

Hope for the Hemlocks in North Carolina

Thom Green
Hemlock Restoration Initiative
Asheville, NC



HEMLOCK RESTORATION INITIATIVE

Who am I?

- Oregon native
- Environmental educator
- Ecologist
- AmeriCorp Alum
- Hemlock protector
- What fuels me?
 - Spiritual connection to the forest
 - Joy of teaching others
 - Belief in the ability of science to provide management options





HEMLOCK RESTORATION INITIATIVE

A ***unique, collaborative partnership*** between multiple state agencies, counties, NGO's, and the federal government with the **mission** of ensuring that eastern & Carolina hemlocks can withstand the hemlock woolly adelgid (HWA) and survive to maturity on North Carolina's **public** and **private** lands.

The HRI Team



Sara deFosset



David Siripoonsup



Hanusia Higgins

Alexis de Seze



Margot Wallston



HEMLOCK RESTORATION INITIATIVE

Established in 2014 by NC Commissioner of Agriculture Steve Troxler

Funded by:

NC Dept. of Agriculture & Consumer Services

USFS – FHP through NC Forest Service

County governments and private donations

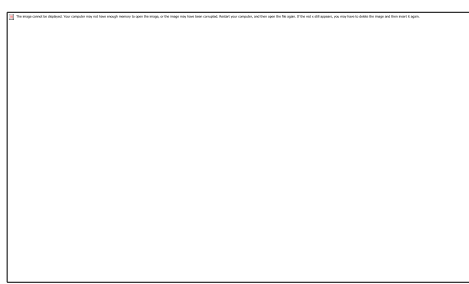
Managed by local non-profit, WNC Communities





(Since 1946)

Supports community development and agriculture initiatives across western North Carolina to improve the quality of life for rural communities and enhance the economy of the agriculture sector



Origin Story



2013:
TVA Ag &
Forestry
Fund

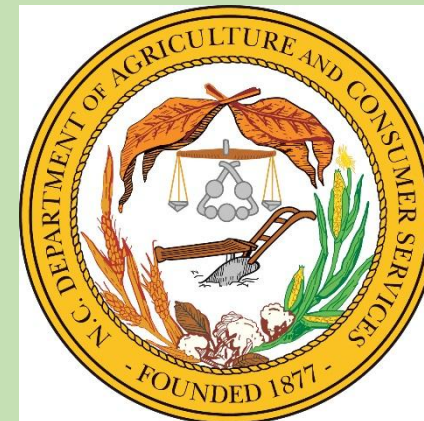
David Smith

Deputy
Commissioner of Ag

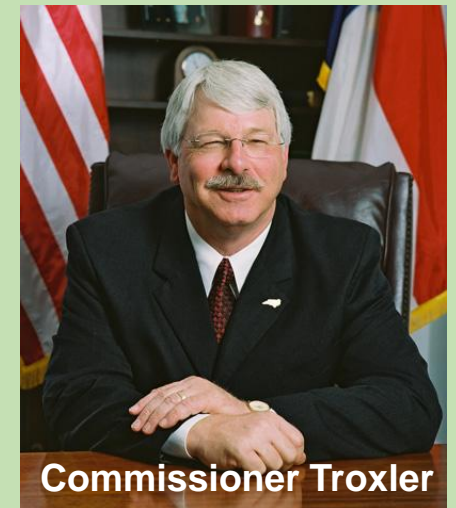


Created in 2014

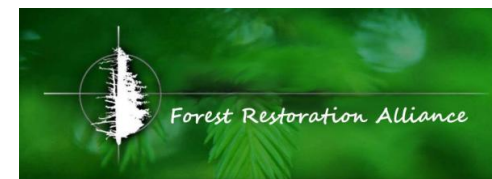
A program of WNCC Forestry Education, LLC



NC Dept of Ag & CS



Collaborative Effort



Initial HRI Award Recipients (\$145,000 in total)



- Chemical Tx of 2,588 trees along the Blue Ridge Parkway
- Educational video and rack card



- Assessment of hemlock stands and restoration planning on privately conserved lands



- Screening hemlocks for HWA resistance
- Collecting and regenerating hemlock seed for resistance/tolerance testing



- Beetles Save Needles Community Training and Release Program
- NC HWA Bio-control Forum
- Regional Release Planning



