.



## Partnering in Detection & Response

When PLM Lake and Land Management Corporation reported finding European frogbit during a routine inspection of Reeds and Fisk lakes in Kent County, state agency staff were able to enlist the help of West Michigan Cooperative Invasive Species Management Area to inspect nearby waterbodies to determine the extent of the infestation. This detection was verified as the westernmost known location of the invasive plant in Michigan and the Midwest. Collaboration resulted in an action plan allowing PLM to begin treatment in September 2016.



## Targeting Watch List Species

An initial report of a second location of European frogbit in East Grand Rapids soon was verified as a different aquatic invasive plant from Michigan's Watch List – yellow floating heart. This detection is the third discovery of the invasive plant in Michigan. Owners of the property where the plant was found noted that the plants had been established in the man-made pond when the home was purchased in 2010, and they were willing to have the species removed. A six-member crew from West Michigan CISMA worked a total of 39 hours to remove 41 submerged pots from the pond along with all visible plant fragments, which could potentially regrow. In total, 3,432 pounds of plant material were removed, bagged and disposed of in a landfill.



## Assuring Readiness for Asian Longhorned Beetle Detection

MDARD and the DNR Forest Resources Division are working with federal and state partners to draft an interagency response strategy for a potential invasion of Asian longhorned beetle in Michigan. Partners participated in a strategic planning roundtable in May 2016 to discuss available resources and an incident command system. State parks staff was trained to conduct visual surveys for evidence of the beetle and other invasive forest pests. MDARD and DNR staff responded to all public and staff reports of potential Asian longhorned beetle. No detections were confirmed.

## Encouraging Public Participation

Citizen involvement plays an important role in detecting new locations of invasive species. The Midwest Invasive Species Information Network (MISIN) is a web- and app-based invasive species identification and reporting tool designed by Michigan State University to aid in early detection and response. The smartphone app can be used by experts or citizen scientists in the field to identify, photograph and report the location of nearly 350 different invasive plants, animals and insects. Any reports of Watch List species immediately are directed to technical experts in Michigan's Quality of Life departments for verification. In 2016, 4,107 new users registered to report sightings on MISIN, contributing to over 23,700 new observations. Michigan's most frequently reported species is invasive phragmites, with over 33,000 records to date.



## EDR in Action: Hemlock Woolly Adelgid



The fact that a successful early detection and response program relies on a well-informed public was illustrated in 2016 when reports from citizens and tree management professionals identified new locations of hemlock woolly adelgid on private lands in Muskegon and Ottawa counties. This small, aphid-like insect uses its long, siphoning mouthparts to extract sap from hemlock branches. Infestations appear as small, cottony masses on the underside of the branch at the base of the needle.

Following verification of the new locations, MDARD held public meetings in the affected counties, providing information on identification, reporting and effective treatment methods. With an estimated 170 million hemlock trees in forests and thousands more in home landscapes, a widespread infestation would cause severe losses across multiple industries, including timber products, nursery stock and tourism. A request for public comment on an internal quarantine for hemlock woolly adelgid was announced by MDARD in December 2016, and widespread monitoring will continue in 2017.

# GOAL 3

## MANAGING AND CONTROLLING INVASIVE SPECIES TO MINIMIZE HARMFUL ENVIRONMENTAL, ECONOMIC AND PUBLIC HEALTH EFFECTS RESULTING FROM ESTABLISHED POPULATIONS

Invasive species are more than a nuisance. Established or widespread infestations can change the makeup of entire 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 making strides in managing invasive species populations in the state.

### BENCHMARK

Treat 6,000 acres for aquatic & terrestrial invasive species



### OUTCOME

8,710 acres treated for AIS & TIS

### TARGETING INVASIVE PHRAGMITES

An MISGP focus on regional phragmites management yielded significant results in 2016 in two strategic locations: the Upper Peninsula and Saginaw Bay. The Upper Peninsula Phragmites Coalition united the efforts of CISMAs across the peninsula to locate and treat populations in wetland and coastal areas with the long-range goal of eradicating the species. CISMA staff mapped over 900 infestations and treated nearly 800 acres of this invasive plant, restoring scenic landscapes in this picturesque region.

