Hemlock Woolly Adelgid

Identification and Management

Presented by:

Caroline Marschner

New York State
Hemlock Initiative
Project Manager

College of Agriculture and Life Sciences

In Partnership With:

Cornell Cooperative Extension | Onondaga County

FINGER LAKES PRISM
Partnership for Regional Invasive Species Management

NEW YORK STATE OF OPPORTUNITY
Department of Environmental Conservation

FOREST SERVICE U S DEPARTMENT OF AGRICULTURE

USDA APHIS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Hemlock Trees

Foundation Species

Filling a Niche

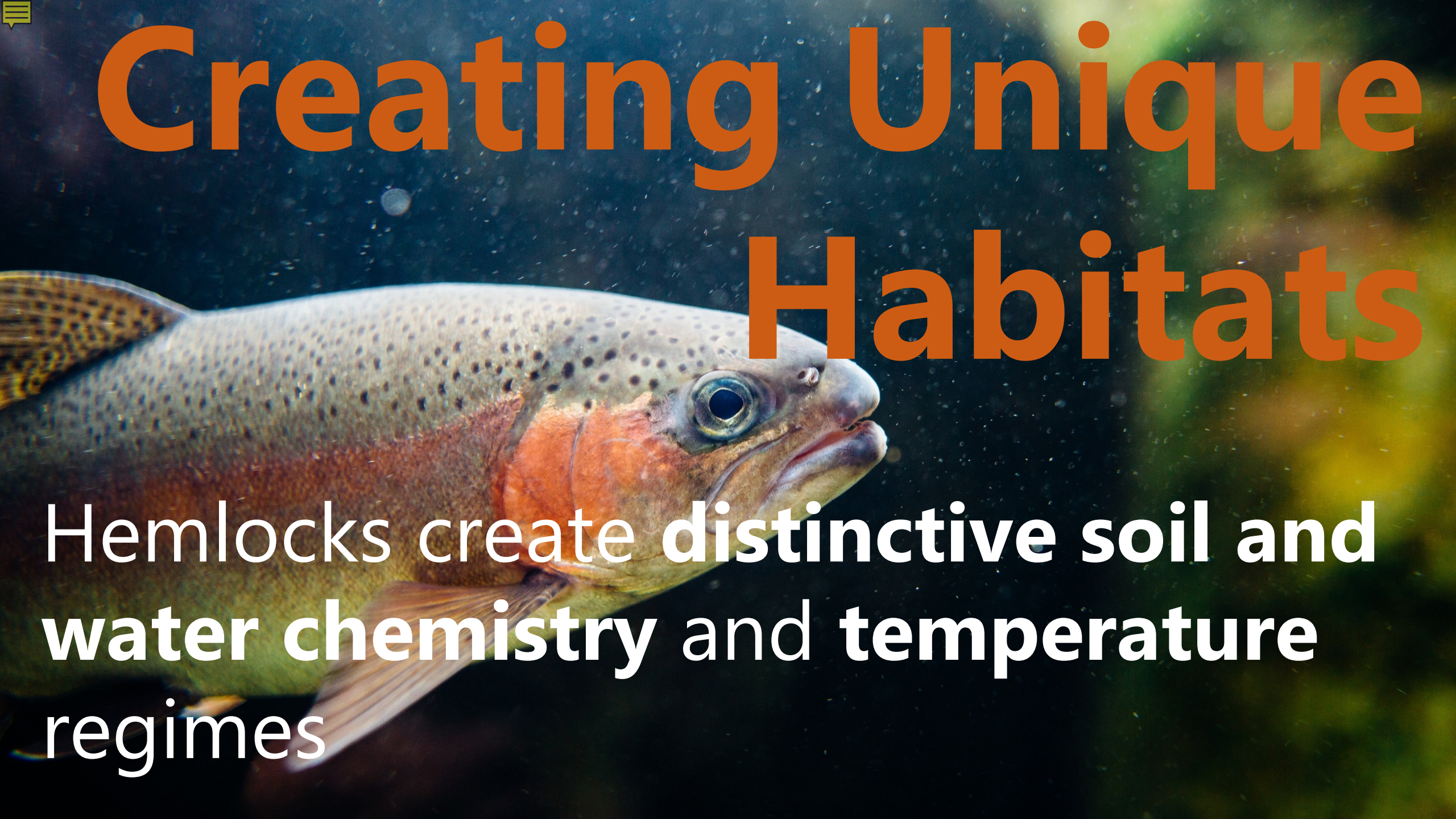
Hemlocks often grow on **steep slopes** and in **shady areas**

Supporting the Food Web

Habitat and food for **over 400 forest species** including birds, mammals, and arthropods

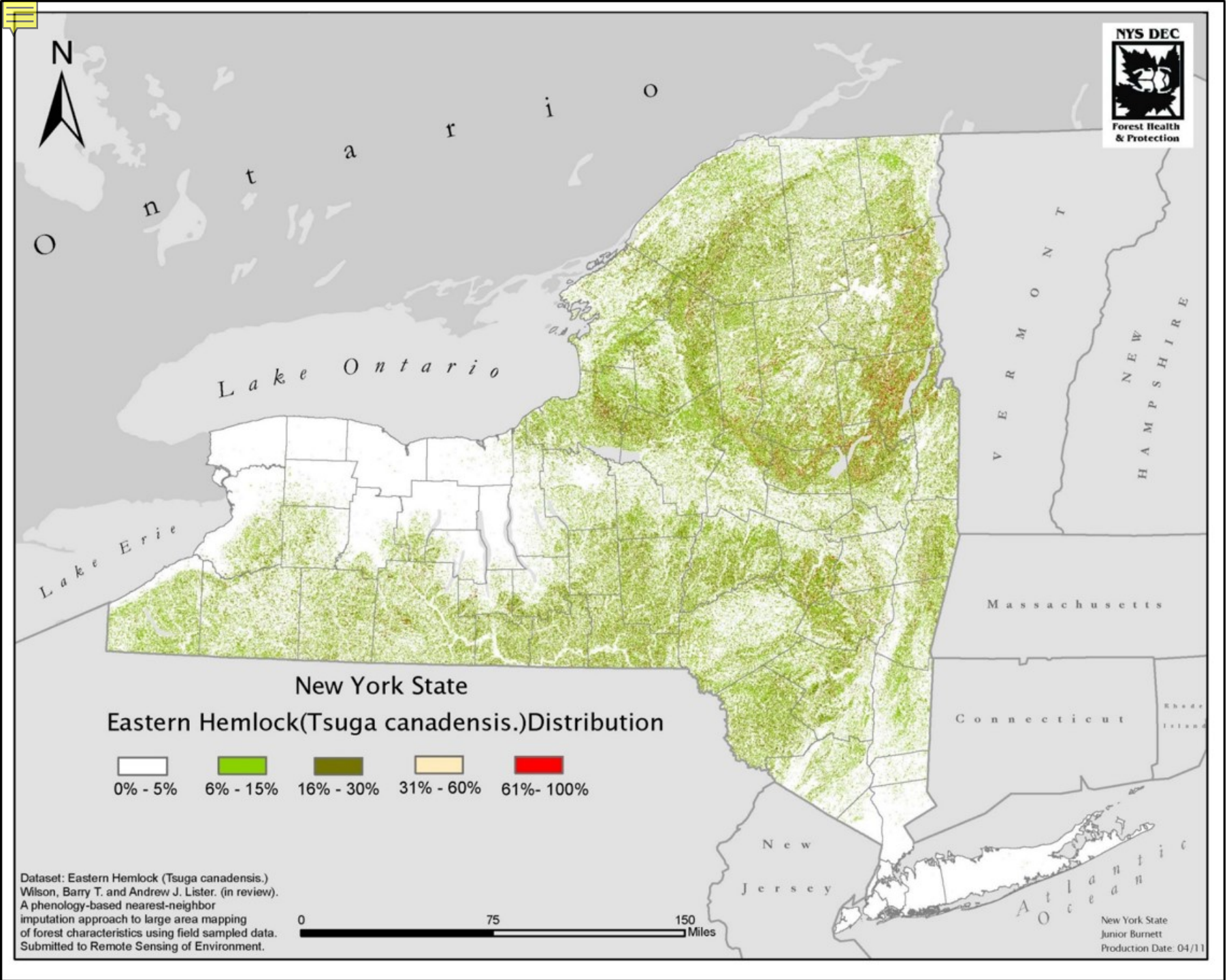

Providing
Ecosystem Services
Hemlocks help keep freshwater streams cold and clean

