



**Tree health,
resilience and
sustainability**

INSTITUTE OF CHARTERED FORESTERS

National Conference • 22 – 23 April 2015 • Cardiff

Lessons Learned from the Emerald Ash Borer (EAB)

Jim Zwack, M.S.

Director of Technical Services

The Davey Tree Expert Company

Personal Introduction

- B.S. Urban Forestry, University of Minnesota
- M.S. Tree Physiology, Iowa State University
- University of Minnesota Landscape Arboretum
- The Davey Institute
 - Director of Technical Services
 - Research, training, educational, and environmental compliance arm of the Davey Tree Expert Company

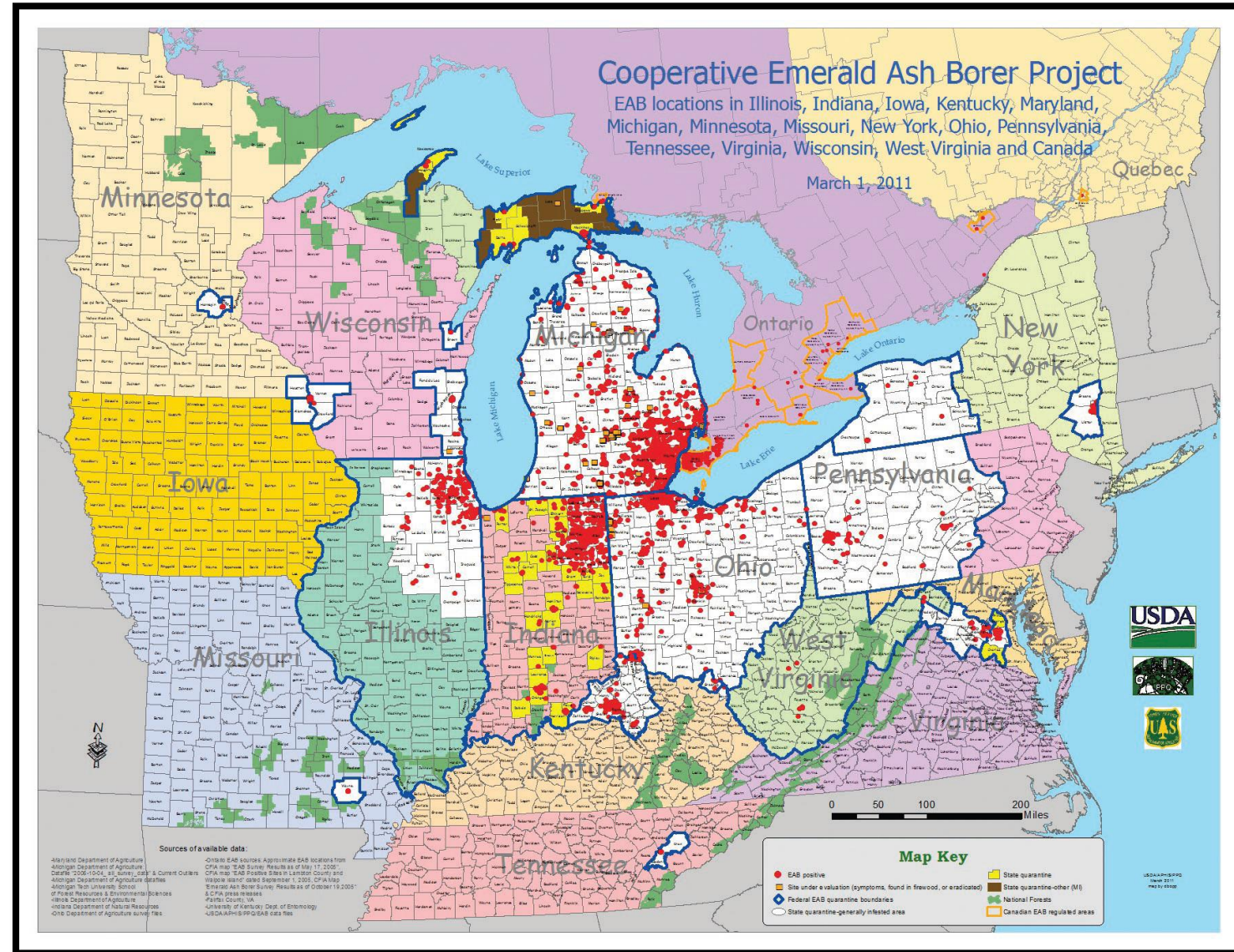
The Davey Tree Expert Company

- Founded in 1880 in Kent, Ohio
- 8,000 employees in 45 US States and Canada
- 16th largest Employee-Owned company in the US
- Utility, Residential, Commercial, and Consulting Business Units



The Basics of EAB

- An exotic invasive pest
- First identified in North America in 2002
- Has killed 10's of millions of trees
- Overall impact will be \$Billions



The Basics of EAB

In North America, EAB attacks all types of ash trees, including:



Green ash



White ash

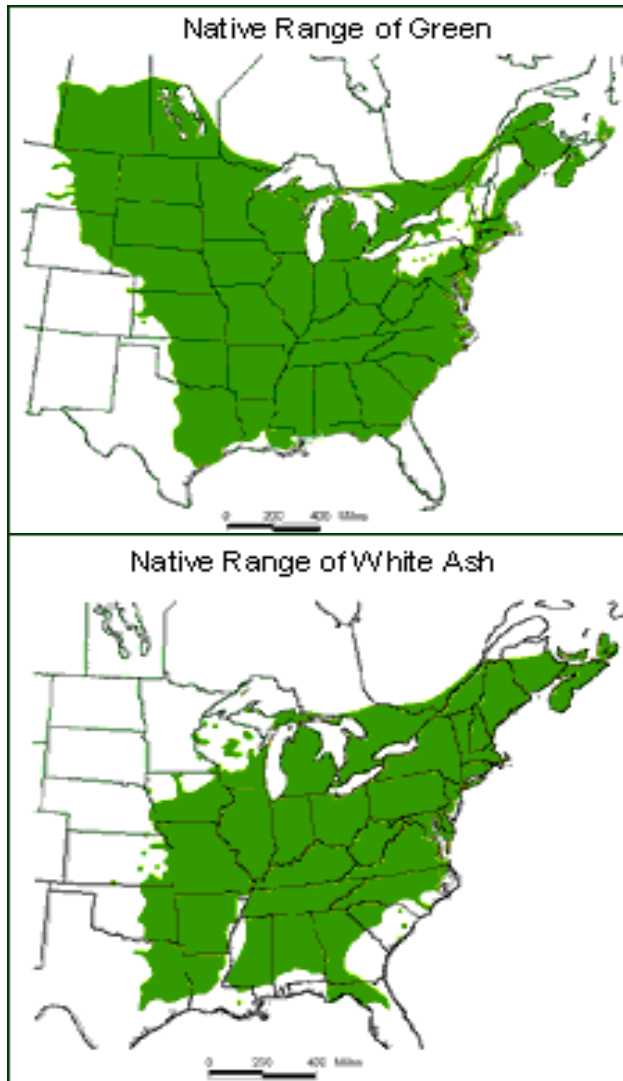


Black ash

And all other horticultural varieties of ash.

EAB Biology

Host Range and Preferences



- Tens of millions of trees have been killed and removed
- 8 billion forest trees threatened
 - ~ 3% of the National forest
- Valued at \$300 billion
- > 35% of urban canopy threatened in some areas
- Wood over 1 inch in diameter is susceptible
- The health of the tree makes no difference
 - Primary, not a secondary borer

The Basics of EAB

Adult beetle
lands on tree
and lays
eggs



Eggs hatch and become
worm-like larvae



Larvae tunnel through tree's
water conducting tissue



Trees begin to
thin and
decline.