In the Saginaw Bay coastal area, where dense stands of phragmites prevent water access in many locations, Bay County worked with partners to chemically treat over 600 acres of phragmites. In the same region, researchers from Michigan Technological University mapped both treated and untreated areas to enhance an aerial identification and treatment planning model based on vegetation, soil type, nitrogen levels and water depth.



# GOAL

# 4

## LIMITING THE DISPERSAL OF ESTABLISHED INVASIVE SPECIES POPULATIONS THROUGHOUT MICHIGAN

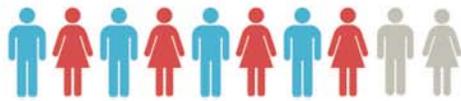
People who live, work or play in areas where invasive species already are established can unknowingly aid in their spread to new areas. Arming these audiences with information that enables them to 1) identify invaders they encounter, and 2) take steps to avoid carrying “hitchhikers” to new locations, will help reduce invasive species in the long term. An individual encounter with a trail sign, training session, workshop or other medium providing invasive species information is measured as an outreach impression.

### BENCHMARK

750,000 outreach impressions

### OUTCOME

Over 5 million outreach impressions



### Protecting Trail Resources

Trail use is on the rise in Michigan, and that's great news for residents but not always for the trails. This is because trail users unintentionally can spread invasive species that can impact the beauty and accessibility of these important recreational resources. A pilot program in Lake, Mason, Missaukee, Osceola and Wexford counties has developed signs and informational brochures for trailheads and tourist stops. The North Country CISMA is using MISGP funds to remind users of both motorized and nonmotorized trails to remove mud and debris from boots, bikes, ORVs and gear to prevent the spread of invasive plants like phragmites and garlic mustard.



### Training Professionals in Decontamination

Michigan's interdepartmental decontamination policy is being implemented through staff training on invasive species awareness and proper decontamination of gear, clothing and vehicles to limit the spread of invasive species through field operations. Commercial loggers and foresters now are receiving training alongside Forest Resource Division staff in identification, reporting and decontamination protocols for invasive species. This action supports our state's commitment to meet international standards provided by the Forest Stewardship Council and Sustainable Forestry Initiative in managing Michigan's state forests.



### Reaching Out through Social Media

The departments developed a three-part invasive species video series for YouTube, providing an introduction to invasive species, ways to reduce their spread and methods to inspect for and remove invasive species after work or recreational activities. The series logged over 6,500 views in the first three months, and numbers continue to climb as CISMAs and other concerned groups utilize this educational resource. A short video on phragmites also was released just before the fall waterfowl season to help hunters understand the effects of the invasive grass on Michigan's water resources. Over 2,200 viewers tuned in to learn how to identify phragmites and avoid transferring seeds and fragments on hunting gear.



## Demonstrating Clean, Drain, Dry

Over 100 volunteers turned out at 66 boat launches around the state for the 2016 Aquatic Invasive Species Landing Blitz, held in the first two weeks of July. Volunteers shared the “Clean, Drain, Dry” message with more than 5,000 boaters, demonstrating how to properly remove weeds and debris, drain bilge and live wells, and dry boats and equipment before heading to the next waterway. Also, several boat washes operating at landings around the state provided free washes to more than 200 boats during the blitz.

## Stepping Out with PlayCleanGo

Michigan’s Quality of Life departments formally adopted PlayCleanGo, an education and outreach campaign for outdoor recreationists developed by the Minnesota Department of Natural Resources and the USDA Forest Service. The campaign encourages outdoor recreation while enlisting recreationists in the effort to stop the spread of terrestrial invasive species. The campaign logo, along with simple tips to “stop invasive species in your tracks” will be integrated into state recreation guides and digests and used on trailhead signs beginning in 2017.



**STOP INVASIVE SPECIES  
IN YOUR TRACKS.**

[PlayCleanGo.org](http://PlayCleanGo.org)



## Engaging the Public

In 2016, Michigan state agencies and CISMAs found hundreds of opportunities to spread the word about invasive species. Nearly 41,000 people attended workshops, presentations and activities focused on invasive species education and management. An additional 2,100 participated in training opportunities to practice identification, reporting and treatment skills to assist statewide efforts. Over 3,000 people turned their interest into action, volunteering 20,000 hours of their time assisting in removal and monitoring activities.

# SPOTLIGHT - INVASIVE CARP: THE LOOMING THREAT TO THE GREAT LAKES

“...Carp pose a significant threat to the ecosystem of the Great Lakes basin.”

