Ecological and Hydrological Impacts of Emerald Ash Borer

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Background

- Woodboring beetle native to Asia
- First identified in Michigan in 2002
- Attacks native ash >1 inch diameter
- Tree death within 2-3 years
- No biological / silvicultural control
News Release

MEDIA ADVISORY
MDA and partner organizations will conduct media availability at 3:30 p.m. today to discuss this finding. The availability will be held at Hampden Park in St. Paul, at the corner of Bayless and Raymond avenues.

FOR IMMEDIATE RELEASE: Thursday, May 14, 2009
CONTACT: Michael Schommer, MDA Communications, 651-260-2956

Minnesota officials find emerald ash borer infestation in St. Paul neighborhood
Plans underway to quarantine firewood and certain ash material for Ramsey and Hennepin counties

News Release

FOR IMMEDIATE RELEASE:
Thursday, April 29, 2010
CONTACT:
Michael Schommer, Communications Director
651.201.6629, Michael.schommer@state.mn.us

MDA confirms emerald ash borer infestation in Houston County

ST. PAUL, Minn. – The Minnesota Department of Agriculture today confirmed an emerald ash borer (EAB) infestation in three trees in rural Houston County along the Mississippi River. The infested trees are in the Upper Mississippi River Fish and Wildlife Area, about 1 mile from an infestation in Victory, Wisconsin, that was found in
Cooperative Emerald Ash Borer Project
EAB locations in Illinois, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, Virginia, Wisconsin, West Virginia and Canada

May 13, 2010

Map Key:
- Red: EAB positive
- Yellow: Site under evaluation (symptomatic, found in flower, or evaluated)
- Blue: State quarantine boundary
- Orange: National Forest
- Green: Map boundary
- Black: State quarantine - urban (UI)
- Orange: State quarantine - rural (UR)

Sources of available data:
- Department of Agriculture
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Forest Service
- U.S. Department of Agriculture, Forest Service
- USDA Forest Service, Cooperative State Research, Education, and Extension Service
- U.S. Geological Survey
- U.S. Fish and Wildlife Service
- State and local governments
- University of Illinois

Map scale:
- 0 - 37.5 miles
- 0 - 60.8 kilometers

Legend:
- State boundary
- County
- City

Map created by the USDA Forest Service, Cooperative State Research, Education, and Extension Service.
EAB Response / Management

Current and past efforts
• Much effort / cash on EAB control
  - largely ineffective
• Urban areas targeted

Need info for management
• Planning and mitigation to address loss of ash in N. America
• Maintenance of ecological function
• Non urban areas with highest potential for impact
Ash in Minnesota

- White ash - upland hardwood forest
- Green Ash - floodplain forests
- Black Ash - black ash wetlands
Black ash wetlands

~ 1 million acres in MN

Wetland characteristics
- >60% stand basal area
- Very poorly drained soils
- NPC – Wfn55, Wfn64

“foundational” species
- Strongly regulates ecosystem processes
- no obvious replacement

Potential for significant impacts on hydrology and water quality
Project Inception

Assumption: EAB will extirpate black ash

Info need: how will hydrology and plant communities respond to ash loss

Project Team: Tony D’Amato et al. (UMN, MFRC, USFS)

Design experiment to mimic impact of EAB in black ash wetlands

Assess response / develop recommendations
Framework

**Overarching Goal:**
Determine ways to keep forested black ash wetlands forested

**Objectives:**
1) Determine EAB impacts on native plant communities, regeneration, hydrology
2) Assess potential for management to mitigate impacts
Hypotheses

• Mortality of black ash will increase water levels and shift vegetation communities dominated by grasses, sedges, alder, and willow.

• Magnitude of change in hydrology and vegetation will be greater in harvested stands compared to simulated EAB-induced mortality

• Shallow-rooted, shade tolerant tree seedlings will have the greatest growth and survival beneath black ash overstories

• Wetland shrub species will have the greatest growth and survival within areas of ash mortality
Site Characteristics

Chippewa National Forest

>70% of basal area in black ash

Range of soil texture and “wetness”

Variation in stand structure
Experimental Design

- Randomized complete block with split-plot
  - Main treatment – ash mortality
  - Split-plot – planting
- 8 replications across 3 sites
- 4 acre experimental units
## Treatments – Ash mortality

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Purpose</th>
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<tbody>
<tr>
<td>Girdle</td>
<td>Assess impact of EAB on ecological functions including hydrology</td>
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<tr>
<td>Harvest – clearcut</td>
<td>Assess impact of preemptive utilization prior to EAB arrival; determine planting survival and efficiency</td>
</tr>
<tr>
<td>Harvest – patchcut</td>
<td>Assess impact of alternative preemptive utilization prior to EAB arrival; determine planting survival and efficiency</td>
</tr>
<tr>
<td>Control</td>
<td>Reference for treatment effects; assess potential for understory planting prior to EAB arrival</td>
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Treatments - Planting

Variety of potential candidates
- tamarack
- Y. birch
- N. white cedar
- Manchurian ash
- white spruce
- silver maple
- swamp white oak
- red maple

Fall planting
- pre and post treatment

Competing vegetation control
- mechanical
Measures – Vegetation

• Regeneration, growth, survival
  - tree regeneration
  - planted trees
  - invasive species
  - understory

• Explanatory variables
  - soil environment
  - Light availability
  - browse
Measures - Hydrology

- Water table depth
  - wells with pressure transducers

- Evapotranspiration
  - sap flow, diurnal water table fluctuation, throughfall, surface evaporation

- Meteorological variables

- Modeling component
## Timeline

5 year project length (intent for longer assessment)

<table>
<thead>
<tr>
<th>Task</th>
<th>Date</th>
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<tbody>
<tr>
<td>Well installation</td>
<td>Fall 2010</td>
</tr>
<tr>
<td>Pretreatment site characterization</td>
<td>2011</td>
</tr>
<tr>
<td>Mortality treatment installation</td>
<td>Winter 2011-12</td>
</tr>
<tr>
<td>Tree planting</td>
<td>Fall 2011, 2012</td>
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<tr>
<td>Measure vegetation, planting, and hydrologic response</td>
<td>2012-2014</td>
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<tr>
<td>Report on response, initial management recommendations</td>
<td>2015</td>
</tr>
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</table>
Outcomes

• Estimates of impacts
  - regeneration / growth
  - invasive species
  - hydrologic modeling

• Possible additional assessment
  - water quality
  - carbon storage / flux

• Management recommendations
  - harvest type (or nothing), planting mix

• EAB spread in cold climates (led by R. Venette)
In the meantime.....

- Threat is not imminent!
  - quarantines
  - bug is slow-moving
  - >20 yrs?

- Utilize silvicultural techniques / NPC
  - DNR silvics interpretations for Wfn 64
  - operational experimentation

- Draft guidelines available
  - MN Forest Resources Partnership
  - MN DNR
Contact info

Comments, suggestions, and inquiries:

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