Michigan Invasive Species Program 2021 Annual Report

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 2021 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 2021 Annual Report highlights the program's goals and accomplishments regarding invasive species prevention, management and outreach; the status of prohibited and restricted species in Michigan; and recommendations for furthering Michigan's Invasive Species Program.

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

Invasive Species Program overview

Invasive species are those that are not native and whose introduction causes harm, or is likely to cause harm, to Michigan's economy, environment or human health. Michigan's economy and ecosystems experience significant negative impacts from plants, animals and pathogens that are introduced into the environment and flourish without natural predators to restrain them. The economic effects of invasive species include significant consequences to property values, tourism, recreation, utilities and industry. Ecological impacts of invasive species include reduction of native species, habitat degradation and altered food webs. Some species even can threaten 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 relation to prohibiting and restricting invasive species. In 2014, Michigan's governor and Legislature designated $5 million in ongoing funding, beginning in fiscal year 2015, to manage the impact of invasive species. This support substantially enhanced Michigan's Invasive Species Program for aquatic (water-based) organisms and initiated a formal program for terrestrial (land-based) species. This support also initiated the Michigan Invasive Species Grant Program, providing $3.6 million in awards annually to agencies, universities and nonprofit organizations to assist with prevention, detection, eradication and control of aquatic and terrestrial invasive species.

The 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 invasive species and terrestrial invasive species core teams in alignment with the priorities of the administration and the department directors. The AIS and TIS core teams communicate internally and externally to ensure a cohesive program.

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

Invasive Species Core Team representation

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

Time frame

This report covers the activities of fiscal year 2021: Oct. 1, 2020, through Sept. 30, 2021.

Goals

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

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

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.

Michigan backs barrier to stop invasive carp

For more than two decades, the Great Lakes region has worked tirelessly to make sure invasive carp do not enter Lake Michigan. In December 2020, Michigan and Illinois announced an effort to work jointly to protect the Great Lakes through an intergovernmental agreement that will allow Illinois to use up to $8 million appropriated in 2018 by the Michigan Legislature to support the pre-construction engineering and design phase of the Brandon Road Ecosystem Project in conjunction with the U.S. Army Corps of Engineers. The design phase is now underway, with engineers examining the best methods to install layered technologies including an electric barrier, underwater sound, an air bubble curtain and a flushing lock in a newly engineered channel designed to prevent invasive carp movement while allowing barge passage. Completed designs are anticipated in 2024.

DNR, Michigan State Police inspect live aquatic shipments

In September 2021, officers from the Great Lakes Enforcement Unit of the DNR partnered with officers from the Motor Carrier Division of the Michigan State Police to identify and inspect fish haulers in southeast Michigan. Their goal was to raise awareness of Michigan aquatic invasive species regulations, including the recently signed director's order requiring invasive fish species to be eviscerated. Over a three-day period, officers monitored commercial traffic and inspected multiple vehicles transporting aquatic cargo destined for pet stores, restaurants and fresh seafood markets in or beyond Michigan. Such cargo could potentially aid in the spread of invasive species. All haulers were found to be compliant with Michigan regulations. This effort marked the beginning of a partnership between two state law enforcement agencies that continues to produce valuable

intelligence and a heightened level of protection against aquatic invasive species.

State demonstrates rapid response to zebra mussel threat

When invasive zebra mussels were discovered in a shipment of aquarium moss balls at a Petco store in Washington state in March 2021, national aquatic invasive species collaboration and readiness were put to the test. A report to the U.S. Geological Survey's Nonindigenous Aquatic Species online reporting system was verified then forwarded to states through the Aquatic Nuisance Species Task Force, including Michigan's AIS coordinator. Within hours, Michigan's Invasive Species Program staff went to work on several fronts. EGLE and DNR coordinated response efforts with states across the nation and with the federal ANS Task Force. MDARD inspectors and DNR law enforcement officers initiated inspections at aquarium supply stores and assisted with identification and proper disposal. Within 36 hours, over 3,000 aquatic pet and plant suppliers and hobbyists in Michigan received an email alert from DNR with directions for disposal of contaminated products. A joint press release was issued to over 120,000 subscribers within three business days of initial notification, resulting in strong press coverage throughout the state.

Michigan takes a stand on ballast water

Since global trade began to connect the Great Lakes to ports across the world, ballast water has been the primary pathway for non-native aquatic species establishment in the Great Lakes basin. The 1990 federal Nonindigenous Aquatic Nuisance Prevention and Control Act initiated ballast water regulation. Seeking more effective measures, in 2007 Michigan began requiring oceangoing vessels to treat discharged ballast water to prevent the movement of aquatic invasive species. Likewise, other states and federal agencies have implemented their own programs. In response to this complex regulatory framework, the Coast Guard Authorization Act of 2018, also known as the Vessel Incidental Discharge Act (VIDA), streamlined requirements for the commercial vessel community. However, USEPA's proposed new standards under VIDA, released in October 2020, met with a formal objection from Gov. Gretchen Whitmer in December 2020, citing numerous state agency concerns about the failure of the proposed standards to protect water quality and prevent the introduction and spread of aquatic invasive species within the Great Lakes.

