Emerald Ash Borer
Asian Longhorned Beetle
1000 Cankers Disease

John Bedford

Pest Response Program Manager

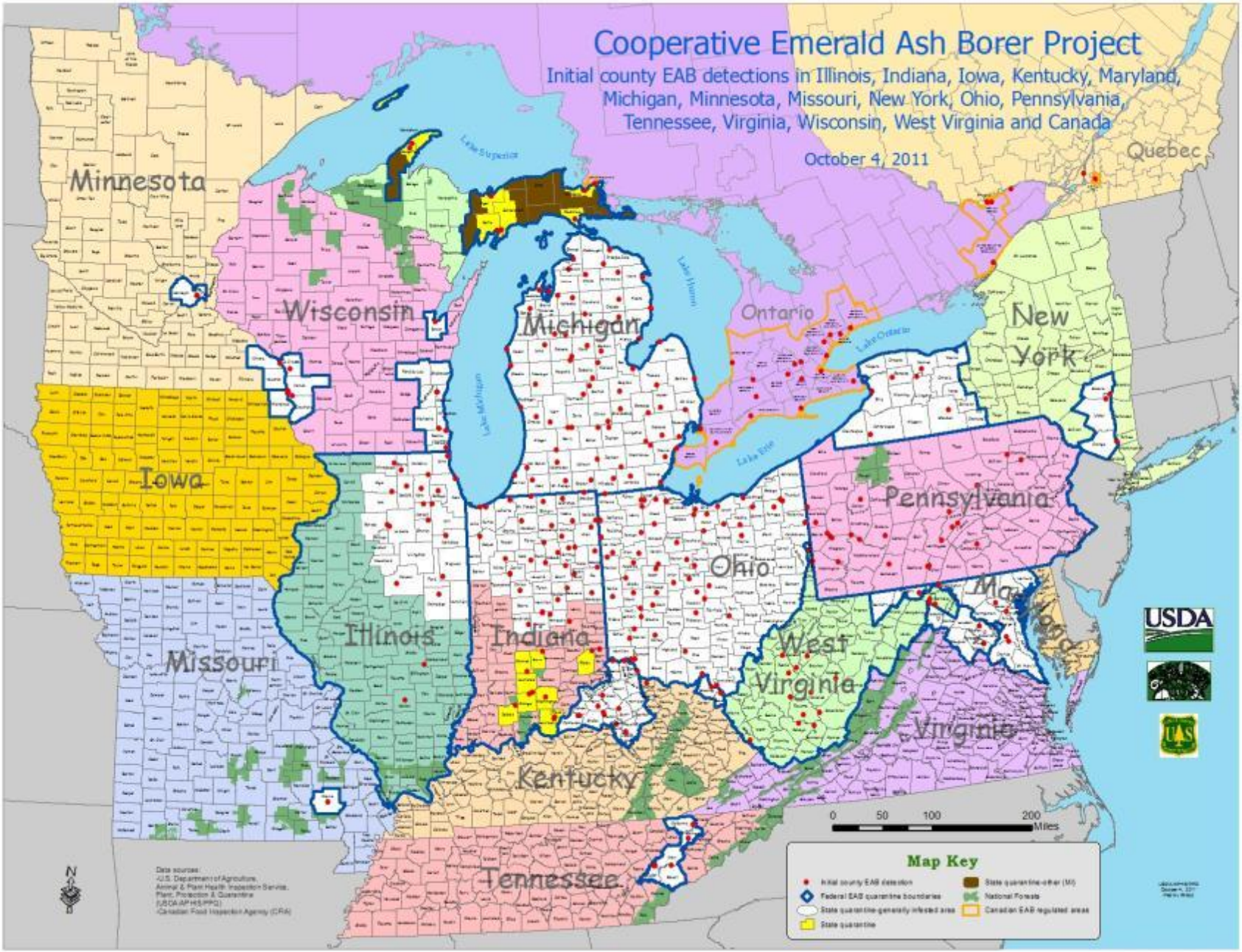
Michigan Department of Agriculture & Rural Development

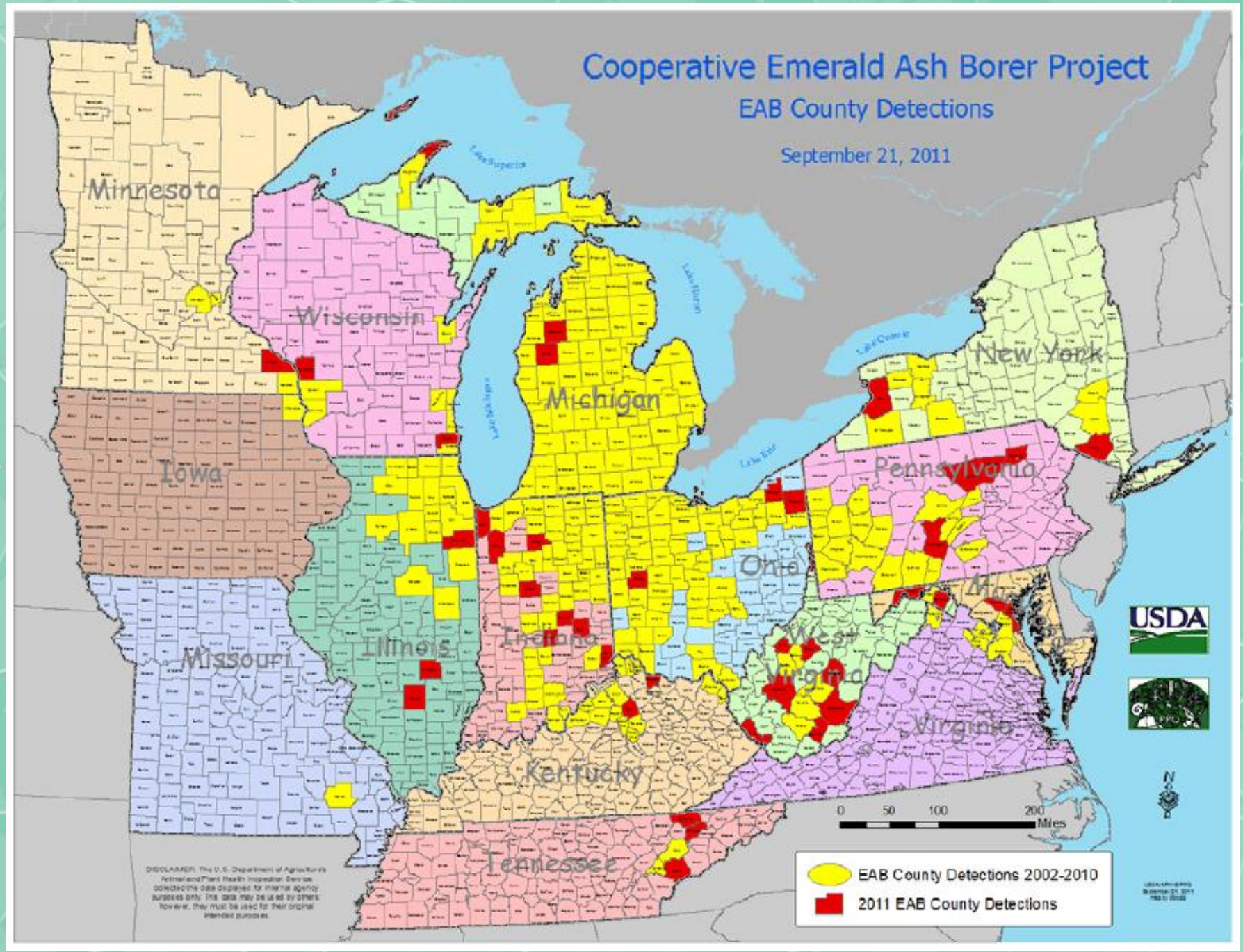
Pesticide and Plant Pest Management Division

MiSAF & MiACF
October 14, 2011

Protect • Promote • Preserve

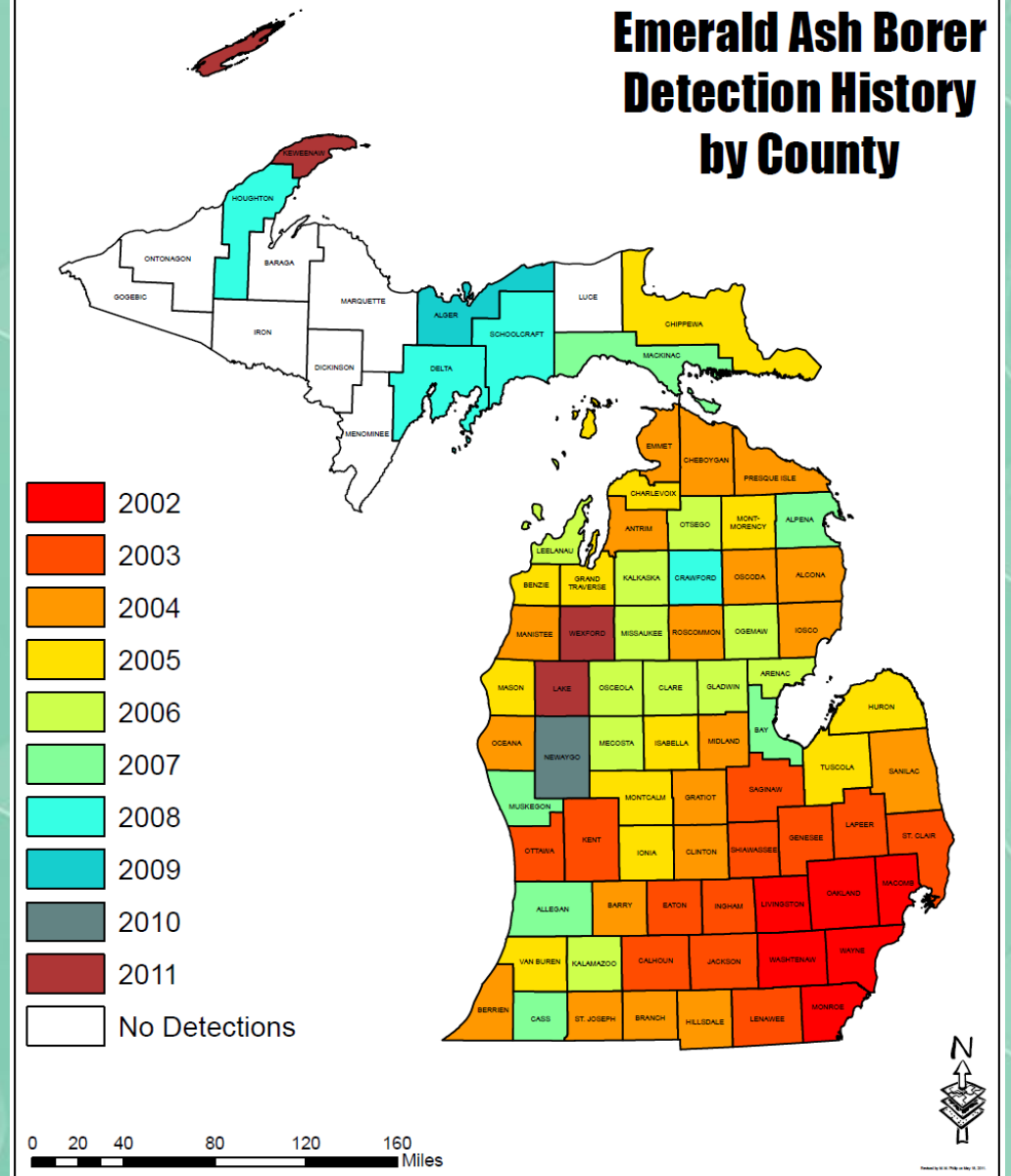
Emerald Ash Borer

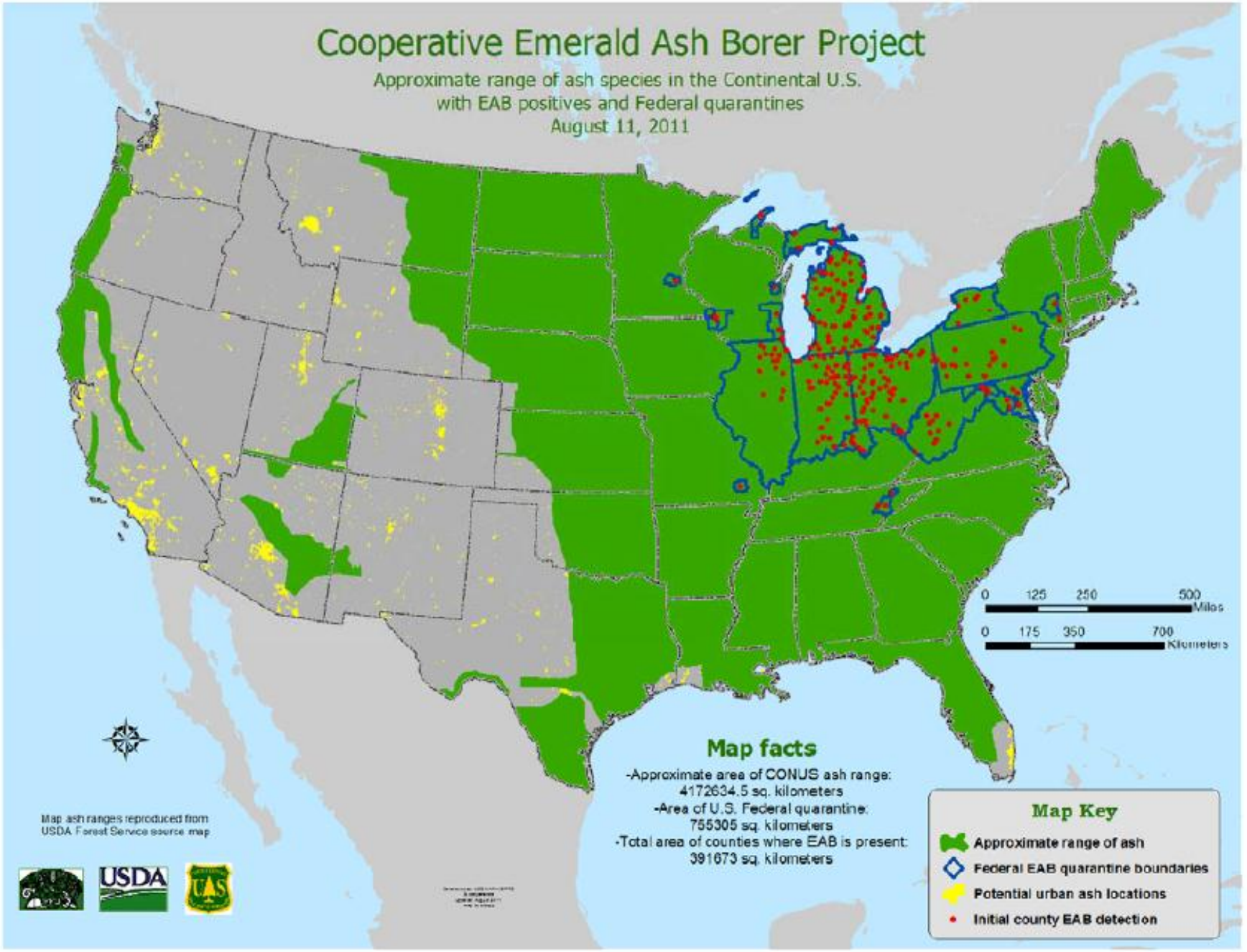

Cooperative Emerald Ash Borer Project
Initial county EAB detections in Illinois, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, Tennessee, Virginia, Wisconsin, West Virginia and Canada
October 4, 2011
Minnesota
Wisconsin
Michigan
Ontario
Quebec
New York
Iowa
Illinois
Indiana
Ohio
Pennsylvania
Missouri
West Virginia
Virginia
Kentucky
Tennessee
USDA
0 50 100 200 Miles
Map Key
Initial county EAB detection
Federal EAB quarantine boundaries
State quarantine-generally infested area
State quarantine
State quarantine-other (MI)
National Forests
Canadian EAB regulated areas

