Individual Pests, Multiple Strategies: North American Experiences with Exotic Invasive Pests Managed at Local, Municipal, and Federal Levels

Jim Zwack, M.S.

The Davey Institute

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What are Invasive Species?

- Invasives
  - Non-indigenous species that establish populations in new areas resulting in uncontrolled population growth at the expense of native species
  - High likelihood for economic and environmental problems
  - Gaining attention as “game-changers”
- University of California Riverside
  - California gets 6 new per year
  - Florida and Hawaii get about 15 per year

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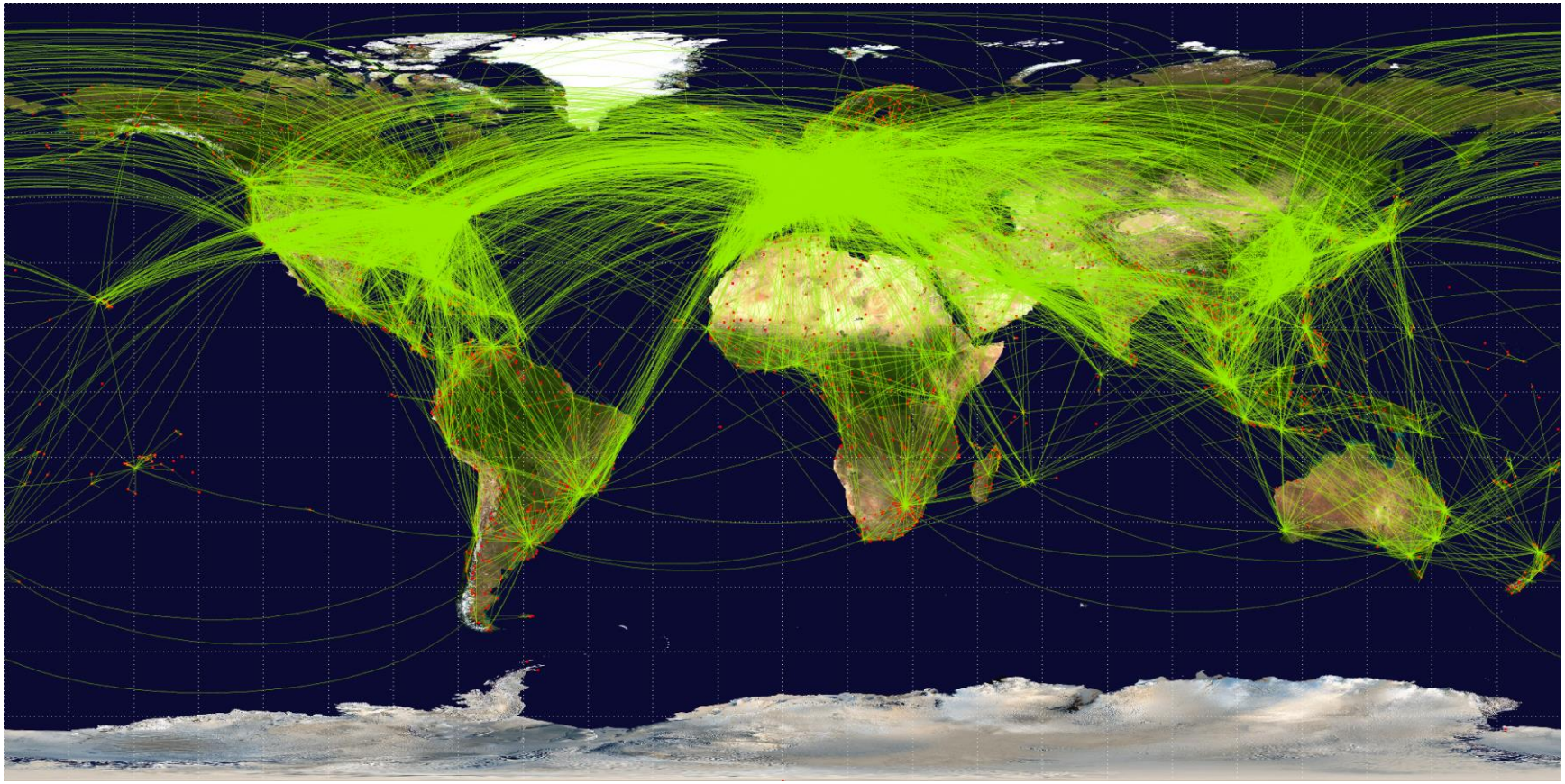
Where Do They Come From?



