# 2024 Forest Health Highlights

*The Connecticut Agricultural Experiment Station*

The Connecticut Agricultural Experiment Station
*Putting Science to Work for Society since 1875*

| CONTRIBUTORS | ROLE OF CONTRIBUTORS |
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| JACOB RICKER (CAES) | Spongy moth egg mass surveys |
| JEFFREY FENGLER (CAES) | Elm zigzag sawfly surveys |
| DANIEL EVANS (CT DEEP) | Wildfire occurrences |

## 1. Aerial Survey

We documented 82,214 acres of new damage in the 2024 aerial survey. Beech leaf disease was the greatest damage causing agent damage followed by oak defoliation and mortality by spongy moth. White pine needle disease also affected nearly all the white pine throughout the state. Emerald ash borer continues to cause substantial ash mortality in the northeastern and northwestern corners of Connecticut, which were invaded in 2019-2020.

| DAMAGE CAUSING AGENT | ACRES |
|---|---|
| Beech Leaf Disease | 37,829 |
| Spongy Moth | 32,229 |
| White Pine Needle Disease | 5,792 |
| Emerald Ash Borer | 3,236 |
| Hemlock Woolly Adelgid | 730 |
| Logging damage | 412 |
| Elongate Hemlock Scale | 259 |
| Unknown | 1,727 |
| **TOTAL:** | 82,214 |

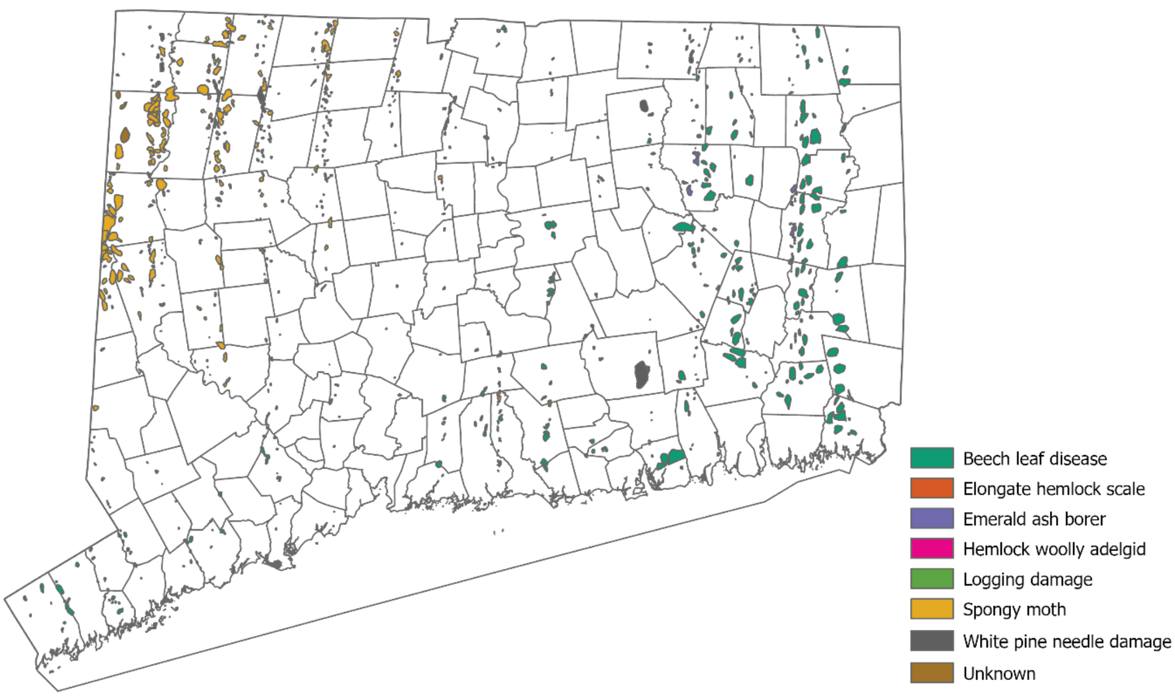



**Figure 1 Forest damage documented in the 2024 aerial survey.**

We note that the acreage reported through the aerial detection survey is likely to greatly underestimate the true extent of damage, particularly for certain agents. For instance, all beech trees in Connecticut are being affected by beech leaf disease and show signs of severe defoliation. However, beech is primarily present in the subcanopy in Connecticut's forests, making its detection through aerial surveys difficult. Areas with reported damage are therefore restricted to areas where beech make up a bigger component of the canopy in eastern Connecticut. Likewise, damages caused by diseases that affect species that typically occur as single individuals in mixed species stands, such as white pine needle disease and emerald ash borer, are also likely to be underestimated given the high number of stressors affecting different species in these forests and the difficulty of simultaneously reporting them all.

## 1. Spongy Moth

Defoliation from spongy moth continues to cause substantial oak defoliation and mortality in the northwestern corner of Connecticut. Since the onset of the current outbreak in 2016, spongy moth damage gradually spread from the eastern to western portions of the state. Overall, however, the 2023-2024 winter egg mass counts remain relatively low compared to past outbreaks in 2016-2017 and 2021 and are primarily restricted to sites in the vicinity of Kent and Bethlehem/Woodbury.