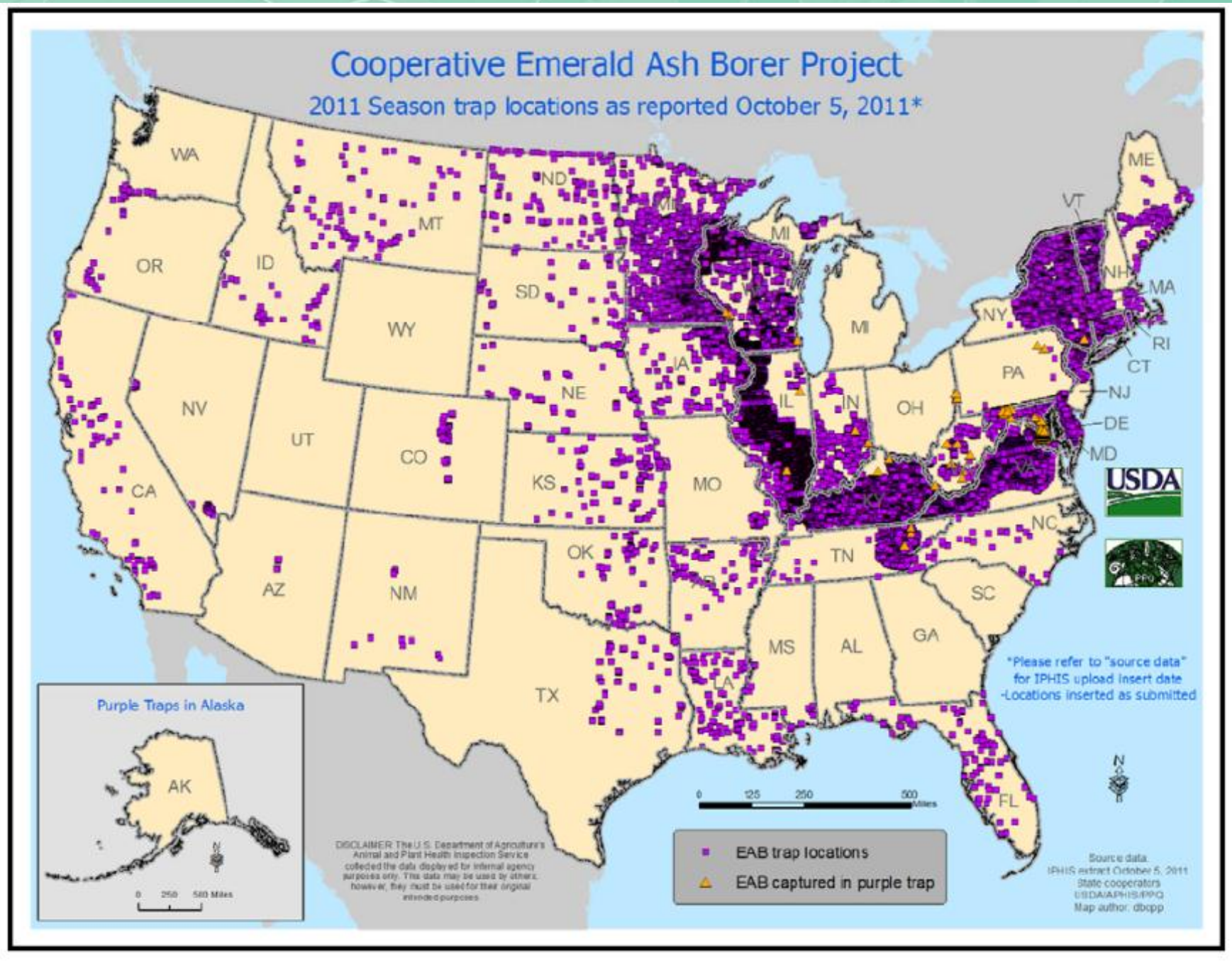

Cooperative Emerald Ash Borer Project
EAB County Detections
September 21, 2011
Minnesota
Wisconsin
Michigan
Iowa
Illinois
Missouri
Indiana
Ohio
West Virginia
Pennsylvania
New York
Virginia
Kentucky
Tennessee
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
0 50 100 200
Miles
EAB County Detections 2002-2010
2011 EAB County Detections
USDA

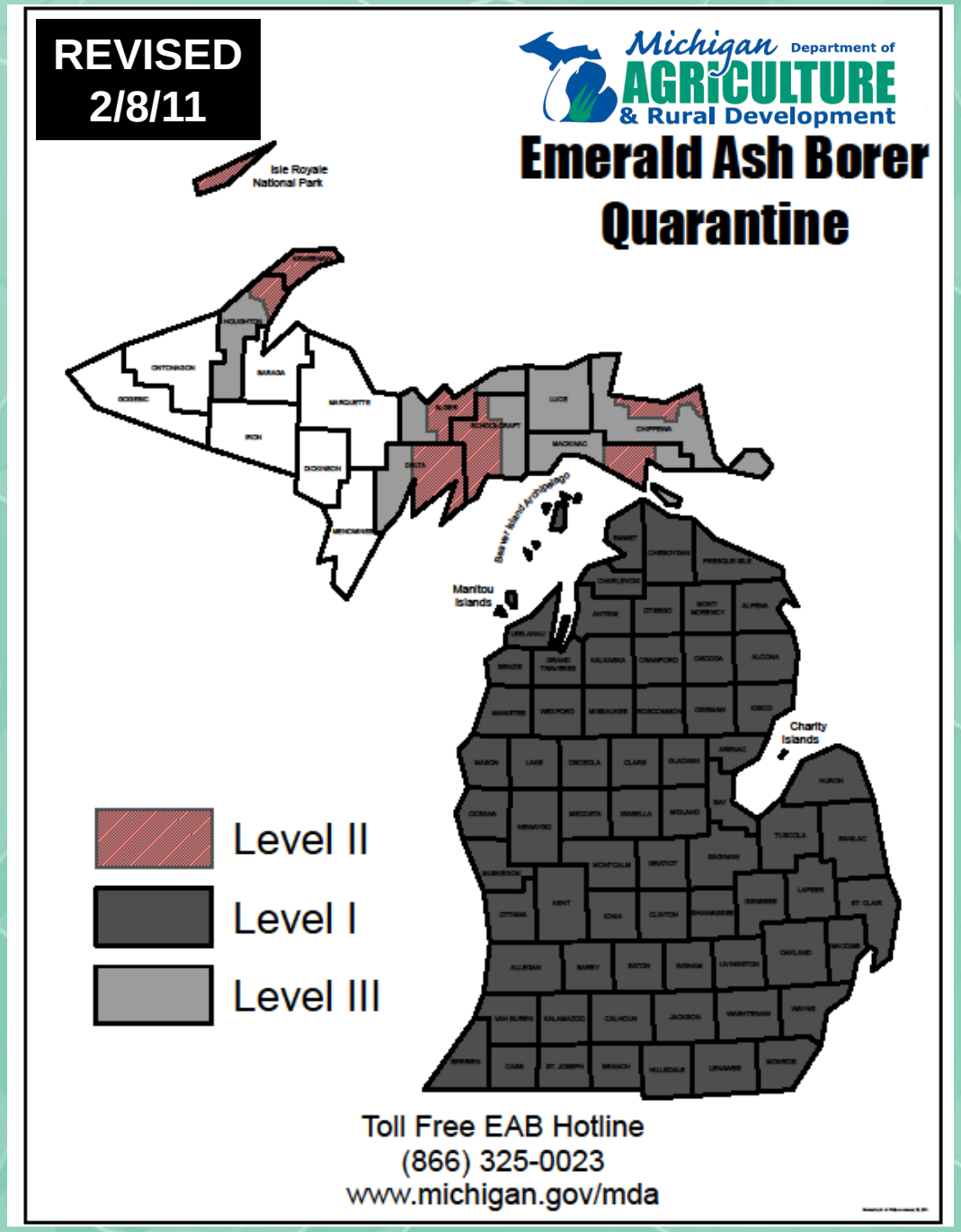
Michigan Department of AGRICULTURE & Rural Development

Emerald Ash Borer Detection History by County




Cooperative Emerald Ash Borer Project
Approximate range of ash species in the Continental U.S.
with EAB positives and Federal quarantines
August 11, 2011
0 125 250 500 Miles
0 175 350 700 Kilometers
Map facts
-Approximate area of CONUS ash range:
4172634.5 sq. kilometers
-Area of U.S. Federal quarantine:
755305 sq. kilometers
-Total area of counties where EAB is present:
391673 sq. kilometers
Map Key
Approximate range of ash
Federal EAB quarantine boundaries
Potential urban ash locations
Initial county EAB detection
Map ash ranges reproduced from
USDA Forest Service source map
USDA


Cooperative Emerald Ash Borer Project
2011 Season trap locations as reported October 5, 2011*
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
IL
MS
MI
IN
OH
TN
AL
KY
WV
GA
FL
SC
NC
VA
PA
NY
ME
VT
NH
MA
RI
CT
NJ
DE
MD
USDA
PPQ
Purple Traps in Alaska
AK
0 250 500 Miles
0 125 250 500 Miles
EAB trap locations
EAB captured in purple trap
*Please refer to "source data" for IPHIS upload insert date
-Locations inserted as submitted
DISCLAIMER The U.S. Department of Agriculture's Animal and Plant Health Inspection Service collected the data displayed for internal agency purposes only. This data may be used by others; however, they must be used for their original intended purposes
Source data:
IPHIS extract October 5, 2011
State cooperators
USDA/APHIS/PPQ
Map author: dbopp



The U.P. counties currently under quarantine are:

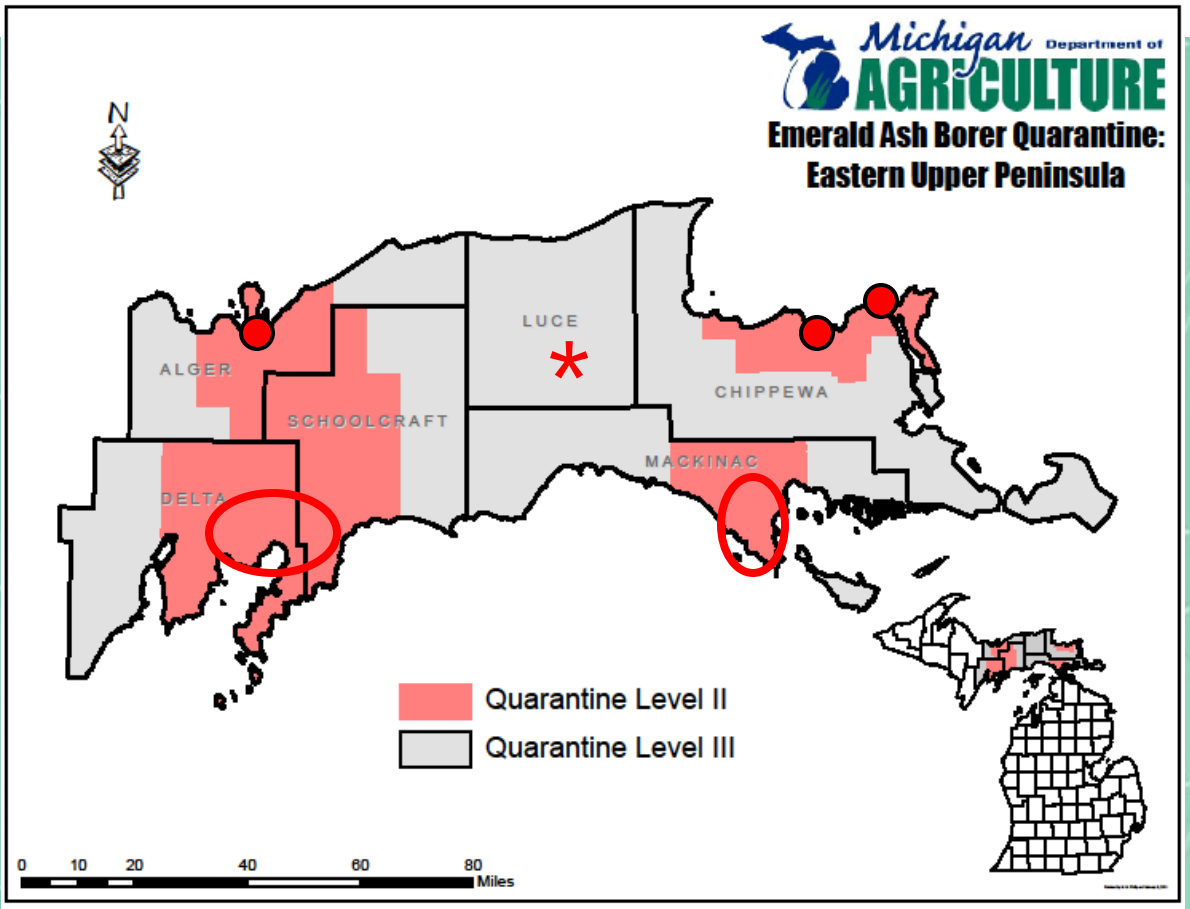
Alger, Chippewa, Delta, Houghton, Keweenaw, Luce, Mackinac, and Schoolcraft.

The **Lower Peninsula continues to be quarantined in its entirety** and is designated as a Quarantine Level I area.

Definition: Level II and Level III

- A Quarantine Level II area includes the townships, within a quarantine county, that contain and adjoin a known EAB infested site.

- A Quarantine Level III area includes the balance of the townships within that county, or in the case of Luce County, where EAB is not known to exist, an entire county that is surrounded by other Quarantine Level II areas.



EMERALD ASH BORER INTERIOR QUARANTINE

It Is **ILLEGAL** To Move Hardwood **FIREWOOD**
And Ash Materials
From Anywhere In Michigan To:

1. The **Beaver Island** Archipelago including North Fox Island and South Fox Island
2. **Isle Royale National Park**
3. **South Manitou Island** and **North Manitou Island**
4. **Big Charity Island** and Little Charity Island

Without A Valid Compliance Agreement

Quarantine violators face fines/penalties ranging from $1,000 to $250,000 and up to five years in jail.

Do Not Move Firewood

Michigan Department of AGRICULTURE & Rural Development

Burn It Where You Buy it

Michigan Emerald Ash Borer Toll Free Hotline: 1-866-325-0023

What's Regulated?

- The Emerald Ash Borer (*Agrilus planipennis*)
- Entire ash (Fraxinus spp.) trees
- Ash logs with bark
- Untreated ash lumber with bark attached
- Ash limbs and branches
- **Firewood of all hardwood species**
  NOT JUST ASH FIREWOOD
- Non-coniferous (hardwood) wood chips and non-coniferous bark chips larger than 1 inch in diameter in 2 dimensions
- Any article determined to present a risk of spreading EAB







Definition:

Firewood

Any tree parts cut into lengths shorter than 4 feet.

(Only **hardwood** firewood is regulated)

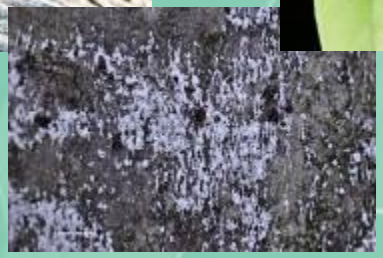
Moving hardwood firewood and other regulated articles in violation of the quarantine, including north across the Mackinac Bridge, can result in fines and penalties ranging from $1,000 to $250,000 and jail time of up to five years.

Though people can freely move firewood throughout the Lower Peninsula and some parts of the Upper Peninsula, they are urged not to as other invasive insects or diseases such as **Asian Longhorned Beetle, Beech Bark Disease, Gypsy Moth, Sirex Woodwasp, Thousand Cankers Disease and Oak Wilt** can hitch a ride on it.

People should only use local sources of firewood.







Bridge Inspection Station

- Closed 9/9/11, 11:59pm
- Does not change restriction on movement of regulated articles from LP to UP
- Random/unannounced operations will occur

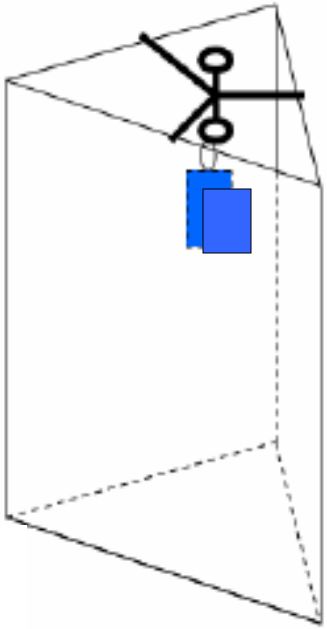
EAB Compliance Agreements

- The Michigan EAB Quarantine restricts **intra-state** movement of regulated articles from the quarantined areas within the State of Michigan
- The Federal EAB Quarantine restricts **inter-state** movement of regulated articles from the quarantined areas within the State of Michigan
- Under the authority of Act, the EAB Quarantine provides for the use of compliance agreements
- The EAB Quarantine allows for any person engaged in the handling or intrastate movement of regulated articles to enter into a compliance agreement if such person agrees to comply with the EAB Quarantine requirements and regulations

