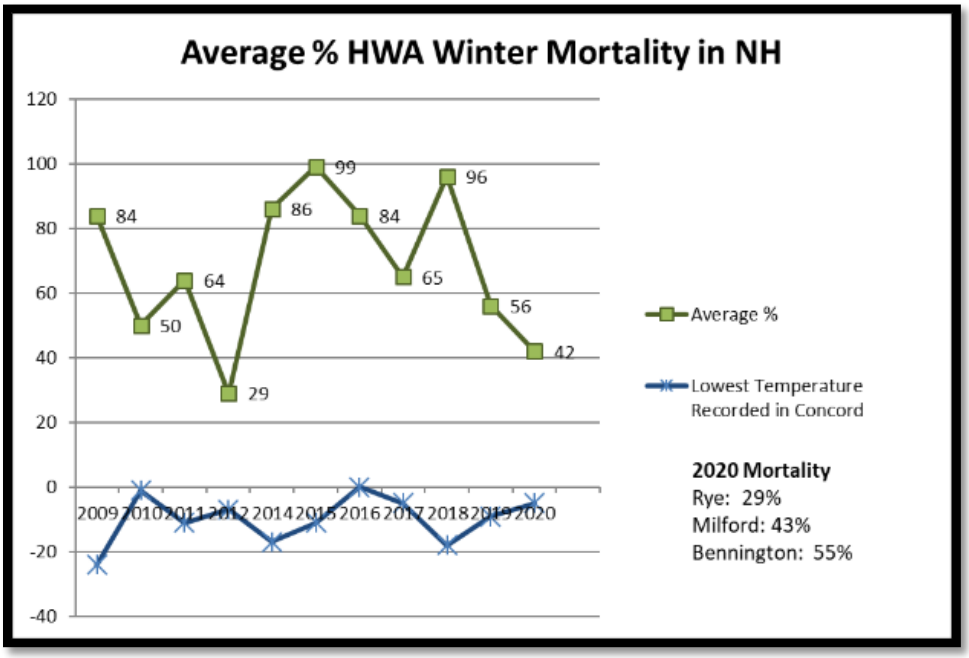
2020 New Hampshire Forest Health Highlights

Field Surveys (By Jen Weimer)

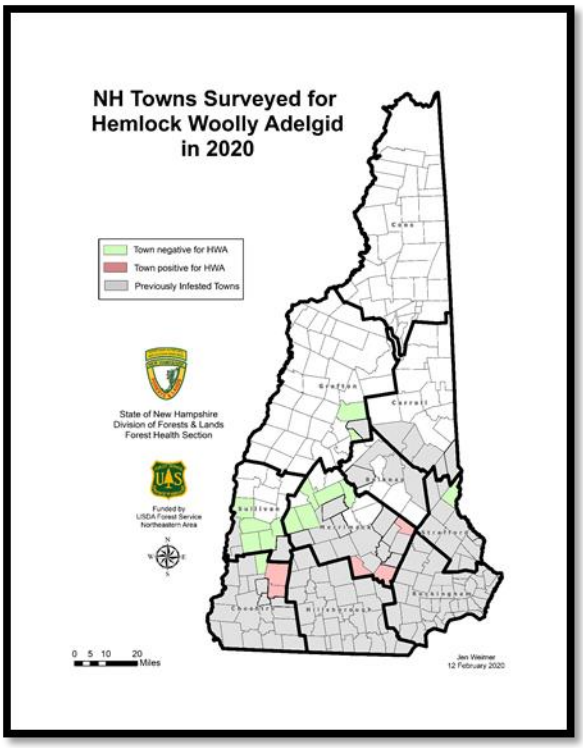
Hemlock Woolly Adelgid and Elongate Hemlock Scale

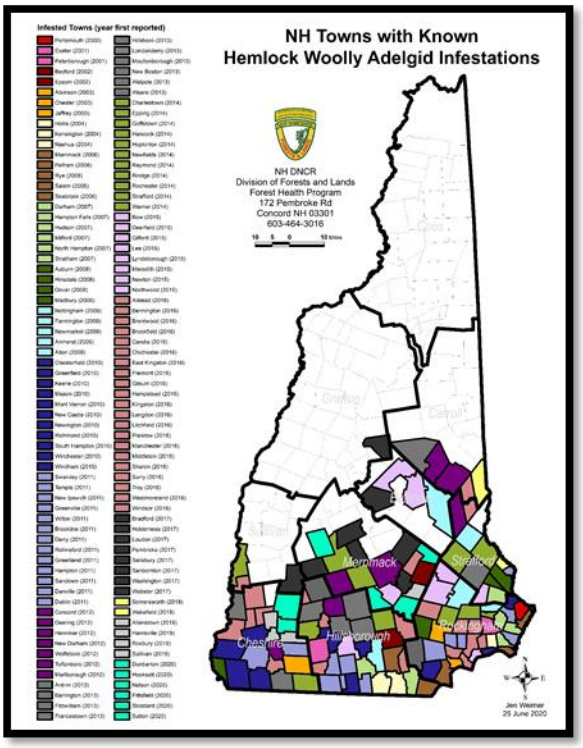
Hemlock Woolly Adelgid (HWA) surveys for 2020 were done in 19 towns that border infested areas in NH. Towns surveyed included Dunbarton, Hooksett, Milton, Campton, Ashland, Claremont, Unity, Acworth, Lempster, Goshen, Newbury, Sutton, Wilmot, Andover, Franklin, Nelson, Stoddard, Marlow, and Pittsfield. Infestations were found in Dunbarton, Hooksett, Nelson, Pittsfield and Stoddard. A landowner also reported an infestation in the town of Sutton over the summer.