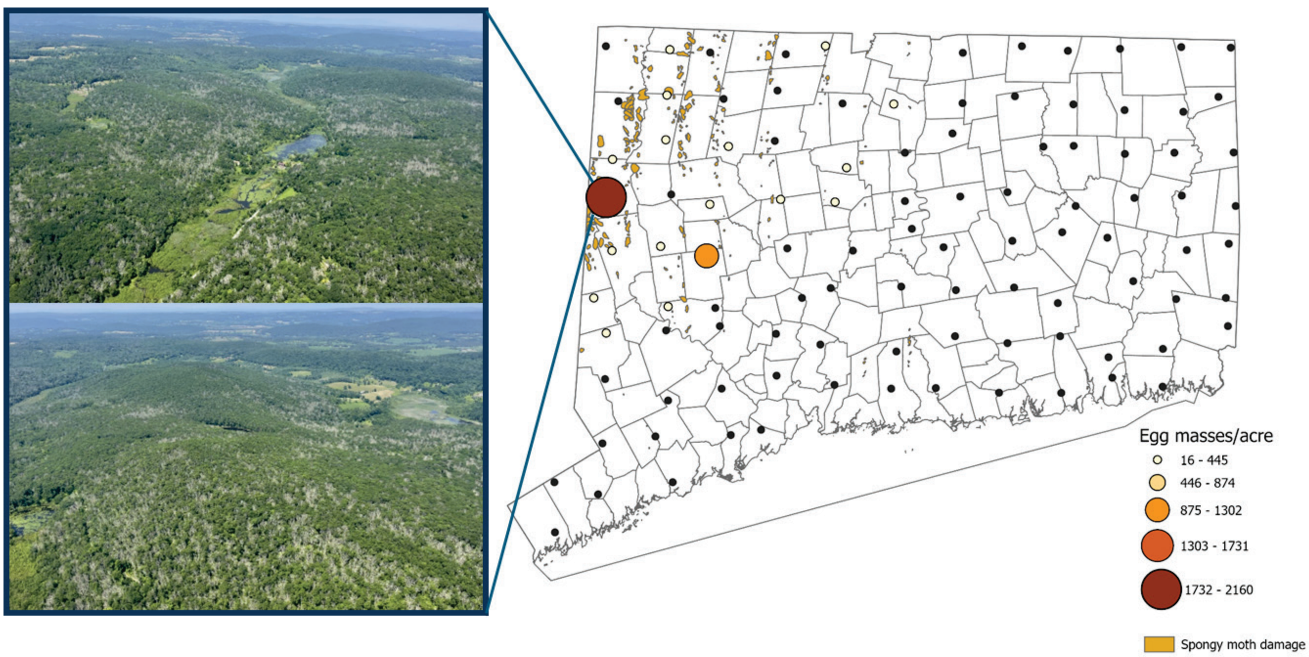



**Figure 2 Map of 2024 spongy moth damage to oaks documented in the aerial survey overlain with the 2023-2024 winter egg mass survey results. Photographs illustrate the extent of damage in the vicinity of Kent, CT.**

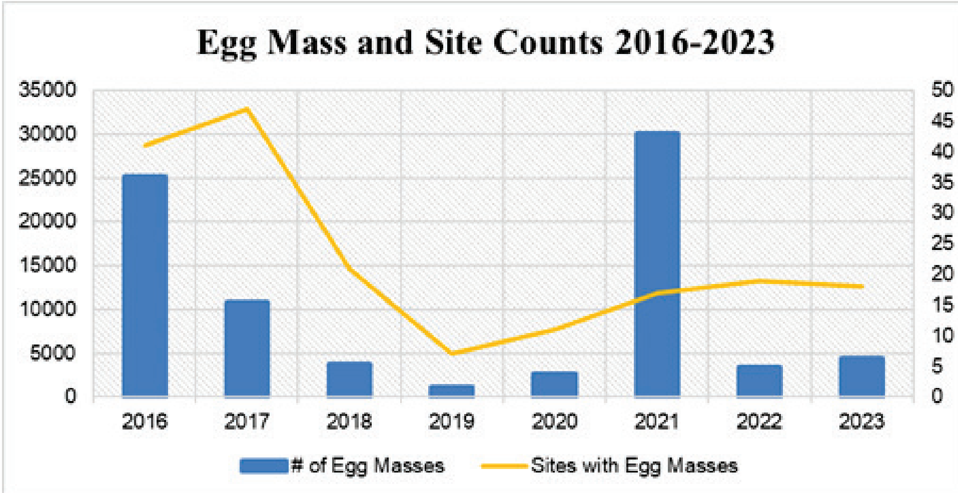



**Figure 3 Spongy moth egg masses/acre and number of sites with egg masses from 2016-2023 (*n* = 103 sites).**

| Year | # Sites with egg masses | Egg masses/acre |
|---|---|---|
| 2016 | 41 | 25136 |
| 2017 | 47 | 10848 |
| 2018 | 21 | 3775 |
| 2019 | 7 | 1184 |
| 2020 | 11 | 2592 |
| 2021 | 17 | 30016 |
| 2022 | 19 | 3408 |
| 2023 | 18 | 4400 |

## 2. Beech leaf disease (BLD)

Beech leaf disease continues to be a leading forest health concern in Connecticut. The first detection of BLD was in Fairfield County in 2019, and by 2021 BLD was present in all remaining counties. Since 2021, the severity of BLD has rapidly increased and now affects all beech trees in the state.

For the past several years, scientists at the Connecticut Agricultural Experiment Station have been monitoring the effects of tree size, canopy light exposure, co-occurrence with beech bark disease (BBD), and forest management history on changes in tree growth and mortality from BLD. The assessment includes annual remeasurement of ~2,500 beech trees at 16 sites from five long-term studies to compare changes in tree growth and mortality to historic trends. This project is funded through the Bipartisan Infrastructure Law High Priority Invasive Species Grant program and will continue for the next 5 years.

