Lakes Region Forest Health

NH Forest Health Program

Ryan Crandall

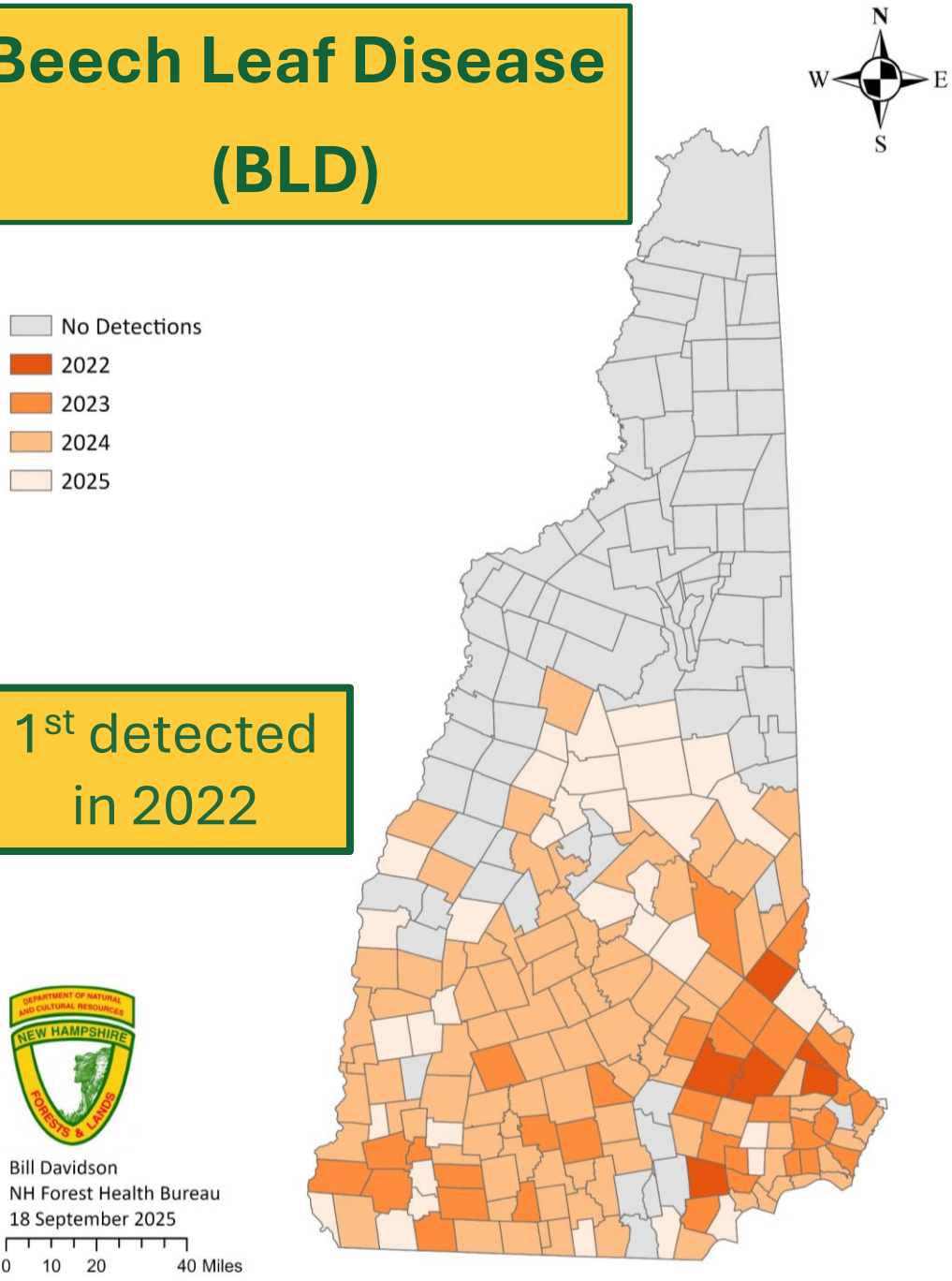
BLD

EAB

HWA

EHS

Beech Leaf Disease (BLD)