- It’s a shrinking world…

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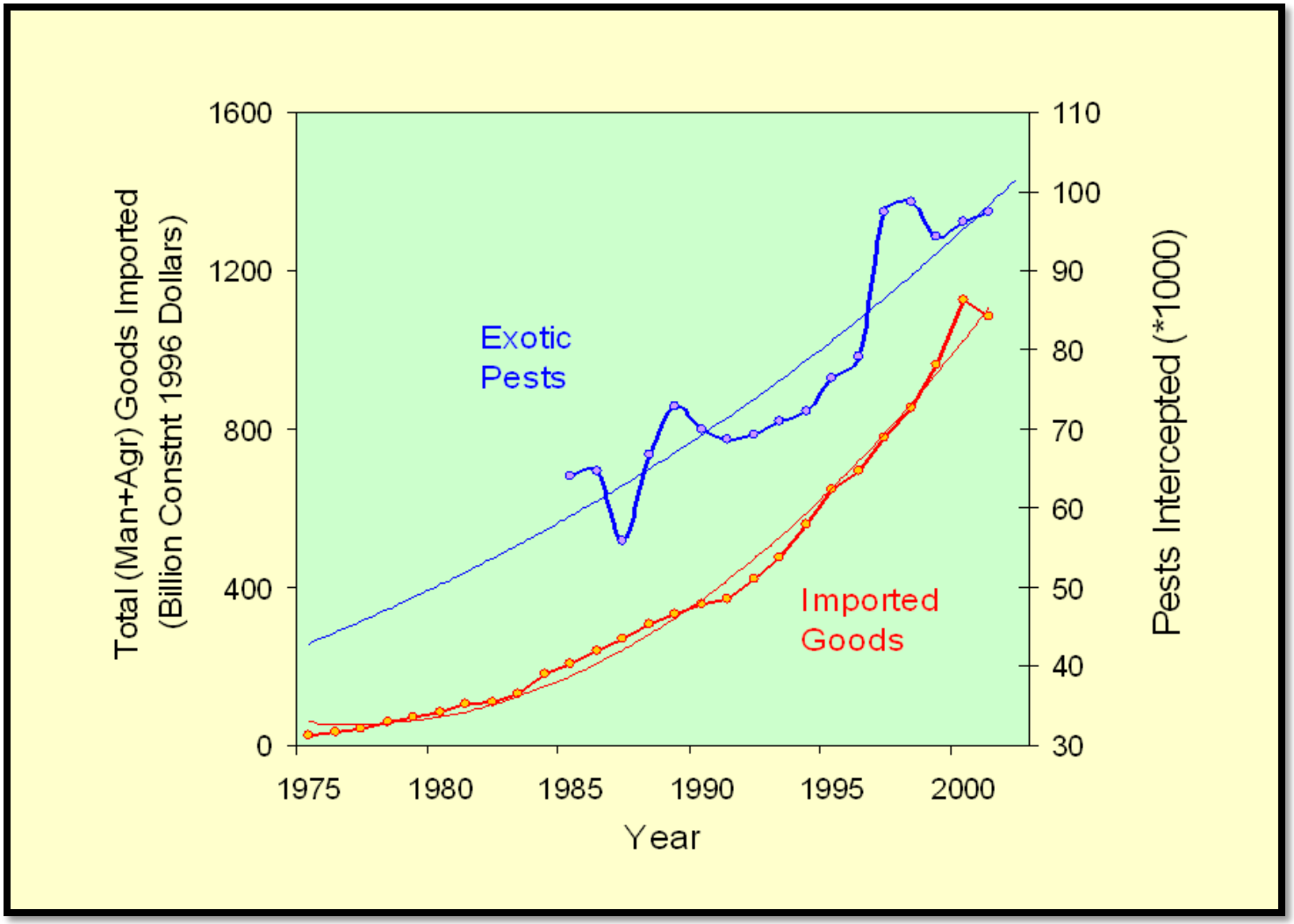
Exotic Pests Linked to Imports