**Figure 4 Example of a typical beech stand in Connecticut dominated by subcanopy beech thickets with severe leaf deformation and defoliation.**

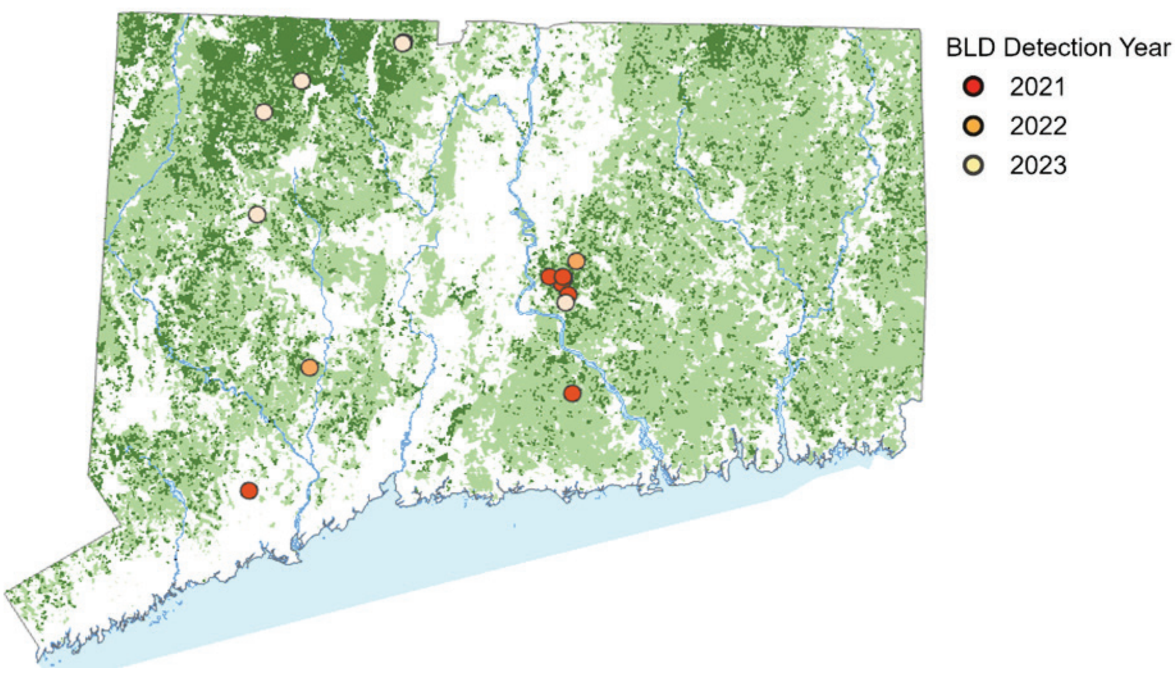



**Figure 5 Locations of 16 long-term monitoring sites used to assess the effects of tree size, canopy light exposure.**

Preliminary data from the long-term monitoring plots shows a steady increase in BLD severity over time. In 2021, an average of 4.5% of foliage was infected with BLD per tree, and this value increased to 35%, 52%, and 68% in 2022, 2023, and 2024, respectively. In 2024, the percentage of foliage infected by BLD was lower for trees in the upper canopy compared to the subcanopy. Dominant and codominant trees had an average of 46% and 67% of infected foliage, whereas intermediate and suppressed trees had 82% and 79%, respectively.

The rapid increase in BLD severity resulted in a concomitant decrease in the percentage of normal foliage, which dropped from an average of 43% in 2023 to 26% in 2024. Again, these effects were more pronounced for subcanopy trees than for upper canopy trees.

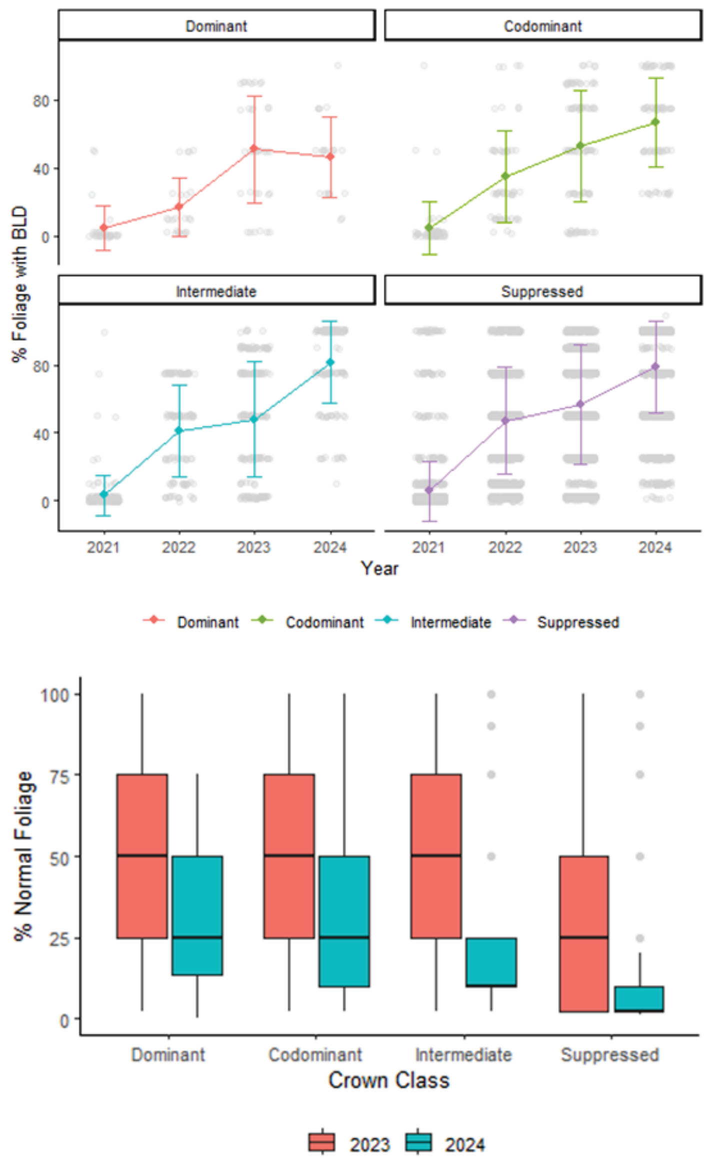



**Figure 6 Increases in beech leaf disease severity over time and the resulting decline in the percentage of normal foliage.**

The decline in annual growth, however, was more pronounced in the upper canopy than in the subcanopy owing to the higher initial growth rates of dominant and codominant individuals prior to BLD. In 2024, average annual growth for dominant trees had declined by ~75% (1.5 mm/yr) relative to pre-BLD growth rates (5.8 mm/yr). By 2024, however, average annual growth rates were comparably low regardless of crown class, with an average of 1.5 mm/yr for dominant individuals to 0.4 mm/yr for suppressed individuals.

