



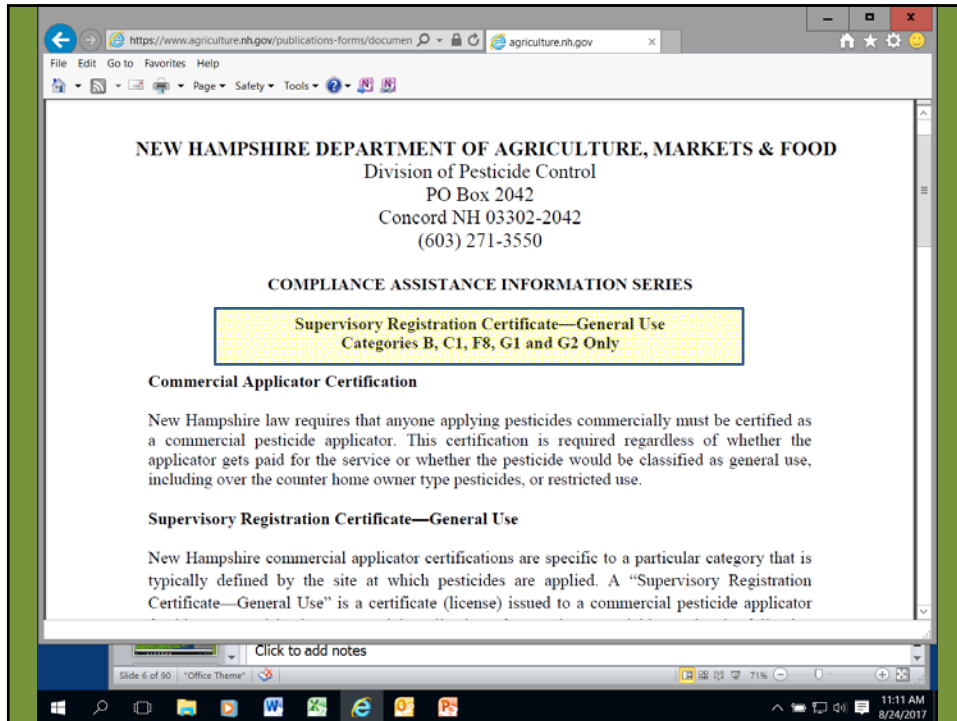




All kinds of ideas to manage the damage:  
Assuming that reducing the amount of beech regeneration and basal area volume is your goal:

1. Even age management to get less shade tolerant competing regen
2. Cut in the winter to reduce logging damage in attempt to limit sprouting
3. Cut in the summer when the root reserves are at their lowest.
4. Leave all the partially resistant beech
5. Don't cut any beech in the harvest area
6. **Leave seemingly resistant beech, cut all of the diseased trees AND stump treat with herbicide**





NEW HAMPSHIRE DEPARTMENT OF AGRICULTURE, MARKETS & FOOD  
Division of Pesticide Control  
PO Box 2042  
Concord NH 03302-2042  
(603) 271-3550

COMPLIANCE ASSISTANCE INFORMATION SERIES

**Supervisory Registration Certificate—General Use**  
Categories B, C1, F8, G1 and G2 Only

**Commercial Applicator Certification**

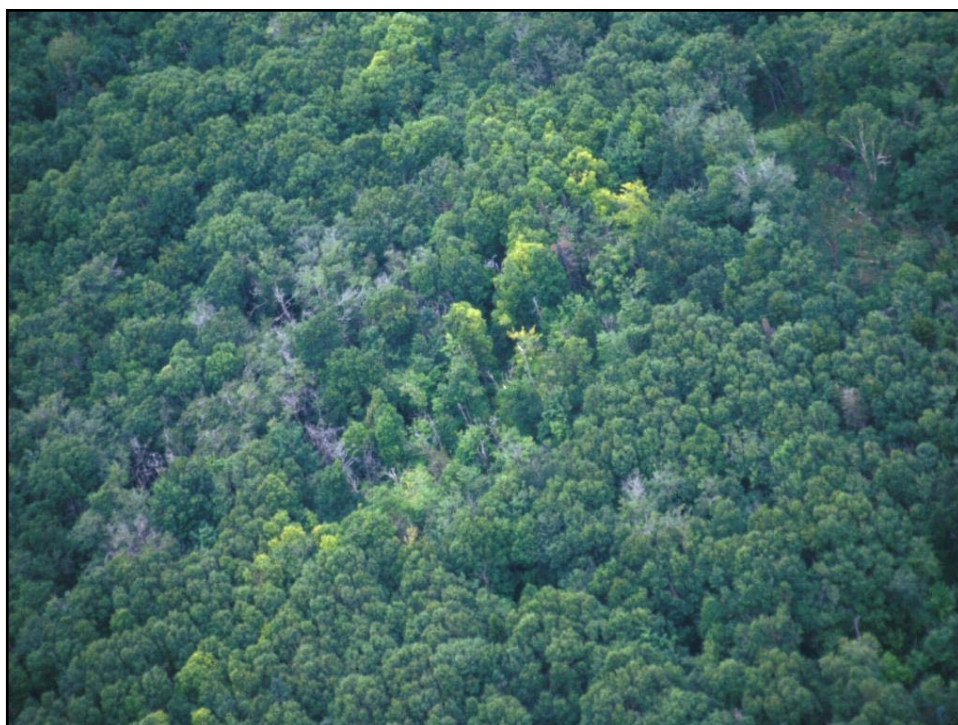
New Hampshire law requires that anyone applying pesticides commercially must be certified as a commercial pesticide applicator. This certification is required regardless of whether the applicator gets paid for the service or whether the pesticide would be classified as general use, including over the counter home owner type pesticides, or restricted use.

**Supervisory Registration Certificate—General Use**

New Hampshire commercial applicator certifications are specific to a particular category that is typically defined by the site at which pesticides are applied. A "Supervisory Registration Certificate—General Use" is a certificate (license) issued to a commercial pesticide applicator

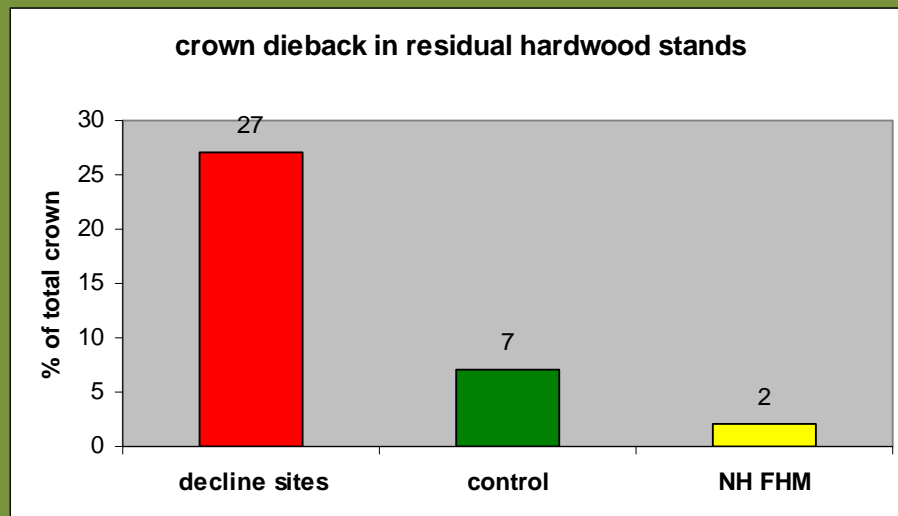




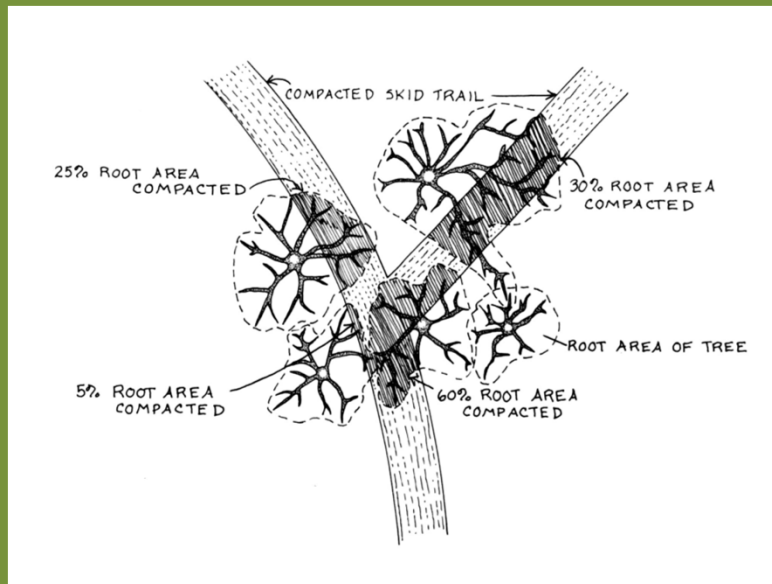
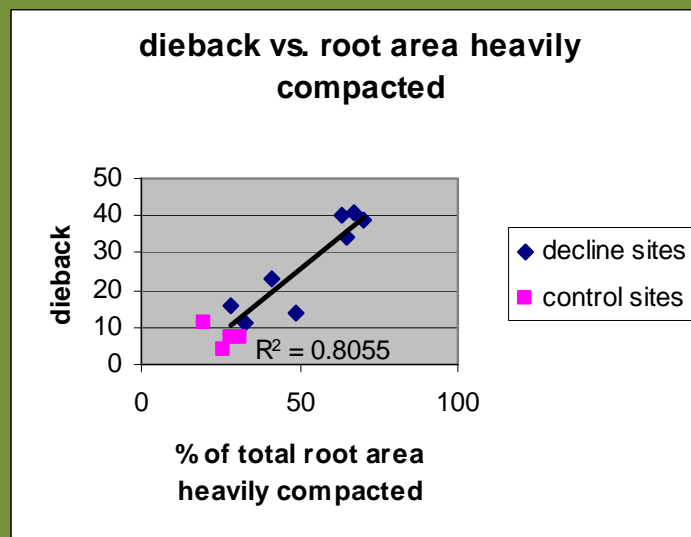




