

Emerald Ash Borer (EAB)

The emerald ash borer (*Agrilus planipennis*) was introduced to the United States in the late 1990's and has steadily spread and expanded its range. EAB introduction sites are usually infested for 3 to 5 years before there is noticeable tree mortality.



Adult emerald ash borer, file photo by the Minnesota Department of Natural Resources

Tree damage and eventual mortality is caused by the larval feeding. The EAB larval galleries disrupt the translocation of water and nutrients through the tree. Extensive cambium feeding will eventually girdle an ash tree, causing mortality.

According to the US Forest Service, EAB is the most destructive forest insect pest that ever invaded North America.



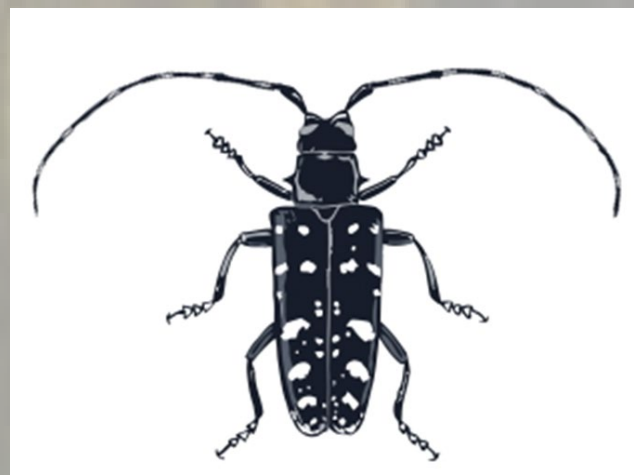
EAB Larval Galleries

EAB is causing widespread mortality of ash species throughout the region and in DWSP forests and will likely kill the vast majority of overstory ash trees in the watersheds. White ash is a relatively small but important component of DWSP forests. We are hopeful that some ash will persist on the landscape.

Asian Long Horned Beetle (ALB)

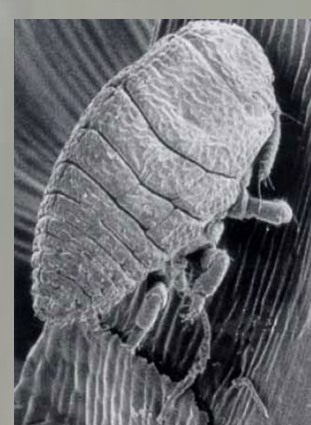
The Asian Long Horned Beetle (*Anoplophora glabripennis*) is a wood boring beetle that attacks hardwood trees including maple, birch, willow, poplar and elm. It is ¾ – 1½ inches long, shiny black with white spots and long banded antennae. Once a tree is infested with ALB, there is no cure - it must be cut down. Early identification of an infestation is key to protecting the community.

Fortunately, ALB has not been detected at the Quabbin & Ware River Watersheds, and eradication efforts in the Worcester area have been successful in reducing the infestation to manageable numbers. There have been no new reports of outbreaks in recent years, though continued monitoring and public awareness is highly recommended.



Exit hole in tree. (MDAR photo)

Hemlock Woolly Adelgid (HWA) & Elongated Hemlock Scale (EHS)



HWA

Below, an HWA infested hemlock. As the insect matures, it produces a covering of wool-like wax filaments to protect itself and its eggs from natural enemies and prevent them from drying out.



Hemlock Woolly Adelgid (*Adelges tsugae* Annand) a tiny insect, less than 1/16-inch long, and Elongated Hemlock Scale (*Fiorinia externa*) also a tiny insect, 1.5-2 mm long, both live and feed off hemlock trees and are particularly harmful to the Eastern hemlock (*Tsuga canadensis*) and Carolina hemlock (*Tsuga caroliniana*) in the Eastern United States.

Both pests latch onto tree needles with piercing, sucking mouthparts and draw up nutrients, causing stress, needle loss and eventual death of the infested tree. It can take years for mortality to occur from either or both, and the two are often found together in our forests.