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.

¿Están limpios sus zapatos?

When the Southwest by Southwest cooperative invasive species management area needed help to reach Spanish-speaking audiences with the "Play, Clean, Go" message, it found assistance from the Michigan Department of Health and Human Services Division of Environmental Health. Division employees have formed a work group to provide culturally appropriate environmental health information. The group was able to use its skills to translate the "Are your shoes clean?" message in a culturally appropriate manner. Now the CISMA is reaching a broader audience in Michigan's southwest corner through trail signs encouraging users to clean their shoes and boots to prevent the spread of invasive species. The translated signs have been shared with the national "Play, Clean, Go" campaign and are now available for use in every state.

Officers ramp up boat inspections

During the 2021 boating season, DNR conservation officers continued with efforts to enforce the requirement to "Clean, Drain and Dry" boats and trailers. Officers took time to educate hunters, anglers and boaters about Michigan regulations designed to prevent the spread of aquatic invasive species. During the annual "AIS Landing Blitz" and the peak boating period around the Independence Day holiday, officers focused on collaborating with lake associations and others to talk with boaters as they launched or trailered their watercrafts. Time was spent during waterfowl seasons to educate hunters about the increasing threat of European frog-bit, an invasive aquatic plant favoring slow, shallow waters where hunters set their blinds. Officers made nearly 10,000 individual contacts and found that nearly everyone they spoke to was already familiar with aquatic invasive species issues and compliant with all regulations.

New funds support clean waters outreach

In 2021, a new mini-grant opportunity from the Michigan Clean Boats, Clean Waters program funded seven outreach projects across Michigan to educate boaters about aquatic invasive species prevention. Lake associations, watershed groups, local units of government and other nonprofit organizations used funds to develop outreach materials, host boat washing events and install signage and boat and trailer cleaning stations at boating access sites. The Michigan Clean Boats, Clean Waters program, initiated in 2006, is a joint effort between Michigan State University Extension and the Michigan Department of Environment, Great Lakes and Energy. Funding for Clean Boats, Clean Waters and its grant program is provided by the Great Lakes Restoration Initiative.

CISMA partners get funding boost

Many of Michigan's 75 conservation districts collaborate with cooperative invasive species management areas. Some districts house CISMA staff or act as fiduciaries for CISMA grants. Other districts provide local outlets for CISMA programs. In September 2021, the Michigan Association of Conservation Districts secured base operational funding for conservation districts from Michigan's state legislative budget. These funds will allow districts to identify and prioritize the most pressing needs in their communities and ensure landowners have access to natural resource management assistance, including help for invasive species issues, for their farms and properties.

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 to respond. 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.

BCK CISMA slows the spread of mile-a-minute weed

After invasive mile-a-minute weed was first detected in Michigan in October 2020, on the campus of Albion College, the Barry, Calhoun and Kalamazoo CISMA went to work organizing a response. The goal was to prevent the spread and establishment of this tree-smothering vine. Fanning out from the original infested site, teams surveyed over 3,400 acres in the Albion community, covering both public and private lands. Mile-a-minute weed was detected in three additional locations, including one along the Kalamazoo River. While Albion staff managed the campus infestation, the CISMA provided no-cost foliar herbicide treatment with permission from landowners. Treated sites will be monitored and additional surveys undertaken each summer until the vine has been eradicated.

Tiny insects may keep knotweed in check

With assistance from Michigan Invasive Species Grant Program funds, researchers at Michigan State University are experimenting with rearing and releasing knotweed psyllids, tiny flying insects that feed on and weaken invasive knotweed plants. Natives of Japan, the psyllids have been permitted for release in Michigan as a biocontrol agent to reduce populations of Japanese, Bohemian and giant knotweeds. Left unchecked, these plants can spread aggressively and cause damage to roads and structures. In 2021, over 2,300 psyllids were released at four knotweed sites in the Upper Peninsula and eight sites in the Lower Peninsula. Through biweekly monitoring, eggs and/or juvenile stages of psyllids were observed at most sites, indicating that released psyllids can reproduce in the field. Continued observation will help determine the

insect's winter-hardiness and ability to survive and reproduce in its new environment.