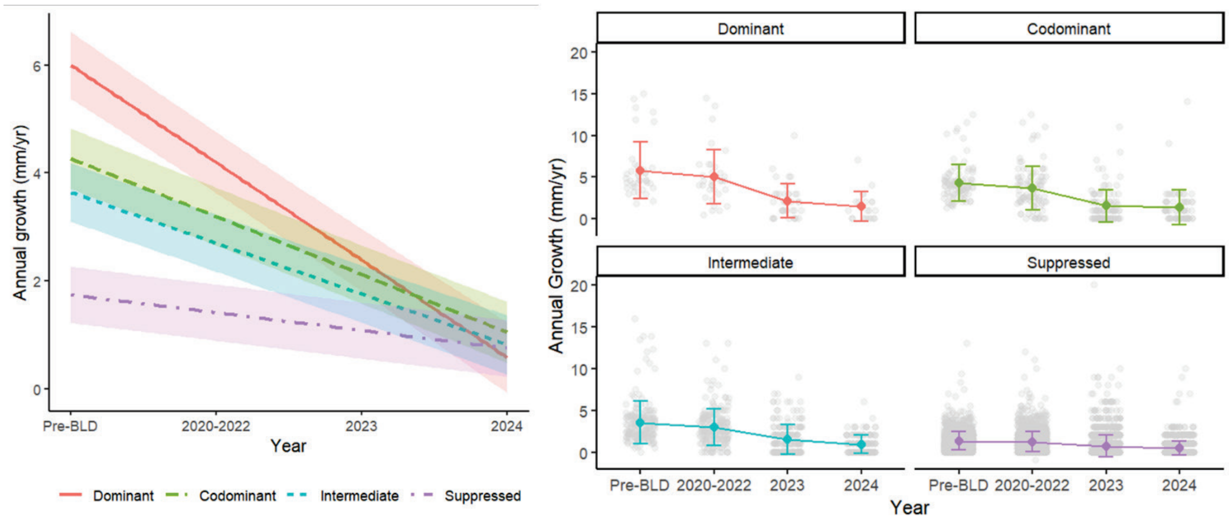



**Figure 7 Declines in annual growth rates by crown class over time following beech leaf disease invasion in Connecticut.**

Despite the dramatic increase in BLD severity and declines in the percentage of normal foliage and annual growth rates, we have not yet seen any changes in tree mortality rates. The 2024 mortality rate (2.1%) was comparably low compared to that of 2023 (3.1%).

## 3. Emerald ash borer (EAB)

Emerald ash borer was first detected in northern New Haven County, Connecticut in 2012. It spread steadily to the rest of the state and has now reached all towns.

**Figure 8 *Spathius galinae* in ash tree in Cromwell, CT in 2019**

Connecticut began releasing biological control agents starting in 2013 in collaboration with the national EAB biological control program. Since that time, releases have been made at 17 sites. Over 175,000 *Tetrastichus planipennisi*, 62,000 *Oobius agrili* and, since starting releases in 2016, 14,793 *Spathius galinae* have been released. Parasitoids have been recovered from all but 2 of the release sites. We have documented parasitoid spread from release sites up to 14 km and have captured individual *Spathius galinae* 28 km from their release sites. Studies in 2020-2022 recovered parasitoids at release sites regardless of age, and EAB larval density. We also found that even at extremely low larval densities, parasitism rates were similar to parasitism rates in areas with high EAB larval densities. We are currently engaged in long-term studies of ash recovery.

Much of the monitoring of EAB populations has been done using the native wasp, *Cerceris fumipennis*. This wasp uses adult buprestid beetles to provision their nests, and the proportion of EAB in their prey is indicative of the level of EAB in the landscape within a kilometer of their nests. Populations of EAB have crashed in the original areas of infestation after killing the majority of ash present, and the current areas of heaviest infestation and highest tree mortality are present in a wide ring around the putative introduction site. The northeastern corner of the state is still in early stages of the infestation. There is no evidence of a second introduction into the state. The three figures below show EAB populations by town as a proportion of *Cerceris* prey in 2012, 2019 and 2024.