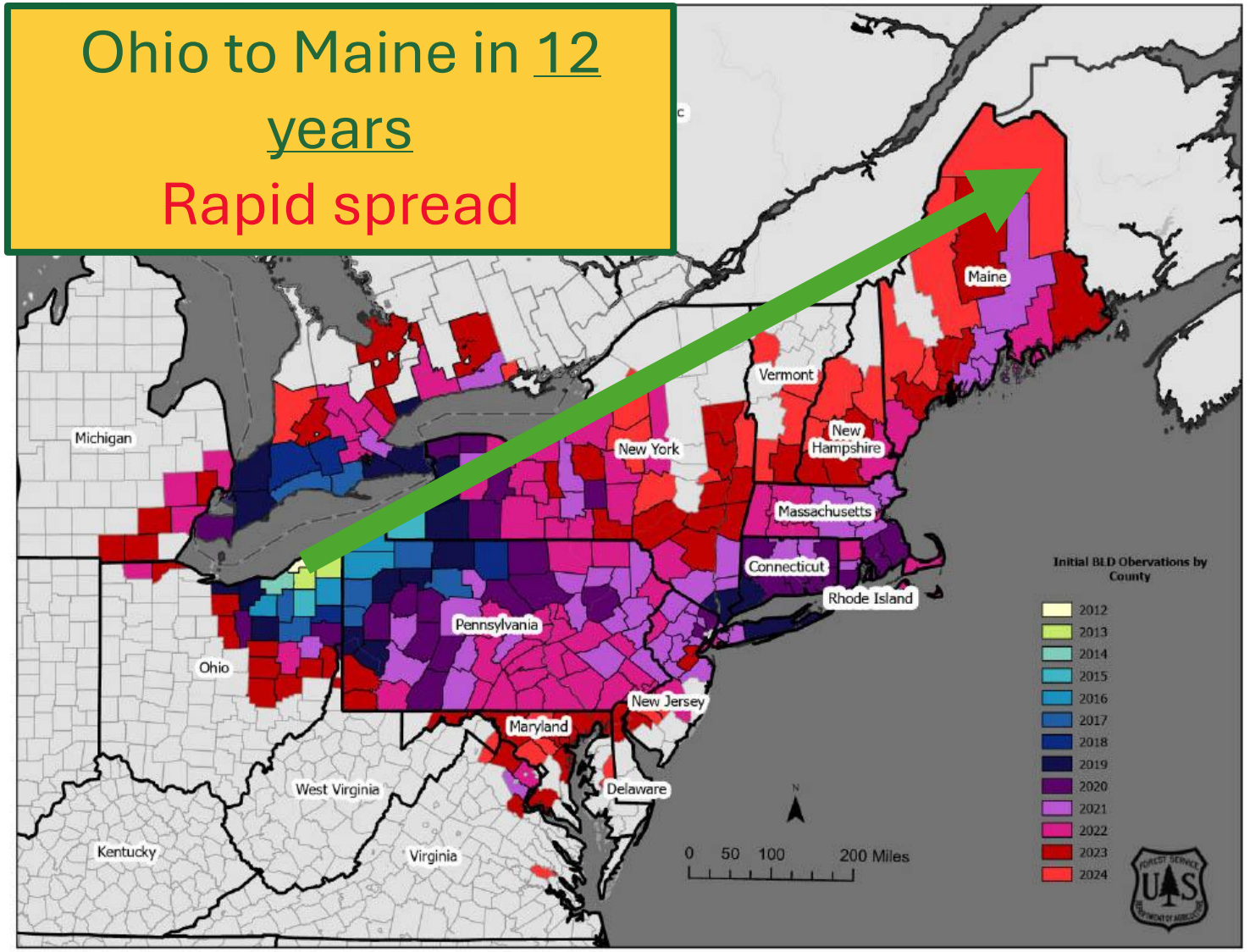


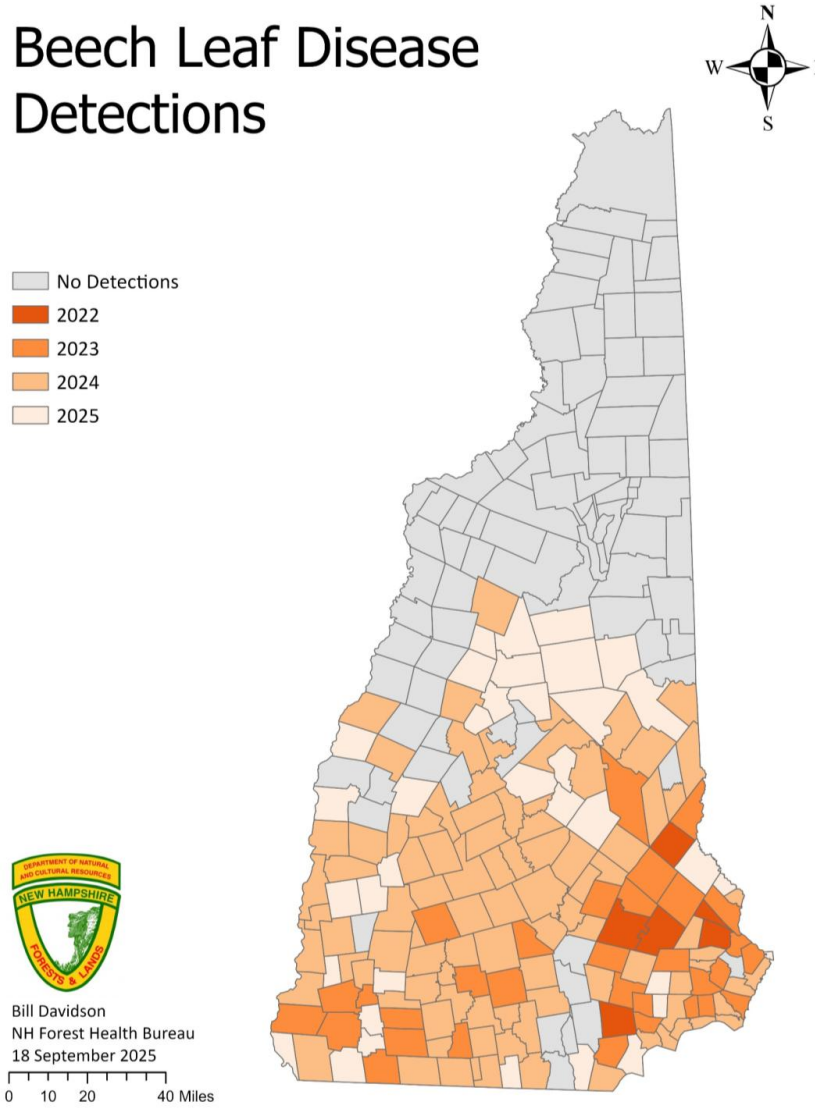
BLD Nematode

Distribution of Beech Leaf Disease

Ohio to Maine in 12 years

Rapid spread

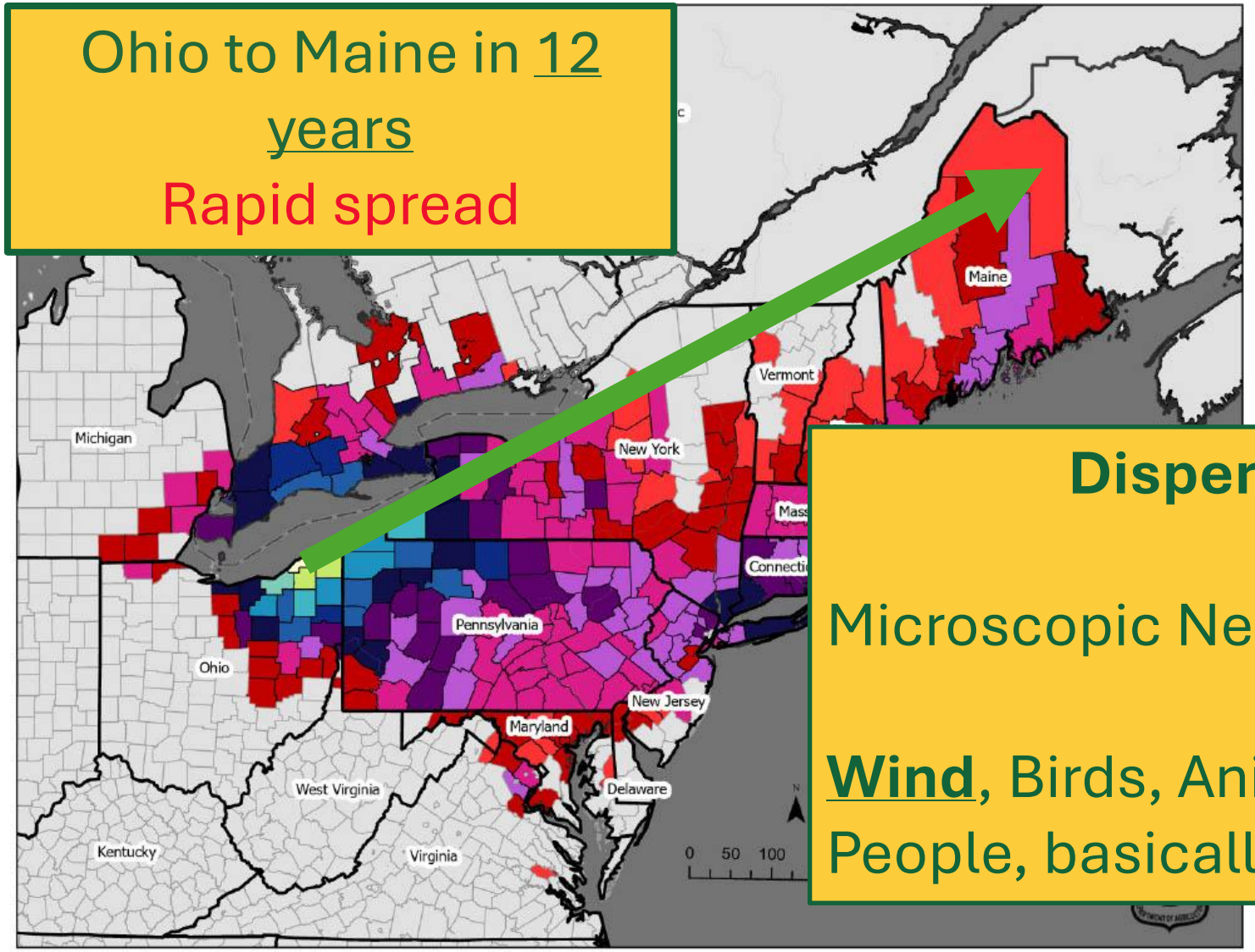




Distribution of Beech Leaf Disease

Ohio to Maine in 12 years

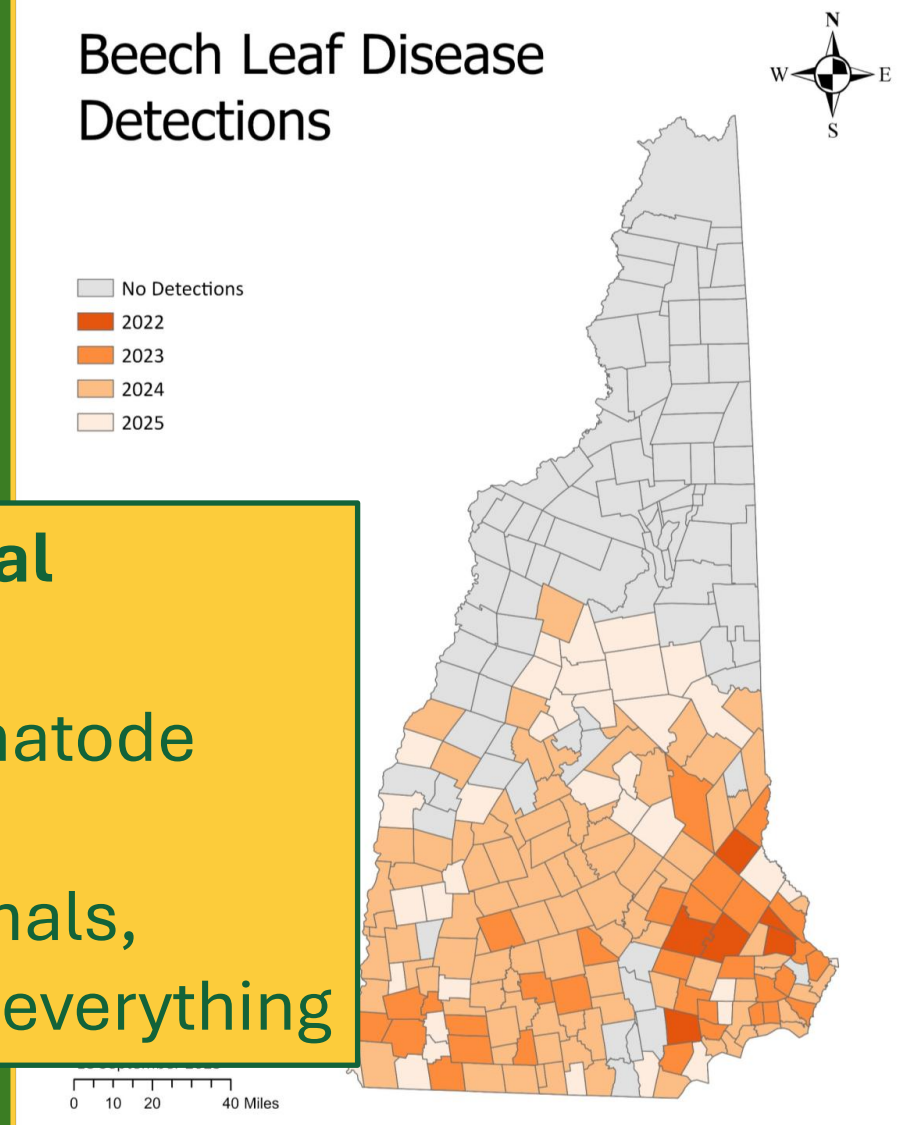
Rapid spread



Dispersal

Microscopic Nematode

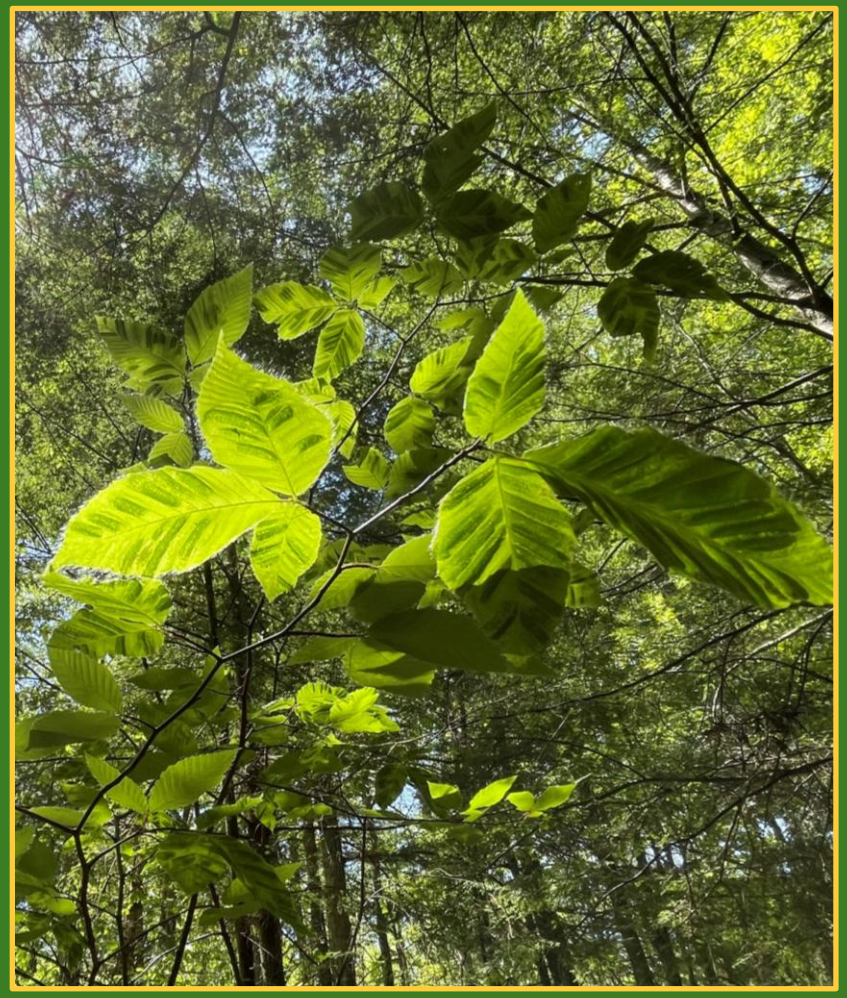
Wind, Birds, Animals, People, basically everything



Beech Leaf Disease Symptoms

Banded Leaves

Interveinal Banding/Darkening



Shrunken & Curling

Feel leathery

Aborted buds

2nd flush leaves lack toothed margin

Leaf curling aphid

Mite damage

BLD

Backlit BLD leaves
Bands Stay Dark

Mortality of BLD infested Beech in southern New England

Sapling trees
2-5 years

Mature trees
7+ years

Timeline uncertain for NH, infestations too new

Beech Leaf Disease

Treatments

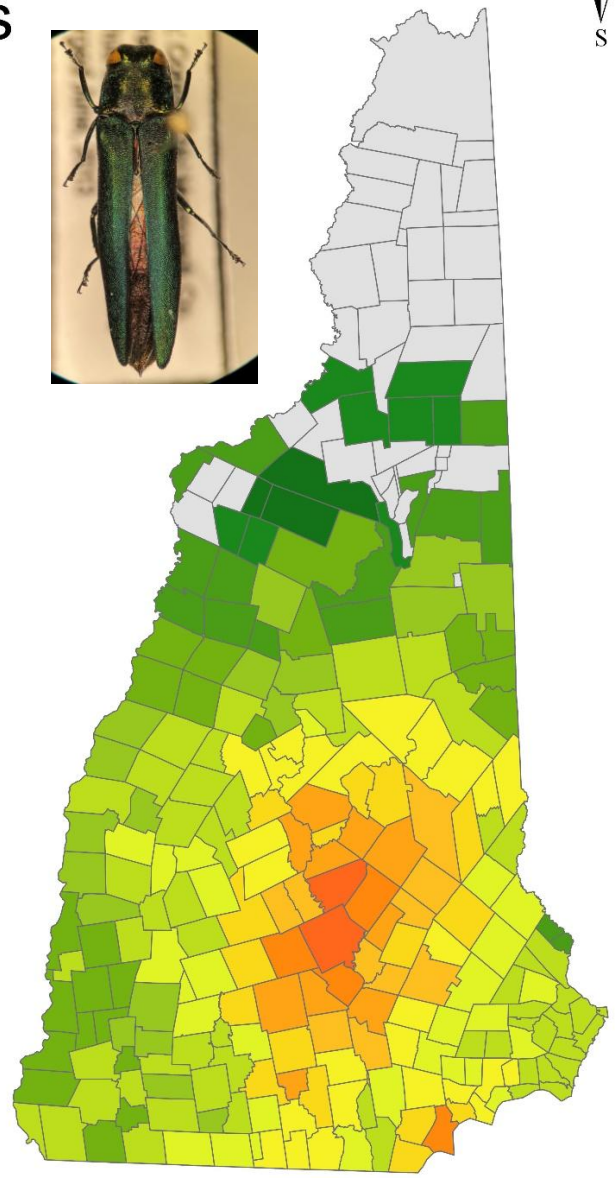
Salts of Phosphorus acid: fungicide, systemic, bark spray

Fluopyram: nematicide, highly toxic, limited use cases, pro application

Thiabendazole: Fungicide, trunk injected, can damage thin-barked trees

Emerald Ash Borer (EAB)