- Integrating biological and chemical control of HWA
- Community outreach

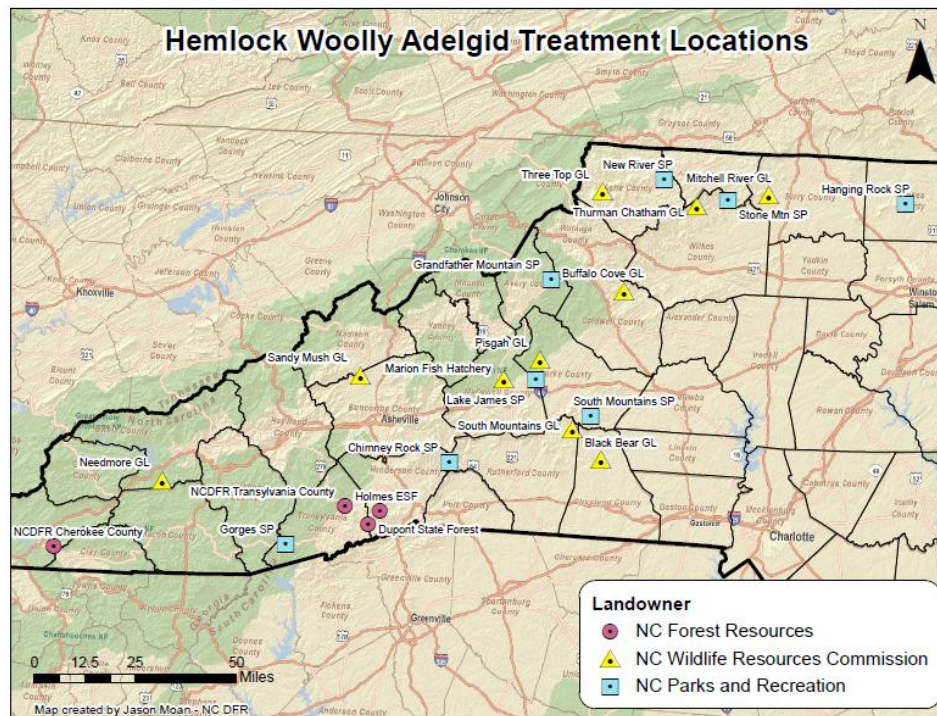
HRI Objectives

To develop and implement a strategic plan to restore hemlock health in North Carolina by:

- Identifying and establishing **hemlock conservation areas**
- Increasing the number of **trees being treated on public lands**
- Implementing **Integrated Pest Management** and long-term biological control of HWA
- **Advancing the development of other control strategies** and restoration techniques, including the search for HWA-tolerant trees and ideal growing conditions
- **Educating landowners**—how to economically treat and manage the hemlocks on their properties

In situ Conservation

- *In situ*: protection of threatened ecosystems, forests, or species within their native habitat
- Identifying and establishing Hemlock Conservation Areas on
 - NC State Parks, Forests, Game Lands
 - Privately conserved lands
- Targeting mature and old growth as well as younger regeneration
- Chemical control = immediate life support



Hemlock Conservation Areas



HRI Supports Multiple Management Strategies:

Short-term:

Chemical
Treatments



Ongoing:

Biological
Control



Long-term:

Genetic Conservation,
Breeding HWA Resistance
& Restoration Techniques



Increasing the number of trees being treated on public lands



HRI facilitates chemical treatment
on public lands in North Carolina,
including:



- State Forests
- State Parks
- WRC Game Lands



44,000 trees chemically protected between 2015 and 2018!



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Implementing IPM and biological control of HWA

Through programs like **Blue Ridge RC&D's** "*Beetles Save Needles*" and **Buncombe County's** "*Bringing Beetles to Buncombe*," HRI has helped release and monitor for *Laricobius* beetles—natural predators of HWA.



To establish an on-going, sustainable source of beetles, HRI works with partners to maintain **local insectaries** and is collaborating with the **NCDA Plant Industry Division's Beneficial Insect Lab** to rear a variety of HWA-predators.