### What did we find at these declining sites ?





**CORRELATION OF HEAVILY COMPACTED ROOT AREA TO CROWN DIEBACK****Correlation between root area compacted and tree dieback**

### 2002-2005 Soil Compaction Analysis

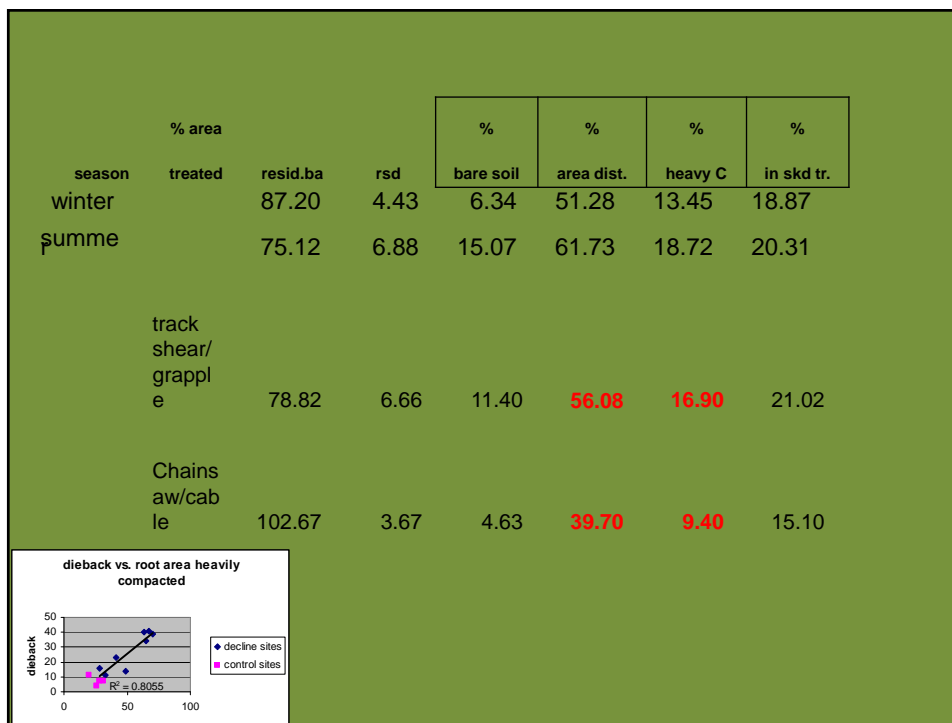
-What % of forest soils within today's timbersales are compacted, both lightly and heavily.

-What % of timbersale area is in skid trails?

-Are there differences in soil compaction and tree wounding between silvicultural prescriptions and equipment types?

Randomly select 6-10 harvests per year on state lands

Systematic random sample of cut area using 10<sup>th</sup> acre fixed plots, (37.2' radius)





Equipment	RBA	basal dam	bare soil	area compacted	heavy compaction	skid trail
track shear/gr apple	78.82	6.66	11.40	56.08	16.90	21.02
Chainsa w/cable	102.67	3.67	4.63	39.70	9.40	15.10

### My Thoughts

**Even aged or unevenaged is fine but getting caught in the middle ends up causing too much RSD.**

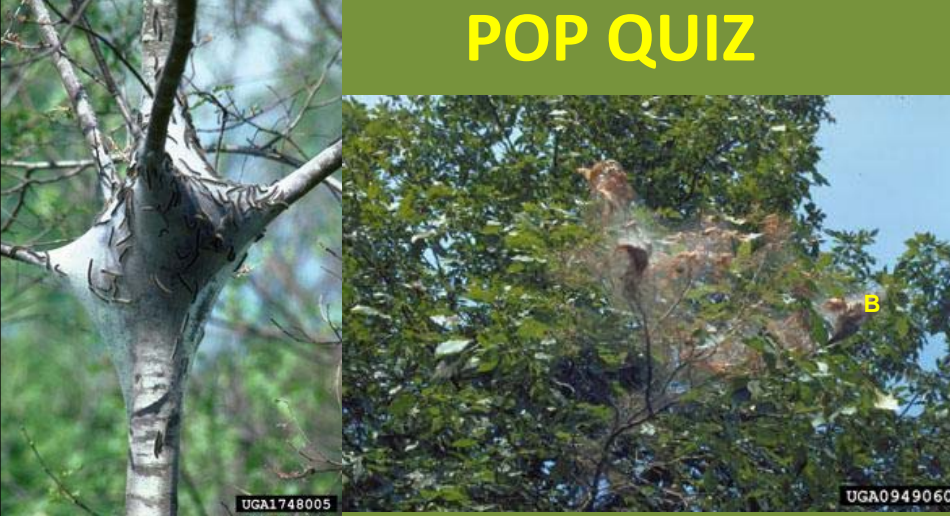
lay out skid trails, work back to front, and encourage smaller equipment, especially chainsaw loggers and cable skidders

Encourage less skid steer equipment if the terrain allows it

**Be diligent about getting off the harvest area before spring break up. Don't let a good idea go bad.**

If RSD is evident don't go back in to remove declining trees. Mortality of trees with 30% dieback is not high. You'll likely just be dealing with a decade of sluggish growth

## POP QUIZ



UGA1748005

UGA0949060

Which caterpillar makes these tents?

