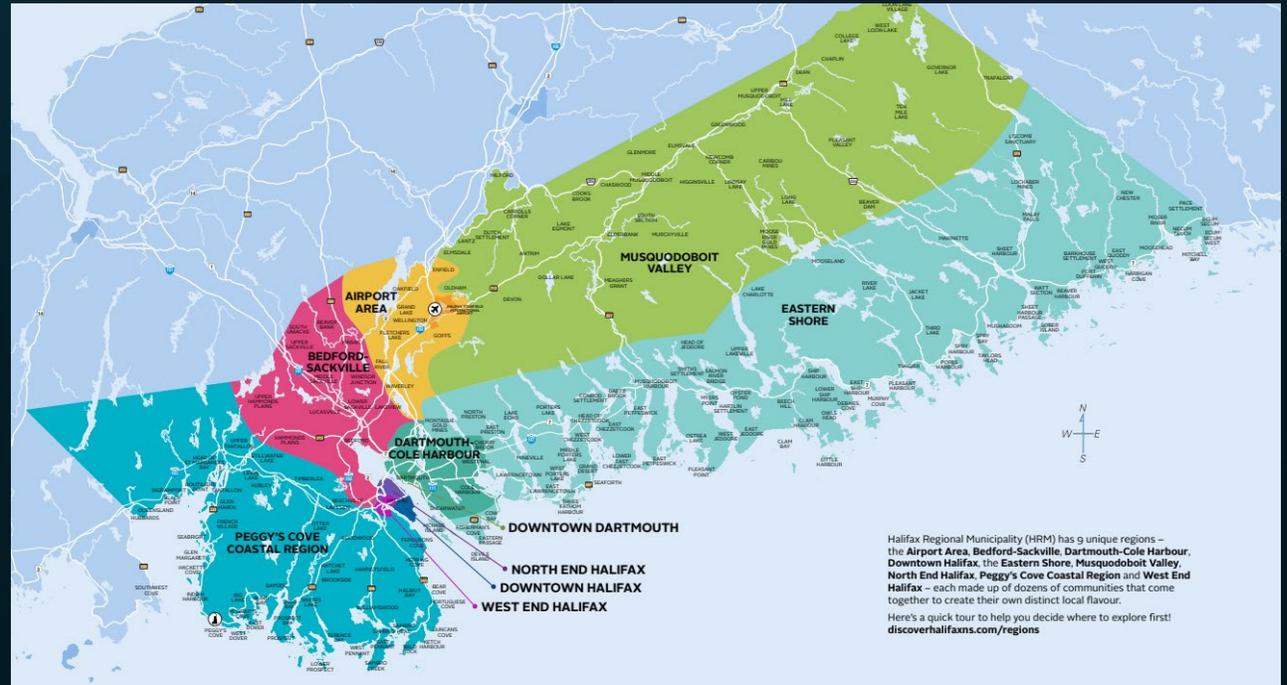


Hemlock Woolly Adelgid (HWA) in HRM

Councillor's Handbook: Planning – *Proactive- Risks - Costs- Pesticide Program (yes, pesticides...)*



Hemlock represents a large portion of remaining old growth

- Large tree
- Lives 250-500 years old
- Formerly dominant across NS (wiped out by human-caused wildfires)
- Large, interesting structures
- Craggy lower limbs





Riparian hemlock

- Commonly line streams and lake edges
- ‘Double importance’ of protecting both aquatic and terrestrial life
- Shade and cool water for trout and salmon
- Maintain water levels
- Regulates stream flow/ Intercepts storm run-off



Hemlock Woolly Adelgid (HWA)

- Invasive insect from Southern Japan
- Attacks only hemlock
- On the underside of branch tips, at base of needles
- Aphid-like, sucks nutrients in sap
- Secretes white waxy 'wool'



Hemlock Woolly Adelgid (HWA)

- Expect full stand mortality
- No natural predators to control it
(but there are insects that will eat HWA in British Columbia)
- Rapid mortality rate: Kills all hemlock within **3-10 years**
(mortality is faster along the coast)



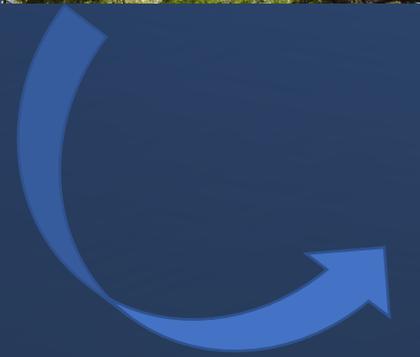
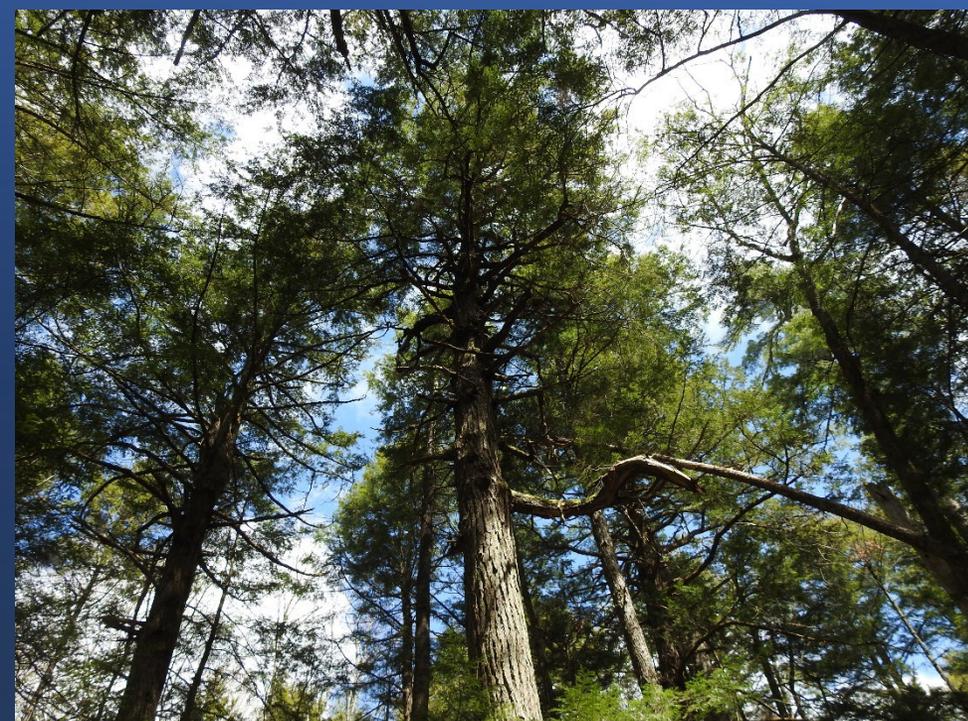
Crawlers and eggs easily disseminated- spring/summer



