

A Discussion on Hemlock Woolly Adelgid



Conserving an Eastern Hemlock Legacy on Your Woodlot

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Hemlock mortality already in southwest- “Grey ghosts”



Eastern Hemlock

A foundation tree species



Photo M. Lancaster



Sissiboo River-dead hemlock in 2020

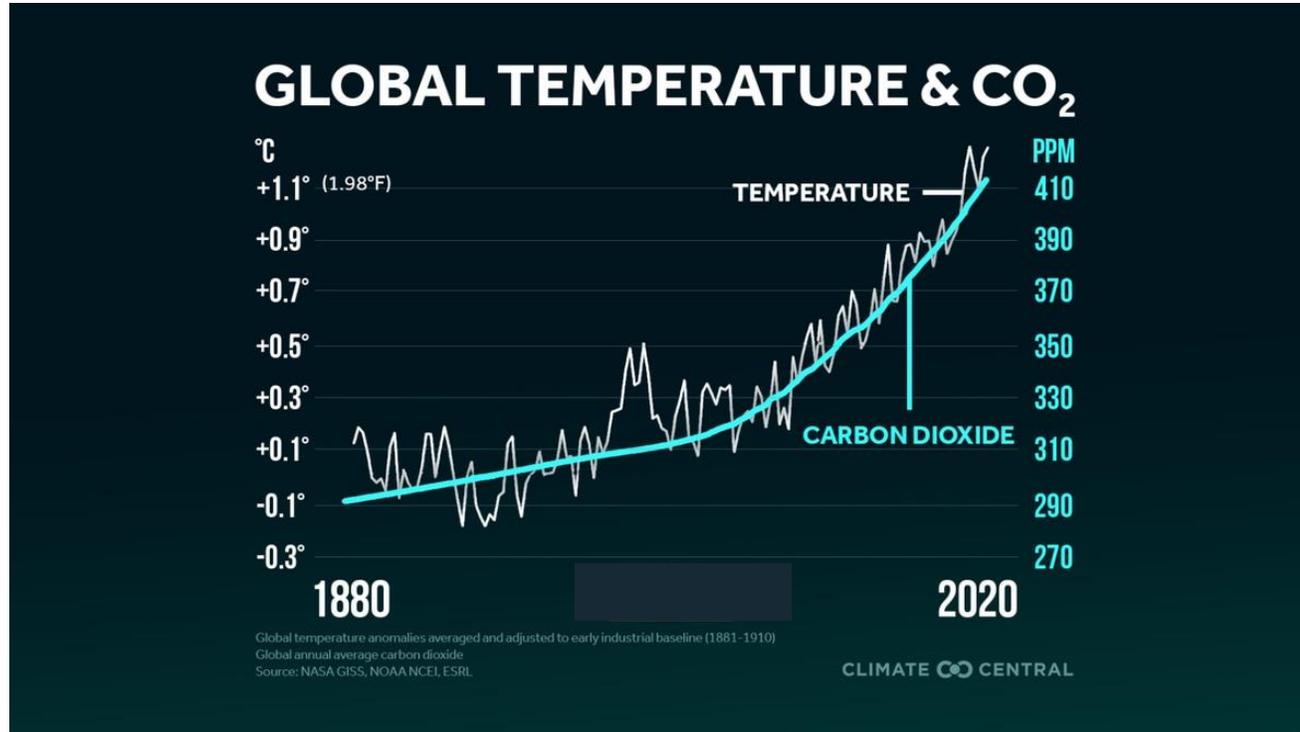
Provides a unique set of ecological conditions not provided by other eastern tree species

- Supports unique biodiversity
- Provides a wide variety of ecological goods & services



***Hemlock bird associates-nearly all in global decline**

Hemlock and the Climate Emergency



- Hemlock are superior at storing carbon!
- Hemlock have long growing season, can store large amounts of carbon above & below ground!
- Old growth forest sequesters and stores the most carbon!