- A. Eastern Tent caterpillar
- B. Fall Webworm
- C. Forest Tent caterpillar





**Forest Tent Caterpillar**

10,000 acres in 2004

66,000 acres in 2005

28,000 acres in 2006

108 acres in 2007

9,000 acres in 2016

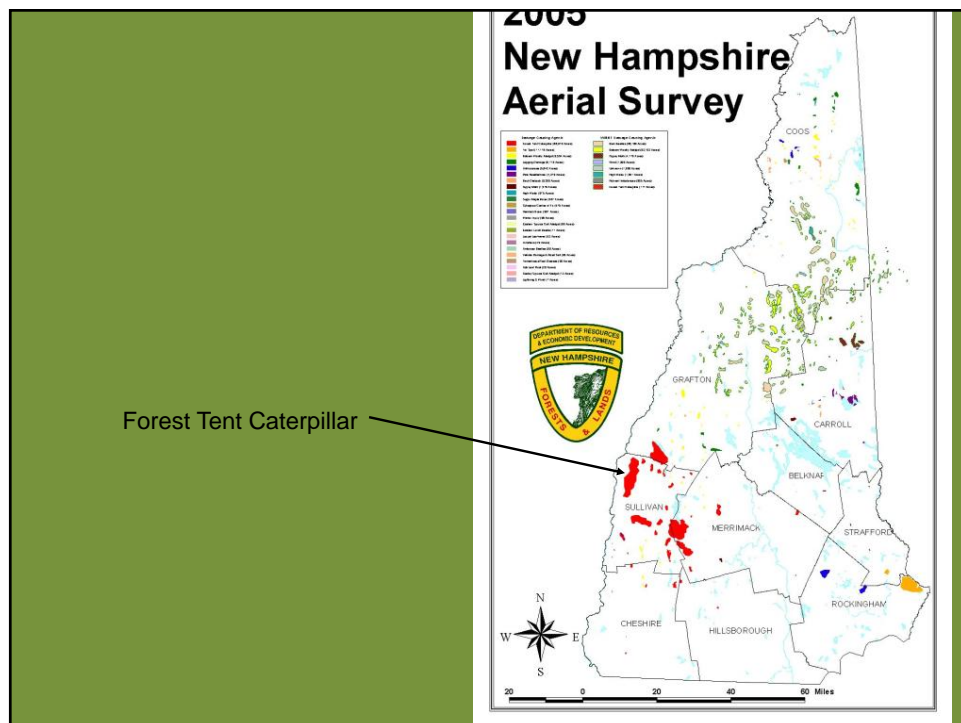
20,000 acres in 2017

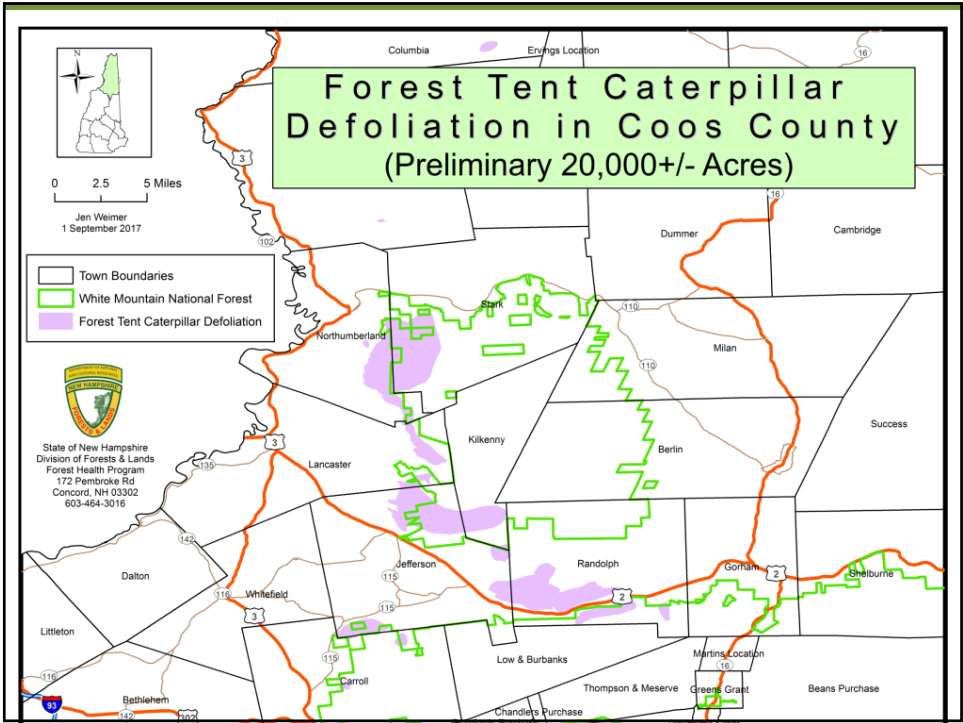


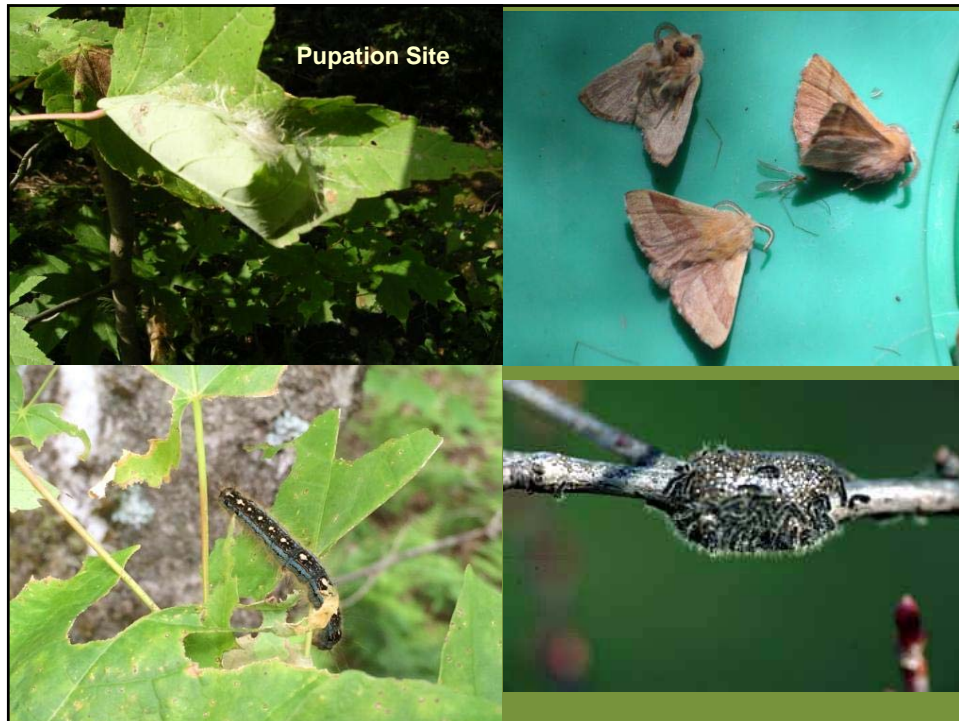

**Favored Hosts:**

- Sugar Maple
- Red Oak

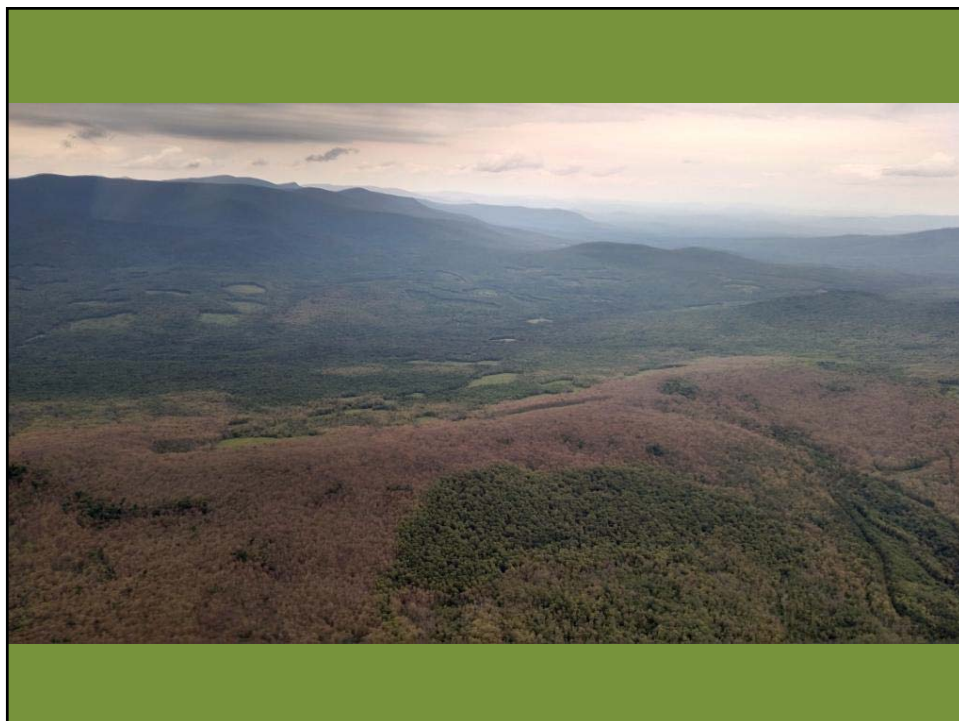
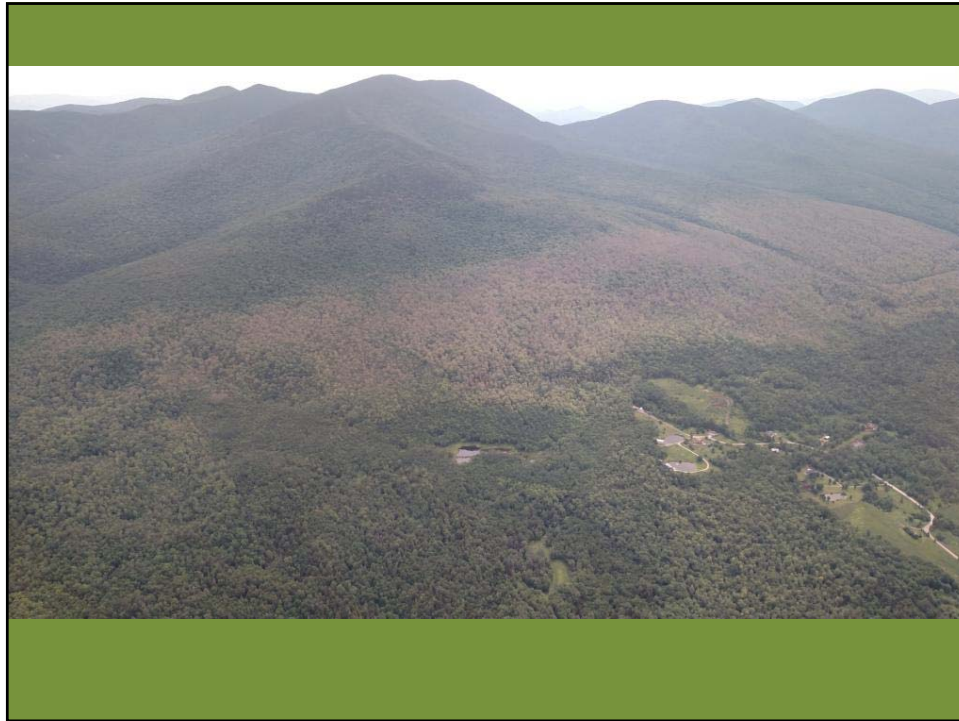


















## FTC Biological Control

### Friendly Fly

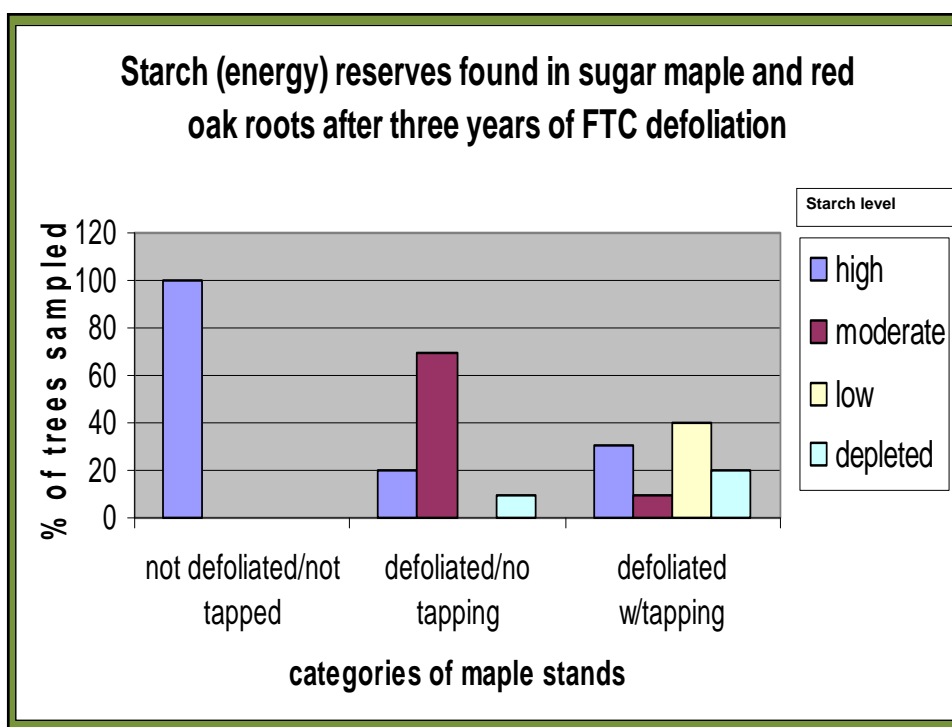
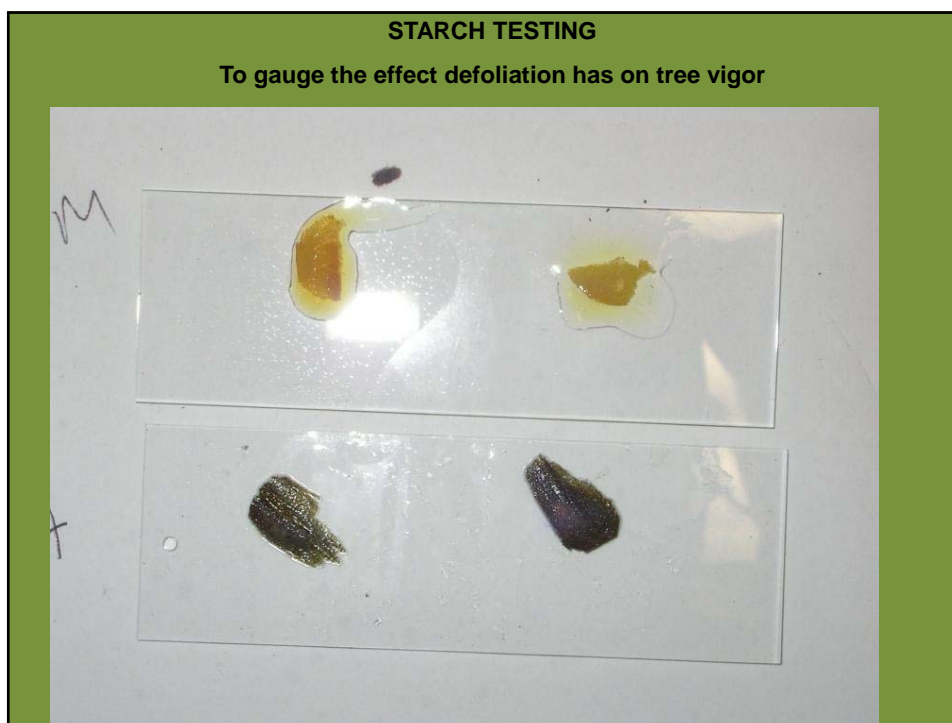
And 40 other predators attack the pupae and eggs of FTC