Bringing Beetles to Buncombe

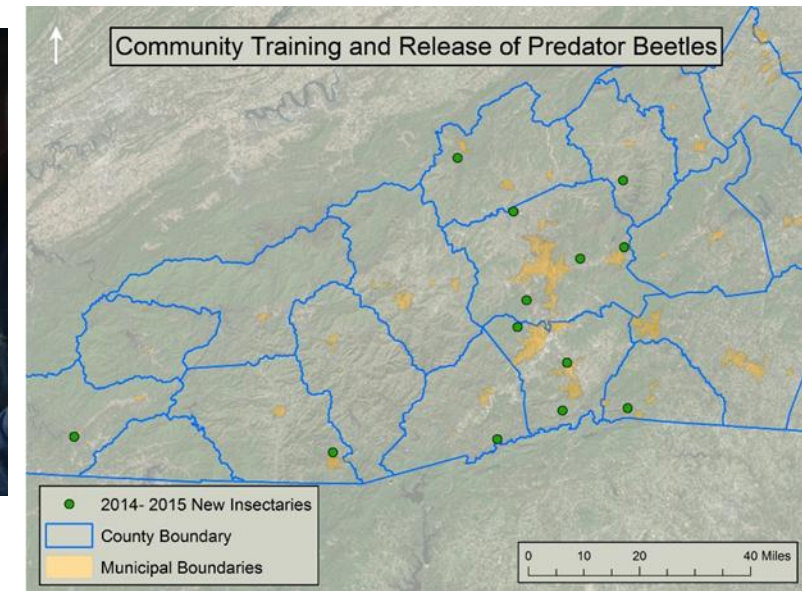
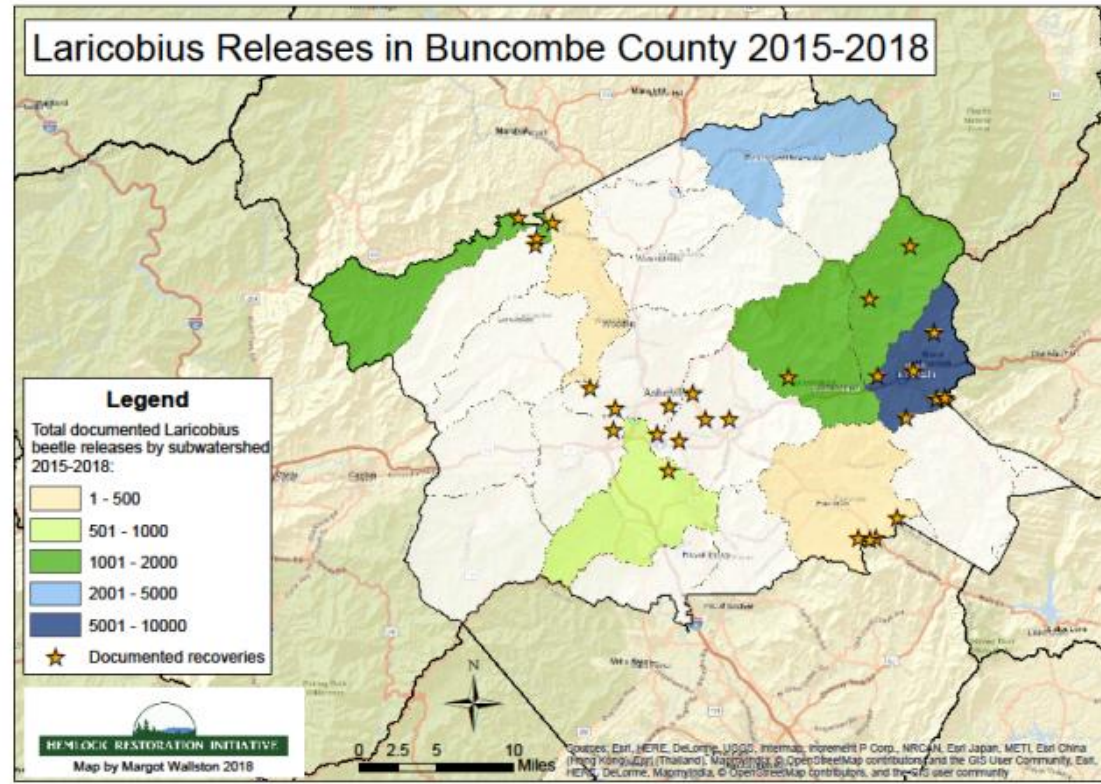
- Released over 10,000 *Laricobius* over 3 years (2015-2018) on public and/or conserved land
- Established 2 insectary sites
- Annual monitoring w/ recovery at all sites
- Partners include: County, City of Asheville, Town of Montreat, NC Wildlife Resources Commission, local colleges and land trusts



Beetles Save Needles

HRI funded Blue Ridge RC&D Council's Community Training & Predator Release Program

- 9 workshops attended by 44 local organizations
- 1.5-day forum on HWA biocontrol in NC
- 13 small-scale pilot community insectaries
- On-going monitoring of beetle populations and training for insectary partners