Emerald Ash Borer Effects

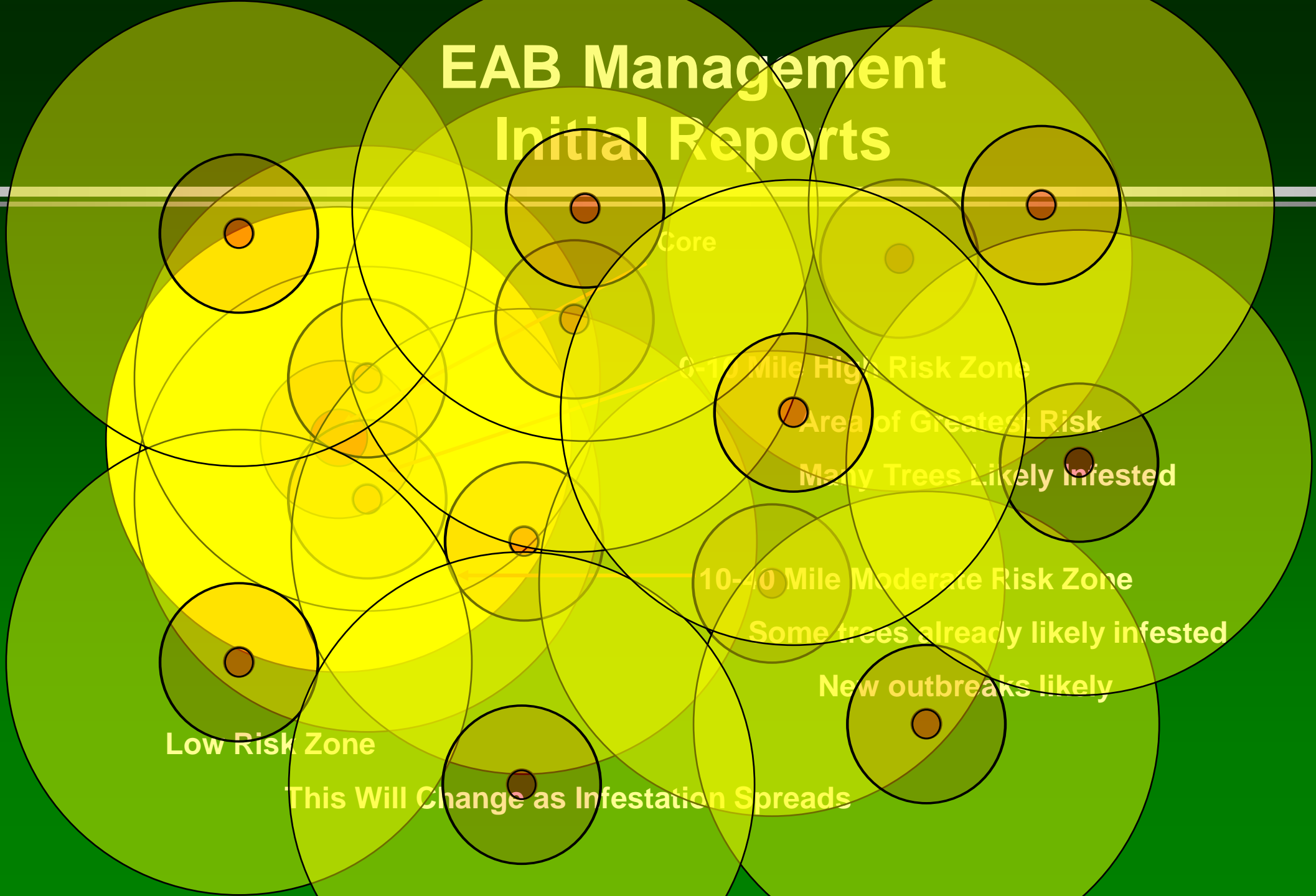


2006

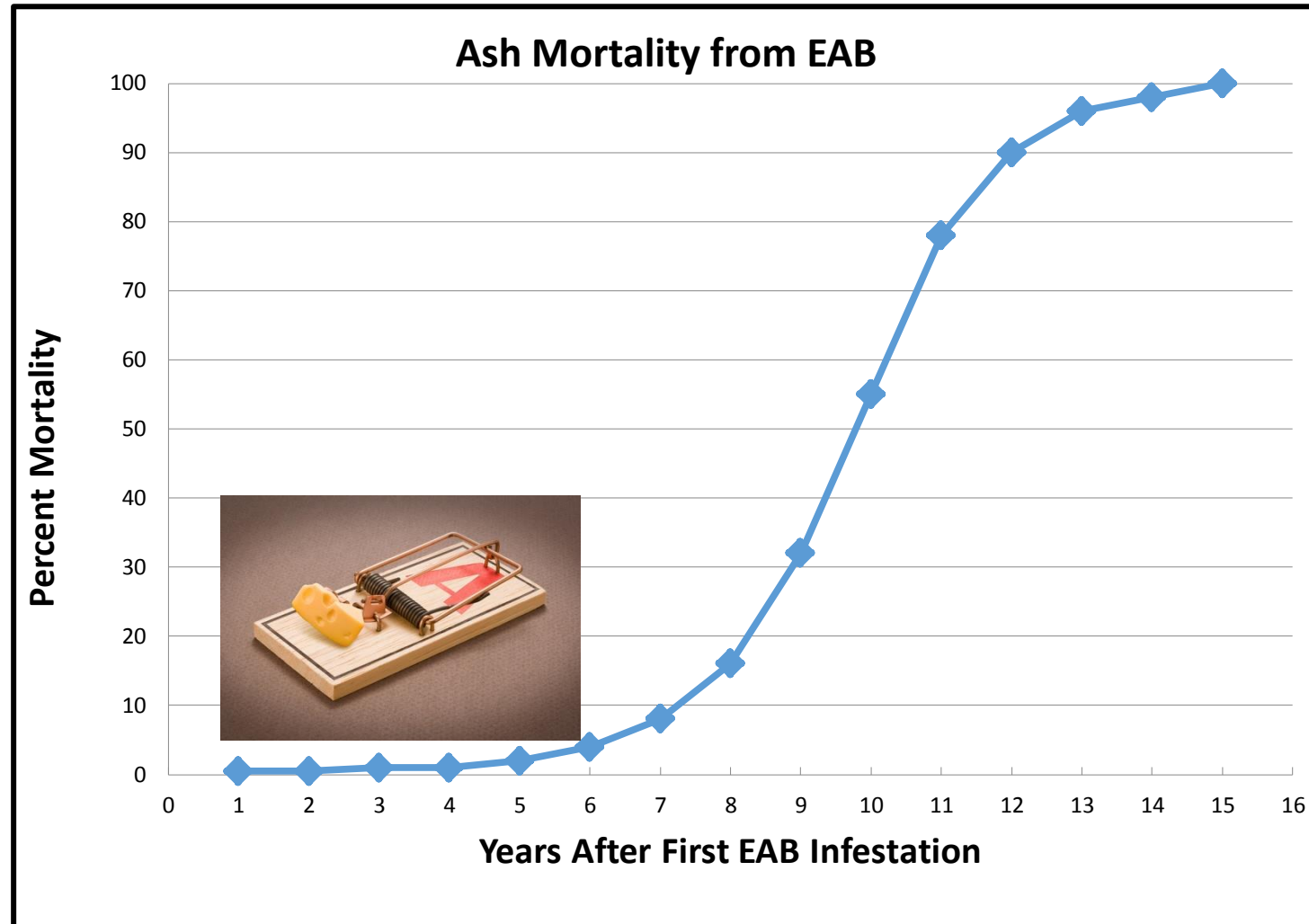


2009

EAB Management Initial Reports



A Predictable Pattern of Losses



What Have We Learned?

“Those who cannot remember the past are condemned
to repeat it.”

George Santayana

1863-1952

Author/Philosopher

What Have We Learned?

- EAB has been a devastating problem already
- A national strategy for the management of EAB does not exist
- There is no “right way” to manage EAB
- Regardless of your plan, if you have ash trees EAB will cost you money



Strong EAB Plans Use Many Tools...

- Education
 - Of public officials, decision makers, private citizens