Terrifying Facts:

- **One adelgid can start a whole new population!**
- **One HWA can produce ~ 5, 000 progeny in one year!**

Photo: G. Martens-Carpenter, Parks Canada

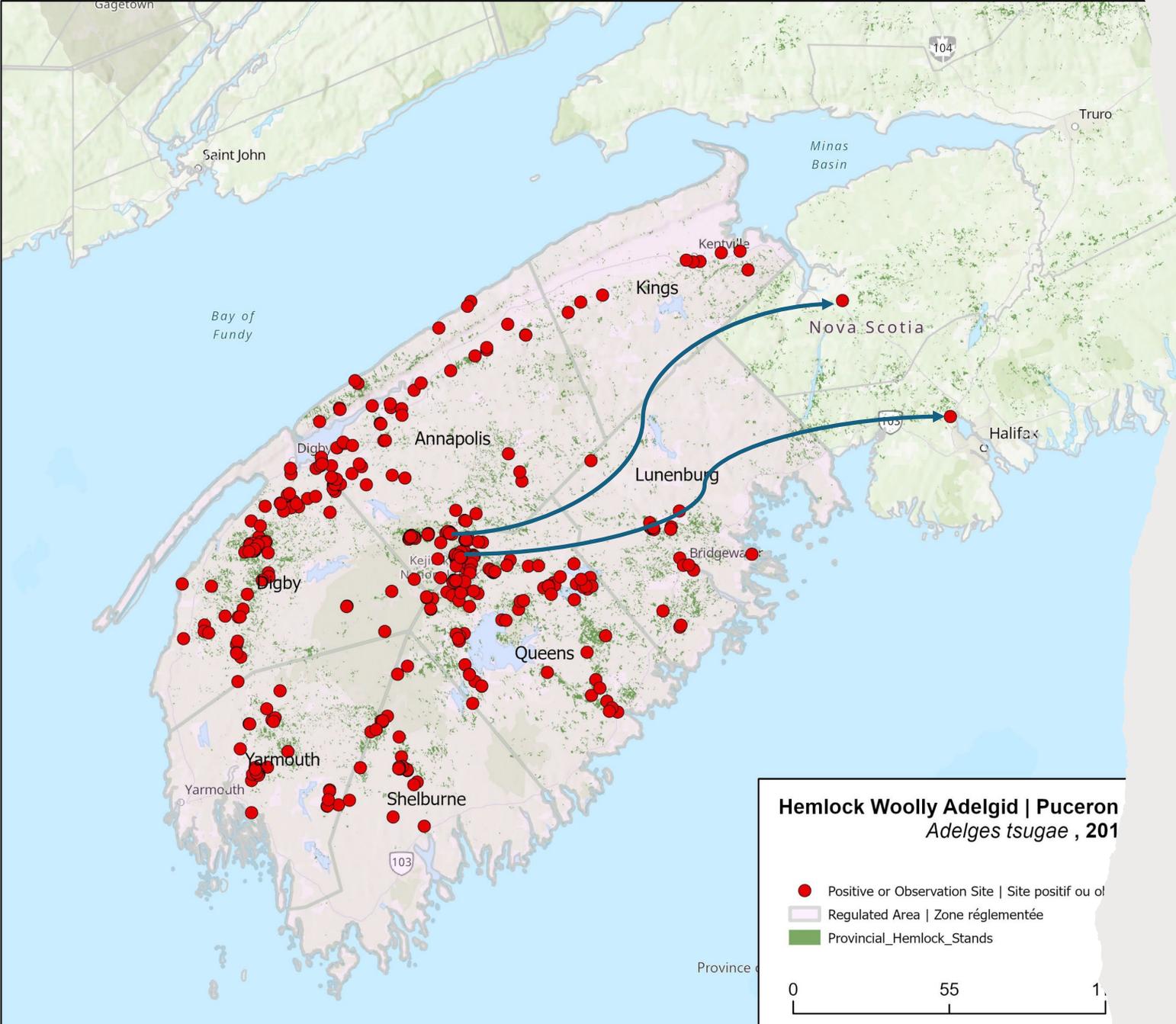


Kills hemlock in 3-10 years

***Permanent loss-**

unlike native pests like spruce budworm- balsam fir recovers

Bear River, NS



(former) HWA Project Coordinator
Kejimikujik National Park 2019-2021

“Slow the Spread”

- Spreads easily -**
- *people
 - migrating birds
 - wind
 - pets
 - deer,
 - nursery stock, etc