*Sarcophaga aldrichi*





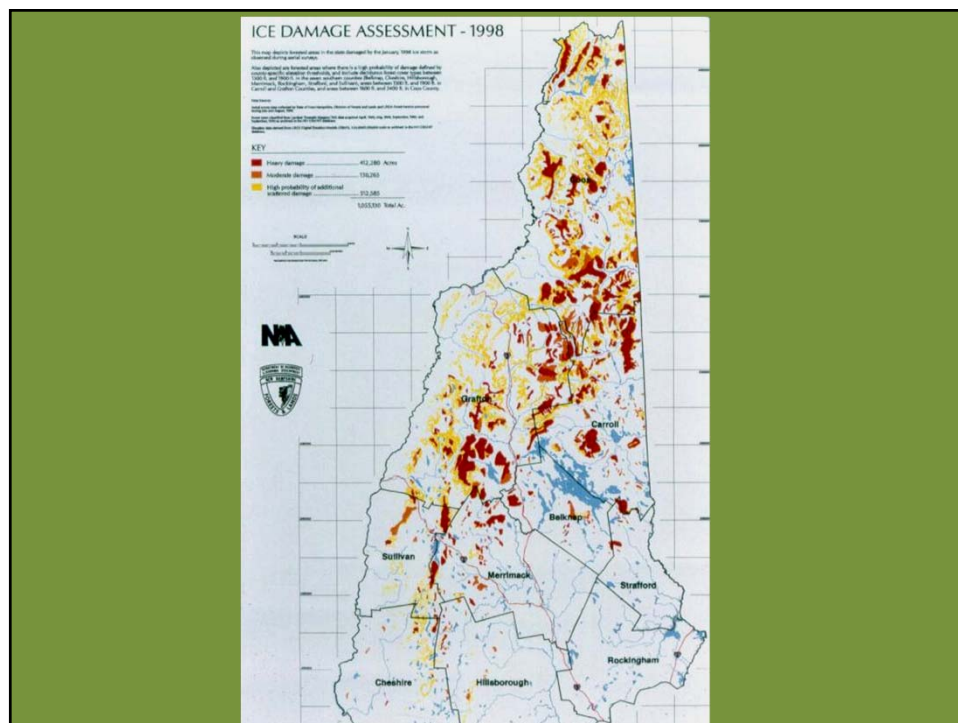




### Recommendations for timber management of defoliated stands

Postpone harvesting until two years post outbreak.

1. current outbreak will concentrate on residual trees
2. don't add soil compaction, root damage and basal wounding to already stressed trees
3. some trees will seriously decline or die from the outbreak. You don't want to leave those and take trees that resisted the outbreak
4. Predators and parasites perform way better in closed canopy situations






## ICE STORMS

Softwood trees are designed far better to handle heavy ice loads. The branches collapse on each other helping to distribute the weight.

Sugar maple does not grow like that and must rely on shedding its leaves as defense of winter snow and ice build up.

The ice storm of 1998 in NH broke 20-90 % of branches in most hardwoods found on south aspects between 1200' elevation and 3000' elevation. Today the mortality rate in those areas has been low and the trees have recovered well in most cases. (Poor birches)



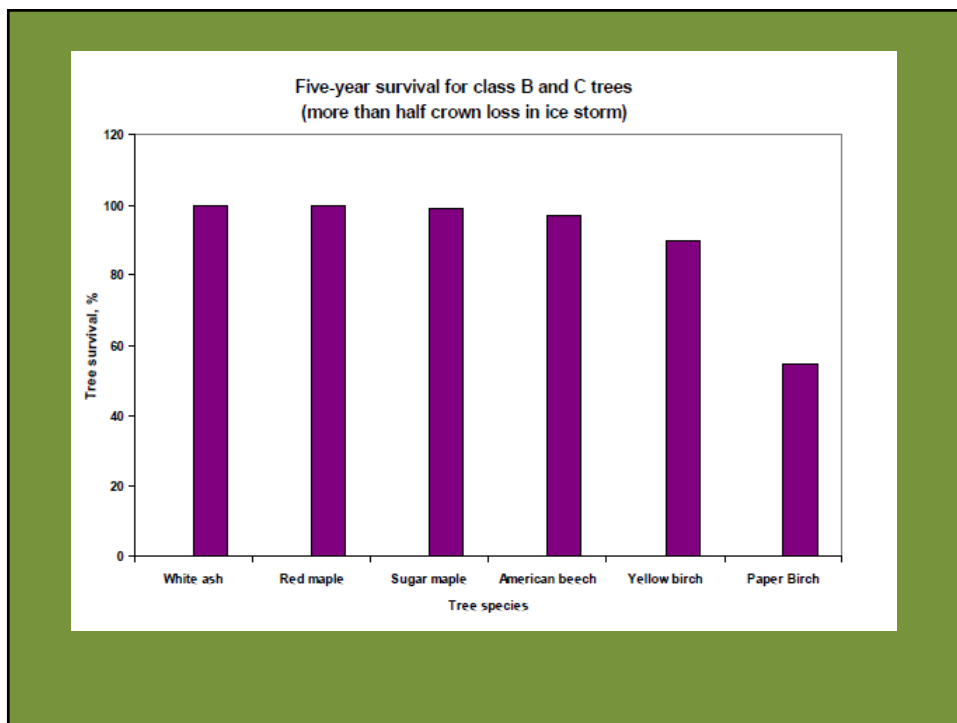


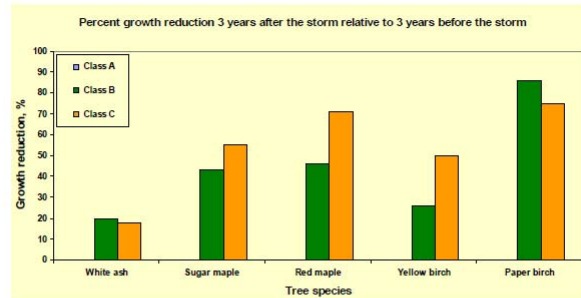
Tree Response Following the 1998 Ice Storm- Walter Shortle, Northern Research Station, Forest Service

Dr. Walter C. Shortle  
USDA Forest Service  
Northern Research Station  
271 Mast Road  
Durham, NH 03824

Phone: 603-868-7620  
E-mail: wshortle@fs.fed.us

**Conclusions:**  
"Ice storms are a natural feature of forests of the northeastern United States and will surely occur again. Trees that are healthy and responsive before the storm are more likely to survive and will recover more quickly from storm injury. Timber stand improvement to enhance tree health may be a prudent preventative treatment.  
**Reduced residual logging damage may decrease the chance of root infection and spread of infection within the tree."**





Class A trees had no growth reduction 3 years after the storm relative to 3, 5, or 10 years prior to the storm (remember again there were no class A paper birch). For class B trees, growth reduction ranged from 20% in ash to 70% in paper birch with maples and yellow birch in the intermediate range of 25 to 40%. Growth reductions were about the same or greater in class C trees.

#### ANTHRACNOSE:

**Causal Agents:** Several genera of fungi (e.g., *Aureobasidium*, *Discula*, *Kabatella*).

**Symptoms:** The symptoms associated with anthracnose diseases vary with the species of maple and the fungus. Symptoms are often apparent from late spring to early summer but additional cycles of disease can result in damage that is visible later in the growing season. The range of symptoms includes leaf spots, blighted leaves and young shoots, cankers, and dieback of young twigs and branches. The most common symptoms are large, irregular, dead areas on the leaf that are often V-shaped or delineated by the veins.





[Adelaide Tyrol](#)

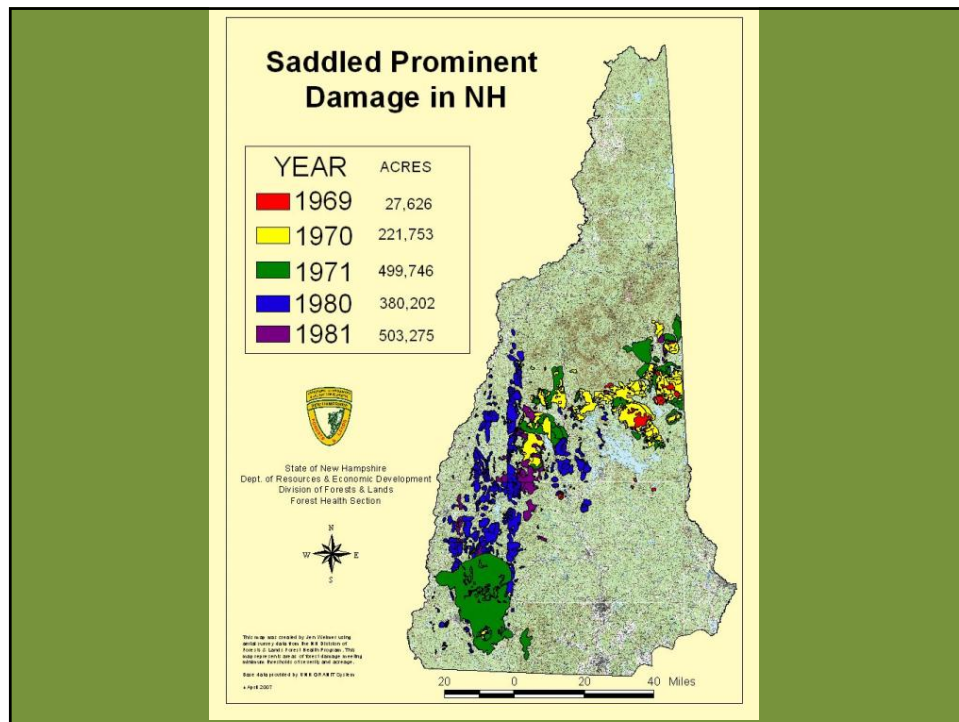
### Maple Leaf Cutter

This pest is a Lepidoptera and has been a visible leaf defoliator in NH since the 1950's. The most severe outbreaks took place in the 1970's

### CONTROL

Because this pest over winters in the duff layer, prescribed fire in the fall or spring will control building populations

Saddled prominent is historically the most damaging maple defoliator in NH. NH has had 100's of thousands of acres of northern hardwoods defoliated by SP throughout the 1970's and early 80's.



