

Forest Health Threats 2023



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DEPT. OF
CONSERVATION AND
RECREATION



dcr
Massachusetts



DCR Forest Health Program

Early detection

Forest disturbance mapping

Long term monitoring

Treatment programs

Biocontrol release programs

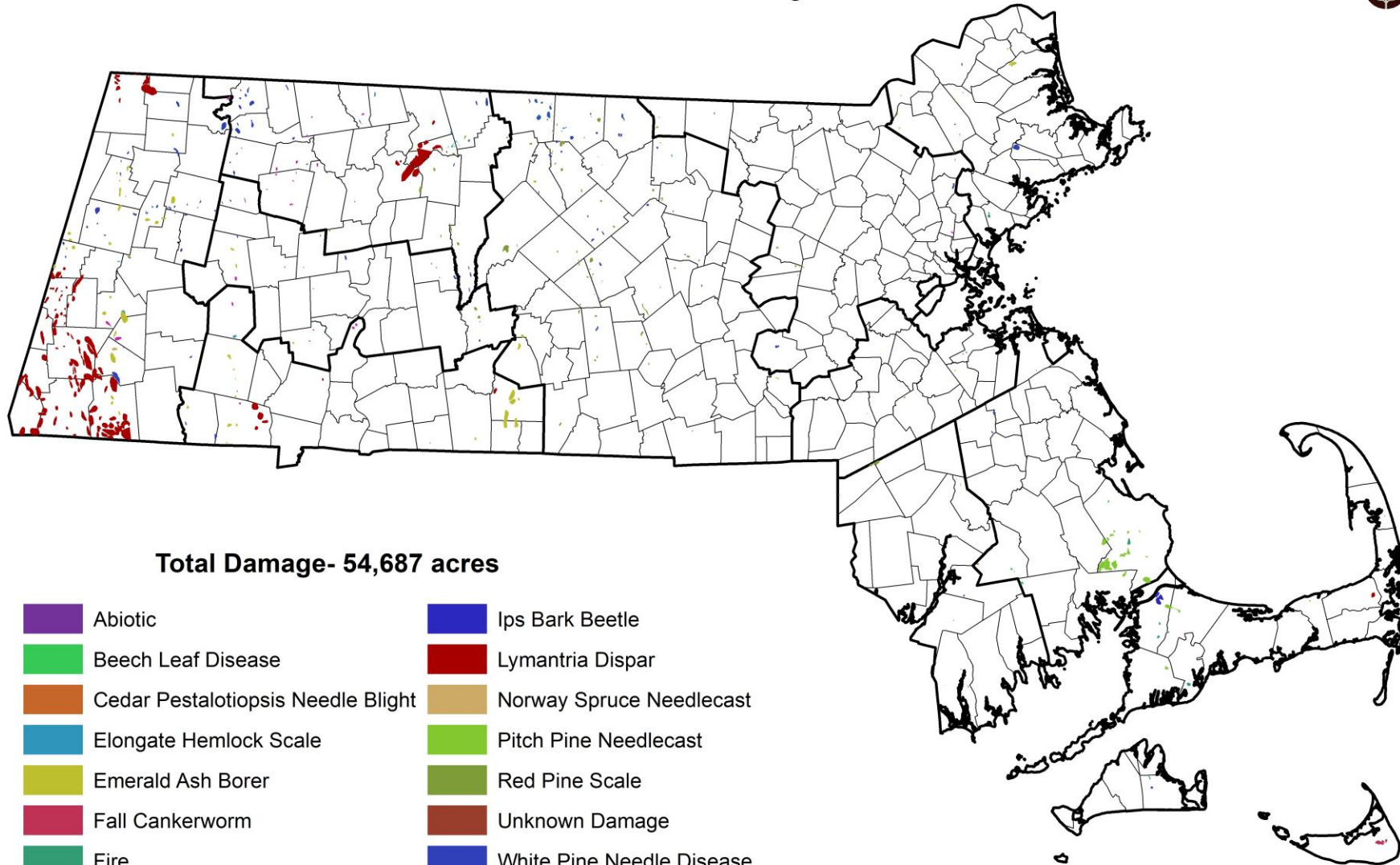






Massachusetts Aerial Survey 2022

Dept. of Conservation and Recreation
Forest Health Program



Total Damage- 54,687 acres

- | | |
|--|---|
|  Abiotic |  Ips Bark Beetle |
|  Beech Leaf Disease |  Lymantria Dispar |
|  Cedar Pestalotiopsis Needle Blight |  Norway Spruce Needlecast |
|  Elongate Hemlock Scale |  Pitch Pine Needlecast |
|  Emerald Ash Borer |  Red Pine Scale |
|  Fall Cankerworm |  Unknown Damage |
|  Fire |  White Pine Needle Disease |
|  Hemlock Looper |  Wind Storm Damage |
|  Hemlock Woolly Adelgid | |

0 12.5 25 50 Miles

Map Created by N Keleher 9/30/2022

Forest Health Story Map

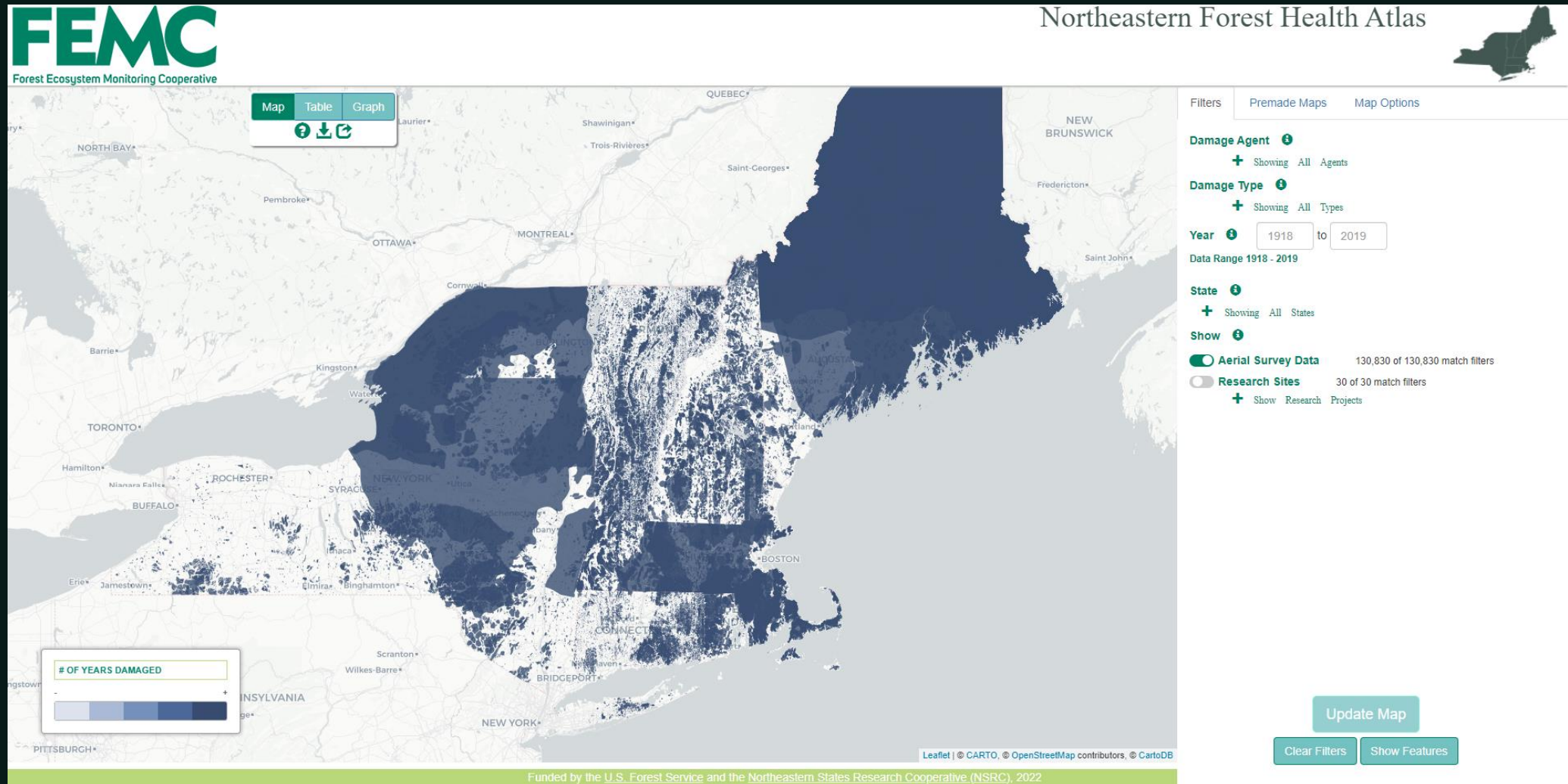
<https://arcg.is/j8TiD>



A screenshot of a web-based Story Map interface. The background is a dark, atmospheric photograph of a forest. At the top left, there is a small 'dcr' logo and the text 'Massachusetts DCR Forest Health Program'. In the top right corner, there are icons for sharing and a menu. The main content area features a large white text overlay: 'Massachusetts DCR Forest Health Program' in a large serif font, followed by 'Learn about the States DCR Forest Health Program' in a smaller sans-serif font, and 'October 4, 2021' below it. A horizontal navigation bar is positioned below the main text, containing several menu items: 'MA DCR Forest Health Overview' (underlined), 'Forest Health Monitoring', 'Aerial Survey', '2021 Aerial Survey Results', 'Emerald Ash Borer', 'Southern Pine Beetle', 'Asian Longhorned Beetle', 'ALB Trapping', 'Hemlock Woolly Adelgid', and 'Elo' with a right-pointing arrow. Below the navigation bar, the 'MA DCR Forest Health Overview' section is visible, with a sub-heading and a paragraph of text. To the right of the text is a vertical image showing an aerial view of a forest landscape with a canopy net visible at the top.