MDARD responds to box tree moth detection

In May 2021, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service identified box tree moth in nurseries and greenhouses in the United States, including Michigan. This was the first detection of this invasive species in the nation. Box tree moth is not considered a forest pest because boxwood is not native to Michigan forests. However, if left unchecked, it can cause significant defoliation and death of boxwood in the landscape. Through inspections, box tree moth was detected at three locations in Michigan, and all infested materials were removed by MDARD and APHIS. To prevent further introduction of box tree moth APHIS issued a federal order prohibiting importation of all boxwood, euonymus and holly plants for planting from Canada. Michigan State University Extension is partnering with MDARD and APHIS to implement an early detection insect trapping program with residents to determine if the box tree moth has been introduced elsewhere in Michigan. While MDARD nursery inspectors continue to inspect commercial boxwood crops, MSUE is working with nursery growers and landscapers to check plants for signs of infestation and to install box tree moth pheromone traps and to report any suspected infestations.

Webinar series showcases Michigan's invasive species efforts

The state's early detection and response efforts were a major focus of the NotMISpecies webinar series, a monthly program exploring how agencies, universities and locally led organizations are working together to protect Michigan's natural resources. Six of the season's 10 segments explored technologies and strategies used to respond to new or emerging invasive species threats including invasive carp, red swamp crayfish, hemlock woolly adelgid and an array of invasive aquatic plants. The series reached 3,584 viewers from the U.S. and beyond, including state, local and provincial governments, local environmental organizations, environmental engineers, major corporations and people interested in invasive species issues. This diverse audience supports the series' goal of sharing innovations in invasive species identification, detection, control and outreach strategies while promoting the work of Michigan's Invasive Species Program.

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.

North Country CISMA makes hiking safer on White Pine Trail

Wild parsnip, an invasive plant that can cause burning and blistering upon skin contact, has become an unwelcome guest along the northern portion of the Fred Meijer White Pine Trail, a 92-mile multiuse trail between Grand Rapids and Cadillac. To limit the potential for human harm and prevent the spread of wild parsnip on the heavily used trail, the North Country CISMA treated nearly 200 acres of the invasive plant in 2021, using both chemical and mechanical methods. The CISMA is working with the Friends of the White Pine Trail to coordinate mowing schedules to allow herbicide uptake and avoid spreading seeds down the trail. CISMA technicians are collecting warm-season grass seed from the surrounding area to plant at treated locations to restore the native landscape and prevent further wild parsnip growth.

Measuring success by the truckload

Two Michigan Invasive Species Grant Program recipients teamed up with local volunteers this summer to remove invasive narrow-leaf cattails and European frog-bit from the boat launch and wetlands of Thunder Bay River at Duck Park in Alpena. Staff and students from Loyola University and Huron Pines Coastal Invasive Species Network demonstrated cutting cattails underwater using aquatic weed whackers, simultaneously killing the cattails and releasing the European frog-bit sheltered by the tall reeds. Volunteers from the University of Michigan Biological Station, Alpena Wildlife Sanctuary and the Thunder Bay River Center cleared plant debris, filling 21 city of Alpena dump trucks. A month

later, volunteers returned to remove emergent frog-bit from the previously cleared areas, this time collecting 10 truckloads of plant material.

Huron Heartlands Invasive Species Network inspires clean forest management

Large, intact forests like the Pigeon River Country State Forest (aka "The Big Wild") represent the most ecologically and economically significant sites in the Huron Pines Heartland Invasive Species Network service area. Most of these forests are managed for commercial timber production, supporting the local economy. Commercial forestry can cause the rapid expansion of certain invasive species, like Japanese barberry and Japanese knotweed, due to soil disturbance, canopy opening and the movement of seeds and plant fragments on forestry equipment. Huron Heartlands ISN is taking a two-pronged approach to address the issue. This year they began providing educational tours for forest managers, highlighting the importance of understanding invasive species impacts on pre- and post-harvested forest stands. The ISN also inventoried over 100 acres, treating Japanese barberry on 57 acres within prime elk habitat. These initial efforts have developed partnerships that will help to expand the program in future years.

Islanders welcome support for invasive species management

Controlling invasive species is a community effort on Beaver Island, with residents, businesses and local government pitching in to protect Michigan's Emerald Isle. The island's invasive species and volunteer coordinators provided a warm welcome and lots of assistance to two Charlevoix, Antrim, Kalkaska and Emmet CISMA interns this summer as they embarked on a 44-mile shoreline survey. Along the way, the interns worked with residents to remove or treat autumn olive, garlic mustard, honeysuckle and wild parsnip and map lingering stands of invasive phragmites and narrow-leaved cattail for later treatment. The interns partnered with the community center and radio station WVBI to record podcasts and speak at a community forum hosted by the historical society. CISMA focus on the island has helped to encourage the Beaver Island Boat Company to share invasive species messages through its digital signage and the Beaver Island Archipelago Trails Association to place boot scrapers at various trailheads and develop an invasive species reporting system for hikers.