Overstocked pole sized stands are vulnerable  
Stands stressed from logging damage, ice storms, and defoliation are vulnerable.

Cut known infested trees before June emergence  
Just keep the stand as healthy and vigorous as possible

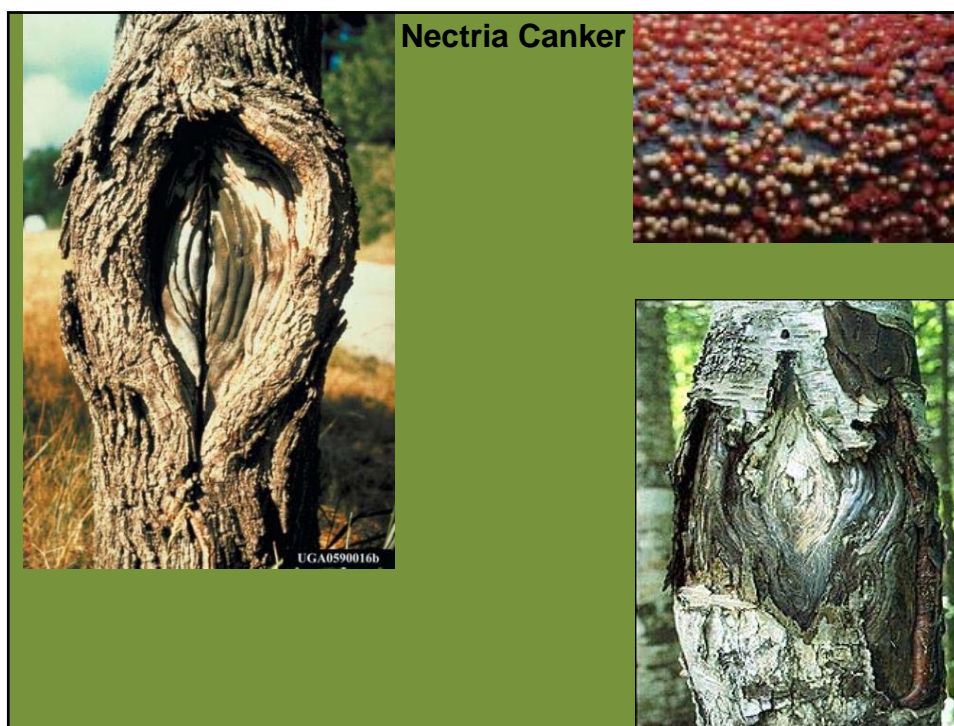
### Sugar Maple borer



UGA3066086









## MOOSE BROWSE

Moose are the largest animal in the Deer Family.. By 1900, there were just two dozen left in NH. Today the herd is at 3,800. A peak of 7,000 10 years ago



Moose eat approximately 19,000 pound of biomass per year. The majority during the growing season when there diet is mostly hardwoods.

In the fall when moose are transitioning to there winter feed patterns they feed on the bark of maple and other hardwoods.

The high volume of browse reduces plant heights and twig density allowing less desirable species to take control of the stand



### MANAGEMENT

Population control.... Disperse browse with large cuts.....use slash to discourage feeding in desired regen and encourage travel in the unproductive groups.....fence .....

## Asian Longhorned Beetle

*Anoplophora glabripennis*



Not in NH YET!



## Exit Holes





## EGG SITE

- oval to round and can be up to ½ inch across







Mike Bohne, USDA Forest Service Northeastern Area



## ALB Look-Alike



**Asian Longhorned Beetle:** feeds on live hardwoods



Male



Female

**Whitespotted Sawyer:** feeds on dead & dying conifers

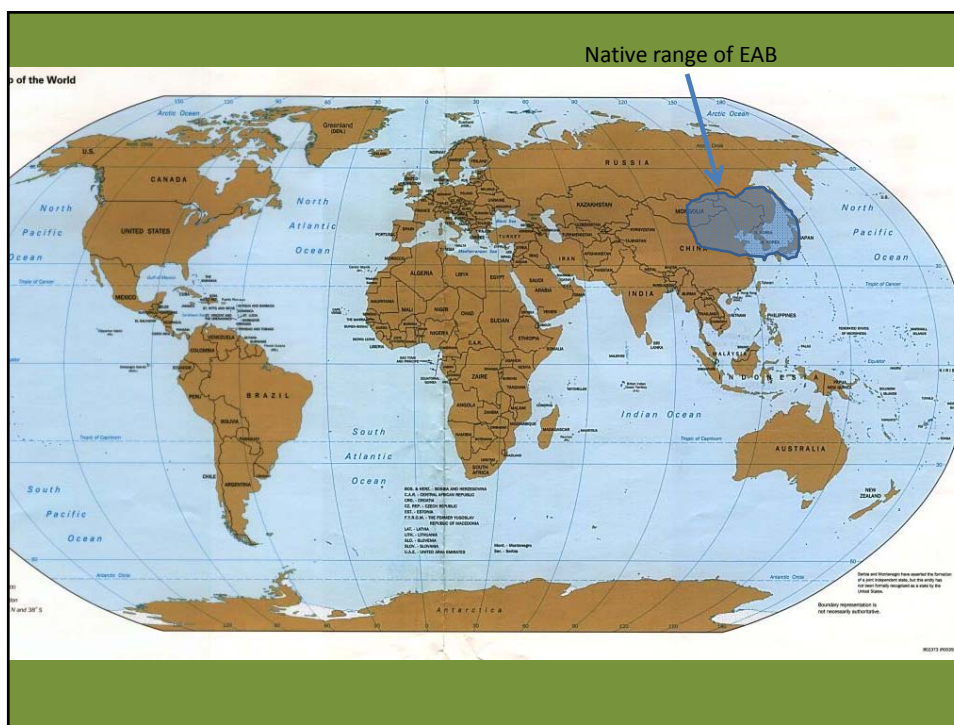
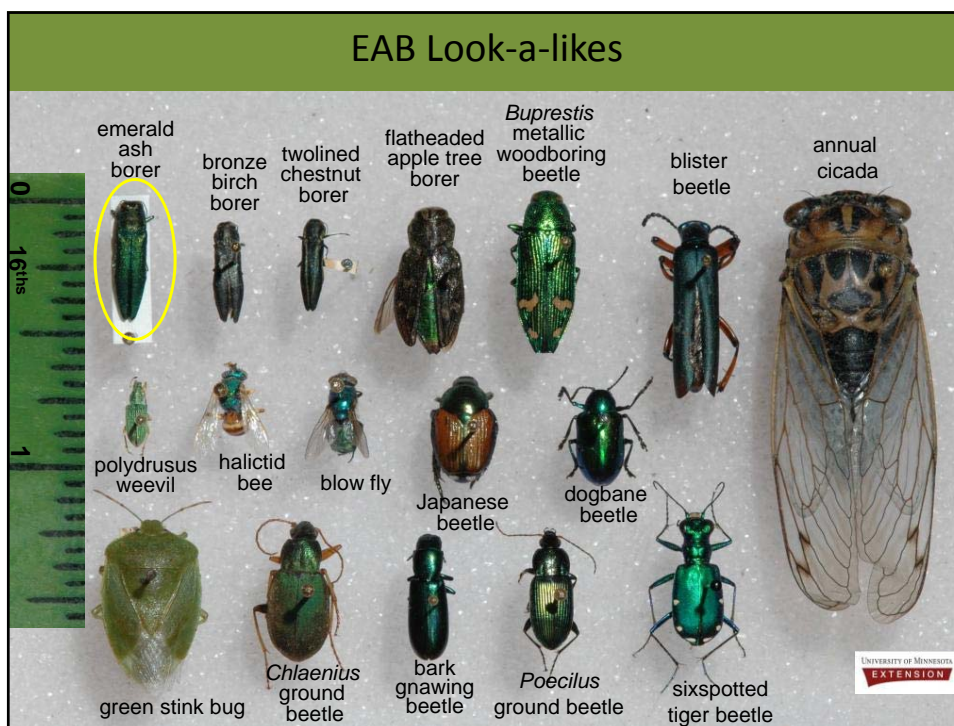


