Michigan Invasive Species Program 2023 Annual Report

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

DEPARTMENT OF NATURAL RESOURCES · DNR · MICHIGAN ™

Michigan Department of AGRICULTURE & Rural Development

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MICHIGAN INVASIVE SPECIES PROGRAM 2023 ANNUAL REPORT

Preface

Michigan's Invasive Species Program is a joint effort of the Michigan departments of Agriculture and Rural Development; Natural Resources; and Environment, Great Lakes, and Energy. The Michigan Invasive Species 2023 Annual Report highlights the program's goals and accomplishments for invasive species prevention, management and outreach, the status of prohibited and restricted species in Michigan, and recommendations to further the program.

This report is submitted by the DNR in compliance with Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, MCL 324.41323 and by EGLE in compliance with NREPA 324.3104(3). This report and other information about invasive species in Michigan are available at Michigan.gov/Invasives.

Epoxy blocks preserve common invasive plants for identification.

Invasive Species Program overview

Invasive species are those that are not native to Michigan and whose introduction causes harm, or is likely to cause harm, to the state's economy, environment or human health. Plants, animals and pathogens that are introduced into the environment and flourish without natural predators to keep them in check cause significant damage to Michigan's economy and ecosystems. These invasive species negatively affect property values, tourism, recreation, utilities and industry. They lead to reduction of native species, habitat degradation and altered food webs. Some invasive species even can threaten human health.

While the invasive species already present in Michigan cause substantial harm, the state's land and water are constantly threatened by the introduction of new invasive species.

Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, Part 413, outlines the roles and responsibilities of state departments in prohibiting and restricting invasive species. In 2014, Michigan's governor and Legislature designated $5 million in ongoing funding, beginning in fiscal year 2015, to manage the impact of invasive species. This support substantially enhanced Michigan's Invasive Species Program for aquatic (water-based) organisms and initiated a formal program for terrestrial (land-based) species. The funding also launched the Michigan Invasive Species Grant Program, providing $3.6 million in awards annually to agencies, universities and nonprofit organizations to aid the prevention, detection, eradication and control of aquatic and terrestrial invasive species. A portion of the MISP is dedicated to annual funding for 22 cooperative invasive species management areas to support locally led invasive species initiatives in Michigan's 83 counties.

> 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.

MDARD, DNR and EGLE share responsibility for invasive species policy, legislation, regulation,

education, monitoring, assessment, management and control. These departments provide oversight and guidance for the aquatic and terrestrial invasive species core teams in alignment with the priorities of the state's executive administration and the department directors. The Aquatic Invasive Species and Terrestrial Invasive Species core teams communicate internally and externally to ensure a cohesive program.

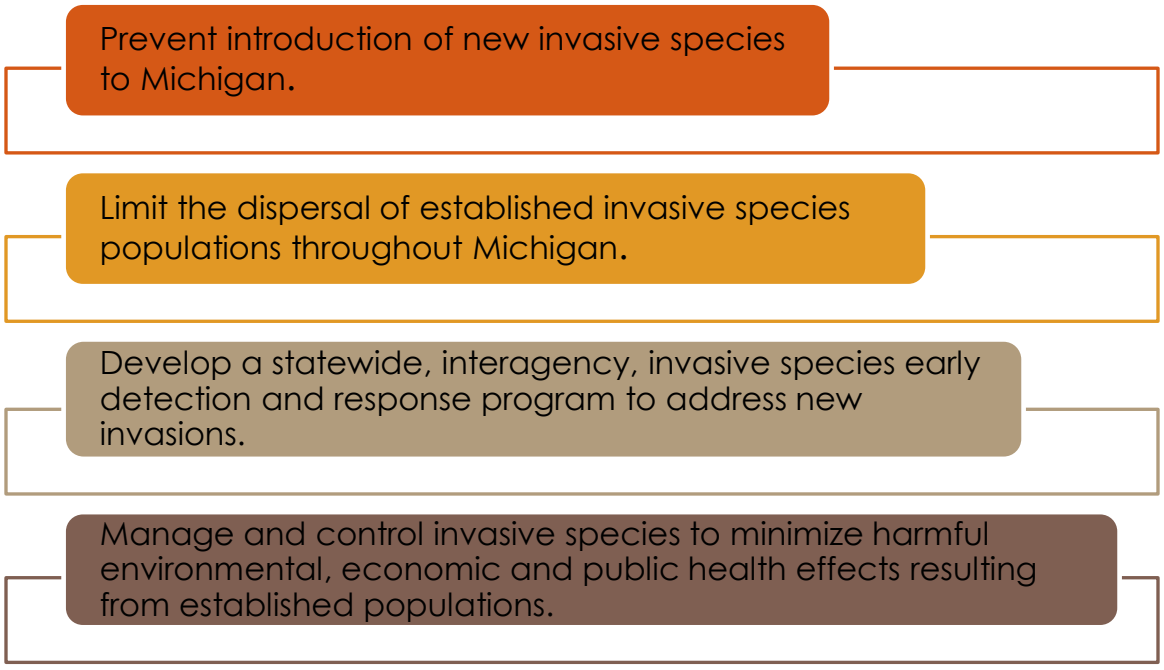
The AIS and TIS core teams develop projects and make recommendations to the departments' leadership based on priorities for each group of invasive species. The AIS core team implements Michigan's Aquatic Invasive Species State Management Plan through both internal and collaborative activities and projects.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

Time frame

This report covers the activities of fiscal year 2023: Oct. 1, 2022, through Sept. 30, 2023.

Goals

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



Goal 1: Prevention

Prevent introduction of new invasive species to Michigan.

