Emerald Ash Borer Regional Meeting

May 17, 2017

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Agenda

Time	Topic
9:00-9:20	EAB Biology
9:20-9:40	EAB Regional Status
9:40-10:00	Strategic Removal Of Host Trees In Isolated, Satellite Infestations Of EAB Can Reduce Population Growth
10:00-10:05	BREAK
10:05-10:20	Biocontrol & Biosurveillance
10:20-10:50	Using Monitoring Data to Optimize EAB Management
10:50-11:00	UMN Past & Present Projects
11:00-11:05	BREAK
11:05-11:25	EAB Cold Tolerance
11:00-noon	Participant Discussion

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EAB Biology

Angie Ambourn | Entomologist

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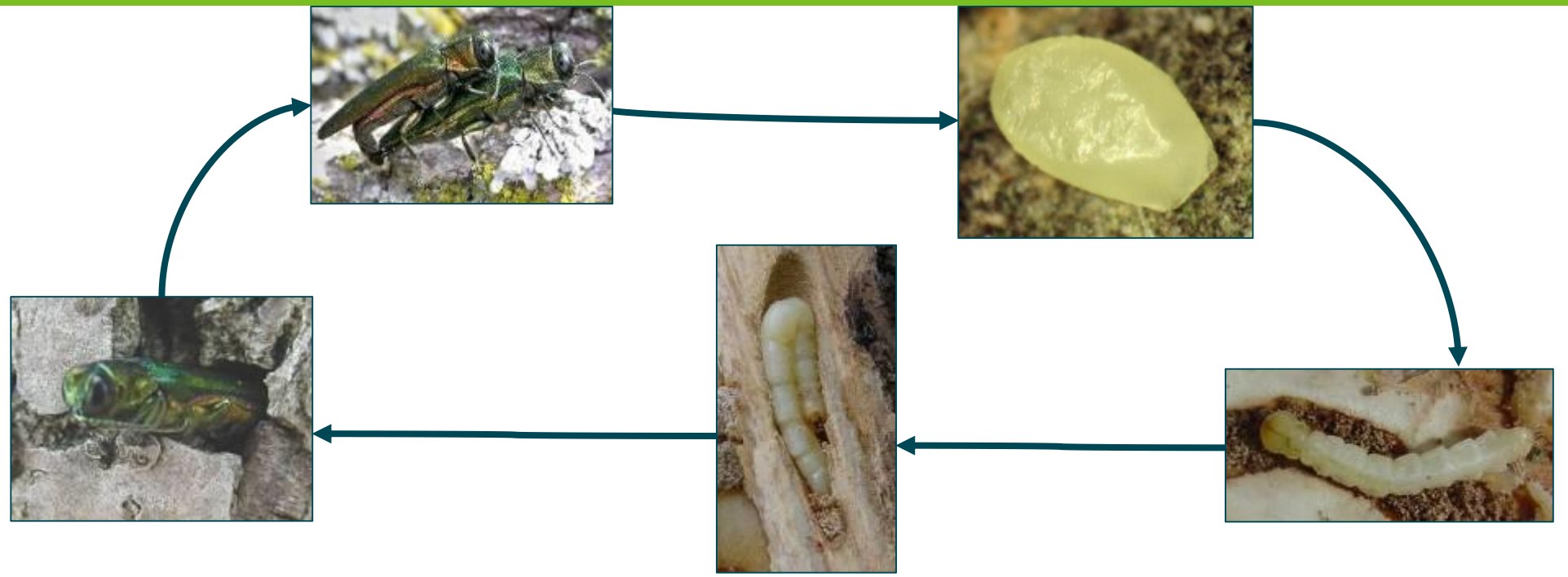
Life Cycle

Life Cycle



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Immature (under bark)	■	■	■	■	■	■	■	■	■	■	■	■
Adult (free living)					■	■	■	■	■			

How Does EAB Kill Trees?

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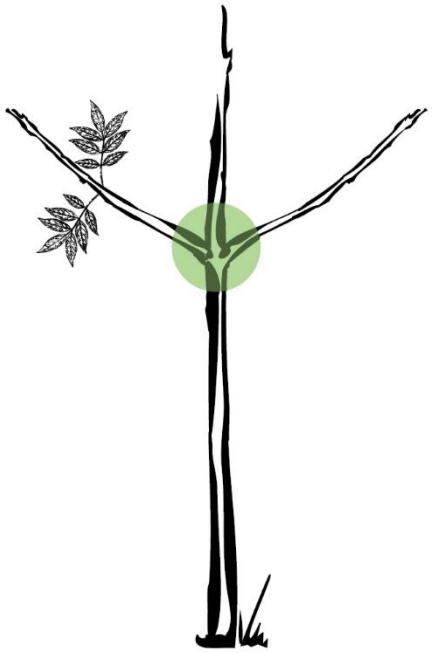
Host Trees

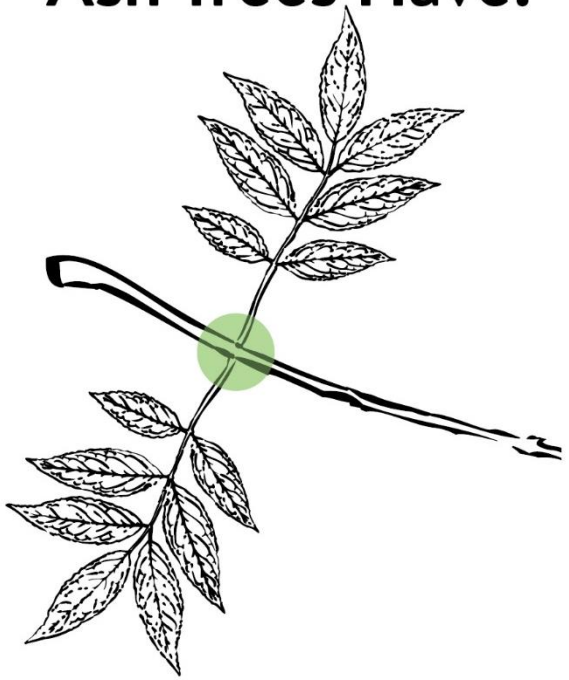
Ash Tree ID

Ash Trees Have:



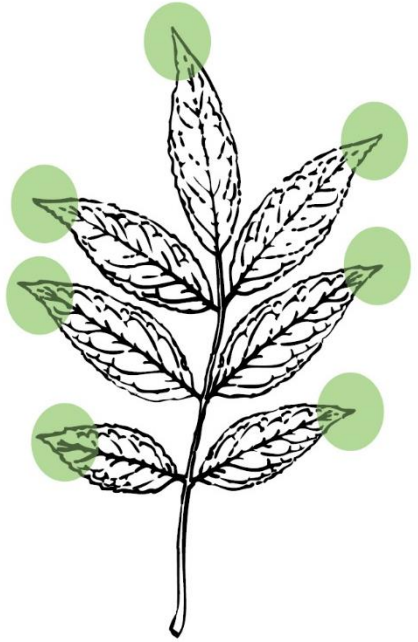
Opposite Branching

Ash Trees Have:



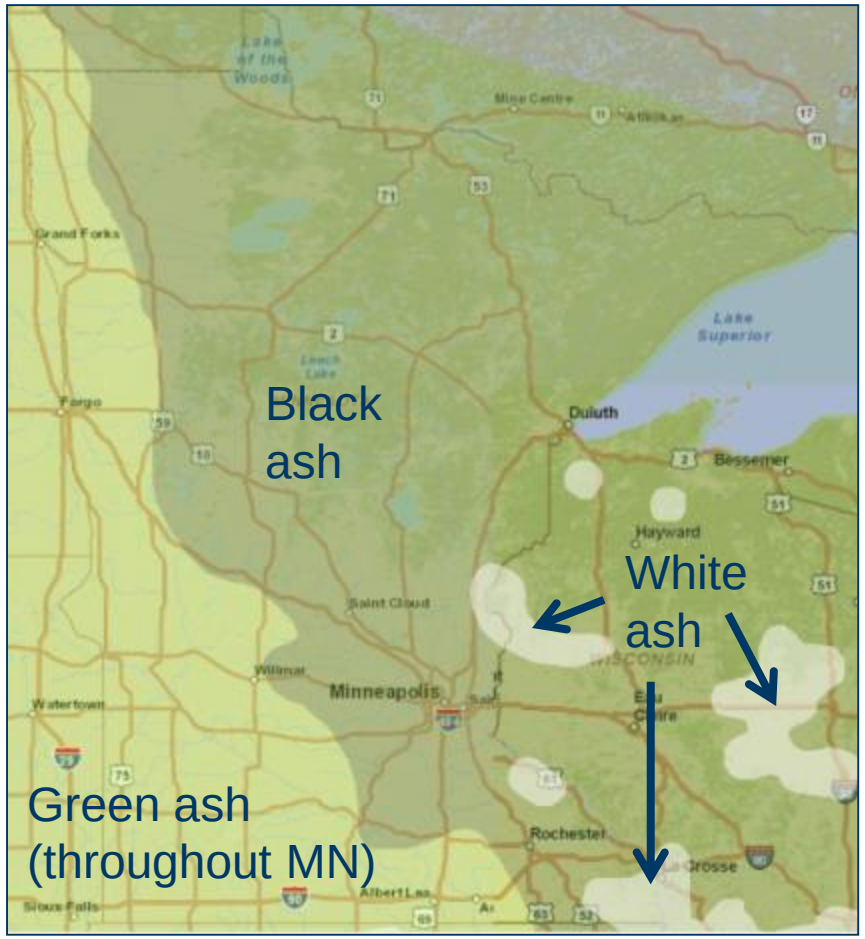
Compound Leaves

Ash Trees Have:



5 to Many Leaflets

Host Trees



Susceptibility

high

Black ash

Green ash

White ash

Blue ash

Manchurian ash

low

Black Ash Cultivars

- Fallgold

Green Ash Cultivars

- Bergeson
- Cimmaron
- Marshall
- Patmore
- Summit

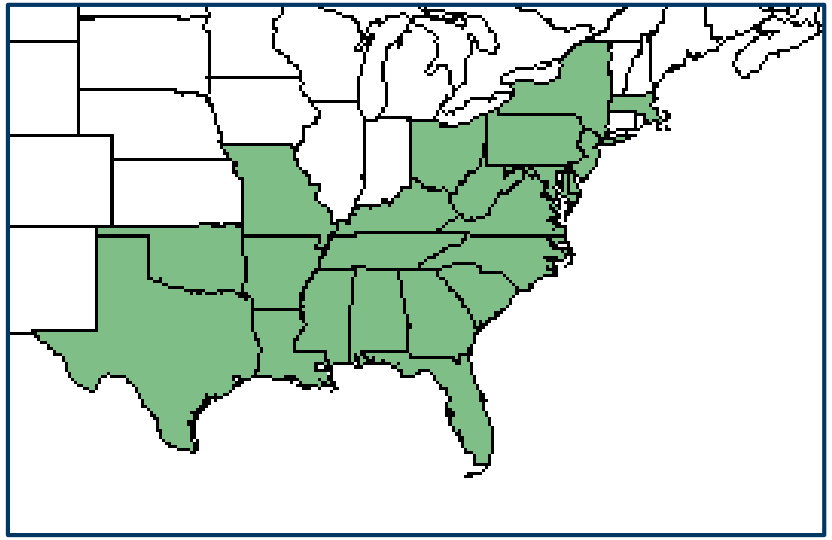
White Ash Cultivars

- Autumn Applause
- Autumn Blaze
- Autumn Purple
- Baltimore
- Greenspire
- Northern Blaze
- Rosehill
- Skyline

Secondary Host Tree

- Olive Family - Oleaceae
- White Fringetree

  Chionanthus virginicus



Fringetree Risk

- Not a preferred host but EAB can complete its life cycle
- Sold in nurseries as an ornamental shrub

