

OHIO – 2021

Forest Health Highlights

The Resource

Ohio encompasses 26,209,700 acres, and 30 percent of these acres are forested, not including the urban forest. Forests have increased dramatically since 1940, including an increase from 7.1 to 8.0 million acres since the late 1970s. Ohio's forests are 85 percent privately owned and the predominant forest type group is oak-hickory, occupying 64 percent of Ohio's forest land. Ohio's forest industries contribute over \$27 billion to the state's economy. The Ohio Division of Forestry manages 24 state forests totaling more than 200,000 acres.

Aerial Forest Health Survey

Each year, the Ohio Division of Forestry, with the use of Ohio Division of Wildlife aircraft, conducts an aerial survey over the majority of the state to survey Ohio's forest health. This year's survey began on June 8 and concluded on June 23. Flight lines were flown in an east to west direction with spacing of about 6 miles. Each flight day, two observers were equipped with digital mobile sketchmap (DMSM) tablet computers containing a GIS/GPS mapping system. The observers identified 310 different sites from the air with discoloration, defoliation, or mortality, totaling 10,253 acres. The majority of these sites were inspected on the ground by Ohio Division of Forestry staff. The top five damage-causing agents (DCA) and associated acreage are below:

Damage causing agent	Acres
Eastern white pine needle damage	7,089
Sycamore anthracnose	1,231
Diplodia canker	784
Yellow-poplar weevil	403
Hardwood anthracnose	155

Eastern white pine needle damage is a suite of native fungal pathogens that infect eastern white pine needles causing discoloration, premature needle loss, and can weaken trees leading to dieback and mortality. This issue appears to be most severe in southeastern Ohio and is likely related to a variety of factors including recent years of above normal rainfall, aging trees, and loss of tree vigor due to competition for sunlight with surrounding trees.

The spring of 2021 saw cool, wet weather which is very conducive to sycamore anthracnose development. Spring defoliation of sycamores was prevalent across Ohio due to this common fungal



Figure 1: Drone image of discoloration caused by eastern white pine needle damage (Credit: Ohio Division of Forestry)

pathogen. Fortunately, this disease typically has little impact to the long-term health of established and otherwise healthy trees. Re-foliation of sycamores was observed by early-summer.

Special Issues

Spotted Lanternfly



Figure 2: Adult spotted lanternflies on tree-of-heaven (Credit: Ohio Division of Forestry)

This planthopper insect is native to Asia and was first documented in North America in southeastern Pennsylvania in 2014. It has since spread to several other Northeastern and Mid-Atlantic states. Ohio's first known spotted lanternfly infestation was discovered in 2020 in Jefferson County in eastern Ohio. In 2021, additional infestations were discovered in Cuyahoga County, near Cleveland. The spotted lanternfly poses a significant threat to the agricultural industry (particularly grape and hops vineyards and fruit orchards) and potentially native forest ecosystems. Most of the known Ohio spotted lanternfly infestations appear to be associated with railroads and the non-native tree-of-heaven (*Ailanthus altissima*). Railroads seem to be a potential pathway of introduction, as spotted lanternflies lay their cryptic-colored

egg masses on nearly any flat surface including train cars, buildings, fences, rocks, and tree trunks. An interagency team, led by the Ohio Department of Agriculture, and including the USDA Animal & Plant Health Inspection Service, Ohio Department of Natural Resources, Ohio State University Extension, and Ohio Grape Industries Committee, is assisting with survey, management, and education and outreach efforts. The Ohio Department of Agriculture has conducted survey and treatment work as well as enacted a quarantine of Jefferson and Cuyahoga counties to limit the spread of the insect.

Oak Wilt

The fungal pathogen *Bretziella fagacearum*, which causes the disease oak wilt, has been known to occur in Ohio for several decades, but there has been a concerning increase in oak wilt infected areas since 2019, with some new infected areas reported in 2021. New and existing infections were identified in all regions of the state. This disease is deadly to oaks and the fungal spores can spread between trees aboveground via sap-feeding beetles and belowground through root systems of neighboring trees that have grown together, or "grafted." Ohio Division of Forestry is working with landowners to help manage oak wilt infections on private land as well as on Ohio Department of Natural Resources (ODNR)-owned properties.