The Great Lakes are vulnerable to invasion by a class of fish that threatens the ecosystem, the \$7 billion fishery, and other economic interests dependent on the Great Lakes and its tributaries. Because of the danger they pose, four invasive carp species – bighead, silver, grass and black - are prohibited in Michigan under the state’s Natural Resources Environmental Protection Act (Part 413 of Act 451).

Invasive carp were brought to the U.S. from Asia to manage nuisance species in aquaculture ponds in the South. During flooding events in the early 1990s, bighead and silver carp escaped and have been spreading throughout the Mississippi River basin, migrating north toward Lake Michigan.

Small numbers of grass carp have been caught in the Great Lakes and its tributaries since the 1980s, but there is no evidence that bighead, silver or black carp are present in Michigan waters. The U.S. Army Corps of Engineers built three electric barriers within the Chicago Area Waterways System to prevent the movement of invasive fish into the Great lakes, and silver and bighead carp now are within approximately 10 miles of the barriers.

Due to their large size and rapid rate of reproduction, bighead and silver carp pose a significant threat to the ecosystem of the Great Lakes Basin. These fish will disrupt the food chain that supports native fish of the Great Lakes, such as walleye, yellow perch and lake whitefish, which could diminish fishing opportunities for recreational and commercial fishers. Also, boaters can be and have been injured by silver carp leaping out of the water when disturbed by motors. Fear of injury could diminish the desire for recreational boating activities in areas inhabited by these fish.

Because the invasive carp problem is a binational and multistate issue, U.S. federal and state governments are working together with Canada on a resolution. The Michigan DNR is among the leading agencies advocating for additional efforts to stop the spread of these fish.



# STATE ACTIONS



Images Courtesy of C. Krueger.



## Environmental DNA

The environmental DNA (eDNA) surveillance program, a collaborative effort between the Great Lakes states and the U.S. Fish and Wildlife Service (USFWS), samples high-priority locations for the presence of bighead and silver carp genetic material.

Since 2013, the DNR has partnered with the USFWS to implement a portion of the eDNA surveillance program in major tributaries to all the Great Lakes except Lake Superior, because it has been deemed very low-risk for introduction. In 2016, 2,323 samples were collected, bringing the total from the last three years to approximately 6,300 water samples collected and analyzed.

During the course of these sampling efforts, a single eDNA sample from the Kalamazoo River tested positive for silver carp genetic material in 2014. Based on further testing and work on the river, it was deemed unlikely that the single detection out of 1,850 samples in 2014 was associated with a live fish. A more likely explanation for that positive sample was a contamination source, such as visiting boaters or anglers from an area where silver carp already are established.

Michigan will continue to partner with USFWS to implement the eDNA surveillance efforts for the early detection of invasive carp in the Great Lakes.

## Grass Carp Research

Grass Carp have been detected in the Great Lakes for at least 30 years; however, within the past few years natural reproduction has been documented in the Sandusky River in Ohio, and this new information has elevated concerns. The Michigan and Ohio departments of Natural Resources have undertaken efforts to control grass carp, including the 2014 Lake Erie Asian Carp Response Exercise. These large-scale control efforts have highlighted the difficulties of controlling grass carp populations that are assumed to be at quite low densities. Both agencies now are engaged in collaborative research efforts with Michigan State University, Central Michigan University, University of Toledo, and federal agencies to strategically address emerging concerns posed by grass carp in Lake Erie in order to develop more effective management measures. The multiple projects have the support of the Lake Erie Committee, which consists of representatives from all fishery management agencies with management authority over the lake and is funded through the Great Lakes Restoration Initiative.

Central Michigan University researchers are studying the fertility, diet and origins of grass carp captured in western Lake Erie. Michigan State University researchers are evaluating large-scale movement, seasonal tributary use and migratory patterns of grass carp. DNR staff from Michigan and Ohio are aiding in study design, collecting samples and acting as liaisons between the commercial fishing industry and university investigators.

This research is a first step toward the ultimate goal of eradicating grass carp. If eradication is not possible, the next goal is to use research information to develop and implement more effective control strategies.