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Recognizing EAB

Confirmation

"S" shaped galleries

EAB Larva

Confirmation

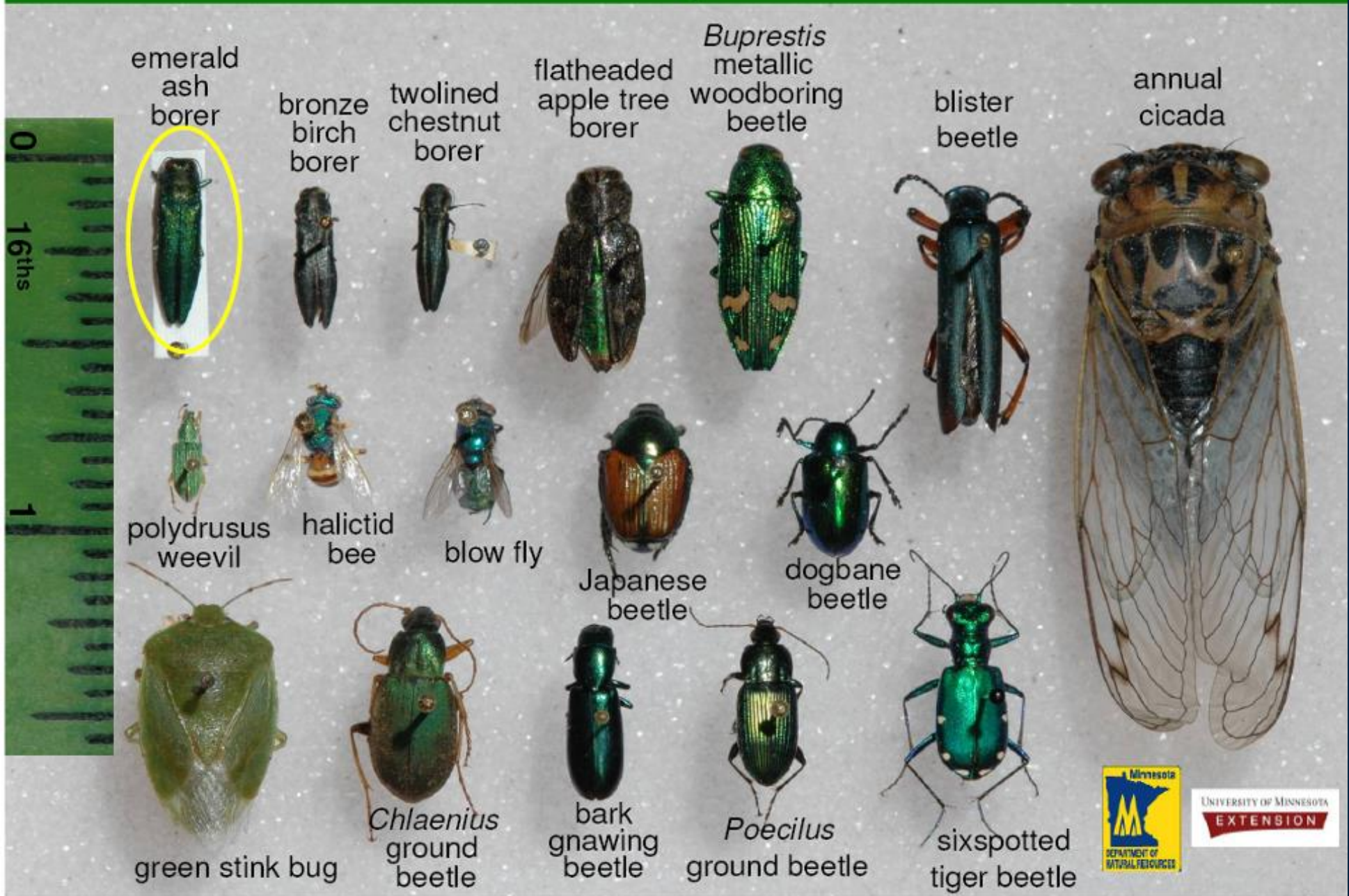
1/8” width

“D” shaped exit holes

EAB Adult

Insects in Minnesota That May Be Confused with Emerald Ash Borer

Jeff Hahn, University of Minnesota Extension
Val Cervenka Minnesota Dept. of Natural Resources



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Signs & Symptoms

Symptom Progression

EAB Status	Symptoms	Years Infested
Small larvae present	None	1
Large larvae present / Emerging adults	Woodpecking possible	2
Increasing larvae numbers 	Woodpecking likely Bark splits possible	3
	Canopy impacts visible	4
	Dead trees present	5-6

Woodpecker Damage

- Mid / Top canopy
- Branches 3-6” in diameter
- Bark transitions to rough
- Bark blonding / flaking
- Dime sized woodpecker holes
- Light colored woodpecker holes
- Oval shaped

Woodpecker Damage

Bark Splits

Native Damage

- Trunk
- Lower canopy
- Dead limbs

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EAB Regional Status

Jennifer Burington | EAB Community Liaison

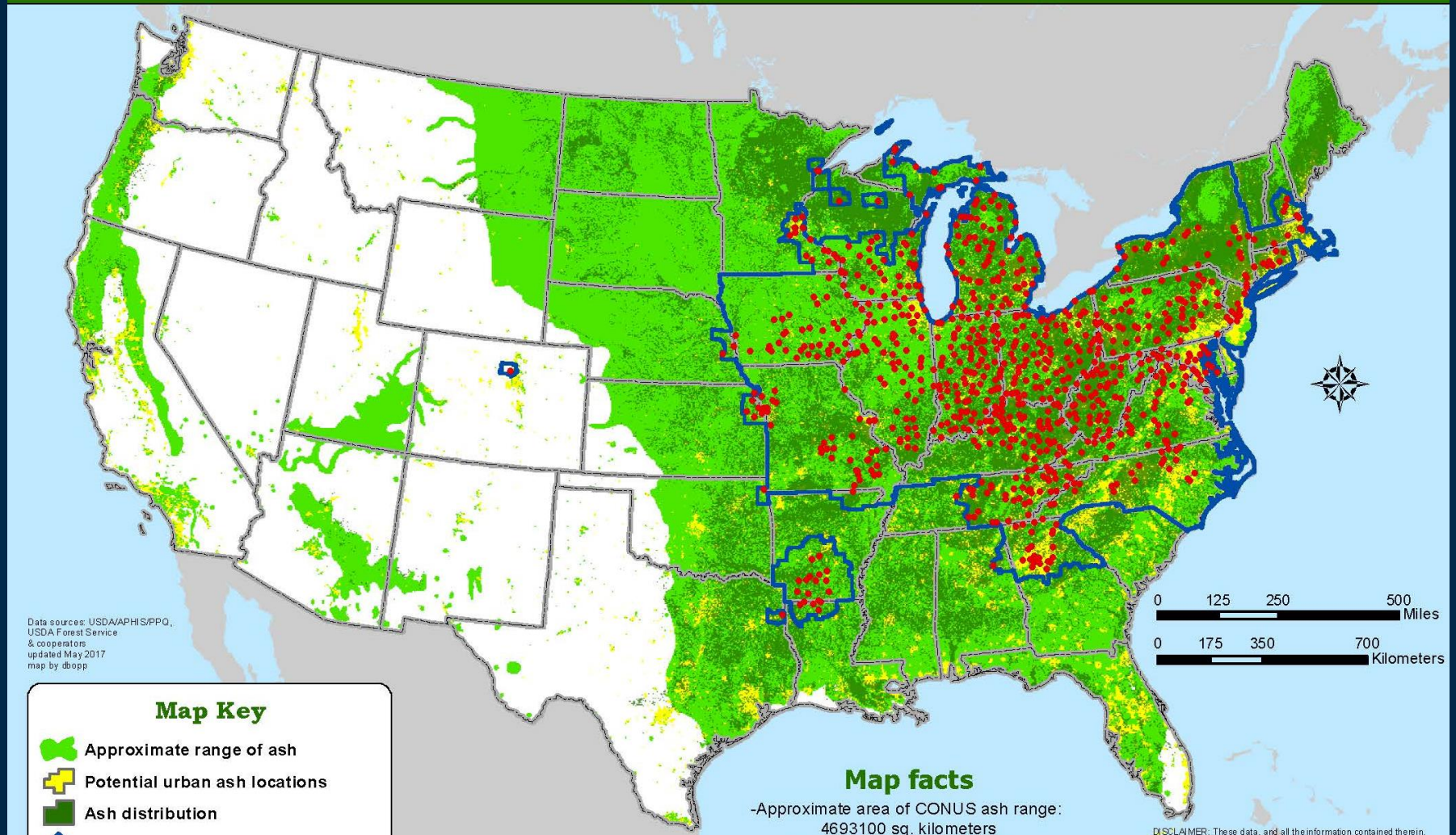
Distribution

USDA United States Department of Agriculture

Cooperative Emerald Ash Borer Project

Approximate range of ash species in the Contiguous U.S.
with EAB positives and Federal quarantines

May 1, 2017



Data sources: USDA/APHIS/PPQ, USDA Forest Service & cooperators
updated May 2017
map by dbopp

Map Key

- Approximate range of ash
- Potential urban ash locations
- Ash distribution
- Federal EAB quarantine boundaries
- Initial county EAB detection

Ash species distribution map source:
USDA, Forest Service, Forest Health Technology Enterprise Team (FHTET).

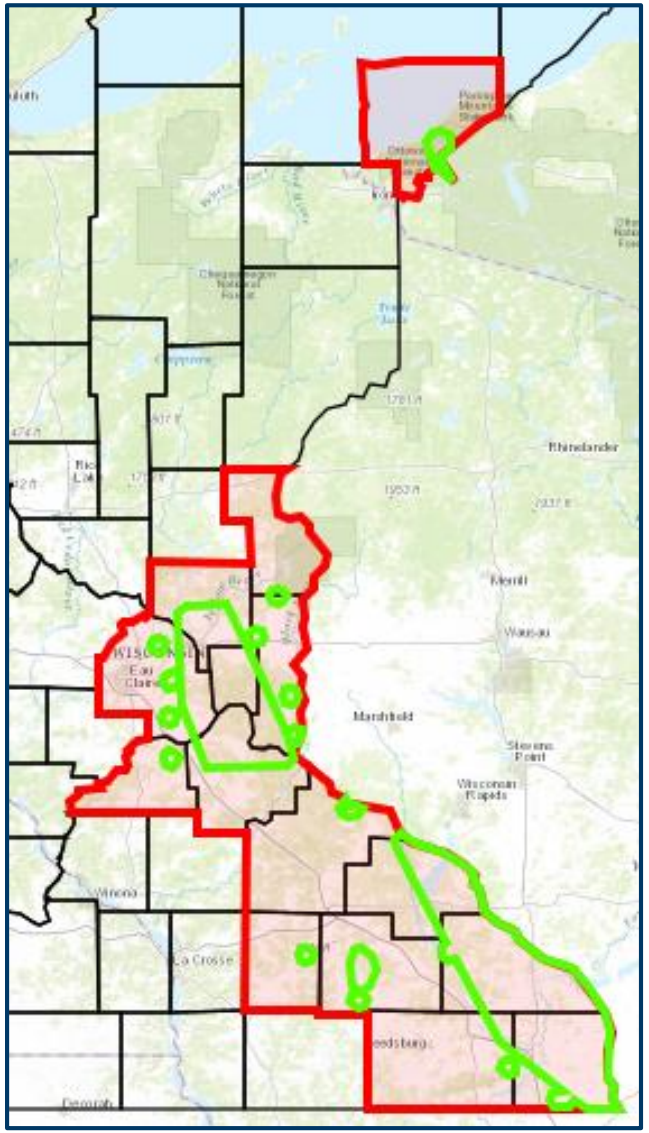
Link to FHTET species distribution maps:
http://foresthealth.fs.usda.gov/host/

Map facts

-Approximate area of CONUS ash range:
4693100 sq. kilometers
-Area of U.S. Federal quarantine:
1850714 sq. kilometers
-Total area of counties where EAB is present:
1220538 sq. kilometers

Minnesota Distribution

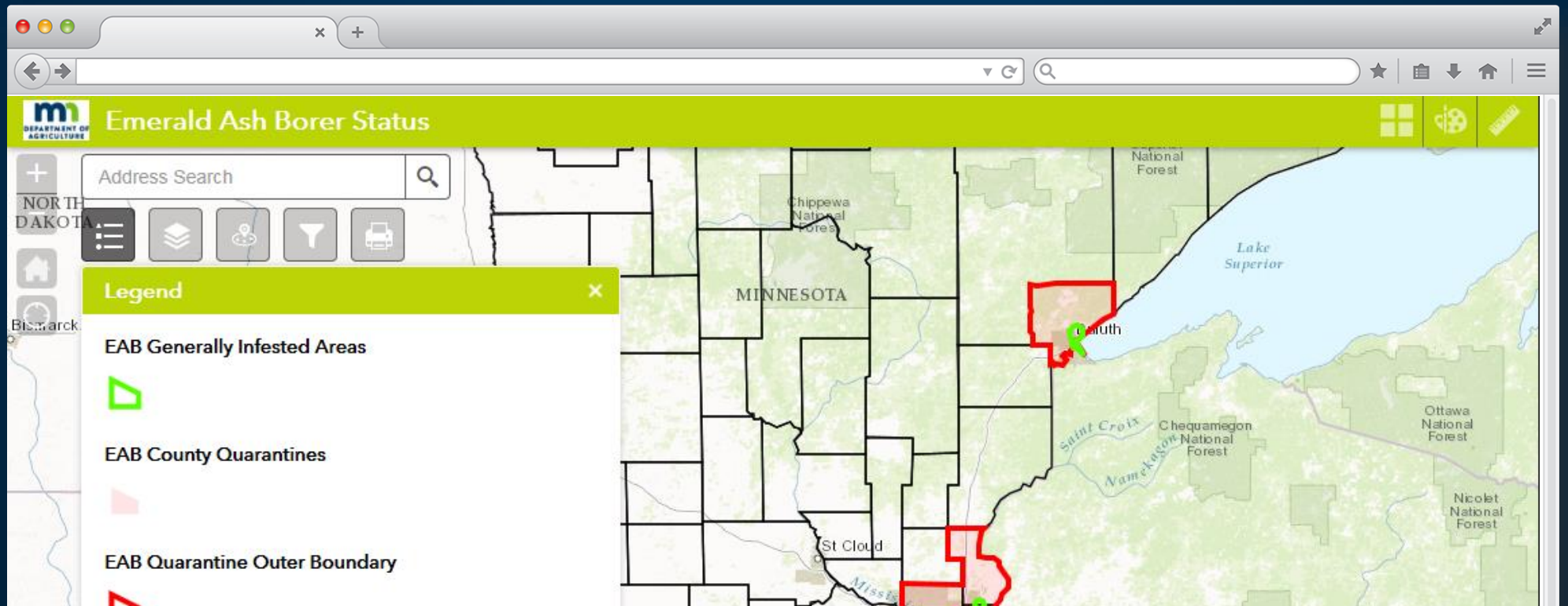
- Generally infested area in green within red EAB quarantined counties
- Quarantined Counties
  - Ash
  - EAB
  - Hardwood Firewood (<4 feet in length)



