

2.13 INVASIVE SPECIES

The National Wildlife Federation defines invasive species as any living organism, whether amphibian, plant, insect, fish, fungus, bacteria, or even an organism's seeds or eggs, that is not native to an ecosystem and causes harm. These species can harm the environment, the economy, and even human health. In addition, species that can grow and reproduce quickly, spread aggressively, and have potential to cause harm are identified as "invasive".

According to the ODNR, Division of Natural Areas & Preserves, of the approximately 2,300 species of plants known to occur in Ohio, about 78% are native or have occurred in Ohio before the time of substantial European settlement (1750). The other 22% of species are not native to the state. Non-native plants have been introduced for erosion control, horticulture, forage crops, medicinal use, wildlife foods, or by accident. Most of these species never stray far from where they are introduced, but some become very invasive and displace native plants throughout the state.

Without natural predators or controls, invasive, non-native plants are able to spread quickly and force out native plants. Other non-native plants are impacting our wetlands by creating monocultures. Native plant diversity is important for wildlife habitat, as many animals depend on a variety of native plants for food and cover.

More information about invasive species in Ohio can be found on ODNR's website: <http://ohiodnr.gov/invasivespecies>, USFWS' website: <https://www.fws.gov/invasives/>, Early Detection & Distribution Mapping System (EDDMapS) website: <https://www.eddmaps.org/>, and the USDA National Invasive Species Information Center: <https://www.invasivespeciesinfo.gov/index.shtml>.

The top ten invasive plant species in Ohio are:

- Bush Honeysuckles
- Autumn – Olive
- Buckthorns
- Common Reed Grass
- Garlic Mustard
- Japanese Honeysuckle
- Japanese Knotweed
- Multiflora Rose
- Purple Loosestrife
- Reed Canary Grass

Per ODNR, aquatic invasive species (AIS) include both plants and animals that have been introduced to our waterways and have become harmful to native species and their habitats. AIS may live entirely within or partially in an aquatic habitat. Below is a list of some Ohio's top AIS threats. The list is not fully inclusive and the USGS maintains an additional list of AIS in the U.S.

Some of Ohio's top AIS are:

- Asian Carp (Bighead Carp, Silver Carp, Black Carp, Diploid Grass Carp)
- Curlyleaf Pondweed
- Hydrilla
- Round Goby
- Ruffe
- Red Swamp Crayfish
- Sea Lamprey
- White Perch
- Zebra Mussel

Lastly, according to the ODNR, Division of Forestry, one of the most invasive insect species in Ohio is the Emerald Ash Borer. This Asian pest is part of a group of insects known as metallic wood-boring beetles. Emerald Ash Borer affects all species of native ash found in Ohio. Because North American ash trees did not coexist in association with this pest, they have little or no resistance to its attack. This ash tree-killing insect from Asia was unintentionally introduced to southeastern Michigan several years ago. Emerald Ash Borer larvae feed on the living portion of the tree, directly beneath the bark. This eating habit restricts the tree's ability to move essential water and nutrients throughout the plant. In three to five years, even the healthiest tree is unable to survive an attack.

RISK ASSESSMENT

The area invaded by each plant species varies based on its preferred environment. Those with the fewest limitations have spread to nearly every county in Ohio. The Emerald Ash Borer is currently found in all 88 counties in Ohio, six neighboring states and the province of Ontario.

The State Management Plan for AIS, produced by the Ohio Department of Natural Resources, prioritizes AIS into two categories based on the degree of negative impact. High-risk species are those that currently cause or could potentially cause significant harm, while medium risk species are those that have a lesser impact, but are still a cause for concern. Below are the high-risk and medium-risk AIS that are the most concerning in the United States. While not all of these AIS are currently present in the State of Ohio, there is still a potential risk for the future.