Sissiboo River 2022

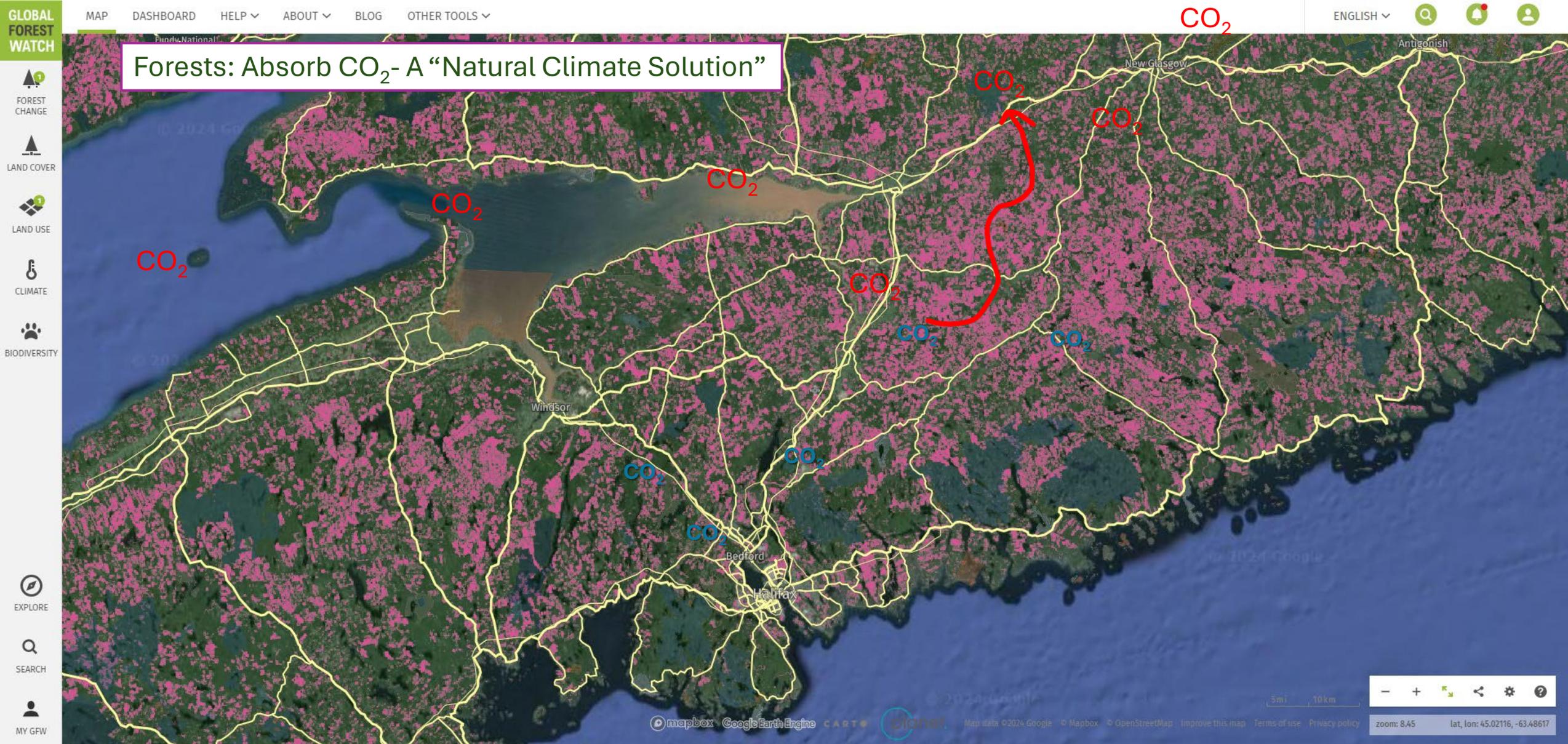
'Grey ghosts' - Old eastern hemlocks gone forever