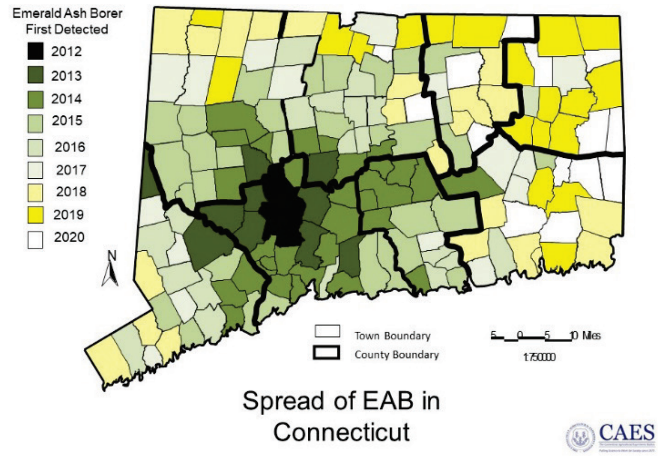



**Figure 9 Spread of emerald ash borer in Connecticut.**

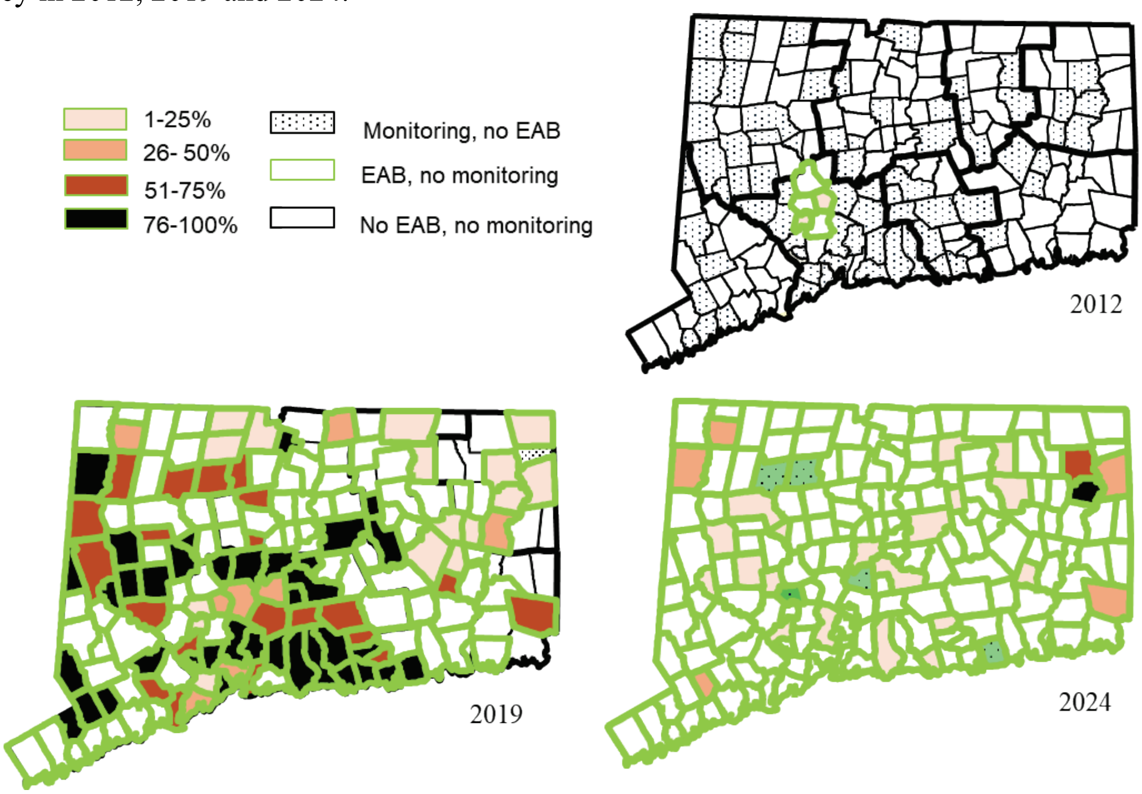



**Figure 10 Emerald ash borer (EAB) populations by town as a proportion of *Cerceris* prey in 2012, 2019, and 2024. This map illustrates the crash in EAB populations in the vicinity of the putative introduction site.**

To assess the longer-term impacts of EAB on understory plant composition (e.g. the relative abundance of native versus non-native species), tree regeneration, and stand dynamics, we established 81 plots at 27 sites in aftermath forests across an estimated time since EAB detection gradient in 2024. This sampling effort included 3 sites per EAB detection year from 2012 through 2020, and within each site, we established 3 plots that ranged in relative ash basal area

(<30%, 30-50%, ≥50%) to capture differences in canopy gap sizes and understory light regimes following overstory ash mortality. At each of the 81 plots, we characterized overstory, midstory, and understory forest structure and composition and measured environmental variables, including canopy transparency and soil conditions.

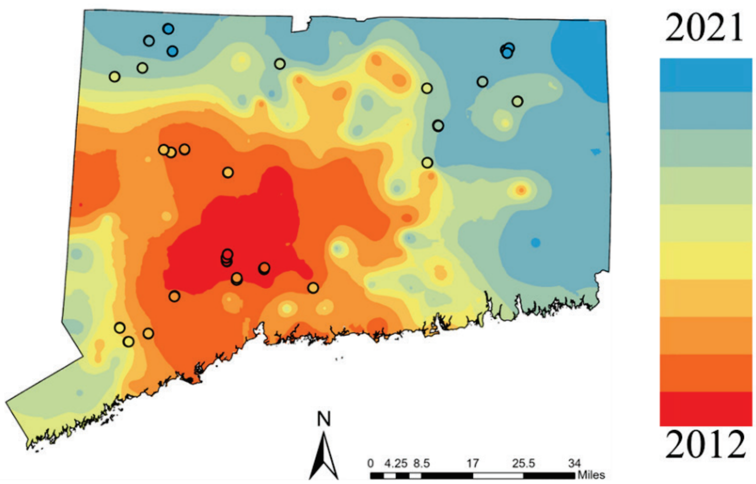



**Figure 11 Locations of the 27 sites arrayed across a time since EAB detection gradient that we are using to assess the impacts of EAB on tree regeneration, understory plant dynamics, and forest development. Data for estimating the time since EAB detection year was provided by Dr. Claire Rutledge. Figure was made by Jack Hatajik.**

In total, this sampling effort included 387 ash trees, the vast majority of which were in the overstory (diameter at breast heigh [DBH] ≥ 10 cm; *n* = 383) rather than the midstory (DBH = 1-10 cm; *n* = 4). Of the 387 ash trees, 73 were alive and 314 were dead, and the percentage of living trees increased in later EAB detection years. We observed no living overstory or midstory ash in sites where EAB was first detected in 2012 or 2013. From 2014 through 2019, the average percentage of surviving ash ranged from 5 to 23%, and in the 2020 sites, 78% of ash were still alive. Of the 73 living ash, 26% had resprouts (*n* = 15) but only 6.8% of dead ash had resprouts (*n* = 20).