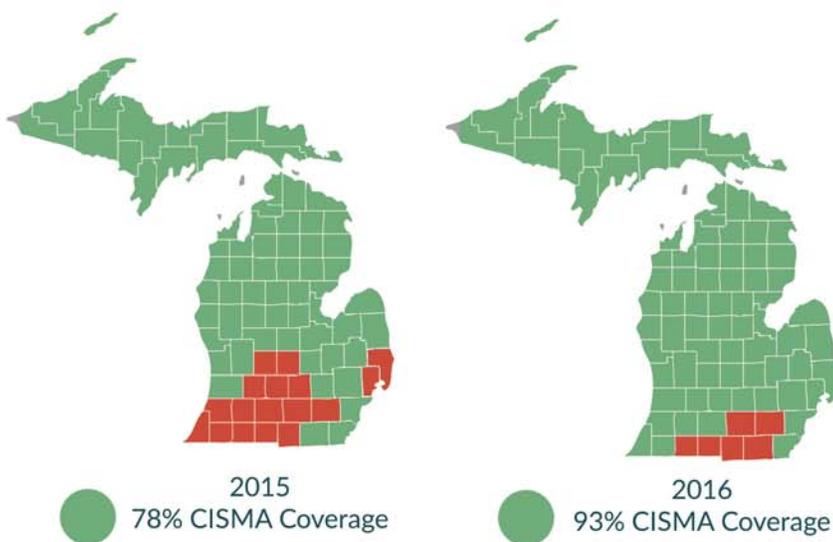
# EXPANDING THE REACH AND CAPACITY OF COOPERATIVE INVASIVE SPECIES MANAGEMENT AREAS

CISMAs are regional, collaborative efforts involving local businesses, nonprofits, government agencies and individuals who provide information and resources to prevent, detect and control invasive species. CISMAs offer workshops and develop outreach materials to help identify and manage Japanese knotweed, phragmites, black and pale swallow-worts and a host of other invasives.

In 2016, five new CISMAs were established with support from the MISGP. These CISMAs provide services to 12 additional counties, bringing total CISMA coverage to 93 percent of the state.

Invasive species “strike teams” and volunteers have treated or removed invasive plants from over 17,000 acres of land and water in Michigan since 2015. This includes hand-removal and disposal of more than 45 tons of plant material.

The level of community support and engagement in the battle against invasive species continues to grow, underscoring the shared value of our state’s natural resources and the importance of continuing to protect and preserve them.



12 new counties were added in 2016, raising the total from 65 counties (78%) in 2015 to 77 counties (93%)

## PUBLIC ACT 537 OF 2014

Public Act 537 of 2014 became effective April 1, 2015, and requires the DNR to develop a permitted aquatic species list. This legislation builds upon Michigan’s existing laws with a focus on 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. The creation of the permitted species list requires consultation with industry and was to be completed by April 1, 2016.

In 2015, 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 will allow government staff to collaborate with industry representatives to effectively implement aquatic invasive species laws related to organisms in trade.



# MICHIGAN'S PROHIBITED, RESTRICTED AND OTHER PROBLEMATIC SPECIES

Currently, 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 in Appendix A 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 the Department of Agriculture and Rural Development, or the Commission of Agriculture and Rural Development in consultation with the Department of Natural Resources 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 usually are available for restricted species.

## SCIENTIFIC PERMITS ISSUED IN 2016 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 2016, 46 permits were granted to partner agencies, universities and other entities, such as consulting firms, zoos, nature centers and other educational institutions.

SPECIES	STATUS	PERMITS ISSUED	PERMITTEES
RUSTY CRAYFISH	RESTRICTED	10	8 UNIVERSITIES, 1 PARTNER, 1 OTHER
ZEBRA MUSSELS	RESTRICTED	7	3 UNIVERSITIES, 2 PARTNERS, 2 OTHER
QUAGGA MUSSELS	RESTRICTED	6	5 UNIVERSITIES, 1 OTHER
ROUND GOBIES	PROHIBITED	11	5 UNIVERSITIES, 2 PARTNERS, 4 OTHER
NEW ZEALAND MUDSNAILS	PROHIBITED	2	2 UNIVERSITIES
RED SWAMP CRAYFISH	PROHIBITED	1	1 UNIVERSITY
AQUATIC PLANTS	PROHIBITED OR RESTRICTED	7 NEW, 2 RENEWED	1 UNIVERSITY, 5 PARTNERS, 2 OTHER

## ADDITIONS OR DELETIONS TO MICHIGAN'S PROHIBITED AND RESTRICTED SPECIES LISTS

There were no changes to Michigan's Prohibited and Restricted Species lists in 2016.