Loss of an ecosystem- deep shaded forests

Cascading effects- Habitat loss for wildlife and many other species

Forest cover loss -yr 2001 to 2022 (pink)- mainly clearcuts

Net Carbon-emitting



Parks and-

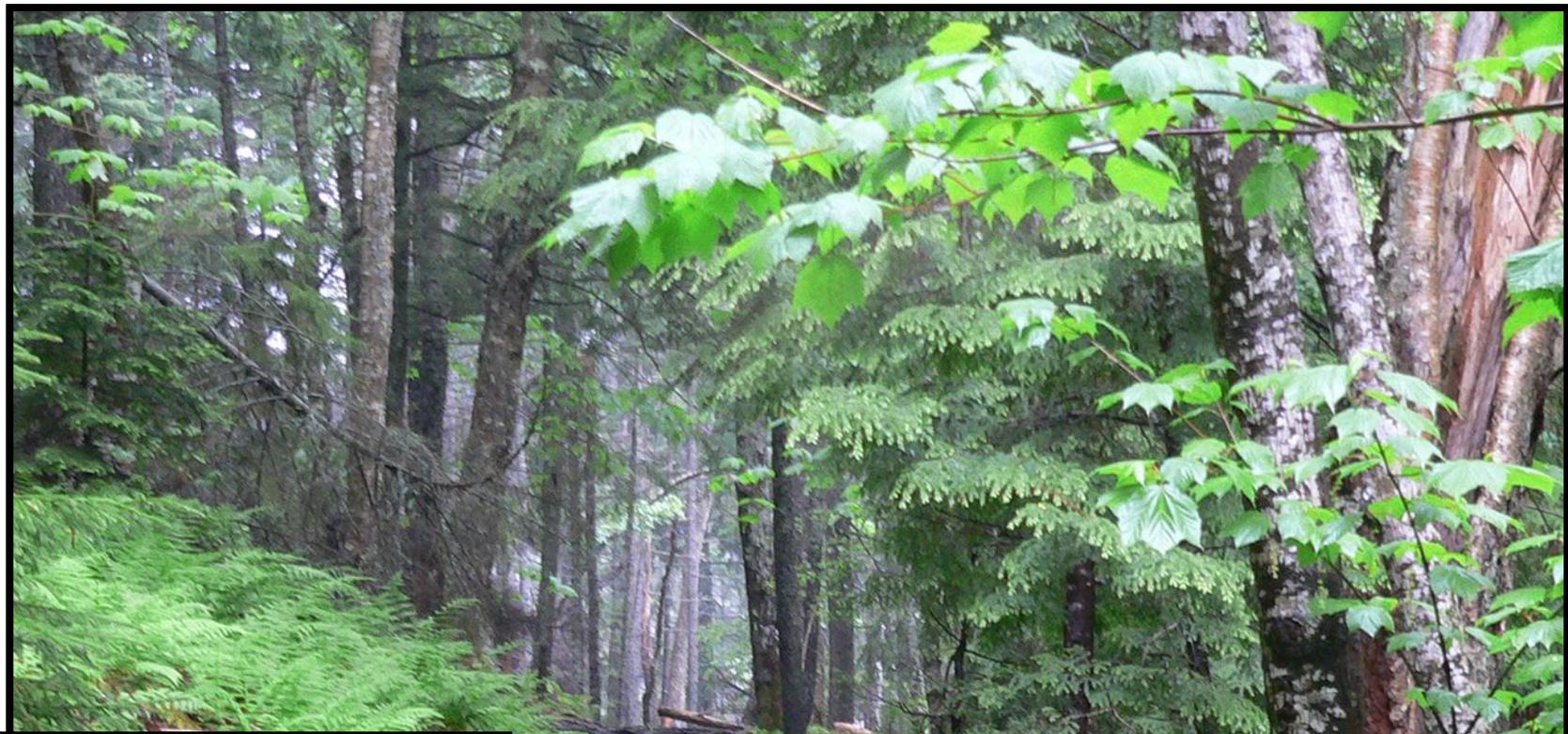
long-lived trees are assets

-Hemlock Ravine (Bedford)

-Second Lake Trail –HRM

-Shubie

-Fleming



The Province is adopting a 'Master Plan' for controlling HWA

Chemical Control



"Systemic Applications"
chemical operates inside tree

Integrated
HWA Management
Approach

Chemical Injections or bark spray

Short-term ~ 10-15 years

Biological Control: Predator insects



Laricobius beetle (First generation HWA) + Silver fly (2nd generation HWA)

Long-term solution



Donna Crossland: Pesticide Operator Sporting Lake



*Chemical Control is never
a first choice*

*But sometimes the only
choice*

“Systemic treatments”

Small amounts of chemical operate inside the
tree



Sally Steele: NS Environment and Climate Change

Chemical Control- A 're-think' for HRM? Not *all* pesticides are bad

- Pesticides are sometimes needed for CONSERVATION



Open applications and environmental exposure are not an option



Injection



Basal Bark Application



Targeted applications to individual trees in small doses

Systemic chemical control for HWA?

Chemical Control: The *only* effective means available in NS.
(Biocontrols are being researched, but won't be effective for 10 + years.)

Use a neonicotinoid chemical (imidacloprid) in small amounts.

How does it work?

- Binds to the neuro receptors of *insects*
- Applied directly to tree, carried with the sap to the canopy
- 'protects from within'
- Effective 4 to 7 years inside the tree
- Not toxic to mammals or birds. Does not bioaccumulate.