Creating Unique Habitats



Hemlocks create **distinctive soil and water chemistry** and **temperature** regimes


76%
of New York's
forested land is
privately
owned



Hemlocks are the **third most common** tree species in New York

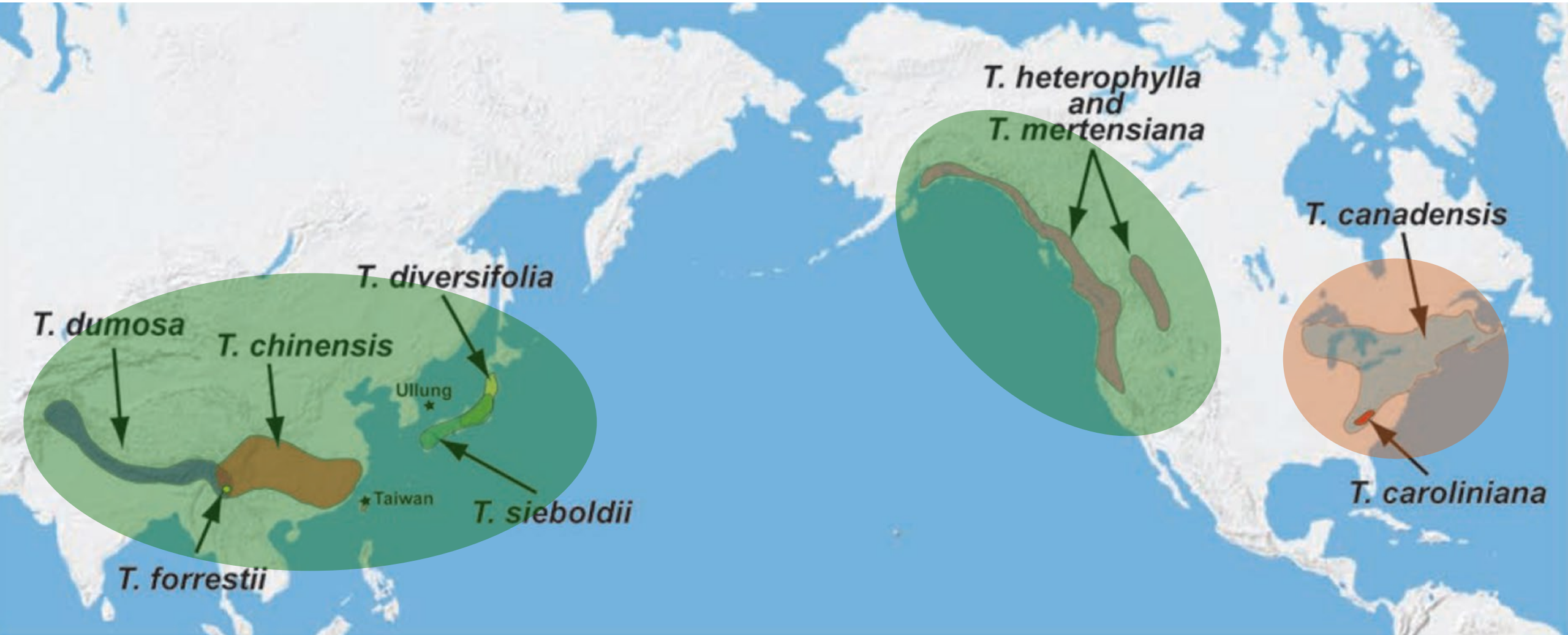

Losing hemlocks
Pisgah National Forest
Photo: Steve Norman

Hemlock Woolly Adelgid

Invasive hemlock pest

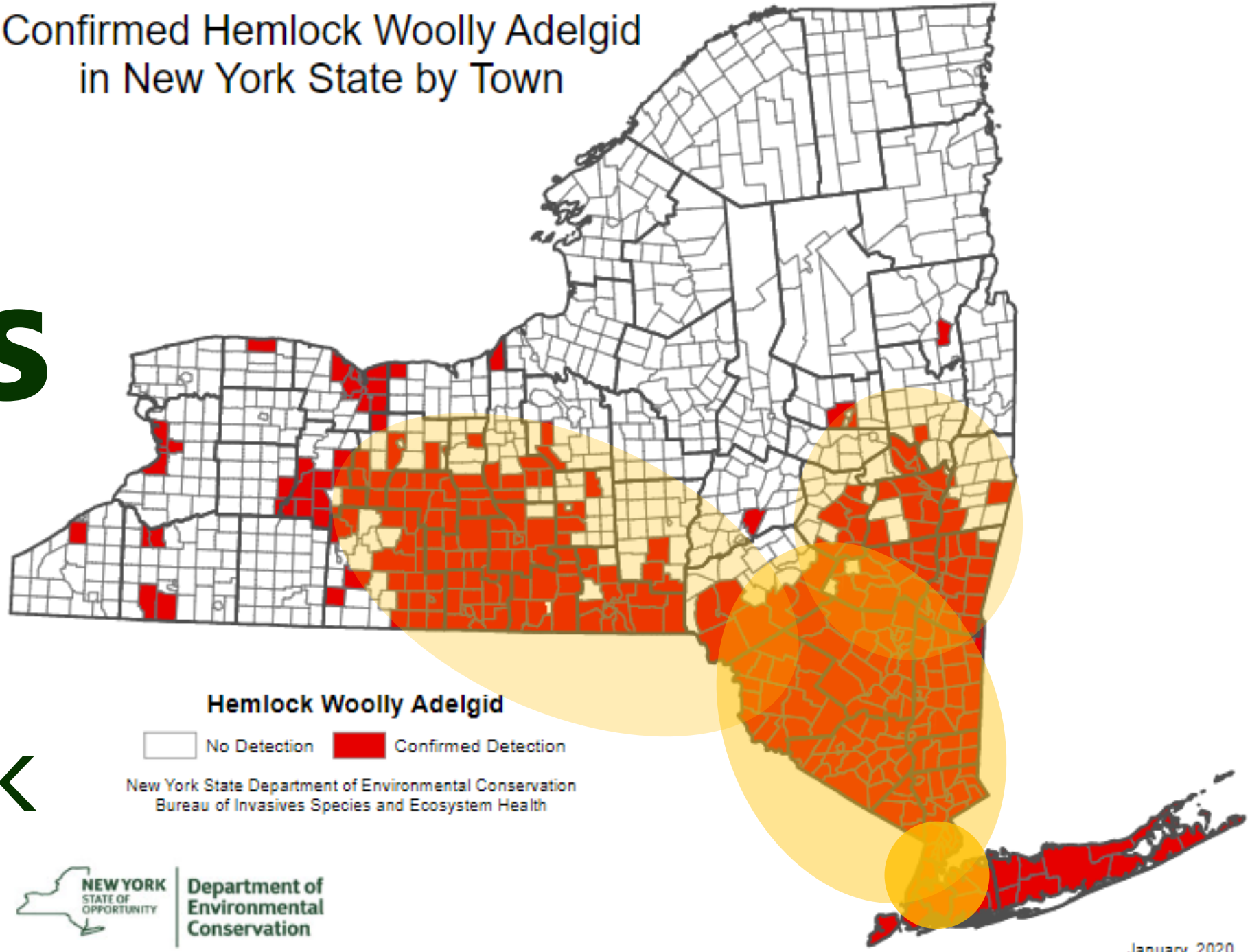
HWA Native Ranges

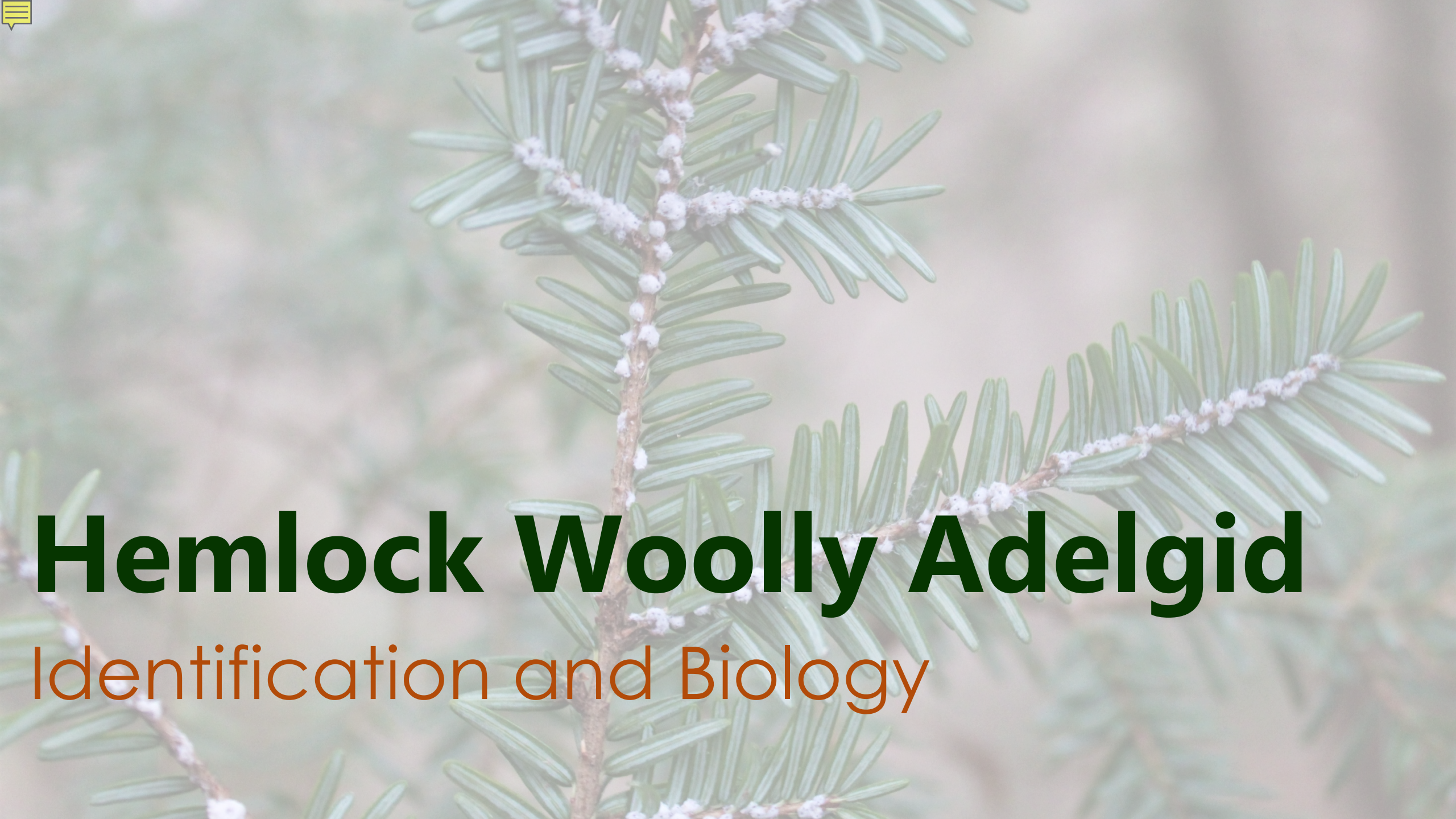
HWA Invasive Range