Spotlight – European frog-bit collaborative

European frog-bit, an invasive aquatic plant on Michigan's Aquatic Invasive Species Watch List, is spreading along Great Lake shorelines, connecting channels and inland waters. Concern over its spread spurred the creation of the European frog-bit Collaborative. Comprised of decision makers, regional invasive species management partners, researchers and other stakeholders, the collaborative aims to reduce the spread and occurrence of European frog-bit by improving management, identifying research needs and enhancing communication.

Every year, EGLE staff and partners collaboratively plan and undertake European frog-bit survey and response efforts across the state. In 2021 the collaborative worked to improve and standardize these activities by field testing a pre/post-treatment protocol and developing a GIS-based app for surveyors to collect presence and density information. Standardizing methods and means ensures consistent and comparable data can be collected by diverse organizations across the state and region. These products supported the following 2021 efforts:

- The Upper Peninsula Resource Conservation and Development Council and all five U.P. CISMAs working together to survey high-risk areas across the entire U.P. using the survey app.
- EGLE and CISMA staff implementing the pre/post-treatment monitoring protocol at control sites.

Research is being conducted to improve understanding of European frog-bit and inform control efforts. Lake Superior State University, Central Michigan University, Michigan Natural Features Inventory, Loyola University and Boise State University in collaboration with EGLE, CISMAs and other partners are measuring the efficacy of different control methods, evaluating the impacts of European frog-bit on water quality and native plants and animals, investigating new detection methods, developing habitat suitability and risk models and understanding the plant's life history.

Outreach, surveillance, control and research efforts working in collaboration are essential to address the challenges presented by European frog-bit and other aquatic invasive species.

Program outcomes

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

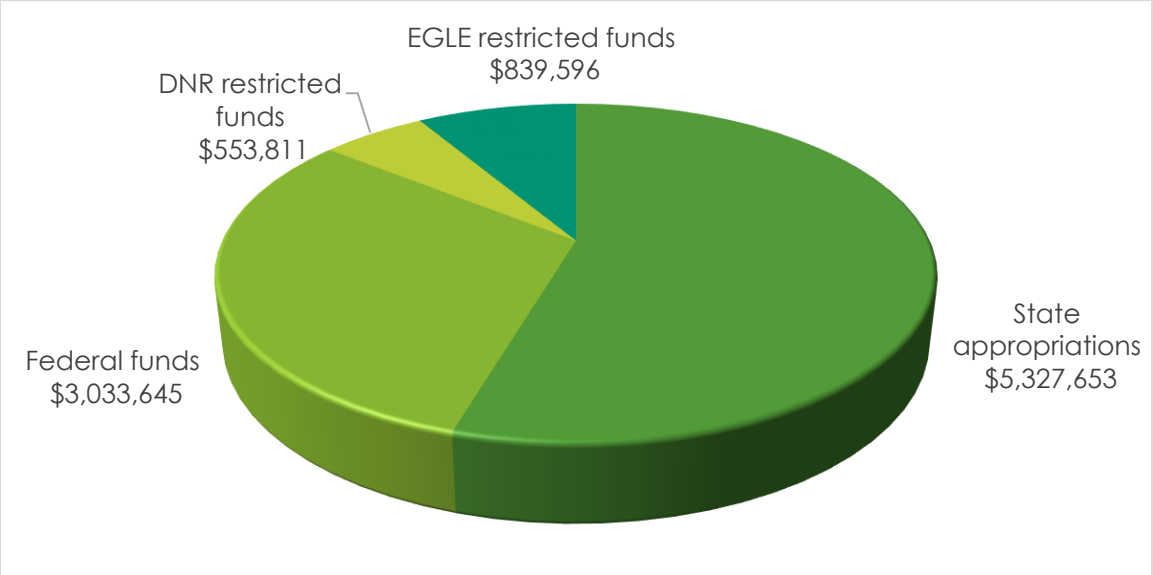
- Establishing cooperative invasive species management areas to ensure statewide coverage.
- Responding to 90 early detection sites.
- Providing outreach to 750,000 citizens to enlist them in detecting and responding to emerging invasive species before they become established.
- Managing and controlling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