EcoJet Injection



Quik-Jet Air Injection

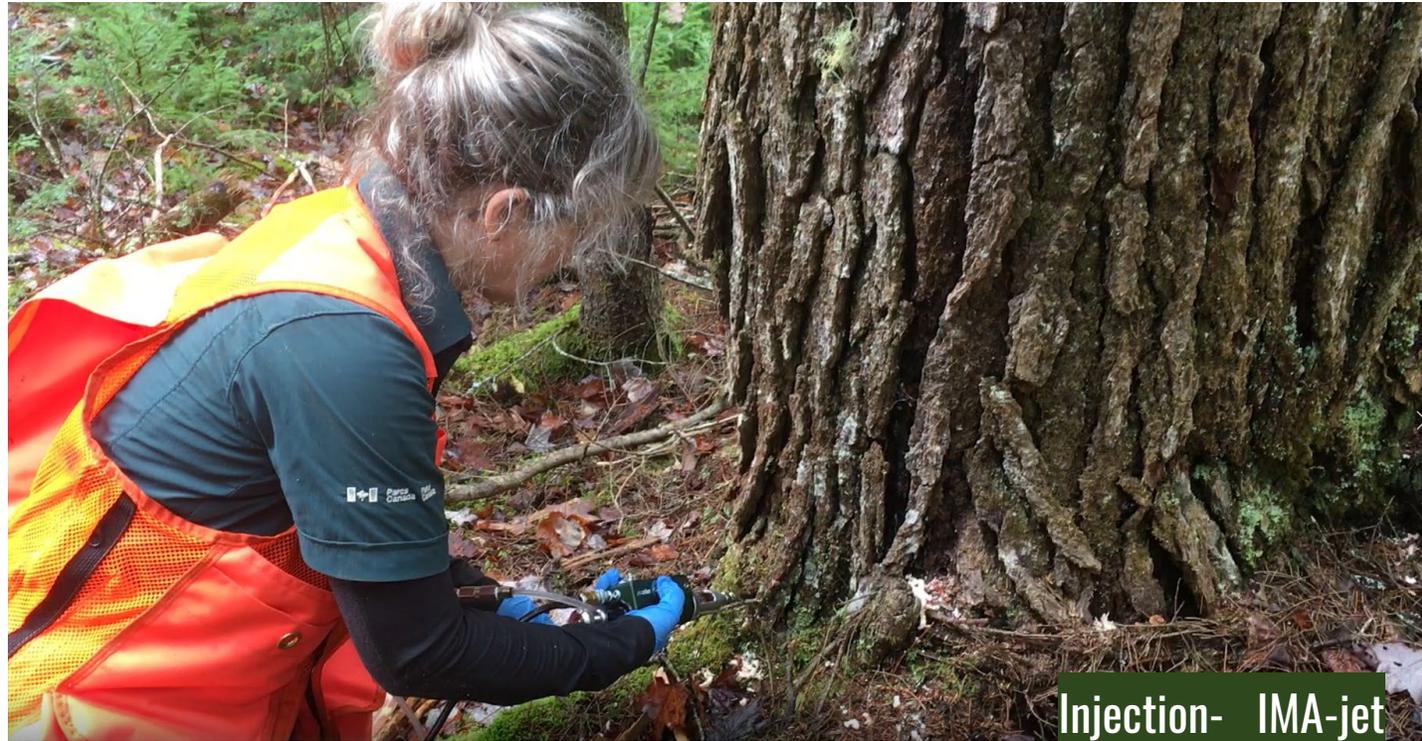


Basal Bark Spray

Must Act Early-
cheapest and most effective

➤ Imidacloprid* - IMA-jet, Xytect 2F
➤ **Azadiractin**
➤ **Dinotefuran**

Fast-acting, but expensive and short duration



- **Imidacloprid research:** completed in NS and USA on 'nontarget' effects to birds, salamanders, pollinators, soil invertebrates, fungi
- Used for many years in USA
- Applied by *certified* pesticide operators

You will probably receive questions from the public...

You will need a plan for HRM hemlocks

Urban Forest Master Plan

1. Request the plan to address invasive forest species

Conserve several tree species	Invasive Pest	Action Plan- includes...
Eastern hemlock	HWA	Communications, Control strategy: Chemical and Biological Controls
American beech	Beech leaf-mining weevil	? Wildlife importance
Ash species (3 native species, plus horticultural trees)	Emerald Ash borer	? (<i>Requires emamectin benzoate</i>) Cultural importance



What's the plan for HRM hemlocks?

2. Decide on a general management strategy now.

3. Obtain guidance from other sources.

- Existing plans and reports
- HWA Working Group- Maritimes – **Join up**
- Consult operators who already treat HWA
(This is an emergency- no time to reinvent the wheel)



Medway Community Forest Strike Team

Potential Options for a Comprehensive Chemical Treatment Program to Conserve Eastern Hemlock in Nova Scotia from Hemlock Woolly Adelgid and lessons learned from other jurisdictions



Report Prepared by Medway Community Forest Cooperative Ltd.
Authors: Donna Crossland, Matt Miller, Mary Jane Rodger and Jennika Hunsinger



Hemlock Woolly Adelgid Management Plan for Canada
Caroline Emilson, Erin Bullas-Appleton, Donnie McPhee, Kathleen Ryan, Michael Stastny, Mark Whitmore, Chris J.K. MacQuarrie



Natural Resources Canada
Canadian Forest Service
Information Report GLC-X-21



4. **Allocate funding** for invasive species control. Chemicals cost \$\$

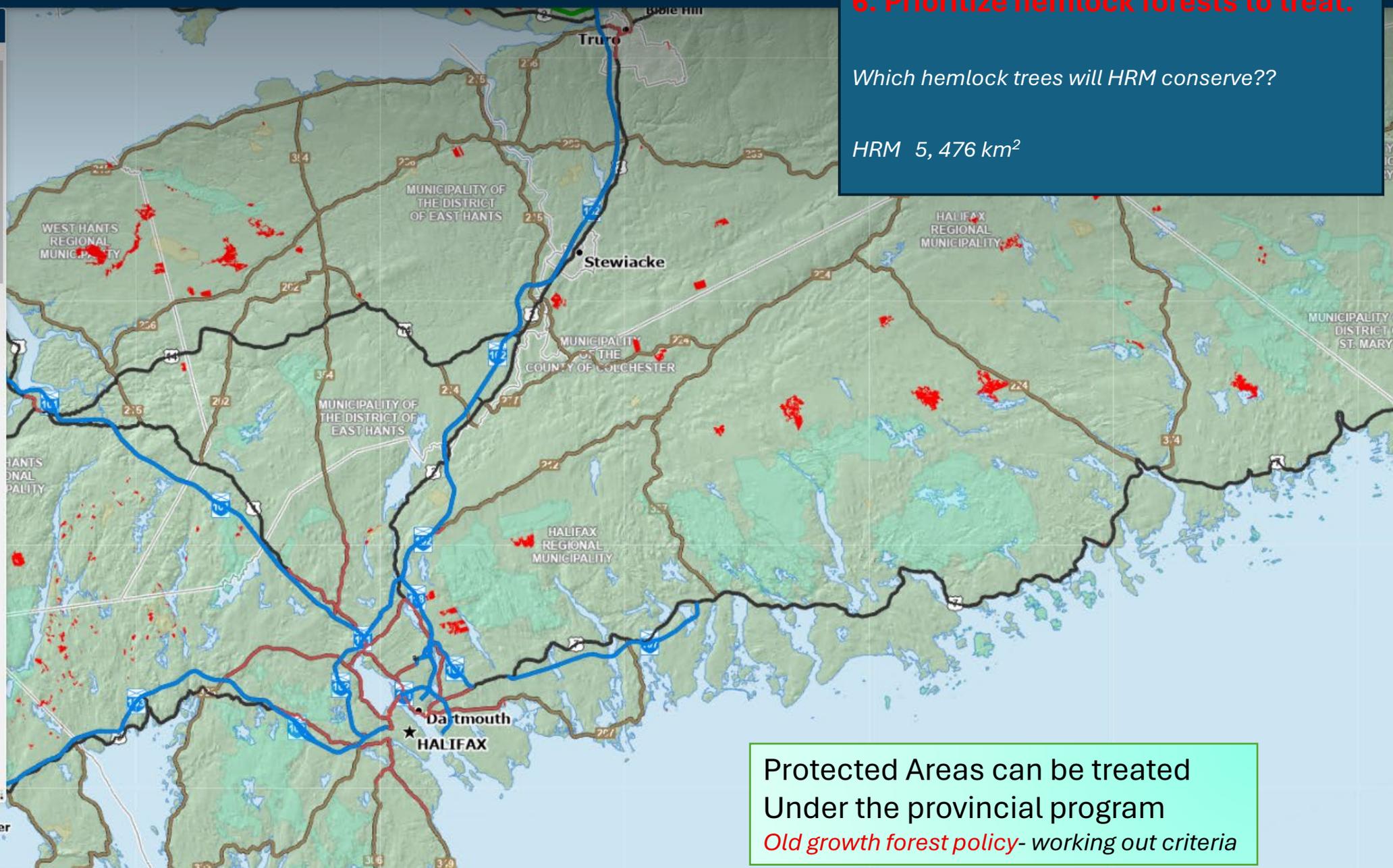
-Set up a donor platform for hemlock treatments?