2011 Survey

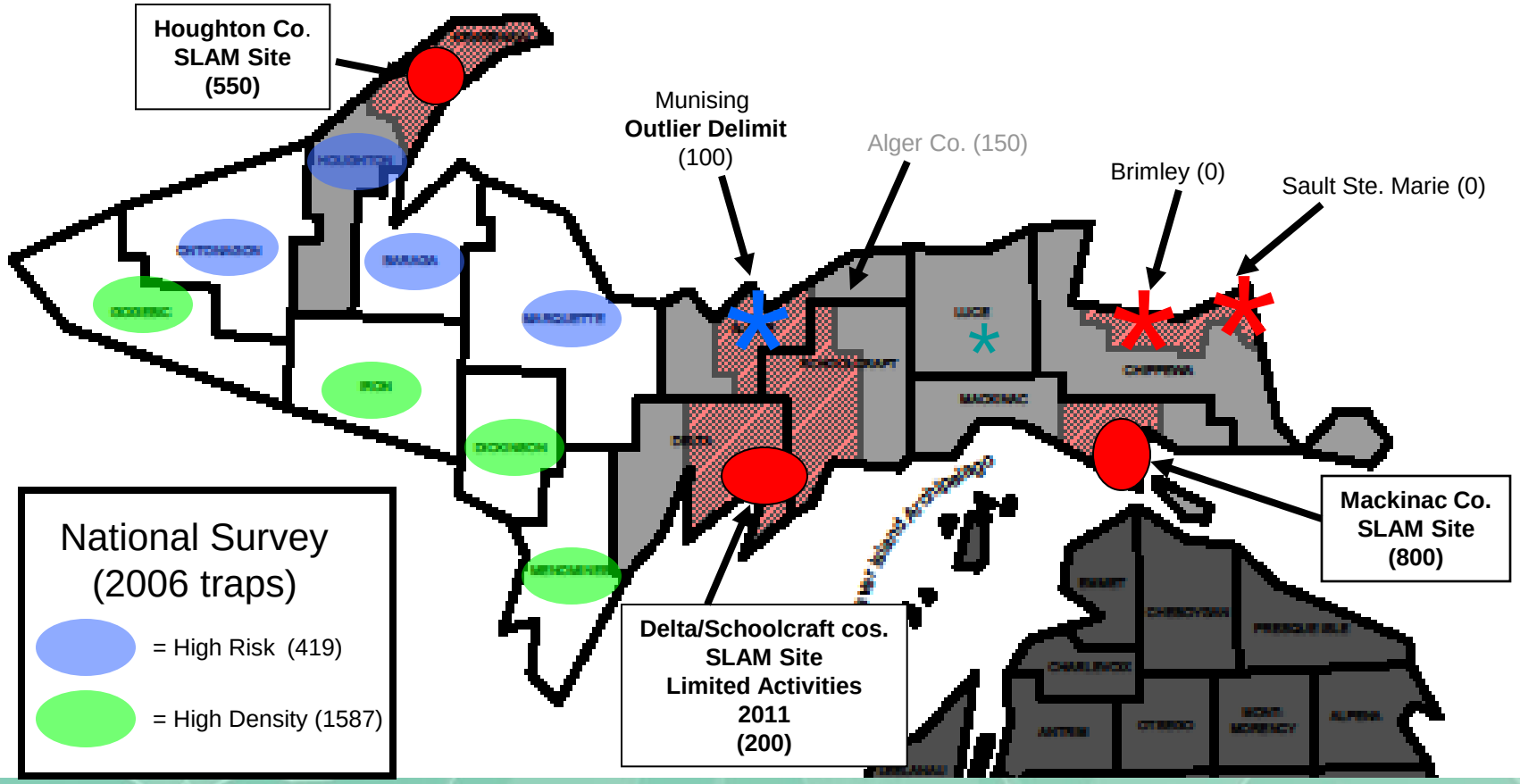
A.P.H.I.S Purple Prism Trap

Three 14” x 24” Panels



Manuka and Z-3 Hexanol Lures
Hang Inside Trap

2011 - Upper Peninsula Emerald Ash Borer Panel Trapping

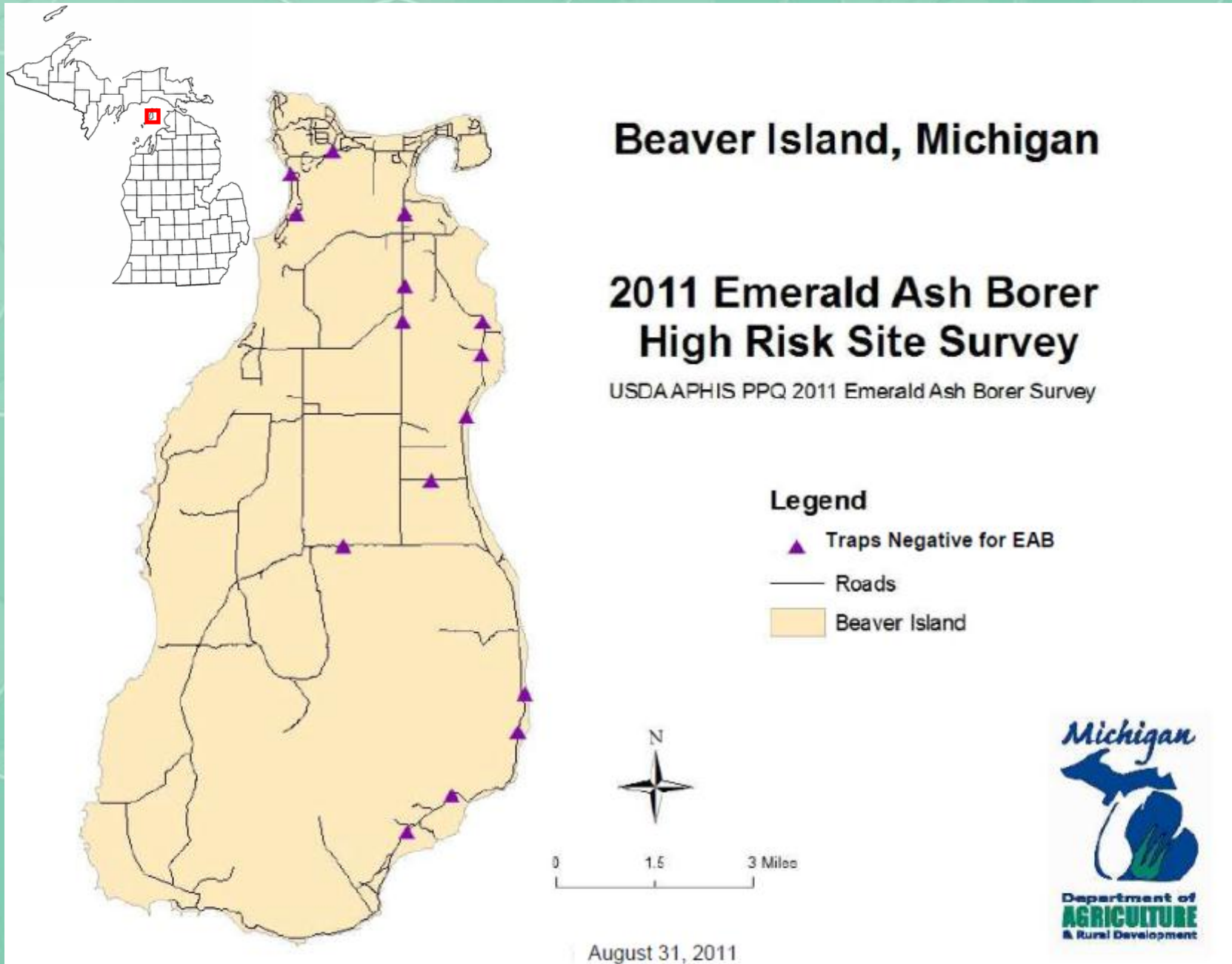


Emerald Ash Borer Quarantine

Level II

Level I

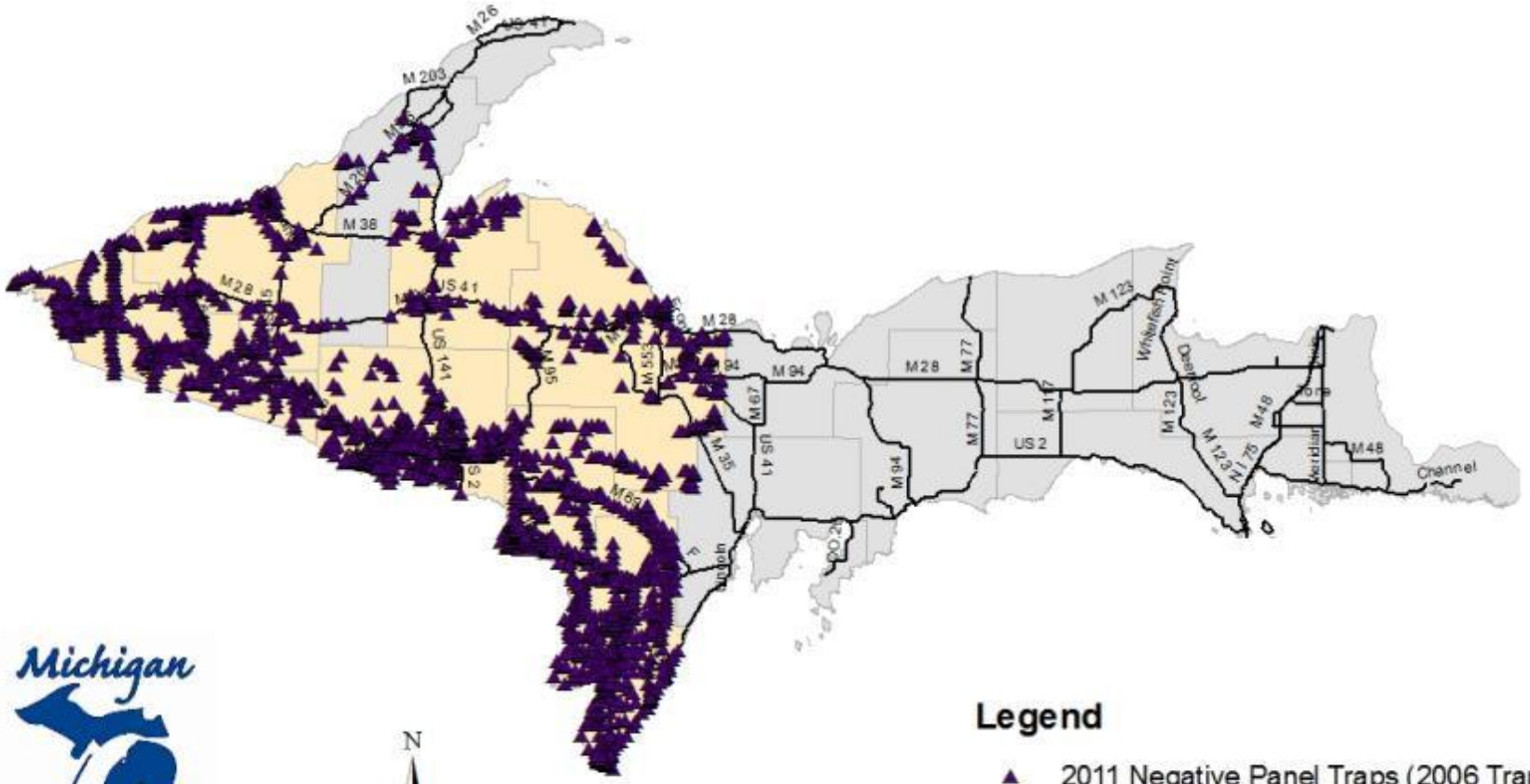
Level III


Beaver Island, Michigan
2011 Emerald Ash Borer
High Risk Site Survey
USDA APHIS PPQ 2011 Emerald Ash Borer Survey
Legend
Traps Negative for EAB
Roads
Beaver Island
N
0
1.5
3 Miles
August 31, 2011
Michigan
Department of
AGRICULTURE
& Rural Development

2011 Emerald Ash Borer High Risk Site Survey

USDA APHIS PPQ 2011 Emerald Ash Borer Survey

Upper Peninsula of Michigan



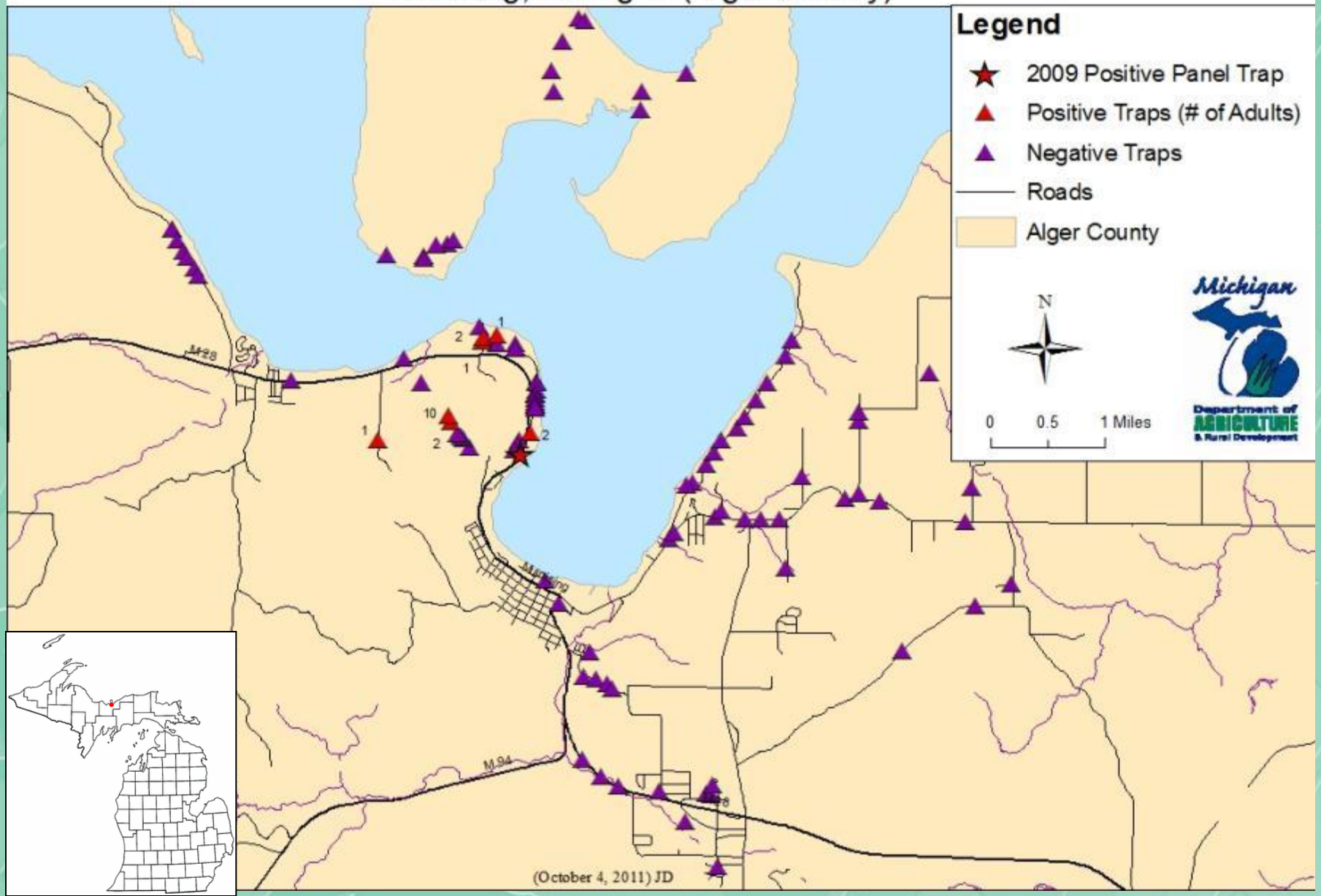
Michigan Department of Agriculture & Rural Development

(October 5, 2011) JD

2011 Emerald Ash Borer Survey

USDA APHIS PPQ 2011 Emerald Ash Borer Survey

Munising, Michigan (Alger County)

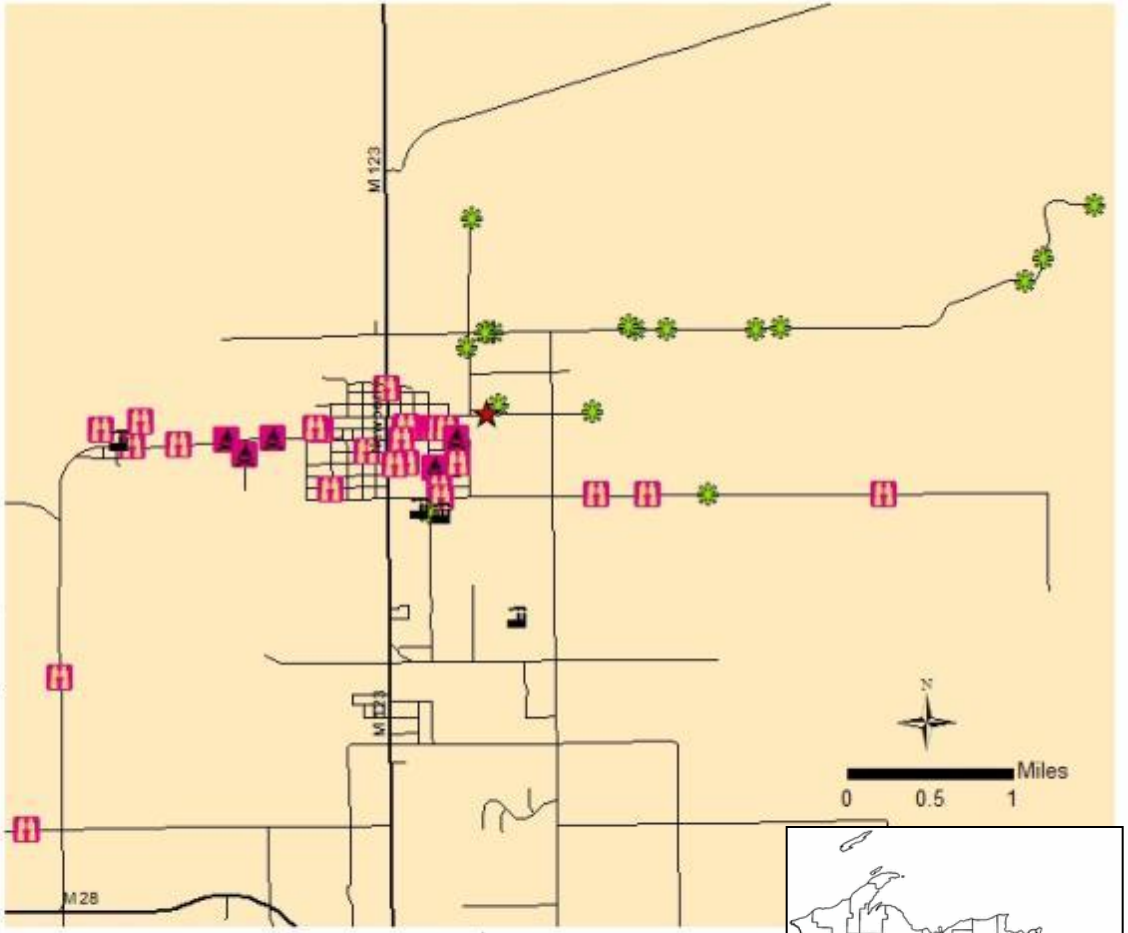


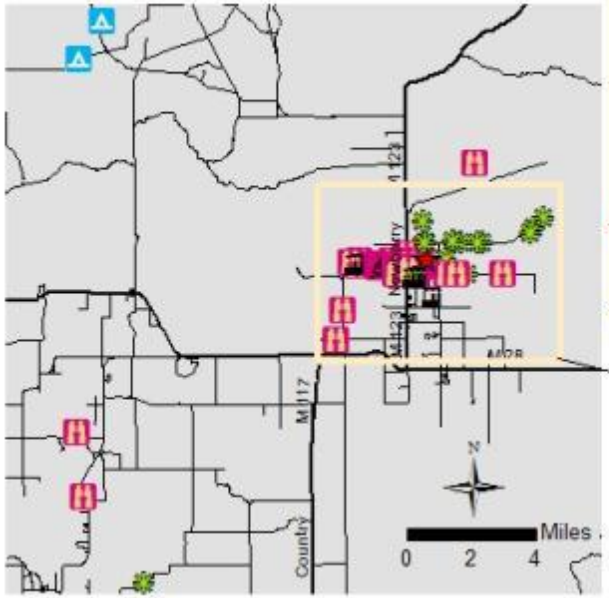
2011 Emerald Ash Borer Delimit Survey

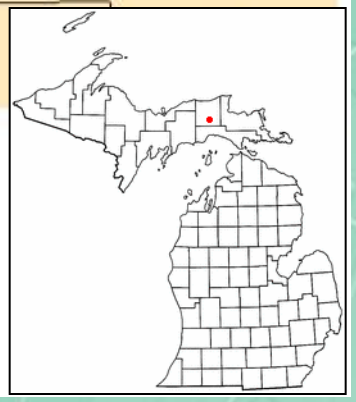
Newberry, Michigan (Luce County)