FEMC Regional Forest Health Atlas

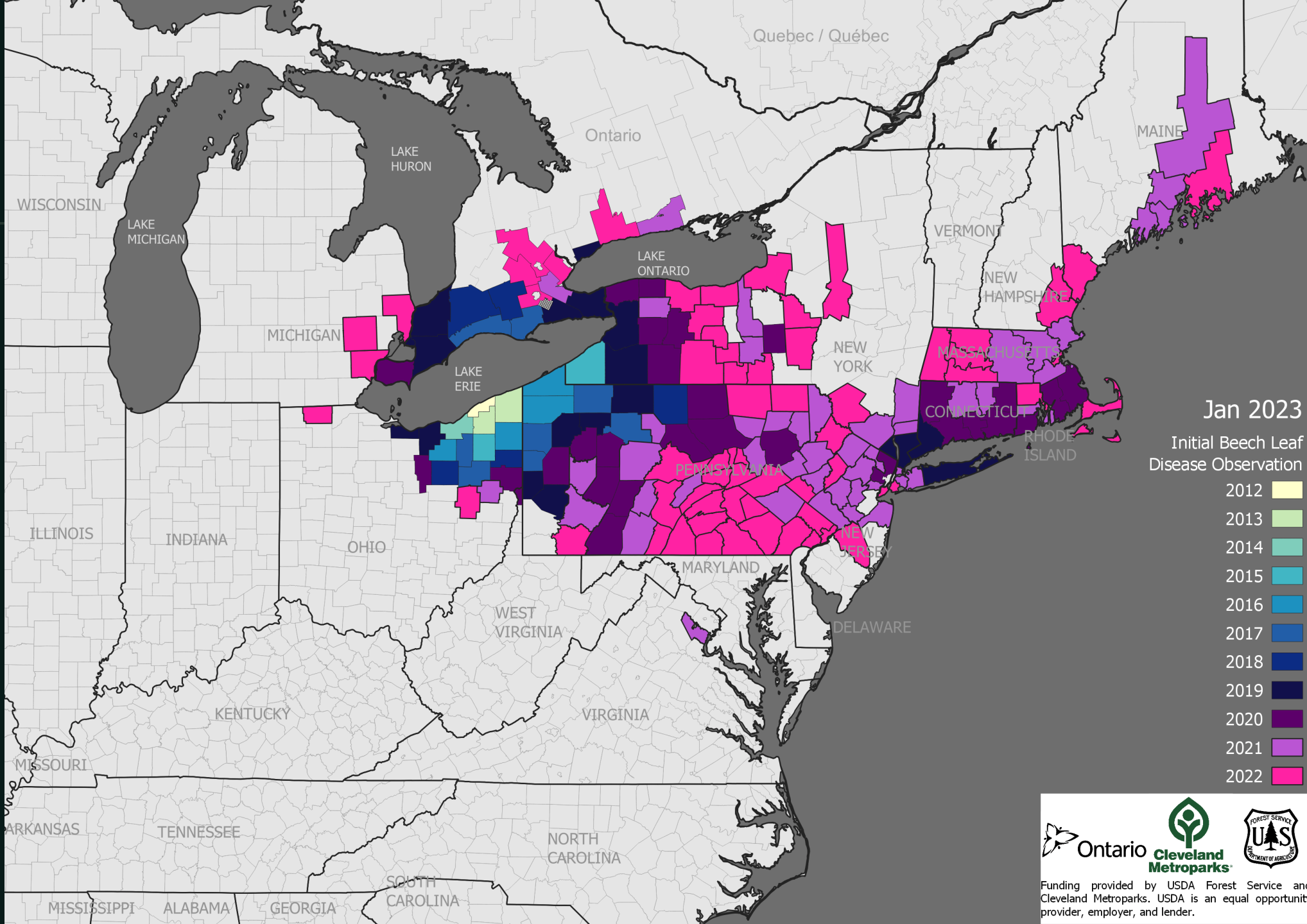
<https://www.uvm.edu/femc/forest-health-atlas>





Beech Leaf Disease

Litylenchus crenatae



Jan 2023

Initial Beech Leaf Disease Observation

- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020
- 2021
- 2022

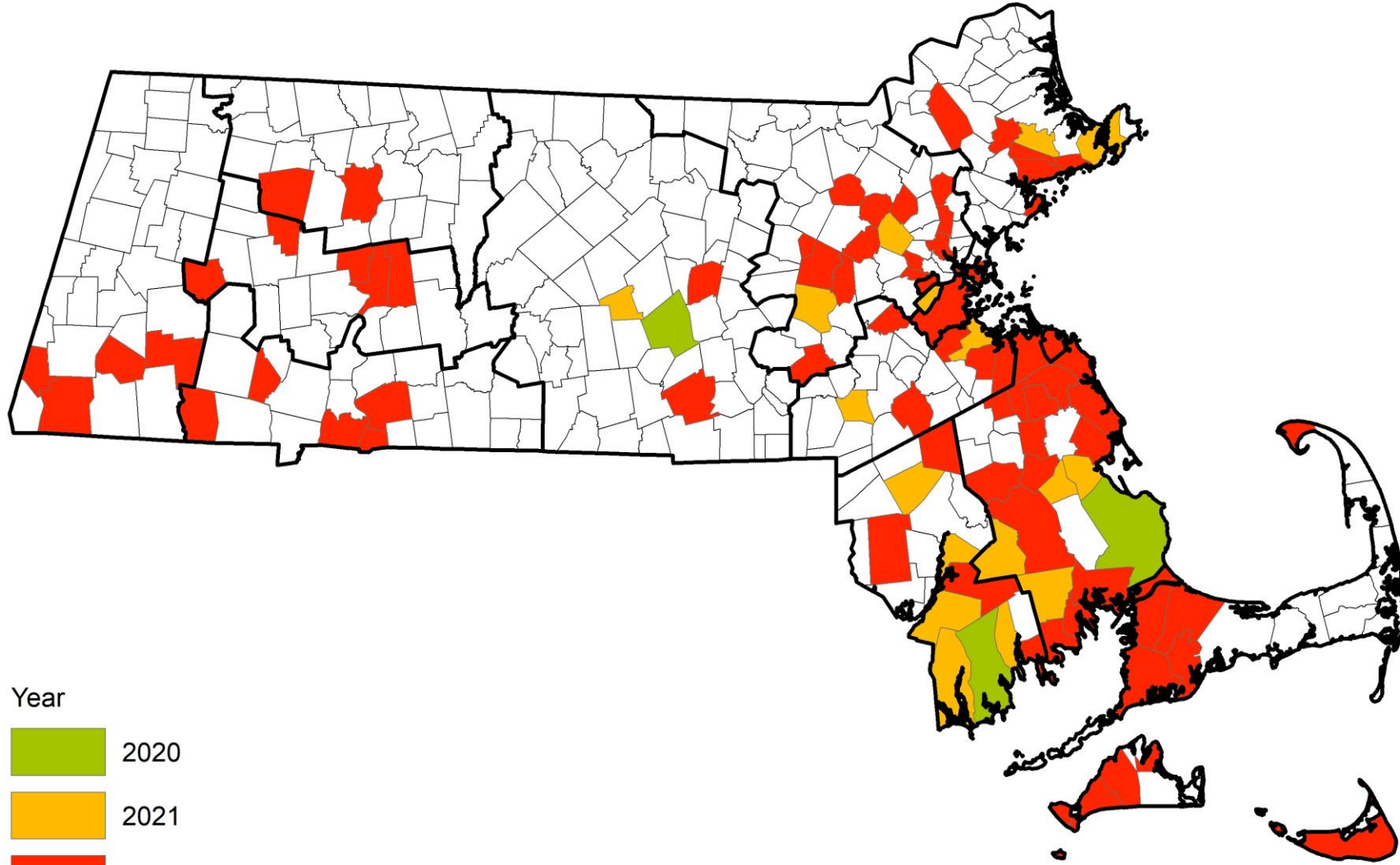


Funding provided by USDA Forest Service and Cleveland Metroparks. USDA is an equal opportunity provider, employer, and lender.




