Ohio Forest Health Highlights 2020

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 10 and concluded on June 29. 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 662 different sites from the air with discoloration, defoliation, or mortality, totaling 18,150 acres. Four-hundred eleven of these sites were inspected on the ground by Ohio Division of Forestry staff. The top six damage-causing agents (DCA) and associated acreage are below:

Table 1. Damage causing agents recorded in 2020 and acres impacted

Damage causing agent	**Acres**
Eastern white pine needle damage	6,988
Unknown hardwood discoloration	2,258
Oak shothole leafminer	1,882
Unknown conifer discoloration	1,545
Oak anthracnose	1,443
Yellow-Poplar weevil	684

Eastern white pine needle damage includes a suite of 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.

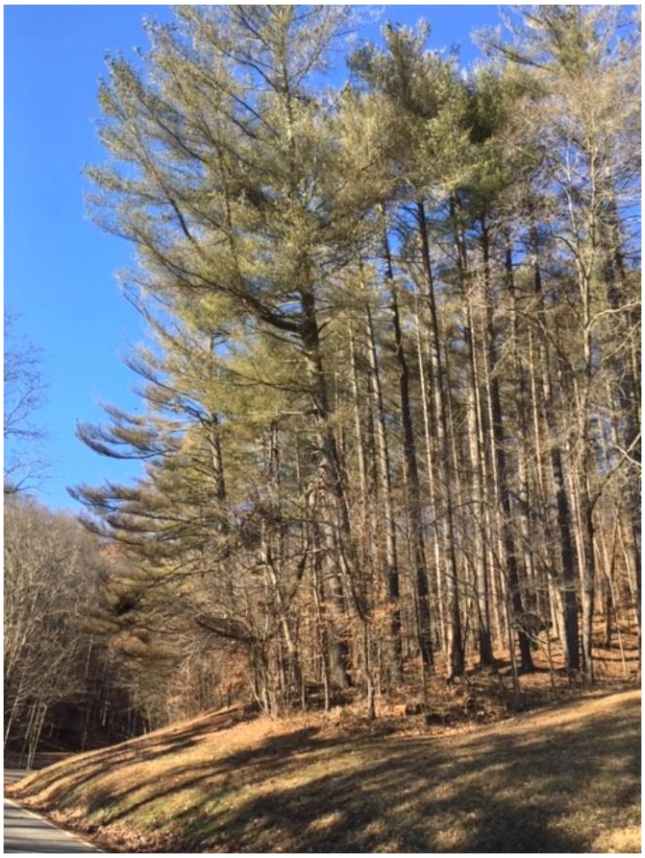

Figure 1.Discoloration caused by eastern white pine needle damage (Credit: Ohio Division of Forestry)

While populations of oak shothole leafminer have been building in many areas of the state over the last few years, this native fly species had an outbreak year across most of Ohio in 2020. The adult female flies pierce newly expanding oak leaves to feed and lay eggs in the spring. The resultant "shotholes" grow along with the expanding leaves, often leaving symmetrical oval to round holes the rest of the growing season. Larvae feed within the leaves as leafminers and create small "blotch mines." While the evidence of oak shothole leafminer was obvious on many oaks throughout Ohio in 2020, little to no impacts are expected on the long-term health of established trees.

Figure 2. "Shothole" leaf symptoms caused by oak shothole leafminer (Credit: Ohio Division of Forestry)

Special Issues

Spotted Lanternfly

In late-October 2020, an infestation of spotted lanternfly was discovered in Jefferson County in eastern Ohio along the Ohio River. 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. It poses a significant threat to the agricultural industry (particularly grape and hops vineyards and fruit orchards) and potentially native forest ecosystems. The Jefferson County infestation is near a major railyard, with trains regularly coming from the East Coast. This is 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. Survey work to delineate the infested area has begun. 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, has been meeting regularly throughout 2020 to coordinate efforts on survey, management, and education and outreach on spotted lanternfly. The Ohio Division of Forestry has assisted with mapping of tree-of-heaven (*Ailanthus altissima*), a key host plant for spotted lanternfly, via unmanned aerial system and will be conducting tree-of-heaven mapping via helicopter in areas believed to be at high-risk for spotted lanternfly introduction, to target further spotted lanternfly detection surveys.

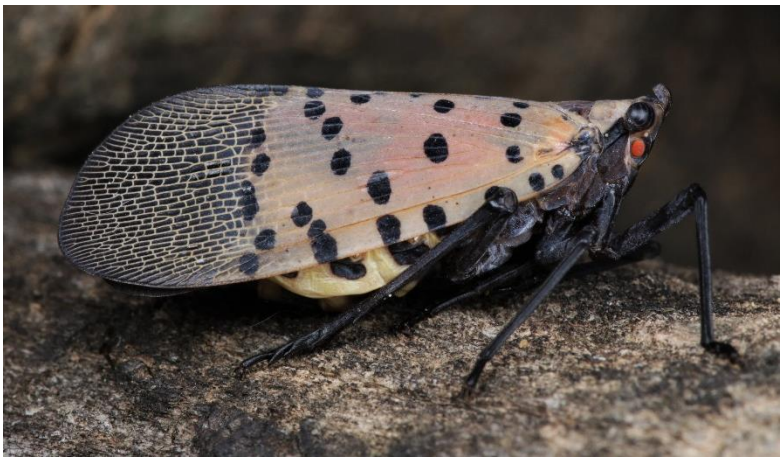

Figure 3. Adult spotted lanternfly (Credit: Ohio Division of Forestry)

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 was a concerning increase in oak wilt infected areas in 2019 with some new infected areas reported in 2020. New and existing infections were identified in parts of Carroll, Columbiana, Cuyahoga, Harrison, Jefferson, Tuscarawas, and Vinton counties. 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." Interestingly, oak wilt was also confirmed in planted Chinese chestnut trees in 2019. The 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.