1980s

HWA enters New York





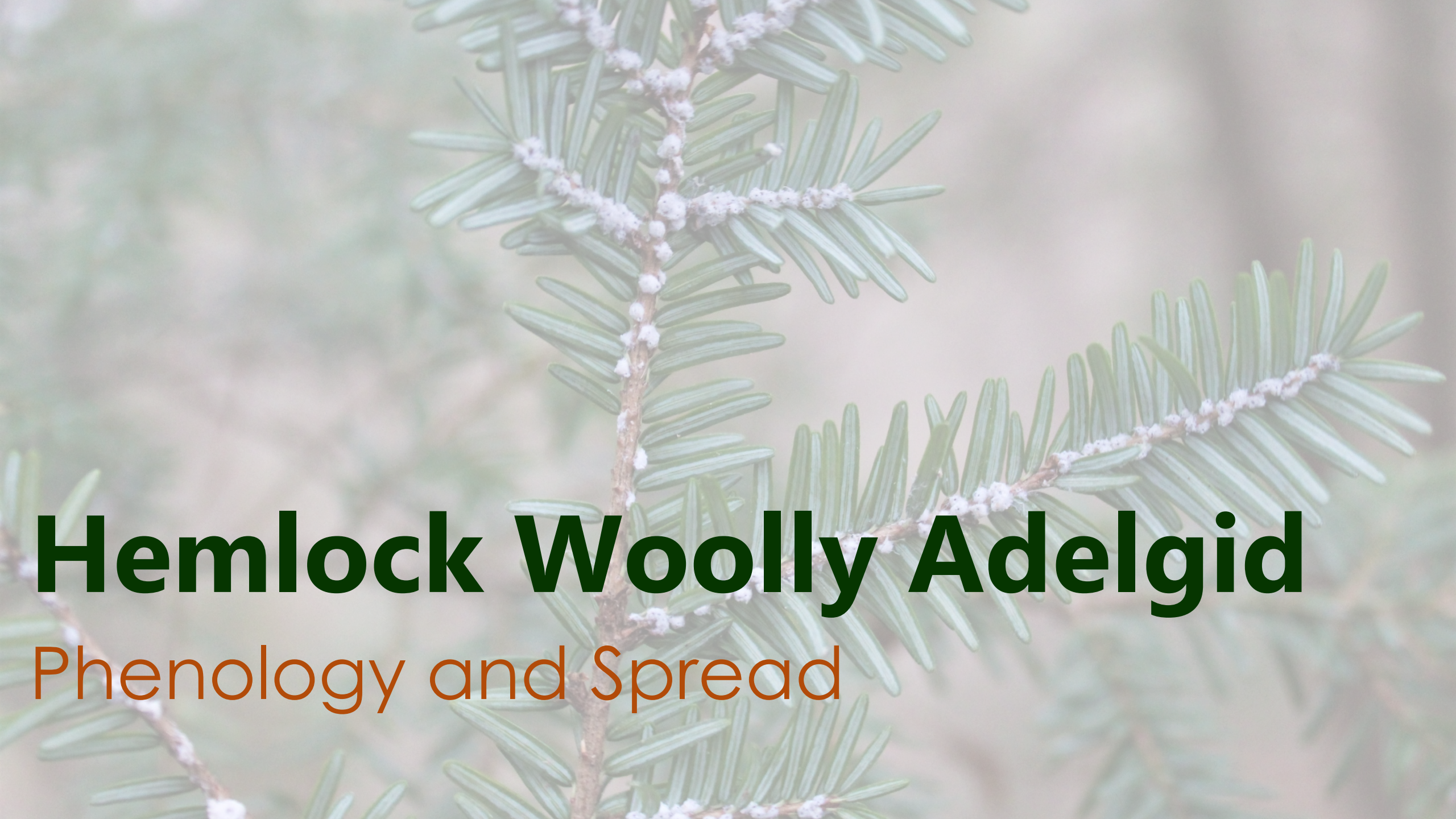
Hemlock Woolly Adelgid

Identification and Biology


Appears as
white, waxy, woolly masses on
hemlock twigs

Feeding
damages
hemlock
twig tissue


4-20
years to kill tree

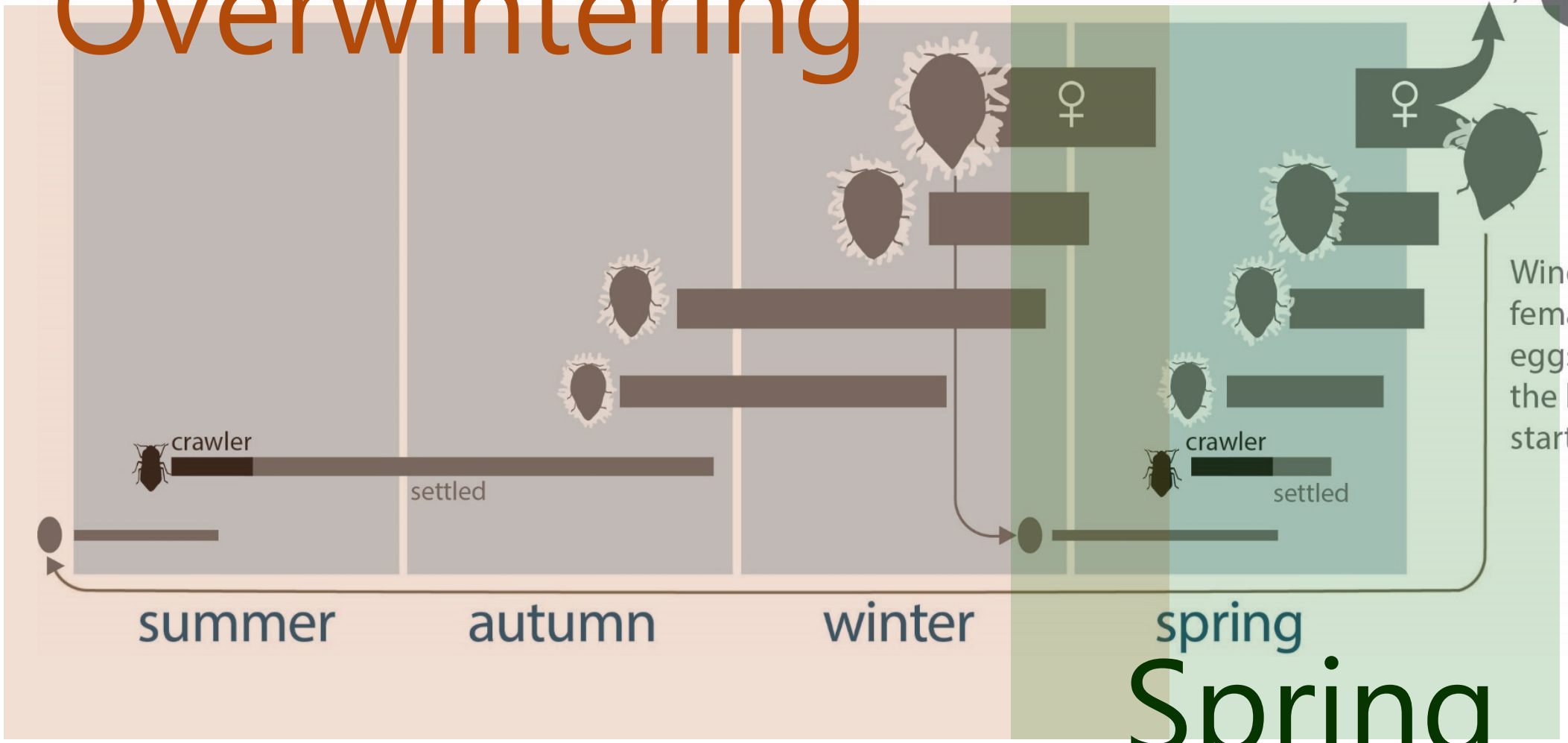


Hemlock Woolly Adelgid

Phenology and Spread

2 generations per year

Overwintering



Spring

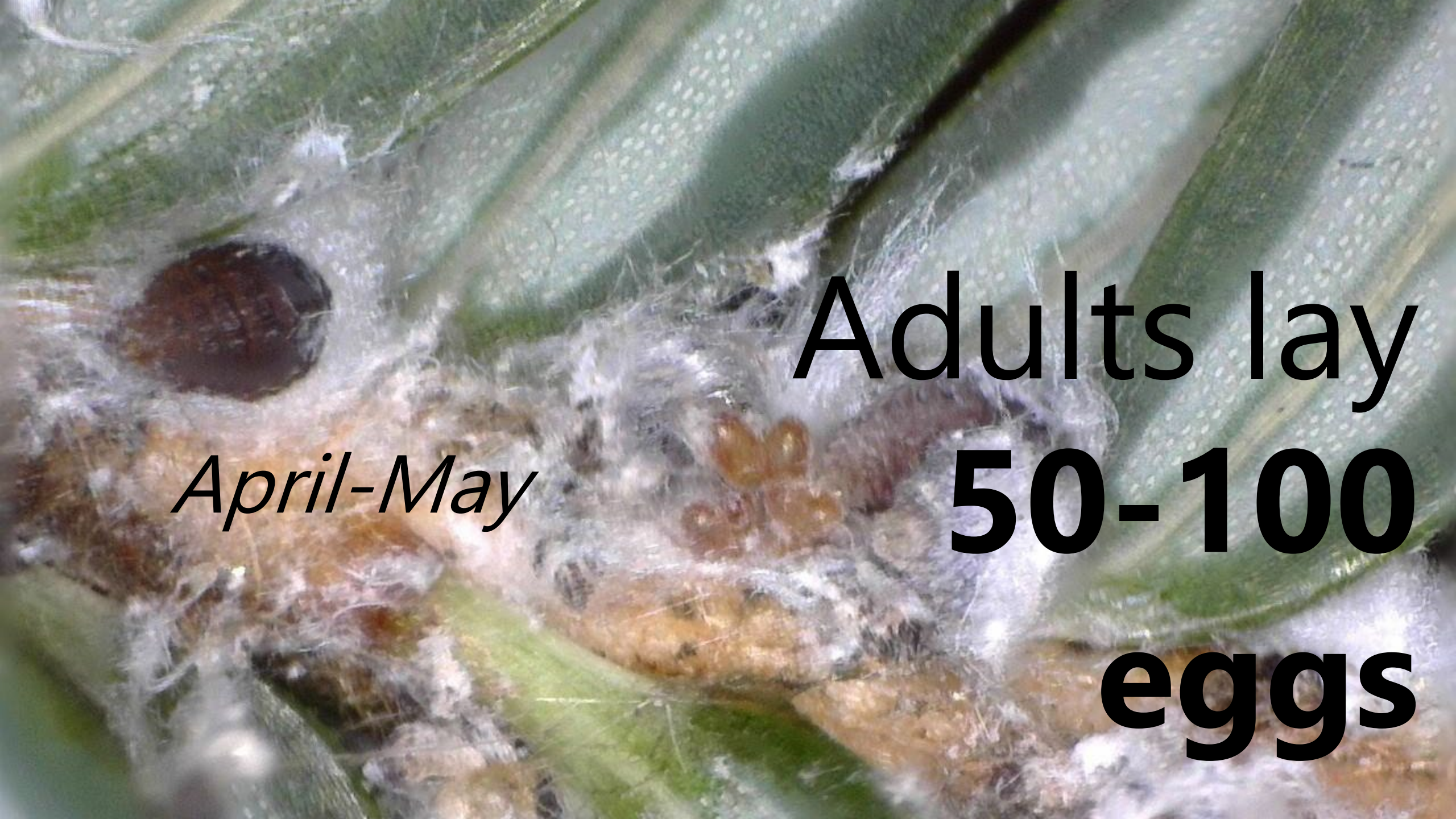

April-June
Only mobile stage!
Hatch from eggs into
crawler stage