Massachusetts Beech Leaf Disease Detections

Dept. of Conservation and Recreation
Forest Health Program



Year

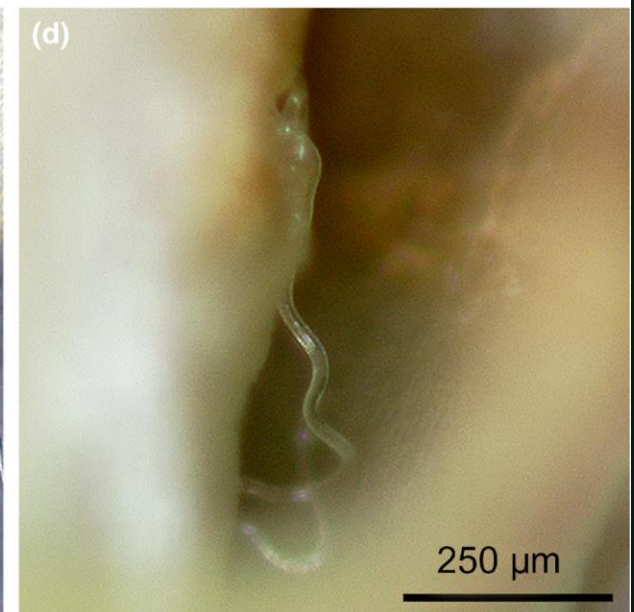
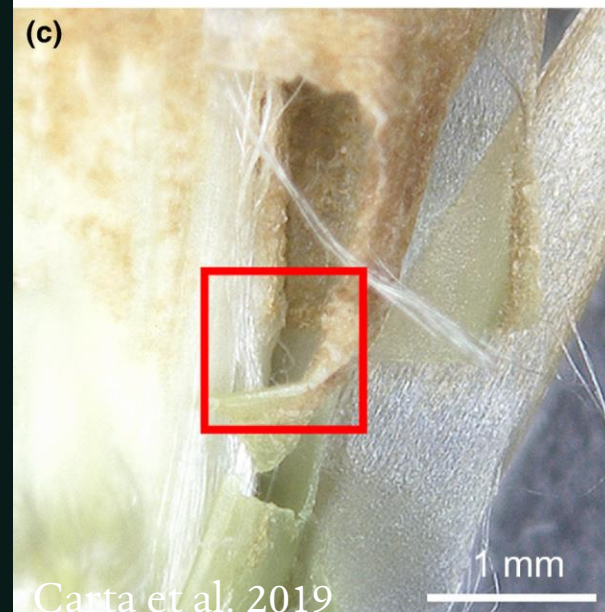
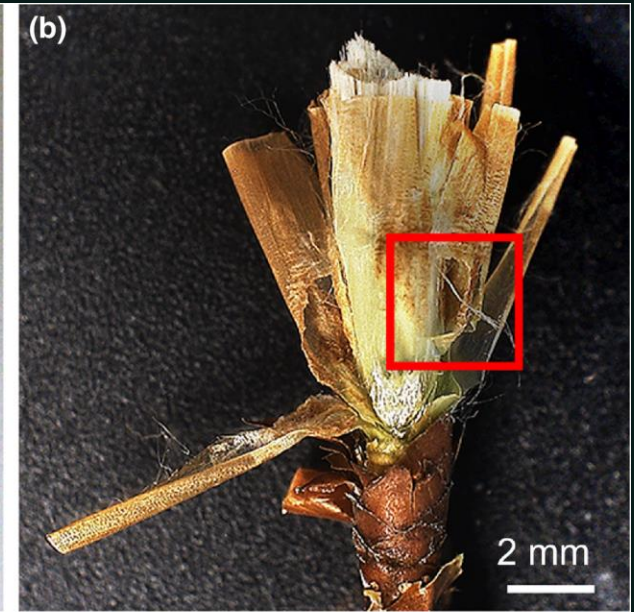
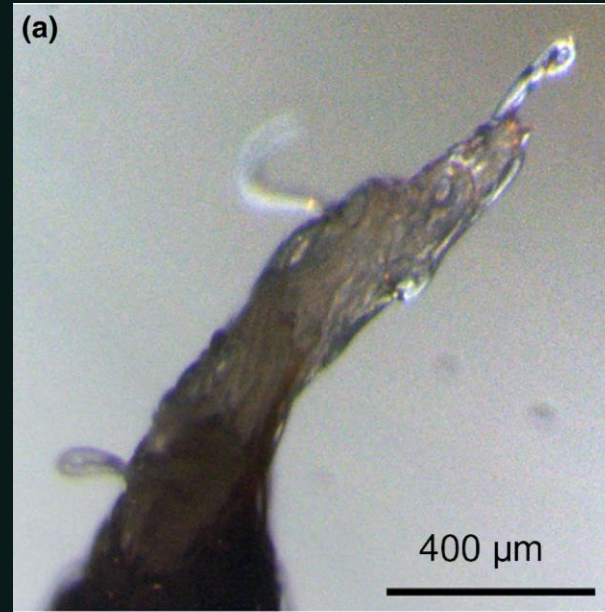
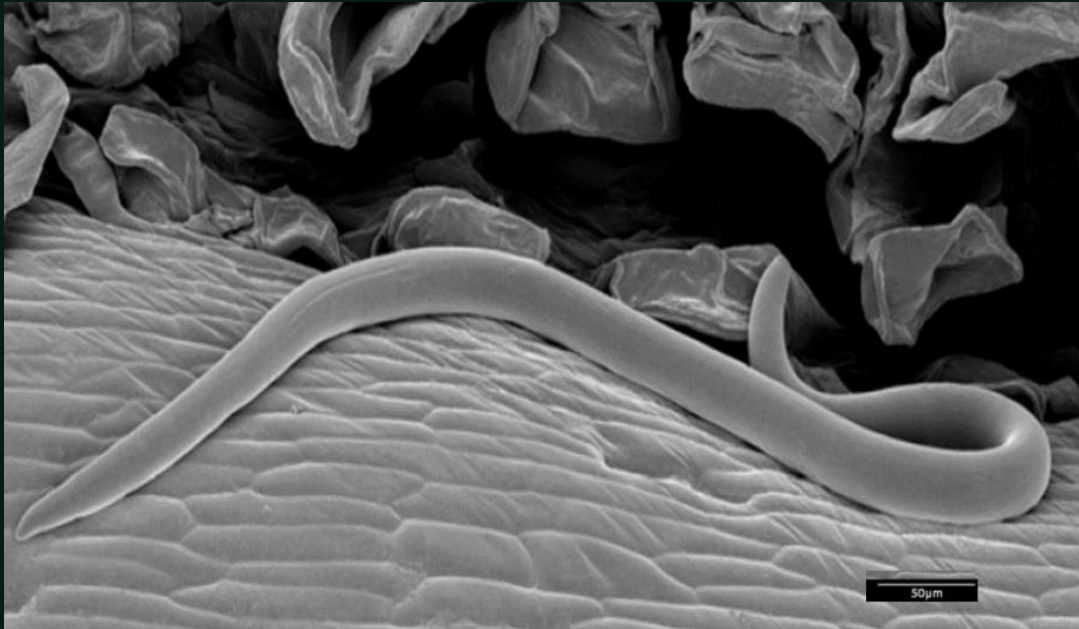
-  2020
-  2021
-  2022