The high-risk AIS are:

- Asian Carp
- Northern Snakehead
- Sea Lamprey
- Round & Tubenose Goby
- Zebra & Quagga Mussels

The medium-risk AIS are:

- Alewife
- River Ruffe
- Spiny & Fishhook water flea

LHMP DATA

Mercer County

The most recent invasive species to impact Mercer County is the Emerald Ash Borer (EAB). EAB is an ash-tree killing insect native to Asia; it kills trees within three to five years of infestation. It was first discovered in Ohio in 2003. Since that time, the Ohio Department of Agriculture and partner agencies have worked to protect the state's 3.8 billion ash trees. Mercer County is not the most impacted area of Ohio but it has experienced effects of the EAB infestation. As diseased trees along waterways have died, they have fallen into the waterways, impacting drainage and the flow of water. Diseased trees along the public right-of-way have also impacted infrastructure, as they are more likely to fall during a storm or high wind event. The Mercer County Engineer and jurisdiction street and road departments have aggressively removed diseased trees along the public right-of-way, which has been effective at reducing the impact on utility lines and other infrastructure

In recent years, Grand Lake St. Marys has been affected by multiple blue-green algae blooms. The algae, which is thought to be caused by increased quantities of phosphorous and nitrogen in runoff water, can produce toxic bacteria that is harmful to plants, animals, and humans. In 2010, the lake was declared

unsafe for contact, including boating and swimming, due to an algal bloom. Because of the lake's importance to the economy of the region, this had a serious impact on businesses in the region. In October 2010, the U.S. Small Business Administration issued a declaration of economic injury for Mercer County and the region surrounding the lake. This declaration made loans available to small businesses and non-profit organizations negatively impacted by the algal bloom on the lake. While algal blooms have occurred on the lake since 2010, none have reached the magnitude and economic impact of this incident.

Putnam County

According to searches and reviews of online information provided by the Ohio Division of Forestry and the Ohio Department of Agriculture, Putnam County is susceptible to several infestations: European Gypsy Moth; Asian long horned beetles; mosquitoes infected with the West Nile Virus; spider mites; cicadas; the pine shoot beetle; and the Emerald Ash Borer.

Currently affecting the county is a European strain of gypsy moth which is one of the most destructive defoliating insects to attack the trees and forests of the northeastern United States. Impacts of a gypsy moth infestation include economic losses through timber mortality, loss of recreational opportunities in severely defoliated areas, and nuisances from gypsy moth caterpillars. A State Gypsy Moth quarantine was established in 1987. The Division of Forestry mitigation efforts have been successful in containing the gypsy moth infestation. Putnam County has yet to experience significant damages as a result of an infestation.

According to the Division of Forestry, the spring of 2004 saw an infestation of Brood X Cicadas in the southern portion of Putnam County. These cicadas were last seen in 1987. Adult cicadas damage deciduous trees especially when the female cicada lays her eggs. Cicada infestation can be mitigated against by careful pruning, covering smaller trees with cheesecloth, or spraying insecticide. The pine shoot beetle infests many species of pine, but Scotch pine is the preferred host. Cosmetic damage to pines growing on Christmas tree farms and nurseries may result in reduced product quality and substantial economic loss.

Emerald Ash Borer, an ash tree-killing insect from Asia, was identified in Ohio in 2003. Despite the fact that the Ohio quarantine has been lifted, to prevent the spread of EAB and other pests, it is still recommended that Ohioans continue to exercise caution when moving firewood. EAB kills ash trees within three to five years of infestation. Adults are dark metallic green, 1/2 inch in length and 1/8 inch wide, and fly only from mid-May to September. Larvae spend the rest of the year developing beneath the bark

HAZARD PROFILE

The probability of a large-scale infestation actually occurring in Putnam County is relatively low, with only moderate associated risk to human life. The recurrence frequency interval for this type of event is difficult to calculate, as infestations are not a rapid onset and subsidence type of event. Infestation is a long term invasion on an area and therefore assigning a statistical frequency of infestation would inaccurately assess the impact of such an event.

INVENTORY ASSETS EXPOSED TO INFESTATION

Infestation does not directly pose a threat to county facilities or human life at this time. This does not preclude the potential for a life threatening infestation or structurally damaging one in the future.

POTENTIAL LOSSES

Infestation is most likely to occur in the acres of forested or farmland and will likely cause no damage to structural assets; however, it may cause significant economic loss. Infestation is considered as a hazard in Putnam County due to the high percentage of agricultural and forestland in the county.

HIRA SUMMARY

Putnam County is susceptible to several infestations that may impact agricultural and forested portions of the county. Economic losses pose the greatest threat to the county and as such mitigation efforts

Clark County

Clark County is subject to both insect and plant evasive species. Although there are over 3,000 species of plants known to occur in Ohio, about 75% are native or have occurred in Ohio before the time of Europeans (1750). Some of those that have invaded Ohio displace native plants and disrupt woodlands, prairies, wetlands, and natural areas.