Crawlers settle on twigs and become **aestivating nymphs**

July-October

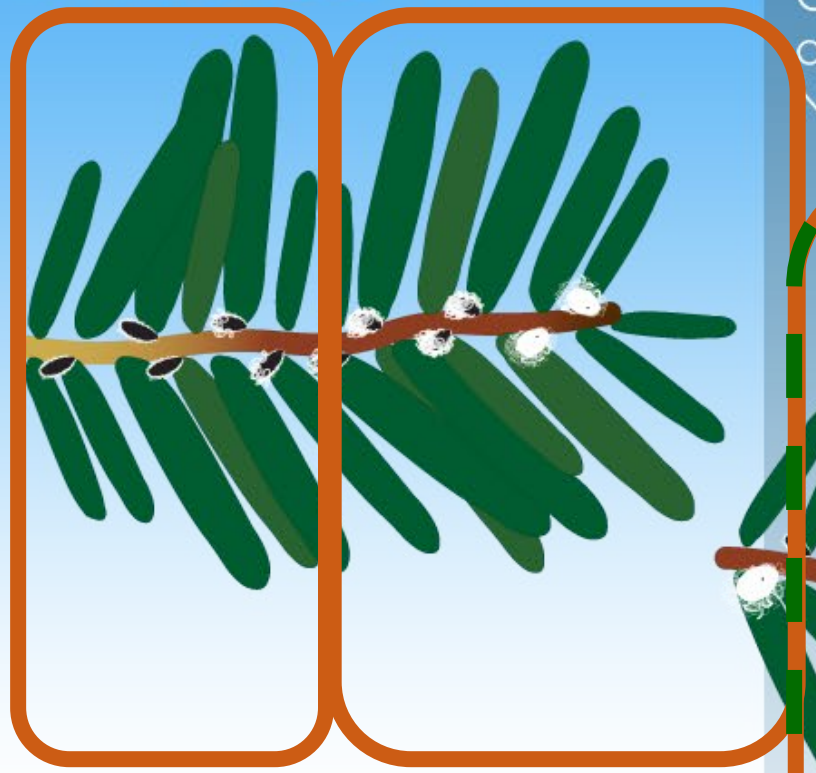
Overwintering only


Nymphs
feed, grow,
and **produce**
wool
November-June


Adults lay
50-100
eggs
April-May

August-February

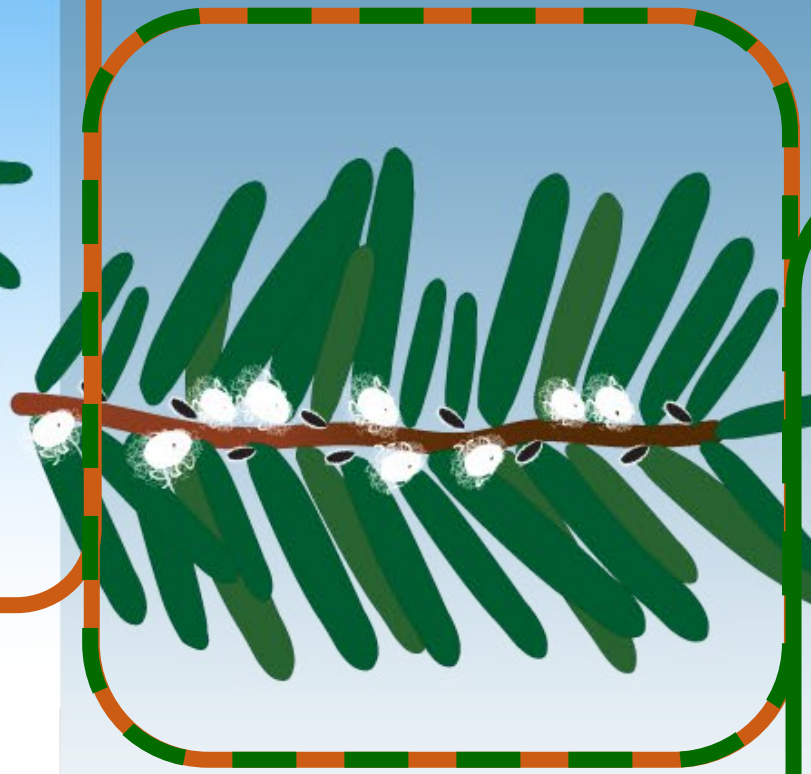
Sistens
Nymphs aestivate during summer, then go through 4 nymphal stages N1-N4



March-May

Sistens
Adults lay eggs

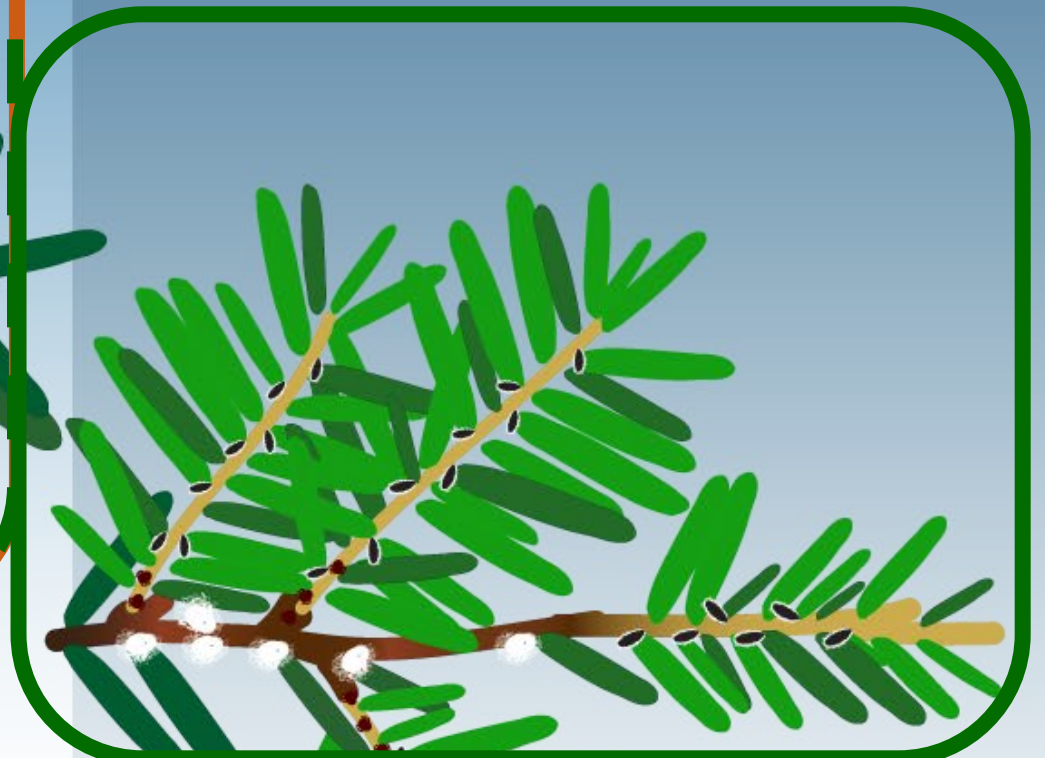
Progrediens
Crawlers settle among sistens adults
N1-N4 to adulthood