0 12.5 25 50 Miles

Map Created by N Keleher 10/24/2022

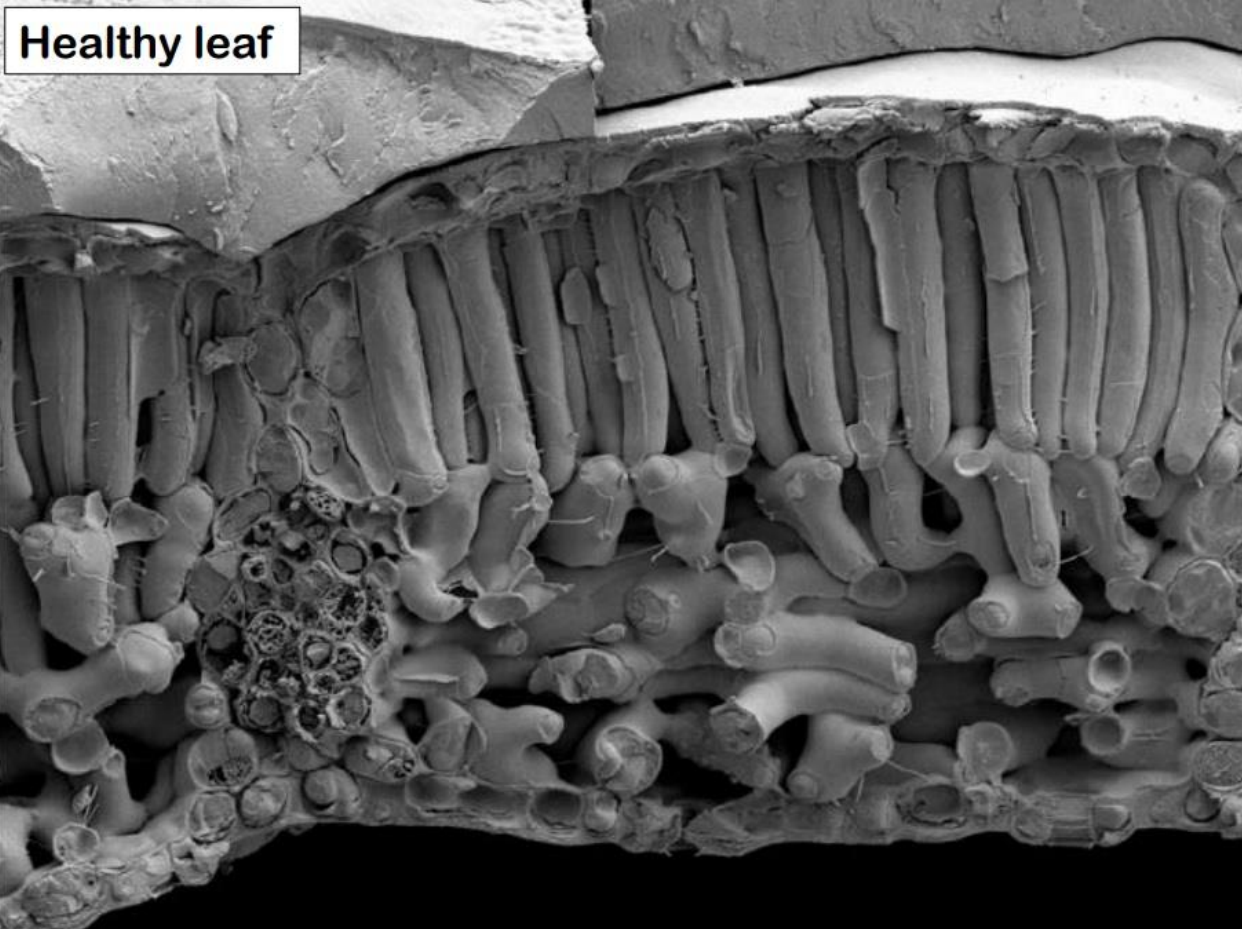


Foliar Nematode



Carta et al. 2019

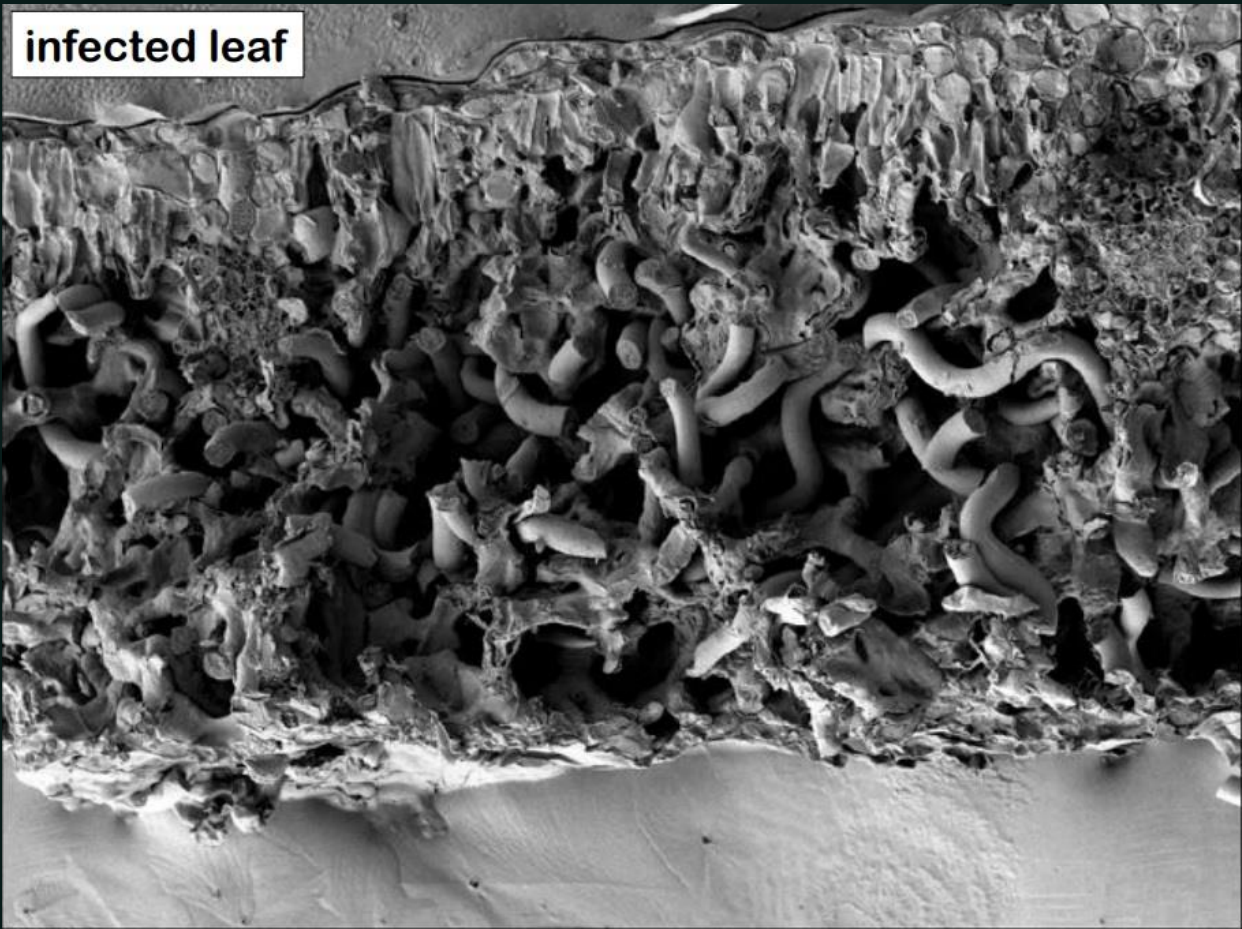
Healthy leaf



ECM1-4700
5.0 KV EM Mag 200X
Normal Leaf X-Section 3 with Stomata

40µm

infected leaf



ECM1-4700
5.0 KV EM Mag 200X
X-Section of Leaf 2

100µm

Gary Baughan, USDA ARS

BLD Symptoms



BLD Progression

As the disease progresses, more of the canopy will be exhibit leaf symptoms. Overtime, leaves will have more dark bands and severely diseased leaves will emerge shriveled and curled. Eventually, impacted buds will be aborted and the tree will have canopy dieback.





Beech Bark Disease Complex

- Beech scale (*Cryptococcus fagisuga*) attack
- Fungal introduction, *Nectria spp.*
- Canker development
- Tree decline and mortality



Beech Bark Disease





Spongy Moth

Lymantria dispar

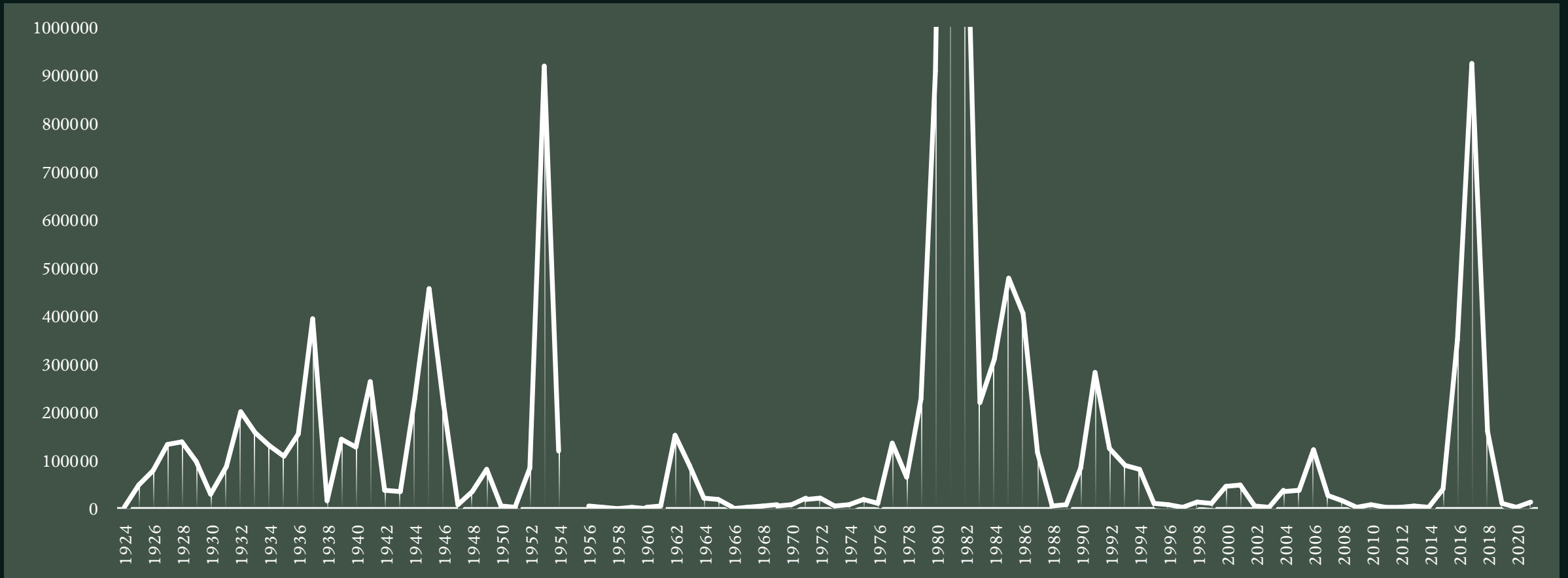


Recent Name Change

Formerly known as gypsy moth



Historic Massachusetts LDD Defoliation



Spongy Moth Recent Impact

	LDD Defoliation	Oak Mortality
2015	38,175	545
2016	349,866	6,536
2017	923,186	122
2018	159,705	23,602
2019	9,955	57,912
2020	140	-
2021	11,455	-
2022	30,895	