- Survey/Detection
- Inventory/Assessment
 - Define the scope of problem
 - Establish an economic conversation
- Treatments
 - To save trees
 - To stage removals for later budget cycles
- Removals
- Management Plan/Decision Making
- Wood Utilization
- Replacement



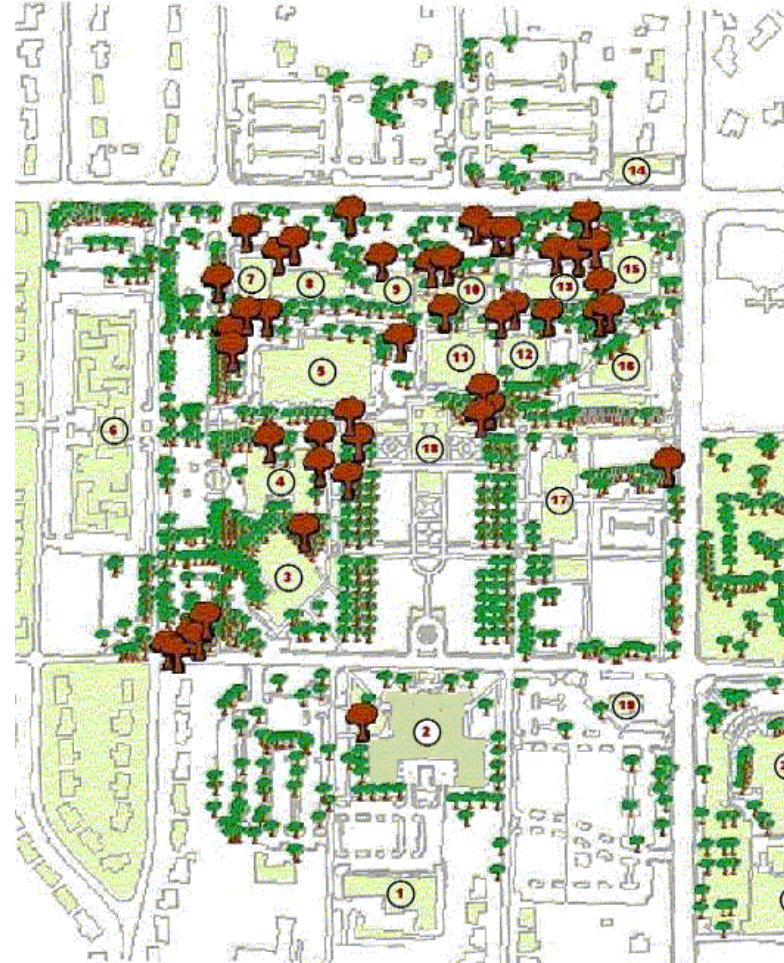
Strong EAB Plans Use Many Tools...

- Education
 - Of public officials, decision makers, private citizens
- **Survey/Detection**
- Inventory/Assessment
 - Define the scope of problem
 - Establish an economic conversation
- Treatments
 - To save trees
 - To stage removals for later budget cycles
- Removals
- Management Plan/Decision Making
- Wood Utilization
- Replacement