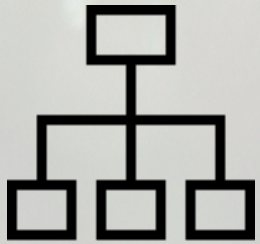
June-July

Progrediens
Adults lay eggs

Sistens (F2 generation)
Crawlers settle on new growth



HWA Invasion



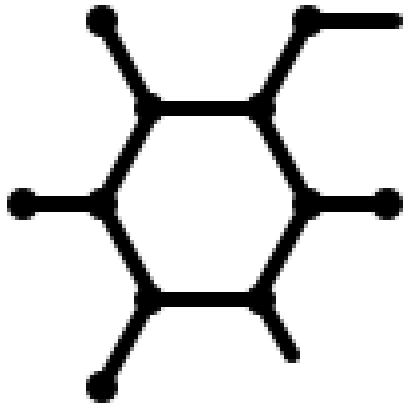
Reproduce **asexually**

2 generations per year

No native **HWA predators**

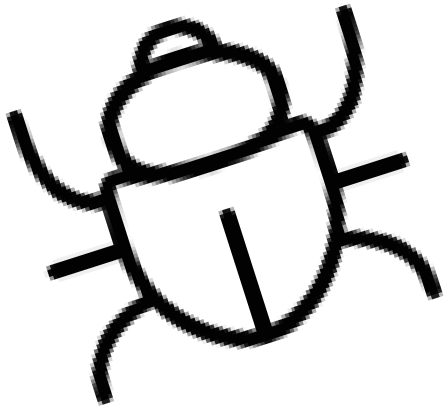

No HWA
population
control

HWA Management



Chemical

Biological




Imidacloprid
Slow-acting
7
Long-lasting
Widely available
Dinotefuran
Fast-acting
1
Short lifetime
Applicators only

