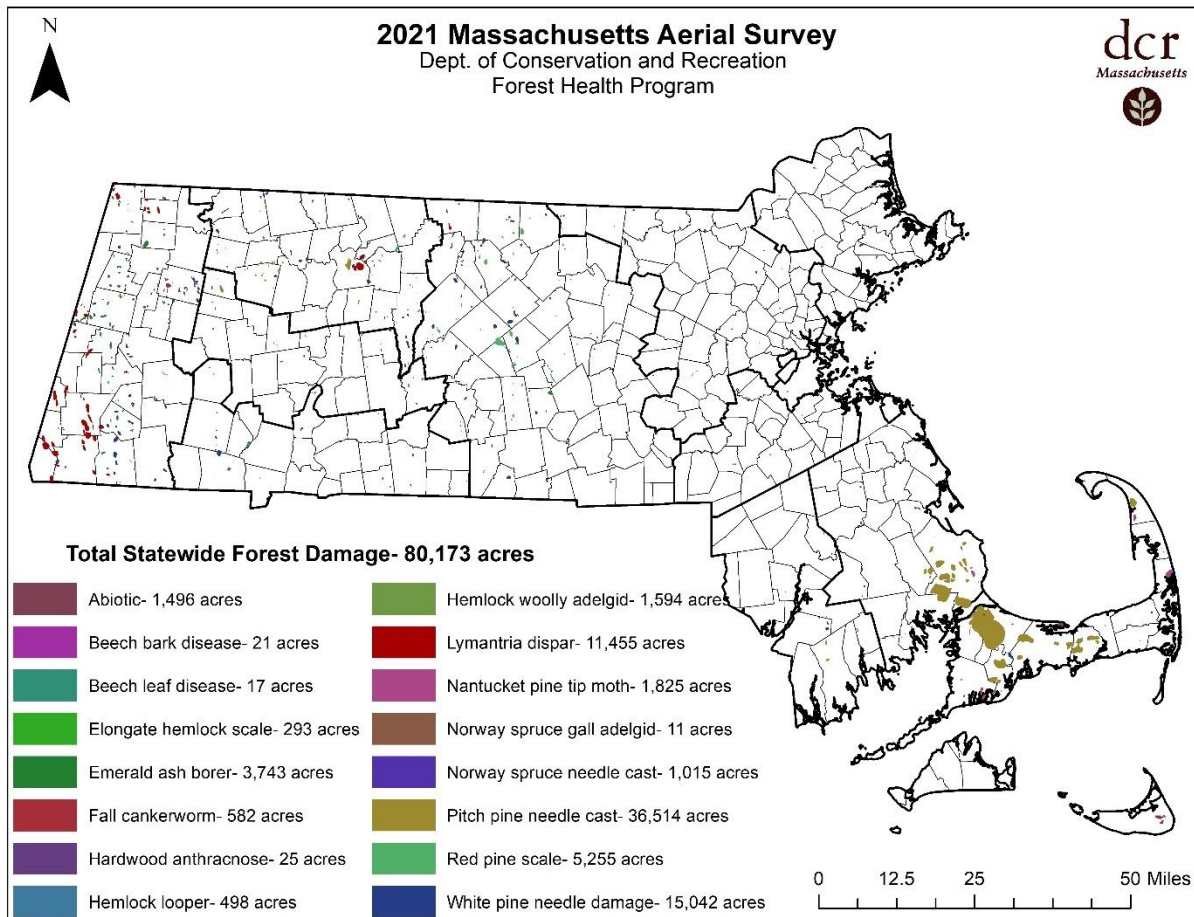


MASSACHUSETTS 2021 FOREST HEALTH HIGHLIGHTS



Results from the Massachusetts DCR Forest Health Program 2021 aerial survey efforts. A total of 80,173 acres of damage was observed.