Forest Pest & Disease Issues

Beech Leaf Disease

A decline of American beech (and potentially several other non-native beech species) has been documented in northeastern Ohio since 2012. This decline is being referred to as beech leaf disease

(BLD) and was first noted in Lake County and is now known to be present in parts of northeastern Ohio, the Canadian province of Ontario, and several Northeastern states. In 2020, beech leaf disease was detected in one new northeastern Ohio county; Carroll. Symptoms are first noticeable as dark interveinal striping on leaves, and progress over a period of one or more years to stunted and distorted leaves, reduction in leaf and bud production, and branch dieback. Mortality of understory trees and saplings has been documented. In 2019, scientists and researchers with several agencies and organizations including the USDA Forest Service, Holden Arboretum, and cooperating Canadian agencies made progress in identifying the possible causal agent, believed to be a newly described species of foliar nematode (*Litylenchus crenatae* ssp. *mccannii*). In 2021, the Ohio Division of Forestry in partnership with Holden Arboretum, sampled American beech (as well as maple and oak species) buds from 24 counties across the state. Analysis identified nematode DNA at roughly half the sites, fairly evenly distributed across the state, including areas far from where beech leaf disease symptoms are known to occur. Nematode DNA was also detected from some oak and maple buds. Those sites that were positive for nematode DNA were re-visited in fall 2021 in order to be examined for beech leaf disease symptoms as well as leaf sample collection for the identification of live nematodes. The results of that sampling effort are currently pending. Additional long-term monitoring plots were established near the margins of the known extent of beech leaf disease in Ohio to better track tree damage progression over time and document impacts and changes to forest ecosystems.

Conifer Fungal Diseases

Several coniferous tree species have been increasingly affected by various fungal diseases in recent years in Ohio. White pine needle damage results in needle discoloration and defoliation and can contribute to dieback and mortality. Multiple native fungi have been identified as contributing to white pine needle damage. This problem seems to be most prevalent in southeastern Ohio at this time. In addition to eastern white pine, eastern hemlock is being impacted by several different fungal pathogens. Fabrella needle blight causes discoloration and premature needle drop in late-summer, particularly on lower branches. Sirococcus tip blight causes shoot dieback. Since 2020, there has been a significant increase in the occurrence of Rosellinia needle blight on eastern hemlock, particularly in southeastern Ohio on lower slopes and near water, where relative humidity tends to be higher during the growing season. Rosellinia needle blight infections create fungal “mats” of needles and cause the death of needles on large sections of branches, or entire seedlings, saplings, and small trees. Lastly, dieback and mortality of Colorado blue spruce (a non-native, ornamental tree in Ohio) continues to occur throughout the state due to various needlecast and canker diseases. All of these fungal issues impacting conifers in Ohio and the region are believed to be, in large part, due to changing climatic conditions – specifically greater moisture during the spring and summer months.



Figure 3: Rosellinia needle blight on eastern hemlock (Credit: Ohio Division of Forestry)

Hemlock Woolly Adelgid and Elongate Hemlock Scale

Two non-native, invasive insects of concern that infest eastern hemlock trees are present in Ohio. Hemlock woolly adelgid (HWA) is known to be present in 18 counties (5 new counties identified to date in 2021), while elongate hemlock scale (EHS) is present on yard and planted hemlock trees in several parts of Ohio, but only known to be infesting hemlock forests in northeastern Ohio. In 2021, the Ohio Division of Forestry, with assistance from several governmental and non-governmental partners, treated roughly 2,000 eastern hemlock trees with the insecticide imidacloprid to protect them from HWA. Since 2013, the Ohio Division of Forestry and partners have conducted HWA biocontrol predator beetle releases. Over 13,000 beetles (*Laricobius nigrinus* and *L. osakensis*) have been released in HWA-infested areas. Monitoring of treatment success and additional predator beetle releases will be ongoing. A more recently approved biological control for hemlock woolly adelgid, two species of silver fly (*Leucotaraxis* spp.), was released for the first time in Ohio in the spring of 2021 at two sites; Lake Katharine State Nature Preserve in Jackson County and Sand Run Metro Park in Summit County. Continued hemlock pest detection surveys are planned for this winter. The ODNR Hemlock Conservation Plan was completed in 2017, with the Ohio Division of Forestry as the lead agency. The plan is guiding the management of HWA and other hemlock pests in Ohio and includes a prioritization of Ohio's hemlock stands. All counties with confirmed HWA infestations are quarantined by the Ohio Department of Agriculture to prevent the movement of potentially infested hemlock materials out of the infested areas.