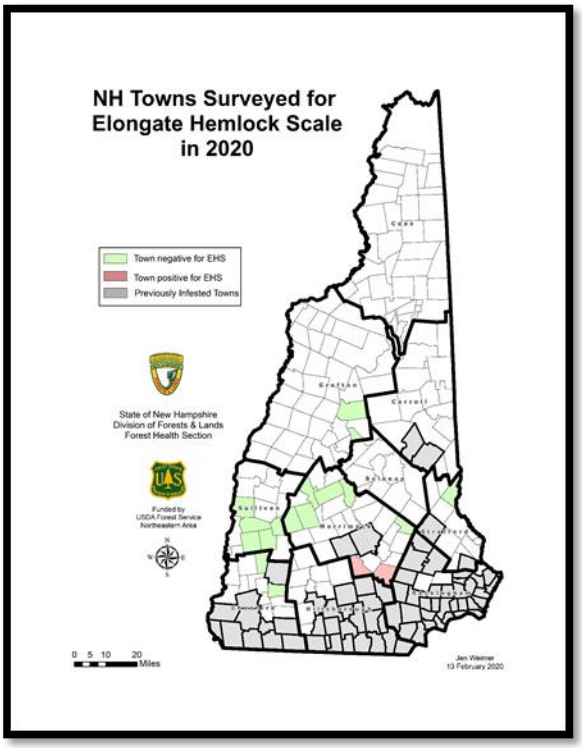


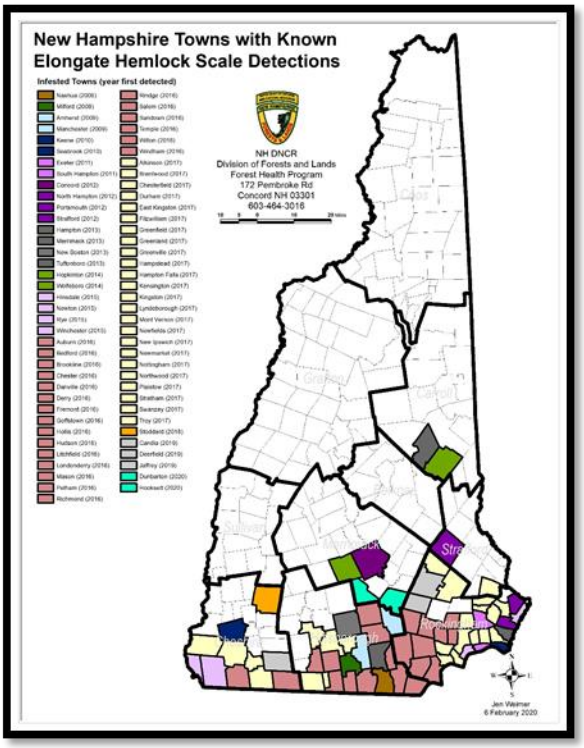
Winter mortality surveys were done for HWA at three sites with an average mortality of 42% which was down from prior years. In addition, larval sampling was done at three sites where *Laricobius nigrinus* (Ln) had been previously released for HWA biocontrol. No larvae were collected this year. Releases of Ln were done at our field insectaries in Durham and Portsmouth in November and December.

Elongate Hemlock Scale surveys for 2020 were done in conjunction with HWA surveys. Towns surveyed included Dunbarton, Hooksett, Milton, Campton, Ashland, Claremont, Unity, Acworth, Lempster, Goshen, Newbury, Sutton, Wilmot, Andover, Franklin, Nelson, Stoddard, Marlow, and Pittsfield. New infestations were detected in Dunbarton and Hooksett.


NH Towns Surveyed for Hemlock Woolly Adelgid in 2020
Town negative for HWA
Town positive for HWA
Previously Infested Towns
State of New Hampshire
Division of Forests & Lands
Forest Health Section
Funded by USDA Forest Service Northeastern Area
0 5 10 20 Miles
Jen Weimer
12 February 2020

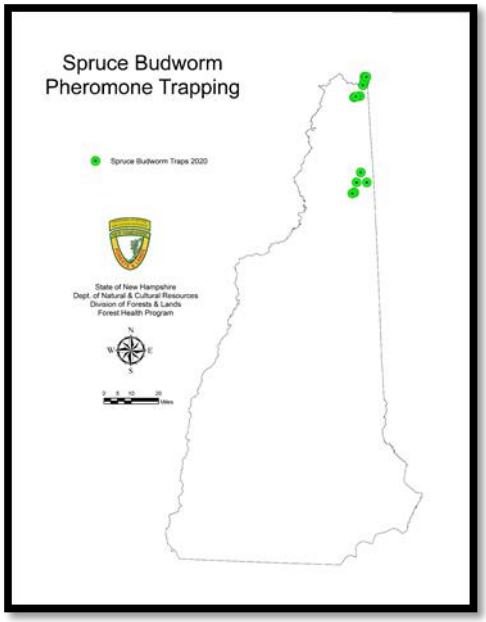

Infested Towns (year first reported)
NH Towns with Known Hemlock Woolly Adelgid Infestations
NH DNCR
Division of Forests and Lands
Forest Health Program
172 Pembroke Rd
Concord NH 03301
603-464-3016
Jen Weimer
25 June 2020