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

Retail network aids in prevention

Michigan's 2019 law requiring sellers of non-native aquatic organisms to register with the DNR has become an important tool in preventing aquatic invasive species introductions. In March 2023, the DNR received a notification from the Association of Fish and Wildlife Agencies regarding unknown species of crayfish found in feeder fish received by retail stores in Idaho, Nebraska, Pennsylvania and Wisconsin. The DNR issued an email alert to its list of nearly 3,000 sellers, requesting that they carefully check shipments and supplies and report any crayfish hitchhikers to the department.

Conservation officers conducted nearly 50 inspections of retail outlets in March, finding hitchhiking crayfish in just a few stores. The juvenile crayfish were collected by officers and examined by DNR Fisheries staff, who determined they were not species prohibited or restricted by state law. Conservation officers regularly monitor pet, bait and live seafood businesses, part of the "organisms in trade" pathway by which regulated invasive species might unlawfully enter the state.

A pale, nearly white, red swamp crayfish, found in a pond near Howell, Michigan, illustrates the difficulty in properly identifying crayfish species.

Study pinpoints industry needs

Concern about the organisms in trade pathway inspired a recent Michigan State University study to gauge the size of the pet crayfish industry in the Great Lakes, as well as store owners' ability to identify the species of crayfish received and sold. Color variations, prevalent in highly invasive red swamp and marbled crayfish, can complicate identification. Additionally, crayfish often are sold under a variety of trade names, making classification difficult.

The survey of approximately 400 stores in eight Great Lakes states found that 101 stores sold crayfish, but only 20% did so routinely. Most owners (60%) expressed low to medium confidence in identifying crayfish species, and 50% were only somewhat or not confident they could identify regulated species. Very few store owners were familiar with which species were regulated in their state.

Michigan, where yabby, marbled and red swamp crayfish are prohibited and rusty crayfish is restricted, had the best score, with 40% of owners aware of the regulations. The study, part of the work of the Great Lakes Invasive Crayfish Collaborative, is driving efforts to develop new and better crayfish identification materials for trade and to initiate a basinwide network for crayfish surveillance.

Outreach campaign targets travelers

Interstate travel is a pathway that can increase the introduction and spread of the invasive spotted lanternfly into Michigan. Vehicles coming from infested areas in the northeast United States can unintentionally carry spotted lanternflies or their egg masses into the state.

In 2023, the MISP introduced the "See it. Squish it. Report it." campaign. Billboards along major freeways and corresponding print materials in welcome centers and rest areas encourage travelers to identify the insect's several life stages, report detections and "squish" any insects found. The campaign has contributed to the nearly 400 reports of potential spotted lanternfly sightings made to the DNR's Eyes in the Field online reporting system. Of these, just a handful of reports were verified as actual single-insect detections. No new infestations have been detected.

MDARD continues to work with Oakland County, the U.S. Department of Agriculture Animal and Plant Health Inspection Service and Michigan State University to jointly manage the spotted lanternfly infestation discovered on municipal land in Pontiac in 2022.

Program protects island species

A grant from the DNR Wildlife Division to the Beaver Island Archipelago Terrestrial Invasive Species Program enabled significant progress on management in this

special location. The island group, including Beaver, Garden, High and Hog islands and other, smaller Lake Michigan islands northwest of Charlevoix, is known for its ecological richness and diversity.

While conducting surveys, program staff and volunteers detected two new invasive plants, coltsfoot and common tansy, which pose significant threats to Great Lakes shoreline communities. Though considered established in most areas of Michigan, these plants and invasive garlic mustard are considered high priorities for control in the archipelago. Locations were mapped and treated, and follow-up treatments are planned. Surveys also yielded new occurrences of Michigan monkeyflower, an endangered species, and dwarf lake iris, a threatened species, both of which could be further imperiled by the presence of invasive plants.

Common tansy, an invasive plant of concern in the Beaver Island Archipelago.

Goal 2: Limit dispersal

Limit the dispersal of established invasive species populations throughout Michigan.

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

Studies reveal new solution for AIS prevention

Research funded by EGLE and the MISP has identified a simple new tool that wading anglers can use to prevent the spread of didymo and New Zealand mudsnails. An Oakland University study showed that Formula 409® Antibacterial All-Purpose Cleaner, when used as a cleaning agent on waders and gear, effectively kills invasive New Zealand mudsnails after 10 minutes of exposure. A separate study, conducted by the Great Lakes Environmental Center, found that the spray cleaner reduced the survival of didymo cells by over 60%.

Both New Zealand mudsnails and didymo thrive in coldwater streams. These high-quality waterways see heavy angler use during trout season, with users often visiting multiple streams in a day. Oakland University's study included a social survey indicating anglers are more likely to use Formula 409® Antibacterial All-Purpose Cleaner than alternatives because the cleaner is readily available, premixed and less damaging to waders and gear.

Because Formula 409® Antibacterial All-Purpose Cleaner is not labeled for aquatic uses, MISP outreach materials caution users to apply the product to waders and gear on land at a reasonable distance from the water to avoid accidental discharge into surface waters.

Didymo blooms in the St. Marys River.

DNR pilots boat wash options

With support from the Great Lakes Restoration Initiative, the DNR started a mobile boat wash program in 2023. A seasonal crew took the wash station to 29 state boating access sites across southern Michigan to encourage boaters to comply with state regulations by cleaning boats and trailers and draining reservoirs before hitting the road. Through the summer, the crew washed 152 boats and provided information to 775 people in 17 counties.

In addition to the boat wash unit, a do-it-yourself mobile cleaning station was placed at 17 access sites for a week at a time to test its level of use by boaters. The CD3 station – short for "clean, drain, dry and dispose" – provides an air-pressure hose, plug wrench, grabbers, a vacuum and a scrubbing tool. Station data logged 187 tool uses, with the air hose and plug wrench being the most popular. The pilot project complements the ongoing mobile boat wash program supported by EGLE and Michigan State University. Data from 2023 and 2024 will help determine the feasibility of long-term aquatic invasive species prevention efforts at state boating access sites.

A CD3 station makes it easy for boaters to clean and drain boats and trailers.