Emerald Ash Borer Detections



1st detected in 2013

Bill Davidson
NH Forest Health Bureau
18 September 2025

0 10 20 40 Miles

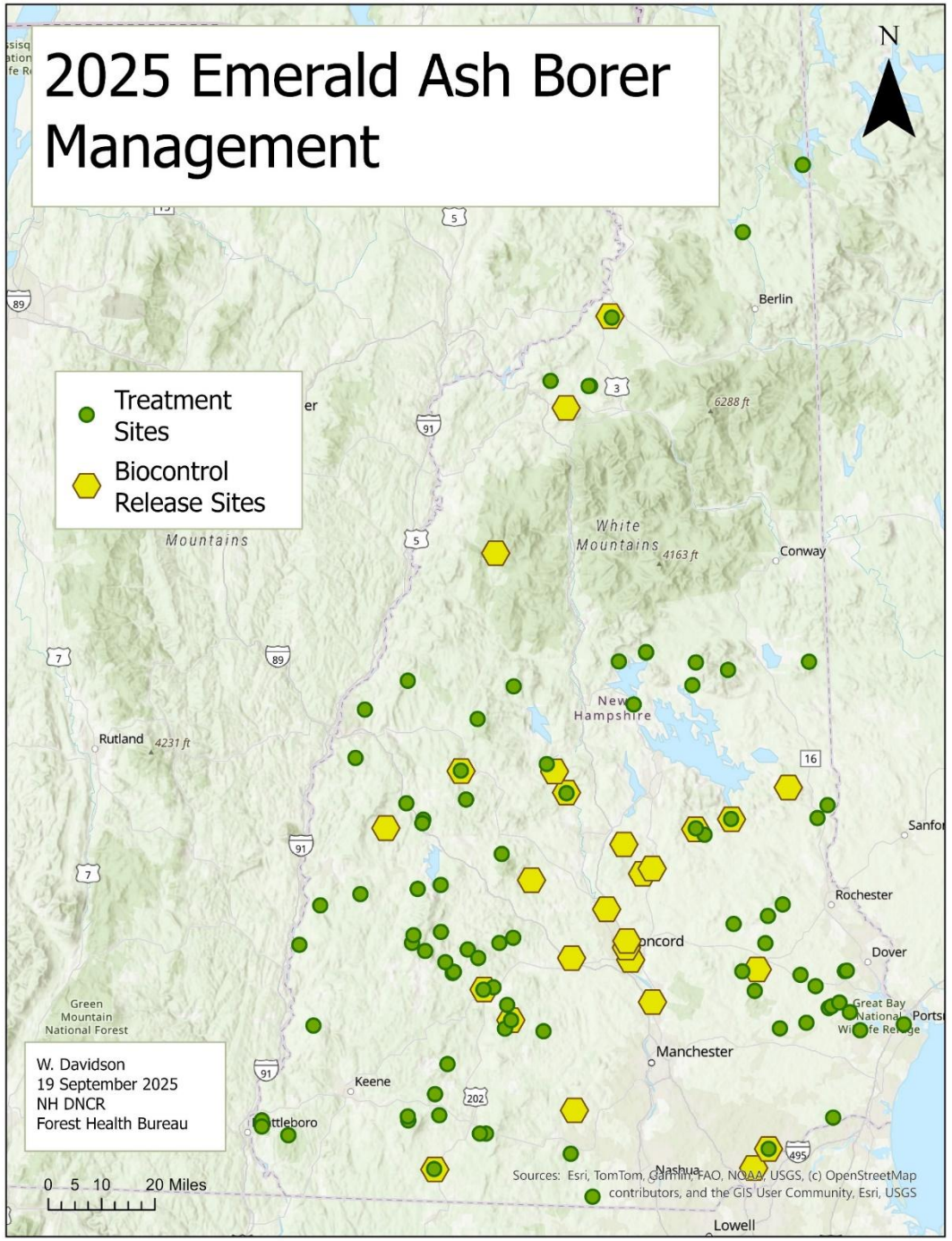
Emerald Ash Borer

Larval Feeding Damage

Emerald Ash Borer

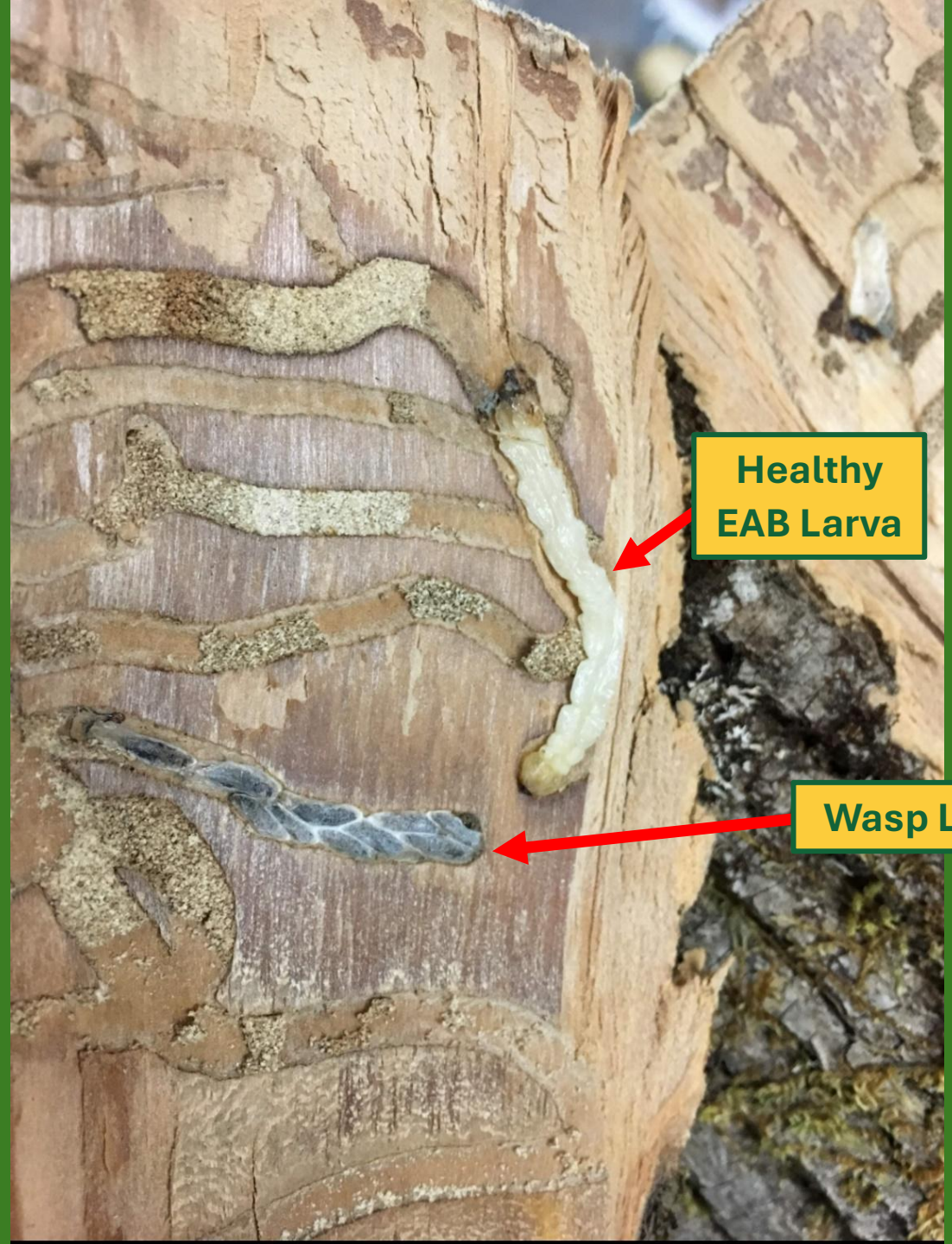
Management

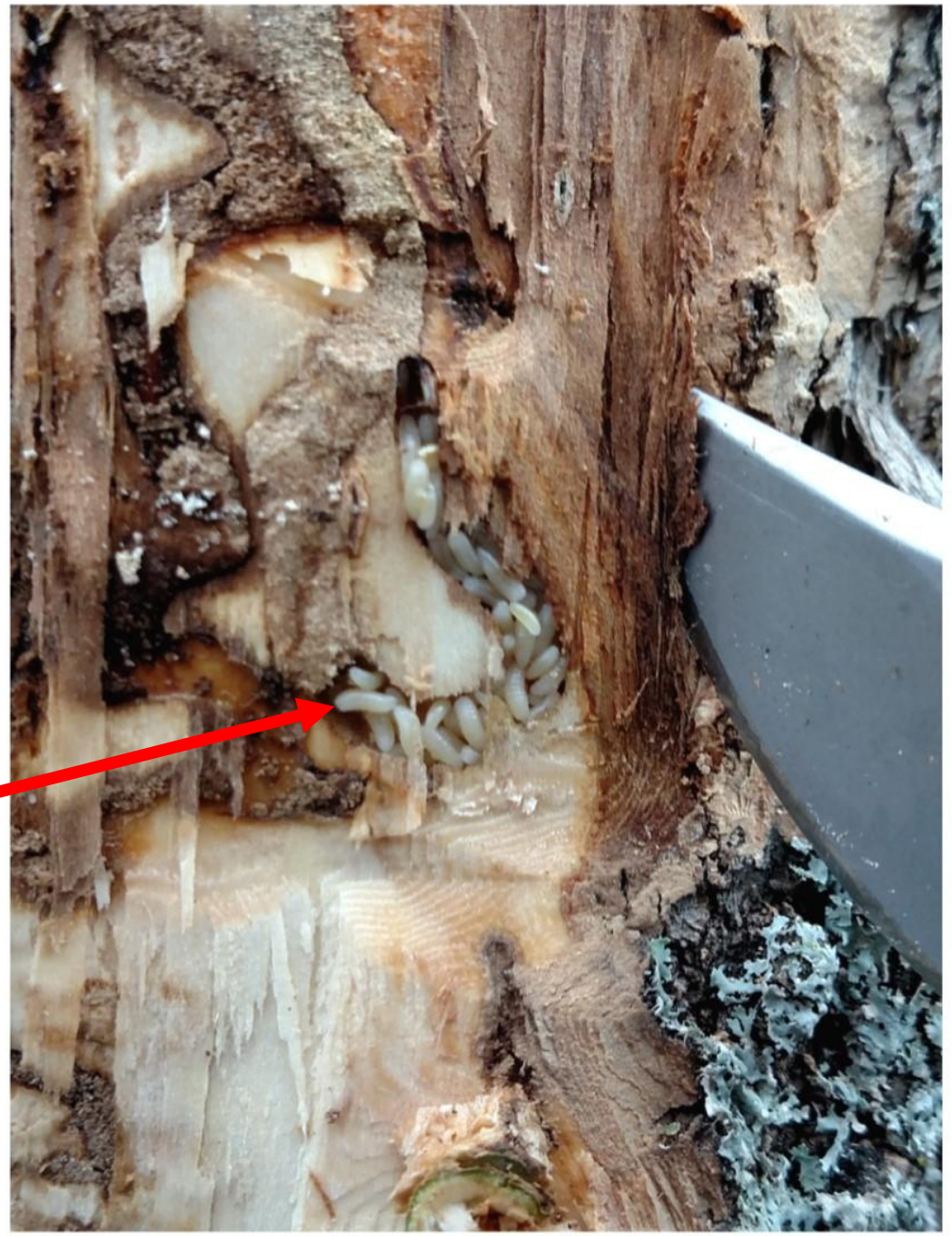
- Treatment Sites
- Biocontrol Release Sites