Those plants that typically have been the most invasive for Clark County residents include:

- Bush Honeysuckle
- Garlic Mustard
- Multiflora Rose
- Autumn Olive
- Callery Pear (Bradford Pear)

According to the ODNR Division of Forestry, one of the most prevalent invasive insect species is the Emerald Ash Borer. It is an Asian wood-boring beetle and affects all species of native ash trees found in Ohio. In 2003, other invasive species to affect Clark County include the Gypsy Moth Caterpillars and Spider Mites. Most recently found in southwest Ohio is the Asian Longhorned Beetle (AJB) which attacks broadleaf trees, particularly maples. An infestation is to spread or swarm in or over in a troublesome manner. Also, to live in or on as a parasite.

The probability of an infestation hazard event actually occurring in Clark County is relatively low, with only moderate risk associated with it. Infestation is most likely to occur in the 30,720 acres of forested or the 257,920 acres of farmland and will likely cause no damage to structural assets. Infestation is considered as a hazard in Clark County due to the high percentage of agricultural and forestland in the county. The Asian Long-Horned Beetle (ALB) has been discovered in Southwest Ohio east of Cincinnati by the U.S. Department of Agriculture. Ohio is the 5th state to detect ALB. These beetles attack a wide variety of broadleaf trees particularly Maples.

There are about 60 species of invasive plants identified in Ohio. Invasive species can cause economic and environmental damages in communities. Clark County is currently participating in a 22 county Woodland Invasive Species Program launched to promote healthier forests. Invasive Bush Honeysuckle is one of the most prevalent invasive species in Clark County. Invasive species plants are usually characterized by fast growing, rapid vegetation spread, and efficient speed dispersal and germination. Since these plants are not native to Ohio, they lack the natural predators and disease which would naturally control them in their native habitats.

Past Occurrences

Invasive species have been around since the settlers of the 1750's. Movement of people and transportation has made the spread of invasive species more prevalent. The Emerald Ash Borer was

introduced in the U.S. in the 1990's from wood packing material from China, first being discovered in Lower Michigan, spreading to Ohio, Maryland, Pennsylvania, northern Indiana, and Chicago.

Probability of Future Events

Invasive species will continue to affect Ohio. With the increase in worldwide trade and the fast modes of transportation, the invasive species will continue to occur. Just as the Asian Longhorned Beetle has recently been discovered in southwest Ohio, new species of unwanted pests will come. The importance of controlling the natural environment native to Clark County will require local, state, nationwide, and international cooperation to avoid unwanted infestations of invasive species.

PAST OCCURRENCES

Invasive species of plants, fish, and insects have been arriving in Ohio since the establishment of European settlers in the 1750s. With each improvement in the scale and speed of human transportation, the potential for unintended introduction of invasive species has increased. Organisms which could not survive the month-long journey from Europe or Africa to America can make the journey in a matter of hours today. Several examples of species introduction pathways follow.

The Round Goby species was introduced from Eurasia into the St. Clair River and vicinity on the Michigan-Ontario border where several collections were made in 1990 on both the U.S. and the Canadian side. Speculation exists the Goby was transported from its native Caspian Sea by way of ballast tanks on ocean-going vessels. Today, the Goby is found in all the Great Lakes and is making inroads in all contiguous state watersheds.

The Multiflora Rose was introduced to the U.S. from Japan in 1886 as an under-stock for ornamental roses. Birds are responsible for spreading the seeds, which remain viable for a number of years. In the 1930s, the Soil Conservation Services advocated the use of Multiflora Rose for erosion projects and as a way to confine livestock. Hedges of Multiflora Rose have also been used as a crash barrier and to reduce headlight glare in highway medians.

The Emerald Ash Borer was introduced into North America sometime in the 1990's. The insect is believed to have been introduced into the U.S. in wood packing material from China. It was first reported killing ash trees in the Detroit and Windsor areas in 2002. Only species of ash are hosts for the beetle, which usually kill infested trees within a couple of years. Since then, infestations have been found throughout Lower Michigan, Ohio, Indiana, the Chicago area, Maryland and recently in Pennsylvania.

Considering the thousands of plant, dozens of aquatic and unknown number of insect species introduced into Ohio over the past 250 years, samples of the most often cited transfer media are provided here. Exotic species can arrive by a nearly endless number of vectors making a complete listing impossible.