Staff get invasive species training

A new program offering invasive species field trainings for DNR staff was initiated in 2023. Sessions covering identification, best management practices and new species allowed already-knowledgeable employees a chance to brush up on their skills, ask experts tricky questions and get a refresher on decontamination

protocols. Collaborative brainstorming on prioritization and treatment methods allowed for critical knowledge-sharing among staff with diverse experiences. Between interactive online trainings and four hands-on field trips, nearly 300 staff in the DNR Wildlife and Forest Resources divisions took advantage of the opportunity to advance their knowledge. Trainings for 2024 will be available to additional divisions.

MDARD video series features invasive insects

To help provide some fun information and education about bugs and insects, the Michigan Department of Agriculture and Rural Development launched the new "Buggin' Out" video series, which includes expert interviews from entomologists, pest management specialists, veterinarians and other scientists who love to talk about bugs. The series is designed to educate and showcase all the things insects do – good or bad – and to shed light on a variety of topics, including:

- The important role native insects play in the ecosystem.
- Integrated pest management solutions for common pests in the home.
- How to protect yourself and your pets from harmful insects like ticks and mites.
- In-depth education about the invasive species of greatest concern in Michigan.
- The negative impact invasive species have on the environment and agricultural industries.

"Buggin' Out" is available now on MDARD's YouTube channel and across the department's social media platforms.

A spotted lanternfly carcass collected after treatment in Oakland County.

Goal 3: Early detection and response

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

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

Bowfishers aid in grass carp efforts

The DNR is strengthening its relationships with bowfishers in hopes these anglers will help report sightings or catch invasive grass carp. Bowfishing is a growing sport in which anglers use a bow and barbed arrows attached to heavy line to target large fish like common carp and suckers. Bowfishing is often done at night in shallow waters with the help of bright lights to spot the prey.

After receiving reports of several sightings and two grass carp captures, staff worked with the Bowfishing Association of Michigan to sponsor a $1,000 prize for the most grass carp caught at the World Bowfishing Tournament, held in Saginaw in 2023. Though no grass carp were captured by the 80 participating teams, the DNR used the occasion to amplify the capture and report message to this target audience. Participants indicated a strong willingness to cooperate, noting that when grass carp are sighted, they are pursued because of their trophy-winning size. DNR staff plans to visit more tournaments in 2024.

Invasive carp prevention efforts continue

In June 2023, environmental DNA surveillance for invasive bighead and silver carp, conducted annually by the U.S. Fish and Wildlife Service, turned up a single positive eDNA sample in the St. Joseph River. Genetic material can be introduced from boats or fishing gear used in other states, and the positive sample, one of 220 taken in the river, came from a busy marina area. Environmental DNA samples are used as an early detection potential warning tool. To determine the validity of the positive result, the USFWS resampled the river in September. This time, no samples were eDNA-positive.

Since 2022, the USFWS has conducted monthly electrofishing and netting in the St. Joseph River each summer to capture and remove grass carp. These efforts will continue in 2024. To date, there is no evidence of any live bighead, silver or black carp in the Great Lakes or Michigan rivers such as the St. Joseph River.

The eDNA program is part of Michigan's invasive carp prevention strategy, which includes conducting fish population surveys, increasing awareness among anglers and maintaining an invasive carp reporting website for anglers to share any suspicious catches or observations.

Student identifies Himalayan balsam

A presentation at the Michigan State University Extension's 2023 AgriPalooza, an agricultural awareness day for fifth graders in Marquette and Alger counties, helped Lake to Lake cooperative invasive species management area identify a new infestation of Himalayan balsam in Chatham. As the CISMA coordinator shared photos of invasive species, a student pointed to the tall, purple-flowered herbaceous plant and offered, "I have that in my backyard." The student's parent, who happened to be chaperoning the event, confirmed that the plant had been widespread in their yard when they first moved into the home, but their small herd of goats was effectively reducing its population. CISMA staff later visited the property to verify the detection and confirmed that the goats were well on their way to eradicating the plant. The CISMA will survey the neighborhood in 2024 and work with local community groups to identify any additional Himalayan balsam infestations in the area.

A Chatham family's goat enjoys the remains of a Himalayan balsam patch on their property.

Goal 4: Minimize harmful effects

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

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

Garlic mustard aphid found in Michigan

The garlic mustard aphid, a small insect that sucks sap from invasive garlic mustard plants, was first documented in the U.S. by a biologist at Holden Forests and Gardens in Ohio. How this European insect arrived in the U.S. is unclear, but it can be effective in controlling the highly invasive plant, now widespread in forests and along roadsides in Michigan. Currently, annual hand-pulling is the most common method of garlic mustard control. Plants can produce hundreds of tiny seeds that spread easily to start new patches.

Garlic mustard aphids feeding on the veins of a garlic mustard leaf.

In collaboration with Holden and the Midwest Invasive Plant Network, the Michigan Invasive Species Program used news and social media to encourage Michiganders to look for and report sightings of the aphid to aid in understanding its distribution and capacity to affect garlic mustard populations. Outreach yielded 23 new positive reports, bringing the total to 37 confirmed locations, all within the Lower Peninsula. Continued reporting is encouraged as researchers learn more about the insect.

MSU team evaluates grass carp control methods

While assisting with grass carp removal efforts in Lake Erie, Michigan State University researchers compared the effectiveness of electrofishing to a combination of electrofishing and use of a trammel net in removing adult fish. Just two grass carp were captured during the two years of sampling, but the team used the capture data of two surrogate species, buffalos and common carp, to evaluate gear effectiveness.

USFWS biologists electrofish for invasive carp.

Results indicated the combination of electrofishing with a trammel net had a greater detection probability for all surrogate species, which are similar in size and body morphology to grass carp and occupy similar habitats. This information was used to update the MSU Quantitative Fisheries Center's adaptive management framework for grass carp by revising objectives, evaluating new potential response strategies and updating the grass carp population simulation model.