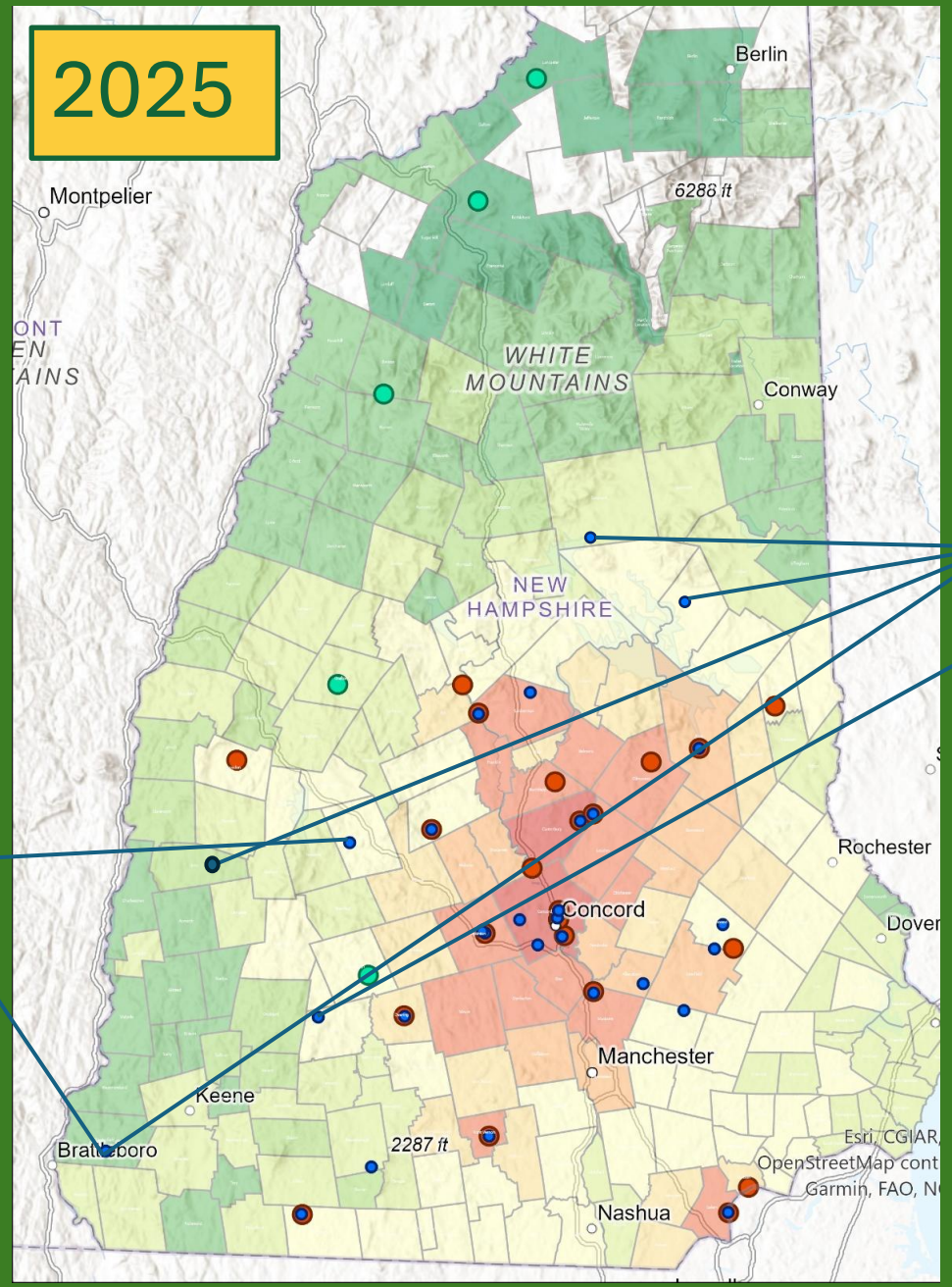
Larval Parasitoids

Egg Parasitoid


Healthy
EAB Larva
Wasp Larvae



2025



Parasitoid Recoveries

Retired Biocontrol Site

Active Biocontrol Site

No Known Infestations

2013

2014

2015

2016

2017

2018

2019

2020

2021

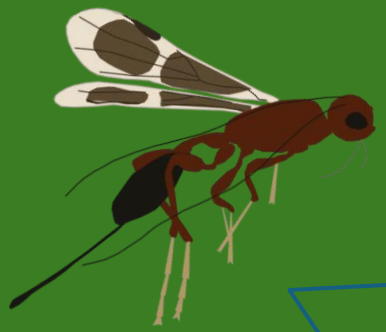
2022

2023

2024

2025

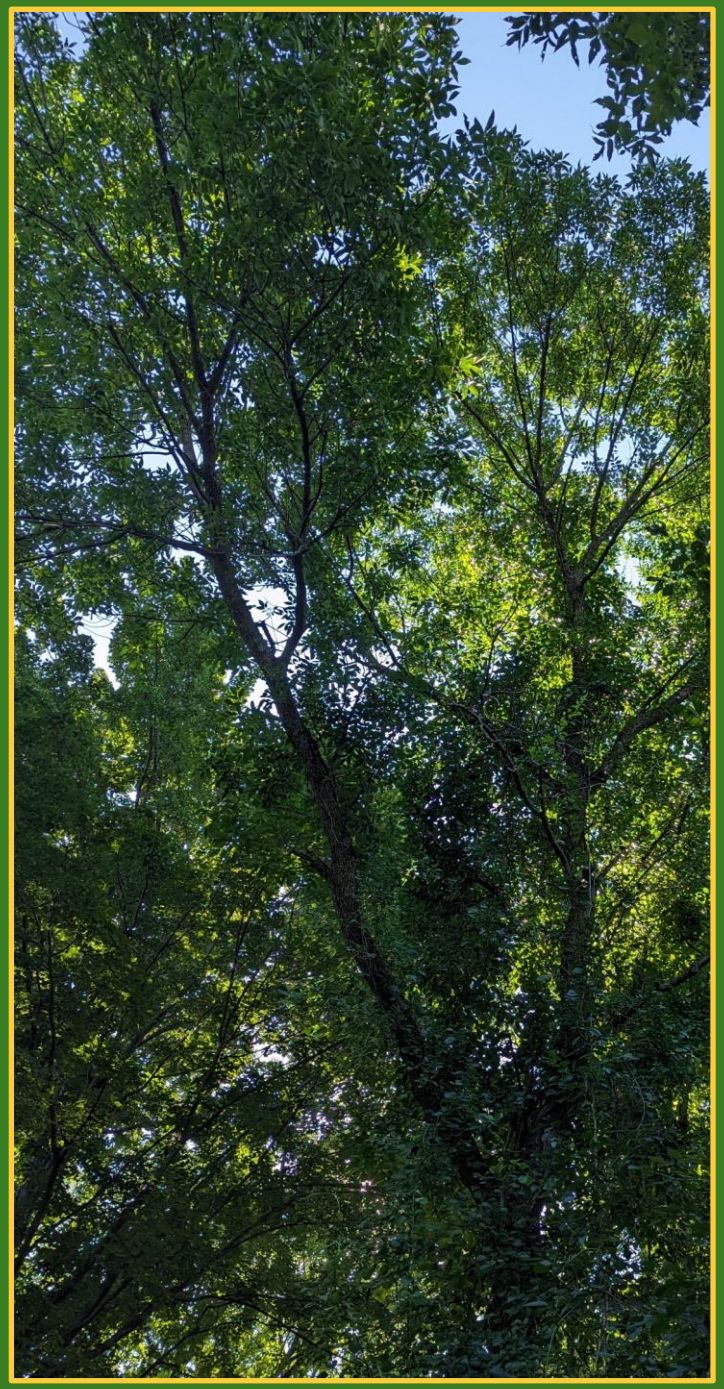
Tetrastichus planipennisi



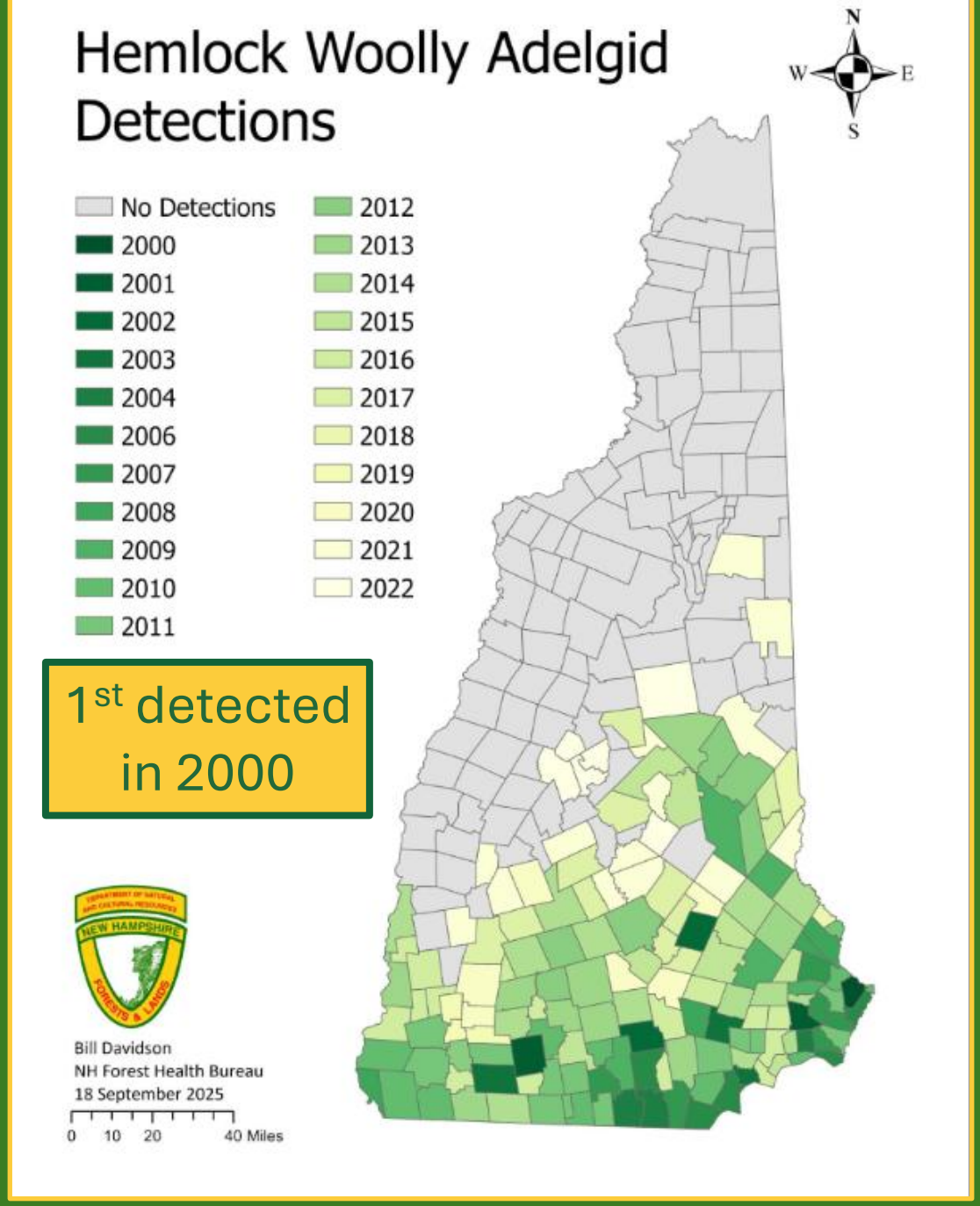
Spathius galinae

Oobius agrili

Lingering Ash Preservation

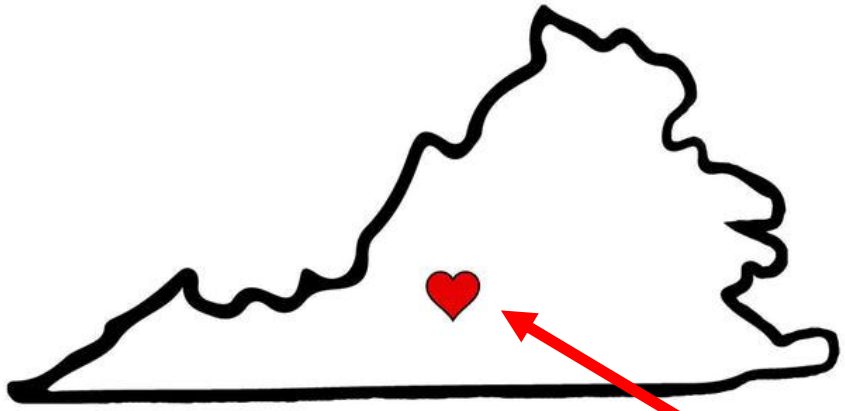


Hemlock Woolly Adelgid (HWA)



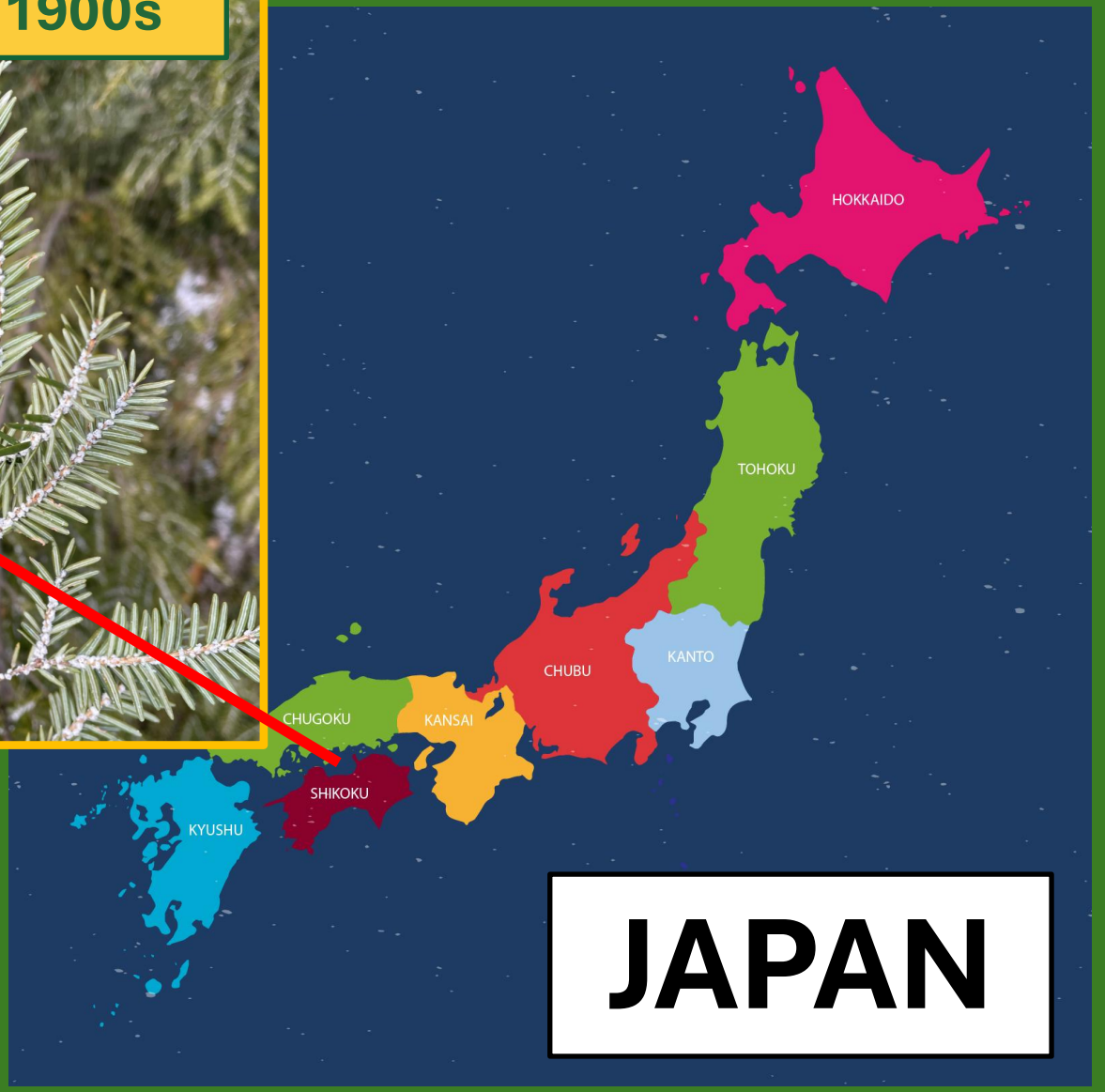
Quick HWA Facts

- Native to **Asia** and Pacific Northwest of N. America
- Sap-sucking insect
- Only feeds on hemlock
- All female and reproduce asexually
- 80-200 eggs per adelgid
- 2 generations per year
  - Summer generation
  - Winter generation
- It only takes 1 to infest an entire tree