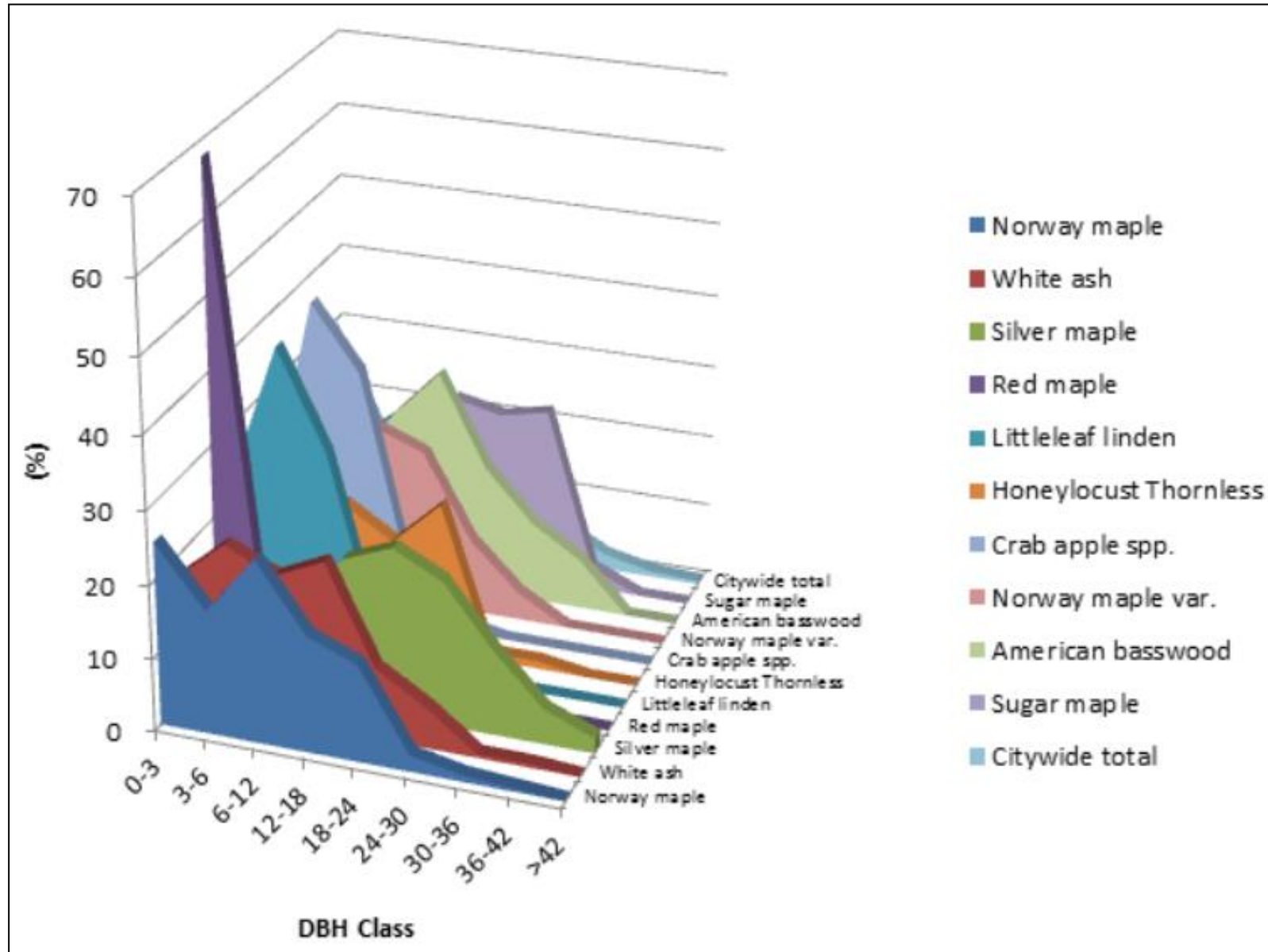


Inventory/Assessment

- Inventory
 - How many?
 - What kind?
 - How big?
 - What condition?
 - Etc.



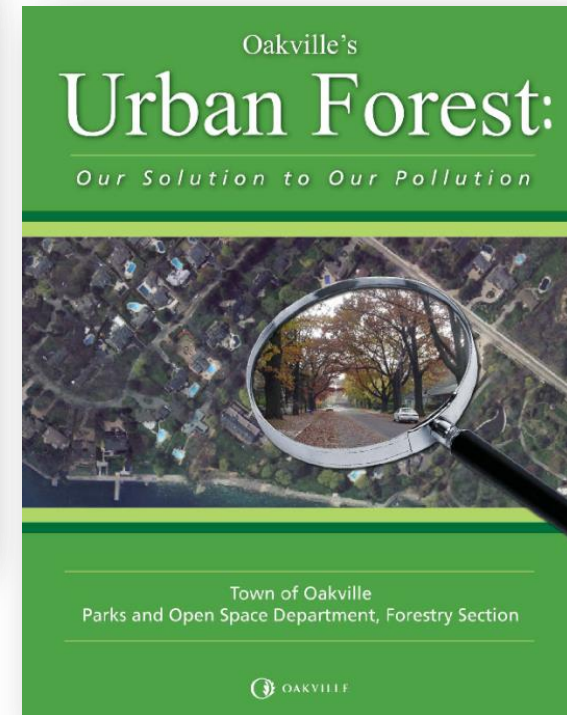
Information from an Inventory



Benefit Based Approach



i-Tree: Demonstrating Tree Value



Ash Tree Benefit Loss

Oconomowoc, WI

 Replace. value	\$1.75M
 Stormwater	\$53,334/yr.
 Air Quality	\$7,556/yr.
 Energy Cons.	\$46,507/yr.
 Carbon	\$6,250/yr.
 Aesthetic	\$68,265/yr.