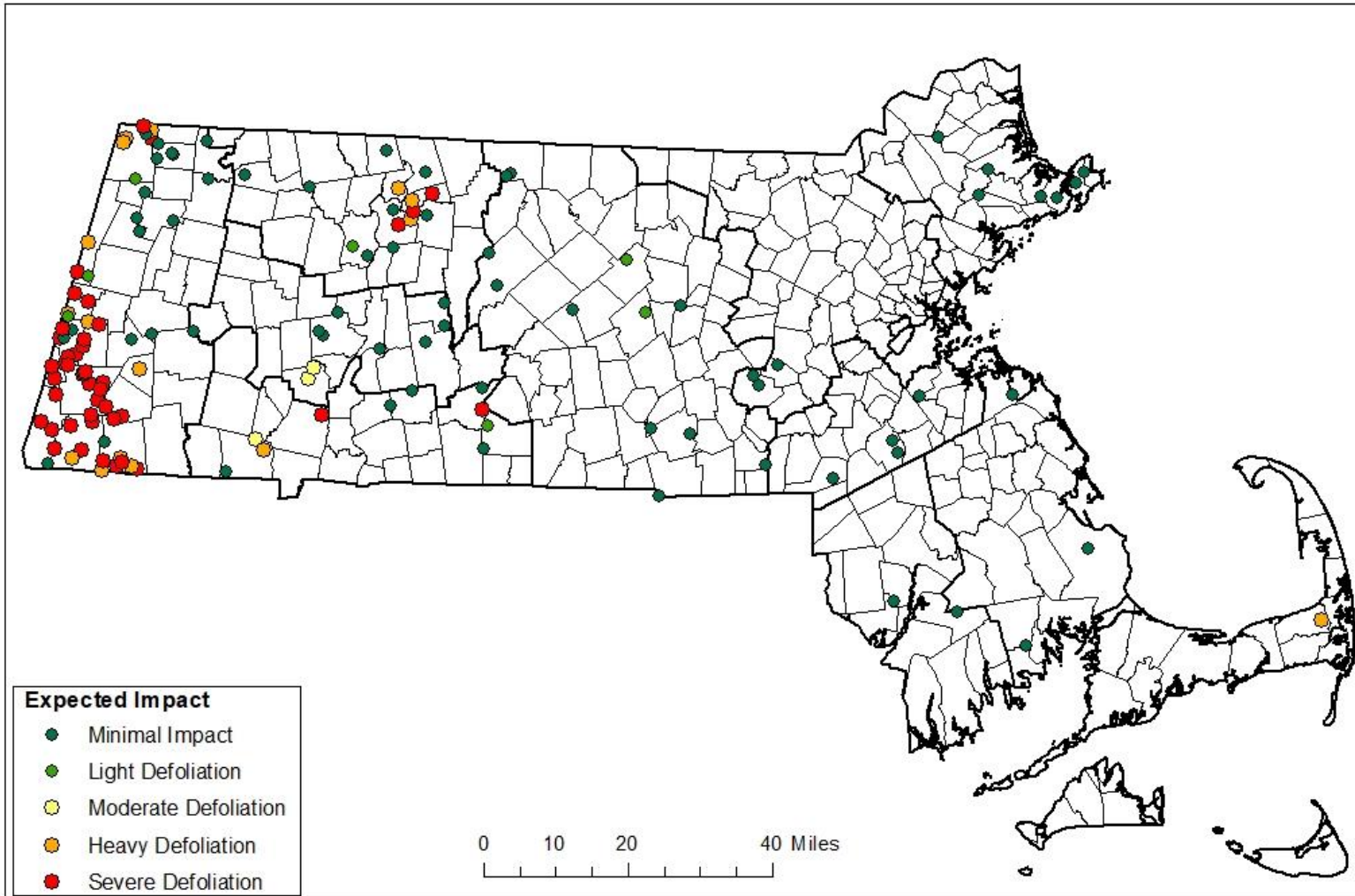
2022 Defoliation Impact



2023 Defoliation Risk

Spongy Moth Egg Mass Survey Results 2022

Department of Conservation and Recreation
Forest Health Program



Map Created by E. Peterson, DCR Forest Health 2/8/2023

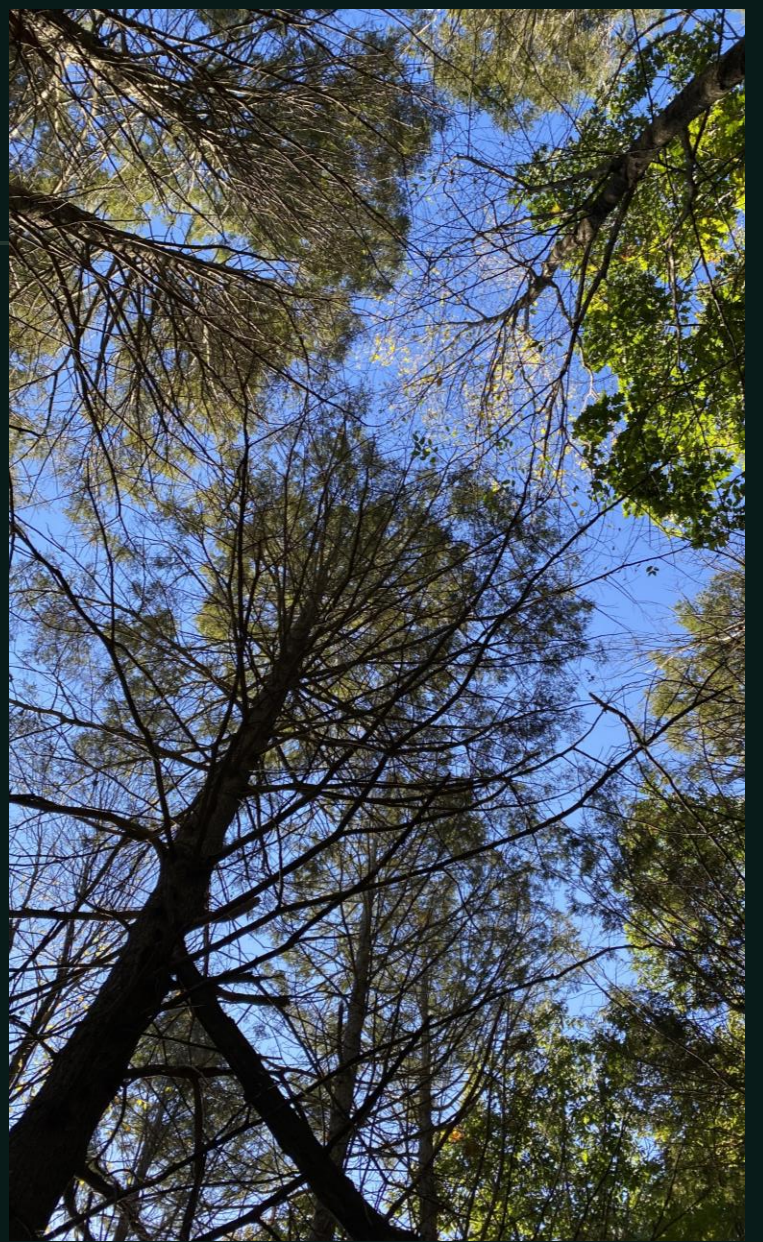
2023 Caterpillar Emergence



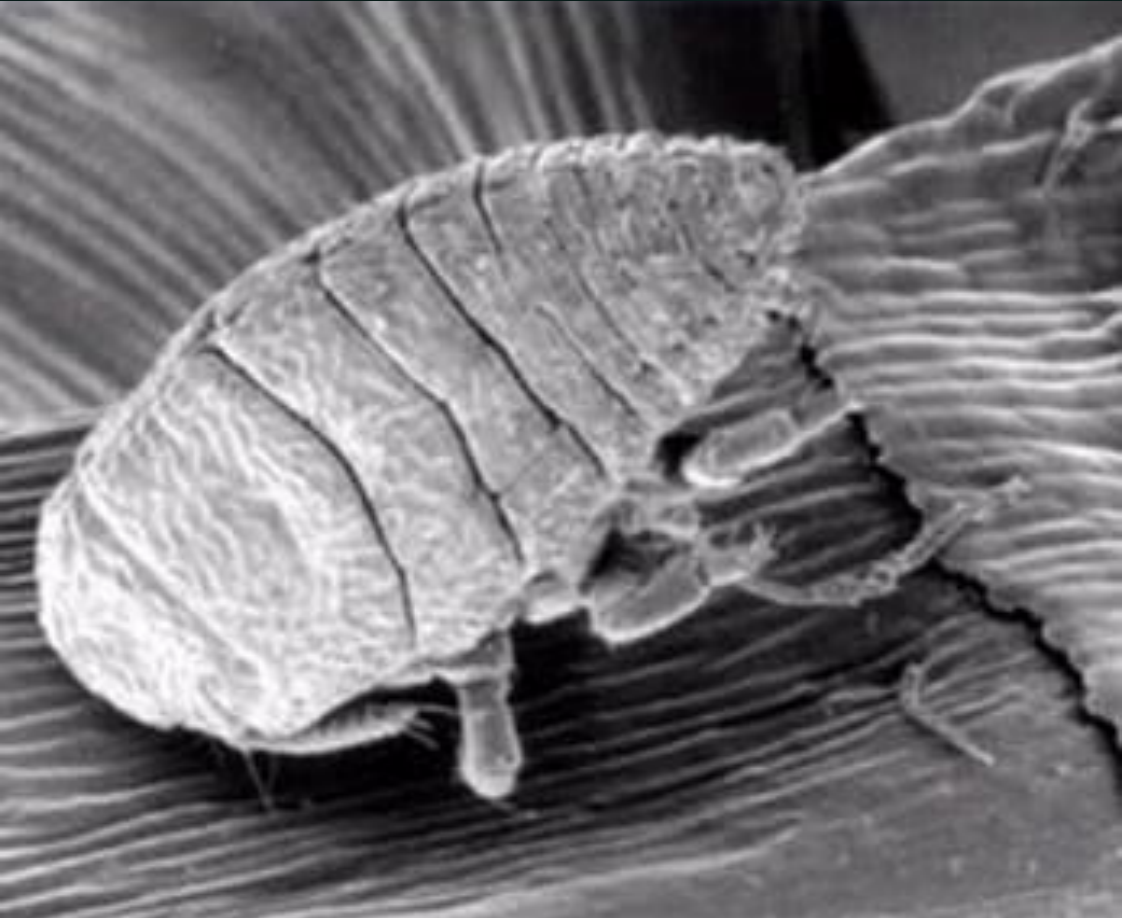


Hemlock Woolly Adelgid

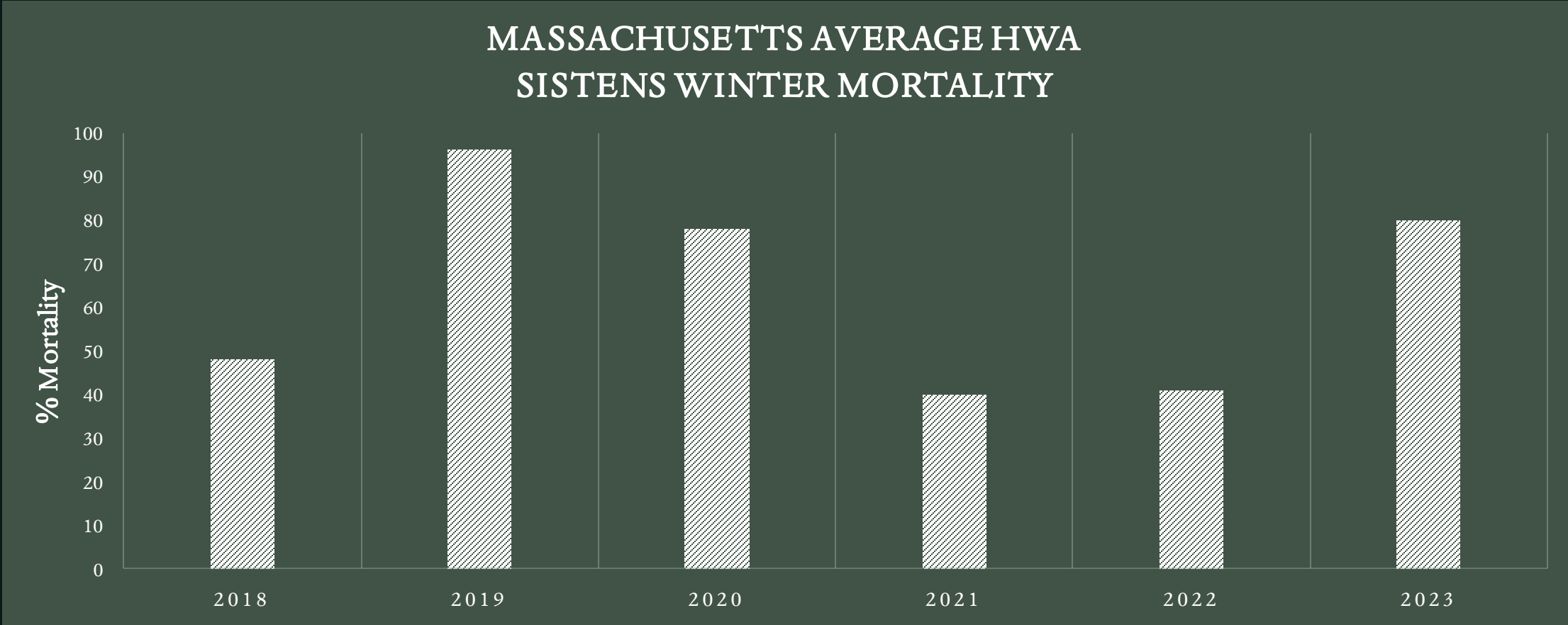
Adelges tsugae

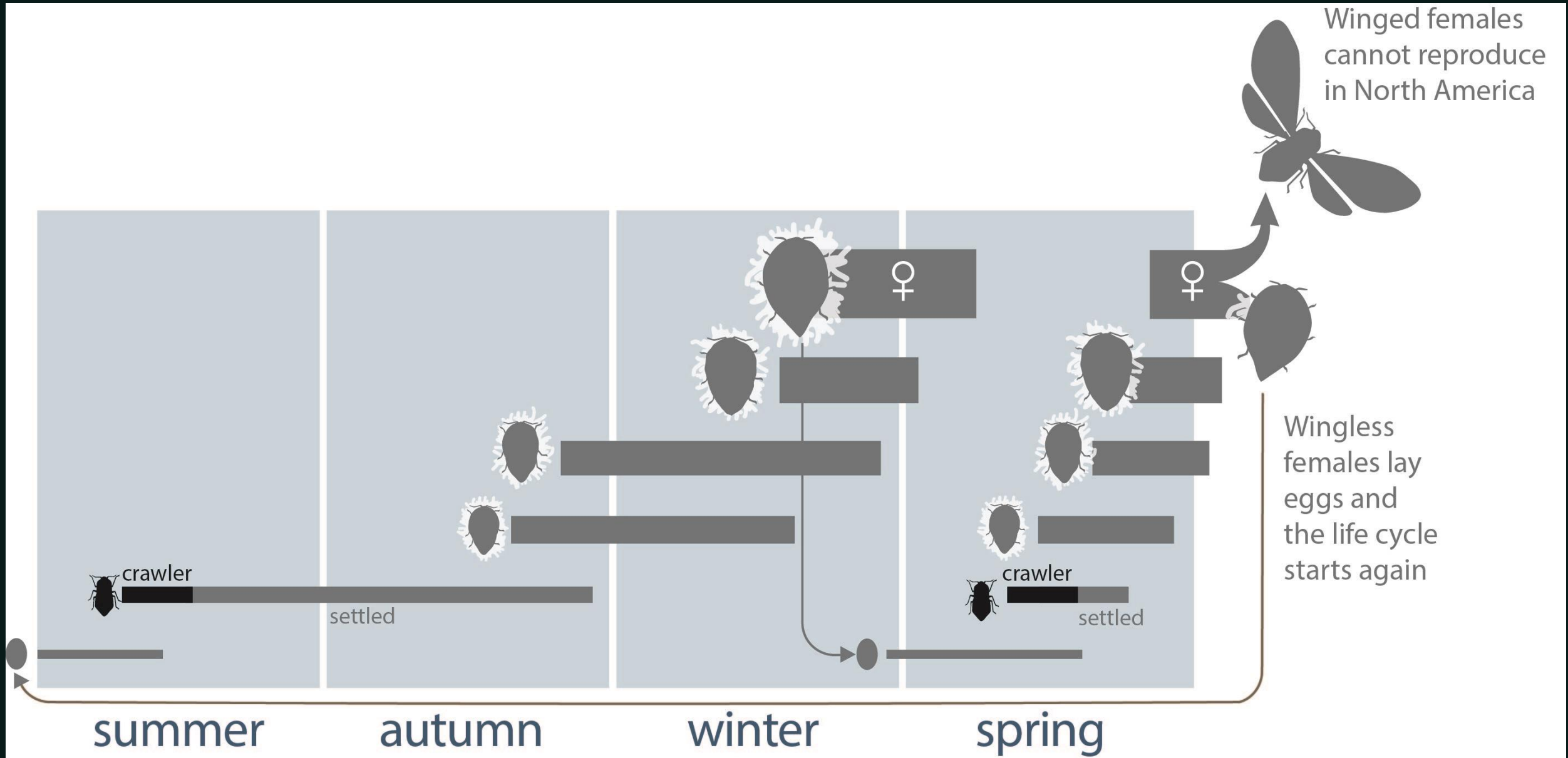


HWA in Massachusetts



Impact of Winter Temperatures







Biocontrol Program



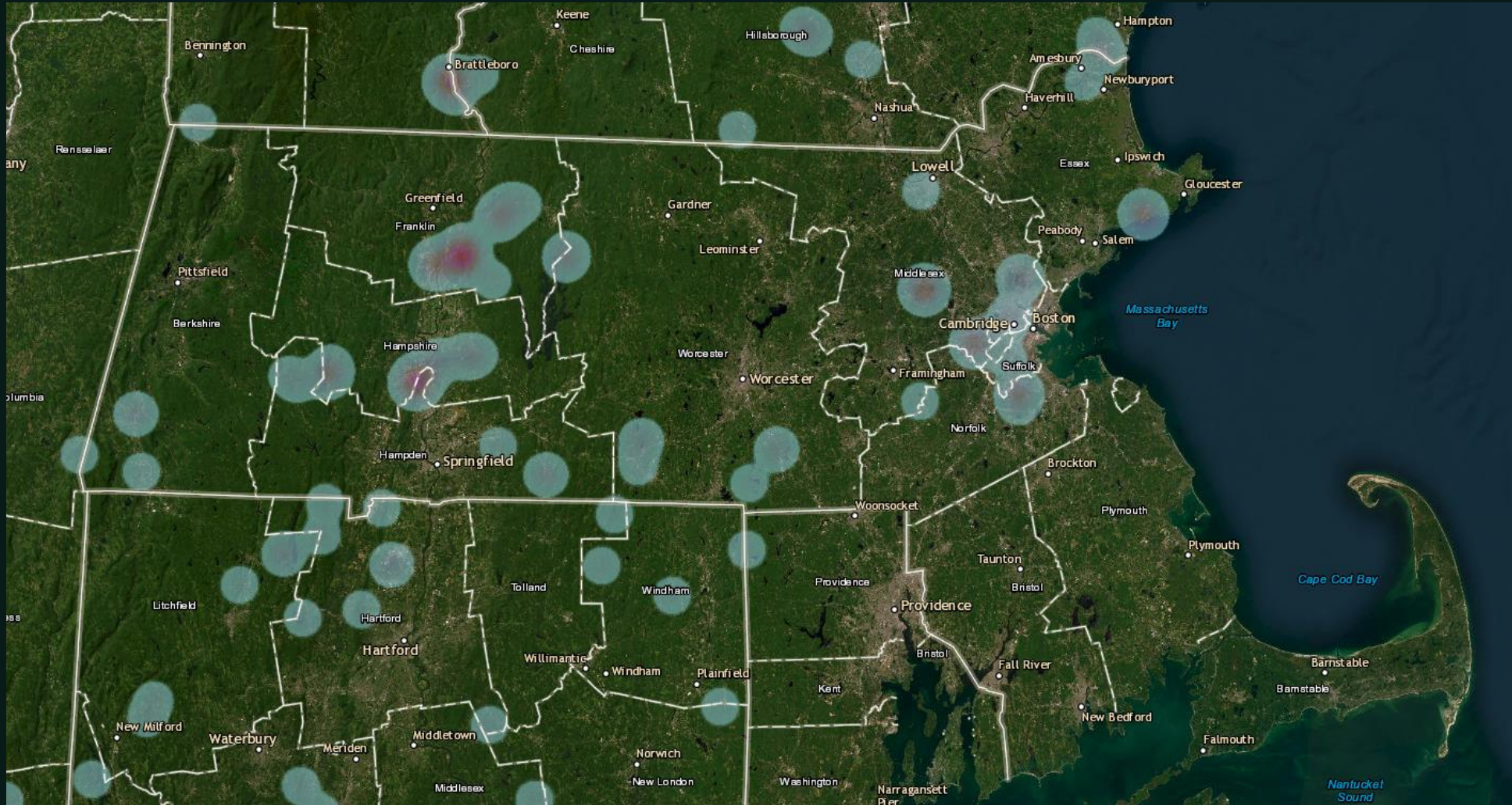
Laricobius nigrinus



Sasajiscymnus tsugae



MA Biocontrol Release Sites 1999-2022



New Species Released 2022

LEUCOTARAXIS SPP.



LARICOBIOUS OSAKENSIS





Leucotaraxis spp.



August-February

Sistens

Nymphs aestivate during summer, then go through 4 nymphal stages N1-N4



March-May

Sistens

Adults lay eggs

Progrediens

Crawlers settle among sistens adults