mda.state.mn.us/eab

Interactive Map

- mda.state.mn.us/eabstatus
- Closest known infested ash tree



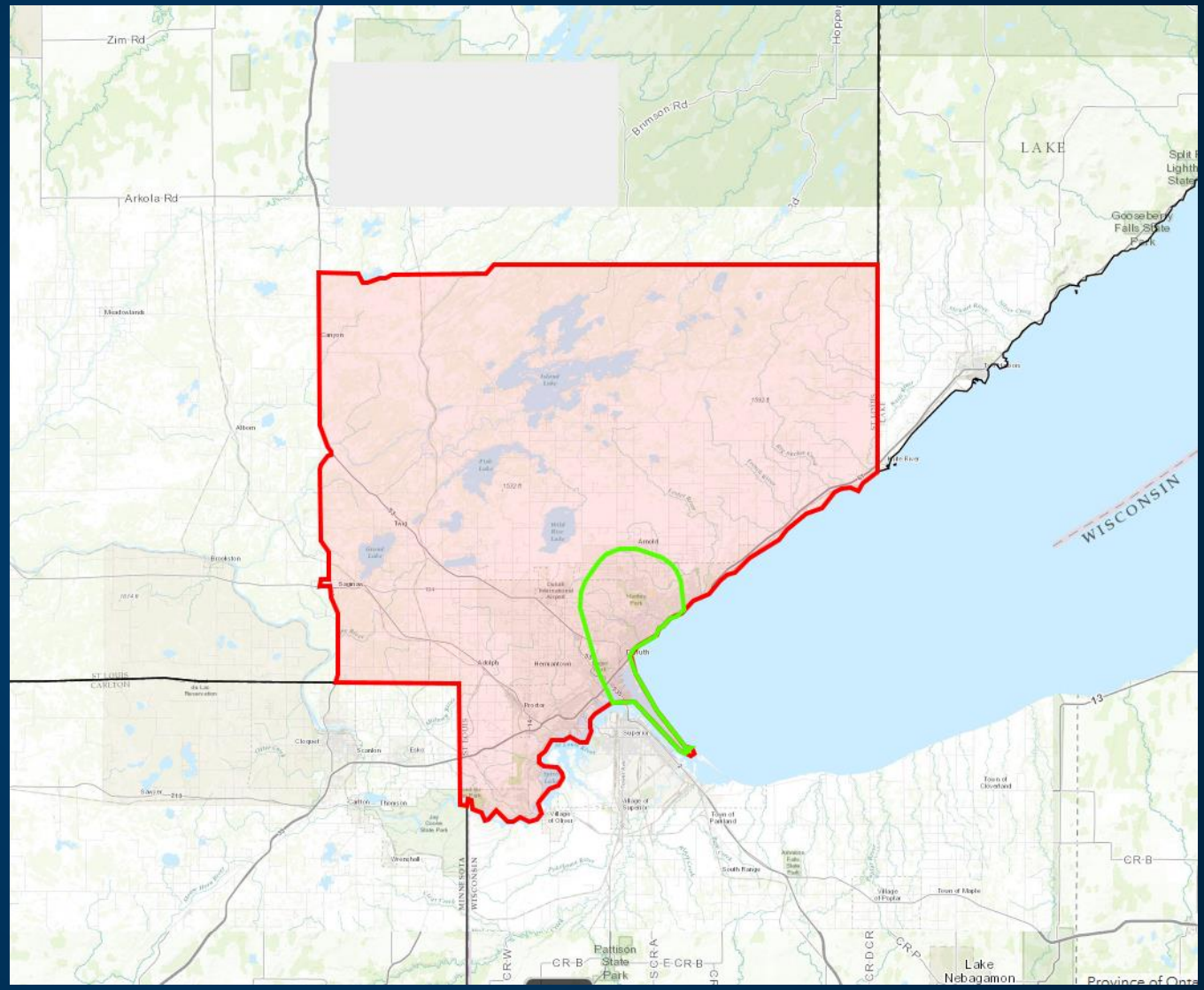
August 2013
- Superior, WI

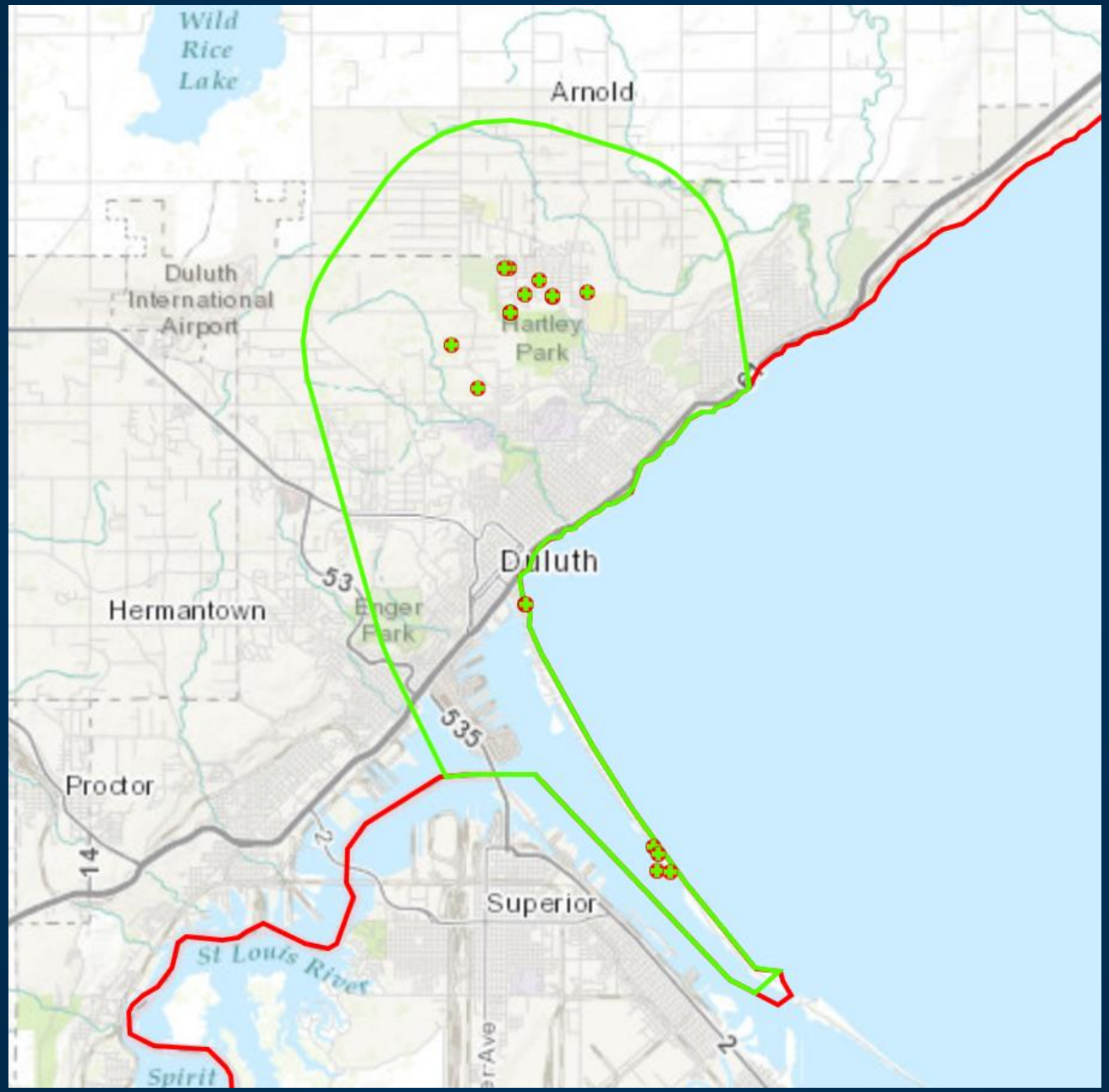
October 2015
- Park Point

June 2016
- Thunder Bay, Ontario

September 2016
- Duluth mainland

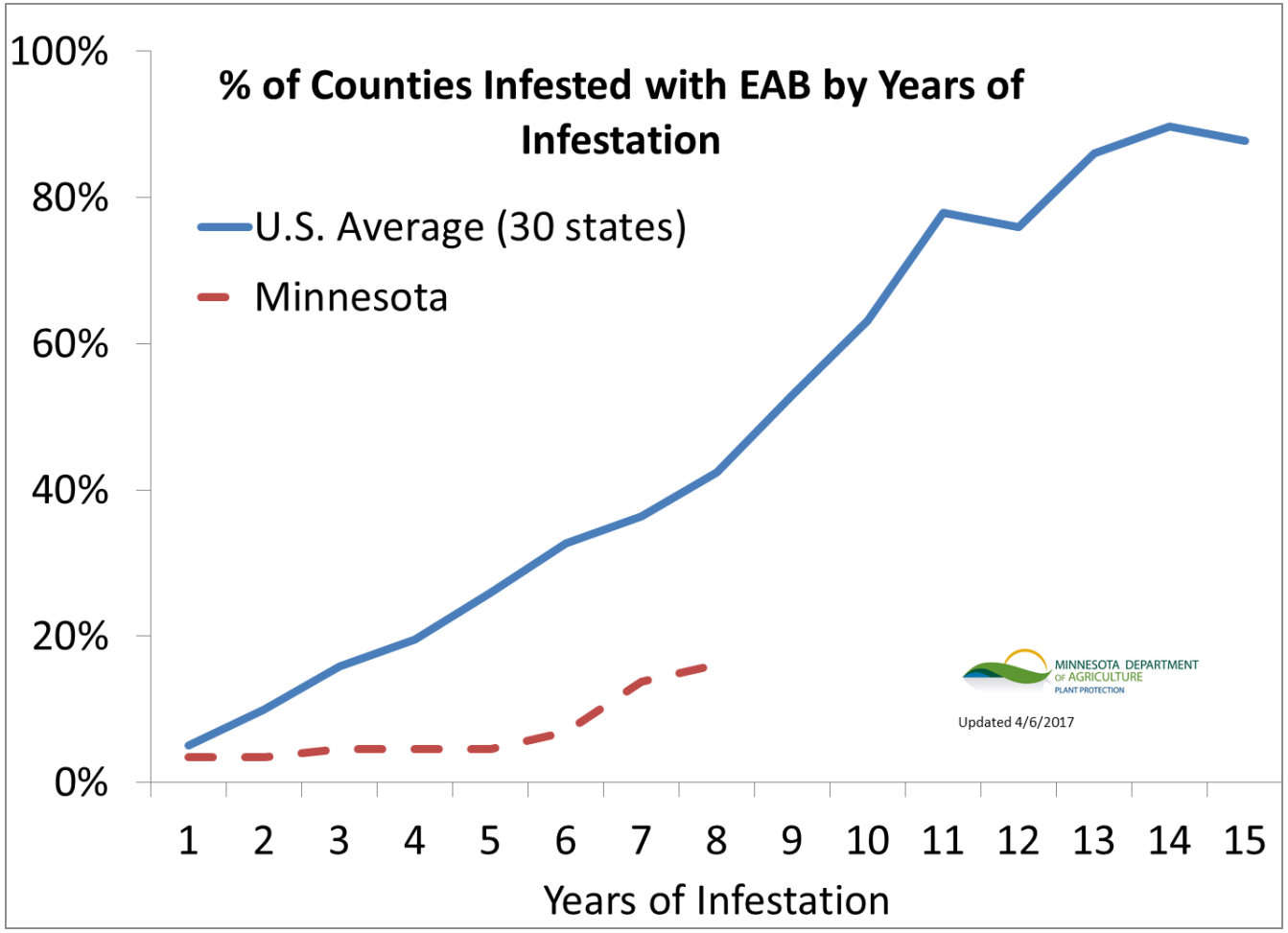
March 2017
- Hartley Park




Wild Rice Lake
Arnold
Duluth International Airport
Hartley Park
Duluth
Hermantown
53
Enger Park
535
Proctor
14
2
Superior
St Louis River
Spirit