Aerial Survey

80,173 acres of forest damage was documented statewide from annual aerial survey

11,455 acres of *Lymantria dispar* defoliation

15,042 acres white pine needle damage

36,514 acres of *Lophodermium* needle cast of pitch pines

Forest Pests and Diseases

Asian Longhorned Beetle (ALB)

The DCR Forest Health Program continues to be the lead state agency in charge of the Asian Longhorned Beetle Eradication efforts in Worcester County. Only one infested tree was discovered in 2021. A single infested maple was found in a residential area of southern Worcester, MA in June 2021. All known infested trees have been removed.

The DCR Forest Health Program deployed and monitored 300 ALB pheromone traps in the Worcester County infestation area. The traps were concentrated in high risks corridors within, and in communities adjacent to, the quarantine zone. Traps did not locate any ALB in 2021. However, trap catch included several cerambycid species, indicating the lure was attracting long horned beetles to the trap and the lure combination and timing was effective.

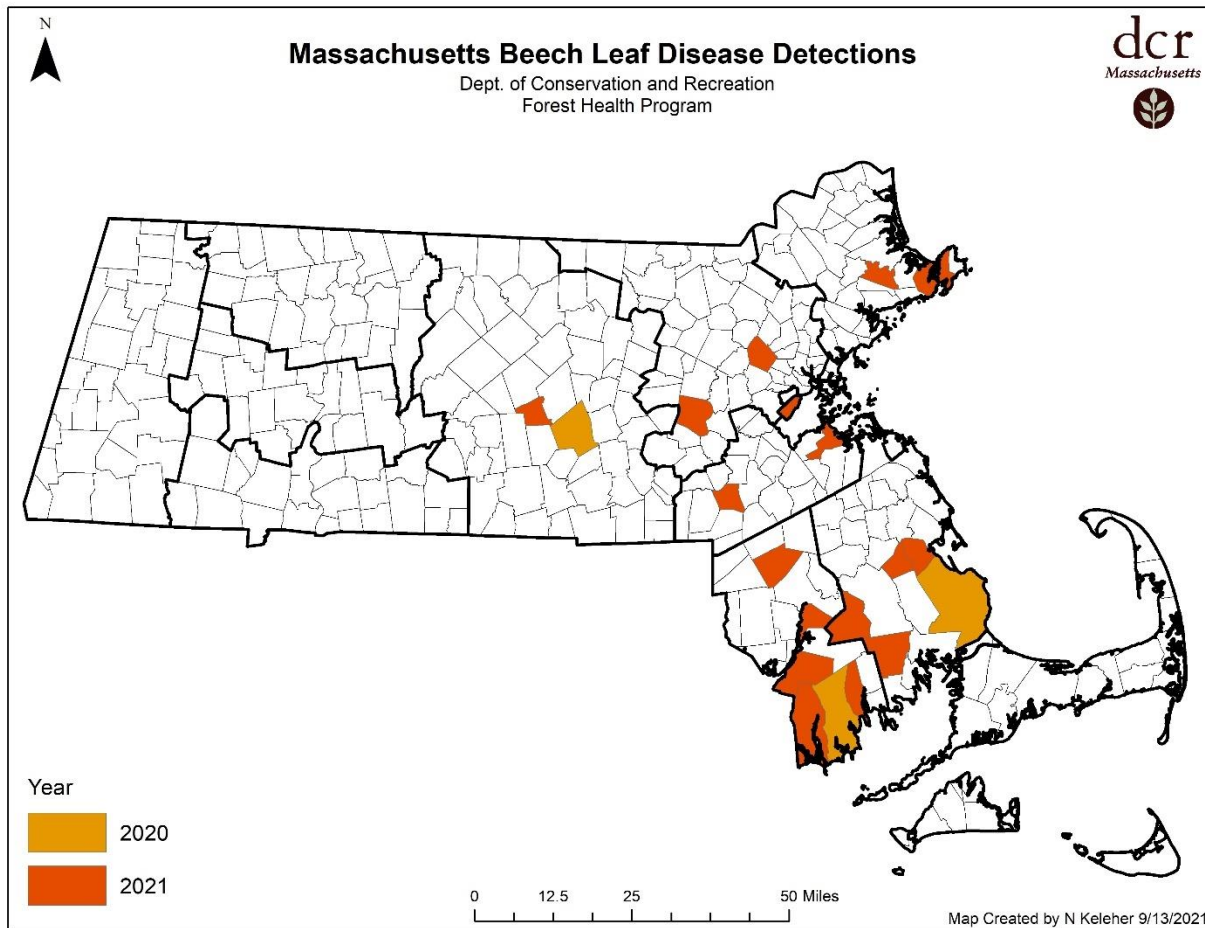


DCR Forest Health staff deploying flight intercept panel traps as part of Asian longhorned beetle trapping survey efforts; Worcester, MA, June 2021

Beech Leaf Disease

Beech leaf disease (BLD) has rapidly spread in Massachusetts since the initial detection in 2020. At this time, BLD has been confirmed in a total of 21 communities, in 6 counties: Plymouth, Bristol, Worcester, Essex, Middlesex, and Norfolk Counties. Infected communities have been detected through ground surveys performed by DCR Forest Health staff and from public reports confirmed through symptom identification and foliage sampling.

The DCR Forest Health Program participated in a regional BLD monitoring effort. A total of 10 permanent monitoring plots were installed in a mix of BLD infected and currently uninfected stands. Monitoring plot surveys were complete in June and July of 2021.