Removing individual trees, applying horticultural oils and biological controls using natural predators have been successful in reducing the spread of infestations in small settings such as a nursery or a landscape, if treated right away. Unfortunately, these are not feasible treatments in a large-scale forested landscape. As a result, HWA & EHS have had a big impact on hemlocks and caused significant mortality on portions of the DCR watershed.



Female EHS are covered in a brown waxy coating; immature males are covered in a whitish waxy coating



The white filaments produced by immature males can be confused for the woolly masses produced by HWA. Both pests are found on the underside of hemlock needles

Insect Threats of Our Forests

A remarkable 60% of the state of Massachusetts is forested, making it the 8th most forested state in the country. To the casual observer, our forests are lush, beautiful and provide endless recreation and health benefits to us. But our trees are under attack from all sides. While some invasive insects have been around for over 150 years, the last few decades have brought in threats in overwhelming numbers, largely due to hitchhikers on increased international commerce. All the species listed here are non-native to North America.

While a few invasive creatures can be handled by a healthy forest, our trees are also under attack from climate change. Periods of extreme drought then extreme flooding, higher than average temps or sudden out of season cold snaps weaken trees and reduce their ability to fight off insects and disease. Threats vary from year to year, with some being of greater concern than others. They are spread most commonly by the transport of firewood & wood products, on birds & animals, and carried by the wind. In most cases, once a tree is infested little if anything can be done to save it. The best protection is education, awareness and prevention.

Most of these invasive species have had an impact on DCR-DWSP (Division of Water Supply Protection) forests. Large tracts of hemlock, oak and red pine have already been lost to insect infestation. And while ash and beech only make up a small percentage of our forests, both of those trees are highly valuable for wildlife and overall forest diversity.

Spongy Moth

Spongy moth (*Lymantria dispar*), formally known as gypsy moth, has been a costly and persistent problem in Massachusetts since its introduction in 1869. This invasive pest causes tree defoliation through its spring feeding in the caterpillar life stage.

Dense feeding populations can consume all the leaves on a tree, defoliating entire stands. The preferred host tree species are deciduous oaks, maple, birch, poplar, willow, apple, and hawthorn. Other, less preferred deciduous trees and even conifers, like white pine or eastern hemlock, will be attacked by spongy moths when there are large outbreaks. We had a major outbreak of spongy moth 2017-2019 which led to heavy mortality of overstory oak on around 2000 acres at Quabbin.

Our state agencies presently rely on nature to manage spongy moth populations. Weather, natural and introduced enemies and the resilience of our forests to withstand defoliation are all parts of this natural system. Populations in Massachusetts have generally experienced cyclical patterns; large population booms are interspersed by years of low population density. Currently, the state does not participate in or fund any spraying or treatment programs.

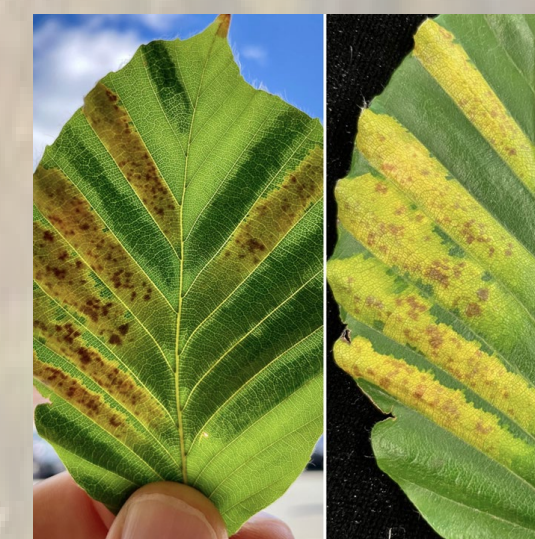


Defoliation at Quabbin Reservoir 2017



Lymantria dispar (spongy moth) females and egg masses (Photo: T. Simisky)