(based on 1872 street trees)

• Replacement val.	\$1.53 M
• Stormwater	\$45,313/yr.
• Air Quality	\$6,295/yr.
• Energy Cons.	\$39,092/yr.
• Carbon	\$5,227/yr.
• Aesthetic	\$55,933/yr.

(Less 304 Ash trees or 16% of street tree population)

Strong EAB Plans Use Many Tools...

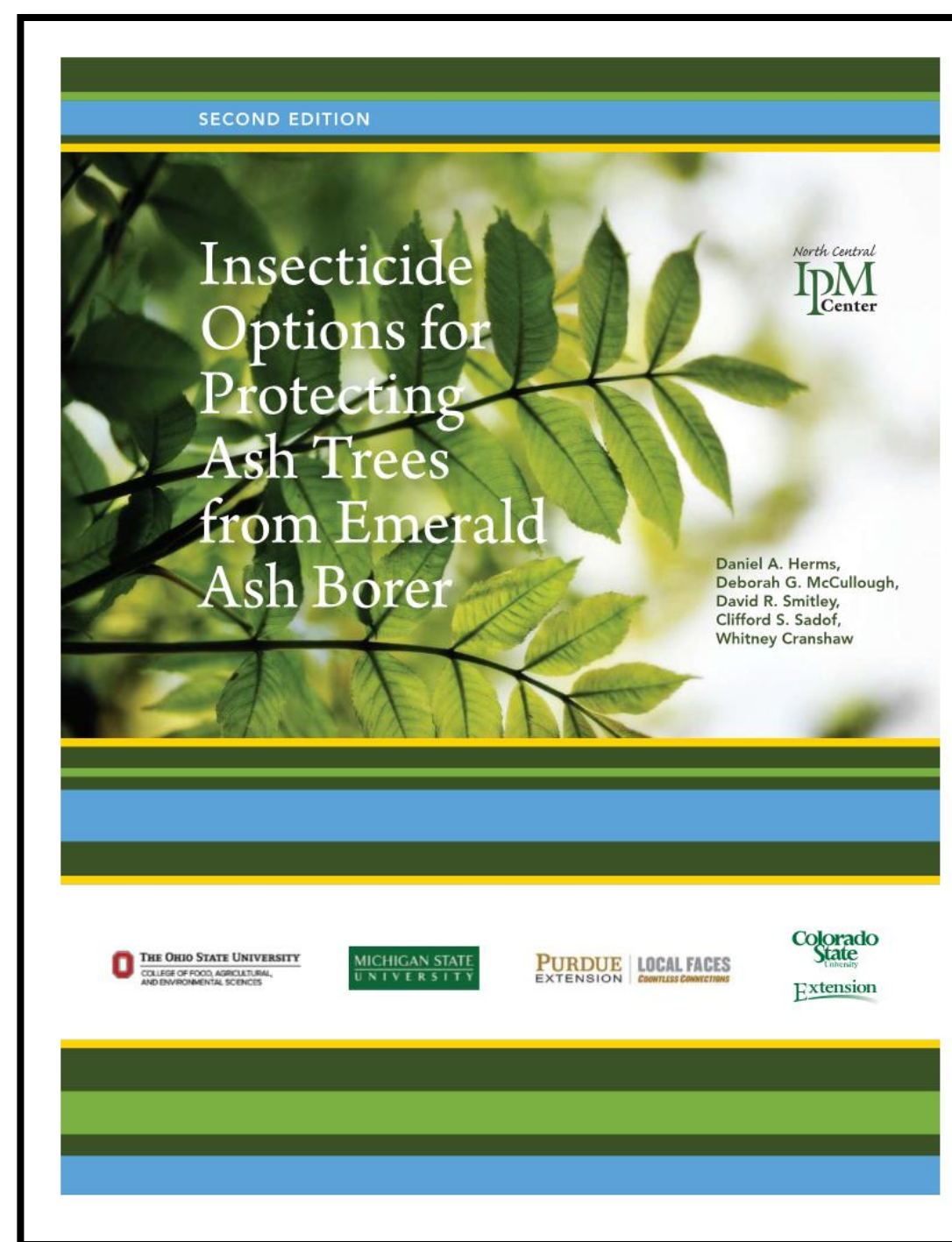
- Education
 - Of public officials, decision makers, private citizens
- Survey/Detection
- Inventory/Assessment
 - Define the scope of problem
 - Establish an economic conversation
- **Treatments**
 - **To save trees**
 - **To stage removals for later budget cycles**
- Removals
- Management Plan/Decision Making
- Wood Utilization
- Replacement