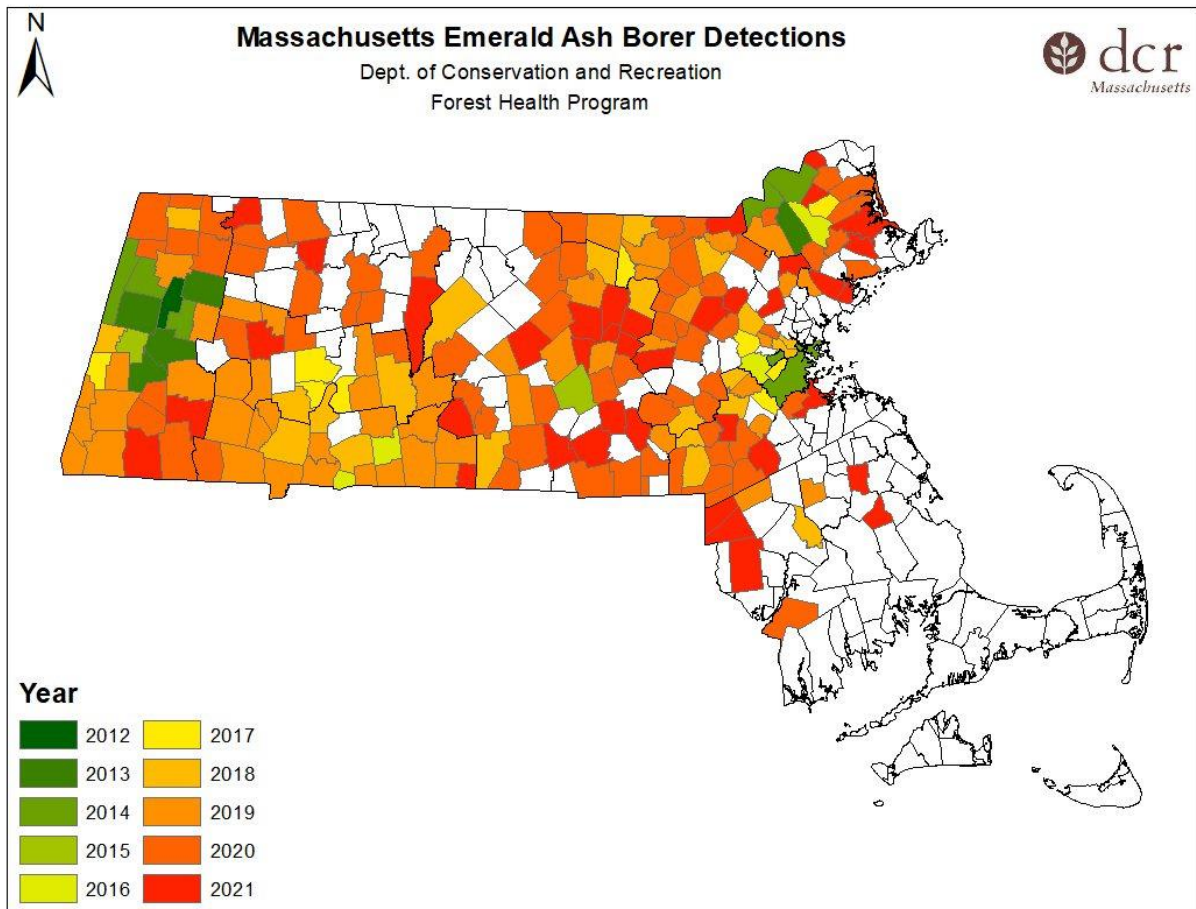


The progression of communities in Massachusetts with beech leaf disease detections shown by the year of first detection. As of November 2021, 21 communities in Massachusetts, across 6 counties, have identified beech leaf disease infections.

Emerald Ash Borer

The DCR Forest Health Program performed visual windshield surveys to detect emerald ash borer (*Agrilus planipennis*; EAB) infestations in new communities and areas. Surveys were performed in all mainland counties across the state. These surveys were focused in areas adjacent to known or suspected infested stands. In 2021, there were 41 new infested Massachusetts communities detected through both windshield surveys and investigations of public reports.

The Forest Health Program released EAB biocontrol species at 5 sites in 2021, this included 2 new release sites and 3 supplemental 2nd year release sites. These release sites were ecologically significant ash stands in Franklin, Middlesex, Norfolk, Plymouth, and Worcester Counties. Three parasitic species were released: *Oobius agrili* (6,000 total), *Tetrastichus planipennis* (7,353 total), and *Spathius galinae* (3,289 total).



The progression of communities in Massachusetts with positive emerald ash borer detections shown by the year of first detection. As of November 2021, 208 communities in Massachusetts, across 11 counties, have identified emerald ash borer infestations.

Hardwood Defoliators

A fall cankerworm (*Alsophila pometaria*) outbreak caused severe oak defoliation in coastal regions of Massachusetts in 2021. The greatest feeding impact was in the oak shrub barrens of Nantucket County. This is the fourth year of severe defoliation caused by fall cankerworm on the island. Collaborators have confirmed that the ongoing pressure from this outbreak event has begun to cause tree mortality.