## STATUS OF MICHIGAN'S PROHIBITED, RESTRICTED AND OTHER PROBLEMATIC SPECIES

There are several primary species of concern for Michigan that currently are listed as prohibited or restricted (Appendix A). The current distribution in Michigan, based on best available knowledge, is provided for each listed species. This coarse-scale distribution is intended to provide a basic snapshot of where each species exists along the invasion curve. 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 particular species truly is not present at all in Michigan or that no confirmed detections have been made.

# 2016 ACTIONS & DETECTIONS OF PROHIBITED OR RESTRICTED SPECIES

Detection and/or specific management actions occurred in 2016 for the prohibited, restricted or other problematic species listed below.



## EMERALD ASH BORER

Since its identification in 2002, the emerald ash borer (EAB) has killed millions of ash trees in Michigan and surrounding states. The DNR and MDARD continue to work in conjunction with a federally funded EAB response project. MDARD staff renews and issues intrastate compliance agreements with receivers, brokers and shippers of regulated articles and conducts compliance agreement inspections with agreement holders. MDARD phytosanitary certificates are required for ash lumber being shipped internationally. USDA-Animal and Plant Health Inspection Service contractors conducted trapping at 122 sites in 2016 including all nonquarantined counties and two quarantined counties in the Upper Peninsula. Only one trap in Baraga County, a quarantined county, captured an adult beetle. Michigan's EAB Interior State Quarantine last was revised on February 10, 2016.

## GRASS CARP

DNR Fisheries maintains an ongoing partnership with commercial fishers, which resulted in 23 grass carp captures in Lake Erie in 2016. The DNR also received notice from anglers of single grass carp captures in both the St. Joseph River and Paw Paw Lake.



To address grass carp concerns in Lake Erie, the DNR partnered with the Lake Erie Committee, universities and federal agencies to implement projects to determine the reproductive capacity (i.e., sterile or fertile) and natal origins of feral grass carp, as well as their potential spawning locations and behaviors in Lake Erie and its tributaries.

The DNR and Michigan State University obtained external funding to hold an initial structured decision-making workshop to inform the control of Lake Erie grass carp. As a result, a sub-group will create a grass carp population model to predict how management actions would affect objectives related to grass carp population growth. The outputs will then be used to inform managers in their decision-making process for grass carp control in Lake Erie.

## NEW ZEALAND MUDSNAIL

Following confirmation of New Zealand mudsnails in the Pere Marquette River near Baldwin in 2015, a work group including the DEQ, DNR, U.S. Forest Service, universities, angling groups and local CISMAs was formed in early 2016 to promote information sharing and coordinate response efforts.

In summer 2016, New Zealand mudsnails were detected in the Au Sable and Boardman rivers near Grayling and Traverse City, respectively. DEQ staff monitored numerous locations across 11 watersheds identified as high risk for the introduction of New Zealand mudsnail. To date New Zealand mudsnails have not been found outside the known infested rivers.

The DNR and DEQ partnered with Michigan State University to obtain federal Great Lakes Restoration Initiative funding to address key concerns regarding the early invasion dynamics of New Zealand mudsnails, primarily focused in the Pere Marquette River. Partners implemented extensive early detection efforts, monitored the spread in the Pere Marquette, and conducted angler surveys aimed at determining awareness of the issue.

New Zealand mudsnails were collected at all known infestation locations for a population genomics analysis of infestations in Michigan to determine potential sources and connectivity among infestations in Michigan.



# EUROPEAN FROGBIT

Work on the European frogbit infestation in Saginaw Bay in 2016 included chemical treatment on over 75 acres at Nayanquing Point and 25 acres at Wigwam Bay. It is estimated that 180 acres of Saginaw Bay are infested with European frogbit. Partners working to control this infestation include DNR Parks and Recreation Division staff, local DNR Wildlife Division staff and the Saginaw Bay CISMA. Local partners including the city of East Grand Rapids and West Michigan CISMA continue to work to control a 2016 detection of European frogbit in Kent County.



# PARROT FEATHER

Parrot feather first was detected in 2013 in a Wayne County detention pond. Treatment and monitoring have resulted in no growth at this location for the second year in a row. In July 2016, a single parrot feather plant was found and manually removed in the Trenton Channel of the Detroit River. Two additional sites were reported in September and October, one on a private homeowner's small pond in Washtenaw County and one in Jackson County. Both sites were chemically treated. Follow-up monitoring for all sites will continue in 2017.