Slow Spread

- Cold weather
- Education
- Outreach
- Aggressive management
- Quarantines
- Sanitation



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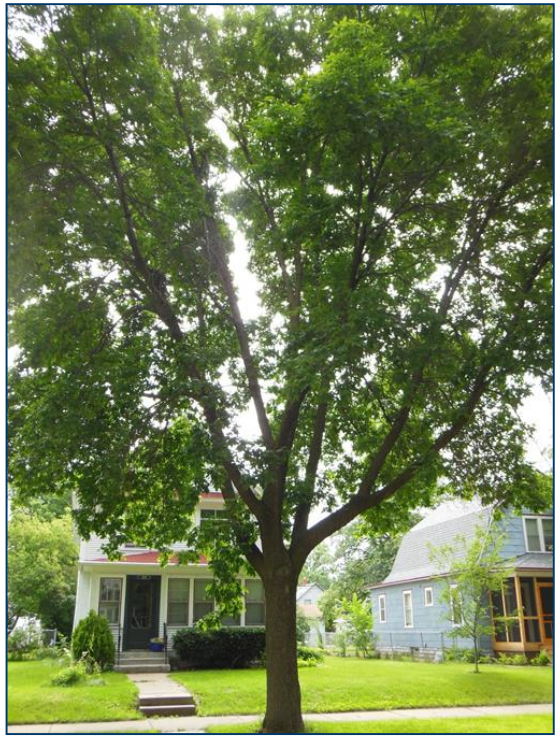
Management

Treatment Plans

- Free permit for private treatment of public trees
- In-house treatments of public trees, $4.77/Diameter inch
- City contract rate extended to private residents, ~$6/D inch
- Treat trees to remove at a later date while waiting for diverse plantings to grow or funds become available



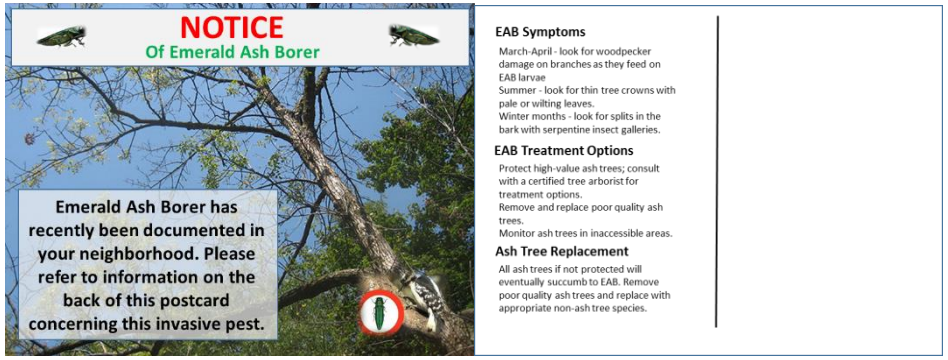
mda.state.mn.us/eab

Removal Plans

- Pre-EAB remove poor quality
- Remove woodpecked trees
- Remove private infested trees (Diseased Tree Ordinance)
- Remove all trees regardless of infestation
- Remove hazard trees

Outreach Efforts

- City Water Bill Insert
- Tree Wraps
- Press Releases
- Postcard Mailings
- Don’t Move Firewood Poster



City A

- Remove poor quality trees
- Remove public infested trees
- Remove private infested trees within a specific distance of adjacent property
- Treat public mature trees in-house, park and boulevard

City B

- Remove poor quality trees
- Remove public infested trees
- No treatments
- No removal of private infested trees

City C

- Remove poor quality trees
- Remove public infested trees
- Remove private infested trees
- Treat mature public park trees, contract
- Treat private trees, offer contract rate

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Reporting

Arrest the Pest

- Take pictures and notes
- Capture the insect or remove bark to see gallery/larvae
- Report
  - GLEDN app (Great Lakes Early Detection Network)
  - mda.state.mn.us/arrestthepest
  - Arrest.the.pest@state.mn.us
  - Call 888-545-6684 and leave a detailed message

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Biocontrol & Biosurveillance

Jonathan Osthus| EAB BioControl Coordinator

Biological Control Agents

- Egg Parasitoid
  - *Oobius agrili*
- Larval Parasitoid
  - *Tetrastichus planipennisi*
- Larval Parasitoid
  - *Spathius galinae*

EAB Biological Control - Implementation

Over 449,000 parasitoid wasps released at 35 sites since September 2010

Biocontrol Agent	2010	2011	2012	2013	2014	2015	2016	All
Tetrastichus planipennisi	2,154	19,480	19,822	42,579	34,434	151,022	45,288	314,779
Oobius agrili	0	3,641	10,241	8,597	12,062	31,490	42,600	108,631
Spathius agrili	1,172	7,596	15,258	0	0	0	0	24,026
Spathius galinae	0	0	0	0	0	0	1,613	1,613
Totals	3,326	30,717	45,321	51,176	46,496	182,512	89,501	449,049

EAB Biological Control - Assessment

- Recovery Methods
  - Tree Debarking
  - Bark Sifting
  - Yellow Pan Trapping

BioSurveillance

- Smoky winged beetle bandit wasp
  - *Cerceris fumipennis*
- Citizen Engagement – Wasp Watchers

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Using Monitoring Data to Optimize EAB Management

Mark Abrahamson, Assistant Director, Plant Protection Division

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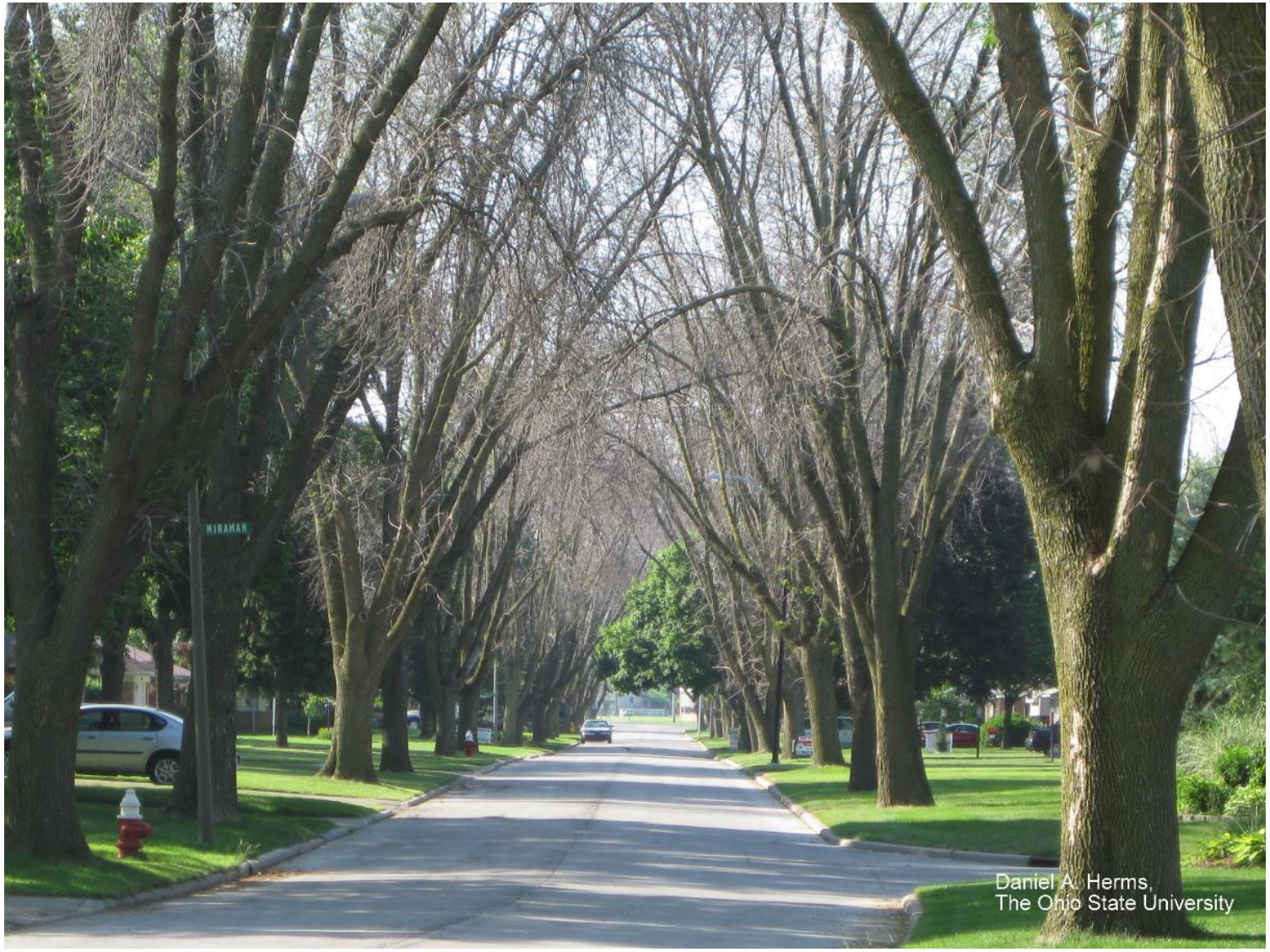
EAB is Bad



Trees are Good!

Environmental Science & Technology

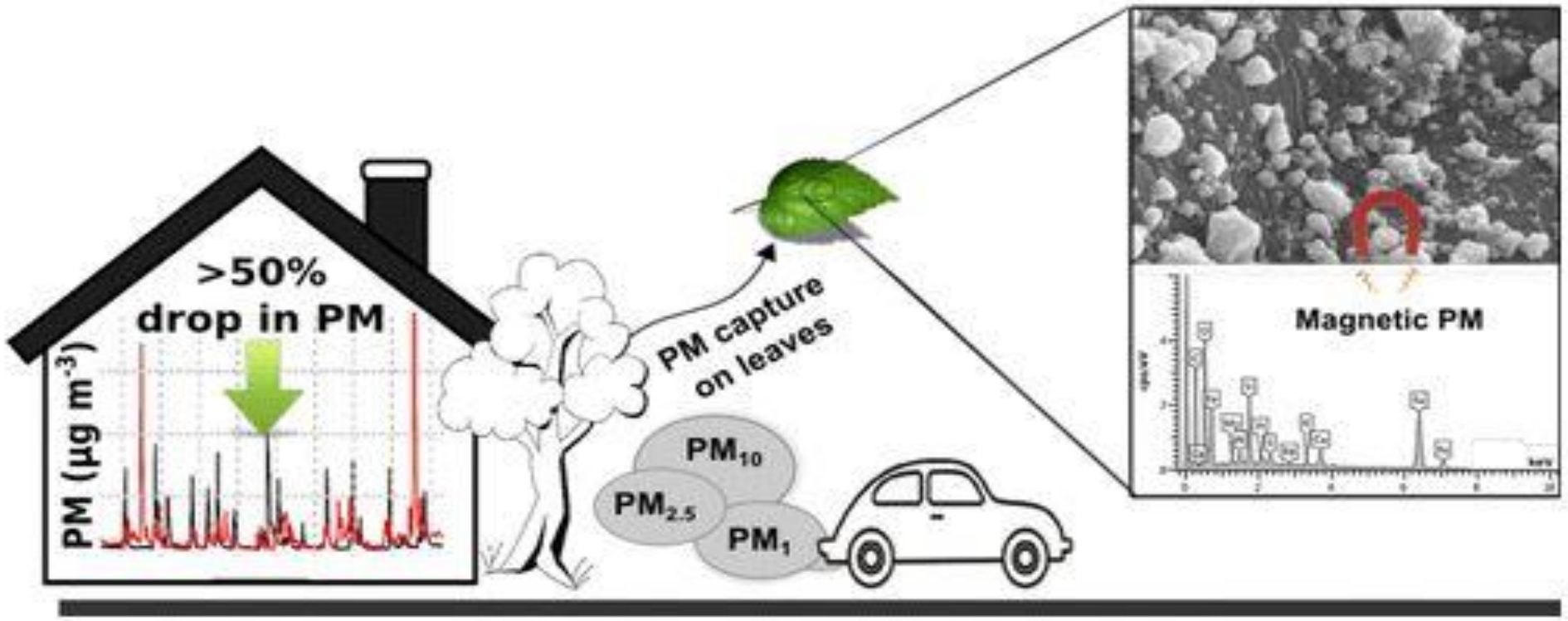
Article

pubs.acs.org/est

Impact of Roadside Tree Lines on Indoor Concentrations of Traffic-Derived Particulate Matter

Barbara A. Maher,* Imad A. M. Ahmed, Brian Davison, Vassil Karloukovski, and Robert Clarke

Centre for Environmental Magnetism & Palaeomagnetism, Lancaster Environment Centre, Lancaster University, Lancaster LA1 4YQ, United Kingdom



The Relationship Between Trees and Human Health

Evidence from the Spread of the Emerald Ash Borer

Geoffrey H. Donovan, PhD, David T. Butry, PhD, Yvonne L. Michael, ScD, Jeffrey P. Prestemon, PhD, Andrew M. Liebhold, PhD, Demetrios Gatziolis, PhD, Megan Y. Mao

Background: Several recent studies have identified a relationship between the natural environment and improved health outcomes. However, for practical reasons, most have been observational, cross-sectional studies.