Table 1 – Michigan Invasive Species Program outcomes 2015-2021

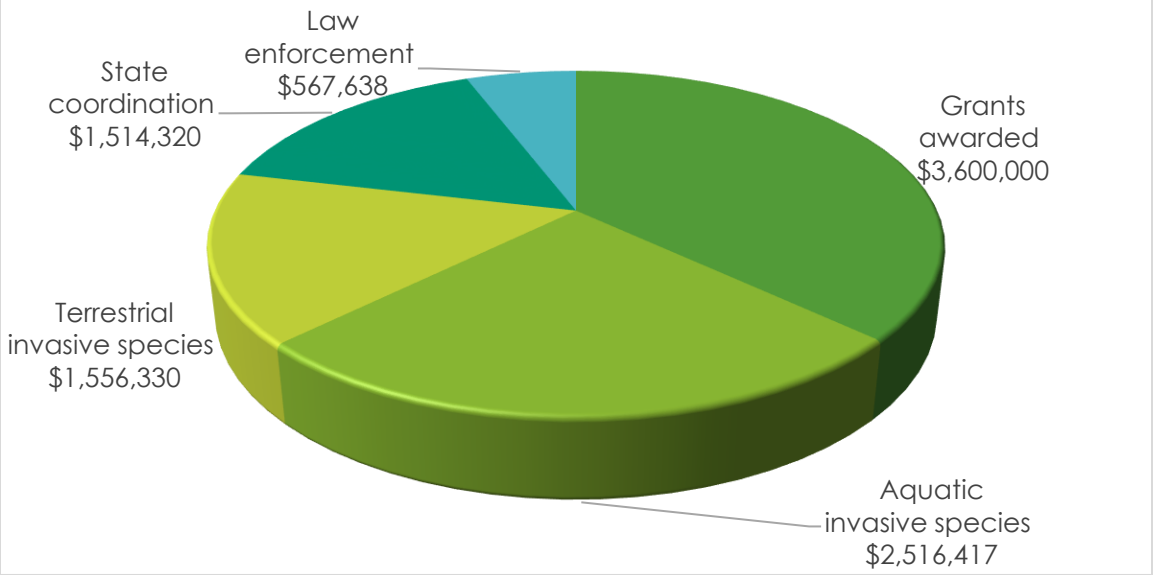
	CISMA statewide coverage (number of counties)	Early detection responses	Outreach impressions	Control acres
Program Goal	83	90	750,000	6,000
2015	65	355	1,495,800	8,369
2016	77	175	5,037,627	8,710
2017	77	194	5,090,658	9,370
2018	83	58	4,274,867	9,410
2019	83	24	6,265,359	12,313
2020	83	8	8,333,206	11,867
2021	83	34	20,461,963	54,245

Program finances – fiscal year 2021

Funding - $9,754,705



Expenditures by program area - $9,754,705



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 at the end of this report. If a species is prohibited or restricted, it is unlawful to possess, introduce, import, sell or offer that species for sale as a live organism, except with a valid permit.

Michigan's Natural Resources Commission, in consultation with MDARD, or the Commission of Agriculture and Rural Development, in consultation with the DNR, may add to the list of prohibited and restricted species.

The term "prohibited" is used for species that are not widely distributed in the state. Often, management or control techniques for prohibited species are not available. The term "restricted" is applied to species that are established in the state. Management and control practices 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 2021.

Scientific permits issued for prohibited or restricted species in 2021

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 2021, 35 permits were granted to partner agencies, universities and other entities including consulting firms, zoos, nature centers and other educational institutions (Table 2).

Table 2 – Prohibited and restricted species permits issued in 2021

Species	Status	Number of Permits Issued	Permittees
Rusty crayfish	Restricted	5	4 universities, 1 partner
Zebra mussels	Restricted	7	3 universities, 2 partners, 2 others
Quagga mussels	Restricted	8	3 universities, 3 partners, 2 others
Round goby	Prohibited	6	3 universities, 1 partner, 2 others
Red swamp crayfish	Prohibited	4	1 university, 3 partners
Ruffe	Prohibited	1	1 university
Terrestrial and aquatic plants	Prohibited or restricted	4	2 universities, 1 partner, 1 other

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

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

Detection and/or specific management actions occurred in 2021 for the prohibited, restricted or other problematic species listed below:

Red swamp crayfish

The DNR conducted an experimental chemical treatment to remove invasive red swamp crayfish from a detention pond in Novi (Oakland County). In July 2021, working with Michigan State University, the U.S. Geological Survey and Auburn University, the DNR evaluated the use of ExciteR™, a pyrethrin-based pesticide, to manage the invasive crayfish. Results indicate the treatment successfully suppressed the population, resulting in the removal of 1,360 red swamp crayfish. Post-treatment trapping indicated the presence of live crayfish in much smaller numbers than pre-treatment, indicating that some survived in burrows. The treatment was deemed more cost-efficient and effective than standard trapping methods.

Firewood pathway management

On Oct. 14, 2021, MDARD announced a proposed exterior firewood quarantine that would regulate firewood entering Michigan from all other states. Public comments, received through Nov. 19, 2021, are being reviewed to determine if any changes are necessary in the document. Once a final draft of a proposed quarantine is agreed upon, the document will be sent to the MDARD director for approval and signature, with an effective date of two weeks after signature. Michigan's Insect Pests and Plant Diseases Act, Act 189 of 1931, as amended, (MCL 286.201 et seq.) provides the legal authority for MDARD to promulgate plant health quarantines. Once a quarantine is signed, MDARD will post the new quarantine and notify industry as required in that act.