Loss of hemlock forests in NS will lead to significant CO₂ emissions

Estimate 16-21 million tons of Carbon emitted

Equivalent of ~one year total provincial carbon emissions

Hemlock Woolly Adelgid (HWA)

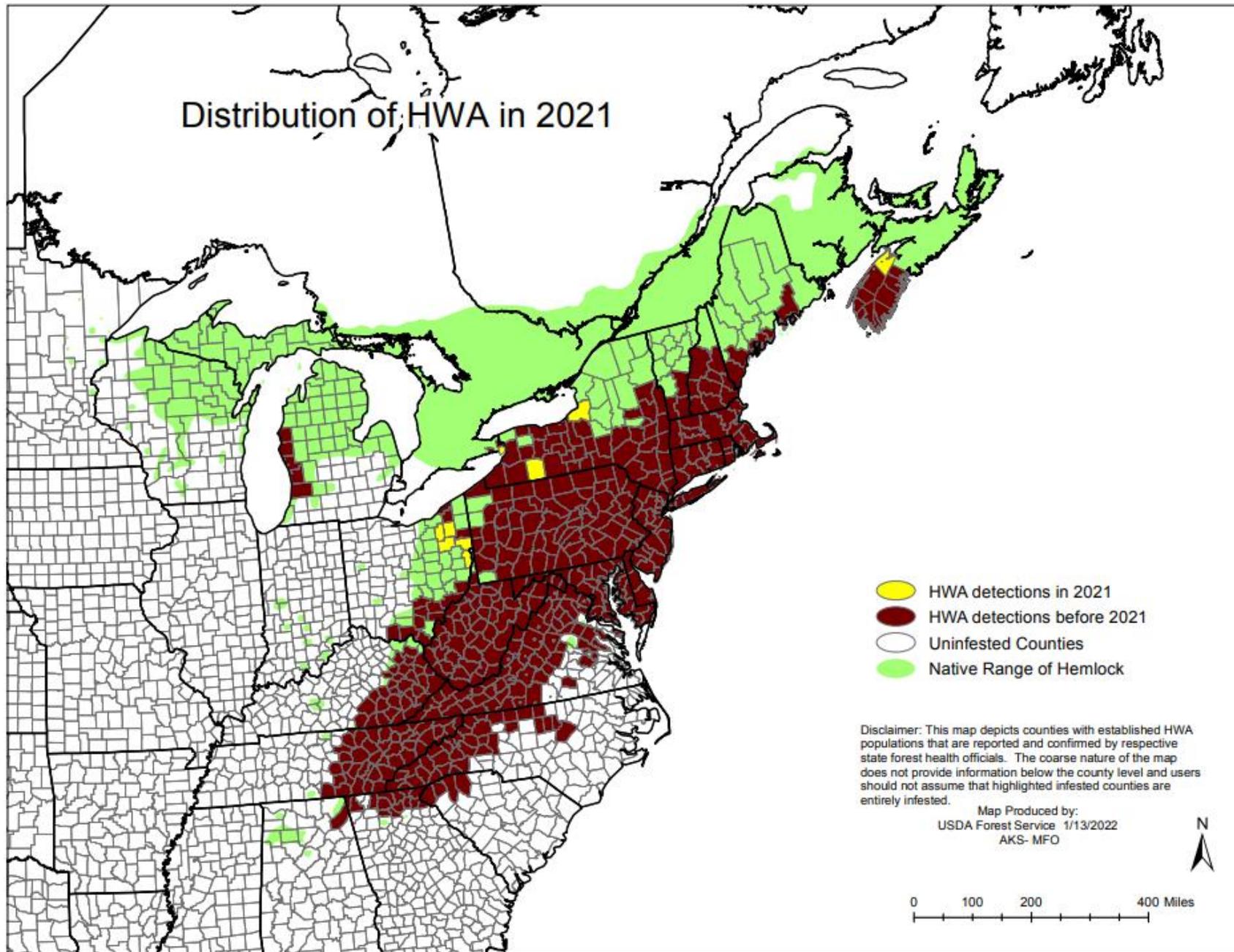
The Issue

- Invasive insect
- Aphid-like. Sucks nutrients and water at the base of needles.
- Secretes white waxy 'wool'

