Introduction to the Emerald Ash Borer Community Management Plan

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Outline

1. Emerald Ash Borer
2. Potential Impact
3. Other Native Species
4. Survey & Detection
5. Management Options
6. PA Community Plan
Emerald Ash Borer

*Agrilus planipennsis* Fairmaire (Coleoptera: Buprestidae)
Native range of Emerald Ash Borer in Asia

EAB Native Range
Presence of emerald ash borer has also been reported in adjacent Mongolia and Russia.

2000 Miles
Host Species in Asia

Fraxinus chinensis

Fraxinus rhynchophylla

Fraxinus mandshurica
Life Cycle

- June to July: 1 mm
- May to July: 7-14 mm
- July to April: 26-32 mm
- May to June: 7-14 mm

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- May to July: 7-14 mm
- July to April: 26-32 mm
- May to June: 7-14 mm
Distribution in North America

Invasive Emerald ash borer found in New Hampshire

The emerald ash borer, an invasive species of beetle that attacks and kills ash trees, was spotted in New Hampshire for the first time last month, officials from the N.H. Department...
**Damages and Symptoms**

- **Dieback**
- **Serpentine gallery**
- **Epicormic shoots**
- **Bark splits**
- **Tree Mortality**
- **D-shaped exit hole**
Host Species in NA

- Fraxinus pennsylvanica
- Fraxinus americana
- Fraxinus nigra
- Fraxinus quadrangulata
- Fraxinus profunda
Potential Impact
Resources at Risk: USA

16 species, 8 billion trees

USDA Forest Service data sources:
County-level estimates of ash densities derived from Forest Inventory and Analysis (FIA) Data.
Forest/non-Forest overlay derived from AVHRR satellite Imagery.
Resources at Risk: Pennsylvania

- 5 species
- 308 million trees
- 3.6% forest cover

Map credit: P. Roth
53 million ash trees were killed by 2009

Kovacs et al. (2010)

- 25 states
- 38 million trees

- 2009-2019
- 17 million trees
  - Treatment
  - Removal
  - Replacement
- $10.7 billion
Other Native Agrilus Species

Bronze Birch Borer
*A. anxius* Gory
- Bronze-black
- Length 12-13 mm
- Host: *Betula* spp.

Two-lined Chestnut Borer
*A. bilineatus* (Weber)
- Pubescent lines on elytra
- Length 11 mm
- Host: *Quercus* spp.

*A. subcinctus* Gory
- Pubescence on elytra
- Length 4 mm
- Host: *Fraxinus* spp.

*A. cyanescens* Ratzeburg
- Metallic blue
- Length 8 mm
- Host: *Lonicera* spp.
Other Native Ash Borers

Ash/Lilac borer
*Podosesia syringe* (Harris)

Ash and privet borer
*Tylonotus bimaculatus* Haldeman

Banded ash borer
*Neoclytus caprea* (Say)

Banded ash clearwing
*P. aureocincta* Purrington & Nielson

Eastern ash bark beetle
*Hylesinus aculeatus* Say

Redheaded ash borer
*N. acuminatus* (Fabricius)
Other EAB Look-alikes

- Six-spotted tiger beetle
  *Cicindella sexguttata* Fabricius

- Metallic wood-boring beetle
  *Dicerca divaricata* (Say)

- Caterpillar hunter
  *Calosoma scrutator* (Fabricius)

- Japanese beetle
  *Papillia japonica* Newman

- Green June beetle
  *Cotinis nitida* (L.)
Survey & Detection

2010 Pennsylvania Emerald Ash Borer Surveillance Lab Results

31 Positive Survey Grids and 6873 Samples Processed

- **FAB Survey Grids that are Positive**
- **EAB Survey Grids that are Negative**
Detection Timeline

Confirmed in 33 counties

- June 22, 2007 in Cranberry, Butler
- Allegheny, Beaver, Butler & Lawrence quarantined
- 2008 Mercer
- 2010 Bedford, Centre, Clarion, Cumberland, Futon, Somerset, Union
- 2011 Huntingdon, Lycoming, Sullivan, Wyoming
- 2012 Bucks, Clinton, Franklin, Jefferson, Montour, Northumberland, Perry, Snyder, Venango
- 2013 Cambria, Fayette
Management Option A: *Tree Removal*
Management Option B: Chemical Control

<table>
<thead>
<tr>
<th>Method</th>
<th>Insecticides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Treatment</td>
<td>Imidacloprid (<em>Merit, Xytect</em>)</td>
</tr>
<tr>
<td>Trunk Injection</td>
<td>Emamectin Benzoate (<em>Tree-äge</em>); Imidacloprid (<em>IMA-jet, Imicide, Pointer</em>); Bidrin (<em>Inject-A-cide</em>)</td>
</tr>
<tr>
<td>Bark Spray</td>
<td>Dinotefuran (<em>Safari</em>)</td>
</tr>
<tr>
<td>Cover Spray</td>
<td>Pyrethroids (<em>Astro, Onyx, Tempo</em>); Carbaryl (<em>Sevin</em>)</td>
</tr>
</tbody>
</table>

- Used as trunk injection
- 0.10-0.40 g a.i. /dbh inch
- 99% control for current year
- Effective for 2 years
- Price tag ~ $500/L (40 g a.i.)
Management Tools C: Biological Control

<table>
<thead>
<tr>
<th>Year</th>
<th>Oobius agrili</th>
<th>Spathius agrili</th>
<th>Tetrastichus planipennisi</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>0 (0)</td>
<td>9,900 (3)</td>
<td>4,100 (4)</td>
</tr>
<tr>
<td>2010</td>
<td>5,452 (5)</td>
<td>55,200 (8)</td>
<td>106,000 (8)</td>
</tr>
<tr>
<td>2011</td>
<td>26,276 (12)</td>
<td>92,257 (12)</td>
<td>147,111 (12)</td>
</tr>
<tr>
<td>2012</td>
<td>77,480 (14)</td>
<td>77,488 (14)</td>
<td>120,670 (14)</td>
</tr>
</tbody>
</table>