2011 Survey Activity

- Adult EAB
- Destructive Sample (18 Trees)
- Firewood Inspection (5 Piles)
- Mill/Log Yard Inspection (4 Yards)
- Visual Survey (29 Ash Trees)
- Campground (2 - No Ash)
- Roads





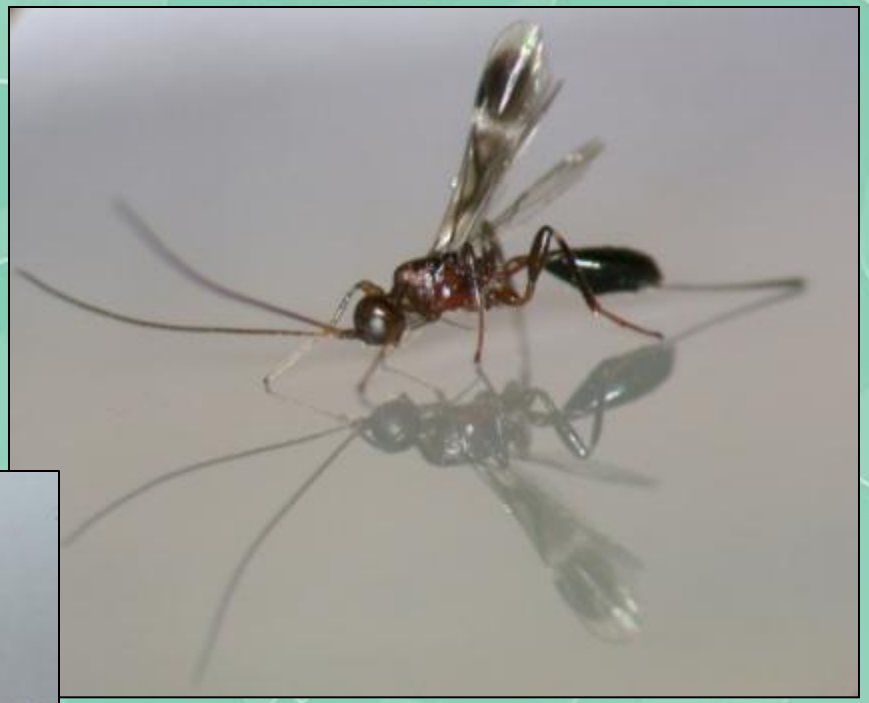


Magnified Area
City of Newberry

(October 10, 2011) JD

Oobius agrili

Spathius agrili



ASIAN

Tetrastichus planipennisi

Native

Atanycolus cappaerti

www.SLAMEAB.info

SLAM
EMERALD ASH BORER
SLOW ASH MORTALITY
PILOT PROJECT

Working to SLAM EAB

"Everyone agrees that we need to do something besides stand back and watch the ash trees die."

So goes the reasoning behind the project to SLAM – SL.ow A.sh M.ortality – in Michigan's Upper Peninsula, said Deborah McCullough, professor of forest entomology at Michigan State University (MSU). Emerald ash borer (EAB), an exotic pest from Asia, was discovered in southeast Michigan in 2002. Since then, this invader has killed an estimated 40 million ash trees in lower Michigan. Populations of EAB have now been found in at least 14 other states and two Canadian provinces, costing public and private landowners millions of dollars. The SLAM project is a collaborative effort involving MSU, the USDA Forest Service, USDA Animal and Plant Health Inspection Service (APHIS), Michigan Technological University (MTU), the Michigan Dept. of Agriculture (MDA), the Michigan Dept. of Natural Resources (MDNR), and Michigan Conservation Districts in Michigan's Upper Peninsula. The goal of the SL.A.M. pilot project in Michigan's Upper Peninsula is to delay and slow the expansion of ash mortality by reducing populations of the beetle in newly-infested sites, outside of known EAB infestations.

News

- SLAM tech teams cuts ash trees to detect EAB
- SLAM project featured in Newsletter of the Michigan Entomological Society
- Tech group works to trap exotic beetle
- Federal funds will help efforts to slow the emerald ash borer invasion in Michigan and beyond
- New strategy being developed to deal with emerald ash borer

Important Documents

- SLAM: Steps in Implementing a Strategy to SL.ow A.sh M.ortality (pdf)

Systemic insecticides for treating landscape ash trees

1. ***Imidacloprid*** (neonicotinoid chemical)
   Many products; can be applied as a soil drench or as trunk injection

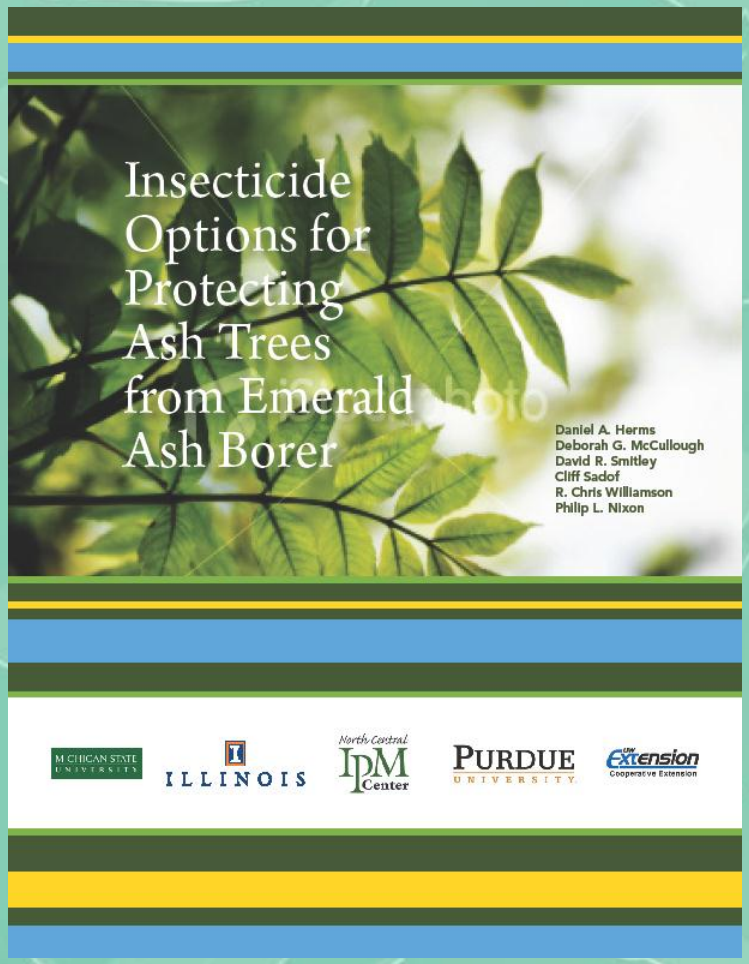
2. ***Dinotefuran*** (neonicotinoid chemical)
   Sold as Safari. Applied as a basal trunk spray or soil application

3. ***Emamectin benzoate*** (avermectin chemical)
   Sold as TREE-age. Trunk injection. (QuikJet or Tree IV)

Where can I find information on insecticides for EAB & ash protection?

Multi-state extension bulletin (June 2009)

See www.emeraldashborer.info



More Information

Websites:

www.michigan.gov/eab

www.emeraldashborer.info

www.dontmovefirewood.org

Michigan EAB toll-free hotline: (866) 325-0023

Asian Longhorned Beetle

♀

2011

♂

The adult ALB is a distinctive-looking insect with the following unique characteristics:

- 1 to 1 ½ inches in length
- Long antennae banded with black and white (longer than the insect's body)
- Shiny, jet black body with distinctive white spots
- Six legs
- May have blue feet

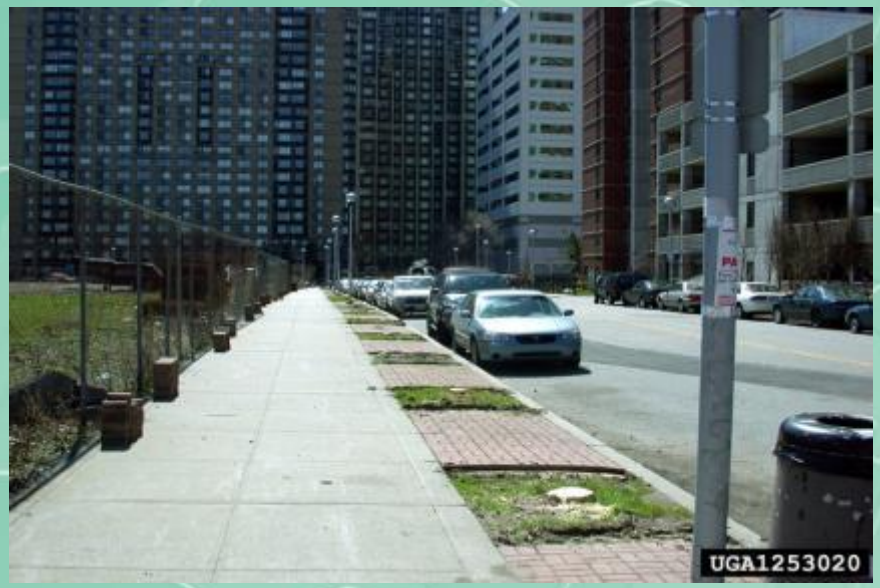
Host Plants

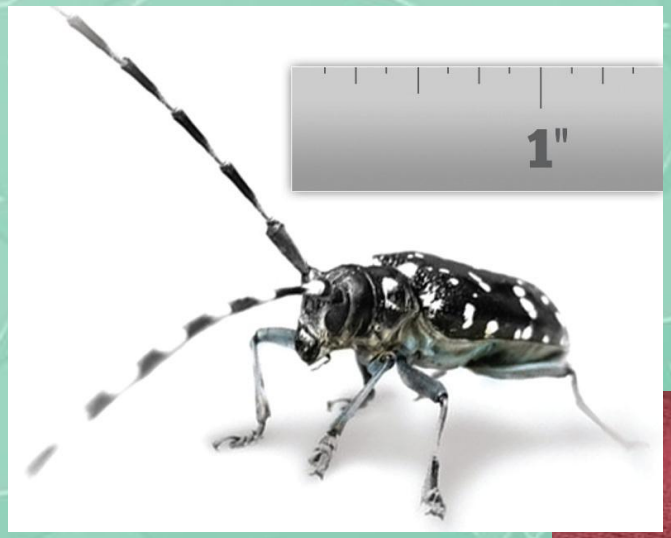
- ***Acer*** (maple)
- ***Aesculus*** (horse chestnut)
- ***Albizia*** (mimosa)
- ***Betula*** (birch)
- ***Celtis*** (hackberry)
- ***Cercidiphyllum*** (katsura)
- ***Fraxinus*** (ash)
- ***Koelreuteria*** (golden rain tree)
- ***Platanus*** (sycamore)
- ***Populus*** (poplar)
- ***Salix*** (willow)
- ***Sorbus*** (mountain ash)
- ***Ulmus*** (elm)

Origin:
Asia

Transported in:
Solid Wood
Packing Material

Déjà Vu All Over Again?



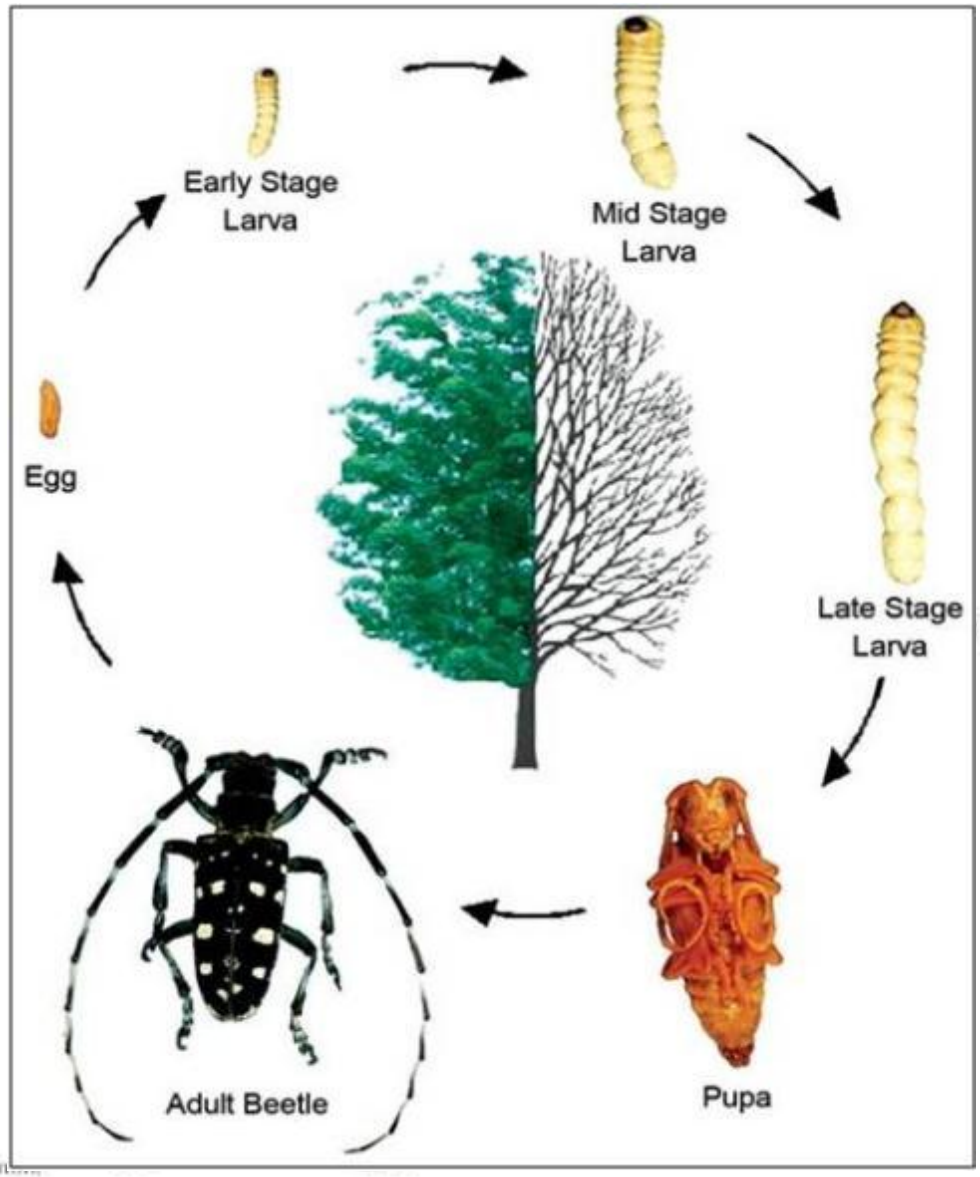

1"

Asian Longhorned Beetle Lifecycle

Adults and ovipostion scars

Emergence holes

Adult emerging from tree



Larva in tree

Pupal chamber in tree

Diagram by Michael Bohr

Throughout its life cycle, the ALB leaves obvious signs of its presence in and around host trees. The adult female chews 35-90 oval depressions, called oviposition sites, into the bark of the host tree. She lays a single egg beneath the bark at each site.

The beetle then hatches into a white caterpillar-like larva that tunnels deeper into the tree, where it feeds and develops over the winter.

In the spring, beetle larvae inside the host tree build a hard case for themselves called a pupa and develop within it. In the summer, the adult beetles chew their way out, leaving dime-sized (1/4" or greater), perfectly round exit holes.