HWA Predator Beetle Insectaries



25-35 ft tall

Full SE exposure

100% live crown ratio

Low-hanging branches



Healthy foliage



L. nigrinus



L. osakensis



Plenty HWA (beetle food)

Regeneration under partial canopy



Lab-reared Beetles



Beetle Monitoring Guides for Land Owners and Managers



- *Laricobius* beetles are now being regularly recovered
- *Laricobius* recovered far away from release sites
- Studies underway to measure the level of predation & resulting impacts on tree health
- However...

the condition of the trees and
biocontrol guidesheet and release
too complex for small releases,



Eggs:
Larvae:
Adults:

Release:
Precipitation: Wind:

Chemical & Biological Control of HWA



Chemical Control

Fast

but

Doesn't
persist

Biological Control

Persists

but

Isn't Fast



Can these strategies be integrated in a way that capitalizes on the strengths and helps offset the weaknesses of each?

Game Plan:

- Integrate selective use of chemical treatments with the release of predators to maintain tree health until predator populations sufficiently establish
- Build up insectary populations to reduce dependence on lab-reared or field collected beetles in far away locations

HRI Supports Multiple Management Strategies:

Short-term:

Chemical
Treatments



Ongoing:

Biological
Control



Long-term:

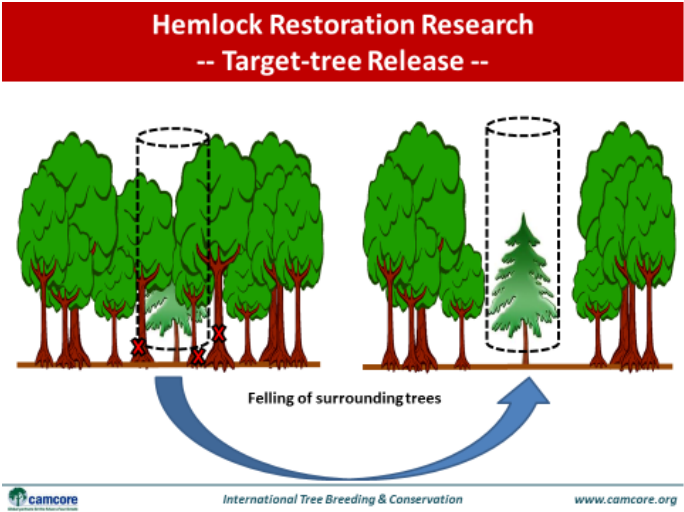
Genetic Conservation,
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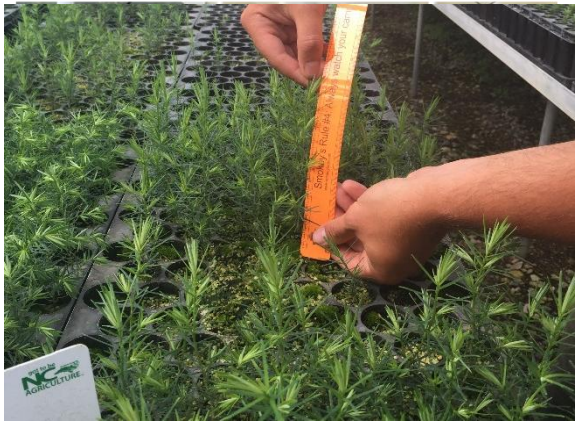
Long-term control strategies & restoration techniques



The **Forest Restoration Alliance** works to breed hemlocks that can resist HWA by testing native “survivor trees” for genetically inherited resistance and hybridizing eastern North American and Asian hemlock species.



Genetic and silvicultural approaches look for long-term solutions like breeding resistant native hemlocks and forest management practices that naturally reduce HWA or make hemlock more resistant to the presence of HWA.



The **NC Forest Service** is experimenting with propagation techniques to determine best methods for growing hemlocks for future restoration and re-planting efforts.



Silvicultural strategies, such as target-tree release being researched by the **US Forest Service Southern Research Station** and **Camcore** offer other short- and long-term HWA management options.