PROBABILITY OF FUTURE EVENTS

Since the beginning of European colonization, non-native species have been arriving in Ohio. With the increase in global trade and travel, the probability of new and unexpected species arriving in Ohio will continue to grow. Legislation is in place around the world in an attempt to control the migration of unwanted species between ecosystems.

ODNR is currently battling the entrance of wild boars from Kentucky and West Virginia. The greatest concentration of verified populations can be found in the unglaciated region of southeastern Ohio. In addition, there are several species of carp currently migrating up the Mississippi watershed from the Gulf

Coast. Per the ODNR, Division of Fish Management and Research, silver and bighead carp are already present in the upper reaches of the Ohio River system in Ohio. The state hopes to seal off all areas where the Ohio River basin and the Lake Erie basin meet. None of the species considered Asian Carp have yet to establish themselves in the Lake Erie basin.

It is certain that new wanted and unwanted species will arrive in Ohio. The importance of controlling the integrity of existing ecosystems will require ongoing state, national and international efforts to avoid unwanted infestations. To this end, the State enacted new rules in January 2018 to make the sale and distribution of 38 invasive species illegal. In addition to the newly illegal plants, the Department of Agriculture assembled an invasive plant committee to review potential future additions to the no-sale list. The 2018 list is available at <http://www.agri.ohio.gov/divs/Plant/Forms/InvasivePlantsNewsletter.pdf>

VULNERABILITY ANALYSIS & LOSS ESTIMATION

METHODOLOGY

Impacts of invasive species tend to have commercial operational impacts, as opposed to many built environment impacts of the other hazards covered. Due to this unique situation, rather than a matrix listing county losses, the loss estimates will be presented using historical response costs to predict future losses in unadjusted dollars.

RESULTS

From the perspective of invasive plant species, the Multiflora Rose is one of most expensive to combat in Ohio. Each individual plant's ability to produce 500,000 seeds a year allows this invasive species to spread over large areas with incredible speed. Agricultural groups are facing the highest exposure and expense in the form of infiltration of croplands and eradication programs. According to agricultural experts associated with the Ohio State University, Ohioans are estimated to spend millions of dollars combating the Multiflora Rose. Precise dollar figures are not available due to the majority of response activities being performed by non-governmental entities.

Turning to invasive aquatic species, the Zebra Mussel is one of the most expensive to control. The mussels naturally collect on any solid surface and create significant problems for drinking water processing facilities and utilities. All in-water structures are impacted including, but not limited to, piers, breakwalls, vessel hulls and vessel engines cooled with external water. Estimates for controlling infestations run between \$2 and \$10 million per year depending on how many sources are aggregated. Should the Zebra Mussel effectively invade the river systems of Ohio, it is suggested the annual control costs could rise 10-fold.

Invasive insect species are both the direct source of damage to trees and a vector for other parasites. In the last century, the North American population of Elm trees was decimated by a fungus which arrived on infected trees shipped to an Ohio furniture company. One of the primary transport methods is through beetles which the fungus uses as a host to move from tree to tree. The beetle's ability to fly exponentially increased the number of trees impacted. Trees located in non-urban areas posed financial impact only to loggers; however, the Elm was a popular urban tree and the cost to remove them ran into the millions over the years.

The Emerald Ash Borer, which is currently impacting the North American Ash tree, has already cost millions of dollars in attempts to identify and isolate infected trees. In Ohio alone, there are an estimated 5 billion Ash trees at risk. Although many research centers are searching for an effective means of

combating the insect, the only method currently available is the use of insecticides which have to be applied annually. The uncaptured cost to treat Ash trees in Ohio will likely reach into the millions, as urban areas combat the insect.

STATE-OWNED AND STATE-LEASED CRITICAL FACILITIES VULNERABILITY ANALYSIS & LOSS ESTIMATION

Similar to drought in Section 2.11, invasive species have a very limited impact on state-owned or state-leased facilities. The most prominent impact to state facilities relates to the maintenance of marinas in Zebra Mussel impacted areas. These mussels can clog inlets that could affect facilities, but not in the same manner as many of the other hazards. Also, Emerald Ash Borer could result in significant increases in fuel for wildfires in Region 3, which could adversely affect state facilities.