Adults Feed on Twigs and Leaf Veins

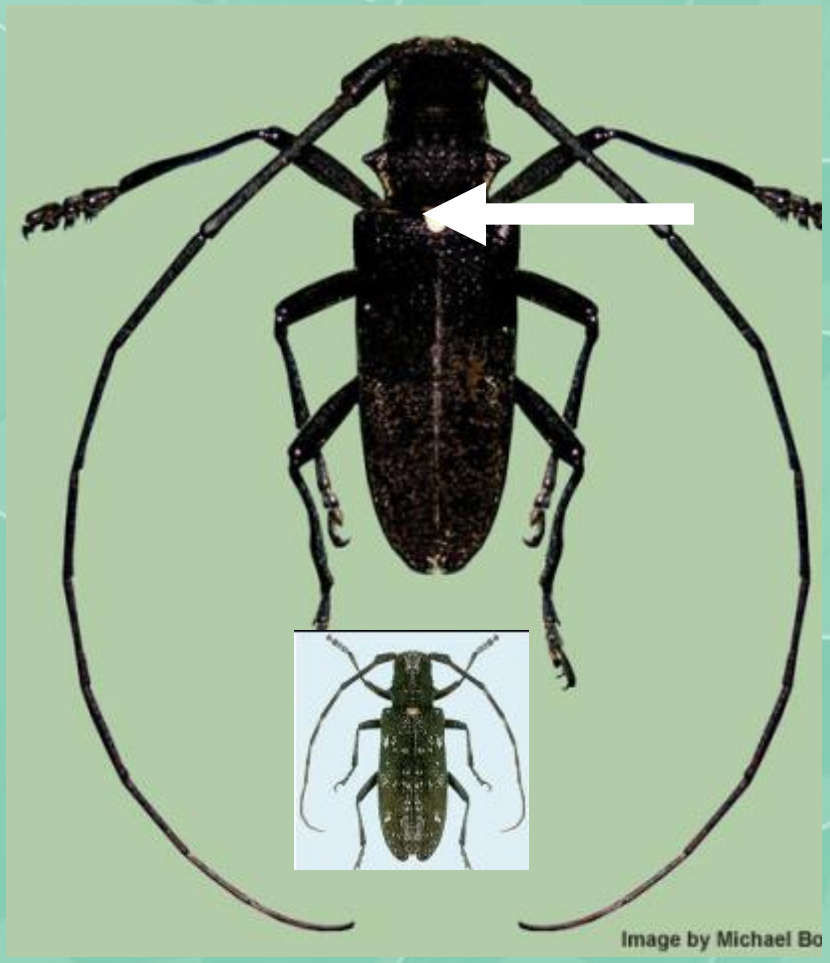
As the beetle tunnels, the ALB often pushes sawdust-like material, called frass, out onto the ground or tree branches.

The tunneling larvae can eventually kill the tree. Adult beetles start to emerge as the weather gets warmer and are most active during the summer and early fall, when they can be seen on trees, branches, walls, outdoor furniture, cars, and sidewalks.

You should capture the insects you think are ALB, place them in a jar, and freeze them—this will preserve the insect for easy identification.


UGA1253012

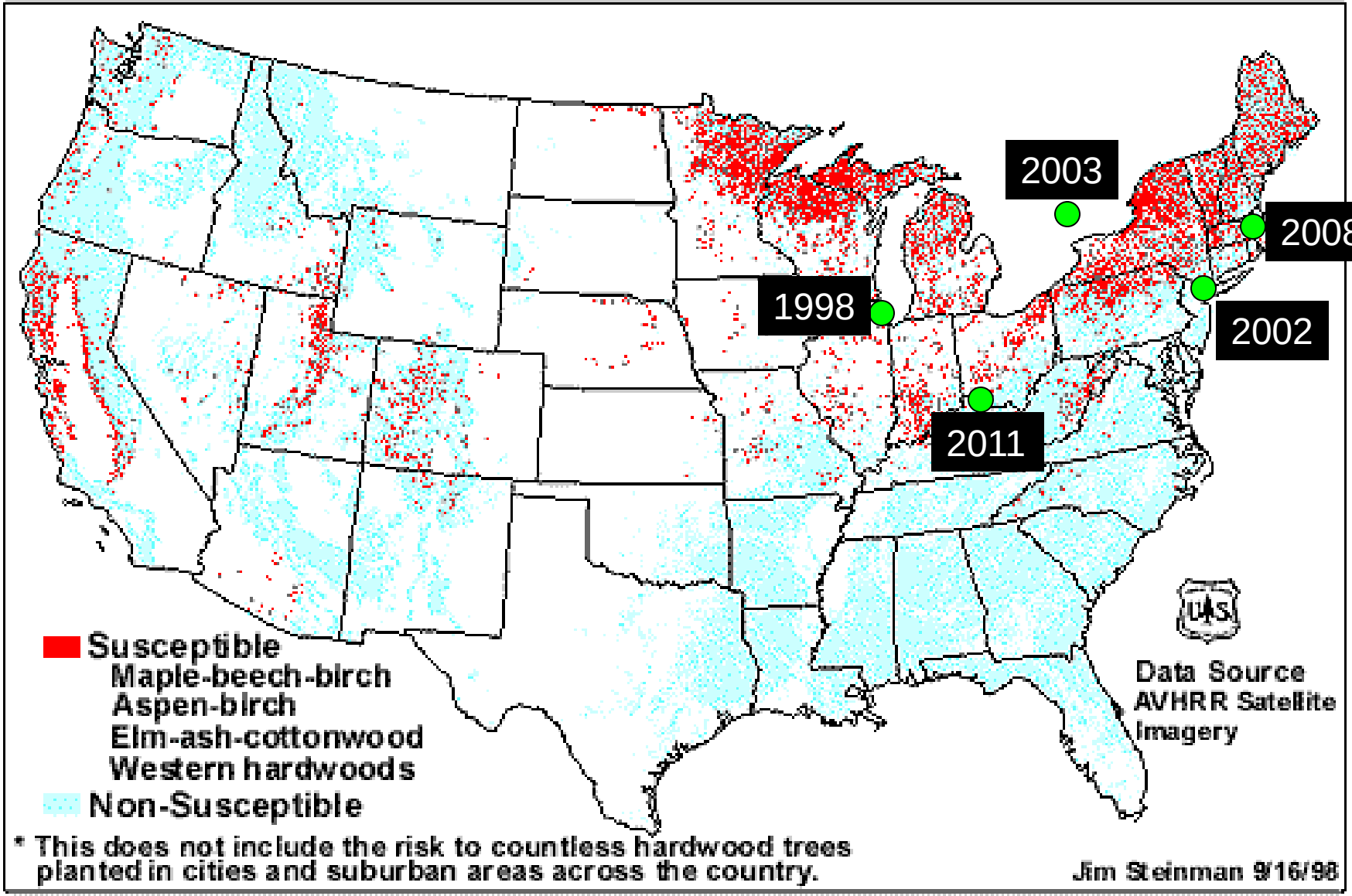
How to tell the Asian longhorned beetle from the Whitespotted sawyer beetle:



The **whitespotted sawyer beetle** is native to this region and feeds on dead and dying pine trees, not live hardwoods. It has a small white spot where the two wing pads come together (see arrow). Some have white blotches (inset) and others are mostly blackish.

The **Asian longhorned beetle** is shiny black, with bright white irregular spots, but lacks the one small white spot found on the whitespotted sawyer (see arrow).

Forest Types Potentially at Risk to Asian Long-horned Beetle*

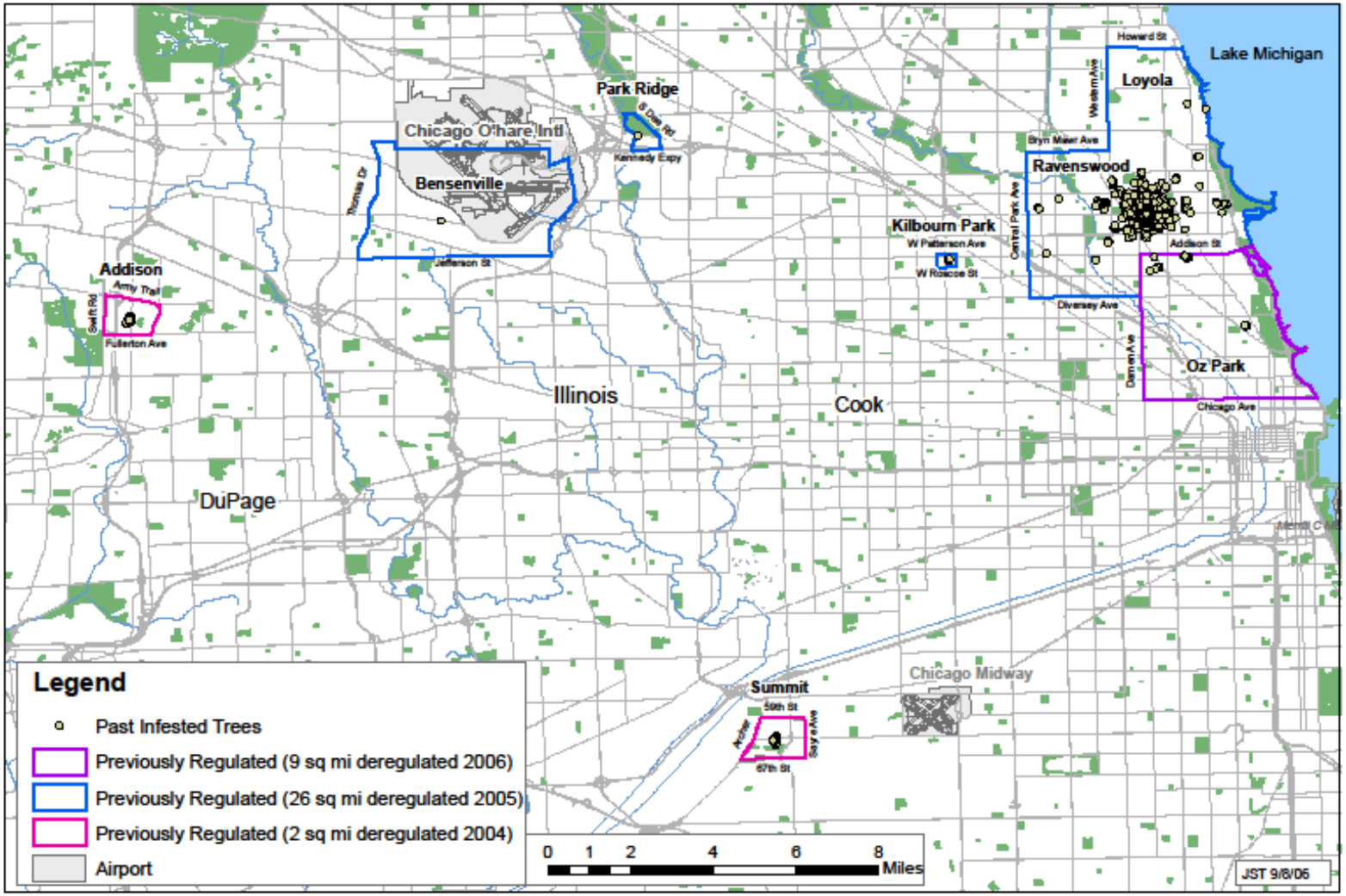


Illinois (1998) – Considered Eradicated

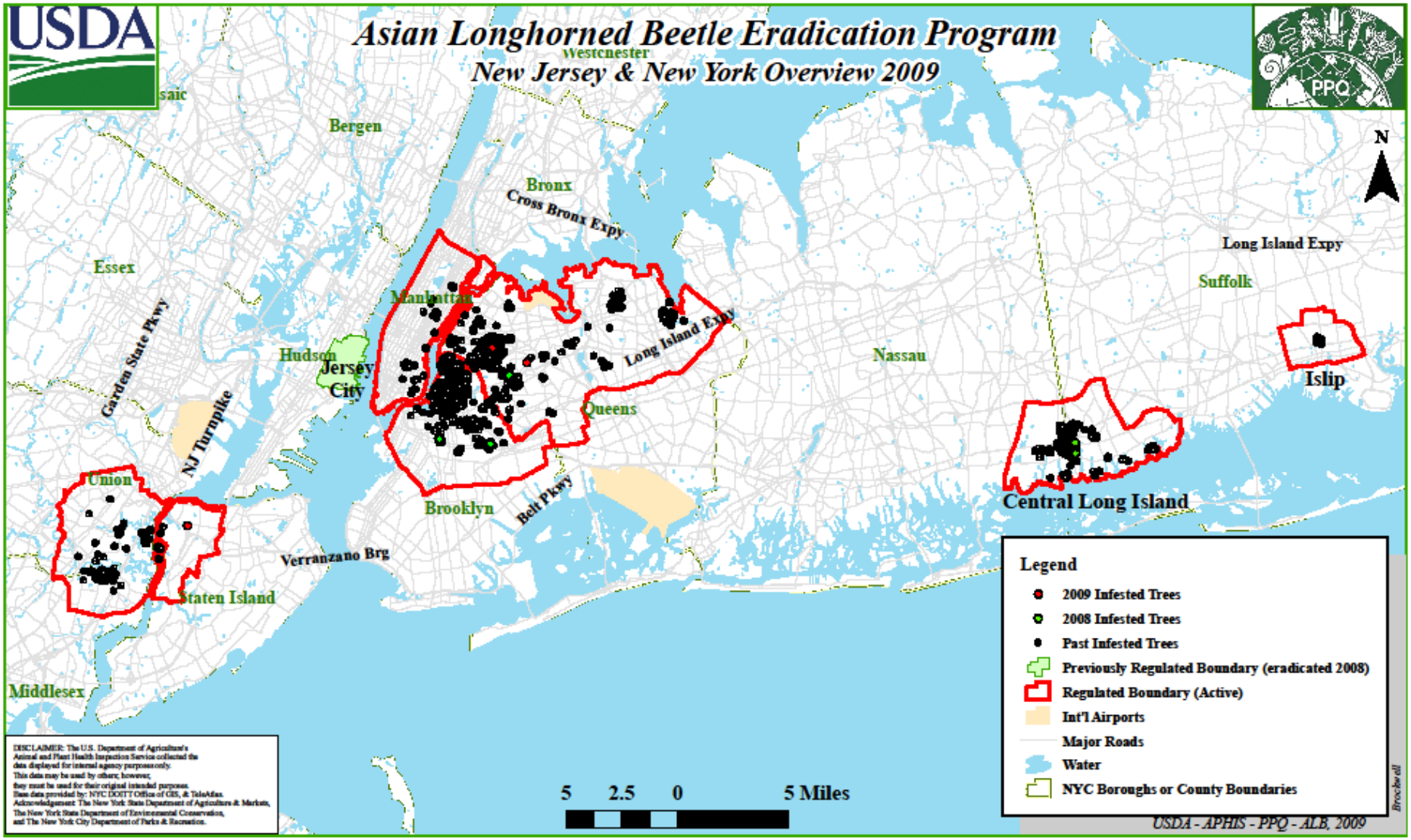
USDA APHIS

Asian Longhorned Beetle

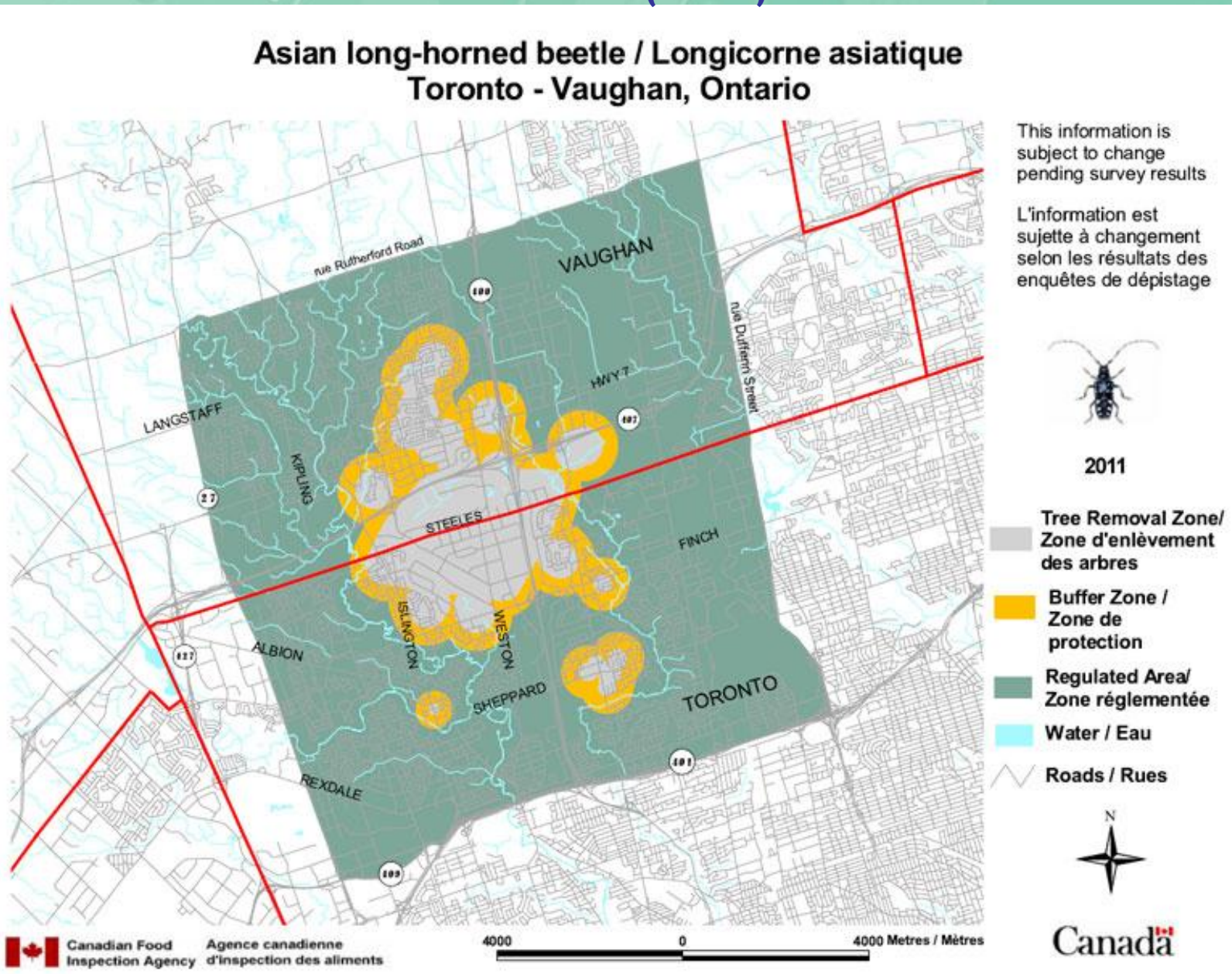
Illinois Regulation History and Infested Trees