# HEMLOCK WOOLLY ADELGID

In 2016, additional infestations of hemlock woolly adelgid (HWA) were identified in Muskegon and Ottawa counties. In response to these findings and those made in 2015, MDARD and DNR, in cooperation with Michigan State University and the U.S. Forest Service, are continuing to develop a comprehensive response strategy. In infested areas, the hemlock resource will be evaluated, survey efforts will delineate the extent of the infestation, and treatment will be undertaken for infested and buffer trees. Outreach and education efforts will continue, as will external quarantine compliance monitoring.

MDARD will work with partners to develop a data collection and management system and ensure timely communication of response plans, activities and achievements. Statewide monitoring for HWA will include follow-up at sites where HWA was detected prior to 2015. Plans also include developing the infrastructure required for future biocontrol efforts should they become necessary.

# RECOMMENDATIONS

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

1

## CONTINUE FUNDING AND SUPPORT OF MICHIGAN'S INVASIVE SPECIES PROGRAM.

2

## ENSURE READINESS, SUSTAINABILITY AND CONTINUED DEVELOPMENT OF MICHIGAN'S EARLY DETECTION AND RESPONSE PROGRAM.

A robust early detection and response program provides the first line of defense against invasive species that have entered the state. Once a new invasive species is reported, it must be verified and the extent of the invasion determined. Compiled information is used to decide the appropriate response to best control or eradicate the species before it becomes widespread.

Michigan largely relies on federal funds to support a seasonal early detection and response program for aquatic invasive species. U. S. Forest Service funds have been used to assist in recent EDR efforts for hemlock woolly adelgid. Dedicated funding is needed to provide structured management for responses to both aquatic and terrestrial invasive species, permit key staff to participate in response teams, and enlist the needed resources to quickly assess and manage invasions.

3

## 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. 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.

4

## EXPAND COLLABORATION WITH INDUSTRIES TO REDUCE THE INTRODUCTION OF INVASIVE SPECIES THROUGH TRADE.

Compliance inspections have been the primary method used to educate trade businesses about Michigan's invasive species laws. Targeted outreach to industry leaders and associations will broaden the reach of invasive species messaging and help to underscore the importance of industry-wide compliance. Trained, knowledgeable staff at retail outlets can be important assets in sharing invasive species information with consumers.

5

## 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 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.

6

## 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 an interior quarantine for emerald ash borer, and exterior quarantines for thousand cankers disease, balsam woolly adelgid, and hemlock 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.