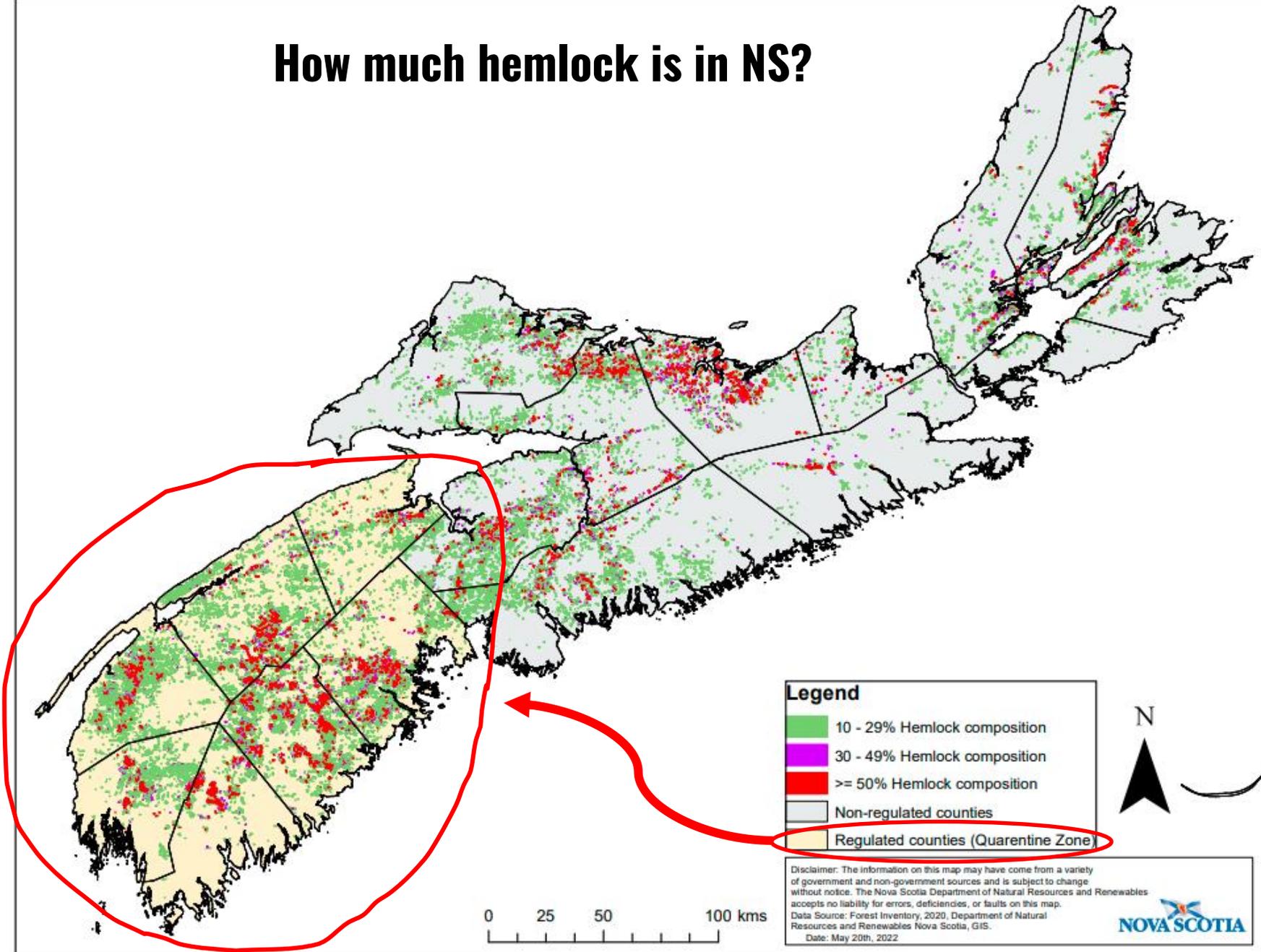
- Rapid rate of mortality: May kill hemlock in 3-10 years
- No natural predators in Eastern North America that limit populations
- Rapid population growth: one female can produce ~5,000 offspring annually
- Winter mortality occurs at -25 C or colder.