N1-N4 to adulthood



June-July

Progrediens

Adults lay eggs

Sistens (F2 generation)

Crawlers settle on new growth



Laricobius beetles

Beetles emerge from the soil in the fall following pupation

Adult beetles lay eggs, larvae hatch and drop into soil to pupate

Leucopis silver flies

Silver fly adults lay eggs, larvae hatch and eat HWA eggs, pupate, then emerge as adults





Elongate hemlock scale

Fiorinia externa

High Density Infestations





Hemlock looper

Lambdina fiscellaria



Native defoliator species common in New England

Periodic outbreaks in our forests

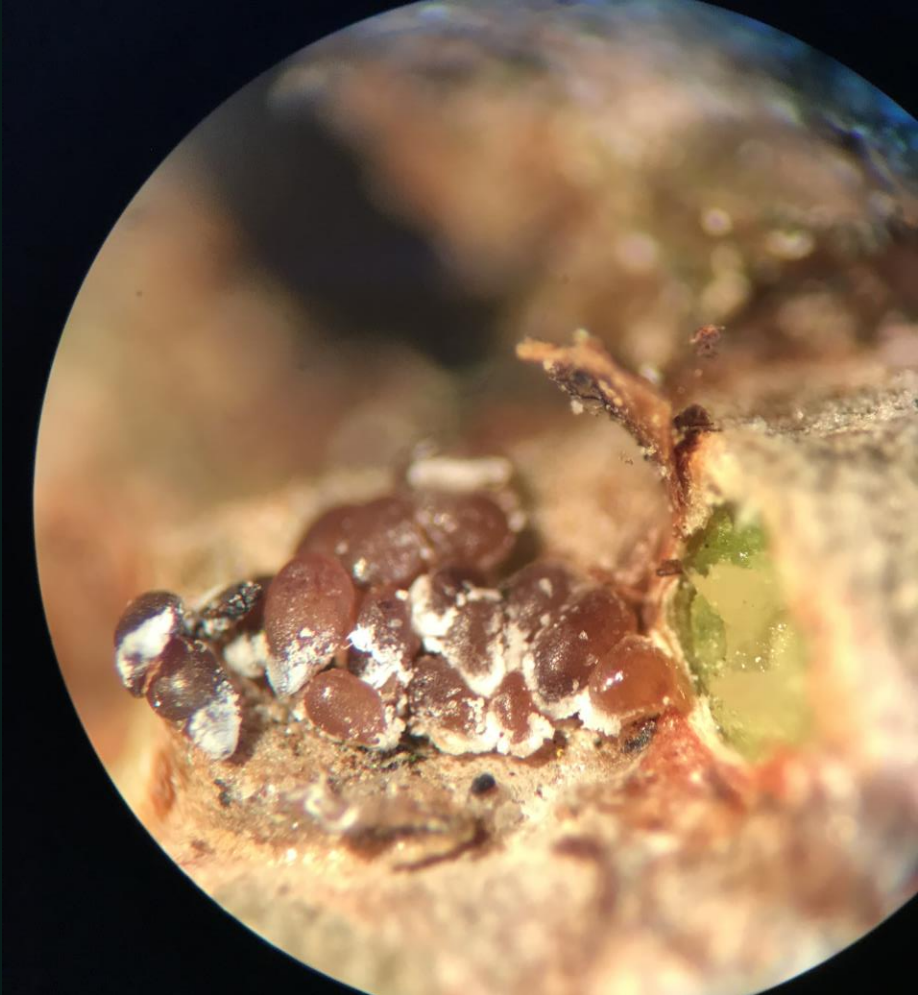




Red pine scale

Matsucoccus resinosae

Spreading Infestations





Red pine management







Eastern White Pine Decline

White pine needle disease



Needlecast disease complex

Cause by multiple fungal pathogens including:

- *Lecanosticta acicola*
- *Septorioides strobi*
- *Bifusella linearis*
- *Hendersonia pinicola*
- *Lophodermium* sp.