Treatments are Effective

- What are the options?
- Three active ingredients in the US have held up to the scrutiny of peer-reviewed research:
 - Imidacloprid
 - Dinotefuran
 - Emamectin benzoate
- *“When applied using formulations, products, and protocols documented as effective by university research, these treatments can provide environmentally sound control of EAB, sufficient to maintain a functional and aesthetically pleasing ash canopy.”*

http://www.emeraldashborer.info/files/conserv_ash.pdf



Key Conclusions about Treatments

1. Insecticides are effective on large trees even under intense pest pressure.
2. Imidacloprid soil drenches most effective on large trees (>15 inch DBH) when applied at the 2X rate.
3. Fall imidacloprid soil drench requires higher rate than spring.
4. Dinotefuran soil and basal bark spray treatments providing good and equivalent control.
5. Emamectin benzoate provides 2 years of control on large trees even at lowest rate.

Strong EAB Plans Use Many Tools...

- Education
 - Of public officials, decision makers, private citizens
- Survey/Detection
- Inventory/Assessment
 - Define the scope of problem
 - Establish an economic conversation
- Treatments
 - To save trees
 - To stage removals for later budget cycles
- **Removals**
- Management Plan/Decision Making
- Wood Utilization
- Replacement



Removals

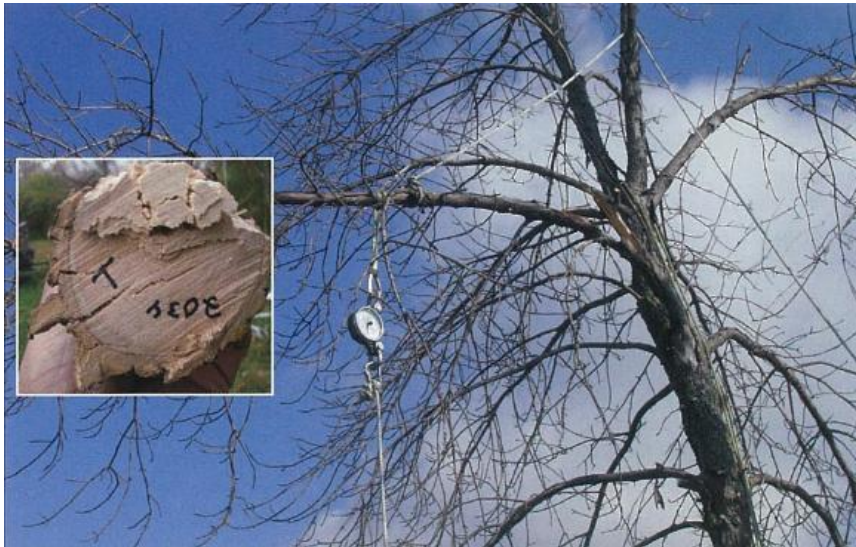
- Heavily stocked? Hard to keep up...
- “It’s not a tree removal project, it’s a canopy replacement project.”
Joe Sulak, City of Columbus



Removals - EAB and Wood Strength



Moisture levels in EAB infested trees are lower and wood in those trees, upon breaking, has significantly more cracking.



Load was applied by pulling down on the branch with a "load" rope that was attached to a dynamometer. Inset: Cracking evidence in a test branch. Images courtesy of Davey Tree Expert Company.

- Moisture content in EAB infested trees was lower than healthy trees
- EAB trees had more wood cracking
- Limbs from EAB trees failed close to the branch union

EAB and Wood Strength



- EAB infested trees are losing strength even if no other visual hazards are apparent.
- Take extra care if bark is sloughing off
- Make sure tie-in branches can support the climbers load.

Do Not Climb If No Canopy Life Is Present!

- Inspect each tree canopy, trunk and root flare. Look for buds or signs of life when judging canopy dieback.
- EAB activity decreases ash wood moisture levels and wood strength thereby increasing risk
- When climbing trees with canopy life the minimum crotch diameter used must be no less than 3 inches diameter, with rope tied-in around the parent (main) stem or leader.
Note: Larger longer branches have more weight and may not mean safer branches.
- Do not shock load any tree that has had EAB activity greater than 1-2 years even if tree appears sound.
- Upper branches in the tree canopy are most susceptible to branch breakage after an EAB infestation of 1-2 years.
- Standing dead ash trees (with more than 2/3 canopy dieback) should be removed by bucket truck or crane methods; or where site conditions will allow, by whole tree felling method.

Inspect each tree prior to entry or work.
Carefully assess the base for signs of bark sloughing and lower branches for brittleness.
Risk increases as you ascend the canopy!



Emerald Ash Borer



Strong EAB Plans Use Many Tools...