NH Towns Surveyed for Elongate Hemlock Scale in 2020
Town negative for EHS
Town positive for EHS
Previously Infested Towns
State of New Hampshire
Division of Forests & Lands
Forest Health Section
Funded by USDA Forest Service Northeastern Area
0 5 10 20 Miles
Jen Weimer
13 February 2020


New Hampshire Towns with Known Elongate Hemlock Scale Detections
Infested Towns (year first detected)
NH DNCR
Division of Forests and Lands
Forest Health Program
172 Pembroke Rd
Concord NH 03301
603-464-3016
Jen Weimer
6 February 2020

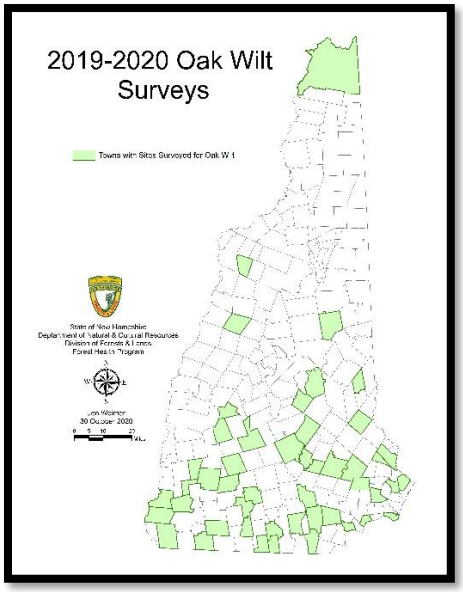
Spruce Budworm

Trapping for spruce budworm continued this year with fewer traps due to travel restrictions. Catches in NH continue to remain at endemic levels. You can find out more info and view an interactive map of the current outbreak in Canada on the Maine SBW Task Force webpage.



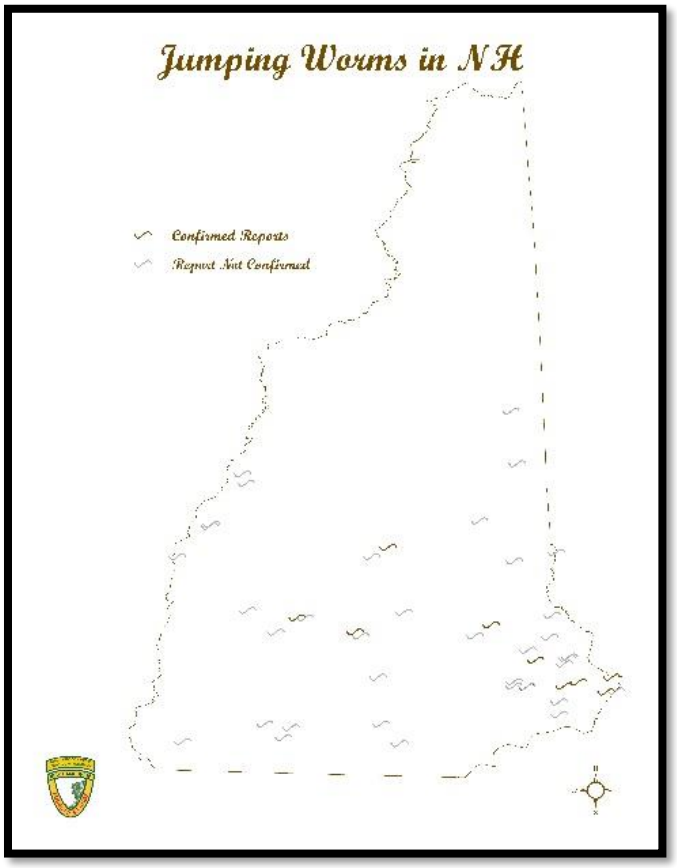
Oak Wilt

Surveys for oak wilt were done at 59 high-risk sites around the state in 2019 and 2020 as part of a Northeast Area Multi-State Comprehensive Oak Wilt Monitoring Project. While all of our surveys were negative for oak wilt there was a lot going on with oak again this year. Of note was defoliation from saddled prominent, oak shothole leafminer and oak slug sawfly, as well as branch dieback from bot canker, and oak twig pruner. See this years' feature creature for more info on oak wilt and other oak pests.



Jumping Worms

Numerous reports of jumping worms came in this year from all over the state. This nonnative invasive earthworm feeds in the organic layer of soil, which can change the structure of the forest floor, negatively affecting native plants. We are currently compiling reports and planning surveys for next year to determine the extent and impact of this new pest in NH. If you think you have seen an overabundance of aggressive worms in your garden or forest that could be jumping worms, we would like to hear from you. Learn how to ID them and report your sightings at nhbugs.org.