7

## 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, may also encourage better management.

# APPENDIX A: STATUS OF MICHIGAN'S PROHIBITED AND RESTRICTED SPECIES A-1

SPECIES	413 STATUS	DISTRIBUTION IN MICHIGAN	COMMENTS
<b>PLANTS</b>			
AFRICAN OXYGEN WEED (LAGAROSIPHON MAJOR)	P	ABSENT	
AUTUMN OLIVE (ELAEAGNUS UMBELLATE)	P	WIDESPREAD	COMMON AND WIDESPREAD THROUGHOUT SOUTHERN LOWER PENINSULA, WIDESPREAD ELSEWHERE STATEWIDE
BRAZILIAN WATERWEED (EGERIA DENSA)	P	ABSENT	ISOLATED POPULATIONS IN IL, IN, MN AND OH
CURLY LEAF PONDWEED (POTAMOGETON CRISPUS)	R	WIDESPREAD	COMMON, ESPECIALLY IN THE LOWER PENINSULA
CYLINDRO (CYLINDROPERMOPSIS RACIBORSKII)	P	ISOLATED	RECORDED IN SEVERAL DROWNED RIVER MOUTHS IN THE LAKE MICHIGAN BASIN
EURASIAN WATERMILFOIL (MYRIOPHYLLUM SPICATUM)	R	WIDESPREAD	COMMON, ESPECIALLY IN THE LOWER PENINSULA
EUROPEAN FROGBIT (HYDROCHARIS MORSUSRANAE)	P	LOCALLY ABUNDANT	LOCALLY ABUNDANT IN SE LOWER PENINSULA; ISOLATED POPULATIONS IN SAGINAW BAY, KENT COUNTY, ALPENA COUNTY AND CHIPPEWA COUNTY
FANWORT (CABOMBA CAROLINIANA)	P	LOCALLY ABUNDANT	LOCALLY ABUNDANT IN LOWER PENINSULA; PRESENT IN IL, IN, OH AND ONT
FLOWERING RUSH (BUTOMUS UMBELLATUS)	R	LOCALLY ABUNDANT	COMMON IN SOUTHEAST MICHIGAN, BOTH INLAND AND COASTAL; ALSO IDENTIFIED IN IN, IL, MN, OH, WI AND ONT
GIANT HOGWEED (HERACLEUM MANTEGAZZIANUM)	P	ISOLATED	PATCHY DISTRIBUTION THROUGHOUT THE LOWER PENINSULA AND WESTERN UPPER PENINSULA; SOME OCCURRENCES HAVE BEEN CONTROLLED
GIANT SALVINIA (SALVINIA MOLESTA, AURICULATA, BILOBA OR HERZOGII)	P	ABSENT	
HYDRILLA (HYDRILLA VERTICILLATA)	P	ABSENT	ISOLATED POPULATIONS IN IN, WI AND OH
JAPANESE KNOTWEED (FALLOPIA JAPONICA)	P	WIDESPREAD	PATCHY DISTRIBUTION THROUGHOUT LOWER AND UPPER PENINSULAS
PARROT FEATHER (MYRIOPHYLLUM AQUATICUM)	P	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 (PHRAGMITES AUSTRALIS)	R	WIDESPREAD	COMMON AND ESTABLISHED IN COASTAL AND INLAND AREAS OF SOUTHERN LOWER PENINSULA; SOMEWHAT LESS ABUNDANT FROM SOUTH TO NORTH; COMMON IN WESTERN UP
PURPLE LOOSESTRIFE (LYTHRUM SALICARIA)	R	WIDESPREAD	BIOLOGICAL CONTROL IS REDUCING POPULATION STATEWIDE
STARRY STONEWORT (NITELLOPSIS OBTUSA)	P	LOCALLY ABUNDANT	RECORDED IN OVER ONE HUNDRED INLAND WATERBODIES, MOSTLY IN LOWER PENINSULA
WATER CHESTNUT (TRAPA NATANS)	P	ABSENT	OBSERVATIONS IN NY, PA AND ONT
WATER SOLDIER (STRATIOTES ALOIDES)	P	ABSENT	ISOLATED POPULATION IN ONT
YELLOW FLOATING HEART (NYMPHOIDES PELTATA)	P	ISOLATED	ISOLATED POPULATIONS IN IL, IN, OH, WI AND ONT. ACTIVE MANAGEMENT OF ISOLATED POPULATIONS IN WAYNE, KENT AND OAKLAND COUNTIES IN MICHIGAN.
<b>CRUSTACEANS</b>			
RUSTY CRAYFISH (ORCONECTES RUSTICUS)	R	WIDESPREAD	WIDESPREAD AND BREEDING IN INLAND WATERS
RED SWAMP CRAYFISH (PROCABARUS CLARKII)	P	ABSENT	
YABBY (CHERAX DESTRUCTOR)	P	ABSENT	
KILLER SHRIMP (DIKEROGAMMARUS VILLOSUS)	P	ABSENT	

