



# Emerald Ash Borer Update

New Jersey Department of Agriculture  
Plant Industry

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# Emerald Ash Borer

*Agrilus planipennis*

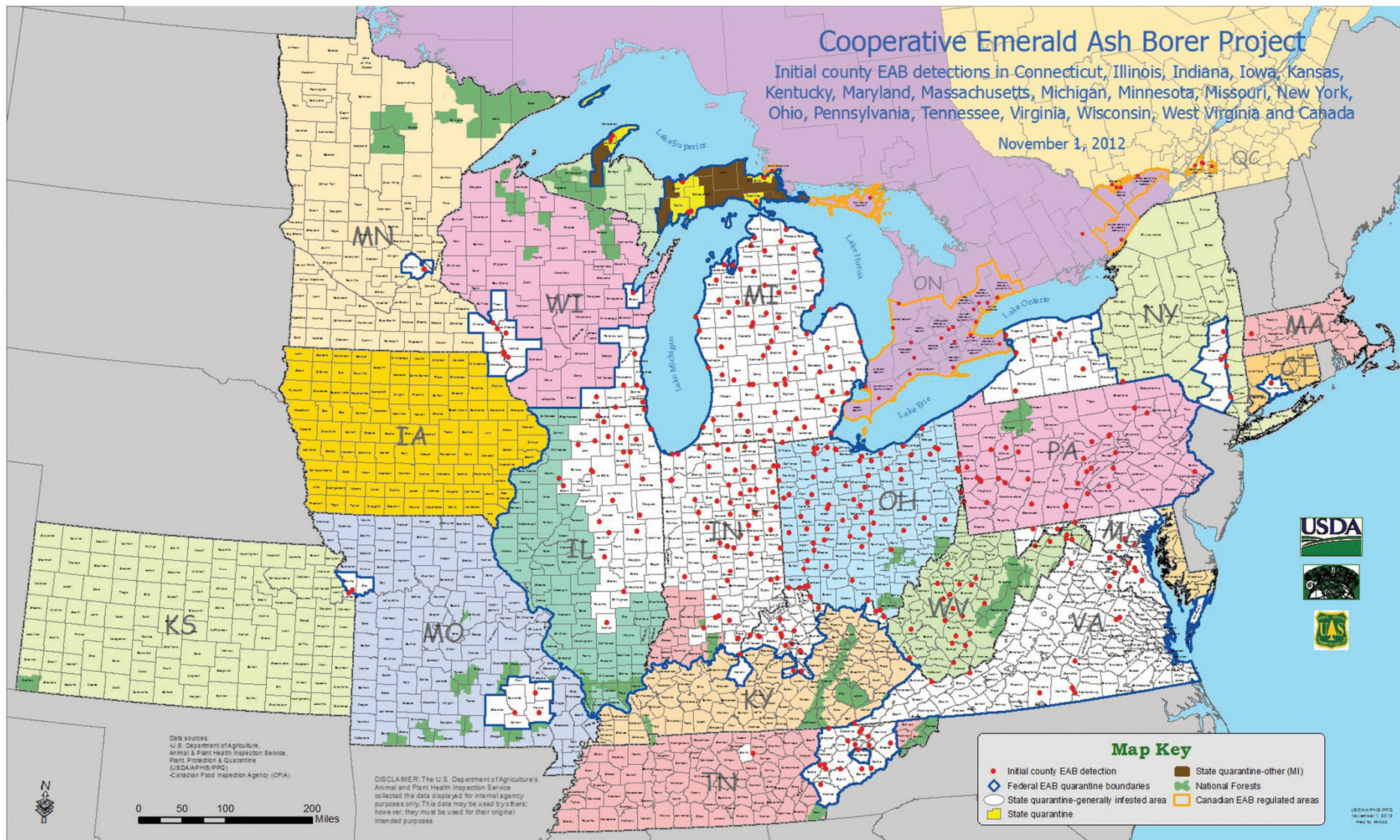
- Is now confirmed in 18 states.
- The summer of 2012 found EAB in Connecticut, Kansas, and Massachusetts.
- It has not been found in New Jersey or Delaware yet.



# Cooperative Emerald Ash Borer Project

Initial county EAB detections in Connecticut, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, Tennessee, Virginia, Wisconsin, West Virginia and Canada

November 1, 2012





**Ash Basal Area  
(ft<sup>2</sup>/acre)**

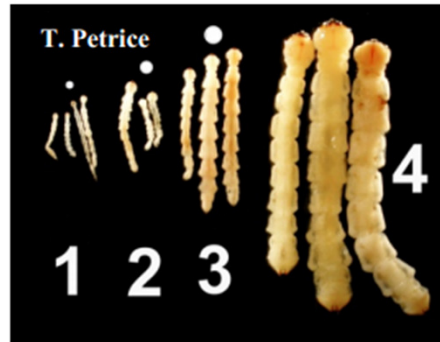


Processing note: This map was produced by linking plot data to MODIS satellite pixels (250 m) using gradient nearest neighbor techniques.