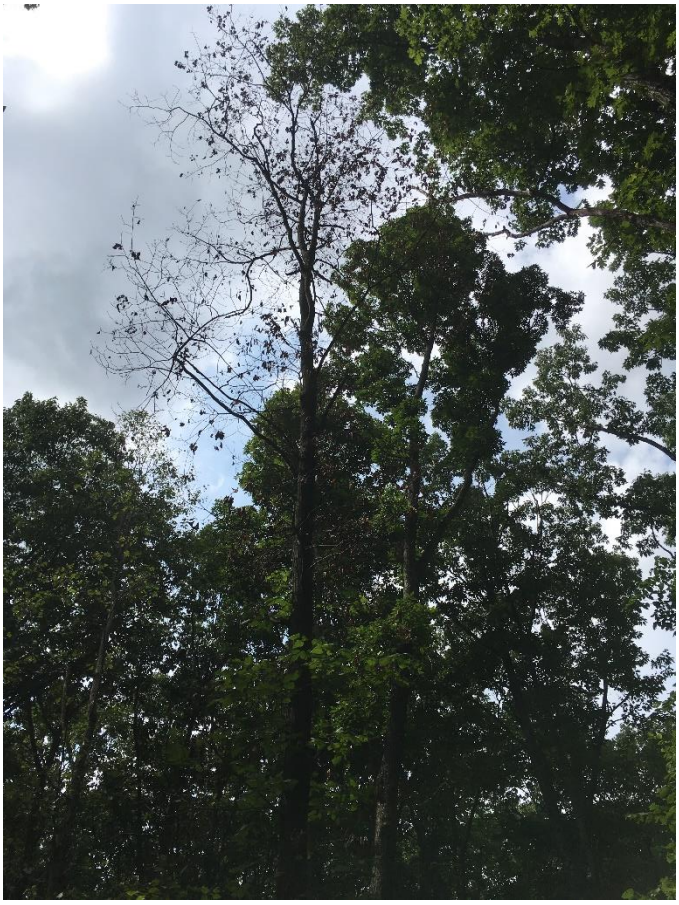

Figure 4. Mature oak tree recently killed by oak wilt (Credit: Ohio Division of Forestry)

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, Pennsylvania, New York, Connecticut, Massachusetts, and the Canadian province of Ontario. In 2020, beech leaf disease was detected in two new northeastern Ohio counties; Ashland and Columbiana. 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*). Work is also being done to document the spatial extent of BLD and study symptom progression. The Ohio Division of Forestry is monitoring for BLD on state forests.

Figure 5. A stand of American beech in northeastern Ohio in decline due to beech leaf disease (Credit: Ohio Division of Forestry)

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 in 2020, stream sampling was conducted at nine sites in six counties downstream of areas where *P. ramorum*-infected plants were confirmed or suspected. The initial round of sampling detected no *P. ramorum* in the environment. Additional sampling and survey work are ongoing.

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 12 counties, 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 2020, the Ohio Division of Forestry, with assistance from several governmental and non-governmental partners, protected roughly 2,000 eastern hemlock trees across 300 acres 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 9,000 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. 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.

Figure 6. Woolly masses of hemlock woolly adelgid on underside of branch (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 7 have located 21,176 infested trees, out of over 3.4 million trees surveyed. As of November 7, 20,320 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

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 experiments 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 needs further research. In 2019, the Ohio Division of Forestry, in cooperation with USDA APHIS, conducted releases of three parasitoid wasp species (*Tetrastichus planipennisi*, *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

Unusual Weather

Ohio experienced abnormally high amounts of rainfall during the spring of 2020.[1] In many parts of Ohio, the middle part of summer saw warmer and drier than normal conditions.[2] These weather anomalies led to widespread damage by foliar, shoot, and root pathogens in the spring such as anthracnose, leaf spots, and root disease on various species of deciduous and coniferous trees. In particular, sycamore anthracnose, maple leaf spot, and various needle disease of Colorado blue spruce and eastern white pine were commonly observed and reported. The height of summer saw dry conditions, resulting in plant stress. Dieback and mortality of sugar maple was observed, likely as a result of the recent weather conditions. The extent of the damage is being assessed and the effects of weather events this year, and in recent years, will likely continue to contribute to forest health issues into the future.

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. Invasive plant treatments were conducted on nearly 2,000 acres of state forest land in 2019. 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.

Figure 7. Tree-of-heaven (Ailanthus altissima) seedling (Credit: Ohio Division of Forestry)

Works Cited:

[1]https://ohiodnr.gov/static/documents/geology/MWIR_202004.pdf

[2]https://www.ncdc.noaa.gov/temp-and-precip/us-maps/1/202007?products[]=tmax-anom#us-maps-select