Best Management Practice

Imidacloprid in Context

Reduced off-target impacts

Low risk to pollinators

Reduced need for reapplication


Treatment prevents
a **cascade of**
ecological effects
from hemlock loss

Where to Manage

Picking Stands to Protect

Initial Decision Tree

- Leading edge/isolated infestations:

  Treat

- Old growth remnant: **Treat**
- Likely to be removed: **Don’t treat**
- All other stands: Put through **metric**

Considerations

Stand Traits

- Current stand health, size, density, isolation
- Environmental stress
- Proximity to HWA, water
- Genetic diversity

Aquatic Ecosystem Value

- Coldwater fish = upland snow in headwater cachement
- Provide direct shade to water
- At-risk water quality
- Stream flashiness*
- Drinking water

Terrestrial Ecosystem Value

- Primary forest
- Ecosystem rarity
- Rare species
- High quality habitat
- Hemlock-dependent species
- Steep slopes*

Cultural Value

- Political viability
- Hazard trees
- Natural/cultural resource
- Use/outreach potential

Sustainability

- Protection/investment risk
- Treatment feasibility
- Climate resilience *
- Deer pressure

Prioritization Tool

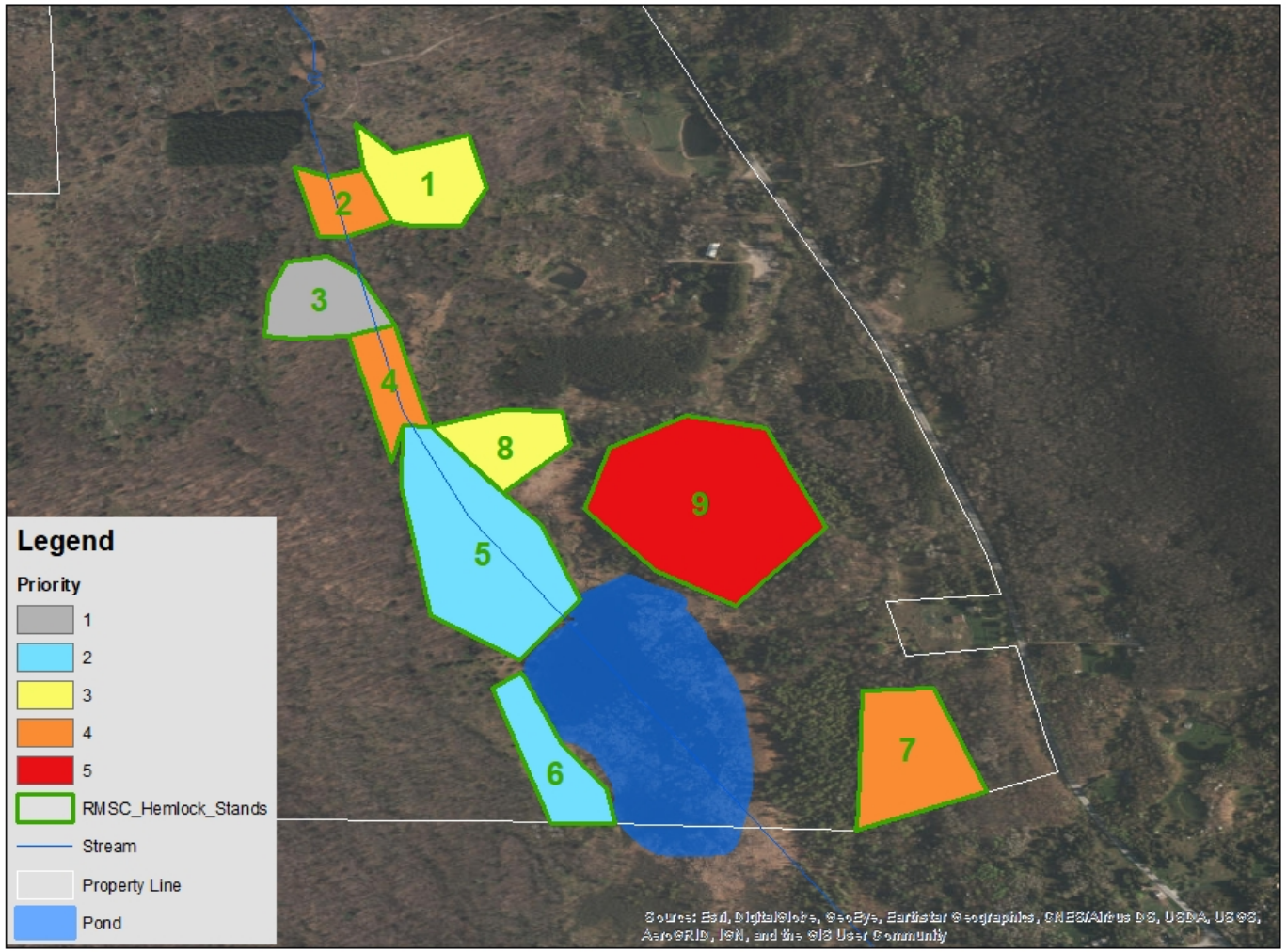
Regional Prioritization of Hemlocks

Conservation of hemlocks is critical to the long-term health of New York's forests. New York has more hemlock trees than any other state in the US; it will be impossible to conserve all of our hemlocks. As hemlock woolly adelgid (HWA) moves through the state, landowners, managers, and regional planners need to prioritize which hemlocks to focus on for survey, conservation and management. This regional prioritization tool is a decision tree and weighting tool to help landowners and land managers decide which hemlock stands are the most important to conserve across multiple properties. If you have only one property or a couple properties that are close to each other, you might consider using our landowner tool, which is more streamlined for use on one or just a few properties.

Depending on the scale at which you are work, different qualities of hemlock stands

	A	B	C	D	E	F	G	H	I	J	K	L	M
		Stand Traits								Aquatic terrestrial value			
	Attributes	Current Stand Health	Environmental Stressors	Stand Size	Hemlock Density	Proximity to HWA	Proximity to Water	Genetic diversity	Stand Isolation	Upland Snow in headwater cachement of coolwater fish habitat	Provide direct shade to water	At-risk water quality	Stream flashiness
	Attribute Weight	3	2	2	2	1	1	1	1	2	2	2	1
	Site 1 Name												
	Site 2 Name												
	Site 3 Name												
	Site 4 Name												
	Site 5 Name												
	Site 6 Name												
	Site 7 Name												
	Site 8 Name												
	Site 9 Name												
	Site 10 Name												

Test Case: Cumming Nature Center



Stated goals:

- Minimize erosion
- Protect streams

Through discussion/survey:

- Spreading globeflower
- Hemlock swamps
- Property history
- Trail safety

Biological Control

Long-term

Landscape-scale

Research still in progress

Laricobius beetles

Pacific Northwest
winter feeder

17K released

Beetles established
at **7 sites**

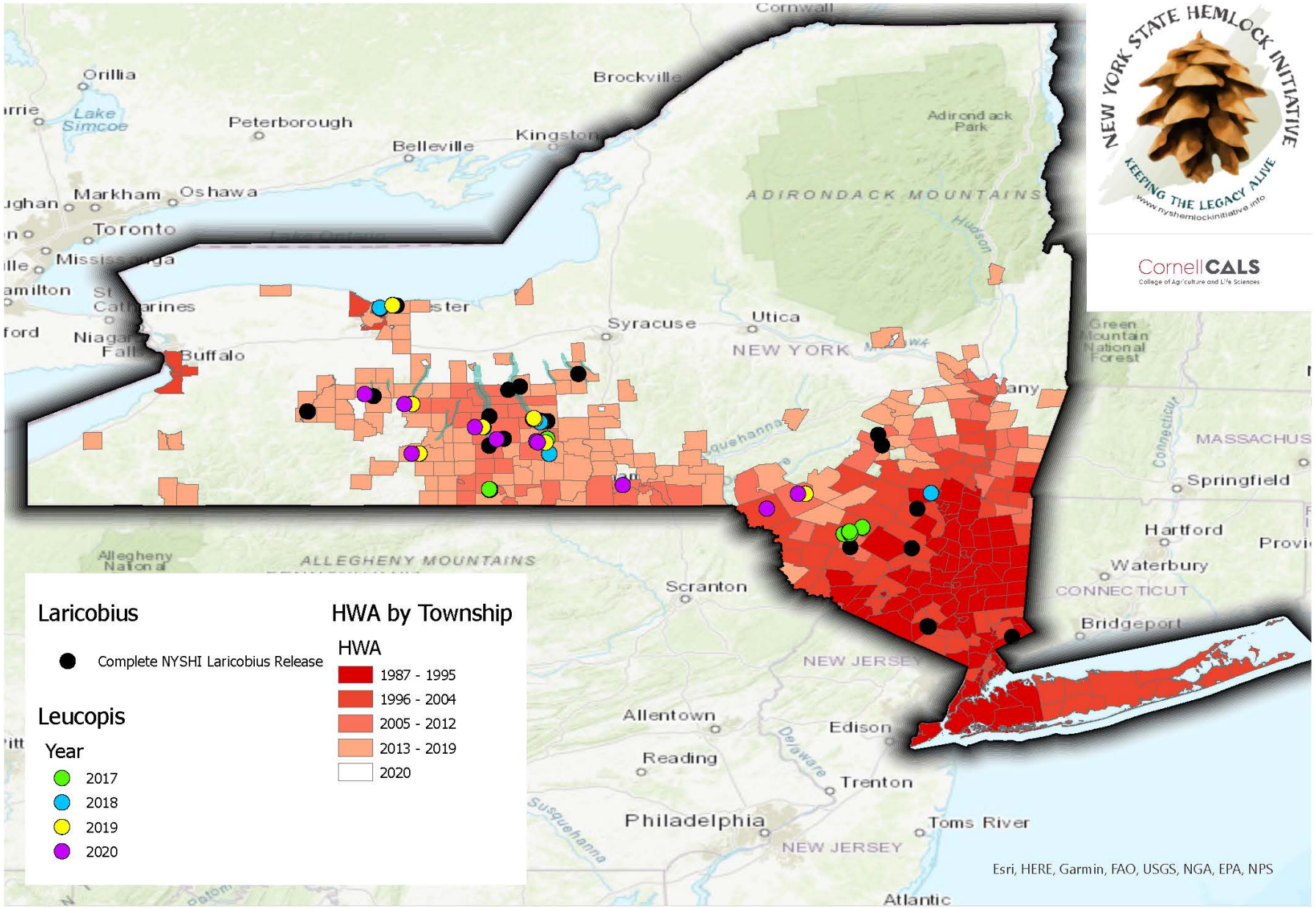
Leucopis silver flies

Pacific Northwest
spring feeder

Eats **HWA eggs**

16K released

NYS Hemlock Initiative Biocontrol Releases



NEW YORK STATE HEMLOCK INITIATIVE
KEEPING THE LEGACY ALIVE
www.nyshemlockinitiative.info

CornellCALS
College of Agriculture and Life Sciences

Biocontrol Research Timeline

Research potential pest predators

Obtain permits for predator release

Releases and continued research

Looking for HWA

You can help!