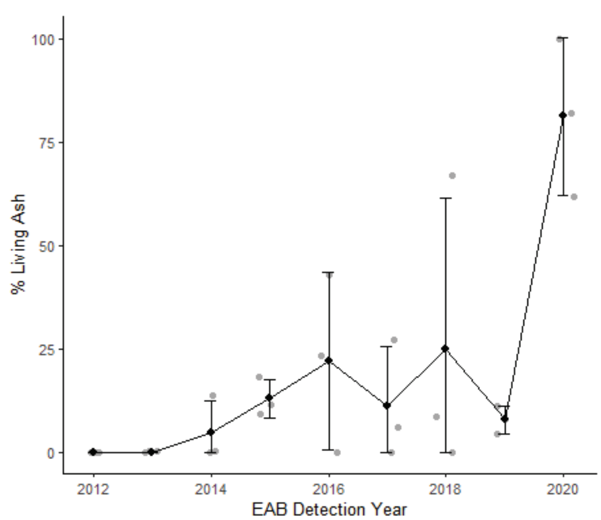



**Figure 12 The percentage of remaining living ash trees by estimated EAB detection year.**

## 4. Elm zigzag sawfly (EZS)

Elm zigzag sawfly was first detected in Connecticut in 2024. Expanded monitoring around the initial detection site confirmed the presence of EZS in three Connecticut counties (Litchfield, Fairfield, and New Haven), and damage was documented in 9 towns.

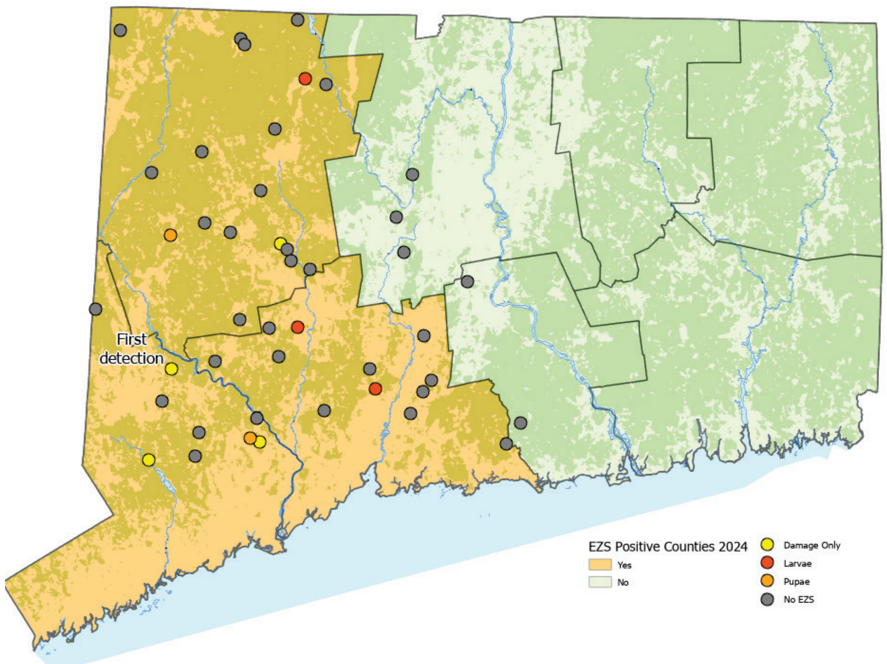



**Figure 13 Locations of sites where surveyed for elm zigzag sawfly**

## 5. Hemlock woolly adelgid

Connecticut's experience using *Sasajiscymnus tsugae*, a specialist predator of Hemlock Woolly Adelgid from Japan, as the sole HWA biological control agent since 1995 has helped sustain the state's hemlock resource with minimal hemlock mortality over three decades. Over 70% of hemlocks are on privately owned lands in Connecticut. As such, Connecticut continues to manage HWA and expand biological control of HWA from state lands to privately-owned forests, lake communities, town open space, land trusts, and the general public using *S. tsugae*. Spearheaded by Dr. Cheah, >64,700 *S. tsugae* were released in 2024 at 177 sites throughout CT on state lands, town open space, land trusts, private forests, bird sanctuaries, lake communities, a private fishing club and many individual homeowner properties. Treesavers, PA donated many thousands of *S. tsugae* to CT in summer 2024, and to date, >327,700 *S. tsugae* have been released in Connecticut since 1995.

However, there was no observed HWA winter mortality in Connecticut in 2024 as there were no subzero winter temperatures reported. As a consequence, there was some resurgence and new invasions of HWA.