5. **Communications Planning**

- Q & As (CFIA, DNRR, NSISC)

Layer List

- Additional Layers
- Nova Scotia Roads
- Property
- NSPRD.Property
- Forestry
- Forestry
 - Old Growth Forest Policy
 - Forest Treatment Overview
 - Forest Treatment Details
 - Forest Stand Details
- Leading Forest Species
 - Exotic Species
 - Jack Pine
 - Red Pine
 - White Pine
 - Balsam Fir
 - Black Spruce
 - Red Spruce
 - White Spruce
 - Red & Black Spruce
 - Eastern Hemlock
 - Eastern Larch
 - Other Softwood
 - Aspen Species
 - Ash



6. Prioritize hemlock forests to treat.

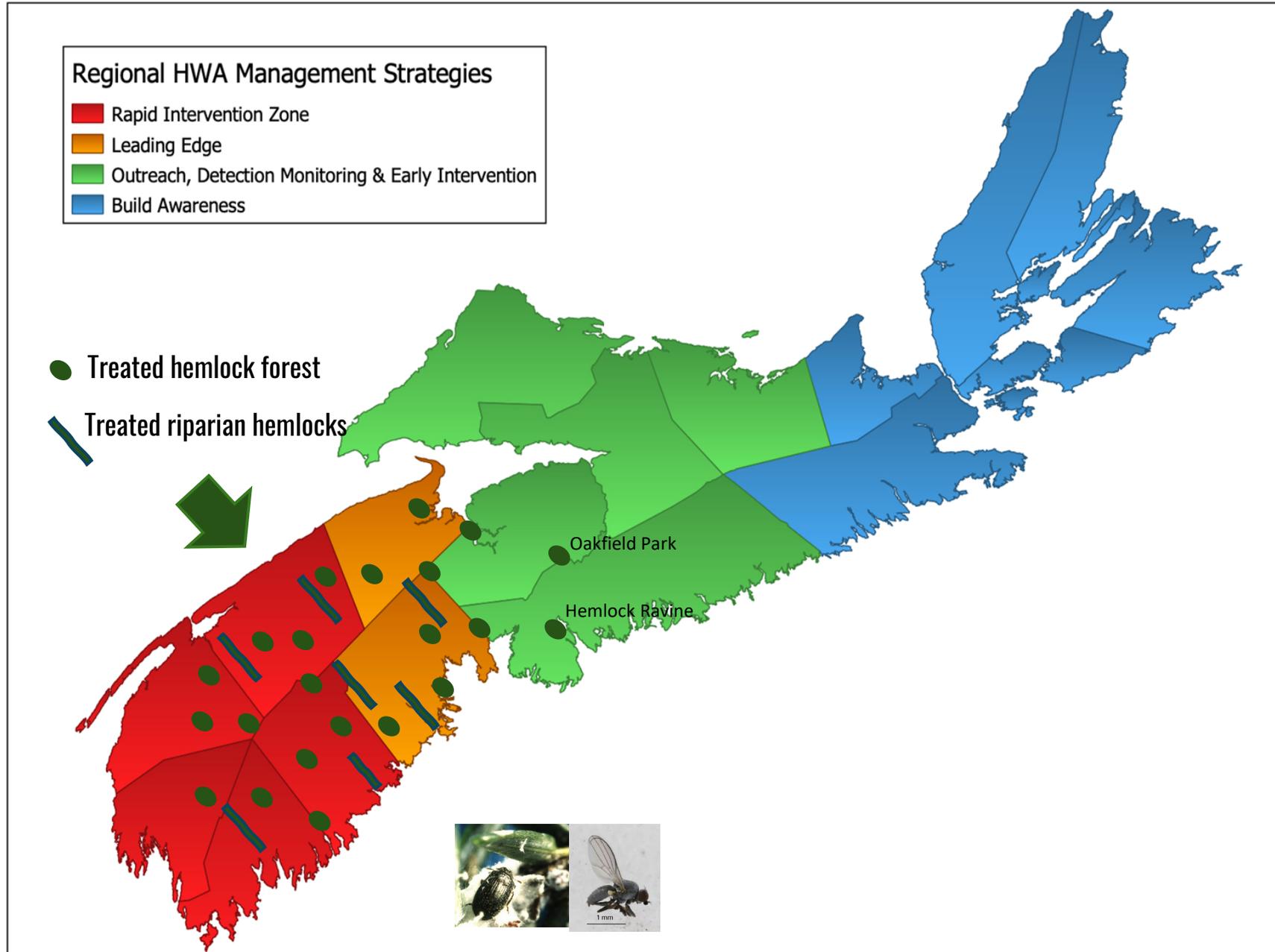
Which hemlock trees will HRM conserve??