Balsam woolly adelgid

In August 2021, the Michigan Department of Agriculture and Rural Development confirmed the first known detection of invasive balsam woolly adelgid in Michigan. The tiny, sap-sucking insects were found on a single private residential property in Rockford, Michigan. An alert arborist recognized the symptoms of infestation on several Fraser fir trees on the property and reported through the Midwest Invasive Species Information Network. That quick action initiated an early detection response effort including an intensive survey of the area and plans to remove and destroy the infested Fraser firs. Balsam woolly adelgid can infest and ultimately kill balsam fir, native to Michigan, as well as Fraser and concolor firs, popular landscape trees around the state. The insect has been on Michigan's Invasive Species Watch List for years because of the potential threat it poses should it become established here. It is considered a serious pest of forest, seed production, landscape and Christmas tree industries. In 2014, MDARD implemented a Balsam Woolly Adelgid Exterior Quarantine regulating the movement of fir nursery stock and firewood into Michigan from areas in North America with known infestations.

Hemlock woolly adelgid

In October 2020, hemlock woolly adelgid was detected at Ludington State Park in Mason County by a member of the Michigan Civilian Conservation Corps Forest Health Crew in the DNR's Parks and Recreation Division, during a routine survey of the park's hemlock forests. The crew at Ludington was able to survey the surrounding area quickly and treat nearly 400 hemlocks in the vicinity to try to prevent the infestation from spreading or intensifying. Through survey efforts, four additional infested trees were identified. Michigan has been combating hemlock woolly adelgid since 2006 and has current infestations in Allegan, Mason, Muskegon, Oceana and Ottawa counties. Ludington State Park is the eighth state park where hemlock woolly adelgid populations have been found, and currently the northernmost point of infestation.

In February 2021, hemlock woolly adelgid was detected on a single tree at the Sleeping Bear Dunes National Lakeshore in northern Benzie County. After thorough surveys by National Lakeshore staff, it was determined that the

infestation was limited to the single tree, which was removed and destroyed to prevent further spread. This infestation is considered eradicated.

Mile-a-minute weed

In October 2020, the Michigan departments of Natural Resources and Agriculture and Rural Development confirmed the first known detection of invasive mile-a-minute weed in Michigan at Albion College's Whitehouse Nature Center in Calhoun County. The fast-growing, barbed vine native to India, Asia and the Philippine Islands can overtake native and landscape vegetation, eventually smothering plants and trees under dense, prickly thickets. The fruit is attractive to birds, deer and small mammals, making it possible for seeds to spread miles away from the original plants. Because of the risk to Michigan's Christmas tree farms, reforestation projects and habitat restoration areas and the plant's limited distribution, mile-a-minute weed is on the state's invasive species watch list.

WATCH LIST SPECIES

Invasive species on Michigan's watch list have been identified as posing an immediate or potential threat to Michigan's economy, environment or human health. These species either have never been confirmed in the wild in Michigan or have a limited known distribution.

Beech leaf disease

In January 2021, MDARD and DNR added beech leaf disease to the state's invasive species watch list. Beech leaf disease is associated with a microscopic nematode (roundworm) that enters and spends the winter in leaf buds, causing damage to leaf tissue on American beech and European and Asian beech species. Infestations result in darkened, thick tissue bands between leaf veins, creating a striped effect on the leaves, leaf distortion and bud mortality.

Trees weakened by leaf damage become susceptible to other diseases and can die within six years. Though beech leaf disease has not yet been found in Michigan, it was discovered in Ohio in 2012 and later in seven eastern states and Ontario. Michigan's approximately 32 million American beech trees are an important component to forests, providing food and shelter for wildlife. The disease's proximity to Michigan, its potential

for rapid spread and its devastating effect on beech trees, already under attack from beech bark disease, provide the rationale for inclusion on the watch list.

New Zealand mudsnails

In August 2021, invasive New Zealand mudsnails were detected at the mouth of Shanty Creek, a tributary of the Grass River in Antrim County. The snails were found during routine monitoring in May by the Grass River Natural Area Stream Watch project and confirmed through DNA analysis by Oakland University. The Grass River is now the sixth river system in Michigan known to be infested by the mudsnails. Their discovery in the Pere Marquette River in August 2015 signaled the first detection in a Michigan inland waterway. In 2016, populations were confirmed in the Boardman and Au Sable rivers. By 2017, the invasive snails were found in the Upper Manistee and Pine rivers. One snail can produce over 200 young in a year. Since few natural predators or parasites of this species exist in North America, their numbers grow rapidly, reducing food availability for other stream invertebrate populations. The DNR and EGLE have incorporated mudsnail monitoring into their standard sampling procedures. Likewise, volunteers across the state who conduct regular monitoring through the Michigan Clean Water Corps or other programs are also trained to look for and report invasive species, increasing the potential for early detection in several rivers and streams each year.