Beech Leaf Disease (BLD)



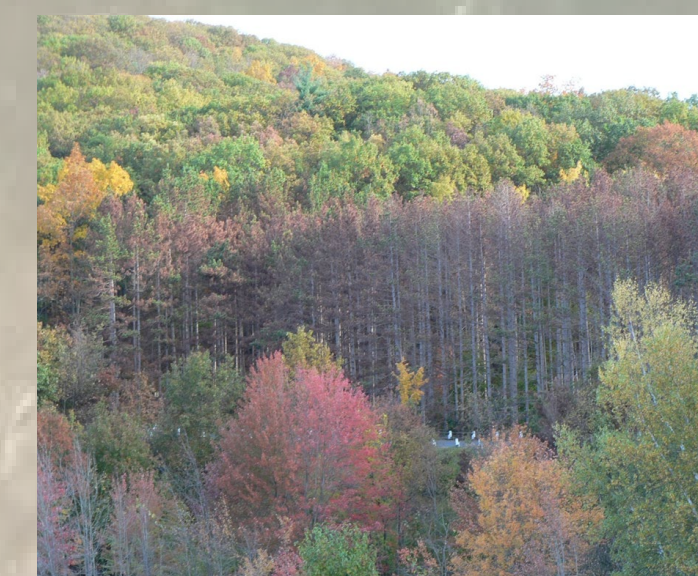
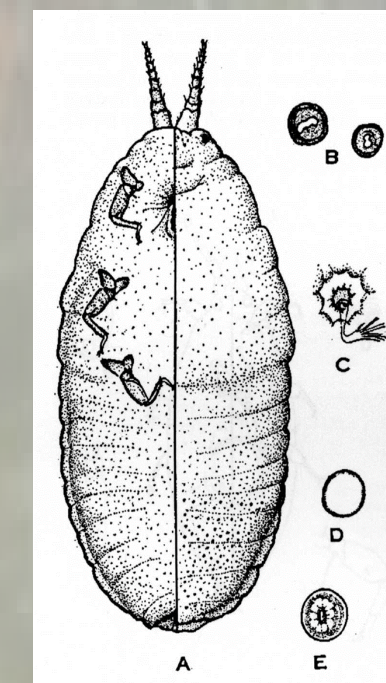
Interveinal banding and early senescence caused by beech leaf disease on a European beech (*Fagus sylvatica*). Photo by N. Brazee

Beech leaf disease (BLD) is associated with a foliar nematode species, *Litylenchus crenatae*. The disease causes damage to a tree's leaves, leading to reduced vigor and can eventually lead to tree mortality. The first detection in Massachusetts was in June 2020 in the town of Plymouth (Plymouth County). Symptomatic trees have since been found in all Massachusetts Counties.

There are still many unknowns about how the disease is spread, how new trees are infected, or how long it takes for symptoms to develop.

American beech is also a small but important component of DWSP forests

Red Pine Scale (RPS)



A Red Pine plantation affected by scale in Quabbin Park.

The Red Pine Scale, (*Matsucoccus resinosa*), is a tiny insect, no more than 1/16" – 1/8" long that lives in and feeds off of red pine trees (*Pinus resinosa*).

Once the scale is established on a tree, that tree will die in approximately 2 years. No measures have been found to be successful in controlling the infestations.

During the construction of the Quabbin Reservoir, thousands of acres of former farmland were planted with red pines to provide a fast-growing cover to protect the land from erosion and to act as a natural filter for the water. Though the trees are not native to MA, the red pine were planted for their ability to grow quickly under a variety of geographic condition. However, beginning in the 1960's and continuing today, Quabbin foresters have been harvesting the red pines to allow conversion to a more diverse forest.

For More information, please go to:
[Massachusetts DCR Forest Health Program](https://www.mass.gov/info-details/massachusetts-dcr-forest-health-program)
(arcgis.com)



PLEASE - do not move any firewood or logs outside of your area.