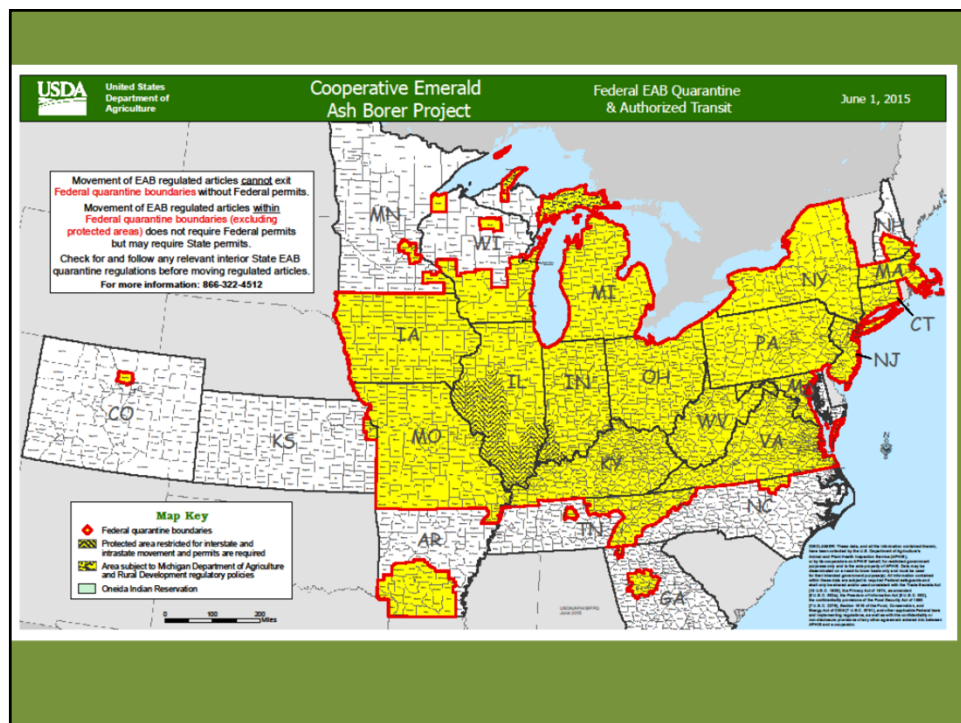
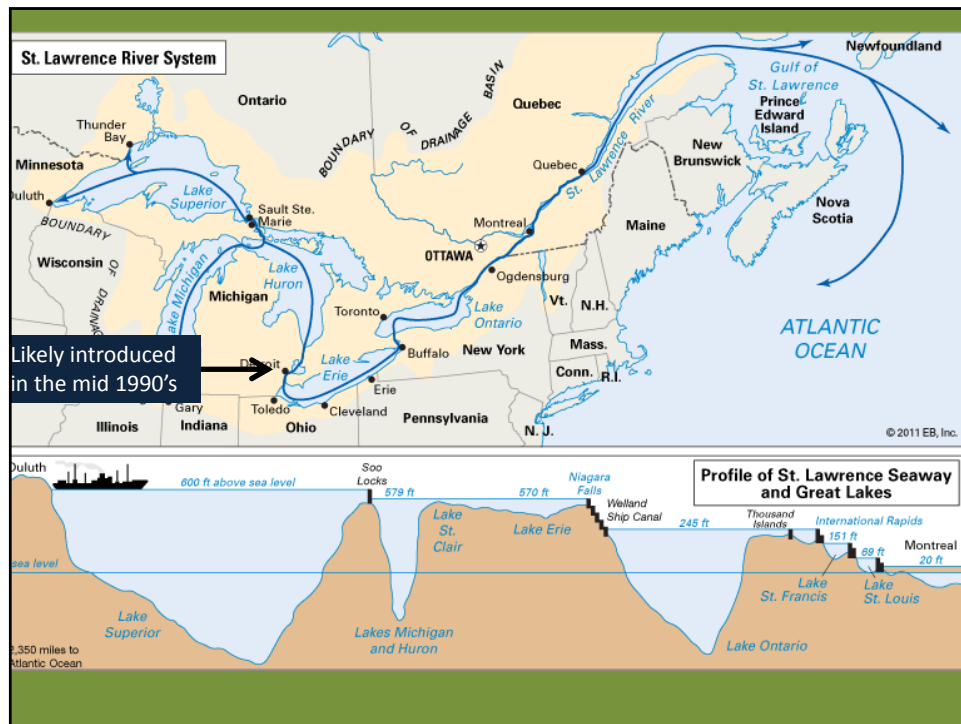
## Emerald Ash Borer

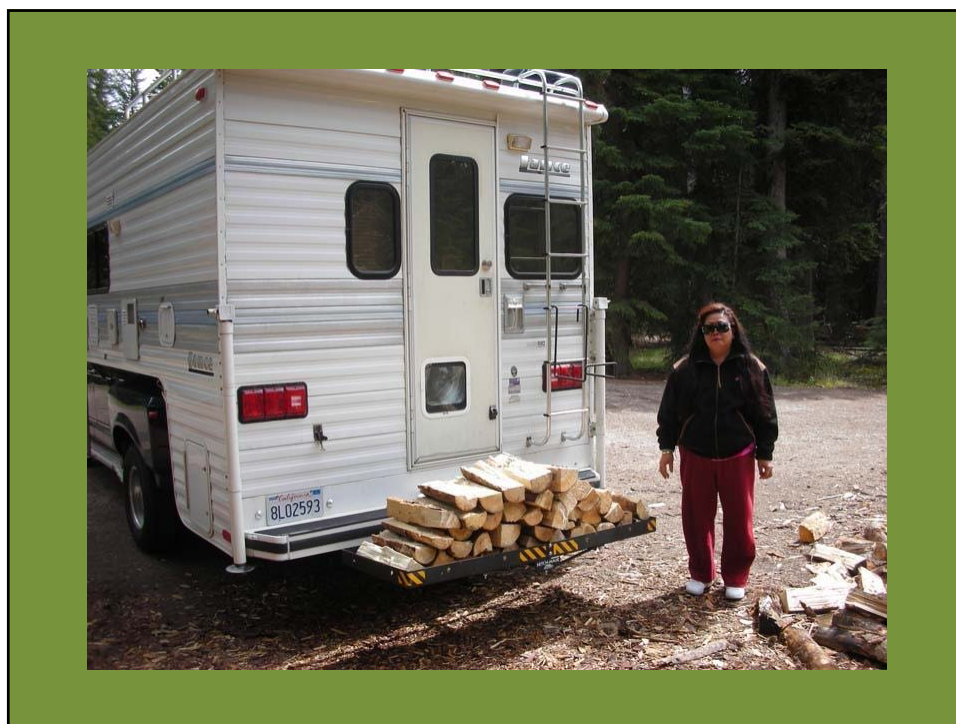
*Agrilus planipennis*









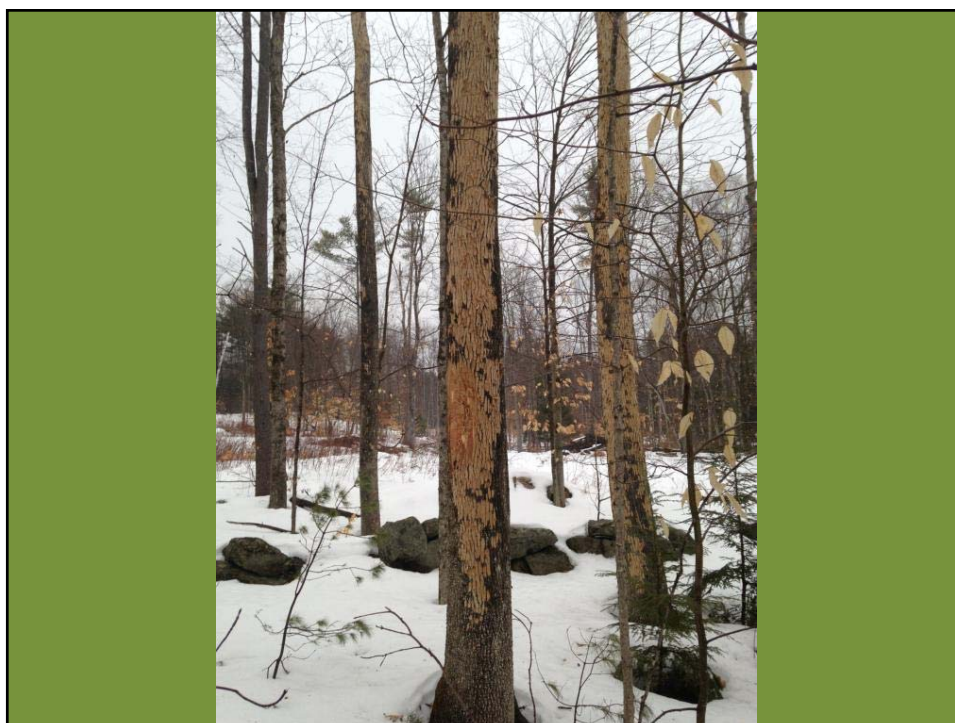
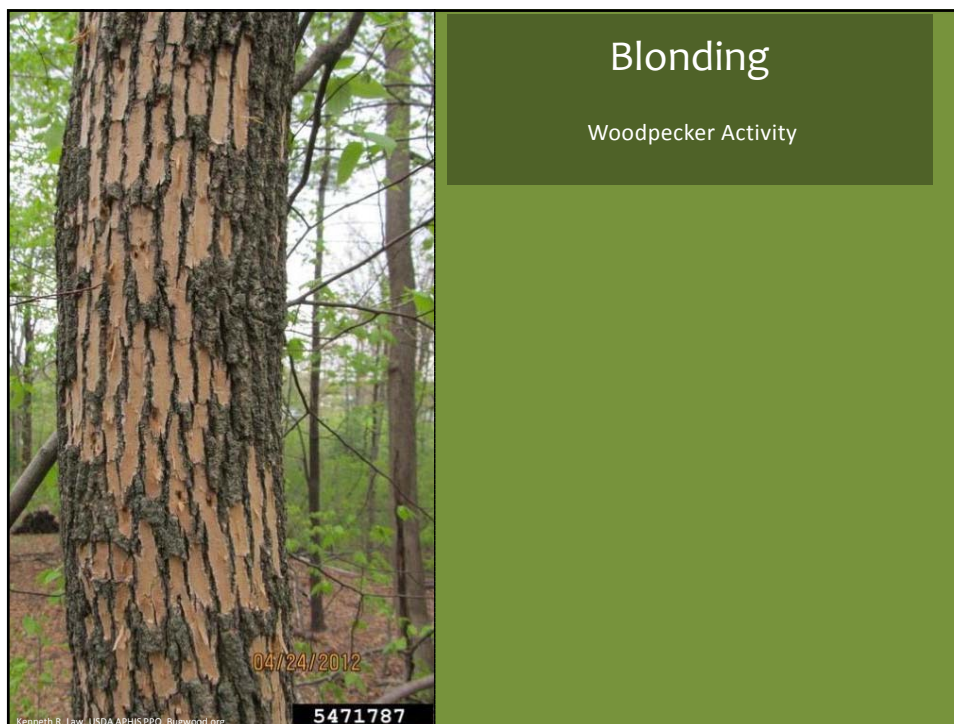