HRM 5,476 km²

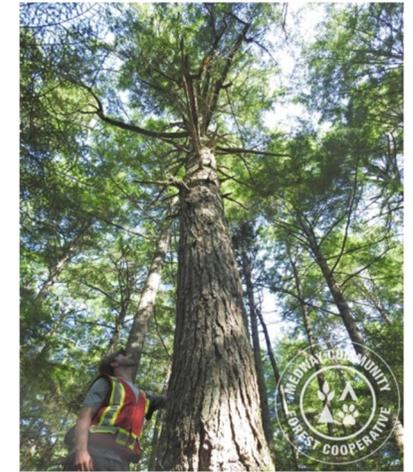
Protected Areas can be treated
 Under the provincial program
Old growth forest policy- working out criteria

Landscape-level strategy

- Conserve a **network** of high-value hemlock across NS
- Chemical treatments in short-term
- Strike Teams + volunteers
- Network allows biocontrol agents to flourish



Potential Options for a Comprehensive Chemical Treatment Program to Conserve Eastern Hemlock in Nova Scotia from Hemlock Woolly Adelgid and lessons learned from other jurisdictions



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Very little old growth

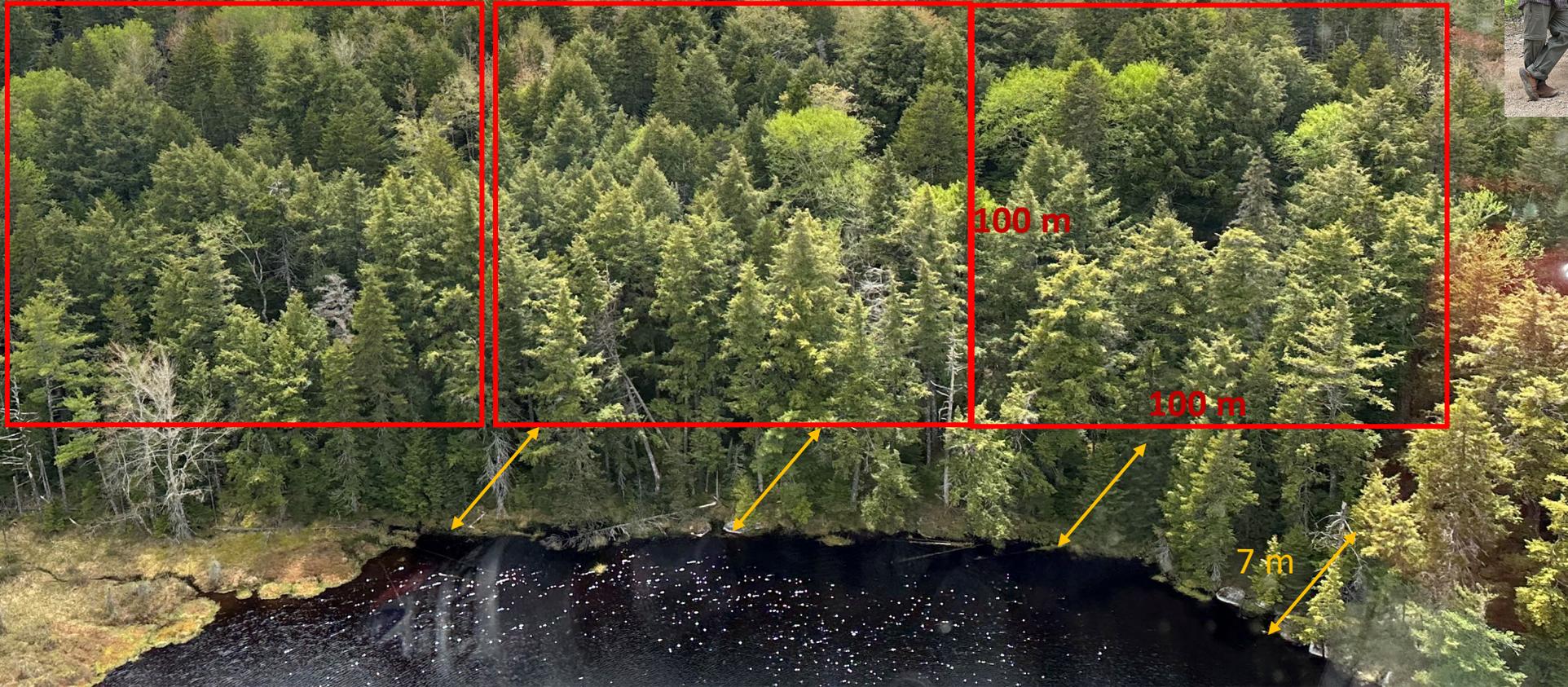
Prioritize hemlock forests to treat.

Which hemlock trees will HRM conserve??

- Riparian hemlocks
- Park hemlocks
- High-value hemlocks
- Hemlocks that supply flood control?

Field strategies: most affordable methods, fast, safe, effective

Save \$\$: 1. "In house" pesticide operator. 2. Strike team approach



Basal bark spray to 1 ha limit.
(Requires 2-4 yrs to complete.)