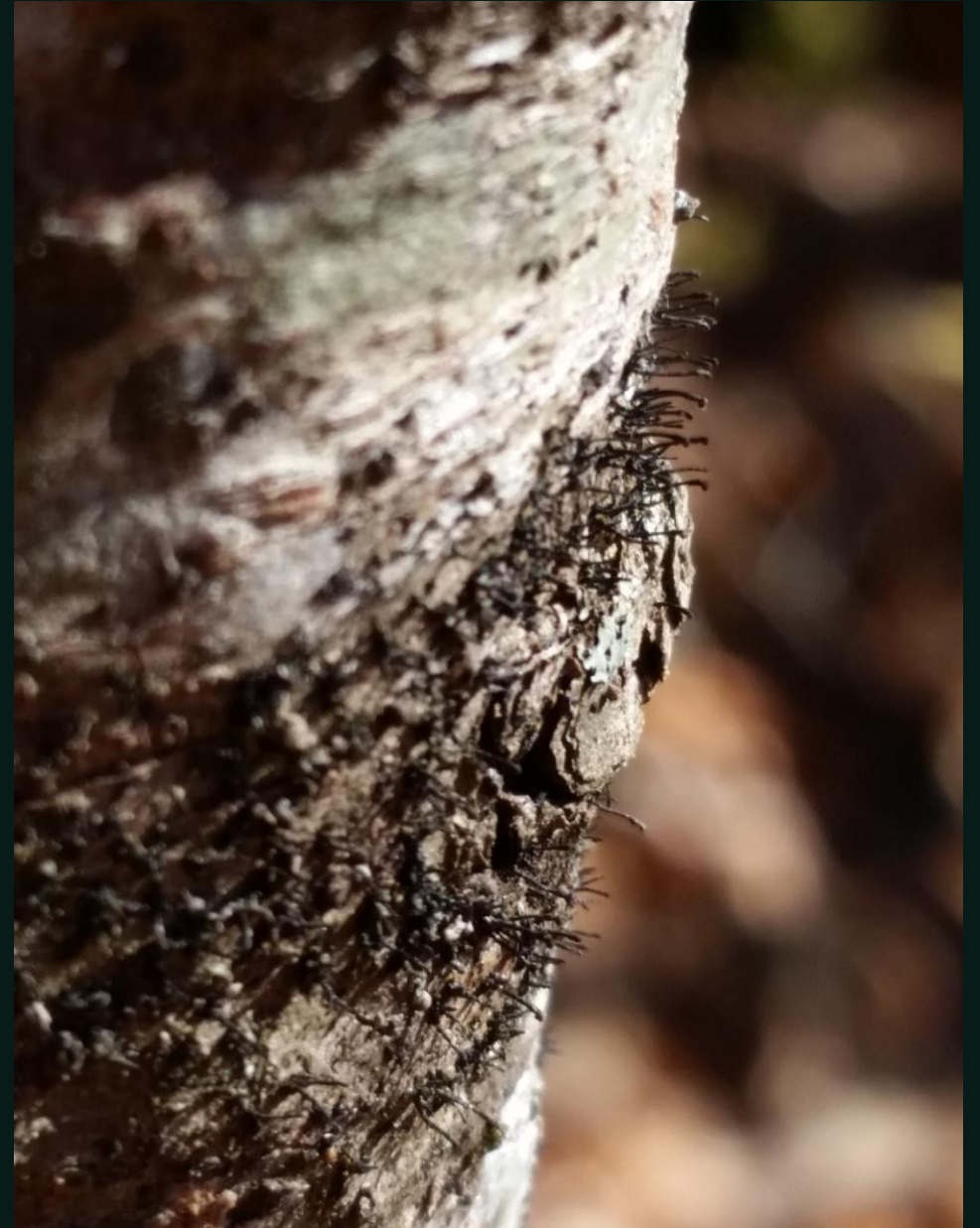
Needlecast Symptoms







Caliciopsis pinea



Canker Formation





Pine Decline and Mortality

Stress from fungal pathogens weakens trees and leaves them vulnerable to other insects and diseases. While WPND does not directly kill pines, we have seen decline and mortality caused by secondary invaders. Drought and other impacts of climate change can further expedite this process.





White Pine Blister Rust

Cause by the introduced pathogen *Cronartium ribicola* WPBR infects 5 needle pines. Requires an alternate, *Ribes sp.* Eradication efforts in the 20th century limited the impact of this disease










Field Manual for Managing Eastern White Pine Health in New England

William H. Livingston, Isabel Munck, Kyle Lombard,
Jennifer Weimer, Aaron Bergdahl, Laura S. Kenefic,
Barbara Schultz, Robert S. Seymour

Figure 1. Needle Discoloration

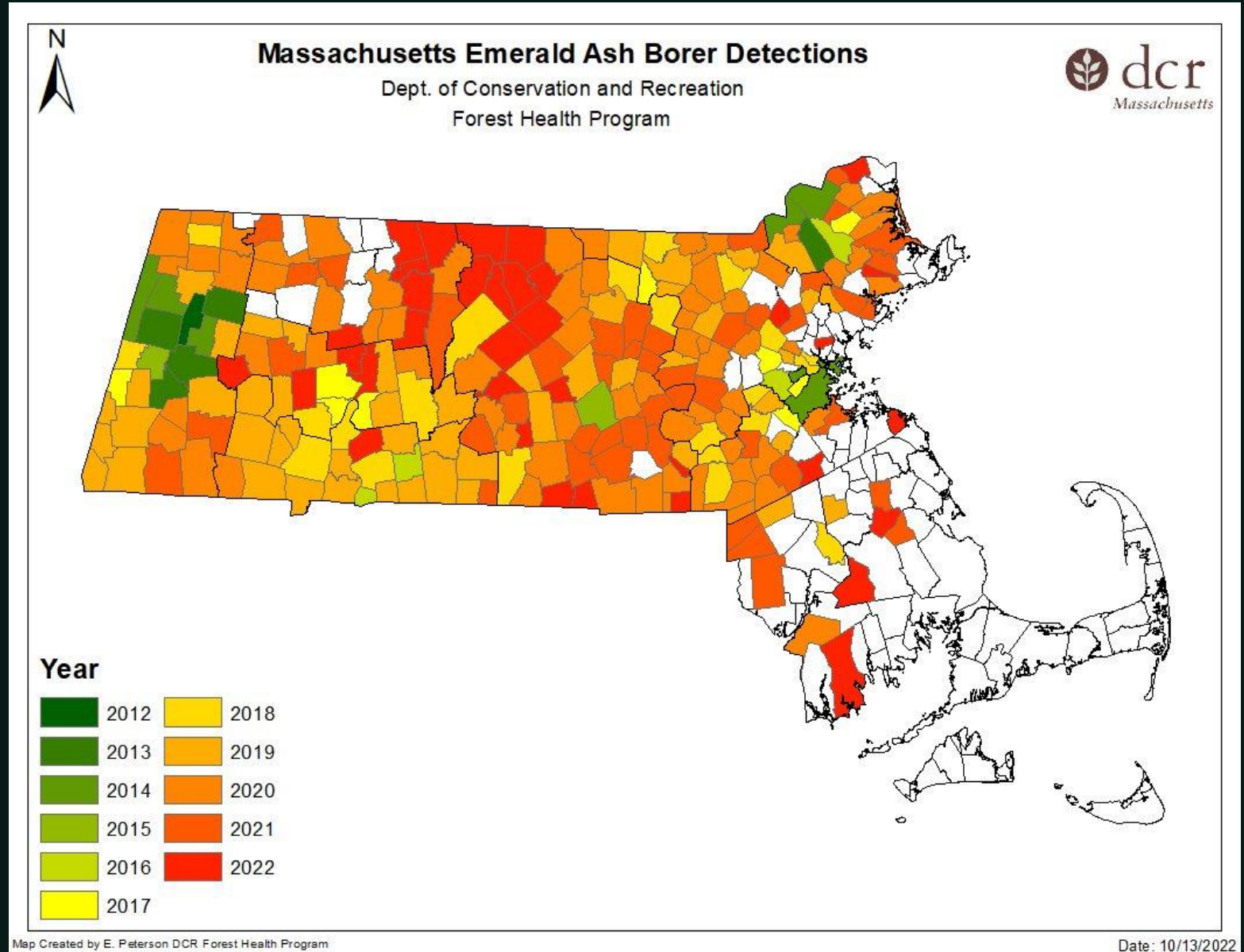
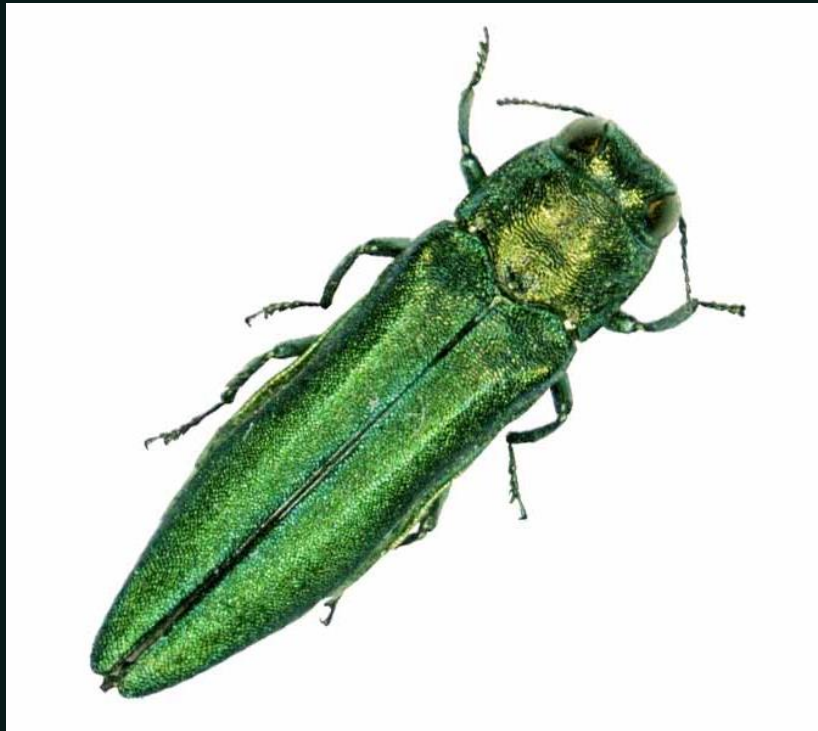
White Pine Weevil	White Pine Blister Rust	Pine Bast Scale/ <i>Caliciopsis</i> Canker	White Pine Needle Damage
<p data-bbox="1159 449 1184 478">A</p>  <p data-bbox="1146 992 1426 1042">Terminal shoot and first whorl curl and turn yellow-red</p>	<p data-bbox="1465 449 1490 478">B</p>  <p data-bbox="1452 992 1732 1021">Orange-red flagging</p>	<p data-bbox="1770 449 1796 478">C</p>  <p data-bbox="1770 656 1796 685">D</p>  <p data-bbox="1758 992 2038 1042">Red flagging (C); thin foliage density due to poor health (D)</p>	<p data-bbox="2076 935 2102 963">E</p>  <p data-bbox="2063 992 2344 1063">Yellowing of second-year needles throughout the tree in June and early July</p>