Spotted lanternfly

Recent discoveries of small populations of spotted lanternfly in eastern Ohio and southern Indiana indicate the invasive insect is moving into the Midwest and could reach Michigan at any time. Spotted lanternfly sucks sap from host plants, secreting large amounts of sticky liquid that attracts pests and fouls surfaces. Heavy infestations can affect outdoor recreation and complicate crop harvests. MDARD, DNR and MSU are working with USDA-APHIS and the USDA Forest Service to complete a spotted lanternfly action plan to assure the state is

ready to respond to the threat. Public outreach efforts are underway to encourage prevention, awareness and reporting. Public participation is essential to early detection, which provides the opportunity to contain an infestation before it becomes a widespread problem.

Asian longhorned beetle

With active infestations in Massachusetts, New York, Ohio and North Carolina, invasive Asian longhorned beetle, a destructive hardwood pest, remains a potential threat to Michigan's forests and urban trees. Early detection efforts in 2021 included MDARD surveys of ports of entry, freight yards and warehouse districts as well as pheromone trapping, conducted by MSU Extension at high-risk recreation and industrial sites across the state. Public outreach efforts continue to focus on identification and reporting, especially during August, when adult beetles are most active. MDARD anticipates completion of an Asian longhorned beetle response plan, focusing on intergovernmental cooperation, in 2022.

Legislative and funding recommendations

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

1. **Supporting and expanding the invasive species fund in Part 413 of the NREPA to address emergency/rapid response**
   Michigan's forests, rivers, inland lakes, wetlands and coastlines are already negatively affected by invasive species like emerald ash borer, phragmites and zebra mussels. Once they are well established and widespread, the damage is irreversible. These invasions translate to economic impacts in the form of management and control costs as well as economic losses such as reduced tourism and recreation opportunity and damage to infrastructure. Michigan's Invasive Species Program addresses all stages of invasion including prevention, early detection, response and management. But even with the best prevention efforts, Michigan continues to experience new invasions like New Zealand mudsnails and threats like invasive carp and Asian longhorned beetles that could devastate waterways and forests.

   Early detection and response to invasive species new to Michigan is a key program component to ensure natural resource protection. Timely response to new invasions corresponds to a higher likelihood of containment and eradication.

   MDARD, DNR and EGLE, in collaboration with partners, are implementing a highly successful invasive species program; however, coordinated response to emerging invasive species threats remains a substantial challenge. The departments' response actions are limited by the inability to quickly access resources. This lack of funding leads to delayed response, which may enable further spread of new invasive species infestations and missed opportunity for eradication. Quick access to a stable source of funding would enable coordinated short-term response actions while long-term solutions are sought.

   Part 413 currently contains authorization for the creation of an Invasive Species Fund (section 324.41311). The fund purpose is narrowly defined for the DNR and MDARD to deposit civil fines and permit fees collected pursuant to Part 413 to be used by those two departments for administering enforcement activities related to Part 413 or public education about invasive species prevention and control.

Recommendation No. 1

Modify the existing statutory language under 324.41311(4) to provide funding for invasive species emergency response activities. Language should be modified in three ways:

1) Include EGLE as an agency able to use funds since the invasive species program is cooperatively implemented by the three departments, where EGLE has responsibilities related to emergency response
2) Include emergency response as an eligible activity for which the fund can be used. Specific criteria for use of emergency response funds would be developed.
3) Consider allocation to the invasive species fund for emergency response.

2. Supporting local AIS prevention and control in inland lakes

Hundreds of Michigan's inland lakes are affected by widely distributed aquatic invasive plant species like Eurasian watermilfoil and starry stonewort that 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 water body ecology. 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.

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

Michigan's Clean Boats, Clean Waters program is cooperatively implemented by EGLE and Michigan State University. Using federal grant funding, EGLE and MSU initiated a pilot mini-grant program in 2020 that funded seven local AIS outreach projects for a total of $21,000. The program is gaining interest throughout Michigan. In 2021, with a budget of $25,691, the grant program received 42 project proposals. The first two

years of this pilot project indicate the interest and need for inland lake prevention efforts at the local level far exceeds the currently available resources. Because the CBCW mini-grant program is a pilot effort using federal grant funds, the future of the program is uncertain.

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 grant program was discontinued in 2020 due to COVID 19-related budget cuts.**

The AIP grant program is constrained by statutory language that limits the use of funds.

Recommendation No. 2

Modify the existing statutory language under 324.414 *to* **allow for the 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 limits on 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.

3. Continuing and enhancing support for Michigan's invasive species program

Since 2014, the state Legislature has 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.

Over the last eight years, the MISP – cooperatively implemented by the Michigan departments of Agriculture and Rural Development; Environment, Great Lakes, and Energy; and Natural Resources – has grown significantly to address Michigan's broad invasive species concerns.