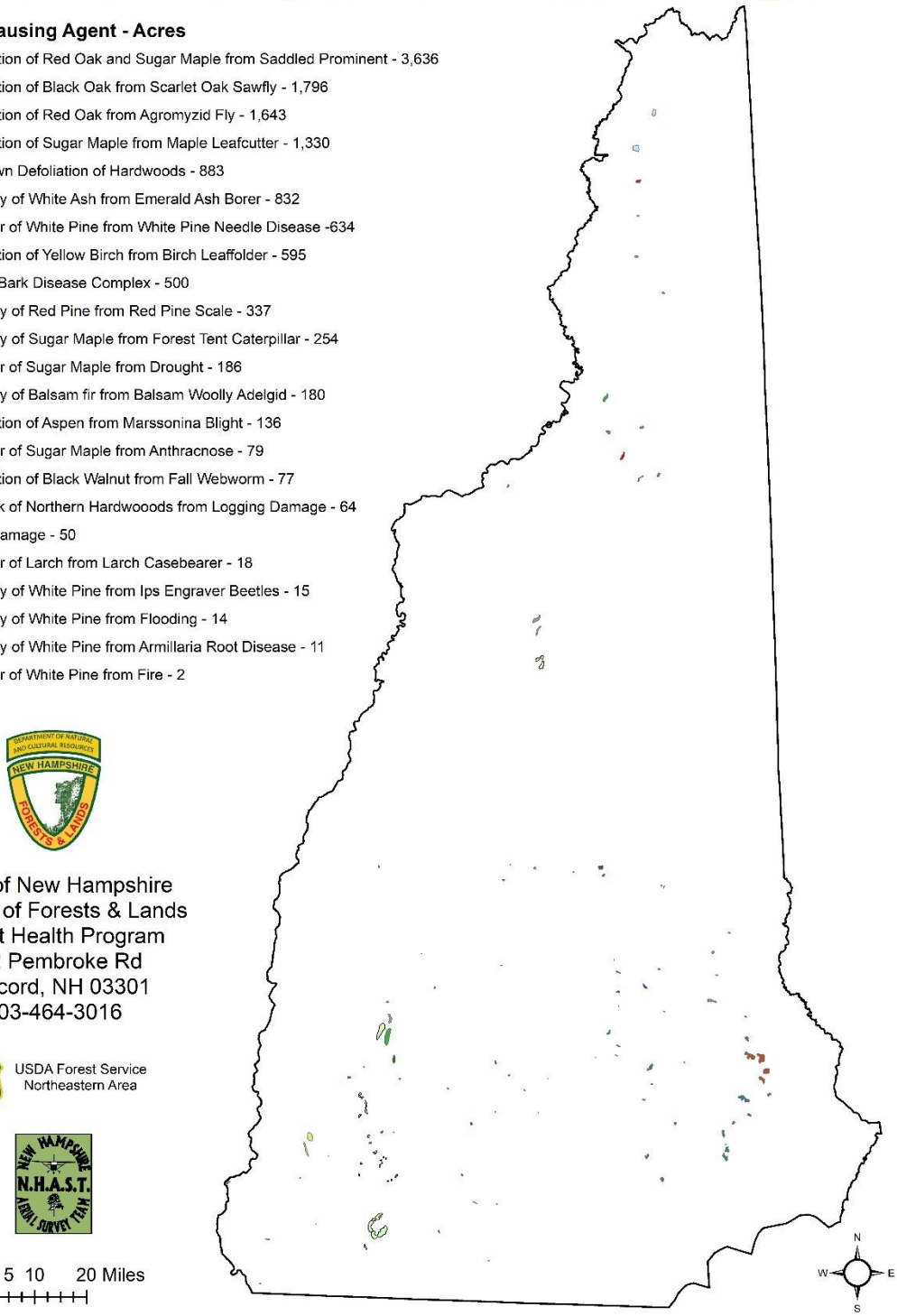
Aerial Survey Highlights

We mapped over 13,000 acres of damage in this year's aerial survey. The most common damage seen this year was defoliation from Saddled Prominent, which was mapped on 3,636 acres of red oak and sugar maple in the south western part of the state. We also mapped defoliation of oak from Scarlet Oak Sawfly on 1,796 acres and Oak Shothole Leafminer (Agromyzid Fly) on 1,643 acres in the south. Maple Leafcutter was mapped on 1,330 acres throughout the state. Mortality from Emerald Ash Borer was mapped on 832 acres and White Pine Needlecast Diseases were mapped on 634 acres. Other notable damage this year occurred from Birch Leaffolder (595 acres), Beech Bark Disease (500 acres), Red Pine Scale (337 acres), and mortality of sugar maple from Forest Tent Caterpillar (254 acres). Click on the map for a pdf of the damage map or check out an online web map (including maps from the past 6 years) for more detail.