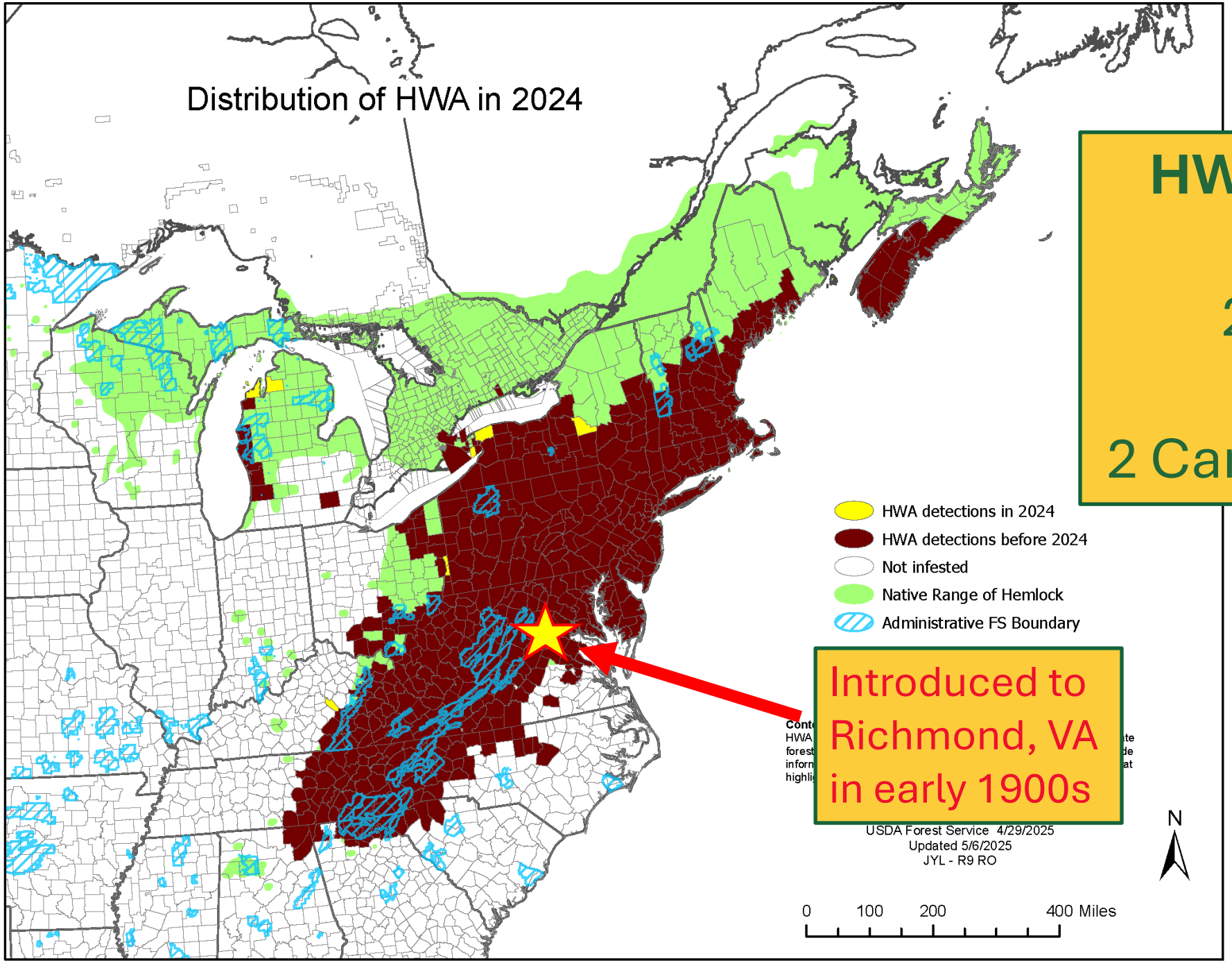


VIRGINIA IS FOR HWA

Introduced to Virginia in early 1900s



JAPAN



HWA Distribution

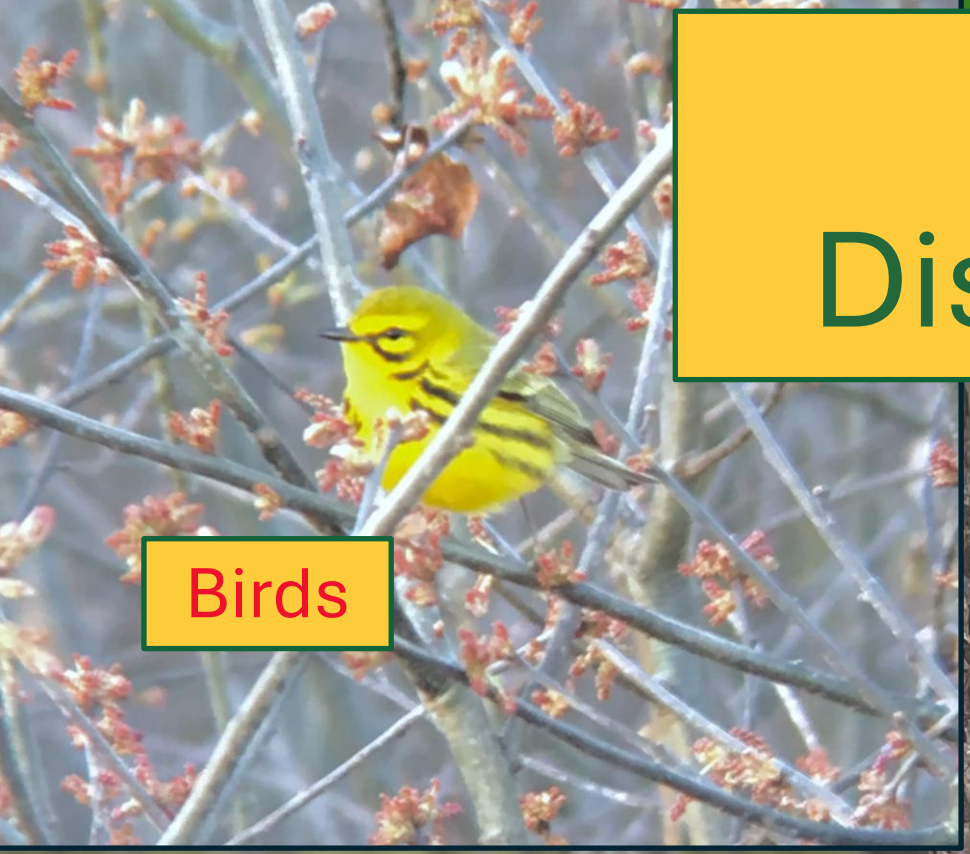
21 US States

2 Canadian Provinces

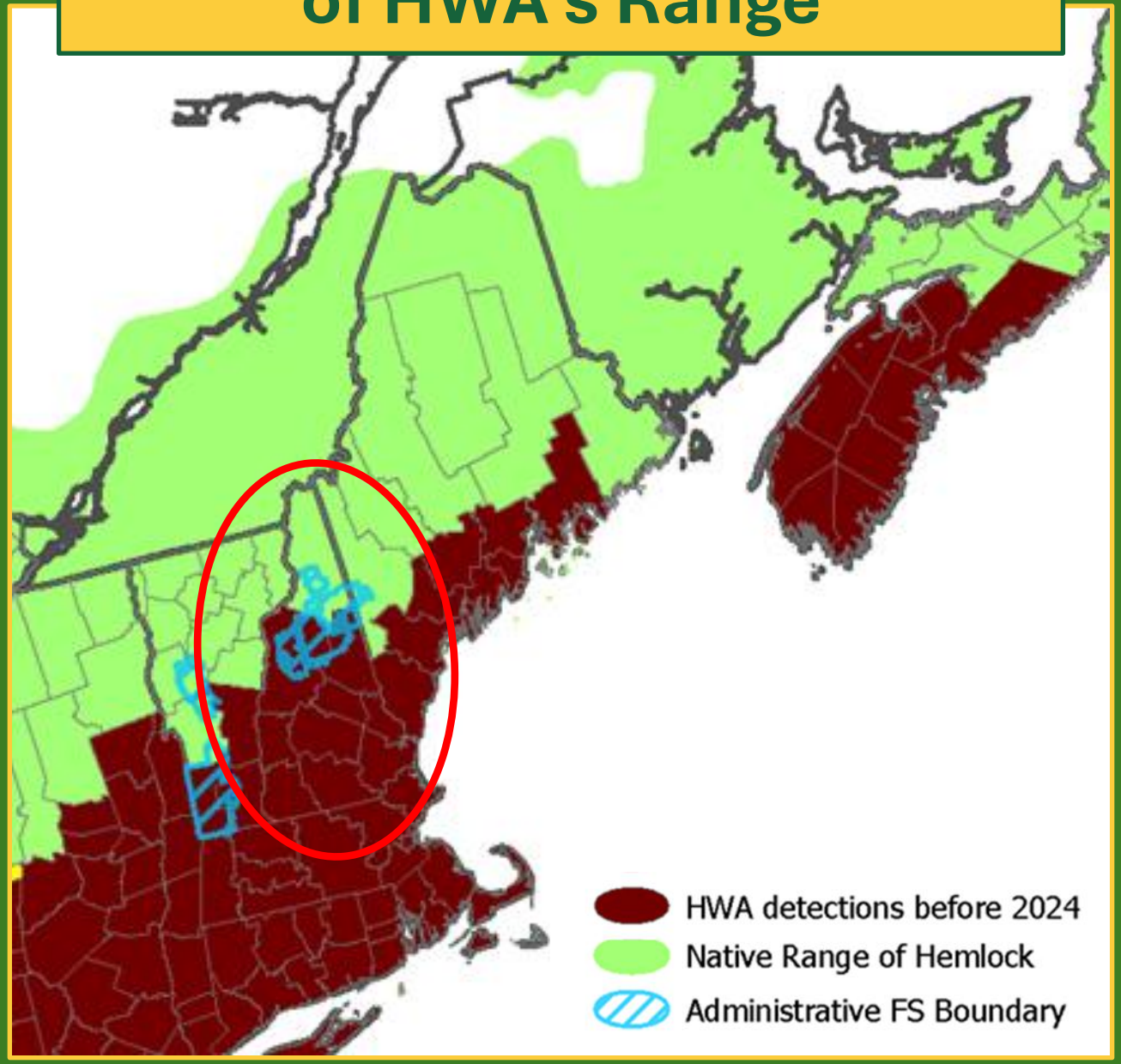
HWA “Crawler”

Only life stage that moves freely

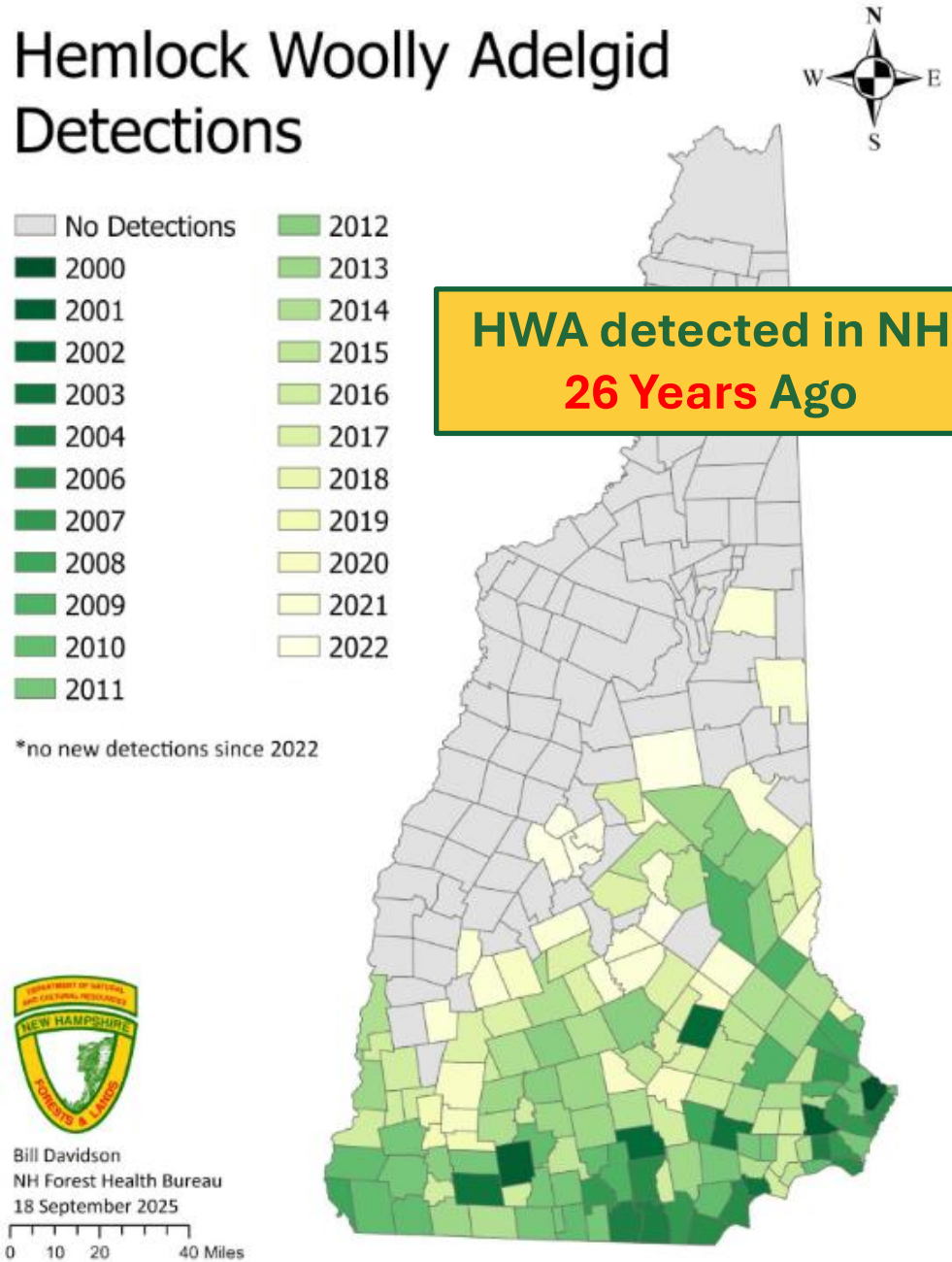
HWA is Dispersed by:



Northern Edge of HWA's Range



Hemlock Woolly Adelgid Detections



HWA detected in NH
26 Years Ago

Impact of HWA on Hemlock

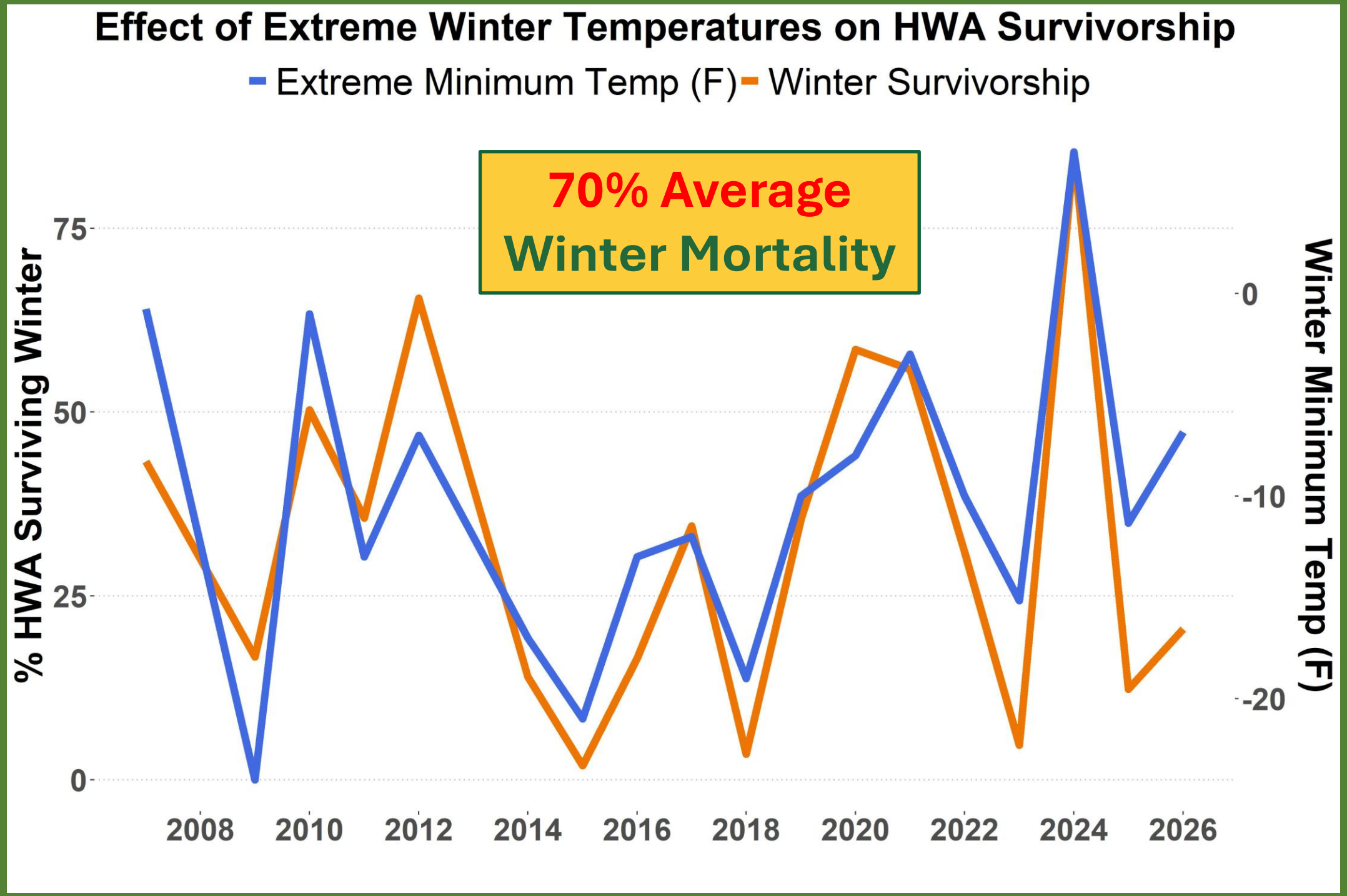
- Branch dieback & Needle Loss
- Loss of lower branches
- Increased vulnerability to drought, other insect pests
- Tree mortality

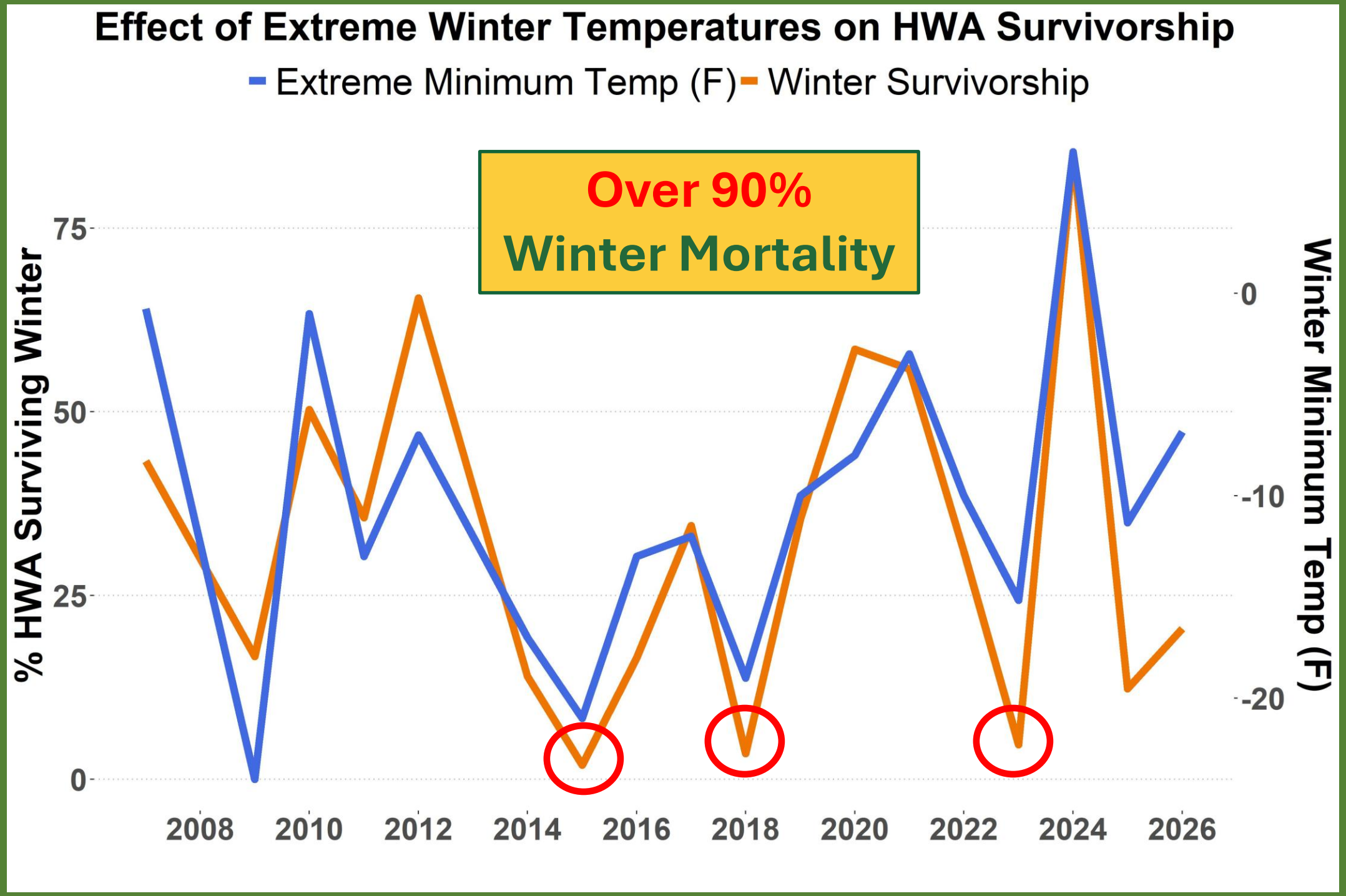
Impact of HWA on Hemlock

- **Southern US: Warm Winters**
  - Rapid population growth
  - Uniform, high levels of HWA
  - Tree mortality in 4-20 years