Invasive Hemlock Woolly Adelgid Found by Camper on Lake George's East Shore

Second HWA infestation for Lake George Watershed and Adirondack Park

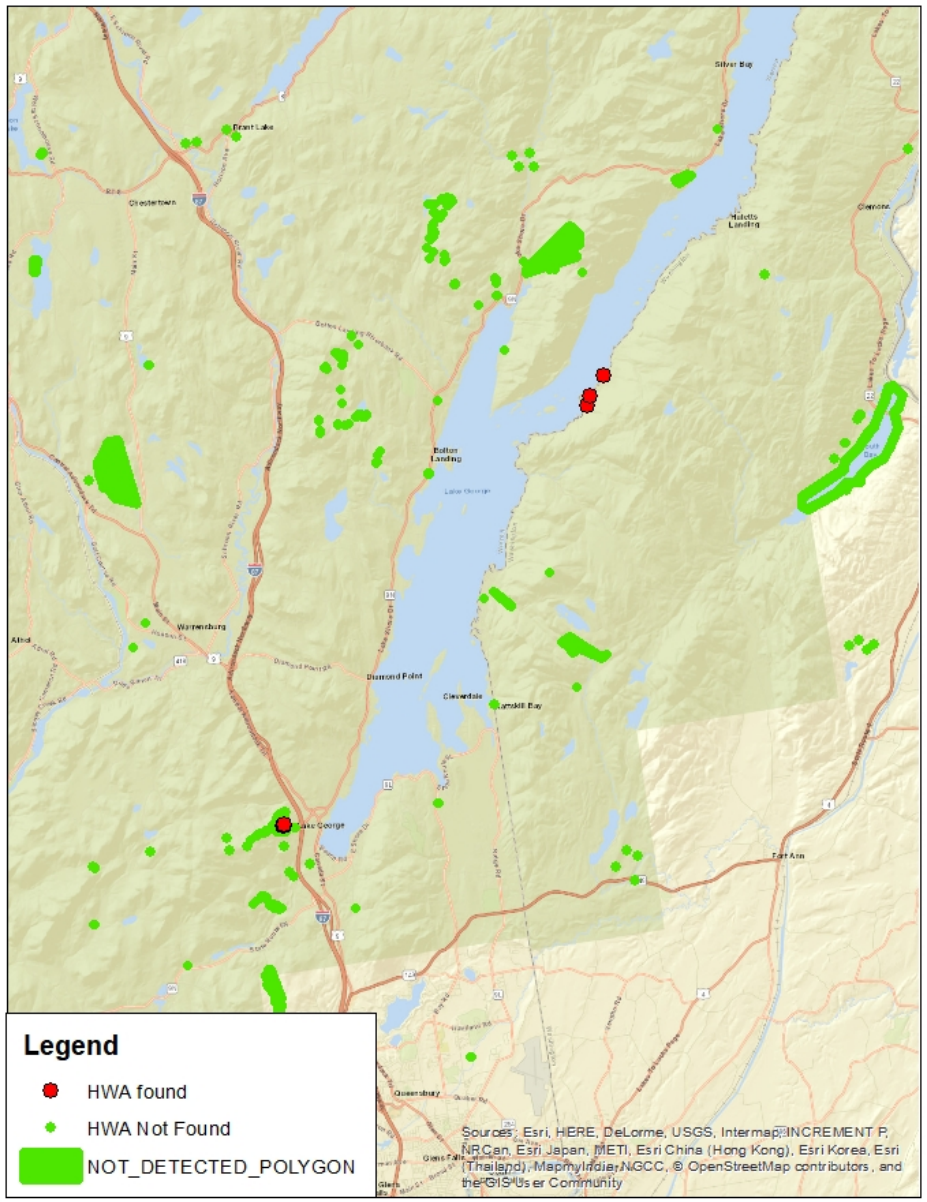
AUGUST 22, 2020

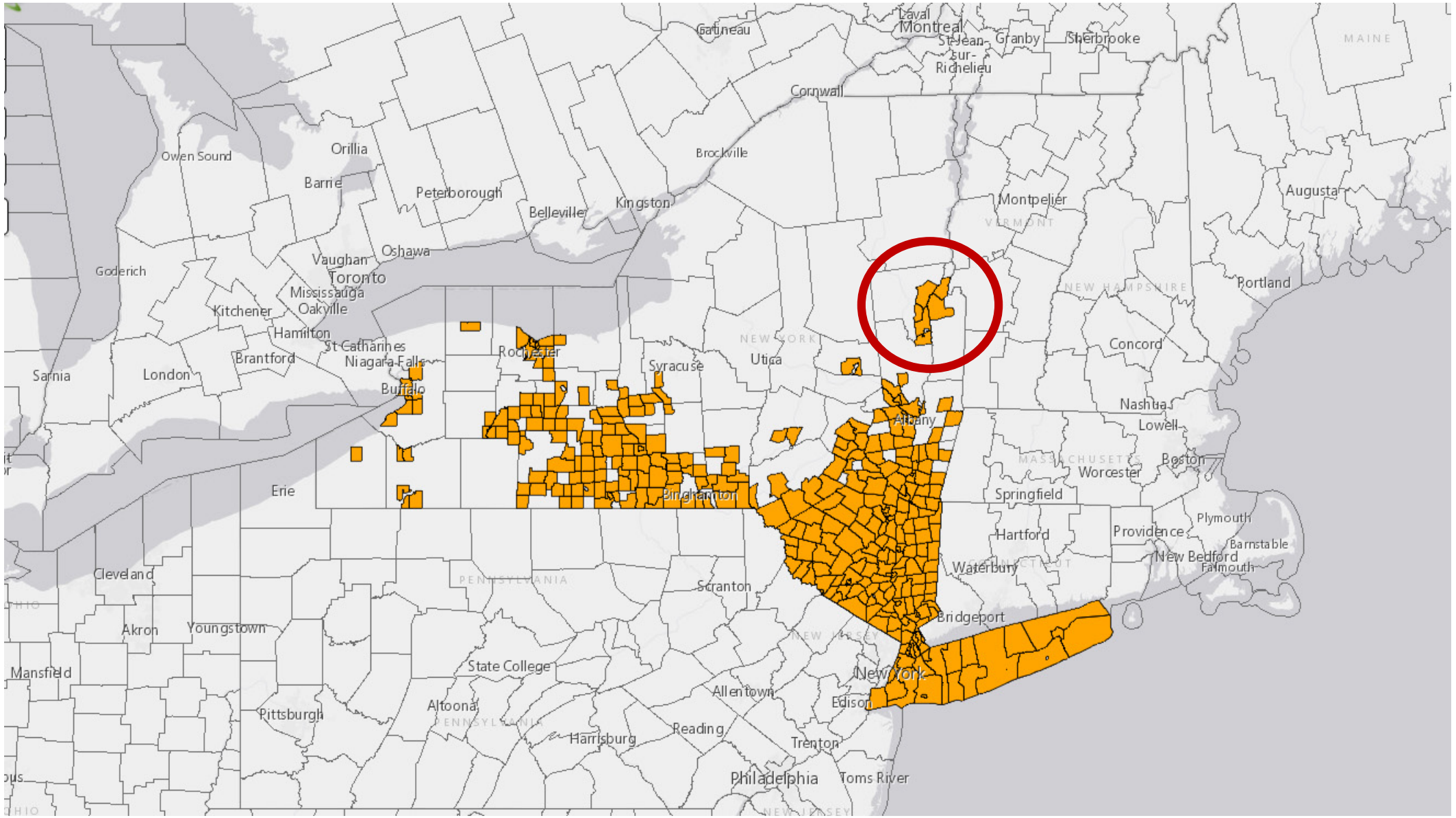
Share Tweet

Hemlocks at Shelving Rock Falls, not far from the site where HWA was discovered several days ago.

By Anthony F. Hall

Lake George HWA




Gatineau
Laval
Montreal
St-Jean-sur-Richelieu
Granby
Sherbrooke
Cornwall
Brockville
Owen Sound
Orillia
Barrie
Peterborough
Belleville
Kingston
Montpelier
Augusta
Goderich
Vaughan
Oshawa
Toronto
Mississauga
Oakville
Kitchener
Hamilton
St Catharines
Niagara Falls
Brantford
Sarnia
London
Buffalo
Rochester
Syracuse
Utica
Albany
Portland
Concord
Nashua
Lowell
Worcester
Boston
Springfield
Hartford
Providence
Plymouth
Barnstable
New Bedford
Falmouth
Waterbury
Bridgeport
New York
Edison
Allentown
Scranton
Reading
Trenton
Philadelphia
Toms River
Harrisburg
Altoona
State College
Pittsburgh
Erie
Cleveland
Akron
Youngstown
Mansfield
Binghamton

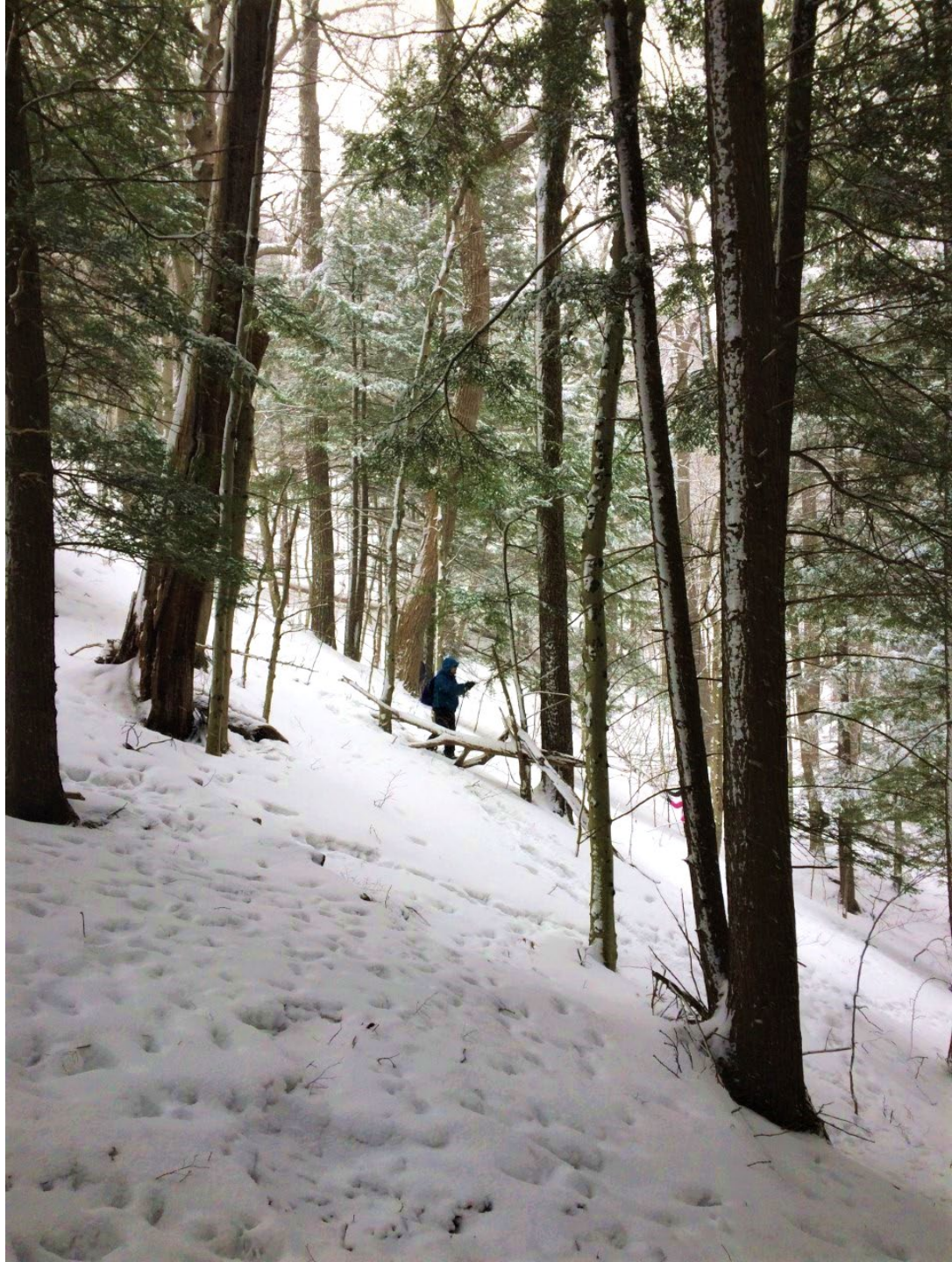
Spring 2021: Eastern Finger Lakes

Landowners

Find your **hemlock trees**

Survey for HWA on your property

Treat infestations



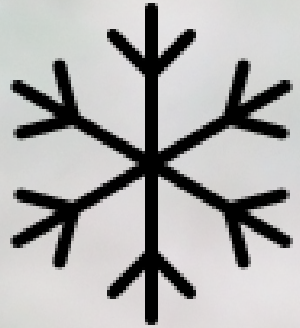
Community Members

Go to areas with **hemlock trees**

Survey for HWA

Report HWA infestations

Final Thoughts



Cannot rely on winter temperatures

HWA surveys and treatments are critical

Biocontrol will move us forward

Thank You!

Visit us online:

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@nyshemlockinitiative

Email Us: nyshemlockinitiative@cornell.edu