The updated framework indicates that continued removal efforts paired with an effective barrier on the Sandusky River to prevent spawning would minimize the abundance of grass carp in Lake Erie and the risk of spread to other systems.

UP CISMAs gear up for AIS

What started as a training plan for European frog-bit surveys across the U.P. turned into a much larger project after the Upper Peninsula Resource and Conservation Development Council learned that its CISMA partners lacked adequate equipment for the job. After conducting a needs assessment, the council, with help from MISGP funds, provided each of the five U.P. CISMAs with kayaks, trailers, life jackets, smart devices and other specialty gear needed for aquatic invasive species surveys.

All CISMA staff members participated in two hands-on technical trainings to learn how to use the equipment and properly identify, map and collect data on European frog-bit, phragmites, purple loosestrife and other aquatic and near-aquatic invasive species they might encounter. CISMAs then shared their new

skills with partners and volunteers in their regions. This thoughtful approach has increased the extent and accuracy of the European frog-bit survey project while ensuring readiness for future aquatic invasive species survey and response efforts.

New techniques help tackle red swamp crayfish

Innovation continues to improve efforts to control red swamp crayfish at several locations in the metro Detroit area. After initiating chemical treatment on affected drainage ponds in 2021, this year the DNR deployed a new chemical application method – a semipermanent grid of in-pond irrigation lines developed by the U.S. Geological Survey. Once installed, the system decreases application time and provides uniform chemical distribution for multiyear treatments.

Technicians also transitioned from treating crayfish burrows with chemicals, a labor-intensive process, to filling burrows with bentonite, a natural clay used to close unused wells. Bentonite permanently seals burrows while stabilizing damaged banks, and it can be applied at any time rather than in conjunction with pond applications. These advances contributed to the completion of 17 pond treatments and more than 1,800 burrow closures in 2023.

Red swamp crayfish chemical treatment is dispersed through a new in-pond irrigation system in Oakland County.

Program outcomes

The following outcomes were established in 2014 to direct the use of state funding to further the goals of the Michigan Invasive Species Program.

- Establishing cooperative invasive species management areas to ensure statewide coverage.
- Responding to 90 early detection sites.
- Providing outreach to 750,000 citizens to enlist them in detecting and responding to emerging invasive species before they become established.
- Managing and controlling 6,000 acres for terrestrial and aquatic invasive species.

Michigan's Invasive Species Program continues to exceed these outcomes through the work of EGLE, DNR, MDARD and Michigan Department of Transportation staff in collaboration with the state's 22 cooperative invasive species management areas and the work of MISGP grantees.

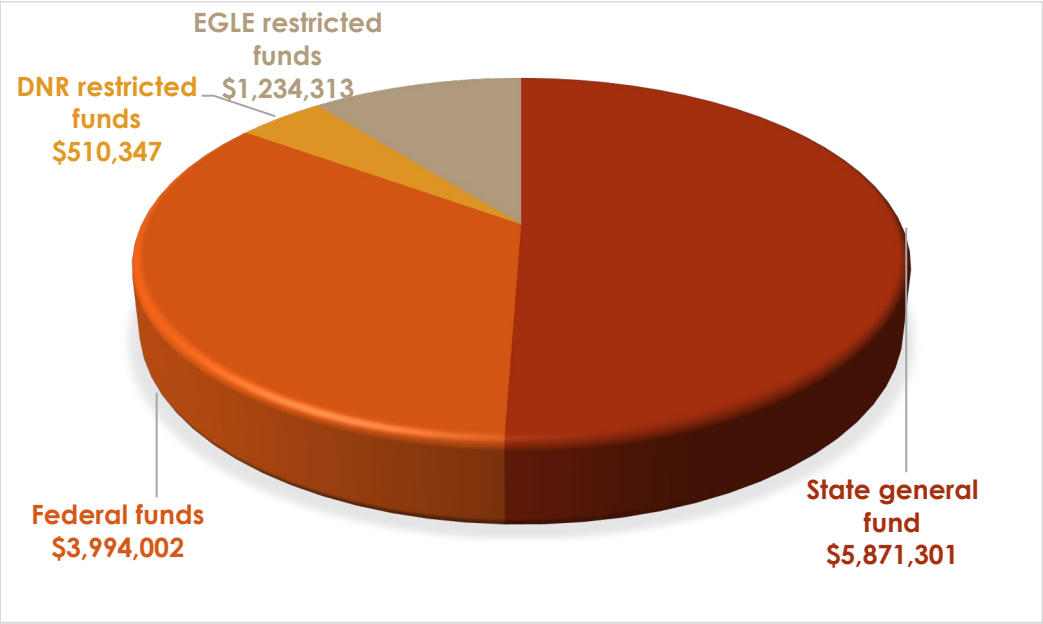
Table 1 – Michigan Invasive Species Program outcomes 2015-2023

	CISMA statewide coverage (number of counties)	Early detection responses	Outreach impressions	Control acres
Program goal	83	90	750,000	6,000
2015	65	355	1,495,800	8,369
2016	77	175	5,037,627	8,710
2017	77	194	5,090,658	9,370
2018	83	58	4,274,867	9,410
2019	83	24	6,265,359	12,313
2020	83	8	8,333,206	11,867
2021	83	34	20,461,963	36,717*
2022	83	7	9,955,778	22,049
2023	83	8	9,003,650	50,094**