- **New England: Cold Winters**
  - Sluggish population growth
  - Patchy, moderate-high levels of HWA
  - Tree mortality takes decades (20-30+ years)

Cold winters kill HWA


Effect of Extreme Winter Temperatures on HWA Survivorship
Extreme Minimum Temp (F)
Winter Survivorship
70% Average
Winter Mortality
% HWA Surviving Winter
Winter Minimum Temp (F)
75
50
25
0
0
-10
-20
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026


Effect of Extreme Winter Temperatures on HWA Survivorship
Extreme Minimum Temp (F)
Winter Survivorship
Over 90%
Winter Mortality
% HWA Surviving Winter
Winter Minimum Temp (F)
75
50
25
0
0
-10
-20
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026

Management of HWA

Biological Control

Laricobius nigrinus

21,000 Released in New Hampshire since 2007

Established populations in Carroll, Strafford, and Rockingham Counties

Only feeds on 1 of 2 HWA generations

Has not controlled HWA

May help extend life of infested hemlock

Silver Flies

5,000 Released in New Hampshire since 2023

Feeds both HWA generations

Not established yet

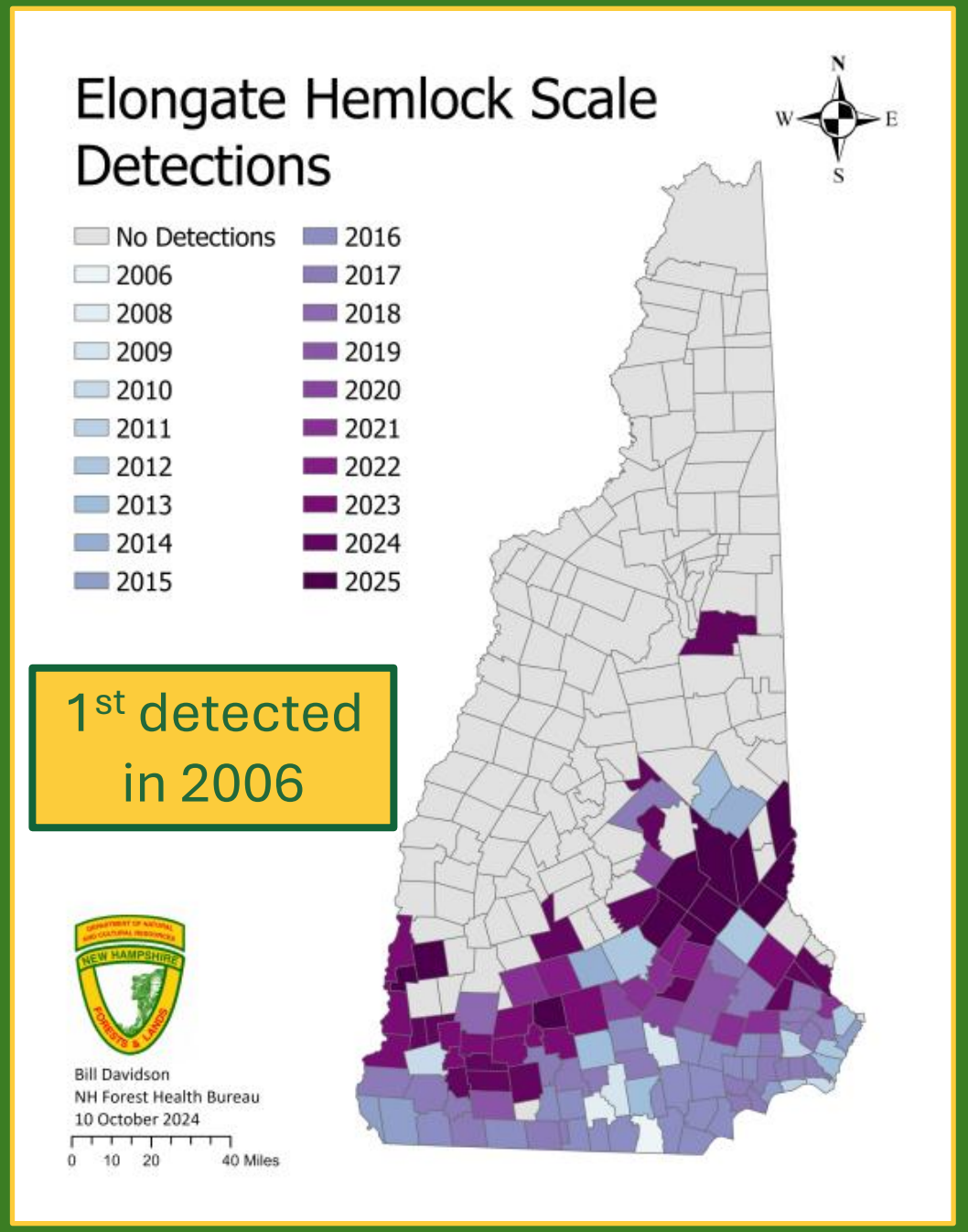
Uncertain if silver flies will establish in eastern North America

Chemical Control

We will discuss this after the next pest

Elongate Hemlock Scale
(EHS)

Elongate Hemlock Scale (EHS)



Elongate Hemlock Scale

Sap feeder native to Japan

Insert straw-like mouthparts into underside of needle

Feeds on variety of conifers, hemlock and balsam fir are preferred

Elongate Hemlock Scale

Sexual reproduction

20-30 eggs per female

Only 1 generation per year

Females are wingless

Dispersal during “crawler” stage

Damage to Hemlock

Yellowing Needles

Needle loss

Increased susceptibility to drought & other pests

Chemical Control Options for HWA & EHS

Hemlock woolly adelgid HWA

Elongate Hemlock Scale EHS

Chemical Control
HWA & EHS

Active Ingredients:

Imidacloprid (Treats HWA only)

Dinotefuran (Treats BOTH HWA & EHS)

Imidacloprid

HWA Only

Dinotefuran

HWA & EHS

Chemical Control
HWA Only

Active Ingredient: Imidacloprid

Formulation: Flowable (liquid)

Application Methods:

-Soil Drench
-Basal Application *(2ee exemption label)*
-Injection

Efficacy takes 6 months to 1 year

Protects trees 4-7 years

Chemical Control
HWA Only

Product Information Bulletin

FIFRA Section 2(ee) Recommendation:

For distribution and use only within the states of CT, DE, KY, MA, MD, ME, MI, NC, NH, NJ, OH, PA, RI, SC, TN, VA, VT, WV

XYTECT 2F INSECTICIDE
EPA Reg. No. 42750-115-74779

FOR CONTROL OF HEMLOCK WOOLLY ADELGID
IN EASTERN HEMLOCK USING A BASAL BARK SPRAY APPLICATION

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

This labeling must be in the possession of the user at the time of application. Follow all applicable directions, restrictions, Worker Protection Standard requirements, and precautions on the EPA registered label.

This XYTECT 2F INSECTICIDE label is valid until December 31, 2029 or until otherwise amended, withdrawn, cancelled or suspended.

For the Control of Hemlock Woolly Adelgid in Eastern Hemlock Using Basal Bark Spray Treatment

Use Directions: Apply 0.1 to 0.2 fl. oz. (3 to 6 mL) per inch of trunk diameter (D.B.H.).

This recommendation is made as permitted under FIFRA Section 2(ee) and has not been submitted to or approved by the EPA.

This 2(ee) Bulletin must be in the possession of the user at the time of pesticide application.

Follow all applicable directions, restrictions and precautions on the respective EPA registered label. For First Aid and other Precautionary Statements, see label attached to the container.

Distributed By
Rainbow Treecare Scientific Advancements DBA: Rainbow Ecoscience
11571 K-Tel Drive
Minnetonka, MN 55343

Active Ingredient: Imidacloprid

Systemic Pesticide

Application Methods

- -Soil Drench
- -Basal Application
  - *-(Xytect 2F: 2ee exemption label)*
- -Injection

Efficacy takes 6 months to 1 year

Protects trees 4-7 years

Chemical Control
Both HWA & EHS

Active Ingredient: Dinotefuran

Systemic Pesticide

Formulation: Water Soluble Packet

Application Methods:

Recommended
-Basal Bark Application
Other Options
-Soil Drench
-Injection

Efficacy takes a few weeks to 6 months

Quick acting!

Protects trees 2-3 years

Application Timing

Spring and Fall when temperatures are less than 80 F

Soil moist, not frozen

Avoid treating during drought (poor uptake/reduced efficacy)

Basal Bark Application

Our preferred application method

Limits non-target impacts

Not as invasive as injecting

Equipment is cheap

Optional: Mix tank of Imidacloprid and Dinotefuran

Apply from soil level to 5 ft

All around the trunk of the tree

Injection Application

Mauget Capsules

Drill holes around base of tree according to label

Apply capsules

Tree sucks up chemical

Dinotefuran and Imidacloprid products available

Who can apply pesticides?

Commercial Applicator

Certified Arborist with Applicator License

or

Landowner can apply without license on their own land

Imidacloprid

HWA Only

Dinotefuran

HWA & EHS

Rules for Treatment Near Water

May require special permit

Application close to water are restricted

Stricter rules within 5 miles of public water intake

Contact NH Division of Pesticide Control
If considering pesticide treatments near water

https://www.agriculture.nh.gov/farms-businesses/pesticides/pesticide-control-board

Where to Report?

NHBugs

PROTECTING TREES AND FORESTS

www.NHbugs.org

Thank you!

Ryan Crandall
Forest Health Specialist
ryan.s.crandall@dncr.nh.gov

More forest pest information at:
https://www.nhdfl.dncr.nh.gov/forest-health

Seedling Project

Summer 2025

Fall 2022

Fall 2022

Spring 2023

Spring 2025

EHS is Dispersed by:

Birds

Balsam Fir
Christmas Trees

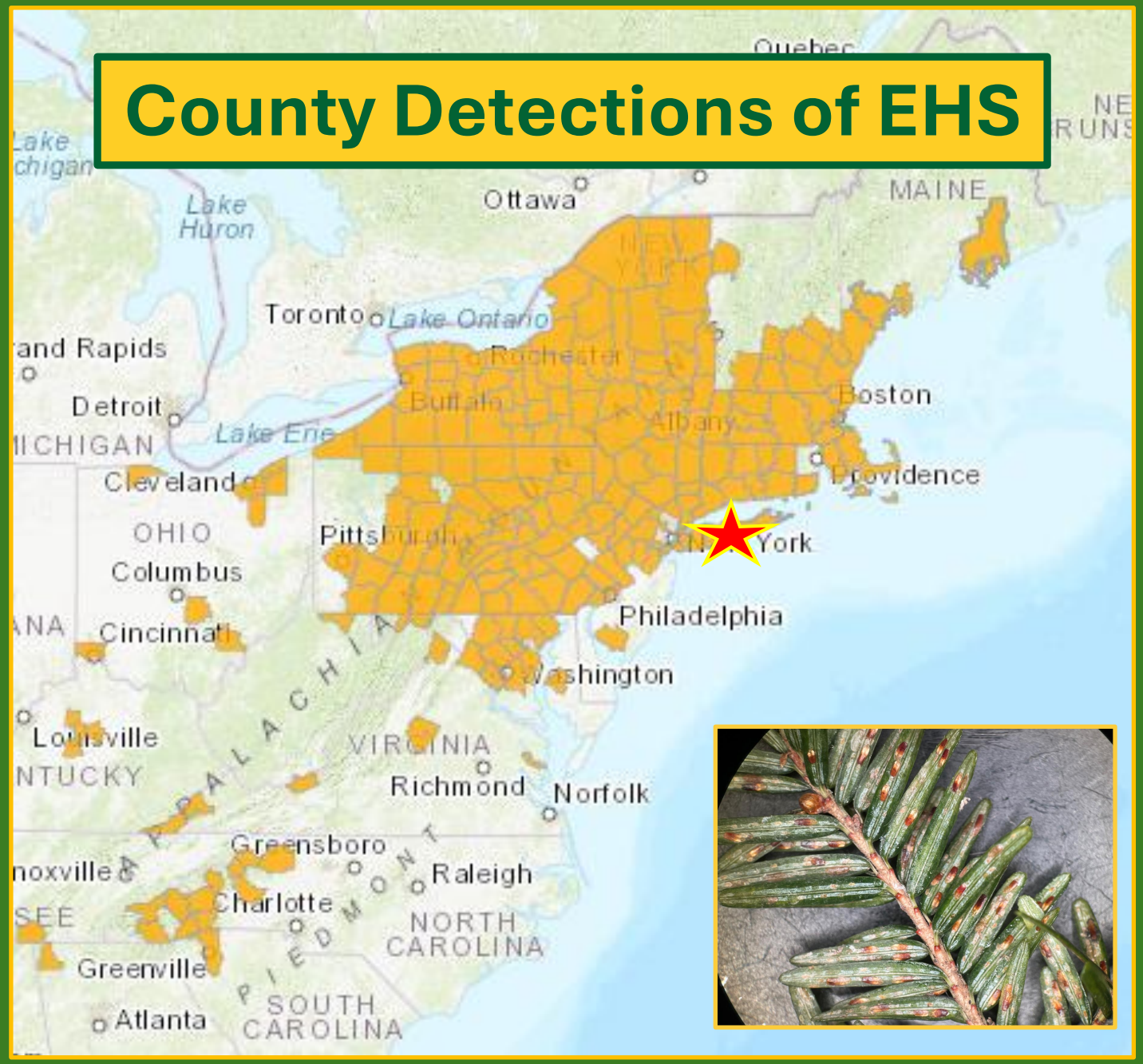
Wind

ans

County Detections of EHS

Introduced to Long Island, NY in early 1900s

Now found in 17 States



Biological Control

Unfortunately, efforts **failed to control EHS**

Research into biological control has stopped

HWA worse pest, research completely shifted to HWA

RSA 483-B: Shoreland Water Quality Protection Act
Vegetative Management for Water Quality Overview