General Outreach and Education

- Formal Presentations
- Trainings & Workshops
- Educational Hikes
- Interpretive Signage
- Tabling Events
- Social Media/Website Content



Providing Resources for Private Landowners

What we are doing:

- 1) Fielding calls from landowners
- 2) Developing & distributing up-to-date instructional materials & educational content
- 3) Offering hands-on trainings and technical advice
- 4) Coordinating with other agencies and experts (NCSU Cooperative Extension, Blue Ridge Forever, etc.)
- 5) Pilot Cost-share Hemlock Treatment Programs

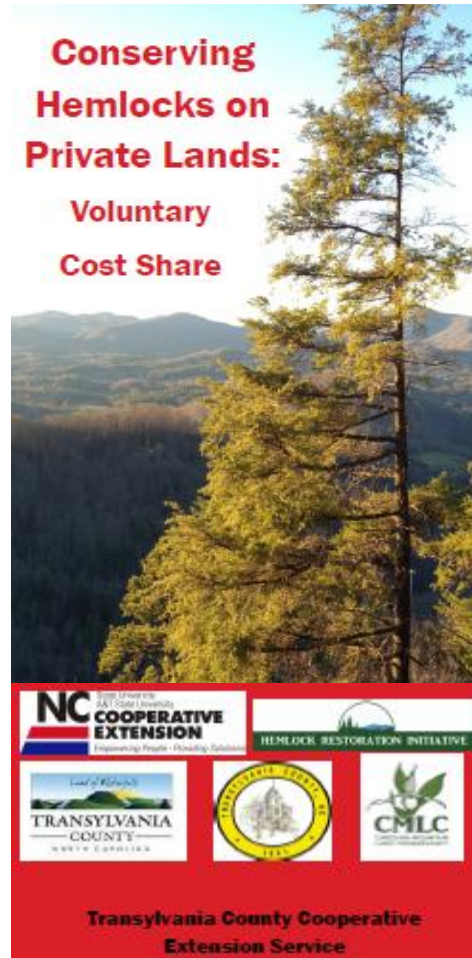


Photo and name of product	Merit 75WP	Merit 75WSP	Zenith 75WSP	Lada 2F	Advanced Tree & Shrub Protect & Feed	Advanced Tree & Shrub Protect & Feed
Producer	Bayer	Bayer	ProChem/Bayer	Nispan	Bayer	Bayer
% active ingredient	75% Imidacloprid	75% Imidacloprid	75% Imidacloprid	21.4% Imidacloprid	0.14% Imidacloprid 0.275% Clothianidin	0.14% Imidacloprid 0.275% Clothianidin
Formulation	Wettable powder	Water soluble packet	Water soluble packet	Flowable liquid	Flowable liquid	Soluble granules
Application method	Soil drench Soil injection	Soil drench Soil injection	Soil drench Soil injection	Soil drench Soil injection	Soil drench	Apply soil surface and water in
Max per acre per year	6.6 oz (0.4 lbs of active ingredient)	6.6 oz (0.4 lbs of active ingredient)	6.6 oz (0.4 lbs of active ingredient)	25.6 fl oz (0.4 lbs of active ingredient)	0.4 lbs of Clothianidin	0.4 lbs of Clothianidin
Volumes	2 oz	6.4 oz (0.4 x 1.6 oz pkts)	6.4 oz (0.4 x 1.6 oz pkts)	Quart or gallon	Quart or gallon	4 lbs or 10 lbs
Avg. cost/ container	\$38	\$110	\$34	\$40 for quart \$70 for gallon	\$20 for quart \$70 for gallon	\$25 for 4 lbs \$50 for 10 lbs
Purchase locally at	Southern Ag Southern States	Southern Ag	Southern Ag	Southern Ag	Southern States	Several local hardware stores
Cost/inch DBH	Low dose: \$0.63 High dose: \$1.27	Low dose: \$0.19 High dose: \$1.54	Low dose: \$0.19 High dose: \$0.37	Quart: \$0.12 to \$0.26 Gallon: \$0.05 to \$0.11	Quart: \$1.07 Gallon: \$1.72	4 lbs: \$2.45 10 lbs: \$2.08
Approximate inches per container	30 - 60 in.	98 - 112 in.	98 - 112 in.	Quart: 10 in. Gallon: 40 in.	4 lbs: 10 in. 10 lbs: 25 in.	
Expected duration	4 - 7+ years	4 - 7+ years	4 - 7+ years	4 - 7+ years	Label at least 12 months	Label at least 12 months
Other notes	Original name brand imidacloprid product	Name brand product	Generic for Merit 75WSP, other names include Confidor, Marbex	Generic for Merit 2F, other names include Quik-Pin, Imidaguard	Not to be confused with Bayer Complete Insect Killer which is for turf and trees	Includes fertilizer



Step 1: Do you have hemlocks?

If **YES**, go to Step 2.