Distribution of HWA in 2021



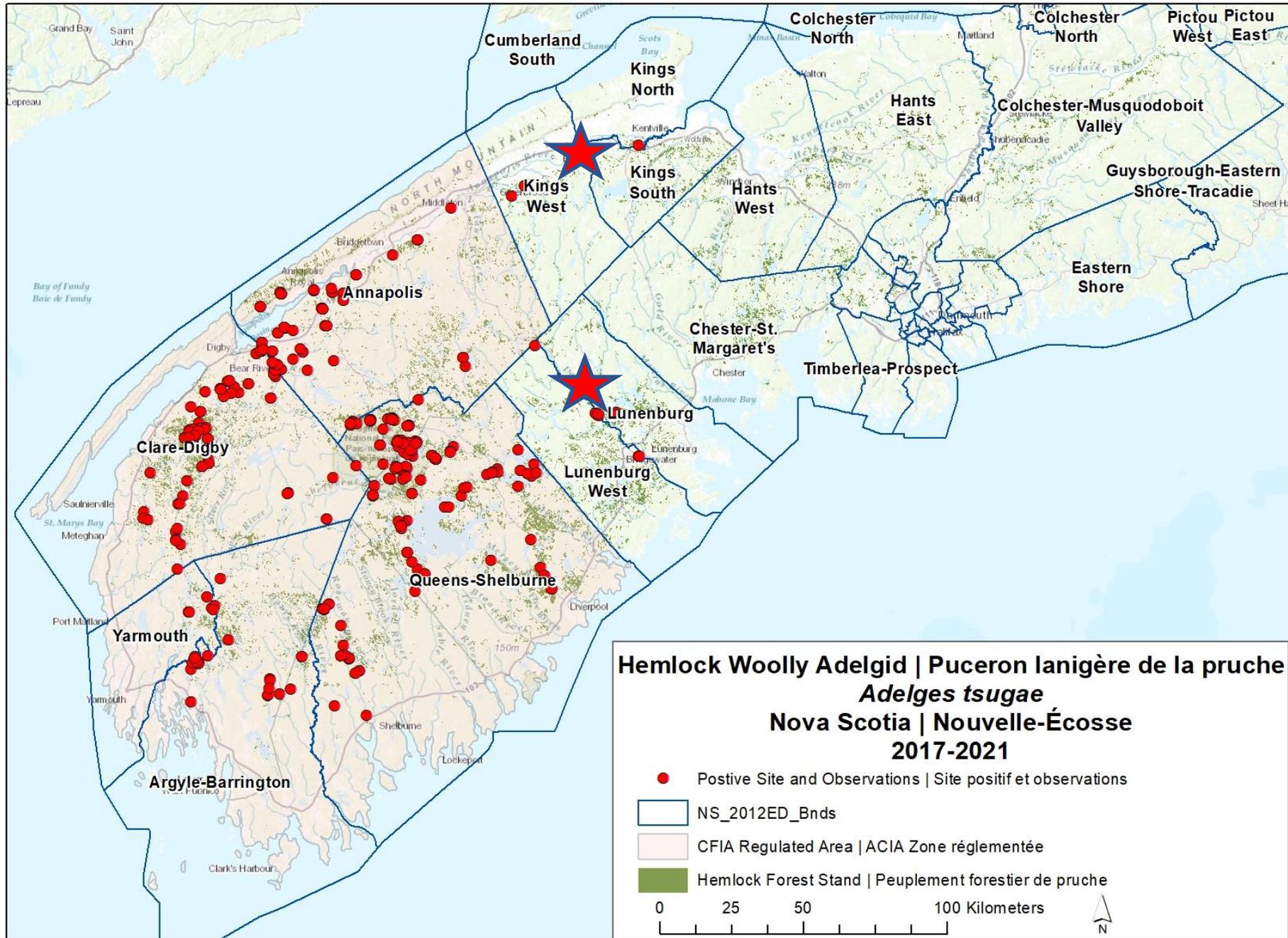
How much hemlock is in NS?



Total of 216,145 ha

~66 % Private land

Currently infested counties
contain ~53% of NS's
Hemlock Forest



HWA Detections

- Detection of HWA since 2017 has shown rapid expansion
- > 17 000 ha of hemlock-dominated forest already impacted
- High mortality in Digby, Yarmouth, and Shelburne Counties

“Slow the Spread” - HWA dispersal vectors

Crawlers and eggs easily disseminated- spring/summer

- Birds
- Wind
- *Firewood
- People, pets
- Nursery stock



A single piece of firewood can DESTROY millions of trees.

Moving firewood, even just a few kilometres away, can spread invasive insects and diseases to our forests.

DON'T MOVE FIREWOOD

Buy it locally. Burn it on site. Never bring it back home.
For more information call 1-800-442-3342 or visit www.inspection.gc.ca

Canada



STOP INVASIVE SPECIES IN YOUR TRACKS.

PlayCleanGo.ca

Clean Your Gear Before Entering And Before Leaving The Recreation Site.