Ryan Duquette
Shoreland Program Supervisor

NHDES Water Division
Land Resources Management Program

February 25, 2026

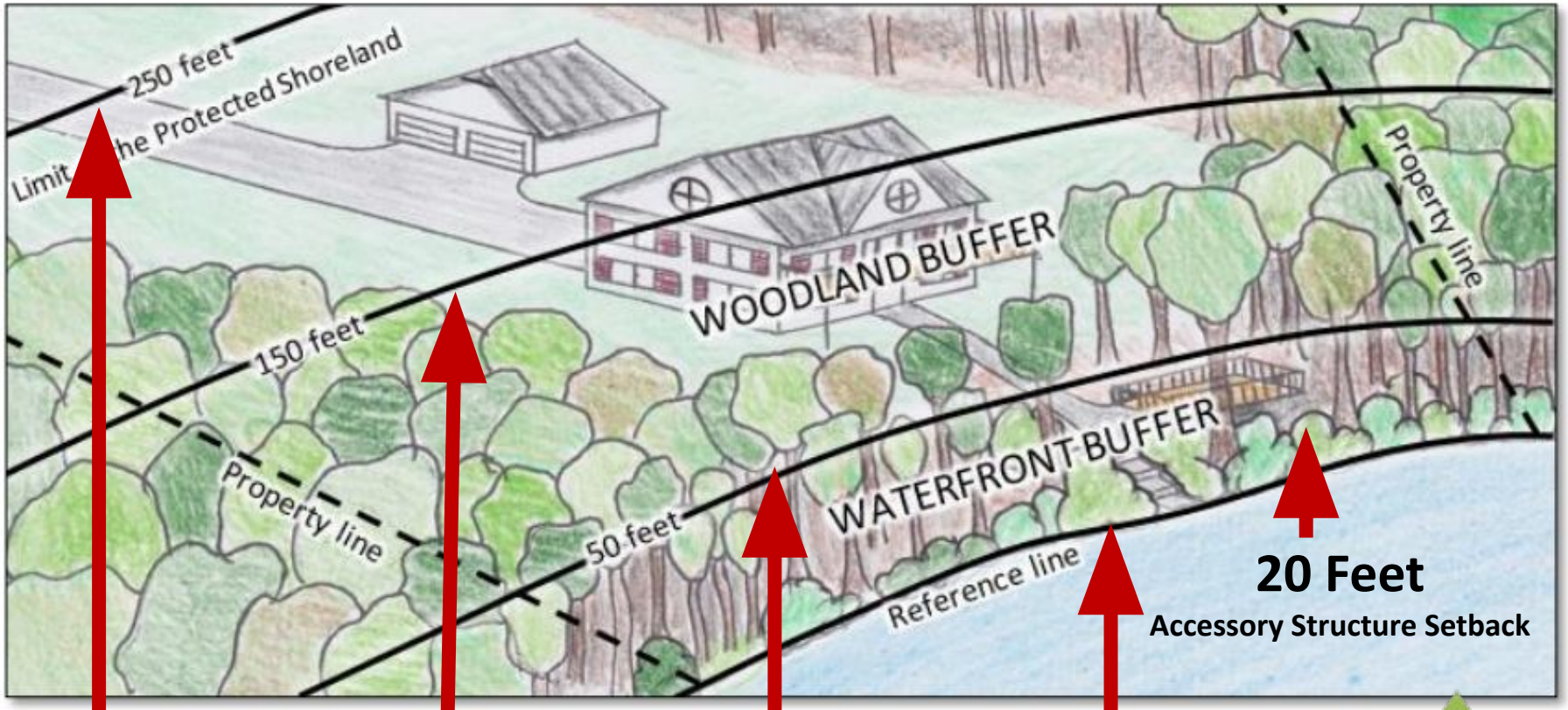
NEW HAMPSHIRE DEPARTMENT OF Environmental Services

RSA 483-B:
Shoreland Water Quality Protection Act

The Shoreland Water Quality Protection Act (RSA 483-B) and its associated rules, Env-Wq 1400, establish a *protected shoreland* close to public waters.

Within this area, vegetation removal, excavation, fill, and development are regulated.

The Protected Shoreland



250 Feet
End of Jurisdiction

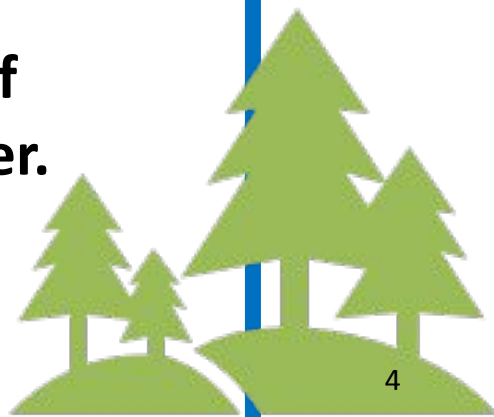
150 Feet
Natural Woodland Buffer

50 Feet
Primary Structure Setback
Waterfront Buffer

Reference Line
Beginning of Jurisdiction

Why Is Preserving Native Shoreland Vegetation Important?

- A combination of native plants is nature's most economical / efficient water purification system.
- Plants help remove the oils, salt, heavy metals, fertilizers, and other contaminants from stormwater runoff (water from rain / melting snow that does not soak into the ground) before they enter our waterbodies.
- Even dense mats of leaves / pine needles ("duff layer") under trees play a role in purifying water.



Why Is Preserving Native Shoreland Vegetation Important?

- **Native shrubs and trees such as blueberry bushes, willows, oaks, pines, are the best vegetation for healthy waterbodies.**
- **Native shrubs and trees slow down, absorb, and purify much more stormwater than plants with shallow roots typically found in lawns and mulched garden beds.**
- **Birds, fish, and insects rely on the shade, protection, and fruits provided by shoreland plants.**

To protect water quality and wildlife habitat!

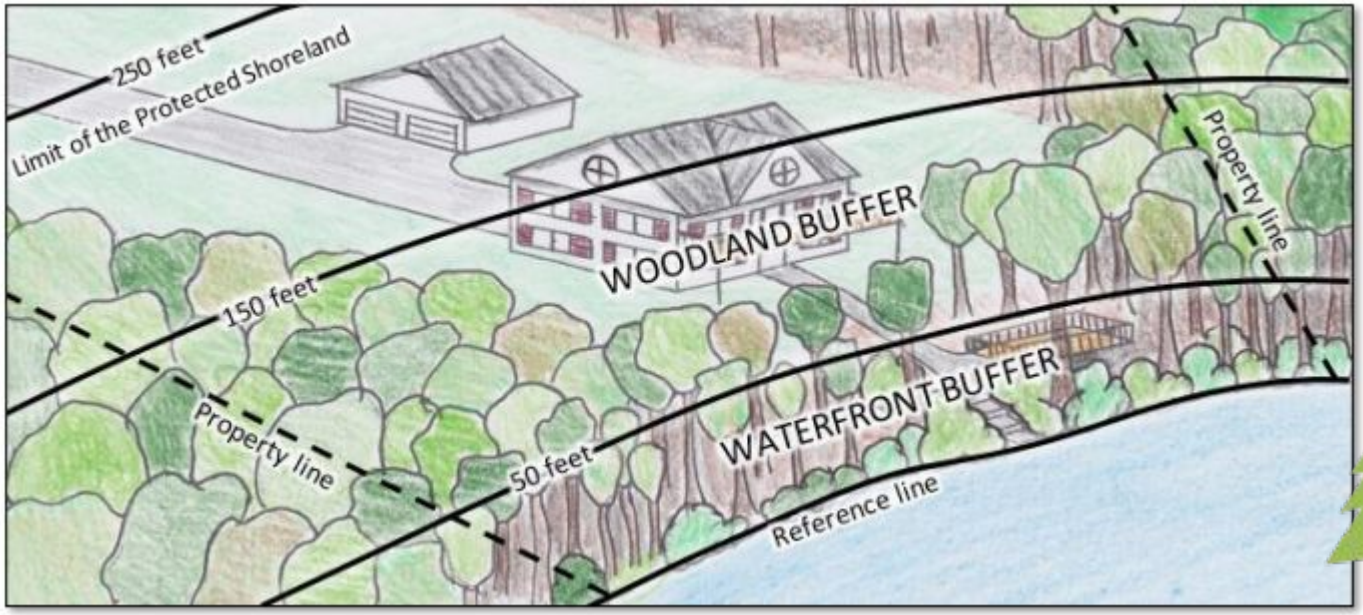
What Vegetation Does the SWQPA Regulate?

- Removal of groundcover, shrubs, and trees.

- 150-ft landward from the reference line of public waters.

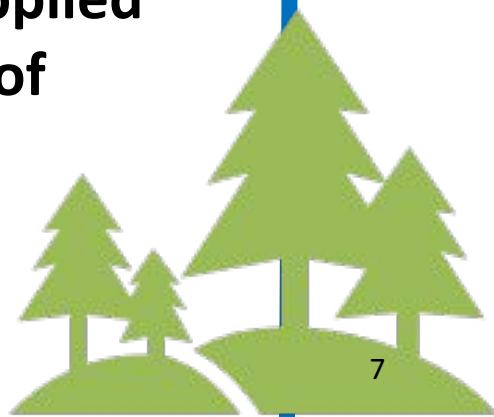
0-50 Foot Waterfront Buffer

50-150 Foot Woodland Buffer



50-foot Waterfront Buffer: Groundcover & Shrub Requirements

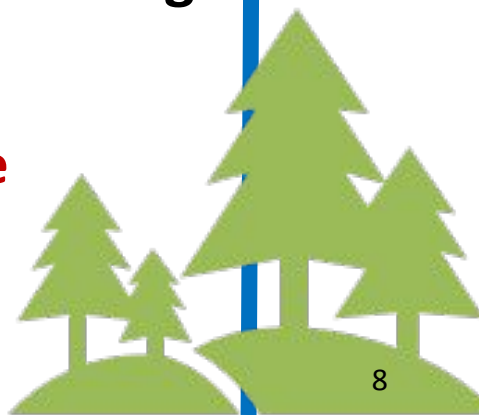
- Duff layer, groundcover, and shrubs **may not be removed and replaced with landscaping or lawn.**
- They may only be removed to provide a single 6-foot-wide footpath to the water or to structures in the waterfront buffer (a shoreland permit may be required).
- Shrubs must be maintained at a minimum of 3 feet high.
- Pesticides or herbicides of any kind may only be applied by a horticultural professional with a Department of Agriculture pesticide application license.



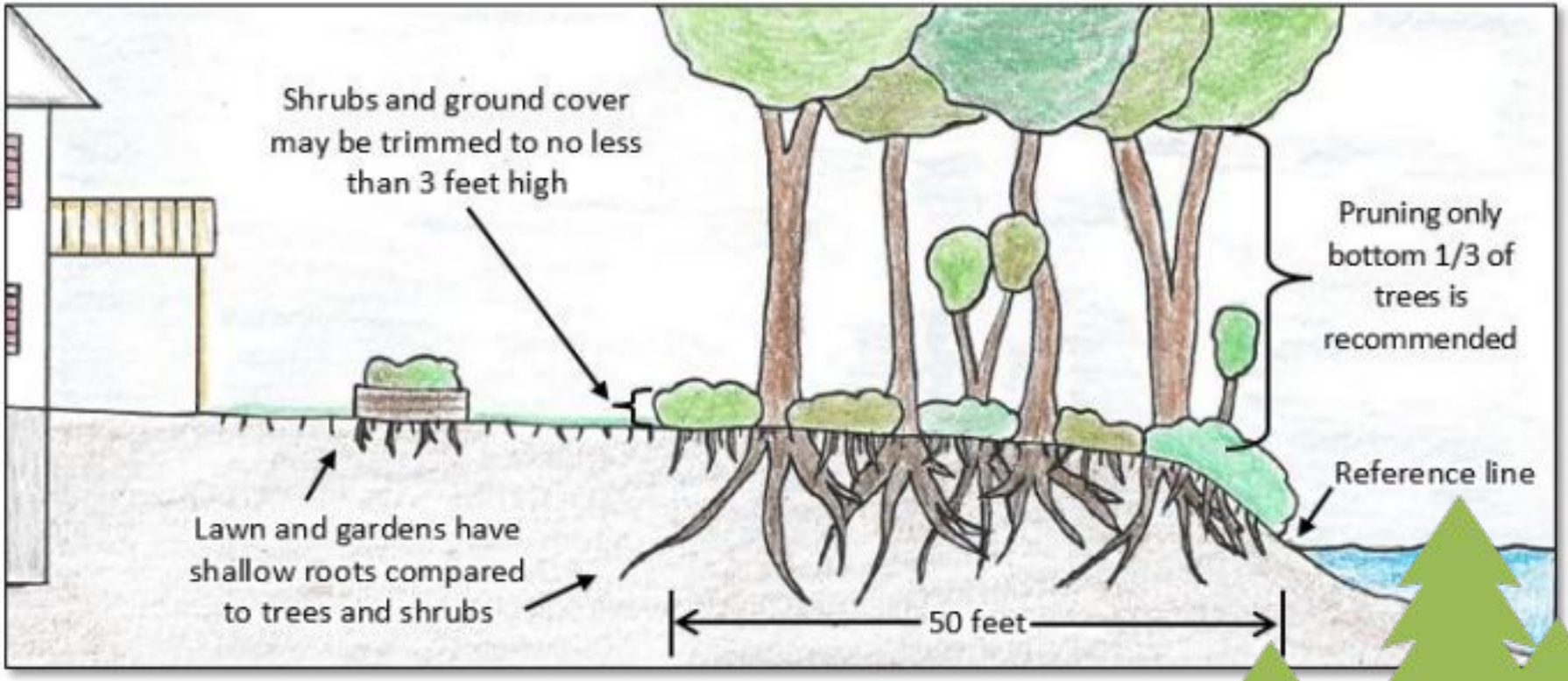
50-foot Waterfront Buffer: Tree Requirements

- Trees may be pruned if it does not endanger their health. Pruning only the bottom 1/3 of a tree is recommended to maintain property aesthetics and tree health.
- Pruning trees often increases views while providing wildlife habitat, privacy, and retaining shade.
- Always determine if a tree can be pruned before removing it.