- Education
 - Of public officials, decision makers, private citizens
- Survey/Detection
- Inventory/Assessment
 - Define the scope of problem
 - Establish an economic conversation
- Treatments
 - To save trees
 - To stage removals for later budget cycles
- Removals
- **Management Plan/Decision Making**
- Wood Utilization
- Replacement



4 Management Approaches

Do Nothing - Try to Keep Up with Removals	Proactively Remove All Ash Trees in Community	Use Treatments to Stage Removals	Use Treatments to Preserve Tree Canopy
<u>Advantages:</u>	<u>Advantages:</u>	<u>Advantages:</u>	<u>Advantages:</u>
<ul style="list-style-type: none"> • Less spending ahead of time 	<ul style="list-style-type: none"> • Done on your schedule 	<ul style="list-style-type: none"> • Spread costs into more years 	<ul style="list-style-type: none"> • No spikes in budget
<ul style="list-style-type: none"> • Works for low populations 	<ul style="list-style-type: none"> • Costs less than dead trees 	<ul style="list-style-type: none"> • Puts you in control 	<ul style="list-style-type: none"> • Retains tree benefits
<u>Disadvantages:</u>	<u>Disadvantages:</u>	<u>Disadvantages:</u>	<u>Disadvantages:</u>
<ul style="list-style-type: none"> • Need <u>capacity</u> to stay on top 	<ul style="list-style-type: none"> • Outcry - live tree removals 	<ul style="list-style-type: none"> • Retain econ/social benefits 	<ul style="list-style-type: none"> • Minimizes liability
<ul style="list-style-type: none"> • Higher liability - dead trees 	<ul style="list-style-type: none"> • Lost economic/social benefit 	<ul style="list-style-type: none"> • Requires ongoing treatments 	<ul style="list-style-type: none"> • Need long term continuity
<ul style="list-style-type: none"> • \$\$\$\$ - high cash cost now 	<ul style="list-style-type: none"> • Are you far enough ahead? 	<ul style="list-style-type: none"> • Still removing live trees 	<ul style="list-style-type: none"> • Remain ash “overstocked”?

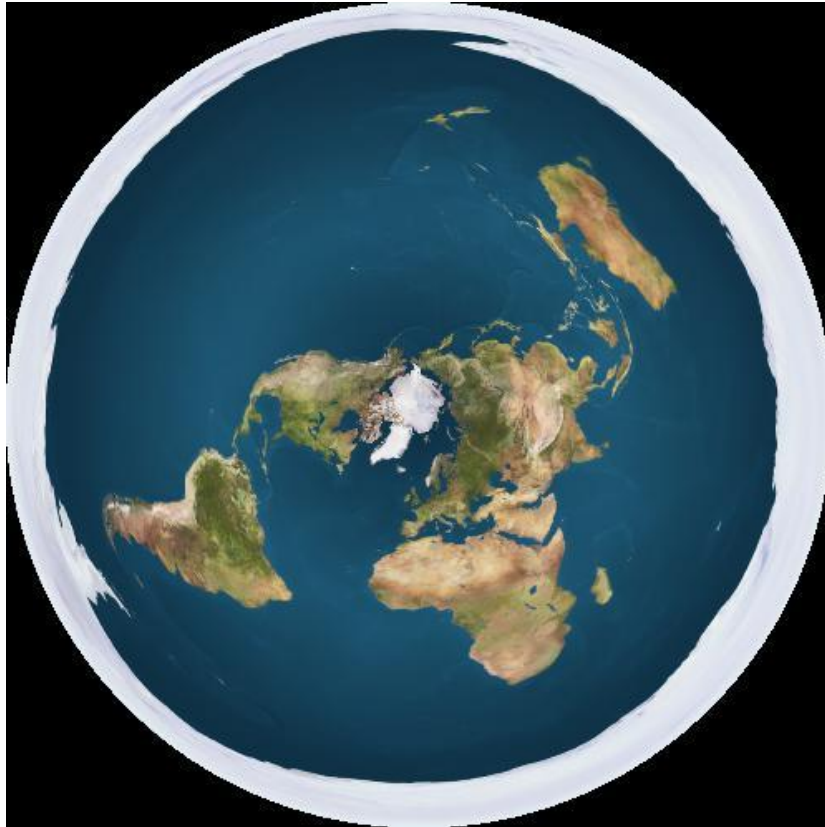
What to do with this info?

- Ask yourself a series of questions:
 - How many ash do I have?
 - When EAB is “all over with”, what do you want to be left with?
 - Do I have community canopy initiatives?
 - What does the public want?
 - What is the motivation of the Council? Mayor? CFO?
- Your goals drive your decision making
- Your place on the curve drives decision making
 - The further along the curve, the fewer choices

Words of Wisdom

- Different stakeholders have different goals
 - A state forester with hundreds of millions of trees will approach this issue differently than a private company taking care of individual trees.
 - One size does not fit all...
- For municipalities and ash population managers, there will be significant costs regardless of what your plan looks like.
 - Get the finance people involved early.
- The more management techniques you can use to manage EAB the more pain you can avoid.
- Common words from the hardest hit areas:
 - “I would have started sooner...”

Our Knowledge is Evolving



james.zwack@davey.com