Inject within
7 m water course buffer

You are not alone.

7. Integrate Volunteers for site preparations and treatments

Volunteers love to 'save old growth'

- Kentville
- Wolfville
- Bridgewater

Berwick Camp- treated by volunteers under 1 paid contractor



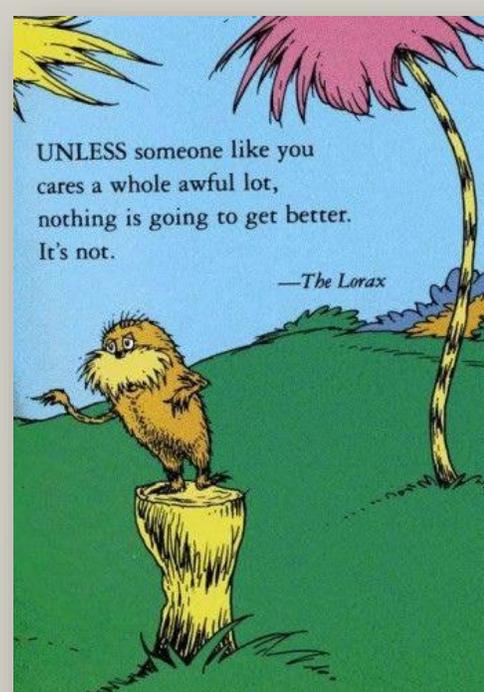
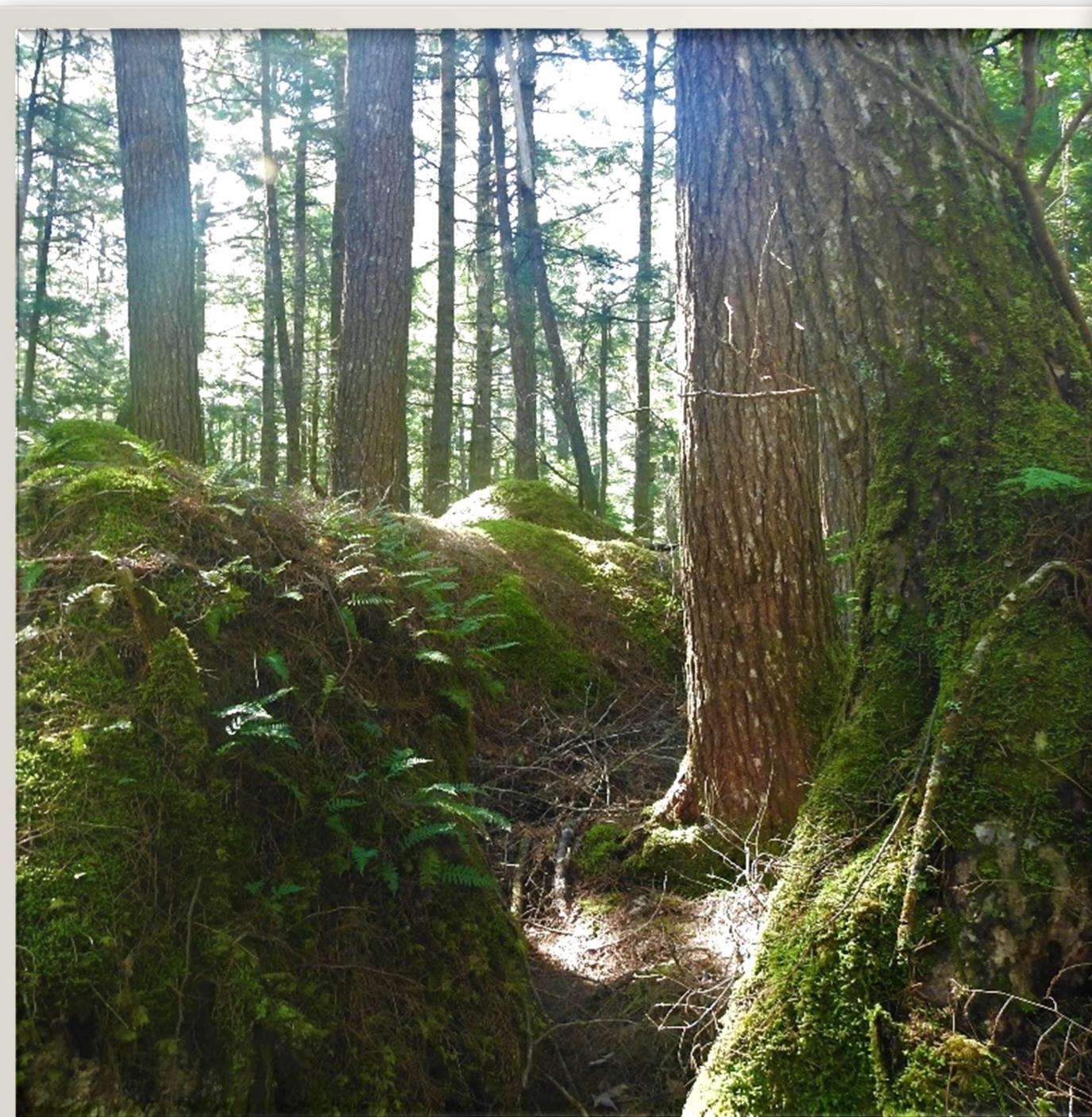
Volunteer crew at Pollard's Falls.

Berwick Camp treated in 2022 using volunteers.

Sporting Lake Nature Reserve: Volunteer- driven



More volunteers are joining in!
Canoe Kayak Nova Scotia??
Hemlock Heroes! > 100 trained volunteers



Trees will outlive us.

The next generation thanks you for conserving them.

Questions?

Email
donnacrossland1@gmail.com