Removing trees and saplings may be permissible, but there are limitations based on a grid segment and point score system.



50-foot Waterfront Buffer: Groundcover & Shrub Requirements



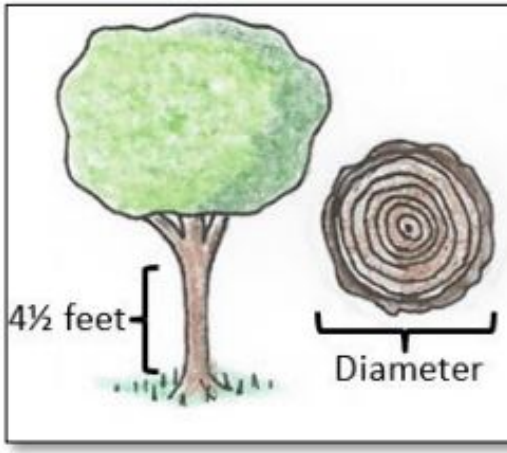
50-foot Waterfront Buffer: Tree Requirements

- Property owners must maintain a minimum tree and sapling point score within each “grid segment”.
- They cannot remove trees or saplings from a segment that does not meet this minimum point score.
- To determine if trees or saplings can be removed, beginning from the northern or eastern property boundary, divide the Waterfront Buffer into grid segments that are 25 ft along the shore by 50 ft inland.
- Properties that have shoreland frontage that does not divide to an even number of 25-ft segments require points in the last segment in proportion to the area of the last segment.

50-foot Waterfront Buffer: Tree Requirements

- Next, to determine if trees can be removed from a grid segment, calculate the grid segment's total tree and sapling point score. Each tree is awarded a point score based on its trunk diameter (width) 4½ feet above the ground.

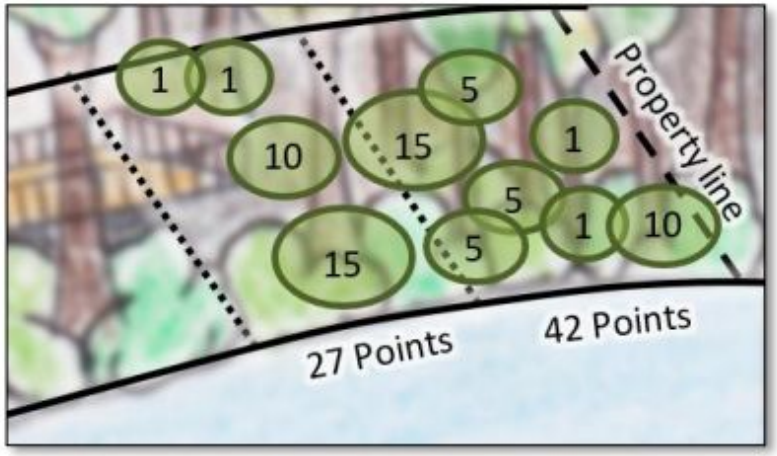
- Dead, diseased or dying trees are not awarded points.



Diameter of tree at 4 ½ feet high.	Point score
1 to 3 inches	1
> 3 to 6 inches	5
> 6 to 12 inches	10
> 12 inches	15

50-foot Waterfront Buffer: Tree Requirements

Trees or saplings may be removed from any grid segment provided that, after removing the trees or saplings, the sum of the tree and sapling point score within the affected grid segment will be at least 25 points.



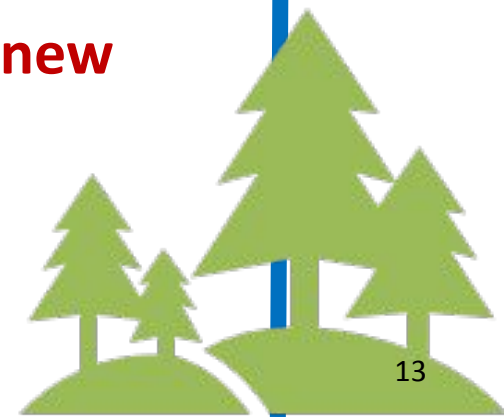
Before management

After management

50-foot Waterfront Buffer: Tree Requirements

Property owners are encouraged to manage grid segments by strategically planting additional native saplings, especially within grid segments that do not meet the minimum point score so that, once the saplings are well established and mature, and the grid segment's total point scores increases above 25 points, trees may then be removed.

NOTE: Stump removal requires a permit. Stumps that are removed are to be replaced with pervious surfaces, new trees, or other woody vegetation.

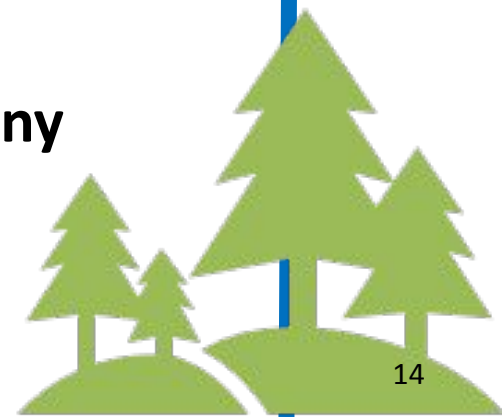


50–150-foot Woodland Buffer: Vegetative Requirements

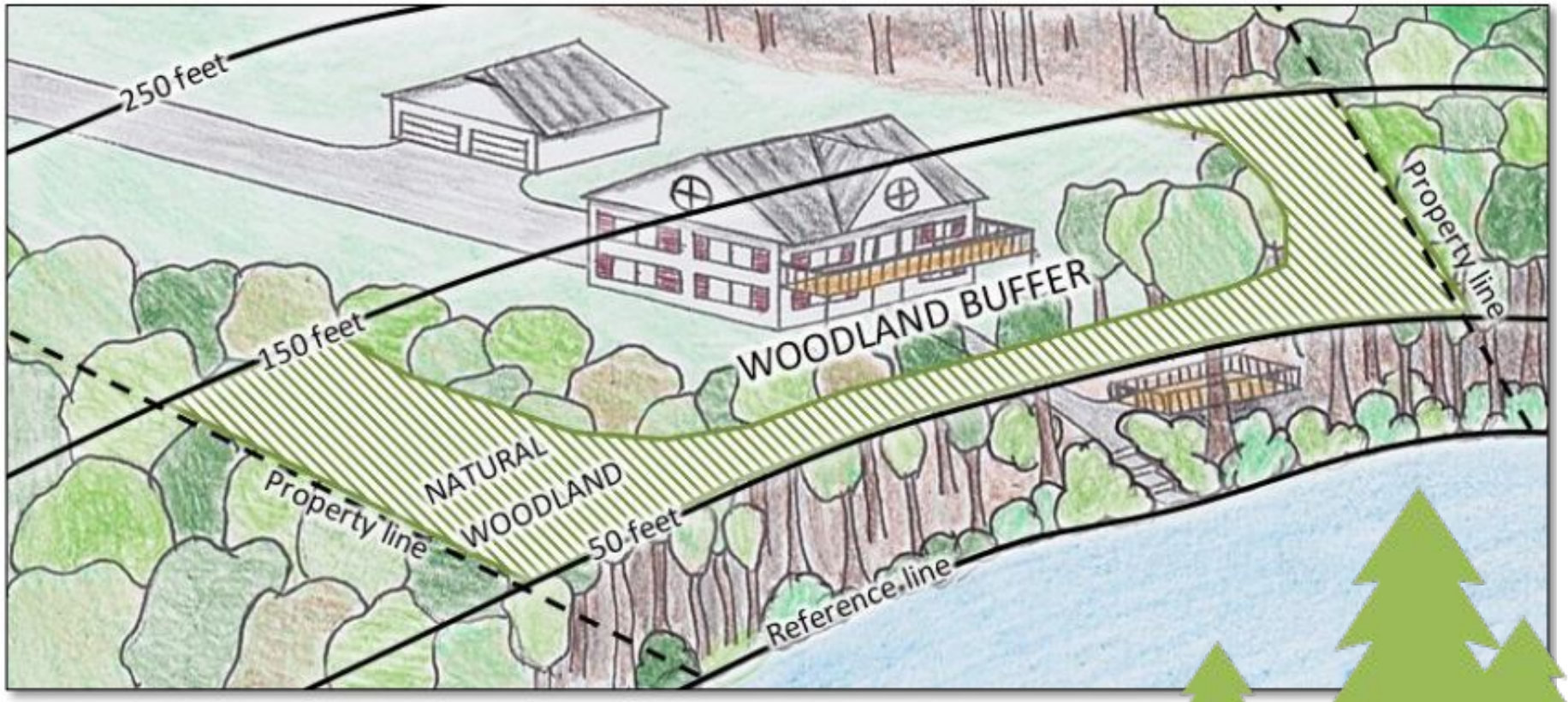
- At least 25% of this area must be managed as natural woodland where all existing native groundcover, shrubs and trees are allowed to grow.

- Property owners have the freedom and flexibility to select which region(s) are designated as natural woodland. Areas of the property with the highest density of native trees, shrubs, and ground cover should be given priority for designating as natural woodland.

- This area does not have to be contiguous, and many people place it on the edges of their property to provide a dense area of vegetation for privacy.



50–150-foot Woodland Buffer: Vegetative Requirements



50–150-foot Woodland Buffer: Vegetative Requirements

- Managing vegetation by allowing the native plants to grow without cutting except as needed to maintain or improve plant health.
- The natural woodland may appear different.

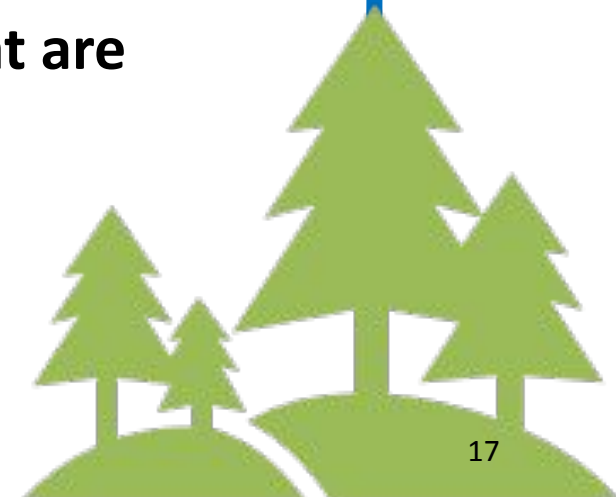
The natural woodland on either side of the path has native trees with some native shrubs for ground cover.

This area may have been an abandoned cleared area, but now qualifies as a natural woodland with native shrubs and ground cover.

This grandfathered lawn area contains a patch of native trees. Because of these trees, the area may qualify as natural woodland, although the grandfathered lawn may be maintained as such.

Permitting Requirements:

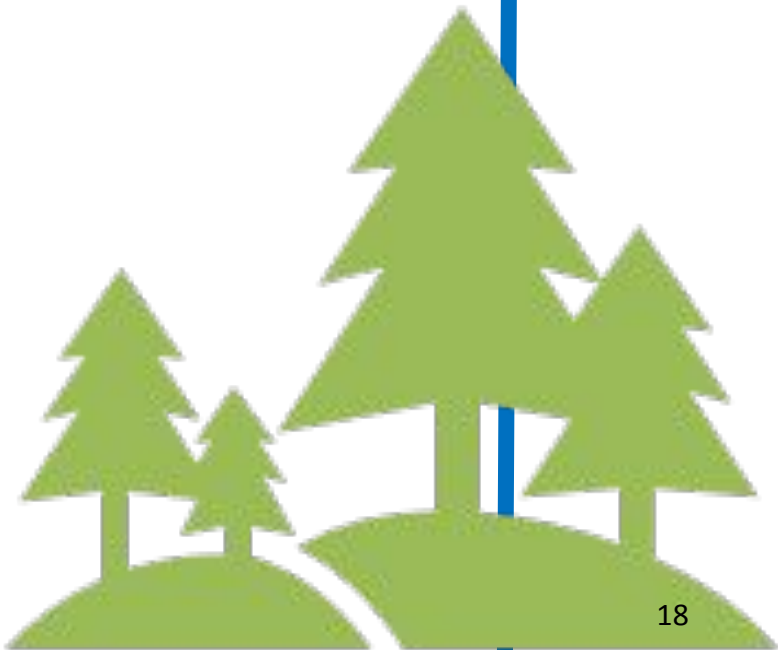
- A NHDES shoreland permit *is not required* for vegetation management provided it occurs in accordance with the requirements.
- A NHDES shoreland permit *is required* for stump removal.
- Before removing trees, always check local ordinances as well. Many municipalities have standards that are stricter than the SWQPA.



Exemptions

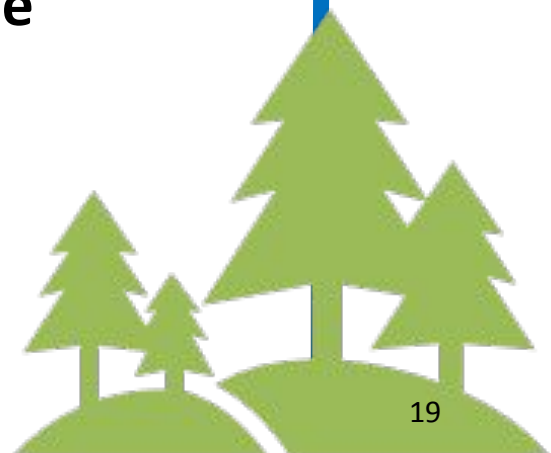
Areas cleared of ground cover, shrubs, or trees prior to July 1, 2008, in excess of the limits described in this fact sheet, may be maintained but not enlarged.

Examples of cleared areas include lawn and mulched landscaped areas.



What About Dead, Diseased, or Dying Trees?

- Any dead, diseased or unsafe tree which has a structural defect and poses an imminent hazard may be cut to ground level at any time.
- "Unsafe" tree means due to a structural defect. It does not mean simply in striking distance to a structure.
- Homeowners must obtain documentation of the tree's condition at the time of removal such as clear photos and written confirmation from a horticultural professional describing the tree's defect or condition.



Thank You! For More Information:

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https://www.des.nh.gov/land/waterfront-development/protected-shoreland