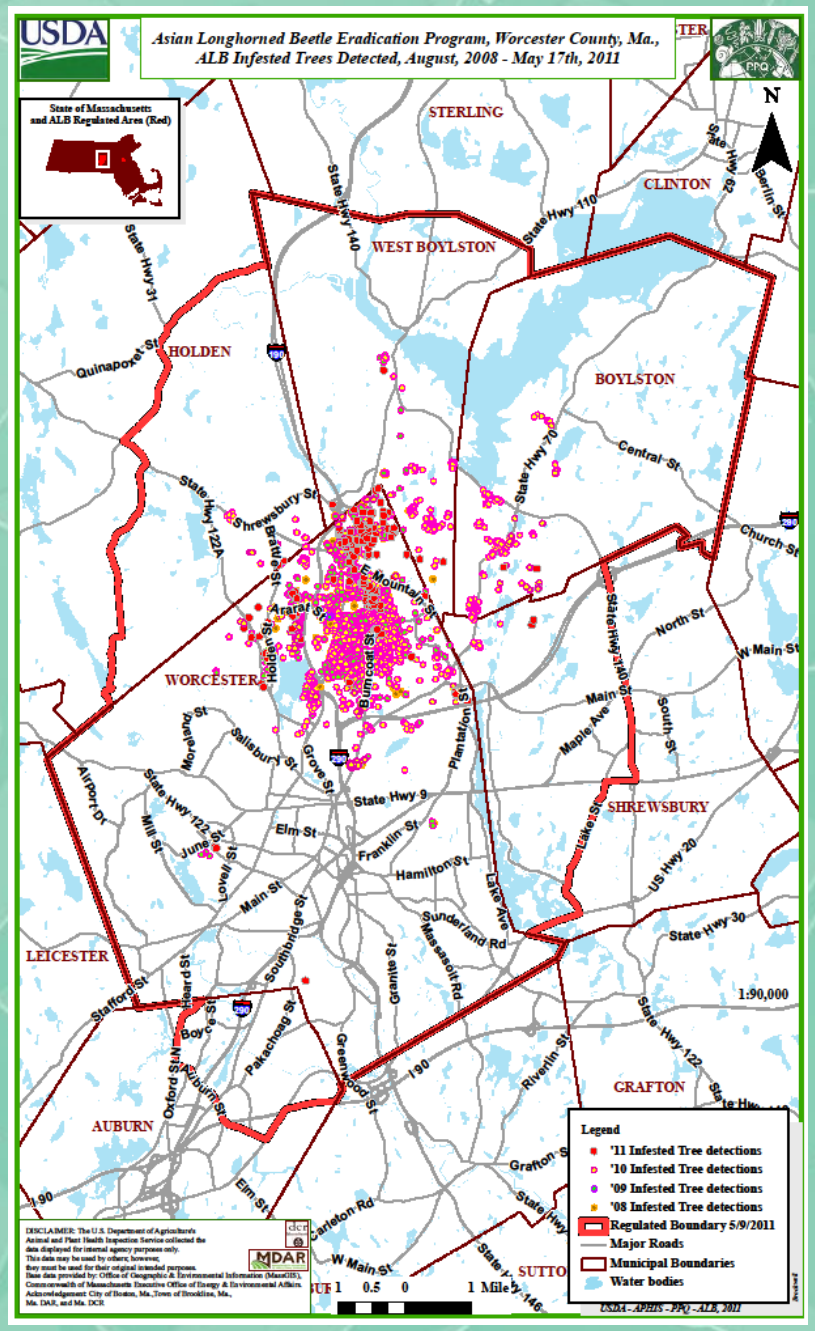
New Jersey and New York (2002)

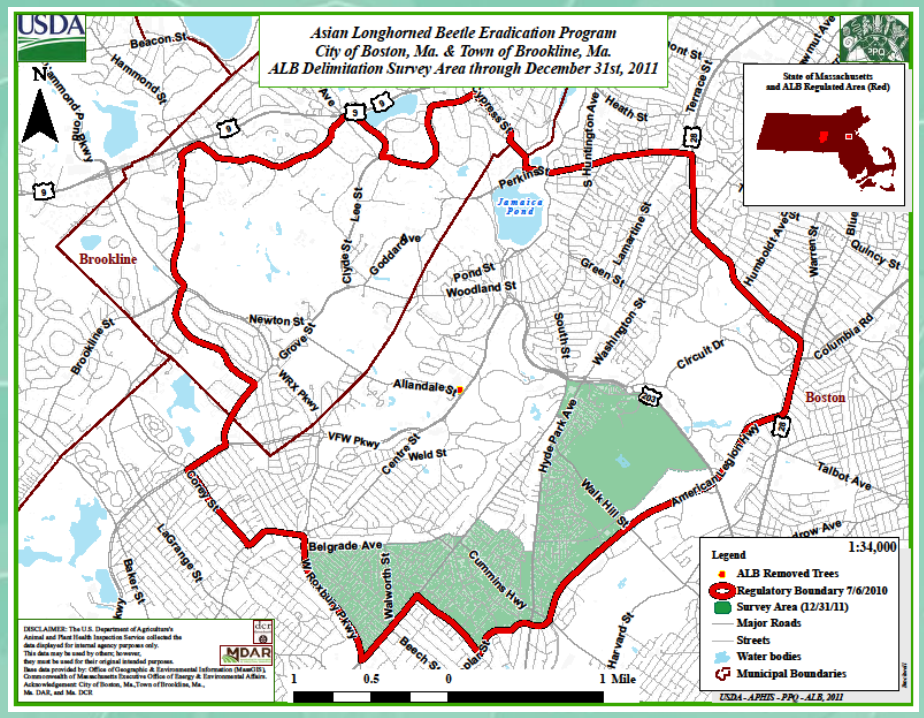


Toronto (2003)

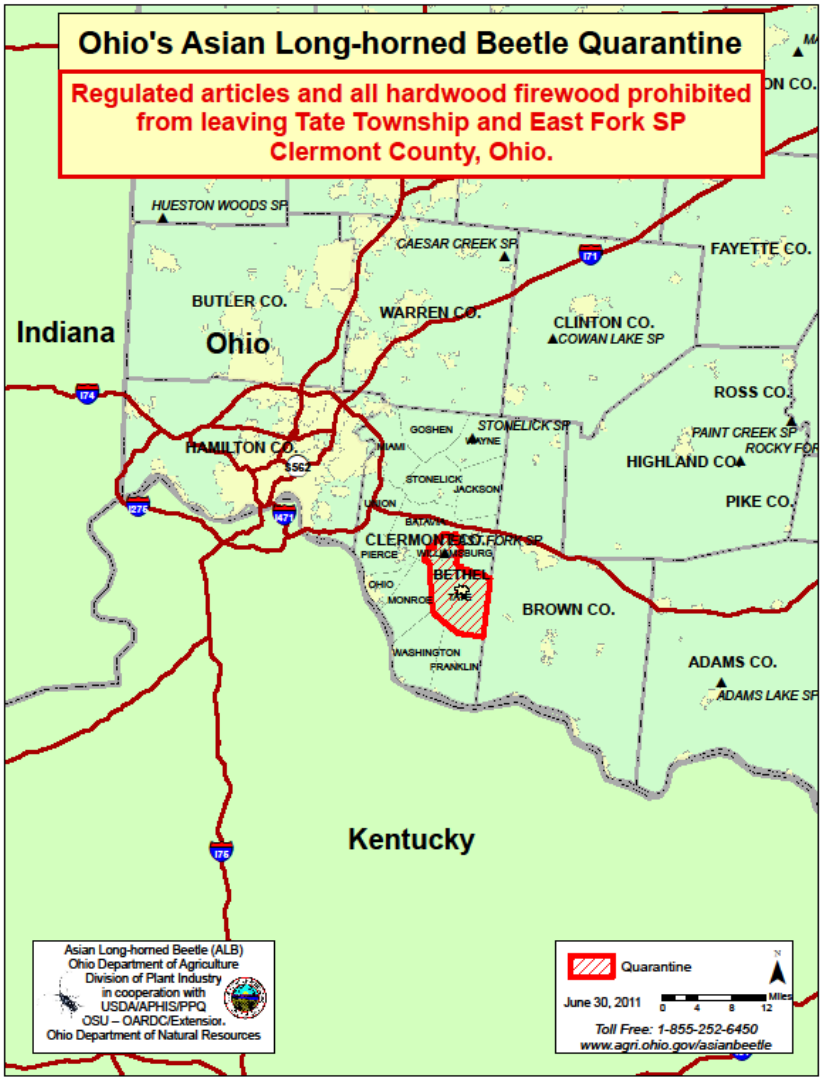


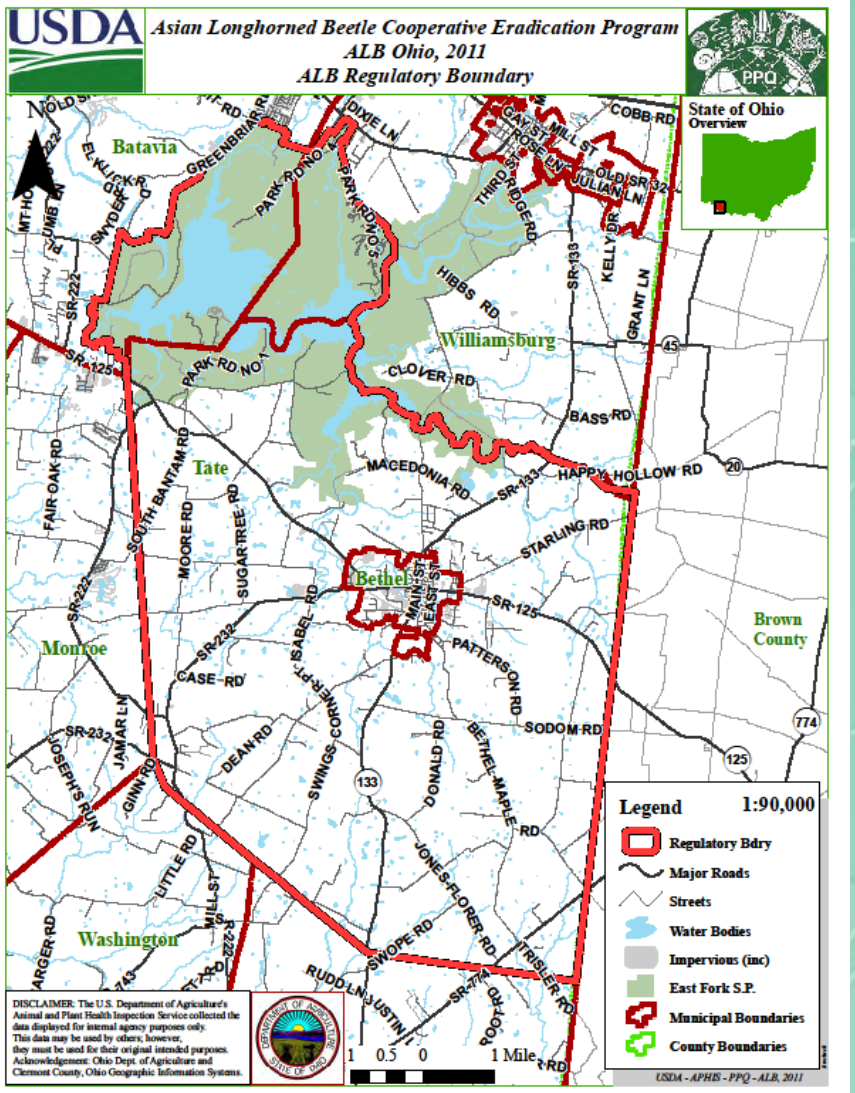
Massachusetts (2008)





Ohio – 2011 !


Ohio's Asian Long-horned Beetle Quarantine
Regulated articles and all hardwood firewood prohibited from leaving Tate Township and East Fork SP Clermont County, Ohio.
Indiana
Ohio
Kentucky
BUTLER CO.
WARREN CO.
CLINTON CO.
FAYETTE CO.
ROSS CO.
HIGHLAND CO.
PIKE CO.
BROWN CO.
ADAMS CO.
HAMILTON CO.
CLERMONT CO.
HUESTON WOODS SP
CAESAR CREEK SP
COWAN LAKE SP
STONELICK SP
PAINT CREEK SP
ROCKY FORK SP
ADAMS LAKE SP
BETHEL
Asian Long-horned Beetle (ALB)
Ohio Department of Agriculture
Division of Plant Industry
in cooperation with
USDA/APHIS/PPQ
OSU – OARDC/Extension.
Ohio Department of Natural Resources
Quarantine
June 30, 2011
Toll Free: 1-855-252-6450
www.agri.ohio.gov/asianbeetle


USDA
Asian Longhorned Beetle Cooperative Eradication Program
ALB Ohio, 2011
ALB Regulatory Boundary
PPQ
State of Ohio
Overview
Batavia
Williamsburg
Tate
Bethel
Monroe
Washington
Brown County
Legend
1:90,000
Regulatory Bdry
Major Roads
Streets
Water Bodies
Impervious (inc)
East Fork S.P.
Municipal Boundaries
County Boundaries
DISCLAIMER: The U.S. Department of Agriculture's Animal and Plant Health Inspection Service collected the data displayed for internal agency purposes only. This data may be used by others, however, they must be used for their original intended purposes. Acknowledgement: Ohio Dept. of Agriculture and Clermont County, Ohio Geographic Information Systems.
1 0.5 0 1 Mile
USDA - APHIS - PPQ - ALB, 2011

Survey

Treatment (Imidacloprid)

Trunk Injections

Soil Injection/drench

Host Removal

Worchester, Massachusetts

Before

After

USDA-APHIS Regulated Articles

On July 14, 2011 The U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) updated the list of regulated articles. The list now includes:

- firewood (all hardwood species)

- green lumber and other material living, dead, cut or fallen—inclusive of nursery stock, logs, stumps, roots, branches and debris of half an inch or more in diameter of the following genera:

  - ***Acer*** (maple)
  - ***Aesculus*** (horse chestnut)
  - ***Albizia*** (mimosa)
  - ***Betula*** (birch)
  - ***Celtis*** (hackberry)
  - ***Cercidiphyllum*** (katsura)
  - ***Fraxinus*** (ash)
  - ***Koelreuteria*** (golden rain tree)
  - ***Platanus*** (sycamore)
  - ***Populus*** (poplar)
  - ***Salix*** (willow)
  - ***Sorbus*** (mountain ash)
  - ***Ulmus*** (elm)

Outreach and Education:

www.beetlebusters.info

www.emeraldashborer.info

(Emerald Ash Borer University
Click On: “EAB OnDemand”
2/10/11 Webinar
“Asian Longhorned
Beetle information”)

www.aphis.usda.gov

DON'T MOVE FIREWOOD

IF FOUND CALL:
(800) 292-3939

Thousand Cankers Disease

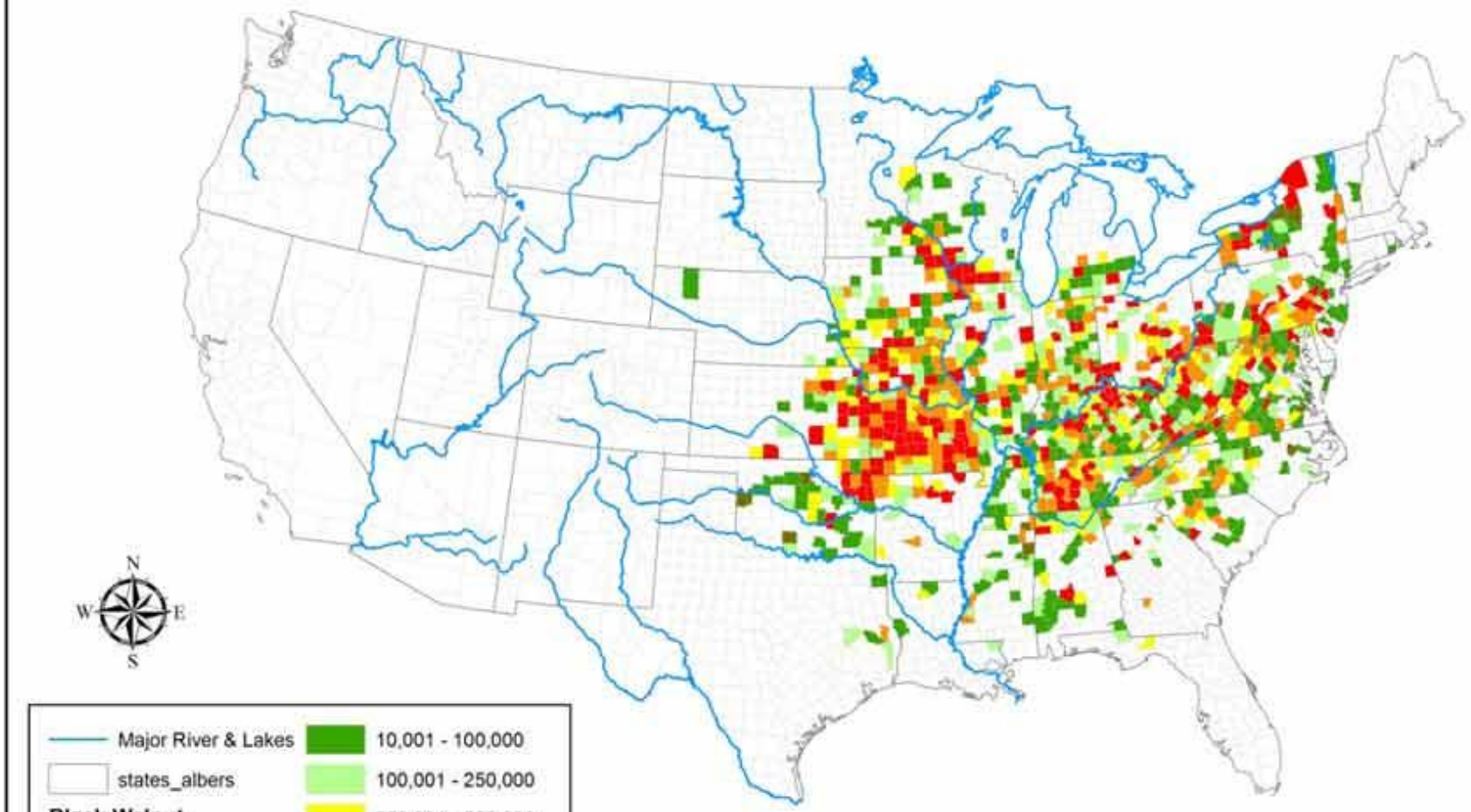
Thousand Cankers Disease on Black Walnut (*Juglans nigra*)

A good year's yield from one black walnut tree growing in Ithaca, NY.