2020 New Hampshire Forest Damage

Damage Causing Agent - Acres

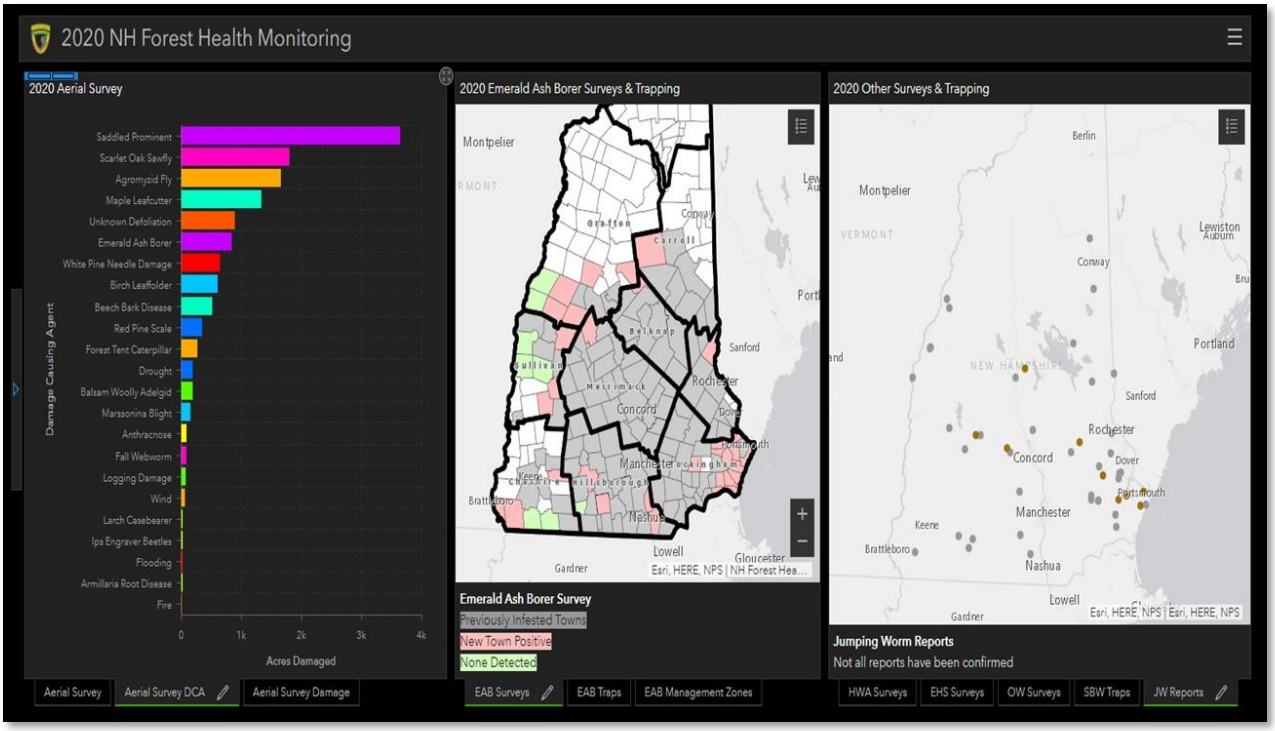
- Defoliation of Red Oak and Sugar Maple from Saddled Prominent - 3,636
- Defoliation of Black Oak from Scarlet Oak Sawfly - 1,796
- Defoliation of Red Oak from Agromyzid Fly - 1,643
- Defoliation of Sugar Maple from Maple Leafcutter - 1,330
- Unknown Defoliation of Hardwoods - 883
- Mortality of White Ash from Emerald Ash Borer - 832
- Discolor of White Pine from White Pine Needle Disease -634
- Defoliation of Yellow Birch from Birch Leaffolder - 595
- Beech Bark Disease Complex - 500
- Mortality of Red Pine from Red Pine Scale - 337
- Mortality of Sugar Maple from Forest Tent Caterpillar - 254
- Discolor of Sugar Maple from Drought - 186
- Mortality of Balsam fir from Balsam Woolly Adelgid - 180
- Defoliation of Aspen from Marssonina Blight - 136
- Discolor of Sugar Maple from Anthracnose - 79
- Defoliation of Black Walnut from Fall Webworm - 77
- Dieback of Northern Hardwooods from Logging Damage - 64
- Wind Damage - 50
- Discolor of Larch from Larch Casebearer - 18
- Mortality of White Pine from Ips Engraver Beetles - 15
- Mortality of White Pine from Flooding - 14
- Mortality of White Pine from Armillaria Root Disease - 11
- Discolor of White Pine from Fire - 2



State of New Hampshire
Division of Forests & Lands
Forest Health Program
172 Pembroke Rd
Concord, NH 03301
603-464-3016

USDA Forest Service
Northeastern Area

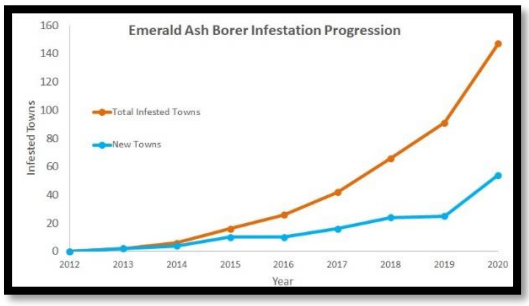
0 5 10 20 Miles



Check out our NEW Forest Health Monitoring Dashboard for interactive maps of all of this year's field and trapping surveys.

EAB Update (By Bill Davidson)

The emerald ash borer infestation in New Hampshire hit an inflection point in 2020. The previous high for new towns where emerald ash borer was detected in a year was 2019 when infestations were discovered in 26 towns; in 2020, 54 towns have been reported. Over this same span the estimated infested area increased from 3,000 mi^2 to 5,000 mi^2, now covering over half of the state. Our management map depicting the full extent of the infestation in New Hampshire, along with a list of all infested towns can be found at nhbugs.org. Spread has been significant in all directions and nearly every town in Rockingham, Hillsborough, Merrimack, Belknap, and Strafford counties is now infested. Significant and widespread ash mortality is visible within many towns in these counties, and even though there are many asymptomatic trees throughout, it is safe to assume any ash within the listed counties is either infested but isn't yet displaying symptoms, or will become infested in the near future.