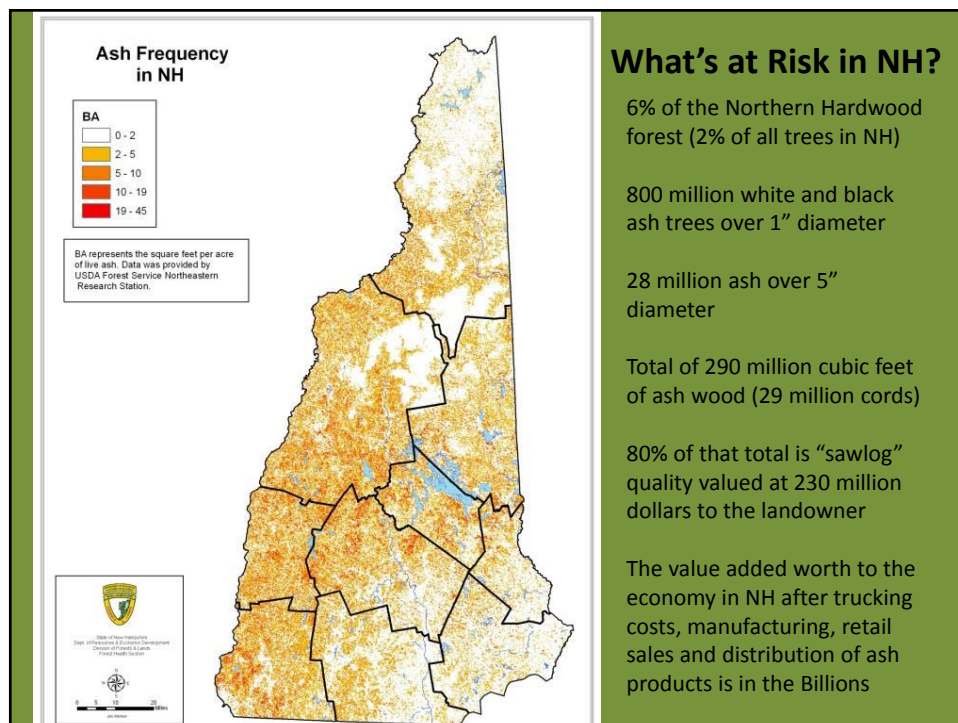


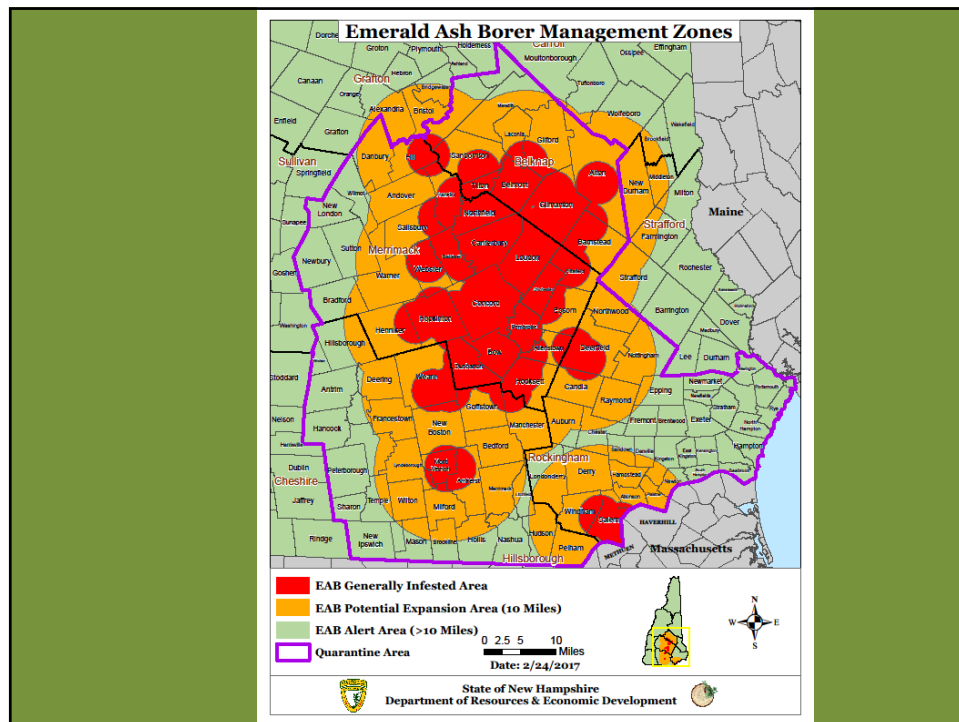















## What We Are Doing Statewide

Objectives


- Detect new infestations quickly
- Slow the spread of EAB statewide
- Slow ash mortality locally
- Maintain ash in the landscape

Methods

- Diverse management tactics
  - bio control, **forest management tactics**, pesticide trials and treatments
- BMP's
- Continual surveying
  - visual, volunteer, traps, cerckeris wasps
- Public outreach
  - UNHCE leads, target user groups, public, conservation groups
- Regulations
  - NHDAMF lead, Quarantine,




*Oobius agrili* – egg parasitoid

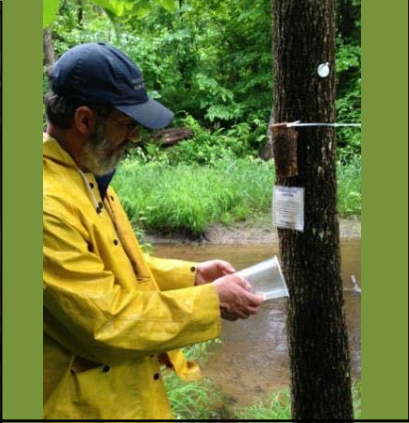


*Tetrastichus planipennisi* – larval parasitoid




	2014	2015	2016
<i>Oob</i>	2600	5000	37,000
<i>Tet</i>	13,000	25,000	40,000





**BIOLOGICAL CONTROL**



**A**

*Tetrastichus planipennisi*

**B**

*Oobius agrili*

**C**

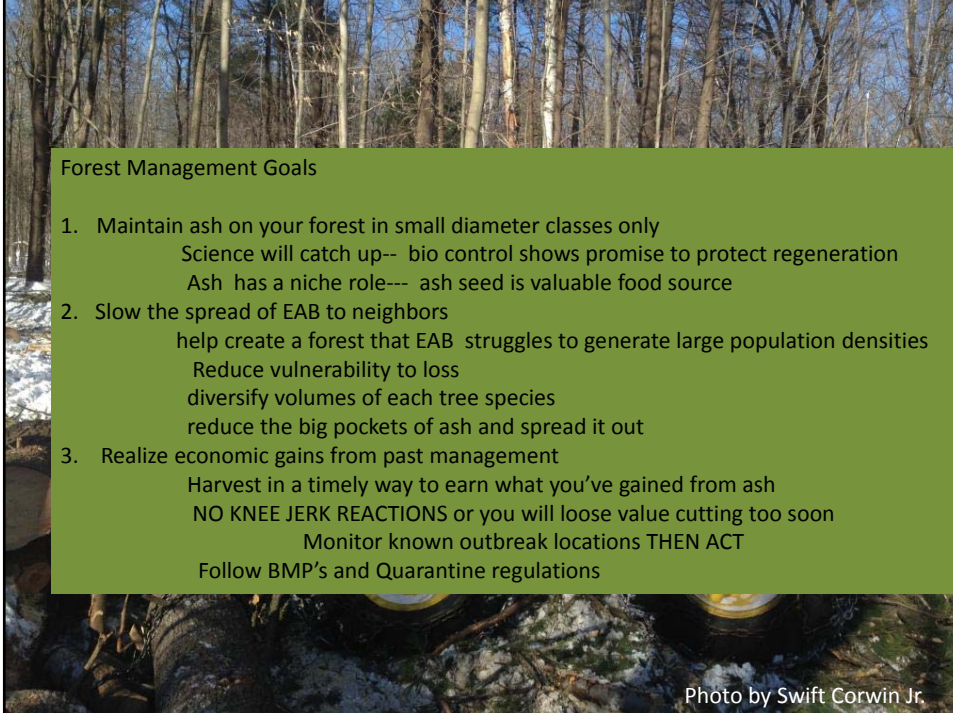
*Spathius agrili*

**D**

3.000 mm

J. Plunkett

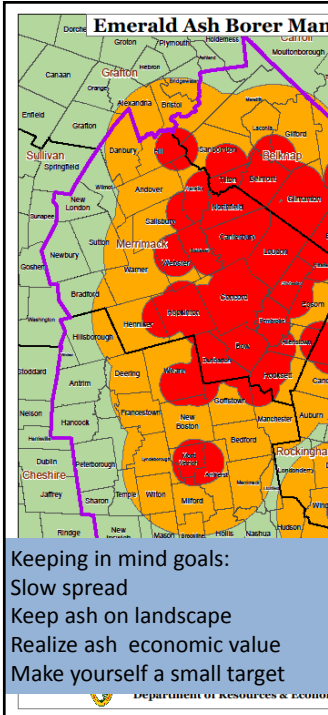




**Forest Management Goals**

1. Maintain ash on your forest in small diameter classes only
  - Science will catch up-- bio control shows promise to protect regeneration
  - Ash has a niche role--- ash seed is valuable food source
2. Slow the spread of EAB to neighbors
  - help create a forest that EAB struggles to generate large population densities
  - Reduce vulnerability to loss
  - diversify volumes of each tree species
  - reduce the big pockets of ash and spread it out
3. Realize economic gains from past management
  - Harvest in a timely way to earn what you've gained from ash
  - NO KNEE JERK REACTIONS or you will loose value cutting too soon
  - Monitor known outbreak locations THEN ACT
  - Follow BMP's and Quarantine regulations

Photo by Swift Corwin Jr.



**RED ZONE:**

1. Identify any high value ash for pesticide treatments
2. Create sink site pre-harvest (timing and technique is everything)
3. Cut most ash leaving a small amount of 4-6" trees

We recognize the "cost" of logging is too high to enter a site for small volumes of scattered large ash.