# Emerald Ash Borer

Signs and symptoms

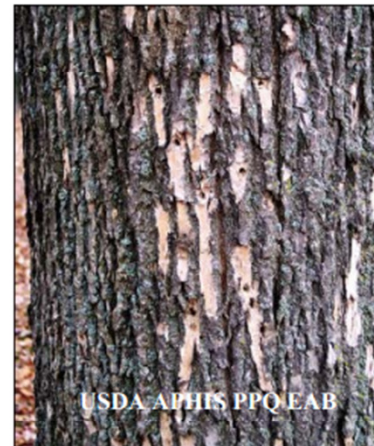




*Bark Split with Larval Galleries Beneath the Bark* (note callusing around old gallery)



*Damage from Woodpecker Feeding*





1



2



3



4



5



*Epicormic Shoots in Winter and Summer*





# Detection and Monitoring





# Bio-monitoring using native wasps

*Cerceris fumipennis*



# Emerald Ash Borer

Treatment and population  
suppression



# Emerald Ash Borer

- The main natural enemies for EAB are parasitoid wasps.
- Laboratory rearing of wild caught life stages in the USA has shown that native parasitoids do reproduce on EAB.
- Most EAB parasitoids are from one of the following families of Hymenopterans:
  - Chalcididae
  - Braconidae
  - Eupelmidae
  - Encyrtidae
  - Eulophidae

# Emerald Ash Borer

## Natural Enemies

- The USDA APHIS PPQ Biological Control Production Facility in Brighton, MI was designed to produce EAB parasitoids for field release.
- Three non-native wasp species are currently being mass reared.

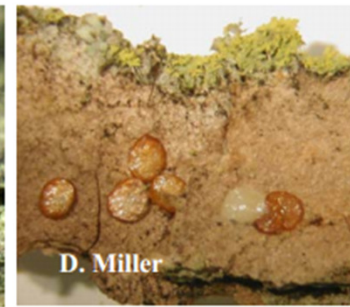
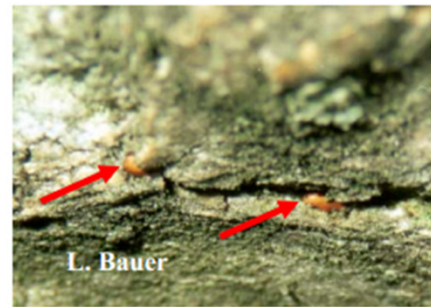




# *Oobius agrili*

- Originally from China
- 2 generations per EAB egg-laying season.
- Each adult females parasitizes ~80 eggs
- Potential to kill 60% of EAB eggs laid in a season.
- Overwinter as larva inside of EAB eggs.

EAB eggs start out white when newly laid and darken as they mature.



EAB eggs often turn dark brown when parasitized by *O. agrili*; unparasitized, healthy eggs remain amber in color (center egg).



# *Tetrastichus planipennisi*

- Originally from China
- 1-2 generations per summer-fall season.
- Adults female lays egg inside larva under the bark.
- Polyembryony - A single EAB larva can produce >130 *T. planipennisi*
- Potential to kill 50% of EAB larva in trees in a season.
- Overwinter as larva in EAB larval



## EAB larva

*T. planipennisi* larvae emerge from host remains and pupate in the gallery.



*T. planipennisi* larvae develop asynchronously, and larvae and pupae are often found together inside one EAB gallery.





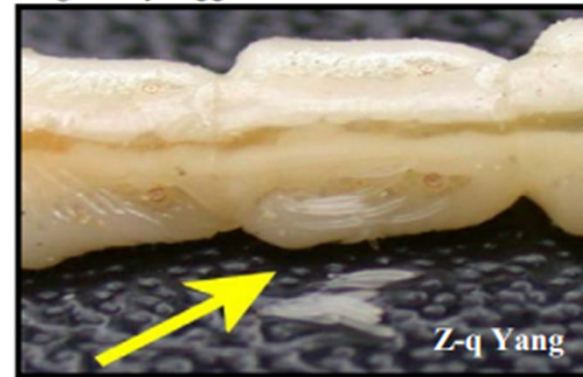
# *Spathius agrili*

- Originally from China
- 1-2 generations per summer-fall season.
- Adults female lays ~8 eggs next to larva under the bark.
- Potential to kill 90% of EAB larva in trees per season.
- Overwinter as larva or pupa in EAB larval galleries.



## EAB larva

*S. agrili* lays eggs on the surface of EAB larvae.



Larvae of *S. agrili* feed externally on an EAB larva.



# Imidacloprid





# DON'T MOVE FIREWOOD

Our forests are threatened by nonnative insects that can kill large numbers of trees. Three recently introduced insects—emerald ash borer, Asian longhorned beetle, and Sirex woodwasp—are wood-infesting species that can be transported long distances in firewood. Once transported into new areas, these insects can become established and kill local trees. We must **STOP THE SPREAD** of these insects and protect our forests and trees.

## How you can help:

- Leave firewood at home—do not transport it to campgrounds or parks.
- Use firewood from local sources.
- If you have moved firewood, burn all of it before leaving your campsite.



Inset photo: Asian longhorned beetle larva (courtesy of Thomas B. Denholm, New Jersey Dept. of Agriculture; [www.forestryimages.org](http://www.forestryimages.org))

# HELP STOP INVASIVE PESTS

For more information, visit the following Web sites:  
[www.emeraldashborer.info](http://www.emeraldashborer.info)  
[www.na.fs.fed.us/tftp](http://www.na.fs.fed.us/tftp)  
[www.aphis.usda.gov/ppq/ep](http://www.aphis.usda.gov/ppq/ep)



USDA Forest Service  
 Northeastern Area  
 State and Private Forestry  
 NA-PR-02-06  
 April 2006  
[www.na.fs.fed.us](http://www.na.fs.fed.us)

The USDA is an equal opportunity provider and employer.





# A special thank you to:

- The Emerald Ash Borer Biological Control Release and Recovery Guidelines-a collaborative effort between USDA, APHIS, ARS, USFS, and state Departments of Agriculture.

The New Jersey's Forests 2008 resource bulletin-a collaborative effort between USDA, USFS, and the Northern Research Station.

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