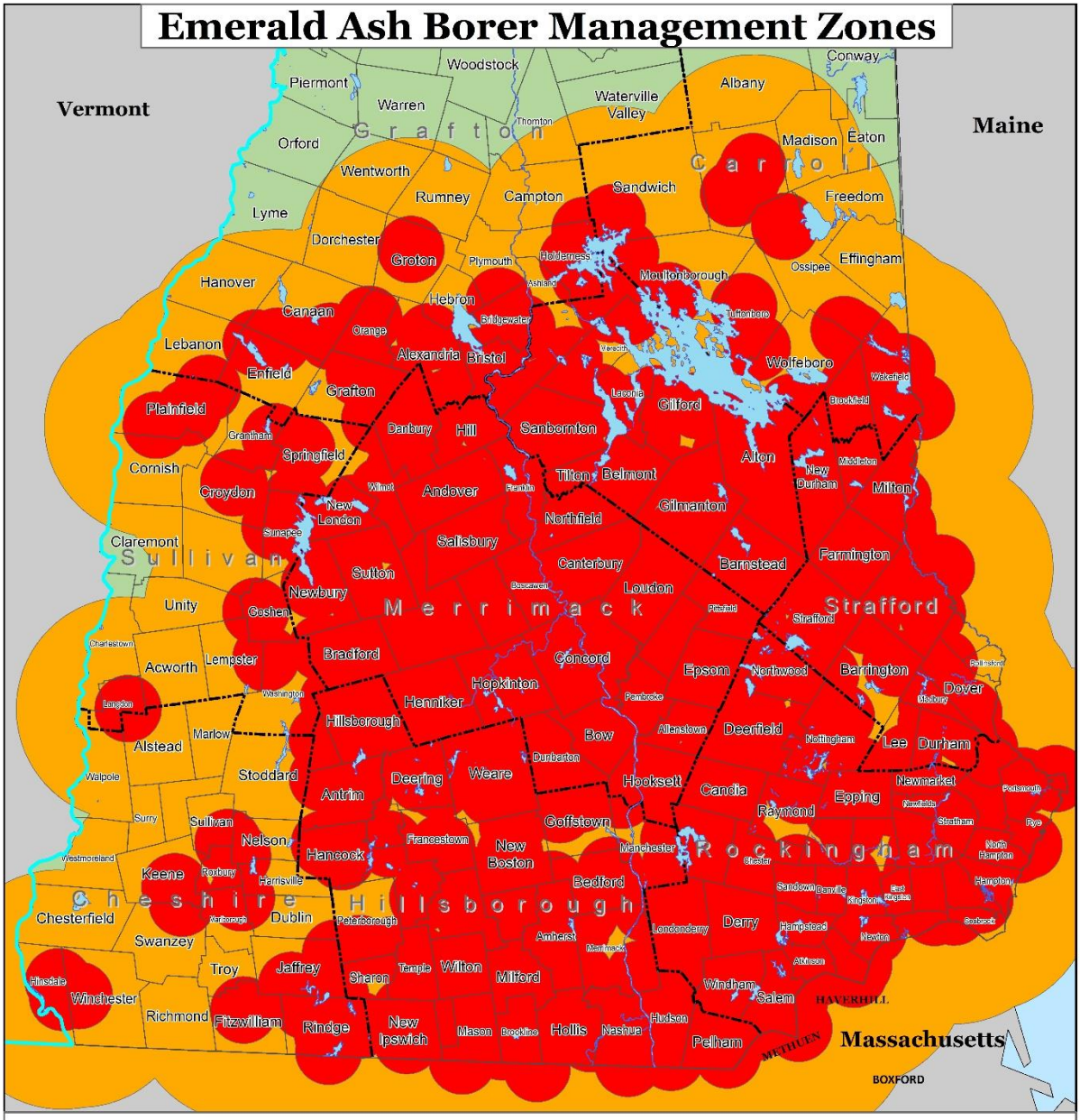
Given the current extent of the emerald ash borer infestation in New Hampshire, it seems as though we have caught up with the rest of the country. Over the past two decades the ash borer has spread from an initial detection in Michigan to nearly every state from Maine to Colorado, encompassing the vast majority of the ash resource in the country. Given the current situation USDA-APHIS has elected to remove the Federal EAB quarantine effective January 14, 2021, a move that will end APHIS' regulatory activities pertaining to movement of ash material. More information about the implications of this decision can be found online.

The elimination of federal regulations regarding interstate movement of ash logs and firewood related to emerald ash borer does not change the best management practices of any transportation of ash materials within NH or between NH and VT or NH and MA. It's unknown at this time how it will effect movement of ash logs and pulp to Maine. Maine has many Counties currently regulated by the Federal quarantine so they will have to enact State quarantine regulations if they plan to continue regulating ash material shipped from NH. Contact your receiving facility in Maine, or the Maine Forest Service to get updated requirements after January 14, 2021. It is also important to note that while their quarantine is being removed, there are still plenty of healthy ash across the state and the region. Following our recommended Best Management Practices aimed at reducing movement of infested ash material will continue to slow the spread of EAB and buy time for trees in non-infested areas.