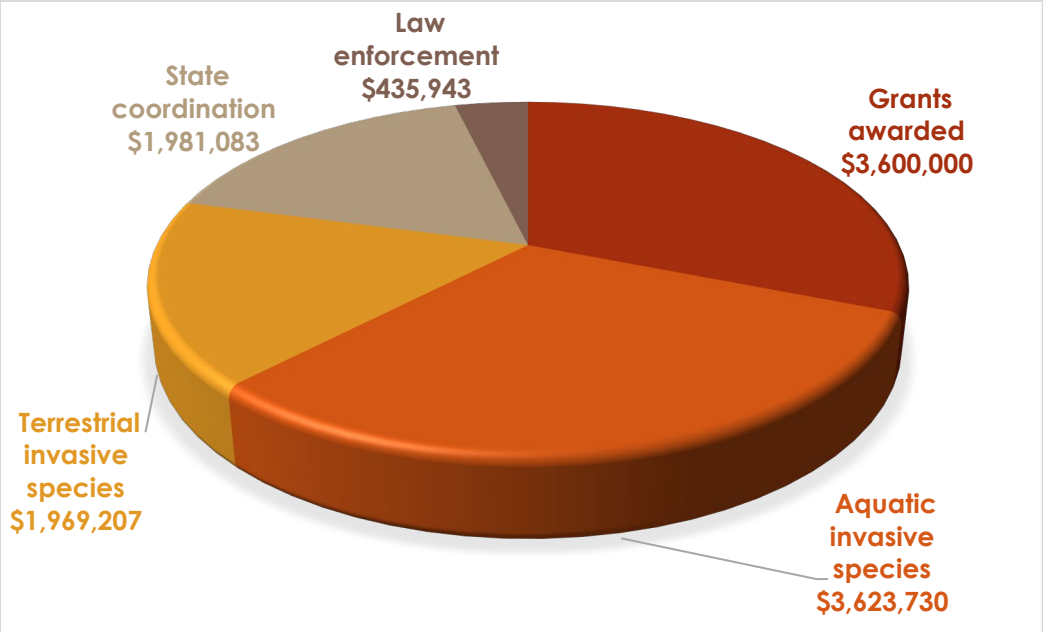
**Began including DNR Wildlife Division control activities.*
***Began including MDOT control activities.*

Program finances: Fiscal year 2023

Funding by source - $11,609,963



Expenditures by program area - $11,609,963



* Expenditures exceed FY23 appropriation amount due to cash and accrued expenditures from grants issued in prior years.

Michigan's prohibited, restricted and problematic species

Michigan laws limit the import, sale and possession of 56 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.

The Michigan 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 usually are available for restricted species.

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

There were no changes to Michigan's prohibited and restricted species lists in 2023.

Scientific permits issued for prohibited or restricted species in 2023

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

In 2023, 60 permits were granted to partner agencies, universities and other entities including consulting firms, zoos, nature centers and other educational institutions.

Table 2 – Prohibited and restricted species permits issued in 2023

Species	Status (prohibited or restricted)	Number of permits issued	Permittees (university, partner or other)
Brazilian elodea	Prohibited	2	1 university, 1 partner
Carolina fanwort	Prohibited	1	1 partner
Curly leaf pondweed	Restricted	1	1 partner
Eurasian watermilfoil	Restricted	1	1 partner
European frog-bit	Prohibited	2	2 partners
Flowering Rush	Restricted	1	1 partner
Giant hogweed	Prohibited	1	1 partner
Grass carp	Prohibited	3	2 partners, 1 other
Hydrilla	Prohibited	2	2 partners
Japanese knotweed	Prohibited	1	1 partner
Parrot feather	Prohibited	1	1 partner
Phragmites	Restricted	5	4 partners, 1 other
Purple loosestrife	Restricted	2	1 partner, 1 other
Quagga mussels	Restricted	11	6 universities, 2 partners, 3 others
Red swamp crayfish	Prohibited	5	2 universities, 1 partner, 3 others
Round goby	Prohibited	6	4 universities, 2 partners
Starry stonewort	Prohibited	1	1 partner
Yellow floating heart	Prohibited	1	1 partner
Water chestnut	Prohibited	1	1 partner
Zebra mussels	Restricted	12	7 universities, 2 partners, 3 others

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

The current distribution of prohibited and restricted species in Michigan, based on best available knowledge, is provided in Appendix A. Some of these species are not yet known to be present in the state. 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 2023 for the prohibited, restricted or other problematic species listed below.

Balsam woolly adelgid found in northern Michigan

Two new infestations of balsam woolly adelgid were confirmed in 2023. One was found by a consulting forester on a residential property in Missaukee County and the other on a tree farm in Oceana County. MDARD inspectors worked quickly with the tree farm owner to tag all infested trees for destruction and ensure unaffected trees could be harvested without risk of infestation spread. In Missaukee, inspectors, assisted by the USDA Forest Service, DNR and CISMA staff, are conducting a widespread, ongoing survey to determine the extent of the infestation across private and public land. MDARD is working with affected landowners to determine remediation options. In 2014, MDARD implemented a balsam woolly adelgid quarantine regulating the movement of potentially infested nursery stock into Michigan from areas in North America with known infestations. These new detections of balsam woolly adelgid follow an initial detection near Rockford in Kent County in 2021. The site was treated, and monitoring efforts are ongoing to ensure successful eradication.

A heavy infestation of balsam woolly adelgid on a tree in Missaukee County.

Beech leaf disease in more areas of southeast Michigan

Beech leaf disease was added to Michigan's invasive species watch list in January 2021 to encourage foresters, residents and land managers to look for and report suspected infestations. In 2022, the disease was first detected in Michigan in Oakland, St. Clair and Wayne counties. New infestations were found in Hillsdale, Lenawee, Macomb and Washtenaw counties in 2023. Beech leaf disease is associated with the nematode Litylenchus crenatae, a microscopic worm that causes damage to leaf tissue, leading to mortality in six to 10 years. With no known treatment, the disease's potential spread through the region could have a devastating effect on Michigan's approximately 37 million American beech trees, which provide food and shelter for wildlife. Available

information on the disease's biology and pathways of spread indicates it is not possible to establish an effective quarantine; however, nurseries, tree care professionals and the public are being urged to refrain from moving beech material from known infested areas.