4. Pay attention to the quarantine timing

**ORANGE ZONE:**

1. Identify high value trees needing pesticide treatments
2. Identify the forests with high volumes of ash (greater than 25% BA of ash) and start planning harvest
3. During regularly scheduled harvests remove large diameter ash leaving small BA's of small trees. Less than 10sq.ft/acre
4. Consider removing ash in the low density ash sites only when you're harvesting during regularly planned visits

**"GREEN" ZONE:**

1. Inventory and plan for being in the red or orange zone.
2. Know which properties you don't plan to harvest
3. identify which properties have rich resources of ash **HOWEVER**, if you're harvesting in the green area and shouldn't return to site for 15 years or more you should treat the site like you were in the orange zone.

**Keeping in mind goals:**  
 Slow spread  
 Keep ash on landscape  
 Realize ash economic value  
 Make yourself a small target

Department of Resources & Economic Development

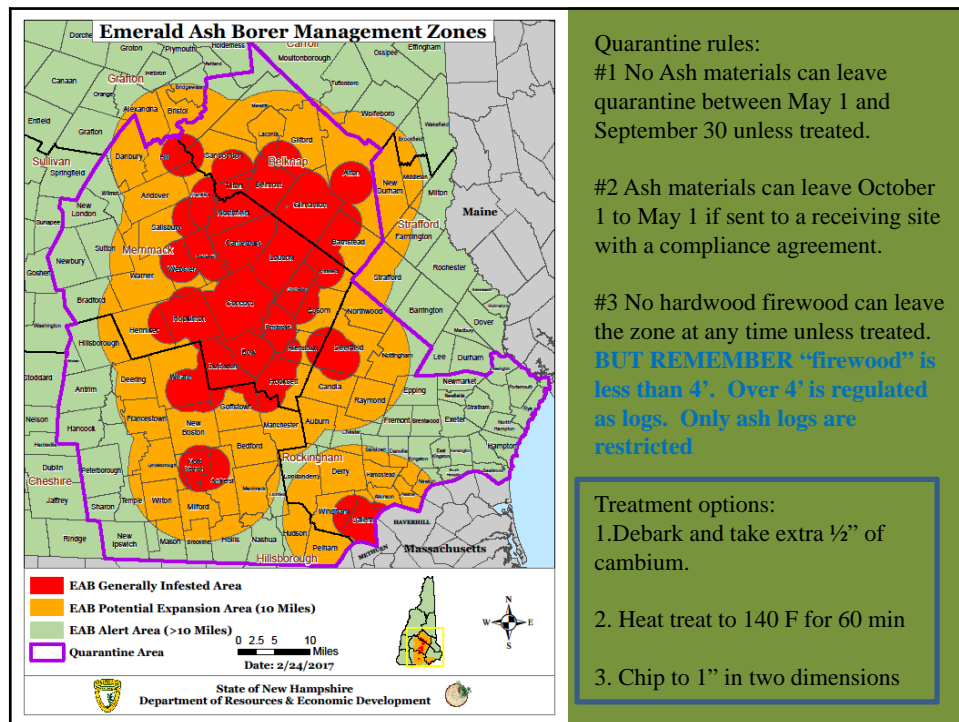






Photo: Jeremy Turner

**Emerald Ash Borer Management Zones**

Legend:  
 ■ EAB Generally Infested Area  
 ■ EAB Potential Expansion Area (10 Miles)  
 ■ EAB Alert Area (100 Miles)  
 ■ Quarantine Area

Scale: 0 2.5 5 10 Miles  
 Date: 3/5/2013  
 State of New Hampshire  
 Department of Resources & Economic Development

## STATE OF NEW HAMPSHIRE WOOD INFESTED BY THE EMERALD ASH BORER

### Best Management Practices for proper handling

Signs of EAB: "S" shaped tunnels under the bark and shallow woodpecker excavation (blonding)

**We need your help to slow the spread of this devastating forest pest. Moving infested ash brings EAB to new woodlots and trees.**

**The EAB quarantine** prohibits movement of hardwood firewood and all ash products out of the quarantine area unless specific conditions are met; whether or not materials show signs of infestation.

**Within the quarantine** area, movement of known infested ash products should be treated according to the recommendations on the reverse side of this sheet to reduce accidental spread of EAB.

**You can help minimize the risk of spreading EAB within the quarantine by:**

1. Delivering ash wood within 5 miles of its origin; **OR**
2. Transporting ash firewood or logs to a kiln or mill, after October 1 for processing before May 1; **OR**
3. Cutting and seasoning ash at its place of origin for 12 months before distribution; **OR**
4. Chipping ash material to 1" size chips in two of three dimensions; **AND**
5. Notifying all recipients that there is a risk of infestation from this material and it should be burned, chipped, sawed into lumber, or heat treated by May 1 of the following year.

Responsible shippers may use this page for documentation of BMPs:

Shipper: \_\_\_\_\_

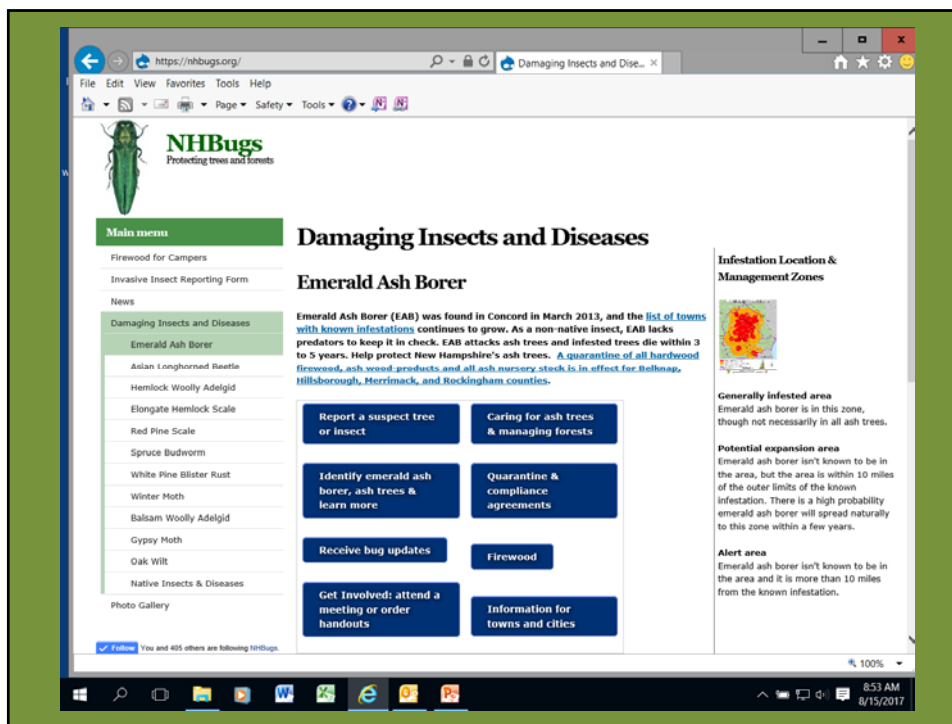
# of BMP employed: \_\_\_\_\_

Delivery Location: \_\_\_\_\_

Date Delivered: \_\_\_\_\_

For more details and current infestation maps please call 603-464-3016 and visit [nhbugs.org](http://nhbugs.org)





The screenshot shows a web browser window displaying the NHBugs website. The browser's address bar shows the URL <https://nhbugs.org/>. The website's header features the NHBugs logo with the tagline "Protecting trees and forests". The main navigation menu includes links for "Firewood for Campers", "Invasive Insect Reporting Form", "News", "Damaging Insects and Diseases", "Photo Gallery", and "You and 405 others are following NHBugs". The "Damaging Insects and Diseases" section is currently selected, displaying a list of pests: Emerald Ash Borer, Asian Longhorned Beetle, Hemlock Woolly Adelgid, Elongate Hemlock Scale, Red Pine Scale, Spruce Budworm, White Pine Blister Rust, Winter Moth, Balsam Woolly Adelgid, Gypsy Moth, Oak Wilt, and Native Insects & Diseases. The "Emerald Ash Borer" page is the active content, featuring a detailed description of the pest, its impact on ash trees, and a list of towns with known infestations. The page also includes a map of New Hampshire showing infestation locations and management zones. A sidebar on the right provides information on "Generally infested area", "Potential expansion area", and "Alert area". The bottom of the browser window shows the Windows taskbar with various application icons and the system clock indicating 8:53 AM on 8/15/2017.

**NHBugs**  
Protecting trees and forests

**Main menu**

- Firewood for Campers
- Invasive Insect Reporting Form
- News
- Damaging Insects and Diseases**
- Photo Gallery

**Damaging Insects and Diseases**

- Emerald Ash Borer**
- Asian Longhorned Beetle
- Hemlock Woolly Adelgid
- Elongate Hemlock Scale
- Red Pine Scale
- Spruce Budworm
- White Pine Blister Rust
- Winter Moth
- Balsam Woolly Adelgid
- Gypsy Moth
- Oak Wilt
- Native Insects & Diseases

**Damaging Insects and Diseases**

## Emerald Ash Borer

Emerald Ash Borer (EAB) was found in Concord in March 2013, and the [list of towns with known infestations](#) continues to grow. As a non-native insect, EAB lacks predators to keep it in check. EAB attacks ash trees and infested trees die within 3 to 5 years. Help protect New Hampshire's ash trees. [A quarantine of all hardwood firewood, ash wood products, and all ash nursery stock is in effect for Belknap, Hillsborough, Merrimack, and Rockingham counties.](#)

**Report a suspect tree or insect**

**Caring for ash trees & managing forests**

**Identify emerald ash borer, ash trees & learn more**

**Quarantine & compliance agreements**

**Receive bug updates**

**Firewood**

**Get Involved: attend a meeting or order handouts**

**Information for towns and cities**

**Infestation Location & Management Zones**

**Generally infested area**  
Emerald ash borer is in this zone, though not necessarily in all ash trees.

**Potential expansion area**  
Emerald ash borer isn't known to be in the area, but the area is within 10 miles of the outer limits of the known infestation. There is a high probability emerald ash borer will spread naturally to this zone within a few years.

**Alert area**  
Emerald ash borer isn't known to be in the area and it is more than 10 miles from the known infestation.