Ash Mortality along the Merrimack River in Concord (Photo-Bill Davidson)

The removal of the Federal quarantine will allow APHIS to put more resources into the biological control program, which continues to serve as the best hope for maintaining ash on our post-EAB landscapes. In New Hampshire, we have released three species of parasitic wasps totaling over 220,000 individuals across 20 sites throughout the state since 2014 and are continuing to add sites along the edge of the expanding edge of the ash borer infestation. Six new release sites will be utilized in 2021, including the first sites in Cheshire, Strafford, and Sullivan Counties. All of the released species are showing signs of establishment in the environment and spread throughout the landscape, encouraging news for maintaining ash as a component of New Hampshire's forests.

Emerald Ash Borer Management Zones



EAB Generally Infested Area

EAB Potential Expansion Area (10 Miles)

EAB Alert Area (>10 Miles)

0 5 10 20 Miles

Date: 12/21/2020

N W E S

State of New Hampshire
Department of Natural & Cultural Resources

Feature Article (By Kyle Lombard)

Ash Trees with Emerald Ash Borer-To Cut or Not to Cut

There have been many questions asked of us in 2020 regarding whether a landowner should cut ash trees in light of emerald ash borer (EAB) or not cut. There is no single answer and no wrong answer as long as the landowner is fully aware of the consequences of doing either and the action taken is guided by principled forestry practices.

The general recommendation is to stay informed of where the EAB infestation is; know where your ash resources are on your property; decide how much economic loss is acceptable; determine extrinsic values and ecological costs of harvesting; and if warranted based on landowner objectives, be prepared to remove larger diameter classes at the appropriate time, on the appropriate sites, and under professional supervision. If a landowner wants to limit economic loss and or reduce beetle pressure on the smaller trees it would be advisable to remove the larger more EAB sustaining trees in the stand. In NH, EAB seems not to build large populations on small, tighter barked ash and preferentially attack the larger deeply furrowed trees. The larger trees have exponentially more cambium and are capable of sustaining much larger populations. There is optimism that biocontrol agents eventually will help protect ash regeneration and young ash forests so any protection we can provide in the form of insect density reduction in the meantime is worthy. If a landowner decides to remove large ash trees they would want to harvest before the infestation has had time to grow to maximum population density. These removals should be included as part of the normal silvicultural plans for the property and should not be poorly planned expeditions across the landscape picking out big ash trees.

(Photo-Jeremy Turner)

If a timber harvest is planned for a property and the landowner decides to leave the big ash trees they should know there is no current data suggesting they will survive an EAB infestation. Much hope was generated from interpretations of a 2018 article in the NRC Research press by Michigan State authors Robinett and McCullough looking at the composition of trees in Michigan's southern ash forests after the EAB infestation was established for more than 10

years. Results found as much as 80% survival of white ash in some sites. What's important to note is that the definition of "survival" was anything with less than 80% dieback. And the majority of survival was in the small diameter classes under 8". There was almost no survival in size classes over 8". Additionally, "survival" (trees not yet dead) increased as you got further from the EAB outbreak centers. This article reinforces what we experience in NH. Mortality is a function of how long EAB has been in the stand, site conditions, tree health, and tree size.

There have been concerns expressed that cutting large ash trees as a strategy to reduce beetle densities and or recover tree value could accidentally remove an unknown resistant tree in the population, forever loosing that potential for study and propagation. That's technically true, there's always a chance. But remember that the normal stand distribution of trees based on both the number and size creates exponentially more trees in the smaller size classes and tree numbers decrease as tree sizes increase. There are many more small trees in a well stocked forest than large trees thus an equally larger chance of finding one of those smaller trees to be resistant or at least tolerant. Our focus should be on protecting and encouraging the younger ash forests where there is a higher likelihood of finding genetic tolerance, not leaving the relatively few big and valuable trees, which tend to be mother trees to large EAB outbreaks and will succumb regardless of any elevated genetic tolerance.

Lastly, please don't think of the recommendation to cut large diameter ash trees as a license to perform a "diameter limit" timber harvest. Only the ash should be cut with diameters in mind. The rest of the stand should be managed with modern silvicultural prescriptions. Cutting all the maple or birch based on diameter will do nothing to change the emerald ash borer population density.

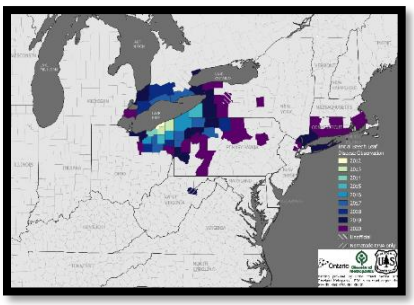
Foresters and Landowners are in a tough spot trying to decide if they need to realize the economic value of their ash, or if they want to try protecting young ash regeneration, or if they want to watch their forest react to the outbreak with no silvicultural intervention at all. The bottom line is that each situation is different and there is professional help available to work through the scenarios. Start with your state forest health specialists, extension educators, and licensed forester and you will develop a response that works for you and your forest.

Sugar maple CTR crop tree release (pink flag) by partial overstory removal of ash on semi-rich site (Photo-Jeremy Turner)

Feature Creature (By Jen Weimer)

Beech Leaf Disease

Beech leaf disease (BLD) is a newly described disease that affects the leaves of beech trees leading to thinning crowns and mortality of mature trees and saplings. Hosts for BLD include American, European, Oriental, and Chinese Beech. First identified in Ohio in 2012, BLD has since been detected in Pennsylvania, New York, New Jersey, Rhode Island, Connecticut, Massachusetts, and Ontario Canada.