Box tree moth quarantine

In April 2023, MDARD implemented an internal quarantine for the invasive box tree moth, preventing movement of boxwood plants and material from infested counties. Though not a threat to Michigan's natural resources, this invasive pest can lead to significant defoliation and death of ornamental boxwoods. After discovering in 2021 that infested boxwood plants had been shipped to some retail stores in Michigan, MDARD urged residents across the state to check boxwoods and report symptomatic plants. Several confirmed reports in southeast Michigan prompted the initial quarantine, which was expanded in December and now encompasses Clinton, Eaton, Ingham, Jackson, Lenawee, Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw and Wayne counties. MDARD continues to promote reporting, removal and proper disposal of infested plants.

European frog-bit removed from watch list

A 2023 review of European frog-bit, an invasive aquatic plant, determined that the plant no longer met watch list criteria due to its establishment in many areas of the state. European frog-bit retains its prohibited status, making it unlawful to possess, introduce, import or sell it in Michigan. State and local management efforts for European frog-bit will continue despite the status change. Michigan's Invasive Species Program continues to participate in the European Frog-bit Collaborative, which aims to improve coordination among stakeholders, establish communication networks and build consensus on next steps for management and research. Significant investments continue to support efforts, largely led by local conservation groups, to reduce the invasive plant's spread.

Hemlock woolly adelgid found in two new counties

In 2023, the range of hemlock woolly adelgid in Michigan was expanded to include Benzie County, now considered the northernmost point of infestation, and Washtenaw County, where an isolated infestation was found at the Nichols Arboretum in Ann Arbor. Extensive survey and treatment efforts continue, with CISMA strike teams focusing on the northern infestation and Michigan Civilian Conservation Corps and DNR staff working within affected state parks. In Washtenaw, MDARD, DNR and the Jackson, Lenawee and Washtenaw CISMA are working with the arboretum on treatment plans and have reached out to

neighboring landowners through webinars, in-person presentations and a door-to-door information campaign. MDARD's updated internal hemlock woolly adelgid quarantine now includes the entire counties of Allegan, Benzie, Manistee, Mason, Muskegon, Oceana, Ottawa and a portion of Washtenaw County.

Hydrilla detected in Michigan

In 2004 Michigan Sea Grant launched its "Hydrilla Hunt" campaign, urging everyone to look for and report the "world's worst invasive aquatic plant." Nearly 20 years later, hydrilla, a prohibited species, has been detected in Michigan for the first time. Two small populations of the plant were found in adjacent private ponds on residential properties in Berrien Springs in southwest Michigan. The plants were discovered during routine monitoring following treatment for another invasive plant, parrot feather, which was found in the ponds in 2020. EGLE surveyed connected ponds, a receiving stream and the St. Joseph River to determine the infestation's extent. Herbicide treatment of the ponds occurred in fall, and a response plan is underway to prevent hydrilla from spreading to new waters and ultimately eradicate the plant.

Hydrilla stalks emerge above the water in a pond in Berrien County.

Mountain pine beetle added to watch list

Mountain pine beetle, characterized as the most aggressive, persistent and destructive bark beetle in the western U.S. and Canada, has been added to Michigan's watch list. Hot, dry summers and mild winters have led to the beetle's unprecedented population growth and range expansion, moving it ever closer to Michigan. If it arrives in the state, the invasive beetle could infest white and red pines, primary species in Michigan's forest ecosystems, and jack pine, which

serves as critical habitat for the Kirtland's warbler. An established population of mountain pine beetle would cause severe losses across multiple industries, including timber products, plant nurseries and tourism. To limit the possibility of human introduction, MDARD issued an exterior mountain pine beetle quarantine in 2020, regulating the movement of all firewood and any pine products with bark attached from areas of the western U.S. and Canada.

Red swamp crayfish detected in Macomb County

A new site of red swamp crayfish infestation was confirmed in 2023 after alert residents near Romeo in Macomb County reported seeing crayfish walking across their lawns. DNR staff worked with the Lake St. Clair CISMA to deploy and monitor traps in ponds on the nearby Greystone Golf Course. Through the summer, 312 red swamp crayfish were collected from five ponds on the property. The invasive crayfish was first detected in locations in Kalamazoo and Oakland counties in 2017. Since then, populations have been found in drainage and golf course ponds in Livingston, Macomb and Wayne counties. The DNR continues to work with the U.S. Geological Survey Michigan State University and local CISMAs on intensive trapping and, where possible, chemical treatment to reduce red swamp crayfish populations.

Water-primrose added to watch list

Water-primrose flowering along the shoreline in Macomb County.

Water-primrose (Ludwigia species), a group of very similar non-native plants, L. grandifolia, L. peploides and L. hexapetala, was added to Michigan's watch list in 2023. Water-primrose is quick to establish and spread in dense mats within wetlands and shoreline areas, outcompeting native species and making boating and water access difficult. Three known populations, two in the greater Detroit area and one in Ottawa County, indicate the species can survive and thrive in Michigan's climate. Once established, water-primrose can be very difficult to remove, making early detection critical. Though not common in trade, water-primrose was likely introduced through the landscape or water garden pathway. Several noninvasive Ludwigia species are common in trade and look much different than water-primrose.

Legislative and funding recommendations

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

1. **Supporting local aquatic invasive species prevention and control in inland lakes.**

Background

Hundreds of Michigan's inland lakes are affected by widely distributed aquatic invasive plant species like Eurasian watermilfoil and starry stonewort, which continue to spread to previously uninfested lakes. In Michigan, the cost of control and management of Eurasian watermilfoil and other invasive and nuisance aquatic plant and algae species adds up to approximately $24 million annually. Aquatic invasive plants can interfere with recreation activities such as swimming, fishing, water skiing and boating, and these plants significantly alter the ecology of bodies of water.