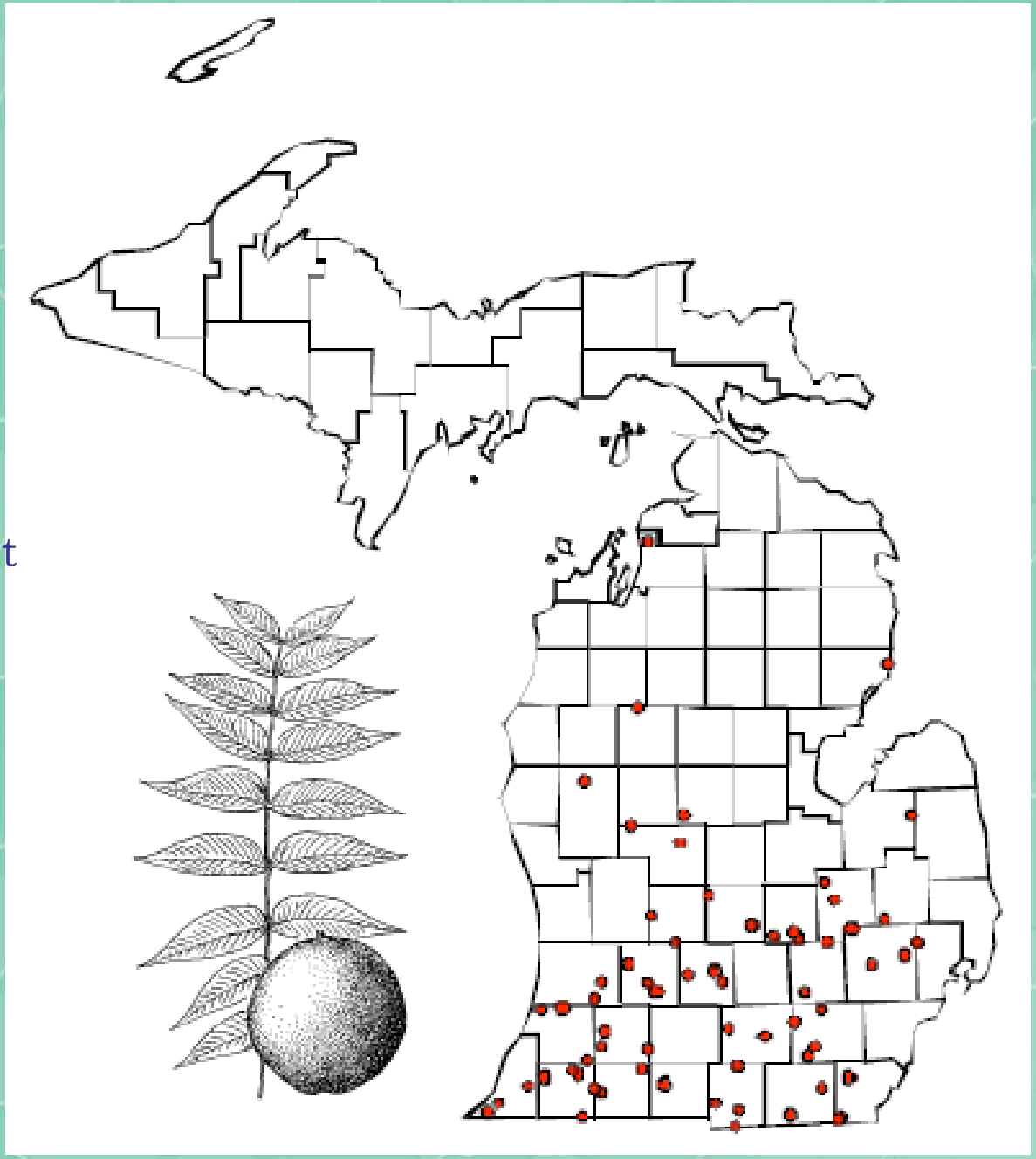
The two most commercially important species are J. regia for timber and nuts, and J. nigra for timber

This was cut in south west Michigan and was 72" diameter.

Number of Black Walnut (*Juglans nigra*) Trees in the Continental United States

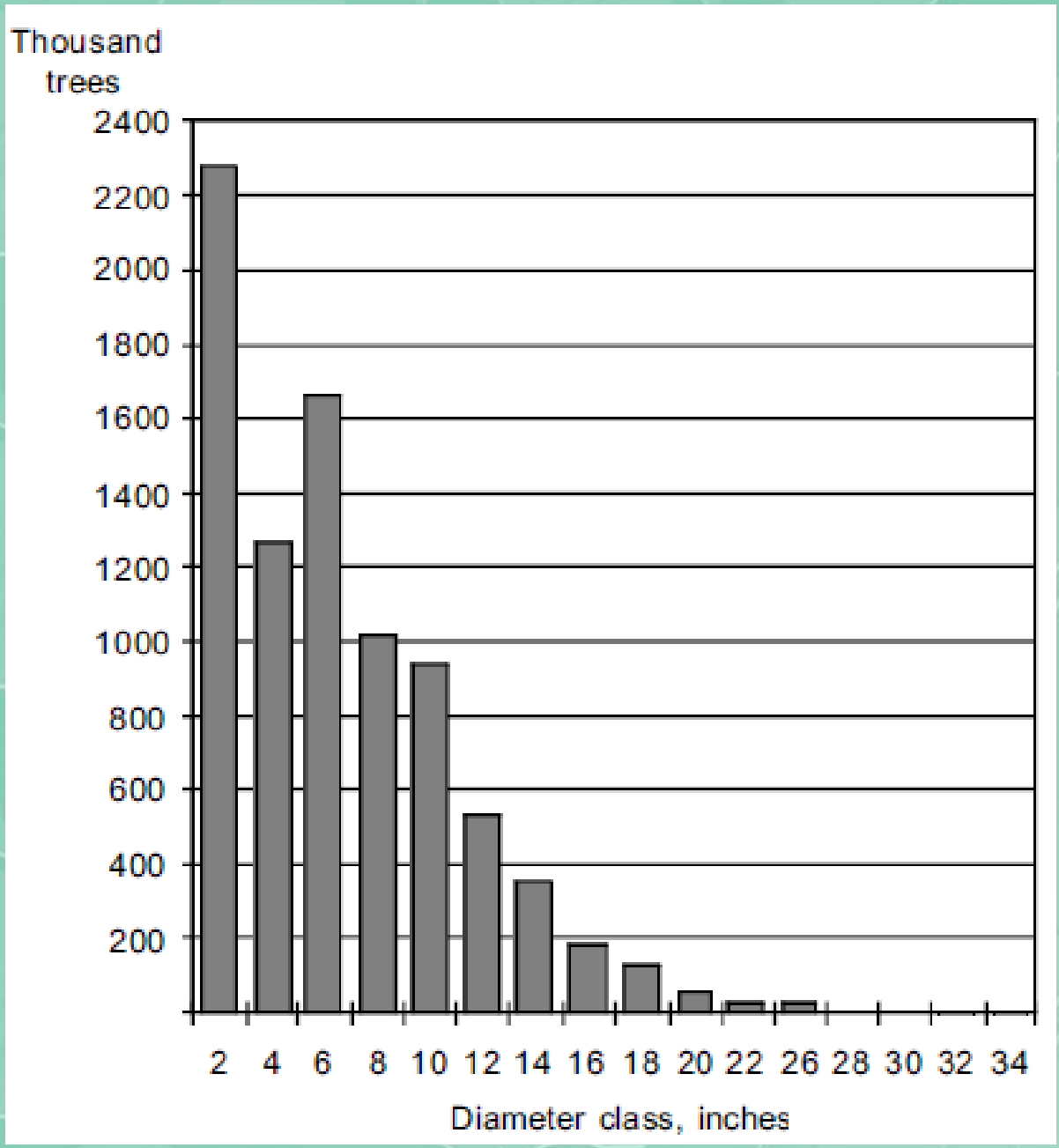


Black walnut trees found in a 1993 forest survey
Estimated 8.5 million walnut trees in the MI forest



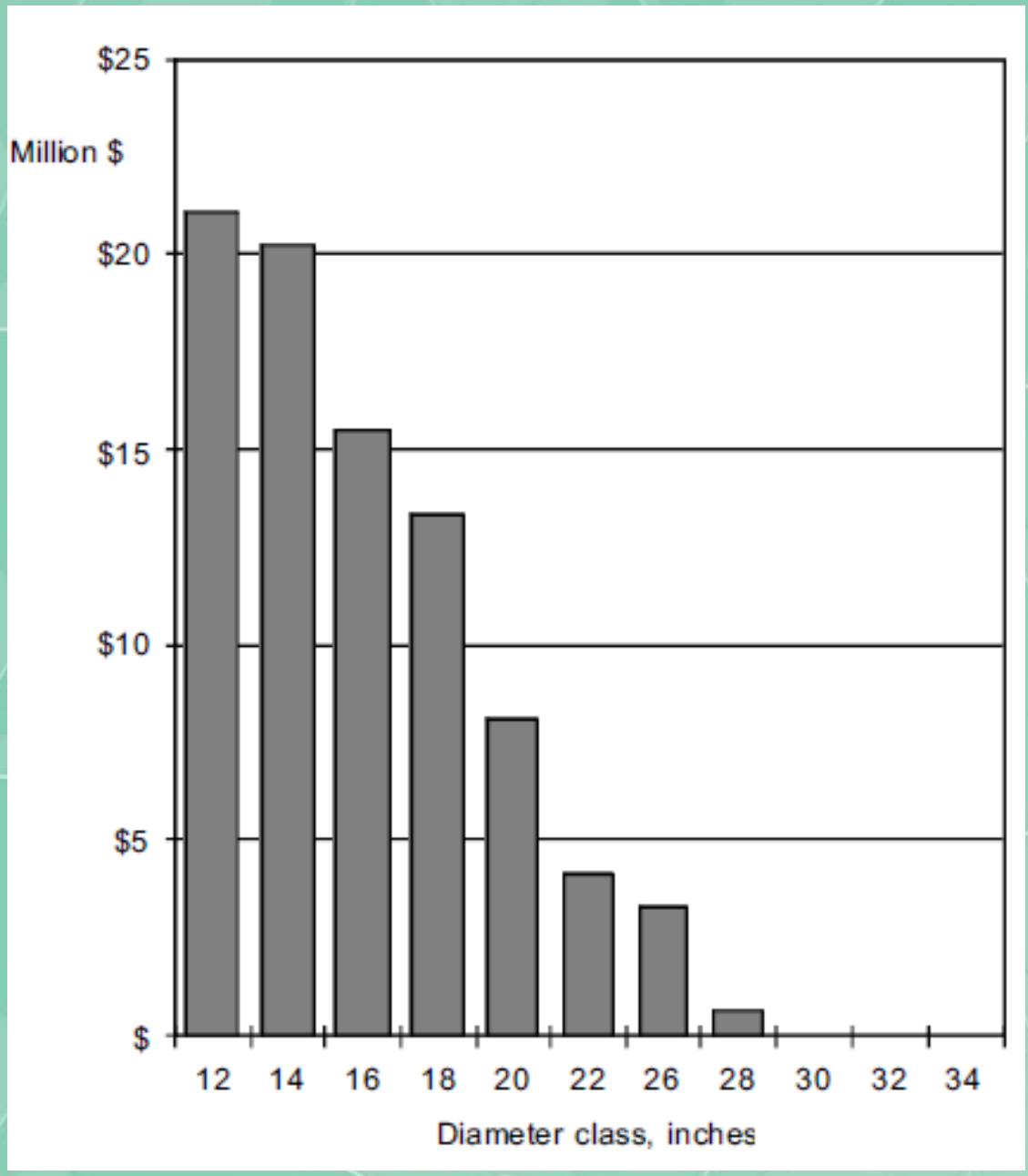
Vasievich, J. Michael; Kingsley, Neal P. 1995. Where are the walnut trees? [in Michigan]. Walnut Council Bulletin. 22(3): 3-4.

Estimated number of black walnut trees in Michigan, 1993, by diameter class
84% are less than 12" DBH



Vasievich, J. Michael; Kingsley, Neal P. 1995. Where are the walnut trees? [in Michigan]. Walnut Council Bulletin. 22(3): 3-4.

- Estimated value of black walnut saw timber on timberland in Michigan, by diameter class, based on $500 per MBF.
- Walnut saw timber value ~$84 million
- Many trees <12” diameter class have low volumes but the best growth potential, MI walnut resource may by worth a lot more.



Vasievich, J. Michael; Kingsley, Neal P. 1995. Where are the walnut trees? [in Michigan]. Walnut Council Bulletin. 22(3): 3-4.

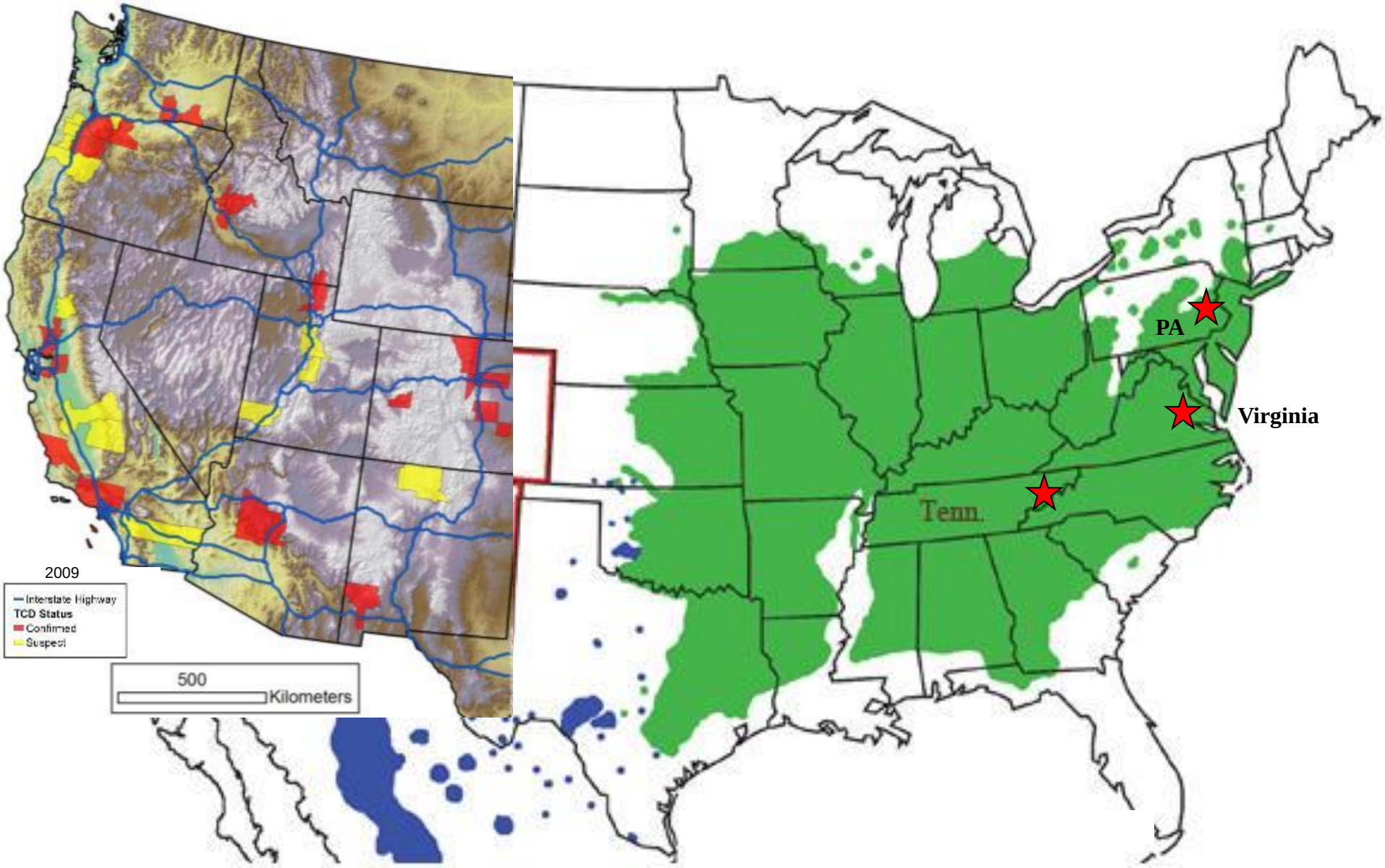
What is it?