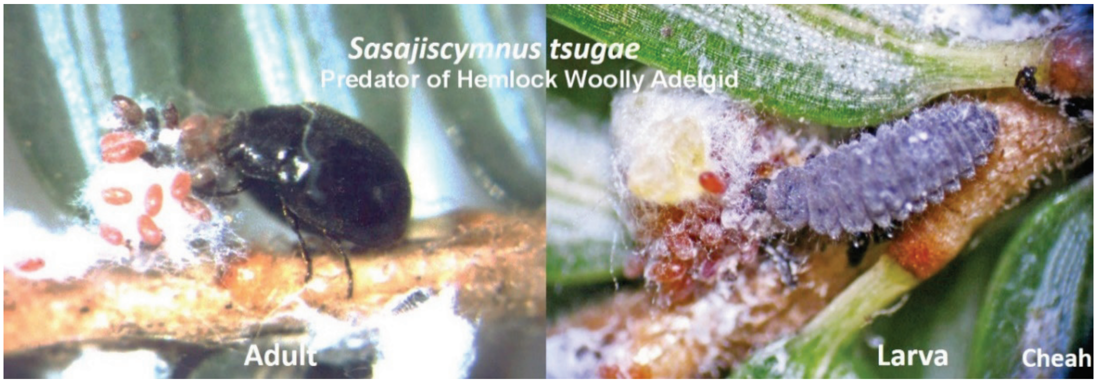


**Figure 14 *Sasajiscymnus tsugae* predator of the hemlock woolly adelgid**

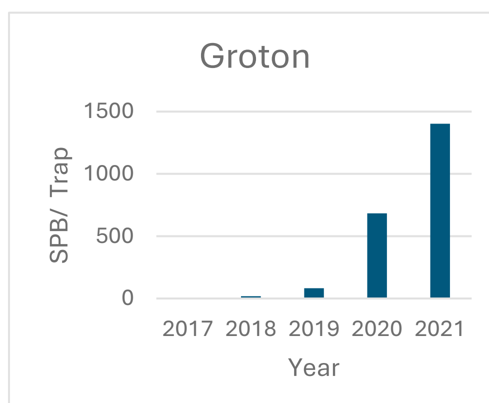
## 6. White pine needle disease

White pine needle disease was widespread on the majority of white pine throughout the state. It was readily apparent in June, during which time we received substantial public inquiries.

## 7. Oak wilt

Connecticut has formed an oak wilt working group to enhance future early detection, monitoring, and outreach efforts and prepare a response plan in the case of future detections. We tested several suspect samples in 2024 based on public inquiries, but to date no oak wilt has been confirmed in Connecticut.

## 8. Southern pine beetle




Southern pine beetle was first detected in the state in early 2015, the apparent result of a weather pattern that rained SPB down on Long Island, NY and southern New England. Initial detections were made in all 8 counties and impacted 5 species of conifers. Trapping has been conducted each year thereafter. Limited numbers were captured in 2015 – 2017, and it was unclear if SPB was established in Connecticut, or if individuals were being wafted over from the large outbreaks in Long Island. In 2018 an exponential increase started, and levels in 2021 were quite high. Winters have not been cold enough in most areas Connecticut to prevent SPB establishment.

Only a few attacked trees have been found since 2015, despite the rising numbers of beetles in the traps. In 2024, there were no reported attacks. The beetles are still in their endemic, or non-outbreak phase. It is unknown if and/ or when they might reach sufficient numbers to cause an outbreak.

Our major species of concern in Connecticut is pitch pine (*Pinus rigida*), whose habitat is one of 13 ecosystem types of concern in the state. The patchy distribution of pitch pine in the state may help to limit outbreaks.

**Figure 15 Scots pine attacked by southern pine beetle at Nassahegon State Forest 9/28/21.**

## 9. Sugar maple early leaf drop

In 2023 and 2024, we observed widespread premature fall browning and leaf drop by sugar maples, which is consistent with reports from other states in the Northeast. Although the cause is not currently known, we expect that it is related to wetter and warmer conditions in the late summer that could be promoting foliar pathogens.

## 10. Fall wildfires and drought

Sustained drought conditions in fall 2024 combined with higher than average temperatures greatly increased wildfire activity in Connecticut in October and November 2024 relative to historic norms. 183 fires were reported in October (relative to an average of 17 from 2018 to 2023), and 123 fires have been reported in November (relative to an average of 32 from 2018 to 2023). Given the ongoing nature of this situation, the acreage of damage is currently unknown. If there is below average winter precipitation and snowpack, high fire risk conditions could persist into the spring. Connecticut has declared a state of emergency and fire bans remain in effect.