Purpose: A natural experiment, which provides stronger evidence of causality, was used to test whether a major change to the natural environment—the loss of 100 million trees to the emerald ash borer, an invasive forest pest—has influenced mortality related to cardiovascular and lower-respiratory diseases.

Methods: Two fixed-effects regression models were used to estimate the relationship between emerald ash borer presence and county-level mortality from 1990 to 2007 in 15 U.S. states, while controlling for a wide range of demographic covariates. Data were collected from 1990 to 2007, and the analyses were conducted in 2011 and 2012.

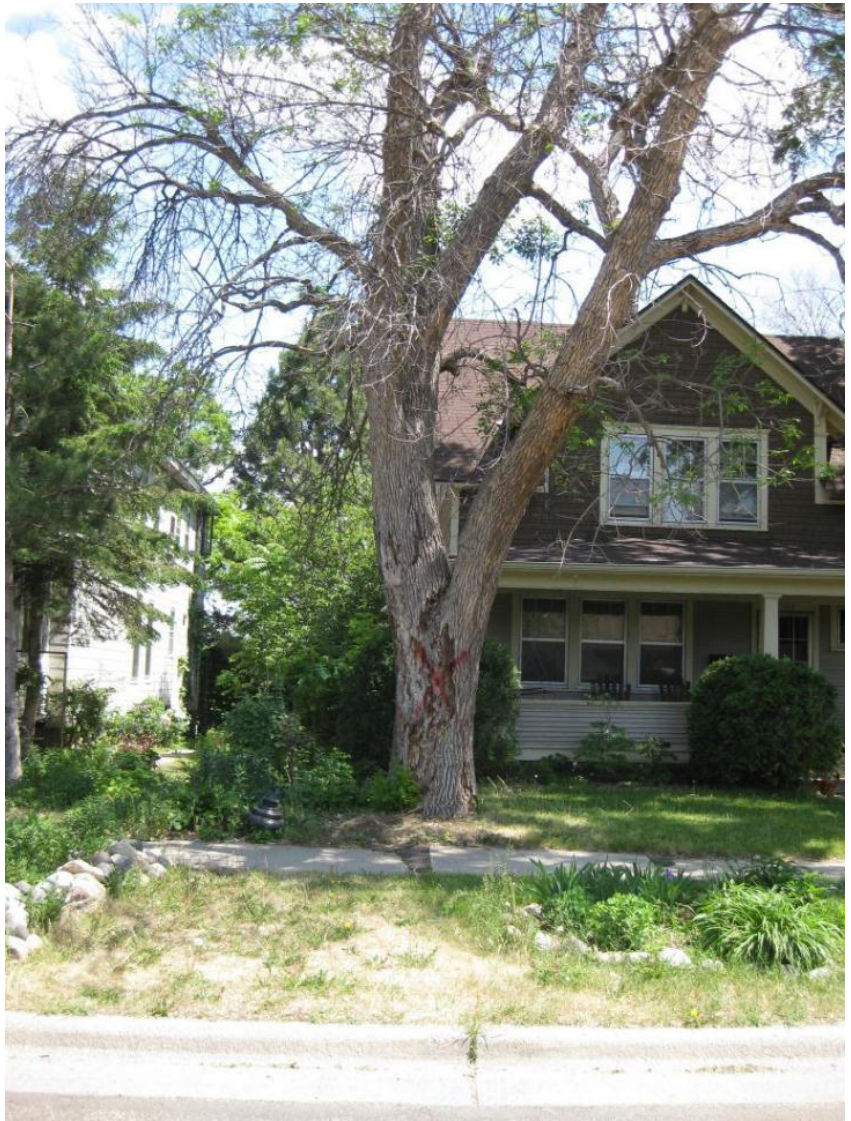
Results: There was an increase in mortality related to cardiovascular and lower-respiratory-tract illness in counties infested with the emerald ash borer. The magnitude of this effect was greater as infestation progressed and in counties with above-average median household income. Across the 15 states in the study area, the borer was associated with an additional 6113 deaths related to illness of the lower respiratory system, and 15,080 cardiovascular-related deaths.

Conclusions: Results suggest that loss of trees to the emerald ash borer increased mortality related to cardiovascular and lower-respiratory-tract illness. This finding adds to the growing evidence that the natural environment provides major public health benefits.

(Am J Prev Med 2013;44(2):139–145) Published by Elsevier Inc. on behalf of American Journal of Preventive Medicine

Fate of EAB Infested Trees

1. Removed (before or after death)
2. Treated with insecticide
3. Die and fall apart



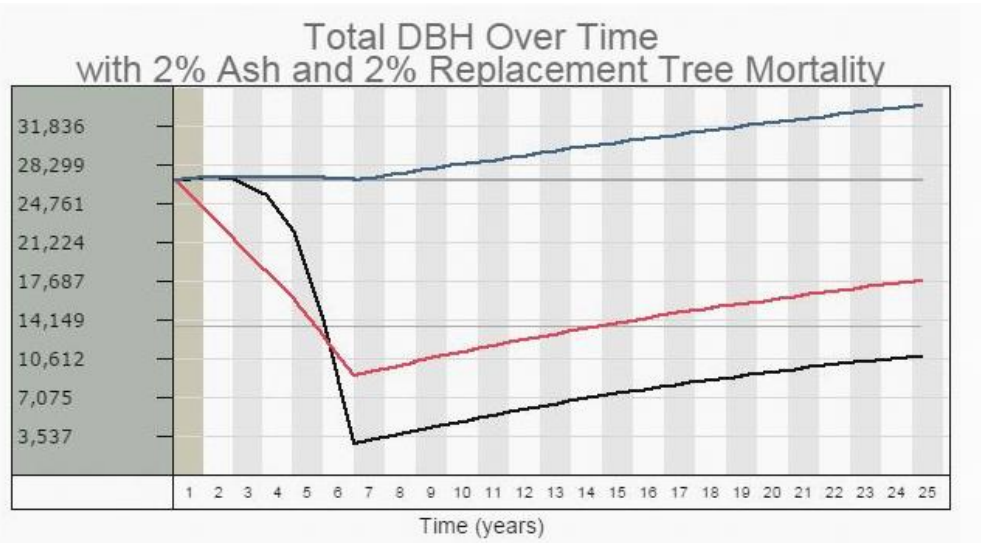
EXTENSION ENTOMOLOGY | EAB IN INDIANA

Emerald Ash Borer Cost Calculator

PURDUE UNIVERSITY

Welcome to the Emerald Ash Borer Cost Calculator 2.1

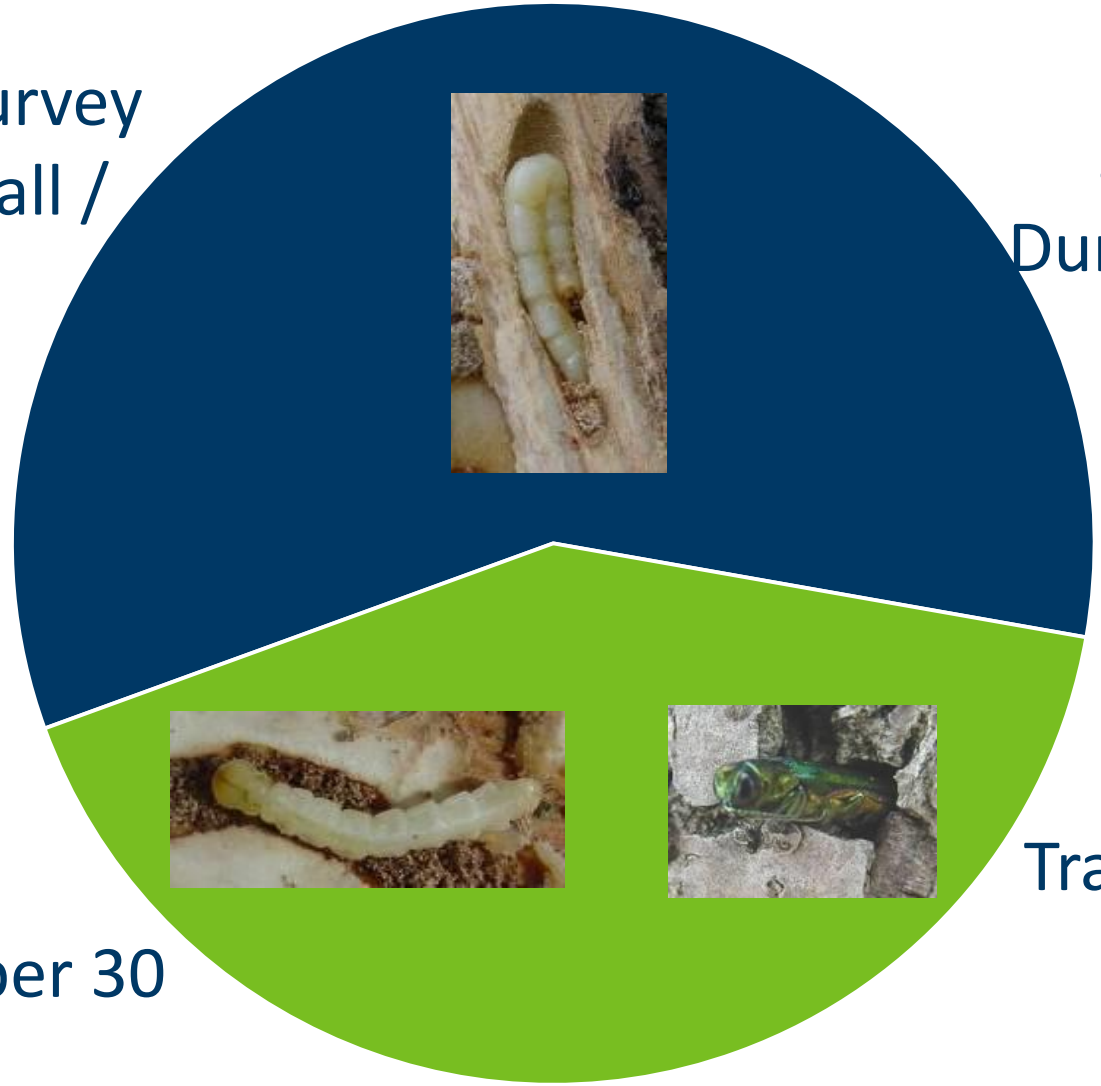
Option 1	Option 2	Option 3
Remove All	Remove All	Remove All
Replace All	Replace All	Replace All
Treat All	Treat All	Treat All
Remove Unsafe Ash	Remove Unsafe Ash	Remove Unsafe Ash
Replace Unsafe Ash	Replace Unsafe Ash	Replace Unsafe Ash
Save 80%	Save 80%	Save 80%
Replace <12	Replace <12	Replace <12
Save 50%	Save 50%	Save 50%
URBAN SLAM	URBAN SLAM	URBAN SLAM