- ### Biosecurity Checklist
- Use a lint roller (or tape) to remove crawlers from **Clothing, gear, pets**
 - Avoid parking under hemlock
 - Launder clothing
 - Avoid visiting multiple hemlock stands on same day

HWA Control Options

Chemical Control



Sporting Lake Ima-Jet Injections



Biological Control



Laricobius beetle

*A QUICK PAUSE TO
ACKNOWLEDGE THE QUEEZY
FEELING YOU MAY BE
EXPERIENCING...*

HWA Chemical Control



Aerial glyphosate application for vegetation management

Open applications and environmental exposure are not an option



Ecolect microinjection system, Bioforest

Targeted applications to individual trees in small doses

Education required to address misconceptions on how chemical is applied.

HWA Chemical Control

The only effective short-term control available.

Imidacloprid → a neonicotinoid chemical

How does it work?

- Binds to the neuro receptors of insects
- Applied directly to tree, moves throughout by natural action & protects from within

Stem injections with “IMA-Jet” only approved & practical method currently available



BioForest Ecolect System



Arbor Jet Quick-Jet-Air System

HWA Chemical Control

Treatment timing is key to effectiveness

- Recommended for treating light to moderate HWA Infestations
- Slow uptake (3-6 months-possibly 1 yr) in hemlocks
- Trees must be healthy enough to move product from base into canopy
- Provides 4-7 years of protection



BioForest Ecoject System



Xytect 2-F Basal Bark Application

HWA Chemical Control

- Xytect 2F – hopefully coming soon!
- Basal bark application
- Cheaper chemical, faster application
- Product application limits (1.89L/ha/yr) may require multiple entries into a stand



Cory Hughes, CFS Xytect Research Trial

HWA Chemical Control – Cost Comparison

Costs will vary depending on chemical and application system

Product	Product Cost (\$/L)	Product Cost/CM	Product Cost for <u>40 cm tree</u>
IMA-Jet	\$ 250.00	\$ 0.40	\$ 16.00
Xytect 2F	\$ 66.00	\$ 0.08	\$ 3.20

*Note – Product Costs (\$/L) May Vary

Where have imidacloprid treatments occurred?



- Protected Areas: CFS-led Research Trials (2019-2021)
Pollard's Falls, Sissiboo, McKay Lakes, Silver Lake
- Kejimikujik National Park and National Historic Site: Treatments Hemlock and Hardwoods Trail and other sites (2021)
- Private arborist treatments: cottage - homeowners in Shelburne, Queens, Yarmouth and Digby Counties
- Sporting Lake (fall 2021) - Volunteer-led initiative- completed full stand treatment (15 ha)

Protecting Your hemlocks

“If you notice your trees getting lighter you need to move fast”
(Whitmore Pers Comm.)

A healthy live crown is essential to pull the chemical to the canopy

1. Monitor HWA poplns- look for egg sacs on underside of branchlets
- check fallen branches/trees

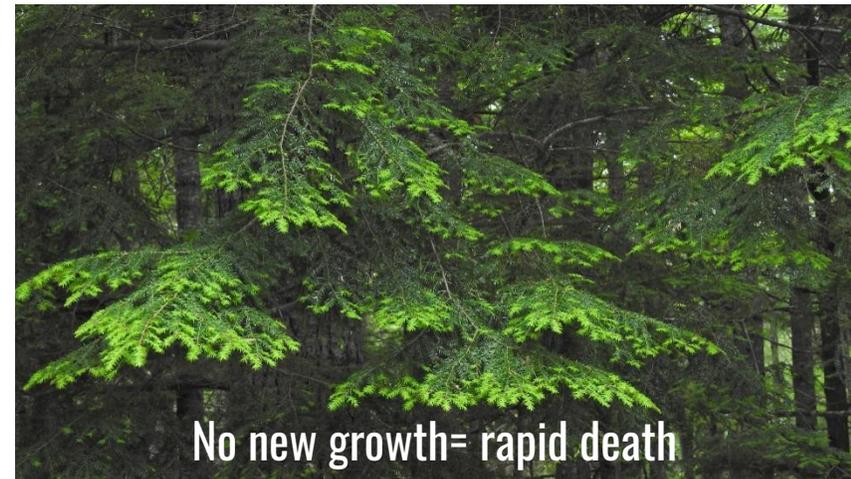
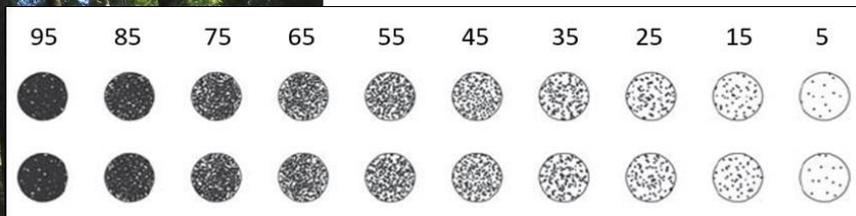
“Trees with heavy HWA need to be treated ASAP” (Whitmore Pers Comm).