Once these species become well established, they are often challenging to control. The financial burden of the management and control of aquatic invasive plants in Michigan inland lakes is placed largely upon the riparian landowners – those with property on or close to the water.

Given costs and challenges associated with controlling established populations of aquatic invasive plants, limiting the spread of these species via recreational boating and other pathways is critical for inland lake protection and efficient use of funding. The state implemented a successful outreach campaign to remind boaters to "Clean, Drain, Dry" boats, trailers and gear before moving to another body of water; however, resources for local prevention activities are limited.

The Michigan Aquatic Invasive Plant Control Grant Program went into effect in 2019 through the addition of Part 414 to the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Through Part 414, EGLE is directed to provide grants to eligible applicants for the control or eradication of aquatic invasive plant species in inland lakes. The Aquatic Invasive Plant Control Grant Program, which was suspended in 2020 due to COVID-19-related budget cuts, is constrained by statutory language that limits the use of funds.

Recommendation No. 1
Modify the existing statutory language under 324.414 to allow for broader protection of inland lakes from aquatic invasive plants. Language should be modified in three ways:

1. Include aquatic invasive species prevention, monitoring and inland lake management plan development as eligible activities for grant funds.
2. Remove statutory application and award deadlines and grant administration expenditure limits, which prohibit EGLE from properly implementing the grant program.
3. Bolster the Inland Lake Aquatic Invasive Plant Control and Eradication Fund over time.

2. Continuing and enhancing support for Michigan's Invasive Species Program.

Background

In 2014, the state Legislature designated $5 million in annual funding to address invasive species. This support substantially enhanced Michigan's Invasive Species Program for aquatic organisms, supported a formal program for terrestrial species and initiated the Michigan Invasive Species Grant Program.

In 2024, annual funding increased to $7 million, and a one-time allocation of $1.5 million was added to the invasive species fund created in section 41311 of the Natural Resources and Environmental Protection Act, 1994 PA 451, MCL 324.41311, to support invasive species immediate response efforts over time.

The increase in annual funding beginning in 2024 will bolster invasive species response capacity, improve public outreach and engagement, support monitoring and enforcement of invasive species regulations, and build a response team focused on managing invasive species in high-priority habitats on state-managed lands.

Through the existing $3.6 million awarded annually via the MISGP, annual support for Michigan's 22 cooperative invasive species management areas was increased by $10,000 to help offset inflation and provide competitive wages. In addition to $70,000 in annual base operating funds, CISMAs also are eligible to apply for up to $40,000 for targeted outreach, survey and treatment projects in their regions. CISMAs remain eligible to apply for up to $400,000 in MISGP priority project funds annually.

Beginning in 2025, the MISGP will provide $130,000 in annual support for Michigan's Clean Boats, Clean Waters campaign, managed by Michigan State University Extension in collaboration with EGLE Water Resources Division.

Recommendation No. 2
Support increased program capacity in the following key areas:

1. CISMA capacity

Today, 22 regional cooperative invasive species management areas are serving the needs of all 83 counties in Michigan, assisting the public in identifying and managing invasive species. To sustain these local delivery networks, each CISMA now receives $70,000 in annual base operations funding. With these funds, only a few CISMAs have been able to assist with early detection and response efforts for species newly detected and expanding in Michigan, like hemlock woolly adelgid, European frog-bit and red swamp crayfish. More robust funding to all CISMAs to support seasonal "strike team" staff would ensure regional collaboration in early detection and response efforts across the state and support prevention and preparedness efforts for emerging threats such as beech leaf disease, spotted lanternfly and Asian longhorned beetle.

2. Environmental justice

MISP leadership is aware of the need to deliver state and regional invasive species efforts that are inclusive of all populations. Additional funding in this area would support a needs assessment and the development and adoption of best practices to address issues of equity, inclusion and environmental justice. Once needs are understood, funding will provide additional CISMA staff in targeted areas to improve outreach and services in underserved communities.

3. Modernizing NREPA Part 413 to enhance biosecurity of Michigan natural, agricultural and cultural resources from threats posed by invasive species.

Background

Part 413 is the primary statutory mechanism to address invasive species issues in Michigan. A 2019 amendment strengthening boating laws to limit the spread of aquatic invasive species and creating a registration requirement for sellers of live, non-native aquatic organisms has been successful in helping to address risks associated with known pathways of invasive species introductions.

However, certain aspects of the statute may not fully protect Michigan from invasive species threats. Through the Great Lakes Fishery Commission Law Enforcement Committee and the Great Lakes Panel on Aquatic Nuisance Species, EGLE and DNR staff members have participated in joint enforcement activities, workshops and discussions to examine case studies and analysis of statutory authorities regarding aquatic invasive species across the Great Lakes states and provinces. For example, the 2021 response to aquarium moss balls

contaminated with invasive zebra mussels that were transported and sold in 46 states and multiple provinces highlights the need for comprehensive protective laws. To enable appropriate enforcement, close regulatory gaps and keep pace with scientific advances, clarification of key terms and concepts in the statute is needed.

Recommendation No. 3

Modify the existing statutory language under 324.413.

1. Clarify or update definitions of key terms:
    a. Refine definitions for the terms "introduction" and "possession" to clarify intent, address ambiguities associated with contaminated materials and aid in enforcement. Add and clarify key words such as "transport, import, purchase, barter, trade, gift, transfer, lease, loan and propagate" to directly address a full range of activities.
    b. Update the current definition of "genetically engineered" to address advances in genetic biocontrol technology and close regulatory gaps.
    c. Incorporate Fisheries Order 248, requiring evisceration, when appropriate, for transport of regulated species such as invasive carp.
    d. Distinguish between natural and intentional spread as it relates to introduction and possession of prohibited and restricted species.
2. Expand the definition in Section 324.41305, which prohibits the introduction of certain types of plants and animals, to include amphibians, reptiles and invertebrates. Provide clear authority to access land, waters, buildings, structures or conveyances for inspection and control of regulated species in certain scenarios.
3. Increase clarity for the distinction between "prohibited" and "restricted" designations to align with intentional spread, natural spread and possession; reclassify species currently listed in these categories based on current geographic distribution; and update associated fines and penalties.