Lymantria dispar caused significant defoliation in Western Massachusetts, areas of severe defoliation were observed in Berkshire and Franklin Counties. Smaller isolated pockets of heavy defoliation and areas of light defoliation occurred in central and eastern Massachusetts. Statewide, 11,455 acres of defoliation were mapped. Historically, *L. dispar* outbreaks in Western Massachusetts have been infrequent and less damaging than the impact of the pest in the eastern part of the commonwealth. However, a changing climate may alter the population dynamics in our forests. In 2021, we observed limited caterpillar mortality caused by the fungal pathogen *Entomophaga maimaiga*. In addition, the program received numerous public reports of adult moth flights this summer. Annual winter egg mass survey completed by DCR Forest Health Program staff will help identify areas at risk of defoliation in spring 2022.

Hemlock Pests

Following another mild winter in 2020-2021, Hemlock Woolly Adelgid (*Adelges tsugae*; HWA) population densities remain high across the state in 2021. The DCR Forest Health Program assessed hemlock woolly adelgid populations through winter and summer sisten mortality surveys. This year, we observed levels of winter HWA mortality much lower than typical for the region. There was an average HWA winter mortality rate of 41% across sites surveyed in early 2021. Summer HWA mortality was slightly above typical for the state, there was an average HWA summer mortality rate of 43% across all sites surveyed in fall 2021 following aestivation break.