2. Canopy density > 65 % - treatment may not work below this level
3. New growth in spring? lime green flush

*Consider treating old growth in advance of nearby infestations. Don't wait for decline.



Crown density score card



No new growth= rapid death

HWA Chemical Control - Safety

- Subjected to stringent PMRA approval process
- Registered for use by Health Canada
- Provincial Pre-Assessment Risk Analysis

“Imidacloprid is a safe pesticide when used appropriately”
(McCarty et al. 2020).

You may already use Imidacloprid on cats and dogs.

Imidacloprid is commonly used for flea, tick, and lice treatments due to its low toxicity to mammals.



- Advantage 55™ 9.1 % imidacloprid, applied 1X/mo
- K9 Advantix II™ 8.8 % imidacloprid, applied 1X/mo
- IMA-jet: 5 % imidacloprid, applied every 5 yrs



Stem injection, Bioforest



What about the birds?

Songbird insectivores in the canopies of hemlocks have not incurred any direct negative effects from imidacloprid (Falcone and DeWalt 2010; McCarty and Adesso 2019).



Bird communities decline when their foraging habitat is lost with hemlock mortality (Becker *et al.* 2008; Toenies *et al.* 2018).

Chemical treatment is important for maintaining suitable habitat for hemlock bird associates (Brown and Weinkam 2014).