If **NOT SURE**, click the link to get help identifying your tree: [Is it a hemlock?](#)

Step 2: Is your hemlock infested by hemlock woolly adelgid (HWA)?

If **YES**, go to Step 3.

If **NOT SURE**, click the following link to get help identifying HWA and other common hemlock pests: [HWA Identification Guide](#)

If **NO**, do not treat for HWA. Why?

Step 3: Assessing the severity of the situation

Click on the following link to determine whether your trees will respond to treatment: [Hemlock Health Assessment Guide](#)

Step 4: Location

The setting in which your trees are located may influence your treatment options. Please select from the following list to learn about location-specific considerations:

- **Open, landscaped or yard-like environment**
- **Forested, closed canopy**
- **Steep slopes**
- **Wet, seepy areas with saturated soils**
- **Sandy soils**
- **In immediate proximity to flowering plants**

Step 5: Hemlock woolly adelgid treatment options

Click on the following links to learn about chemical treatment options

- [General HWA Treatment Info](#)
- [Simple Soil Drench Instructions](#)
- [Chemical Product Comparison Chart](#)
- [Cost Sharing Options](#)

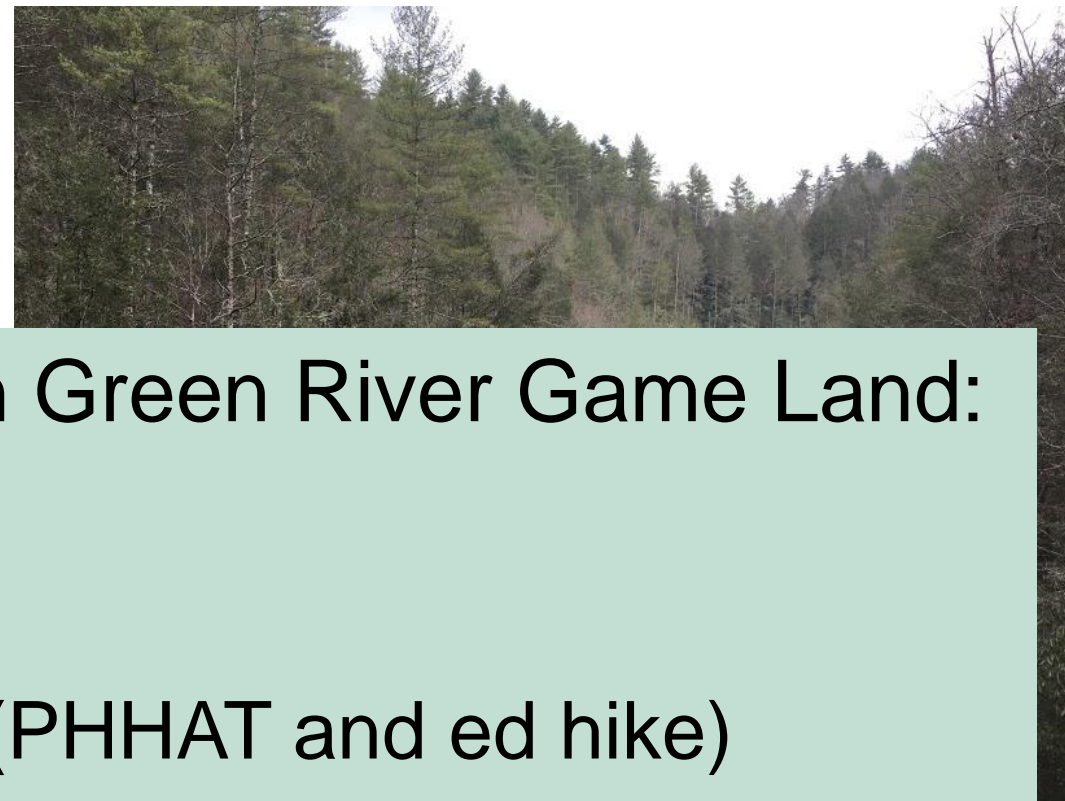
Success stories:

Chuck the Hemlock Hero



Success stories:

Green River Game Land



Partners we have worked with just in Green River Game Land:

- NCWRC (treatment and PHHAT)
- NCFS BRIDGE (treatment)
- MountainTrue (Green Riverkeeper) (PHHAT and ed hike)
- American Whitewater (PHHAT)
- Polk County Recreation (ed hike)
- Warren Wilson College (volunteer workday)
- WNC for the Planet (volunteer workday)
- Chuck



Take home message





HEMLOCK RESTORATION INITIATIVE

Thank you for your passion!

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