Use of Monitoring to Inform Management

EAB Lifecyle

Visual Survey During Fall / Winter / Spring



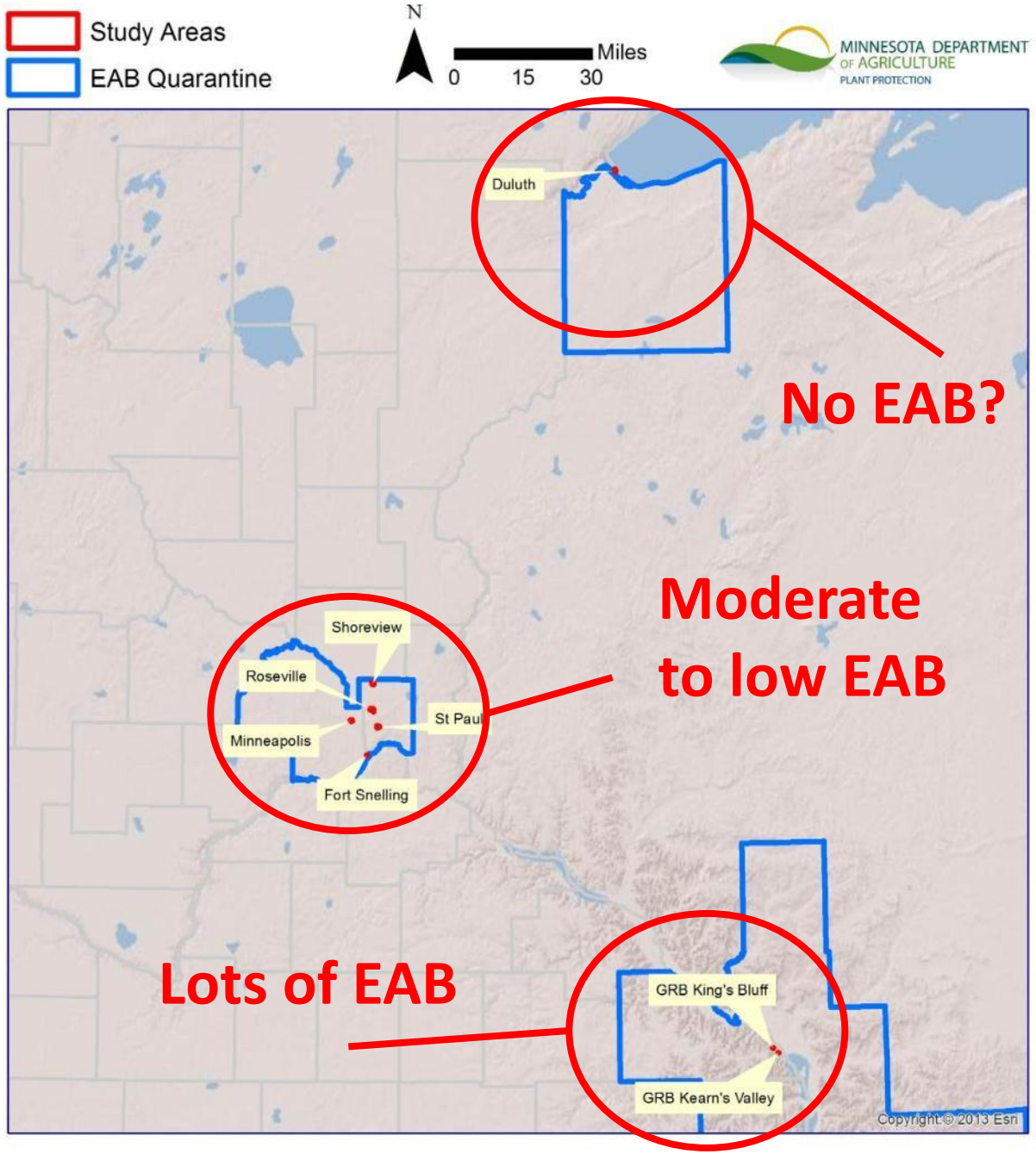
Branch Sampling During Fall / Winter / Spring

May 1

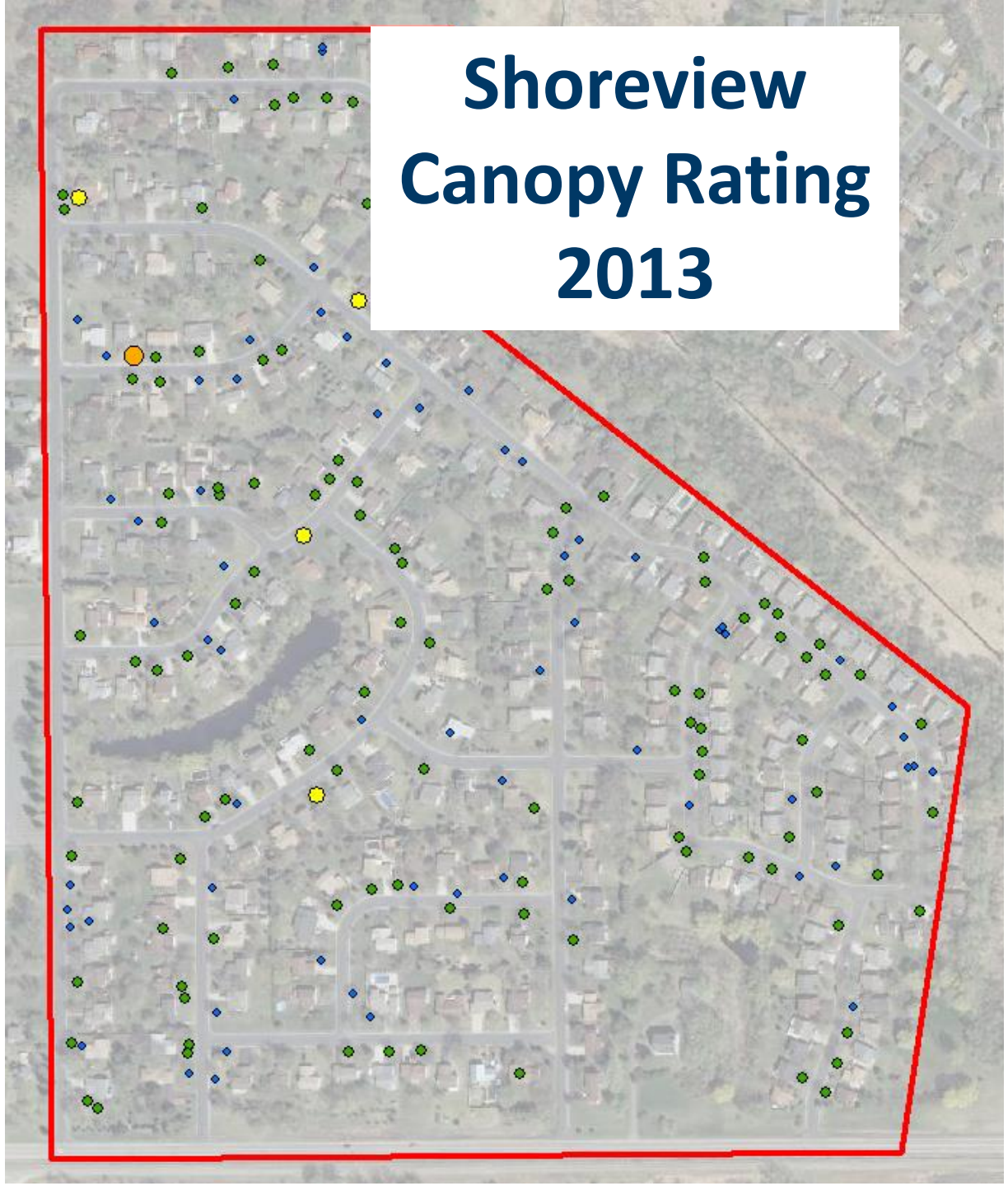
Trap Survey During Summer

September 30

EAB Detection Study Sites



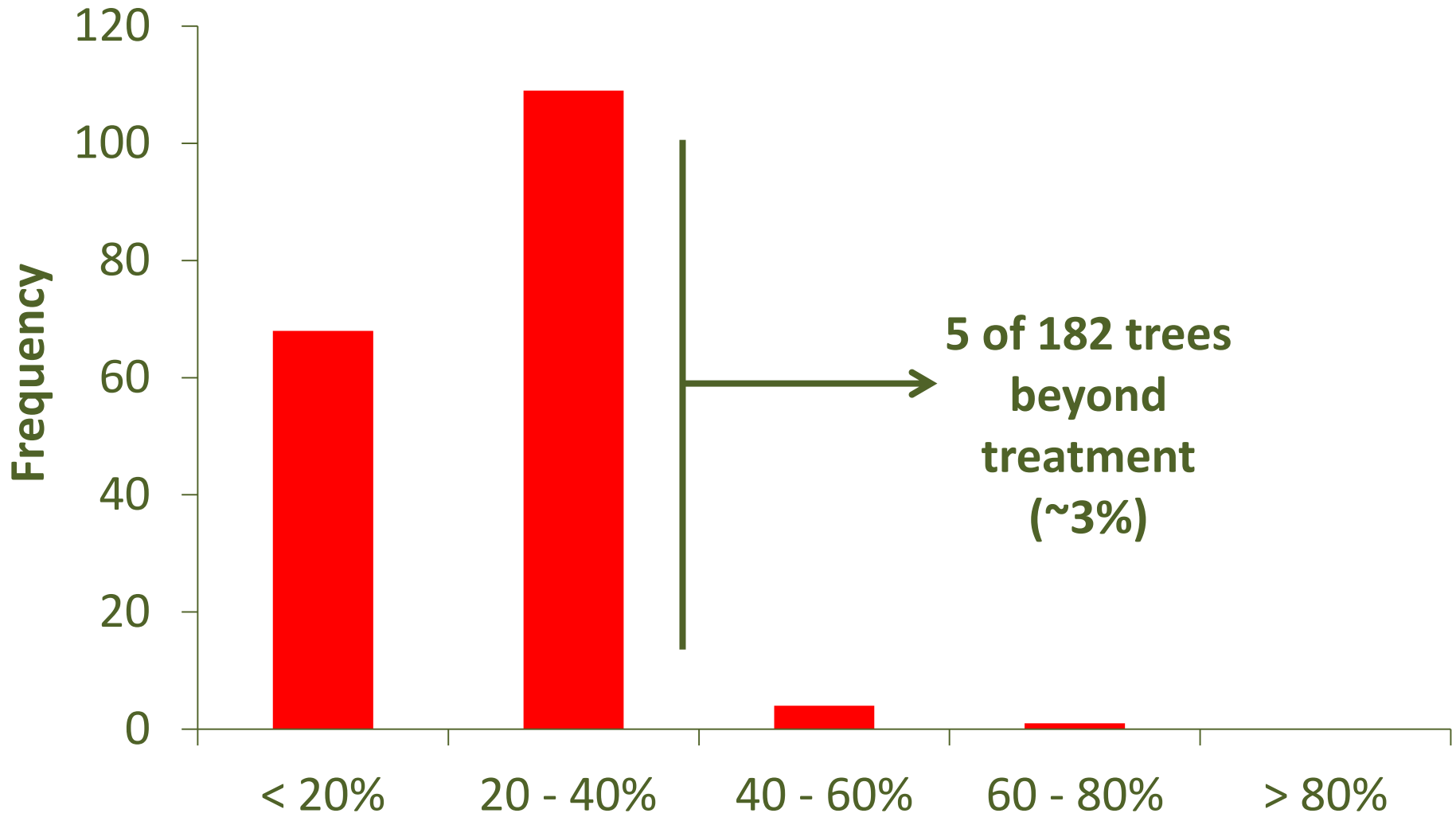
Shoreview Canopy Rating 2013



Canopy Rating

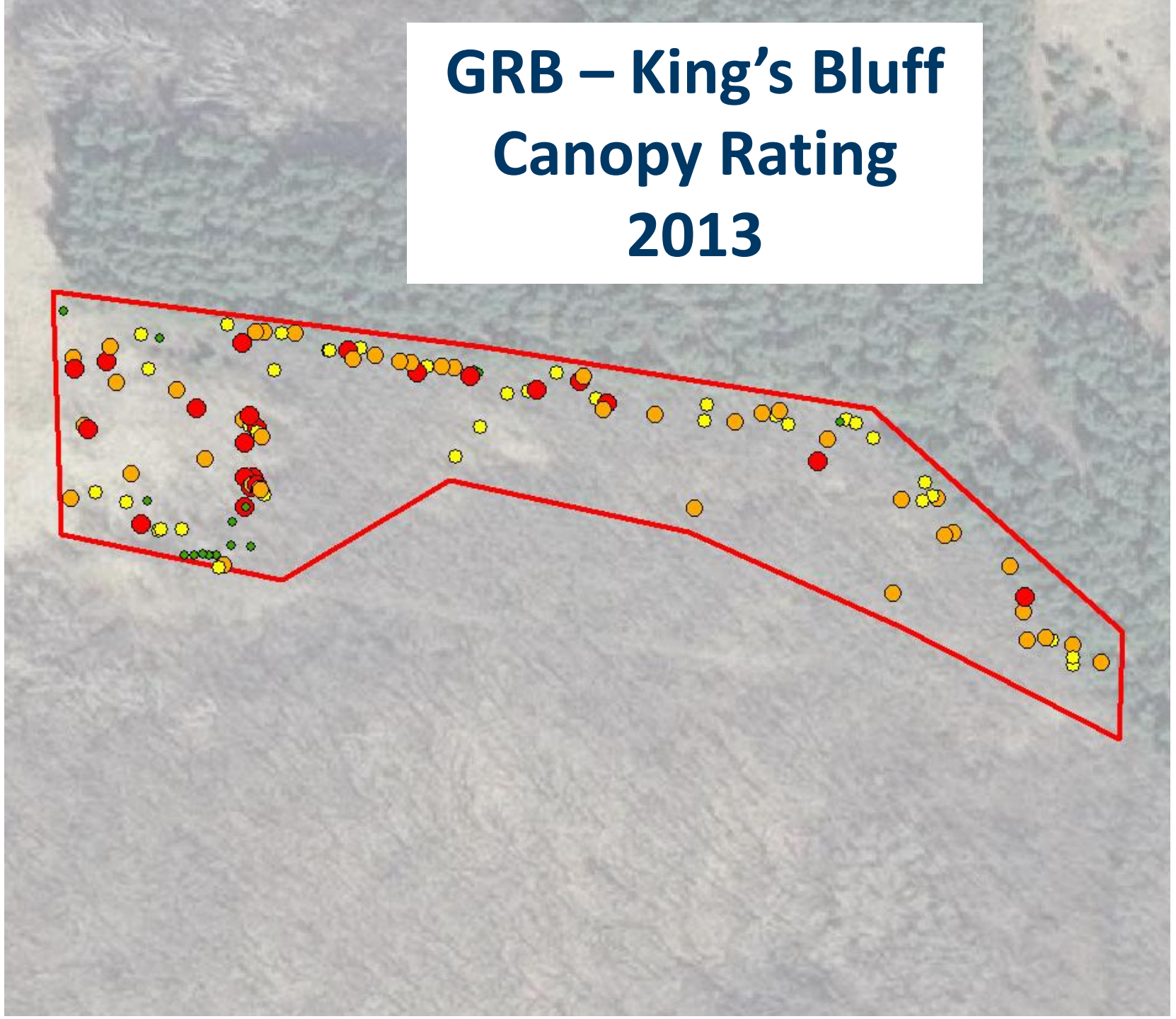
- < 20% loss
- 20-40%
- 40-60%
- 60-80%
- > 80%