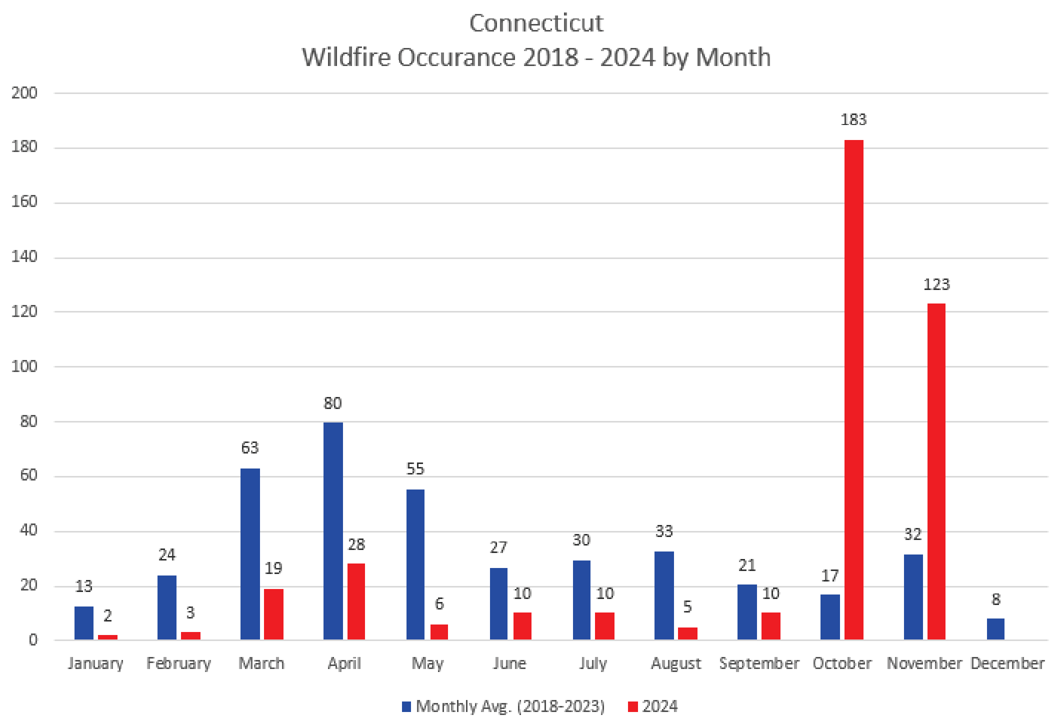



**Figure 16 Monthly number of wildfires in 2024 relative to historic averages. Source: CT DEEP.**

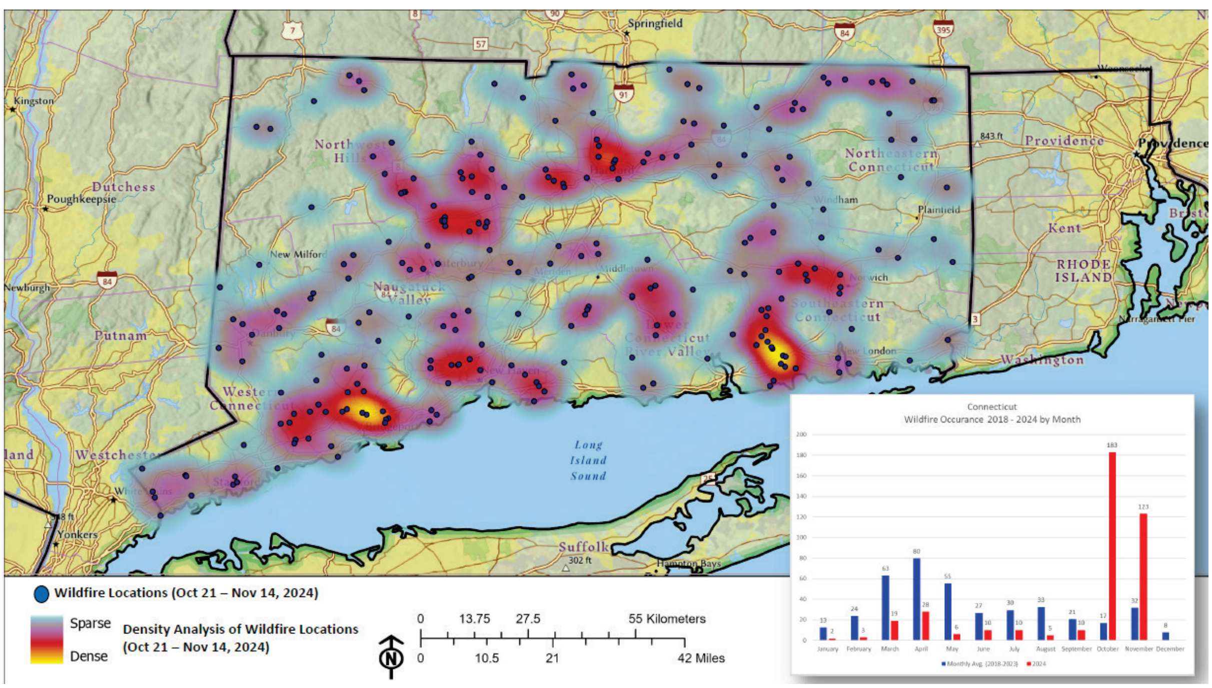



**Figure 17 Distribution of fall 2024 wildfires across Connecticut. Source: CT DEEP.**

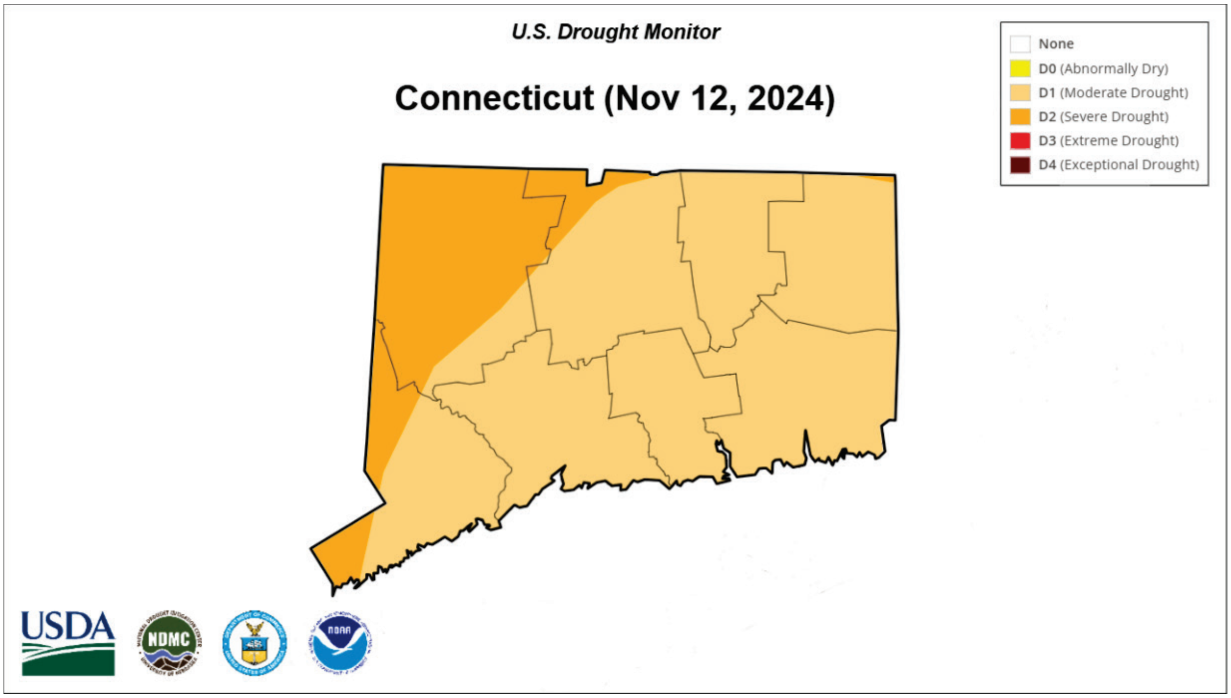



**Figure 18 Moderate to severe drought conditions persist across Connecticut as of November 2024.**