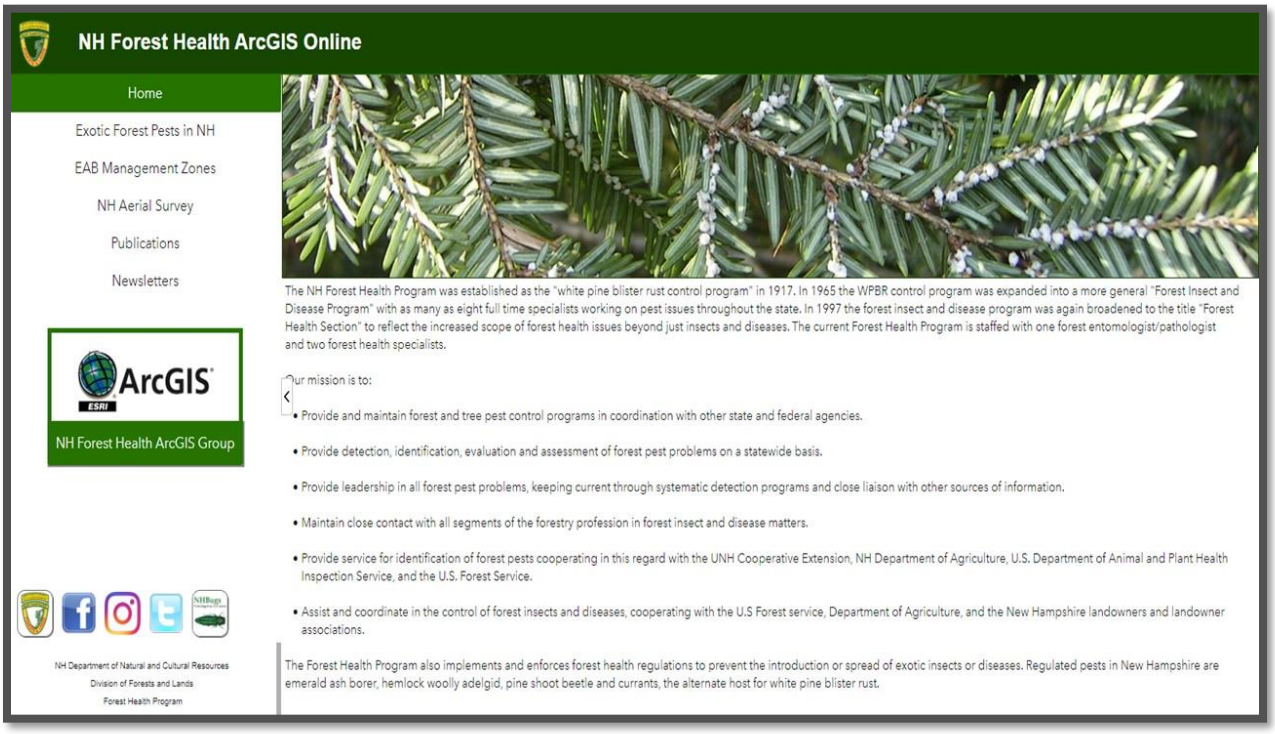
Little is known about how BLD spreads but the disease is associated with a foliar nematode species, *Litylenchus crenatae,* which may be spread via water, insects, or birds. Nematodes are microscopic wormlike organisms that inhabit the entire planet and can be predatory, saprophytic, or parasitic. The nematodes that cause BLD can be found on leaves in the canopy throughout the summer and fall, or overwintering on the ground in detached leaves and in the buds. It is believed that they infect the leaves possibly with a bacterium in the spring as the leaves emerge.

Beech leaf disease can be identified by the distinctive dark stripes between the veins on the leaves, which can be easily viewed by looking up through the crown. Leaves can also become curled or deformed, yellow, and drop prematurely. There are pests that can cause similar symptoms such as aphids and mites. Sightings in NH can be reported at nhbugs.org.

Beech Leaf Disease, Aphid Damage, Mite Damage

Office Notes

The NH Forest Health Program office and lab is located at the Caroline A. Fox Research and Demonstration Forest in Hillsboro. Our small staff monitors the condition of NH's 4.8 million acres of forest. You can help by contacting us if you observe any forest damage. Photos can be uploaded at NHBugs.org or you can contact us. You can also follow us on social media to keep up to date on forest health issues. We currently have 1254 followers on Facebook, 787 followers on Twitter, and 1157 followers on Instagram. Thanks for being so social with us! In addition, we email quarterly updates in March, June, and September. If you are not already on the mailing list, you can sign up on our website or Facebook page. NEW this year be sure to check out our ArcGIS online page.



Forest Health Contacts

Program Coordinator
Kyle Lombard
603-464-3016
Kyle.Lombard@dncr.nh.gov

Forest Health Specialist
Jen Weimer
603-419-0079
Jennifer.Weimer@dncr.nh.gov

Forest Health Specialist-EAB
Bill Davidson
603-892-5156
William.Davidson@dncr.nh.gov

Get Social with us @NHForestHealth