- A beetle vectored fungal infection of Eastern Black Walnut
- The large number of cankers created suggest the disease's name
- An infested tree usually dies within 3 years of intitial sympotoms

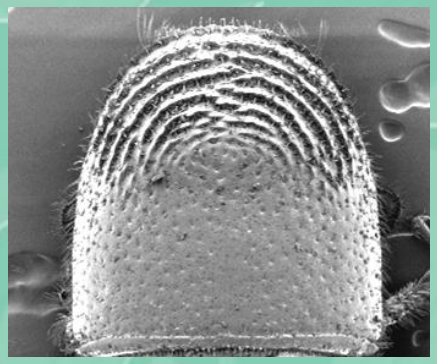
Where is it?

- Occurs in 8 western states and in 2010 in Knoxville TN
- June 2011-two counties in Virginia around Richmond and on August 9, 2011 in Bucks Co., Pennsylvania

Native Walnut & TCD Distribution



Walnut Twig Beetle
Pityophthorus juglandis



Photos by Steven J. Seybold

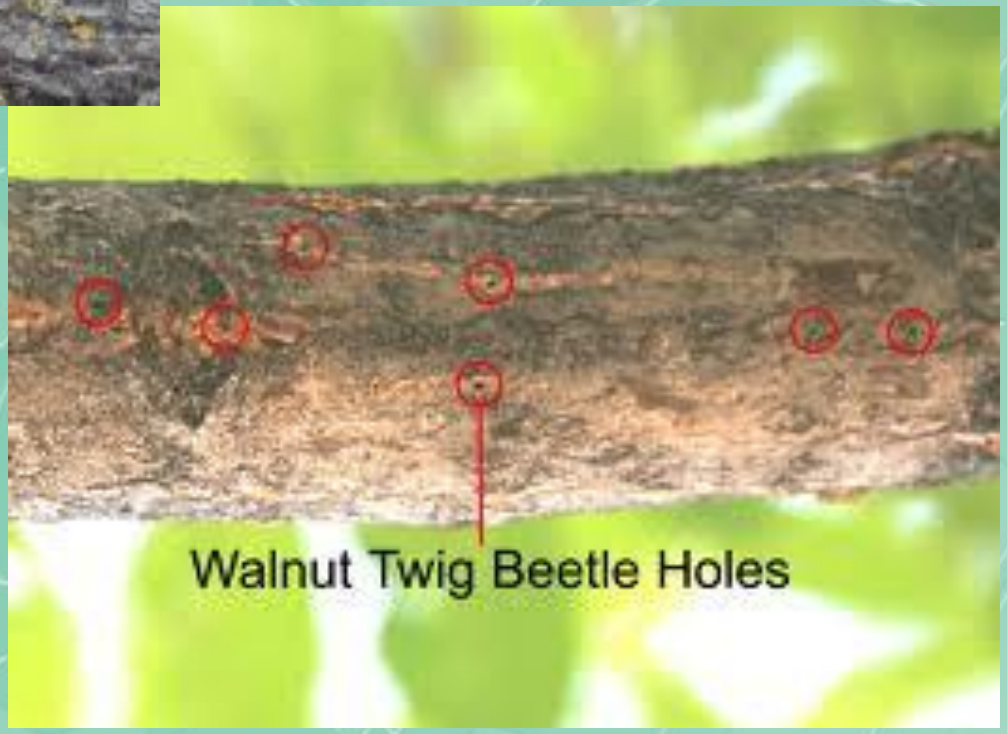
- Adult beetle very small (1.5 to 2.0 mm)
- 4-6 concentric ridges on the upper surface of pronotum
- Larva white, C shaped and found in phloem
- Attacks branches>2” and main trunk
- 2-3 generations per year

Walnut Twig Beetle

Adult

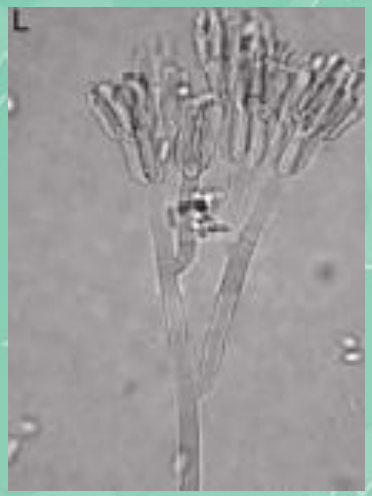
Larva

Galleries



Geosmithia morbita

- Off-white to buff in culture
- Genus not known to be plant pathogens
- No sexual state known
- Yeast like phase
- Always found in association with the beetle, frass, and galleries

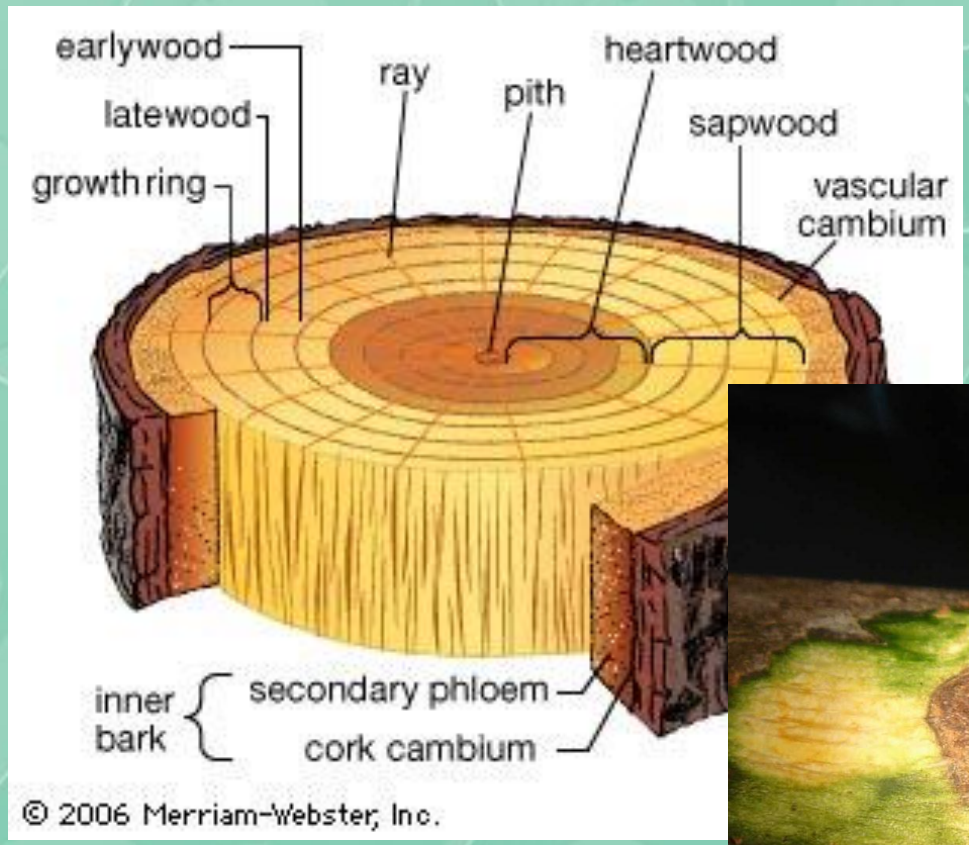


•*Geosmithia* species are associated with a number of beetle hosts in Europe but none of them are pathogens

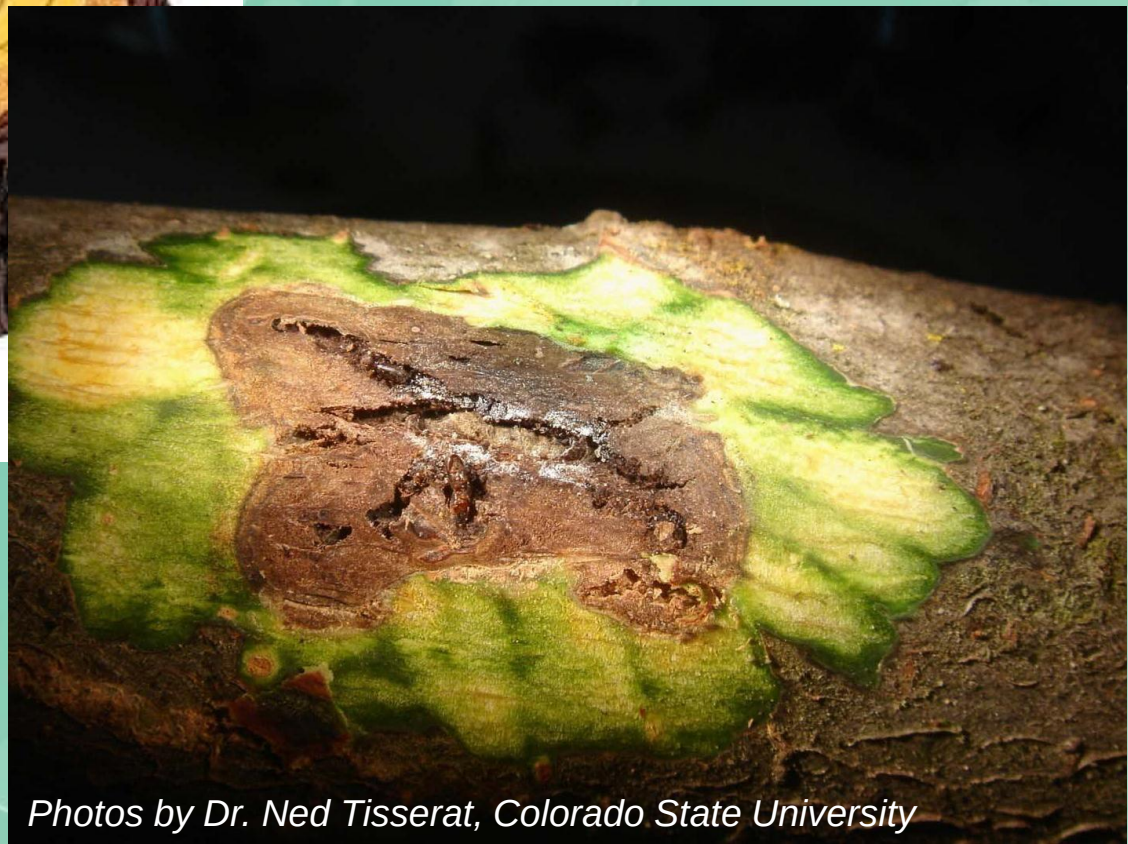
Disease Symptoms

Thinning Crown * Branch Mortality * Leaves smaller than normal

Bark Pathogen



- Cankers initially restricted to phloem/bark and don't extend into cambium—no signs apparent from the outside
- No open-faced cankers formed



Photos by Dr. Ned Tisserat, Colorado State University

Disease Symptoms

- Numerous small cankers on branches. Bark does not slough off.
- Beetle galleries and cankers not evenly distributed on branches or trunk
  - More damage on lower side of branches
  - More damage on one side of trunk westside


June 2008


September 2008


June 2009
Slide by Ned Tisserat

Other Cankers on Walnut

Fusarium sp.

- Isolated from cankers but not from galleries
- Elongated vertical cankers on trunk during final stages of decline
- Darkly stained, diseased wood beneath the bark.
- Sprouts near the canker or at the base of the stem.
- Associated with ambrosia beetles

Other Cankers on Walnut

Perennial Target Canker

- *Nectria galligena*
- Concentric rings
- Young cankers difficult to recognize
- Tiny, red fruiting bodies
- Located on main stem

Other Walnut Tree Problems

- Hail injury
- Storm damage
- Anthracnose
- Crown decline in trees growing in grassy sites
- Early leaf senescence (i.e. fall coloration)
- Freezing damage to buds

Research

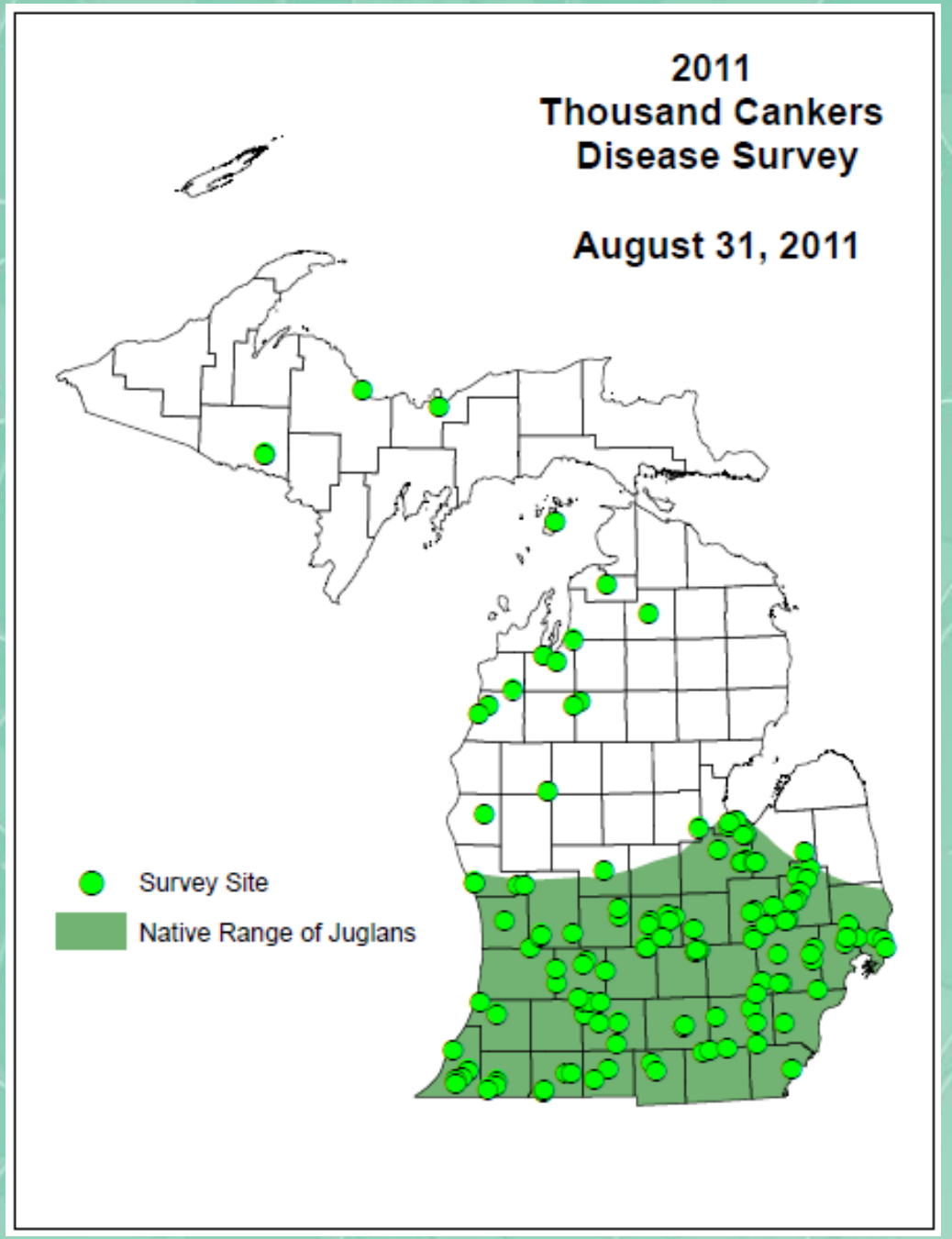
- Pheromone traps
- Pesticide control
- Vector transmission
- Overwintering biology
- Estimation of the risk and threat to the walnut-growing industry
- Insecticide treatment

Michigan TCD Survey 2011

- Visual survey
  - Late June to August
- Roadways, sawmills, walnut groves, ditch banks, urban trees, logging sites

MDARD TCD Survey 2011

- 109 sites
- All Negative



MICHIGAN DEPARTMENT OF AGRICULTURE & RURAL DEVELOPMENT
PESTICIDE AND PLANT PEST MANAGEMENT DIVISION
Thousand Cankers Disease of Walnut Quarantine

Established to prevent the introduction into Michigan of the causal agents of Thousand Cankers Disease of Walnut and sets forth regulated areas, regulated articles, shipping restrictions, and violations.

REGULATED AREAS: The entire states of,
Arizona, California, Colorado, Idaho, Nevada,
New Mexico, Oregon, Washington, Utah and any other areas where Thousand Cankers Disease of Walnut may become established.

REGULATED ARTICLES

1. **The walnut twig beetle** in any living stage of development.
2. **The fungal pathogen** *Geosmithia morbida sp. nov.*
3. **Firewood of any non-coniferous (hardwood) species.**
4. **All plants and plant parts of the genus *Juglans*** including but not limited to nursery stock, budwood, scionwood, green lumber, and other material living, dead, cut, or fallen, including logs, stumps, roots, branches, and composted and uncompostedchips.
5. **Any article, product, or means of conveyance when it is determined by the Director to present the risk of spread** of Thousand Cankers Disease of Walnut

EXEMPTIONS

Juglans species plant parts and processed plant products as follows are exempt from the provisions of this quarantine:

1. Nuts, nut meats and hulls.
2. Processed lumber that is 100% bark-free, kiln-dried with squared edges.
3. Finished wood products without bark, including walnut furniture, instruments, and gun stocks.

RESTRICTIONS

1. All regulated articles originating from regulated areas are prohibited entry into the State of Michigan.
2. Regulated articles originating in an area not known to have Thousand Cankers Disease but transiting through an area known to have Thousand Cankers Disease will be considered to be regulated articles.
3. Regulated articles to be used for research purposes, at the discretion of the Director, may move under a compliance agreement.

If you have suspect trees to report, please call MDARD's toll free number

1-800-292-3939

Michigan Department of AGRICULTURE & Rural Development

Questions?


PROMISE
MICHIGAN
you won't move firewood.
Moving firewood kills trees.

Michigan

Department of
AGRICULTURE
& Rural Development

Thank You

John Bedford
Pest Response Program Manager

Pesticide and Plant Pest Management Division

bedfordj@michigan.gov

Protect • Promote • Preserve