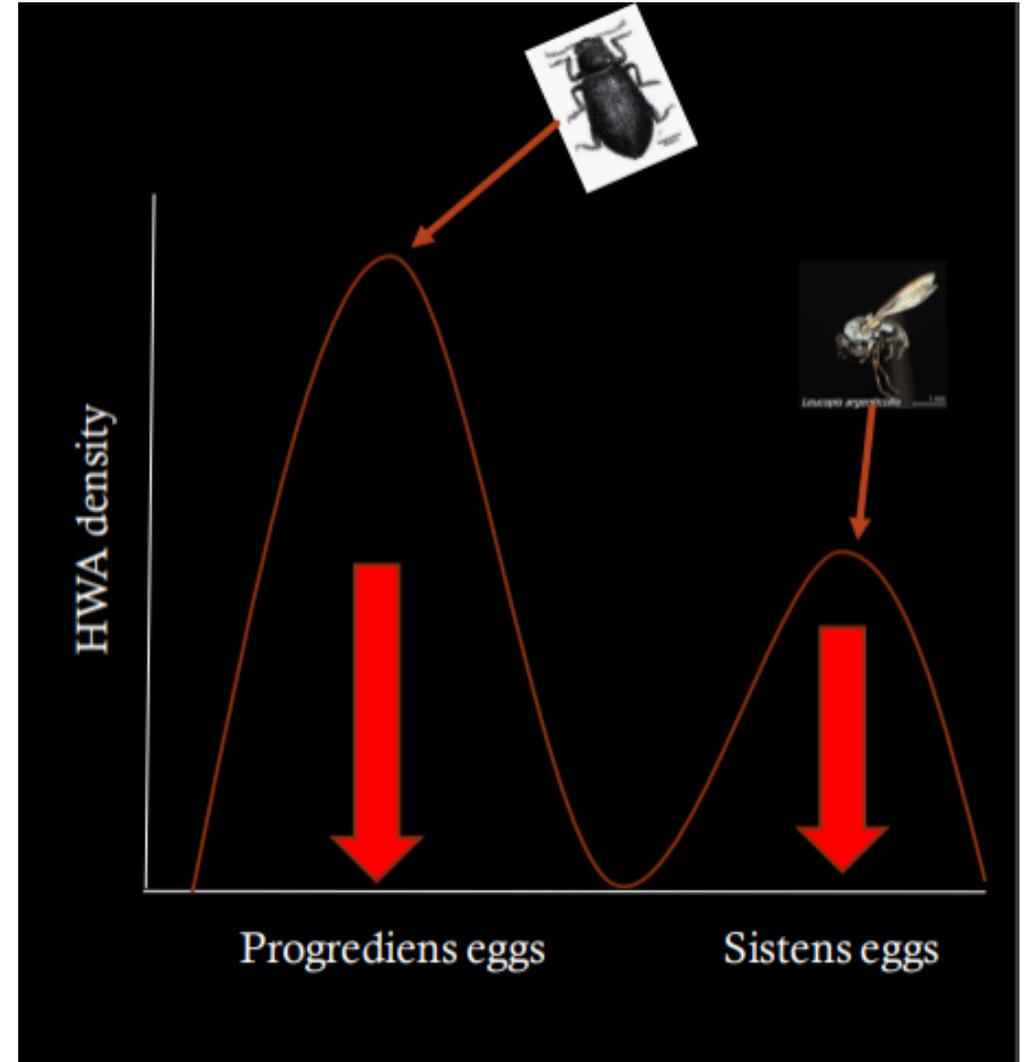
HWA - Biological control

News Just In!
Silver Fly *Leucotaraxis*
survives NY winters!!

Sounds scary! What's involved?



- Introduce predators from BC (or western USA)
- Stringent testing and oversight
- Requires a complex of predators to control both HWA generations
- Build upon USA research, speeds process



Jeff Fidgen CFS

Role of Silviculture for Forest Stewardship

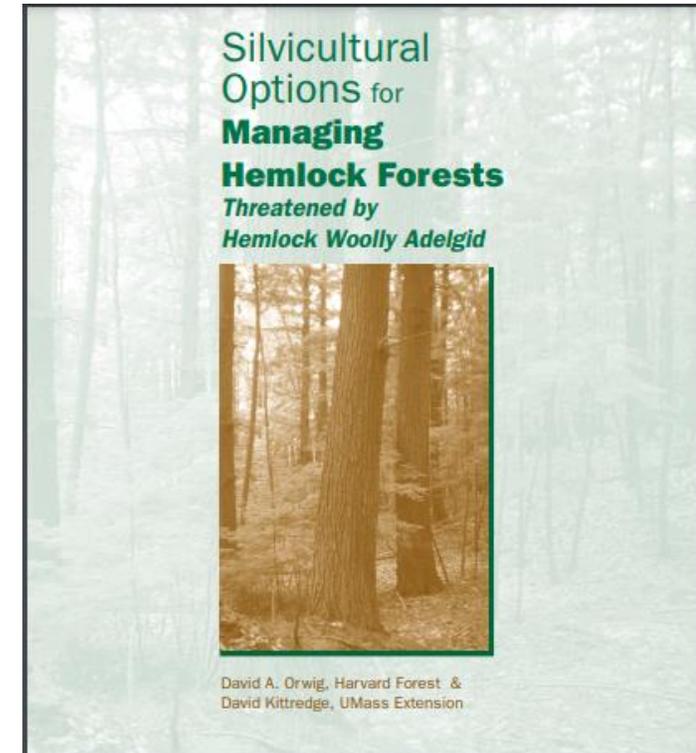
- AVOID PRE-EMPTIVE SALVAGE HARVESTING
- Thinning to promote vigor **may** help trees withstand infestation longer
- **Early** intervention strategy for **central/eastern** region
- Thinning can also help mitigate impacts by diversifying forest stands
- Need to avoid logging damage to soils, roots & residual trees



MCFC & CFS Silviculture Trial

Additional HWA Resources

- CBC Radio “Atlantic Voice” documentary on Sporting Lake (tomorrow)
- Nova Scotia Hemlock Initiative - www.nshemlock.ca
- Giants of Nova Scotia - www.giantsofnovascotia.com
- New York State Hemlock Initiative - blogs.cornell.edu/nyshemlockinitiative
- “Silvicultural Options for Managing Hemlock Forests Threatened by Hemlock Woolly Adelgid” (David Orwig & David Kittredge)
- Association for Sustainable Forestry – “Category 7 Silviculture” Program





Questions?