Sudden Oak Death

Phytophthora ramorum, a fungus-like organism that causes the disease sudden oak death, was detected on rhododendron and lilac nursery stock in the spring of 2019. The Ohio Department of Agriculture (ODA) and USDA Animal & Plant Health Inspection Service (APHIS) responded to retail outlets to remove and properly dispose of high-risk plants. The Ohio Division of Forestry and Ohio State University Extension worked with ODA and APHIS to conduct enhanced outreach to landowners that might have purchased infected plants in southeastern Ohio, where most of Ohio's high-risk oak forests occur. Those efforts resulted in several calls from landowners, including the removal of one rhododendron plant confirmed to be infected with *P. ramorum* from Hocking County. The spores of *P. ramorum* can be detected in surface water, so stream sampling was conducted at nine sites in six counties downstream of areas where *P. ramorum*-infected plants were confirmed or suspected. All samples collected in 2020 were negative for *P. ramorum*. Additional sampling occurred at the same sites in fall 2021, with results currently pending.



Figure 4: Conducting sampling for *Phytophthora ramorum* (Credit: Ohio Division of Forestry)

Asian Longhorned Beetle

The USDA Animal & Plant Health Inspection Service (APHIS) and Ohio Department of Agriculture cooperatively manage the Ohio Asian longhorned beetle (ALB) eradication program and enforce a quarantine area of 57 square miles, centered over Tate Township in Clermont County, including East Fork State Park and Wildlife Area, to prevent the movement of regulated items including wood from

any hardwood tree species out of the infested area. Surveys as of November 13 have located 21,517 infested trees, out of over 3.8 million trees surveyed. As of November 13, 21,291 infested trees have been removed. A tree replanting project was initiated by the Ohio Division of Forestry in the fall of 2012, with non-ALB host tree species available to landowners who were impacted by landscape tree removals by the Ohio ALB program. Since the start of this program, approximately 1,600 trees have been distributed for planting.

Emerald Ash Borer



Figure 5: Adult emerald ash borer (Credit: Ohio Division of Forestry)

Emerald ash borer (EAB) has been the most devastating forest pest in Ohio in recent years, and quite possibly in history. As of 2016, all 88 of Ohio's counties have confirmed infestations. In northwest Ohio, where EAB was discovered in 2002, the majority of native ash trees have been killed. Significant mortality of ash is now occurring throughout Ohio. In late 2014, a researcher at Wright State University discovered EAB infesting white fringetree. Subsequent studies have confirmed the ability of EAB to complete its lifecycle within white fringetree in the natural environment as well as in cultivated olive in the laboratory. The impact EAB will have on these tree species requires further research. In 2019, the Ohio Division of Forestry, in cooperation with

USDA APHIS, conducted releases of three parasitoid wasp species (*Tetrastichus planipennis*, *Spatius agrili*, and *Oobius agrili*) for biological control of EAB in Pike County. The Ohio Division of Forestry continues to help woodland owners manage their forests and utilize their ash resources, assist communities that are dealing with EAB issues, and work to increase public awareness about the insect.

Notable Occurrences

Brood X Periodical Cicada Emergence

The spring of 2021 saw the emergence of "Brood X" of the 17-year periodical cicadas across multiple states, including parts of Ohio. In Ohio, three species of periodical cicadas that make up Brood X emerged in May, mainly in the central and southwestern portions of the state. By early-July, Brood X's lifecycle had come to a close, just as the evidence of the females' egg-laying ("oviposition") was becoming noticeable. Periodical cicada oviposition on small stems and twigs of many species of plants can cause branch tips to die from the oviposition site to the end of the branch. This can result in discolored, dead leaves hanging on dead twigs, referred to as "flagging." Flagging damage from Brood X was



Figure 6: Adult Brood X periodical cicada (Credit: Ohio Division of Forestry)

commonly observed through the summer in the area of emergence. Little to no long-term health impacts are expected on otherwise healthy and established trees and shrubs.

Non-native Invasive Plants

Non-native invasive plants are a threat to the biodiversity of forests throughout Ohio. Some forests contain dense infestations of invasive plants such as *Ailanthus*, Asian bush honeysuckles, autumn-olive, multiflora rose, and Japanese stiltgrass, while other areas remain largely uninvaded. Aerial mapping of *Ailanthus* in southern Ohio has allowed for targeted treatments to reduce infestations on state forest, national forest, and neighboring lands. The Ohio Division of Forestry has partnered with researchers from the U.S. Forest Service Northern Research Station to examine the efficacy of *Verticillium nonalfalfae*, a soil-borne fungus, as a potential biocontrol for *Ailanthus*. The Ohio Division of Forestry promotes invasive plant control by working with Ohio's Cooperative Weed Management Areas (CWMAs), Cooperative Invasive Species Management Areas (CISMAs), Partnerships for Regional Invasive Species Management (PRISMs), and on private land through its Service Forestry Program and through other outreach events.