Emerald ash borer

Agrilus planipennis

Current Detected Infestations





EAB Damage

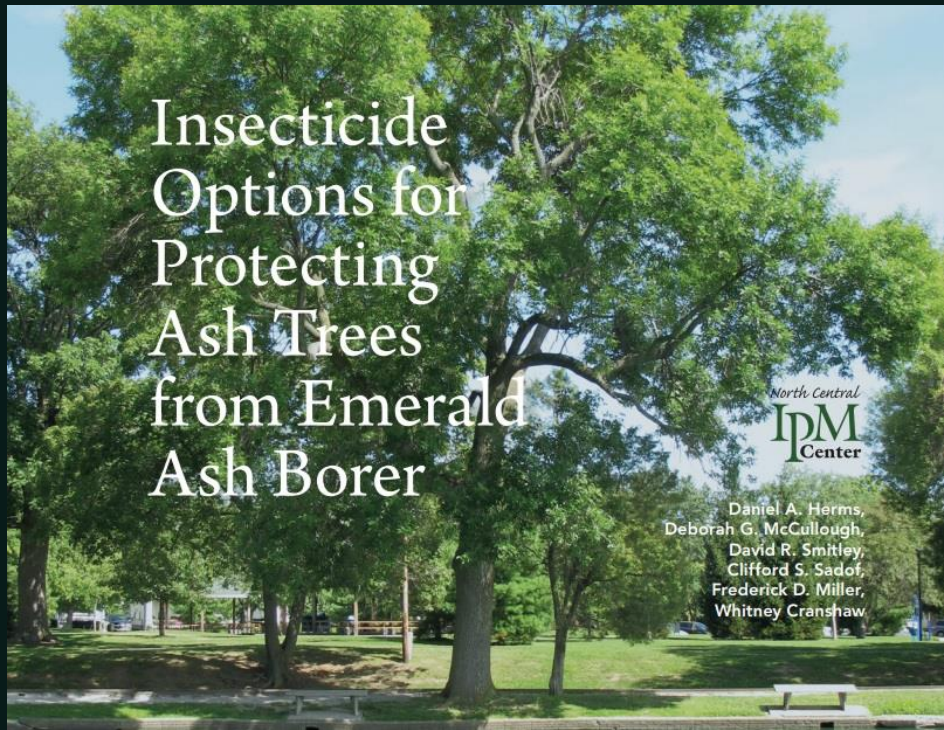


Tree Decline and Mortality





Pesticide Treatment Options



http://www.emeraldashborer.info/documents/Multistate_EAB_Insecticide_Fact_Sheet.pdf

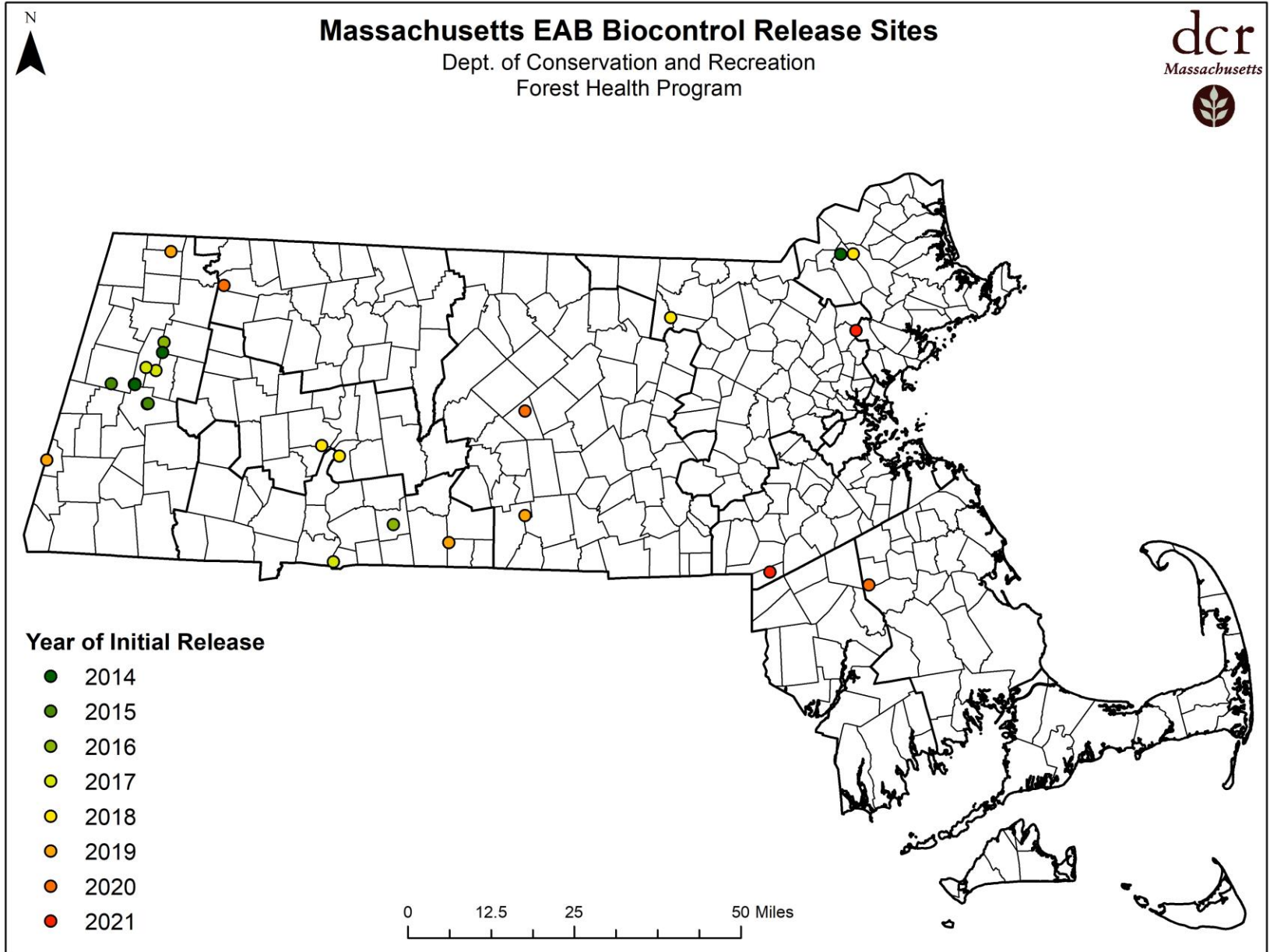


Biocontrol Release Program

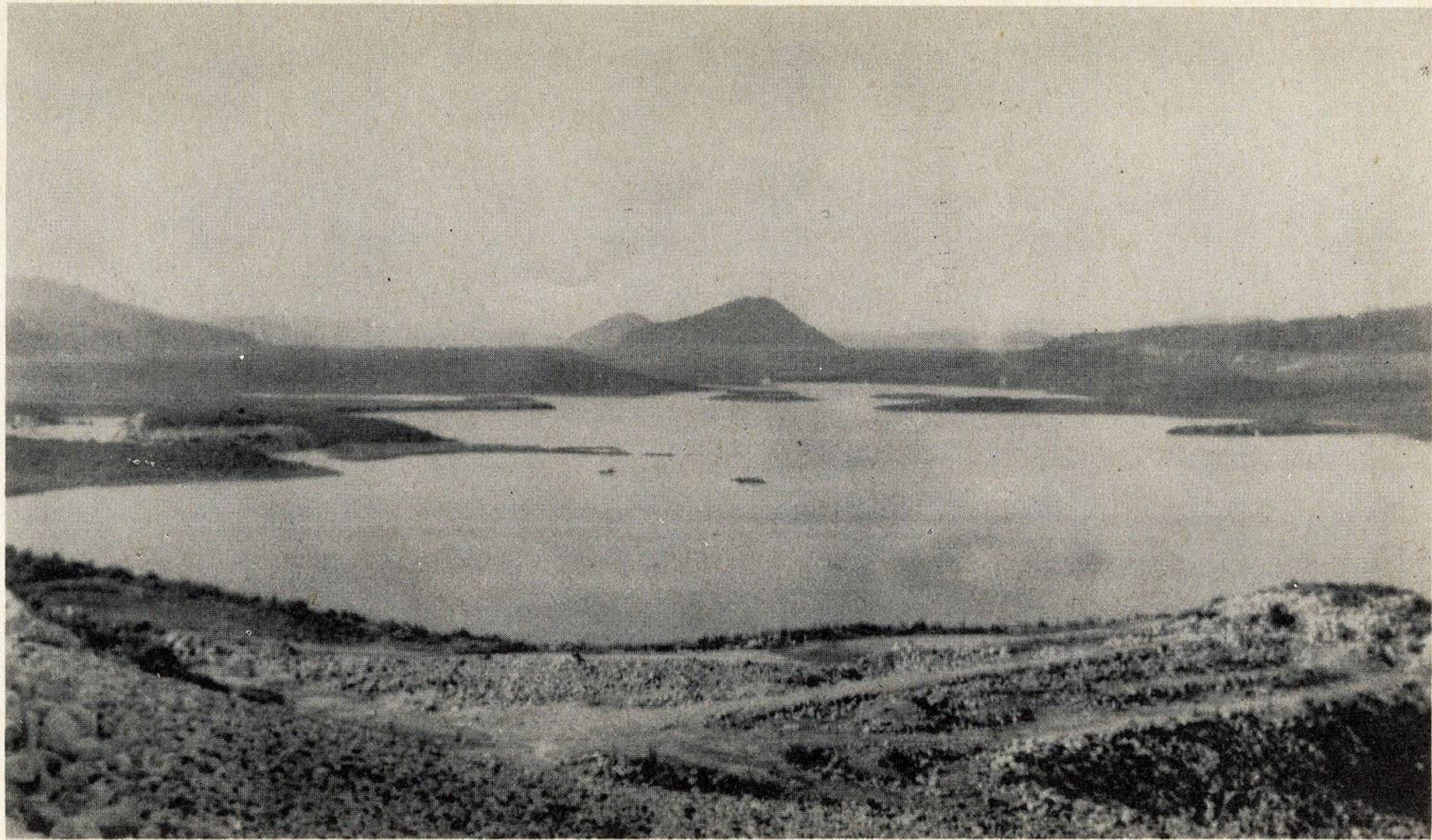
Three parasitic wasp species released in MA

- *Spathius galinae*
- *Tetrastichus planipennisi*
- *Oobius agrili*





Map Created By N Keleher, DCR Forest Health 7/22/2021



Quabbin Reservoir



Questions

Nicole Keleher

Nicole.Keleher@mass.gov

Website:

<https://www.mass.gov/service-details/forest-health-program>

Story Map:

<https://arcg.is/j8TiD>