All infested states but CT, KS, MA, VA, NH
What can you do as a community?
## Management Strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Tree Removal</th>
<th>Chemical Control</th>
<th>Biological Control</th>
<th>Cost</th>
<th>Ash Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Action</td>
<td>Maximum (later)</td>
<td>No</td>
<td>No</td>
<td>High (later)</td>
<td>No</td>
</tr>
<tr>
<td>Selective</td>
<td>Moderate (gradual)</td>
<td>Yes</td>
<td>No/Yes</td>
<td>Moderate (lasting)</td>
<td>Only high priorities</td>
</tr>
<tr>
<td>Preemptive</td>
<td>Maximum (now)</td>
<td>No</td>
<td>No</td>
<td>High (now)</td>
<td>No</td>
</tr>
<tr>
<td>Aggressive</td>
<td>Minimum (gradual)</td>
<td>Yes</td>
<td>Yes</td>
<td>High (lasting)</td>
<td>Maximum</td>
</tr>
</tbody>
</table>
Lessons Learned: No Action

Windsor, ON

- EAB found in 2002
- 9% ash in the city
- 6000 dead ash in 2005
- only 5% ash survived
- cost $4 million (remove and replace)

Ann Arbor, MI

- EAB found in 2003
- 17% ash in the city
- 10,000 dead ash in 2005
- 7000 removed so far
- cost $2 million (remove only)
Lessons Learned: Selective

Fort Wayne, IN

- EAB found in 2006
- 13,500 city ash trees
- 15 yr plan (2009)
- Remove dead trees
- Protect 1,000 with imidacloprid
- Annual cost $900 K (remove, treat and replace)

Northbrook, IL

- EAB found in 2010
- 3,000 parkway trees
- 4 year plan (2010)
- Remove 730 weak trees
- Protect 268 with emamectin benzoate
- Total cost $426,500 (remove, treat, and replace)
Lessons Learned: Preemptive

Toledo, OH

- EAB found in 2004
- 9,100 city trees
- 1,100 tree removed w/ federal funds
- Eradication abandoned in 2005
- More dead trees
- Future cost unknown

Grand Rapids, MI

- 10,000 city trees
- 10 year plan (2007)
- Replace all ash trees
- Total cost $7-12 millions
- EAB found in 2009
- Dead tree removal
- $600 K spent
Lessons Learned: Aggressive

Milwaukee, WI

- EAB close by in 2008
- 33,000 city trees
- Treat all trees with emamectin benzoate
- Cost $1.6 million (2 yr)
- Remove them in 20 yr
- Total cost $25 million (remove, treat and replace)

London, ON

- EAB found in 2006
- 9,938 city trees
- 15 year plan (2011)
- Protect 384 trees with Azadirachtin
- Remove & replace others
- Total cost $14.3 million
Communities in Pennsylvania

- 67 counties
- 56 cities
- 958 boroughs
- 1 town (Bloomsburg)
- 1,547 TOWNSHIPS (93 - 1st class, 1454 - 2nd class)

Parks and Natural Areas:
- National park
- USACE lands
- State parks
- State forests
- Game lands
- Subdivisions
- Nature reserves
- Golf course
- Schools
- Private properties
Why Community Plan?

Urban trees

✓ Have compensatory values
✓ Part of the community
✓ Being cared by professionals
✓ Resource worthy
✓ Legal requirement
Untreated ash trees after EAB peak, Belvedere Dr., Toledo, OH, June 2009.
A Community EAB Management Plan is:

a written document specifically drafted to deal with current or anticipated EAB infestations in its urban forests. It contains clear objectives and viable approaches in the management of EAB at the community level. When adopted, it becomes the official action plan for the community to use in its battle against EAB for the protection of its ash resources.
Plan Components

http://www.dcnr.state.pa.us/forestry/insects/disease/eab/index.htm

✓ Administration
✓ Executive summary
✓ Authority
✓ Introduction
✓ Ash resources
✓ EAB infestation
✓ Approaches
✓ Wood utilization
✓ Material disposal
✓ Replanting
✓ Community outreach
✓ Cost/benefit analysis
✓ Fiscal planning
✓ Time table
✓ Data Collection
✓ Reporting
Implementation

Tree Inventory
Tree Removal
Chemical Control
Biological Control

Cost / Benefit Analysis
Outreach / Public Education
Material Disposal
Replanting
Model Plan: Greenwood Furnace State Park

- Ash distribution at Plot A in Greenwood Furnace State Park
- EAB found in 2011
- Initiate plan 2/12
- Selective approach
- Inventory 4/12
- Tree removal 5/12
- Parasitoids release 5-9/12
- Chemical control 6/12
- Crown rating 7/12
- Official plan 12/12
- Removal & replanting 04/13
Model Plan:
Borough of West Chester

- EAB not found
- Partnered w/ WCU
- Initiate plan 2/12
- Selective approach
- Tree inventory 5/12
- Crown rating 7/12
- Tree removal (TBA)
- Parasitoids release (?)
- Official plan 12/12
- Chemical control 2013
Summary

✓ EAB is NOT just another forest pest

✓ Can kill apparently healthy ash trees

✓ Close to 100% infested trees die within 4-5 yr

✓ Massive ash mortality and increased safety hazard

✓ Need a plan if ash is found in your area

✓ Select appropriate strategies to meet your goals

✓ Contact DCNR for more info and help