Appendix A: Species listed as prohibited (P) or restricted (R) under Part 413

Table 3.A - Fish

Species	Part 413 Status	Distribution in Michigan	Comments
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	Limited natural reproduction in Ohio waters of Lake Erie. Captures in St. Joseph River. Isolated detections have been reported in other Great Lakes and inland waters.
Ide (Leuciscus idus)	P	Absent	
Japanese weatherfish (Misgurnus anguillicaudatus)	P	Isolated	Single breeding population in the Shiawassee River.
Round goby (Neogobius melanostomus)	P	Widespread	Widespread and established in lakes Erie, Huron and Michigan. Isolated collection in Lake Superior near Marquette. Isolated but established populations in inland waters.
Rudd (Scardinius erythrophthalamus)	P	Absent	Isolated collections on the Ontario side of Lake St. Clair.
Silver carp (Hypophthalmichthys 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. Additional observations in northern Lake Huron and western Lake Superior.
Wels catfish (Silurus glanis)	P	Absent	
Zander (Sander lucioperca)	P	Absent	

Table 3.B - Plants

Species	Part 413 Status	Distribution in Michigan	Comments
African oxygen weed (Lagarosiphon major)	P	Absent	
Autumn olive (Elaeagnus umbellata)	P	Widespread	Common and widespread statewide.
Brazilian waterweed (Egeria densa)	P	Absent	Isolated populations in Illinois, Indiana, Minnesota and Ohio.
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 frog-bit (Hydrocharis morsus ranae)	P	Locally abundant	Locally abundant along coastlines, with isolated inland populations across the Lower Peninsula.
Fanwort (Cabomba caroliniana)	P	Locally abundant	Locally abundant in Lower Peninsula, primarily in the southwest. Present in Illinois, Indiana, Ohio and Ontario.
Flowering rush (Butomus umbellatus)	R	Locally abundant	Common in southeast Michigan, both inland and coastal. One isolated population in Alger County.
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 Indiana, Wisconsin, Ohio and Pennsylvania.
Japanese knotweed (Fallopia japonica)	P	Widespread	Patchy distribution throughout the Lower and Upper peninsulas.
Parrot feather (Myriophyllum aquaticum)	P	Isolated	Active management of isolated populations in Berrien, Calhoun, Jackson, Washtenaw and Wayne counties.
Phragmites or common reed (Phragmites australis)	R	Widespread	Established in the southern Lower Peninsula. Locally abundant populations along Great Lakes shorelines, especially in the U.P. and northern Lower Peninsula, have been reduced through management.
Purple loosestrife (Lythrum salicaria)	R	Widespread	Biological control is reducing population statewide.
Starry stonewort (Nitellopsis obtusa)	P	Locally abundant	Recorded in over 100 inland bodies of water, mostly in the Lower Peninsula.
Water chestnut (Trapa natans)	P	Absent	Observations in New York, Pennsylvania and Ontario.
Water soldier (Stratiotes aloides)	P	Absent	Isolated population in Ontario.
Yellow floating heart (Nymphoides peltata)	P	Isolated	Active management of Isolated populations in Berrien, Ingham, Kent, Oakland, Ottawa and Wayne counties.

Table 3.C - Crustaceans

Species	Part 413 Status	Distribution in Michigan	Comments
Marbled crayfish (Procambarus virginalis)	P	Absent	No populations detected in Michigan, but this species historically has been available for sale in the pet trade. First North American wild population detected in Ontario.
Rusty crayfish (Faxonius rusticus)	R	Widespread	Widespread and breeding in Great Lakes and inland waters.
Red swamp crayfish (Procambarus clarkii)	P	Isolated	Isolated populations in southern Michigan, primarily in the southeast. Approximately 40 bodies of water representing nine complexes.
Yabby (Cherax destructor)	P	Absent	
Killer shrimp (Dikerogammarus villosus)	P	Absent	

Table 3.D - Mollusks

Species	Part 413 Status	Distribution in Michigan	Comments
Brown garden snail (Helix aspersa)	P	Absent	Two Michigan 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/southeast Michigan.
New Zealand mudsnail (Potamopyrgus antipodarum)	P	Isolated	Established in Lake Ontario and Lake Erie and present in Lake Superior. Established populations in the Au Sable, Boardman, Grass, Pere Marquette, Pine, Rapid and Upper Manistee 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 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.

Table 3.E - Birds

Species	Part 413 Status	Distribution in Michigan	Comments
Eurasian collared dove (Streptopelia decaocto)	P	Locally abundant	First observed in Michigan in 2002, and has since been documented in 22 of 83 Michigan counties.

Table 3.F - Mammals

Species	Part 413 Status	Distribution in Michigan	Comments
Feral swine (Sus scrofa Linnaeus)	P	Widespread	Historically, feral swine have been reported in 72 of 83 Michigan counties, but occurrences presently are limited to a few localized areas in the northern Lower Peninsula and central Upper Peninsula. Active management has reduced occurrences statewide.
Nutria (Myocastor coypus)	P	Absent	Farmed in Michigan in the 1930s. No confirmed detections since the 1960s.

Table 3.G - Insects

Species	Part 413 Status	Distribution in Michigan	Comments
Asian longhorned beetle (Anoplophora glabripennis)	P	Absent	Not detected in Michigan. Active infestations in Massachusetts, New York, Ohio, Ontario and South Carolina. Eradicated from Illinois and New Jersey.
Emerald ash borer (Agrilus planipennis)	P	Widespread	Widespread throughout Lower Peninsula. Isolated or patchy distribution across Upper Peninsula.