This progress has both broadened the understanding and sharpened the focus of invasive species prevention, detection and management in Michigan, leading to a clearer assessment of program needs to both sustain current efforts and meet future challenges.

Recommendation No. 3
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 receives $60,000 in annual base operations. Currently 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 assure 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 understand and take action to assure state and regional invasive species efforts 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 in program delivery. Once needs are understood, funding will provide additional CISMA staff in targeted areas to improve outreach and services in underserved communities.
3) Law enforcement sustainability
   DNR's Law Enforcement Division has become an integral part of the MISP's efforts to communicate and enforce Part 413 invasive species regulations. Short-term federal grants from the Great Lakes Restoration Initiative have assured that officers across the state are trained in invasive species boating laws and spend time at boating access sites each summer talking to boaters and ensuring compliance. LED's Organisms in Trade initiative, also supported by annual GLRI grants, has grown to include inspection of live food markets, pet stores and commercial haulers and monitoring internet and interstate sales to prevent or intercept prohibited and restricted

species. However, competitive GLRI grants do not provide stability to support ongoing implementation of these activities into the future.

4) Terrestrial invasive species program capacity
   Michigan's Aquatic Invasive Species program benefits from support through the Great Lakes Restoration Initiative, which provides dedicated funds for implementation of Michigan's federally approved AIS State Management Plan, interjurisdictional AIS projects and AIS projects related to Lakewide Action Management Plans. GLRI funds bolster AIS prevention activities, early detection and response efforts, and regional control of key species like phragmites and European frog-bit. Without a similar external funding source to broadly support terrestrial invasive species initiatives, Michigan's TIS program is lagging in all these areas. Recent detections of new terrestrial invasive species including mile-a-minute weed and Japanese stiltgrass and a growing list of emerging threats like spotted lanternfly and beech leaf disease make the need for additional TIS efforts much more urgent.

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

Table 3.A - Plants

Species	Part 413 Status	Distribution in Michigan	Comments
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 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 eastern coastline from Lake Erie to St. Marys River; and in Alpena, Chippewa, Ingham, Jackson, Kent, Mackinac, Oakland, Oceana, Ottawa and Washtenaw counties
Fanwort (Cabomba caroliniana)	P	Locally abundant	Locally abundant in Lower Peninsula, primarily in southwest Lower Peninsula; 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; also identified in Indiana, Illinois, Minnesota, Ohio, Wisconsin and Ontario.
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 Lower and Upper peninsulas.
Parrot feather (Myriophyllum aquaticum)	P	Isolated	Active management of isolated populations in Berrien, Calhoun, Jackson, Washtenaw and Wayne counties; isolated populations in Illinois, Indiana, New York, Ohio and Pennsylvania.
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 Upper Peninsula.
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 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.

Species	Part 413 Status	Distribution in Michigan	Comments
Yellow floating heart (Nymphoides peltata)	P	Isolated	Active management of Isolated populations in Ingham, Kent, Oakland Ottawa and Wayne counties. Isolated populations in Illinois, Indiana, Ohio, Wisconsin and Ontario.

Table 3.B - Crustaceans

Species	Part 413 Status	Distribution in Michigan	Comments
Marbled crayfish (Procambarus virginalis)	P	Absent	No populations detected in the wild, but this species historically has been available for sale in the pet trade.
Rusty crayfish (Faxonius rusticus)	R	Widespread	Widespread and breeding in Great Lakes and inland waters.
Red swamp crayfish (Procambarus clarkii)	P	Isolated	Isolated population in Sunset Lake in Vicksburg, Michigan. Other isolated populations exist in private waters near Farmington Hills and Novi, Michigan.
Yabby (Cherax destructor)	P	Absent	
Killer shrimp (Dikerogammarus villosus)	P	Absent	

Table 3.C - 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	Suspected limited natural reproduction in Ohio waters of Lake Erie; 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	

Species	Part 413 Status	Distribution in Michigan	Comments
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.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, Michigan.
Giant African snail (Achatina fulica)	P	Absent	
Girdled snail (Hygromia cinctella)	P	Locally abundant	Wayne County, Michigan.
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 and Upper Manistee rivers.
Golden mussel (Limnoperna fortunei)	P	Absent	
Wrinkled dune snail (Candidula intersecta)	P	Locally abundant	Wayne County, Michigan.
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.

Table 3.E - 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.F - Birds

Species	Part 413 Status	Distribution in Michigan	Comments
Eurasian collared dove (Streptopelia decaocto)	P	Isolated	First observed in Michigan in 2002, has since been documented in Alger, Berrien, Kalamazoo, Mason and Grand Traverse counties.

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 and Ontario. Eradicated from Illinois and New Jersey.
Emerald ash borer (Agrilus planipennis)	P	Widespread	Widespread throughout Lower Peninsula; isolated or patchy distribution across Upper Peninsula.