# APPENDIX A: STATUS OF MICHIGAN'S PROHIBITED AND RESTRICTED SPECIES A-2

SPECIES	413 STATUS	DISTRIBUTION IN MICHIGAN	COMMENTS
<b>FISH</b>			
BIGHEAD CARP (HYPOPTHALMICHTHYS NOBILIS)	P	ABSENT	
BITTERLING (RHODEUS SERICEUS)	P	ABSENT	
BLACK CARP (MYLOPHARYNGODON PICEUS)	P	ABSENT	
EURASIAN RUFFE (GYMNOCEPHALUS CERNUUS)	P	LOCALLY ABUNDANT	PATCHY DISTRIBUTION IN GREAT LAKES; ABSENT IN INLAND WATERS
GRASS CARP (CTENOPHARYNGODON IDELLUS)	P	ISOLATED	SUSPECTED LIMITED NATURAL REPRODUCTION IN LAKE ERIE AND ISOLATED DETECTIONS HAVE BEEN REPORTED IN THE ST. JOSEPH AND KALAMAZOO RIVERS AND PAW PAW LAKE.
IDE (LEUCISCUS IDUS)	P	ABSENT	
JAPANESE WEATHERFISH (MISGURNUS ANGUILLICAUDATUS)	P	ISOLATED	SINGLE BREEDING POPULATION IN THE SHIAWASSEE RIVER
ROUND GOBY (NEOGOBIOUS MELANOSTOMUS)	P	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 ERYTHROPHALAMUS)	P	ABSENT	ISOLATED COLLECTIONS ON THE ONTARIO SIDE OF LAKE ST. CLAIR
SILVER CARP (HYPOPTHALMICHTHYS MOLITRIX)	P	ABSENT	
ANY FISH FROM THE SNAKEHEAD FAMILY (CHANNIDAE)	P	ABSENT	
STONE MOROKO (PSEUDORASBORA PARVA)	P	ABSENT	
TENCH (TINCA TINCA)	P	ABSENT	
TUBENOSE GOBY (PROTERORHINUS MARMORATUS)	P	ISOLATED	ISOLATED, ESTABLISHED POPULATIONS IN THE ST. CLAIR RIVER, LAKE ST. CLAIR, DETROIT RIVER AND WESTERN LAKE ERIE
WELS CATFISH (SILURUS GLANIS)	P	ABSENT	
ZANDER (SANDER LUCIOPERCA)	P	ABSENT	
<b>MOLLUSKS</b>			
BROWN GARDEN SNAIL (HELIX ASPERSA)	P	ABSENT	TWO MI DETECTIONS IN THE PAST - BOTH ERADICATED
CARTHUSIAN SNAIL (MONACHA CARTUSIANA)	P	LOCALLY ABUNDANT	WAYNE COUNTY
GIANT AFRICAN SNAIL (ACHATINA FULICA)	P	ABSENT	
GIRDLED SNAIL (HYGROMIA CINCTELLA)	P	LOCALLY ABUNDANT	WAYNE COUNTY
HEATH SNAIL (XEROLENTA OBVIA)	P	LOCALLY ABUNDANT	LAPEER COUNTY/SE MI
NEW ZEALAND MUDSNAIL (POTAMOPYRGUS ANTIPODARUM)	P	ISOLATED	ESTABLISHED IN LAKE ONTARIO AND LAKE ERIE AND PRESENT IN LAKE SUPERIOR. ESTABLISHED POPULATIONS IN THE PERE MARQUETTE, AU SABLE, AND BOARDMAN RIVERS
GOLDEN MUSSEL (LIMNOPERNA FORTUNEI)	P	ABSENT	
WRINKLED DUNE SNAIL (CANDIDULA INTERSECTA)	P	LOCALLY ABUNDANT	WAYNE COUNTY
QUAGGA MUSSEL (DREISSENA BUGENSIS)	R	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)	R	WIDESPREAD	WIDESPREAD IN INLAND AND GREAT LAKES WATERS OF THE LOWER PENINSULA; PATCHY DISTRIBUTION IN INLAND WATERS OF THE UPPER PENINSULA AND LAKE SUPERIOR
<b>MAMMALS</b>			
FERAL SWINE (SUS SCROFA LINNAEUS)	P	WIDESPREAD	HISTORICALLY REPORTED IN 72 OF 83 COUNTIES; HOWEVER, OCCURRENCES ARE PRESENTLY LIMITED TO LOCALIZED AREAS IN 12-15 COUNTIES.
NUTRIA (MYOCASTOR COYBUS)	P	ABSENT	FARMED IN MICHIGAN IN THE 1930S
<b>BIRDS</b>			
EURASIAN COLLARED DOVE (STREPTOPELIA DECAOCTO)	P	ISOLATED	FIRST OBSERVED IN MI IN 2002, HAS SINCE BEEN DOCUMENTED IN KALAMAZOO, TRAVERSE, BERRIEN, ALGER AND MASON COUNTIES.
<b>INSECTS</b>			
ASIAN LONGHORNED BEETLE (ANOPLOPHORA GLABRIPENNIS)	P	ABSENT	NOT DETECTED IN MICHIGAN; ALB INFESTATIONS CURRENTLY ACTIVE IN NY, MA, OH AND ONTARIO; ALB ERADICATED FROM IL AND NJ