Shoreview 2013



EAB Regional meeting/https://www.mda.state.mn.us/emeraldashborer

GRB – King's Bluff
Canopy Rating
2013



Canopy Rating

- < 20% loss
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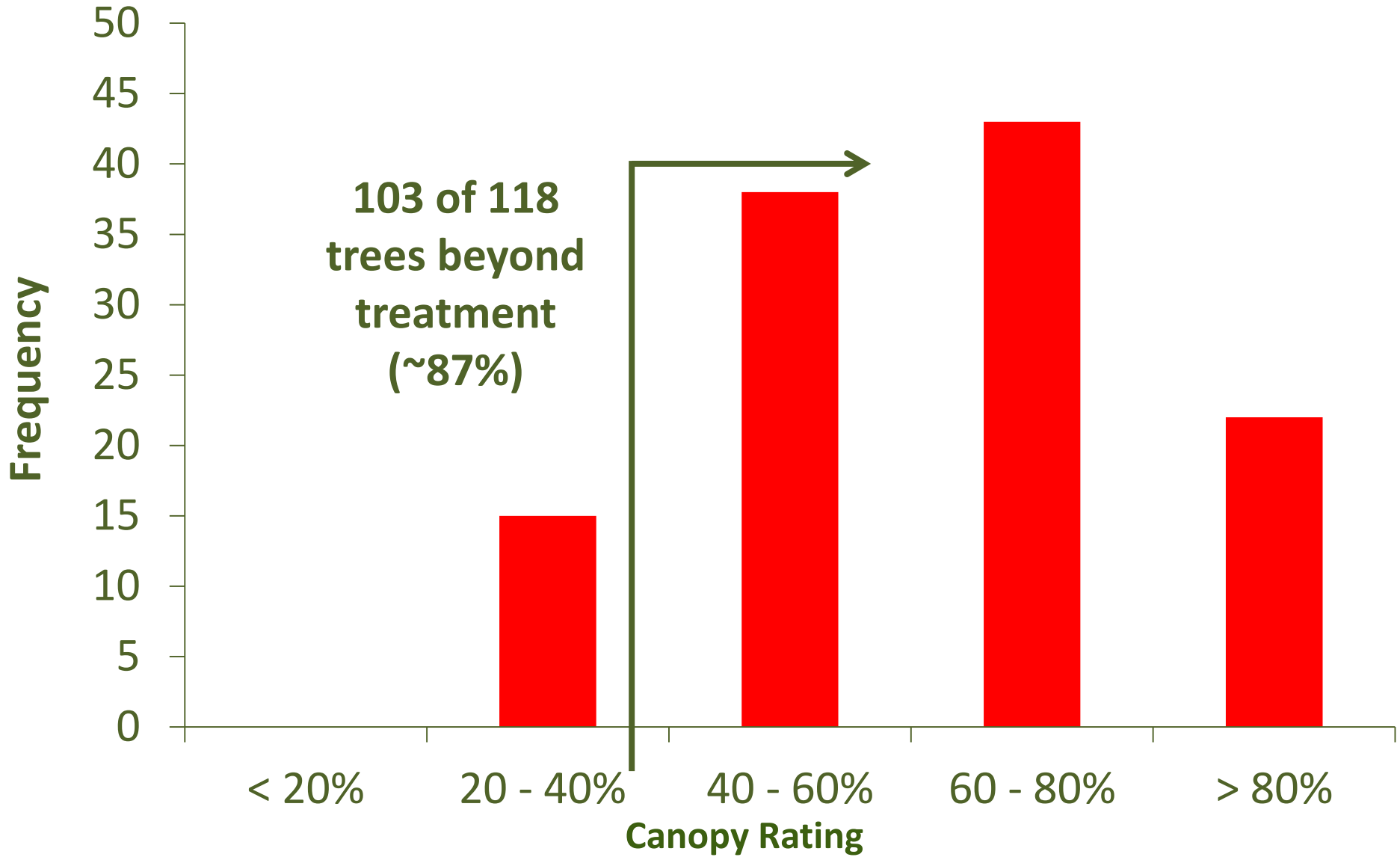
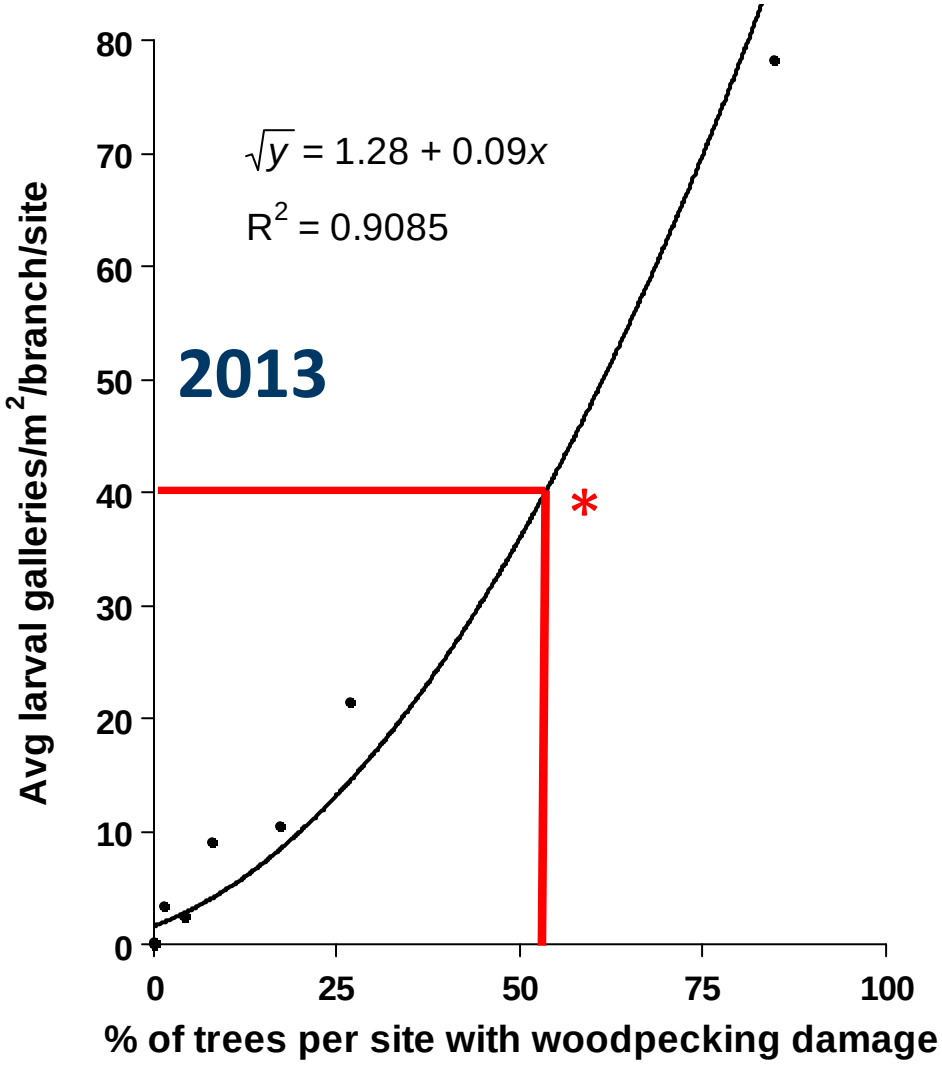
GRB Kings Bluff 2013

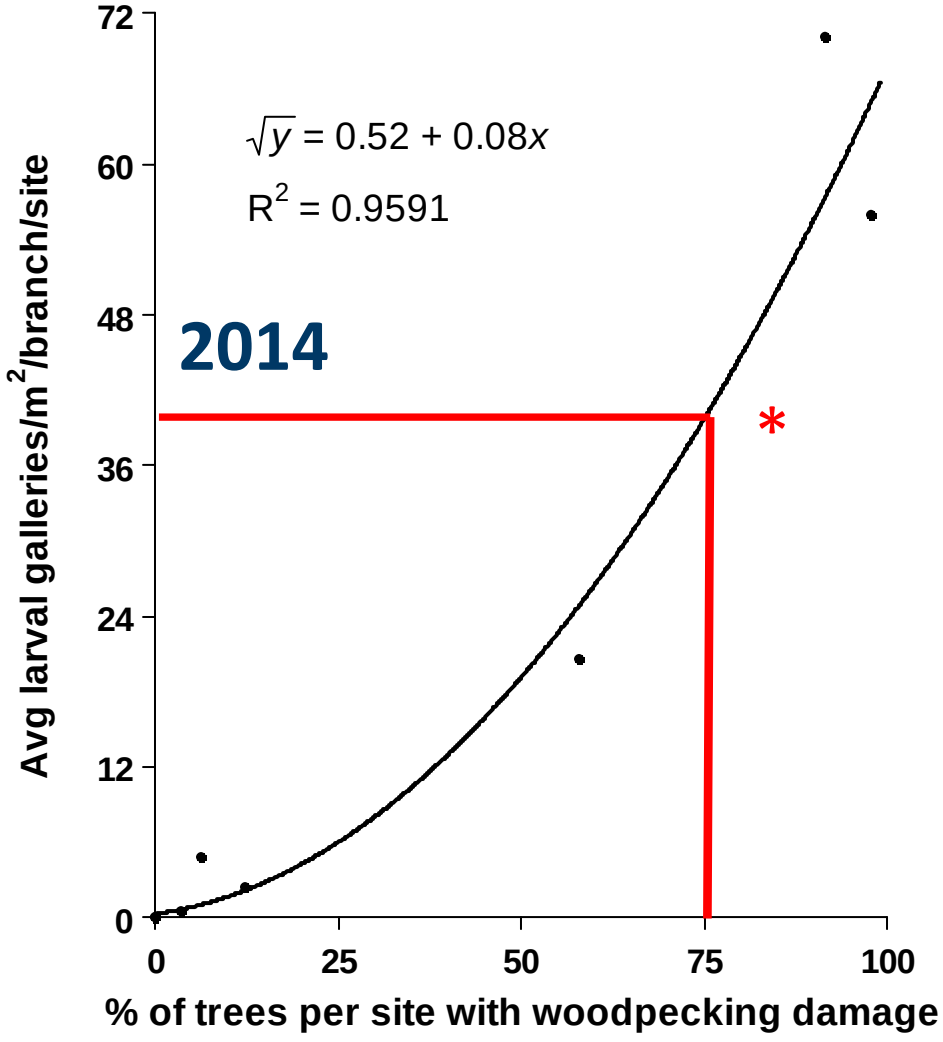


Value of Monitoring-Woodpecking (Branch Sampling)

* From Flower, et al. 2013. The relationship between the emerald ash borer and ash tree decline…