Hemlock stand decline and mortality is observed in the highest rates in stands with HWA and an additional stressor; elongate hemlock scale (*Fiorinia externa*; EHS) has become prevalent in hemlocks statewide and is causing widespread damage. While HWA stress on trees fluctuates with the highly climate influenced pest populations and gives trees some recovery in low HWA density years, EHS stress appears to be more persistent year after year once a stand becomes infested. In 2021, 293 acres of hemlock decline was attributed to elongate hemlock scale.

Feeding from the native caterpillar hemlock looper (*Lambdina fiscellaria*) caused defoliation and incidences of hemlock mortality in 2021. There has been an observed increase in the hemlock looper population in central and western Massachusetts. The greatest impact was seen in northern Worcester County where many understory hemlocks died this summer due to needle loss caused by hemlock looper.

Targeted pesticide treatments were implemented by the Forest Health Program in ecologically and culturally significant eastern hemlock stands on state forests to reduce infestation levels of hemlock woolly adelgid and elongate hemlock scale. In June 2021, hemlocks at Bash Bish State Park, Chester Blandford State Forest, Maudslay State Park, Middlesex Fells State Reservation, and Mohawk Trails State Forest were treated with basal bark spray or trunk injection applications of dinotefuran. Health metrics and pest population density values were collected by forest health staff in treated and untreated control trees at the end of the growing season to assess and quantify the beneficial impact of treatments on overall hemlock health.

There has been limited success with the establishment of predatory biocontrol beetles for the control of HWA. The Forest Health Program continues to monitor *Sasajiscymnus tsugae* and *Laricobius nigrinus* predator release sites. As of November, no predators were recovered in 2021.

Red Pine Scale

Statewide, the Forest Health Program continues to observe the rapid decline of red pine stands caused by red pine scale (*Matsucoccus matsumarae*). Large areas of mortality and crown discoloration in red pine plantations are being mapped annually; a total of 5,255 acres of red pine scale damage was detected in 2021. All counties with substantial red pines stands are impacted by this insect and many areas also exhibit symptoms of fungal pathogens.

Pitch Pine Stressors

In 2021, lophodermium needle cast caused crown discoloration in pitch pine stands throughout the Commonwealth. Symptoms were seen in both continuous coastal pitch pine forests and in isolated inland stands. The fungal pathogen led to spring yellowing and browning of the needles and the eventual loss of the infected needles. This widespread infection was unexpected because we experienced drought conditions through much of the summer in 2020.

Pitch pines in the southeast coastal areas also suffered from discoloration caused by tip dieback from Nantucket pine tip moth (*Rhyacionia frustrana*). Pockets of trees in Barnstable and

Plymouth Counties were impacted by the larval feeding of this moth. The severity of damage greatly varied, from some areas with only a few branches infested to those with most of the canopy exhibiting tip damage.

The DCR Forest Health Program was unable to trap for the presence of southern pine beetle (SPB) in pitch pine stands during the 2021 field season. Program staff completed ground surveys in high priority areas to identify any possible suspicious damage in pitch pine stands; no damage attributed to southern pine beetle was discovered. To date, no southern pine beetle infested trees have been found in Massachusetts. We will continue to monitor for the presence of this destructive forest pest.



Discoloration observed in needle cast impacted pitch pine stands. Plymouth, MA; June 2021.

White Pine Needle Damage

Eastern white pine needle damage diseases continue to cause a significant impact and noticeable spring needle loss throughout the commonwealth. Eastern white pines in all counties of the state suffer from crown discoloration, thinning canopies, and general decline caused by the stress of the fungal needle pathogens. In 2021, approximately 15,042 acres of white pine stands with white pine needle damage was documented. DCR Forest Health staff have identified areas where the persistent stress of the needle cast disease has led to individual tree decline and eventual mortality.



Severe needle discoloration observed in eastern white pine infected with fungal pathogens causing white pine needle disease. Charlemont, MA; June 2021.