Analysis by Wilke and Aukema, University of Minnesota



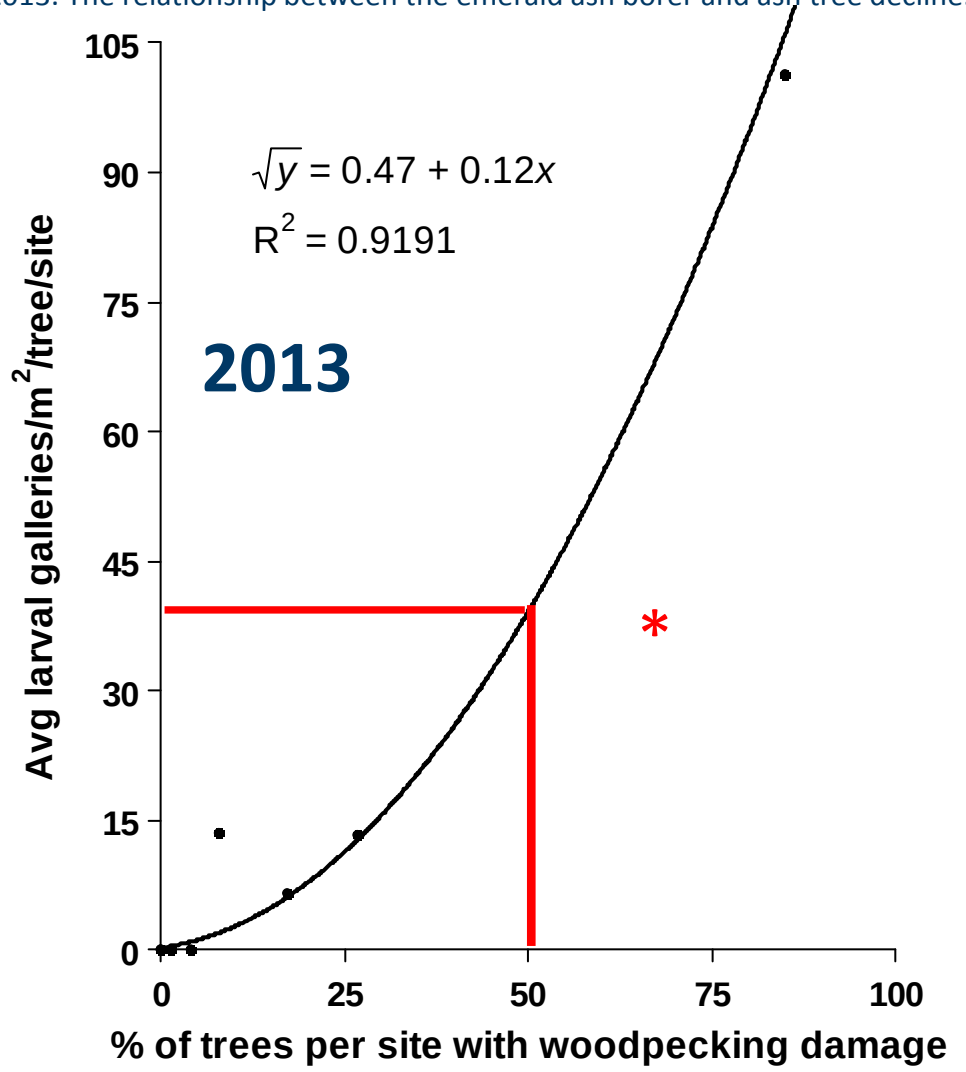


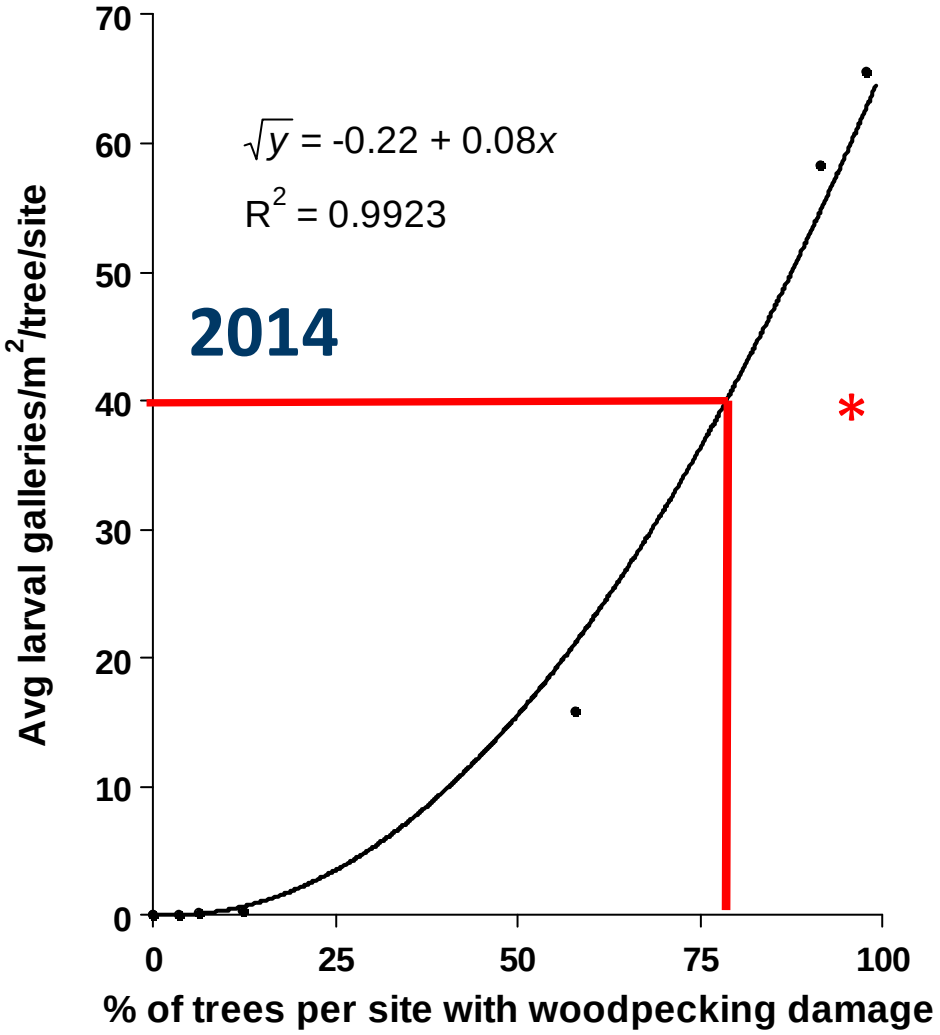
ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

Value of Monitoring- Woodpecking (Whole Tree)

* From Flower, et al. 2013. The relationship between the emerald ash borer and ash tree decline…

Analysis by Wilke and Aukema, University of Minnesota





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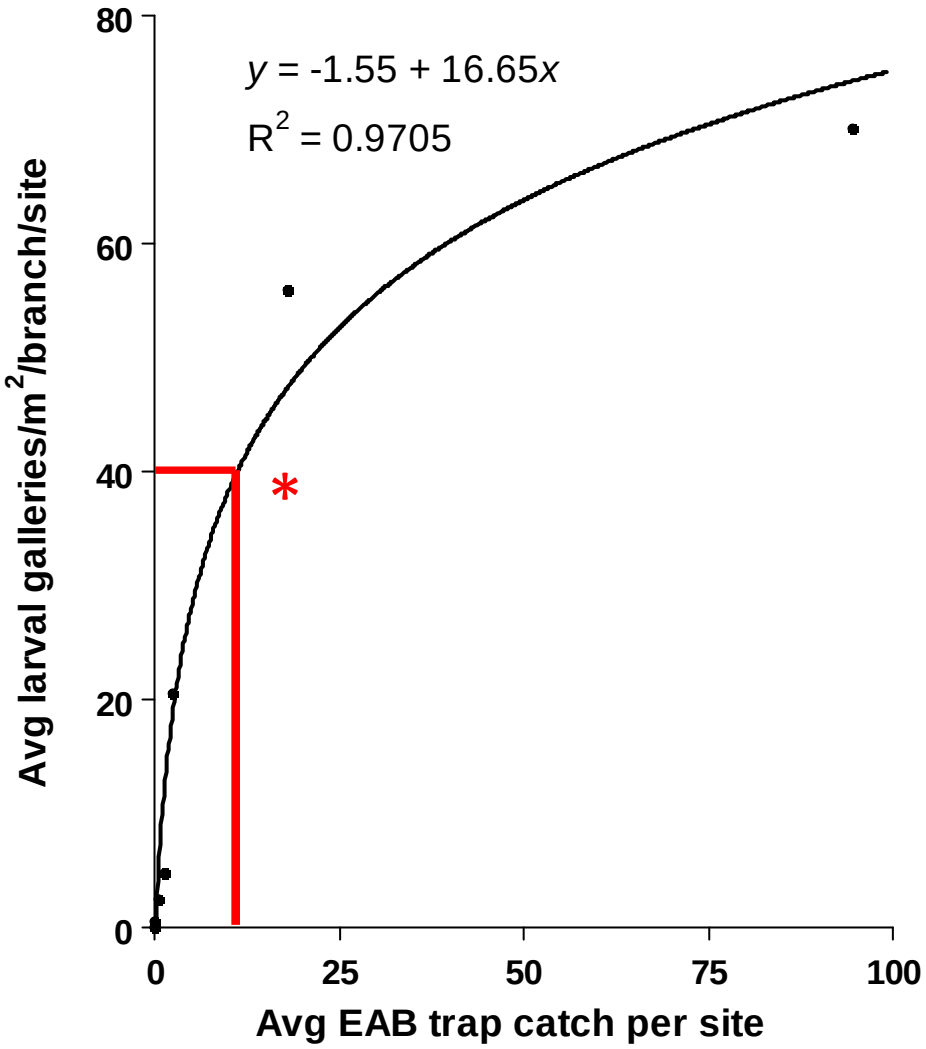
Value of Monitoring- Trapping

Analysis by Wilke and Aukema, University of Minnesota

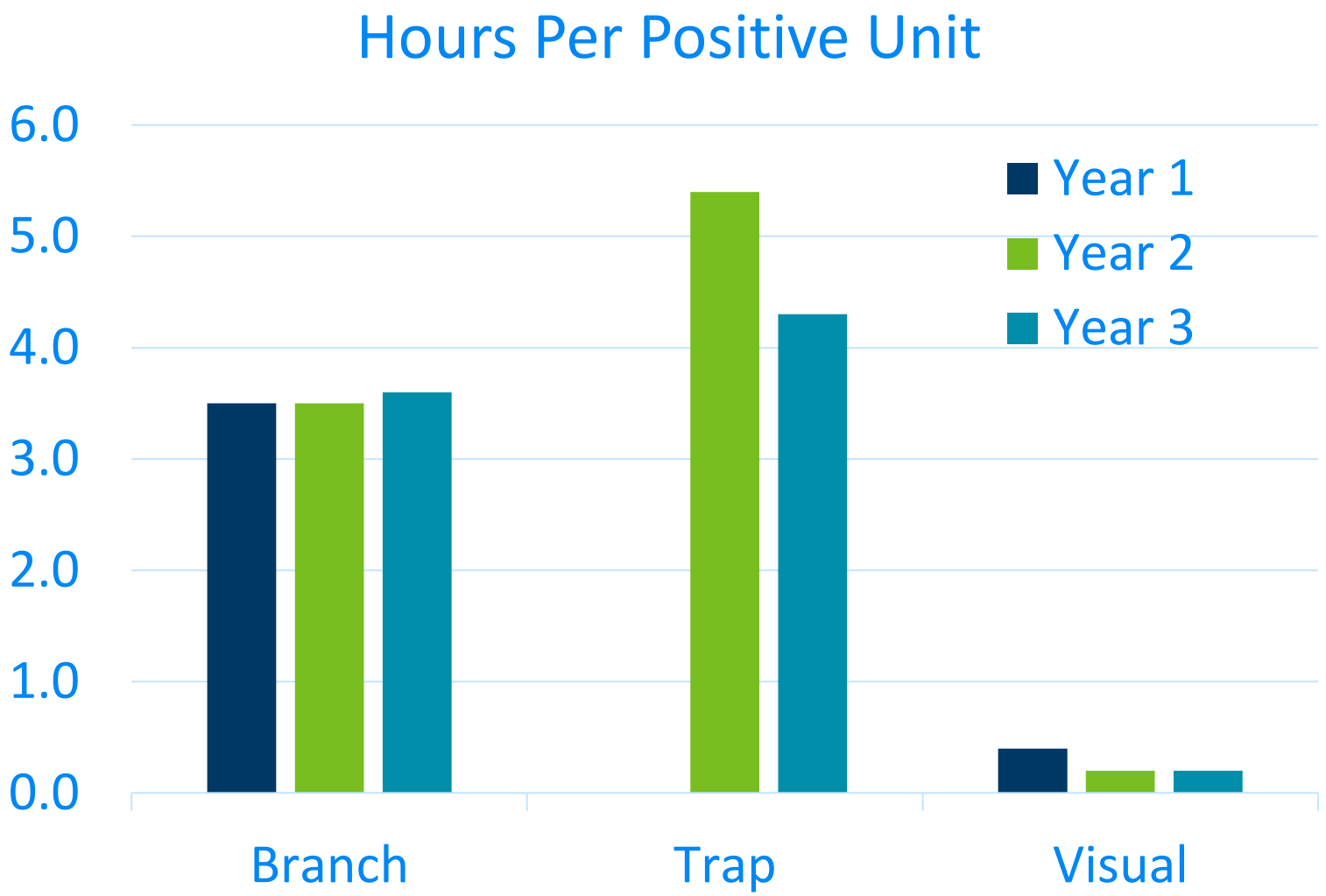


2014

* From Flower, et al. 2013. The relationship between the emerald ash borer and ash tree decline…

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

Value of Monitoring- Time Management



ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

Funding Sources and Partners

MDA – Mark Abrahamson, Angie Ambourn, Chris Mallet, Jennifer Burington, Jon Osthus, William Martin

U of M – Brian Aukema, Rob Venette, Aubree Wilke, Sam Fahrner

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Thank you!

Angie Ambourn

Angie. Ambourn@state.mn.us

651-201-6073

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Thank you!

arrest.the.pest@state.mn.us

888-545-6684