Graph David Kellum, Ph.D. – San Diego County Entomologist

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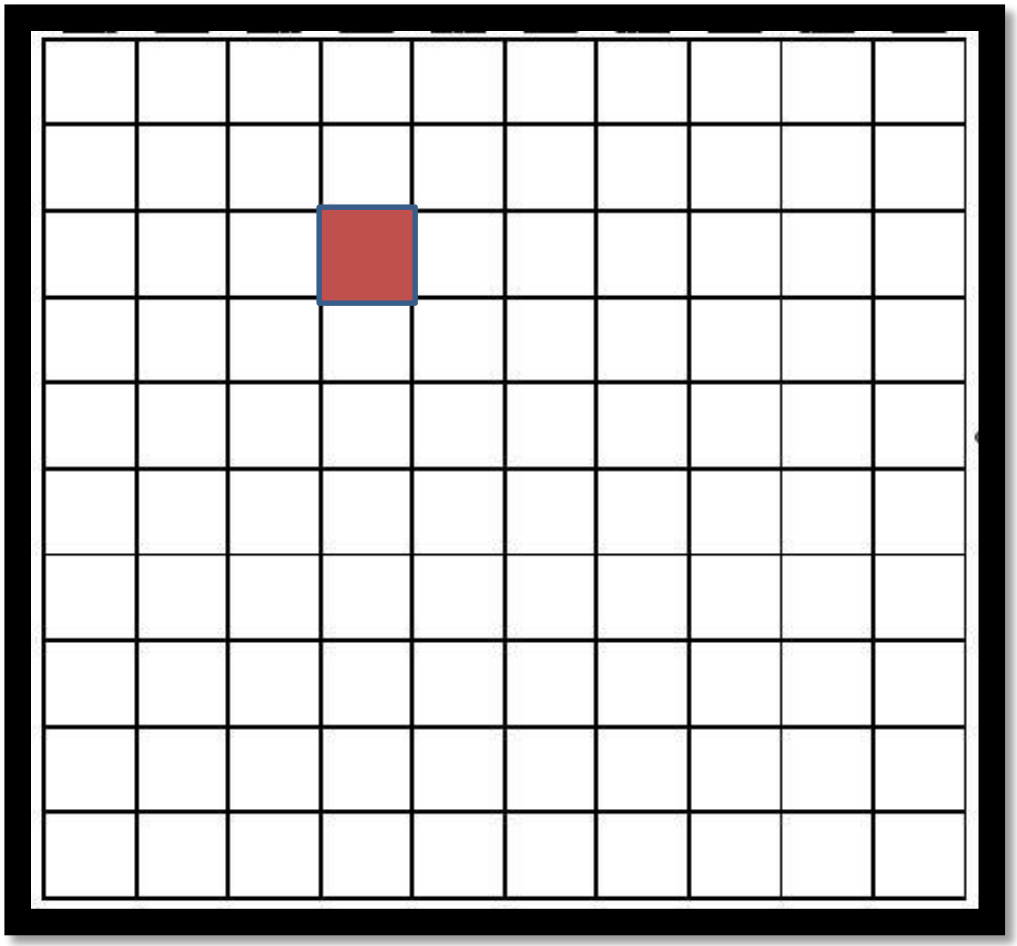
How Do They Establish?

- Despite all this…
- “Tens Rule”
  - Of non-native species that enter a new ecosystem, only about 10% will survive
  - Of those that survive, only about 10% of those will become invasive pests
  - 1% of original



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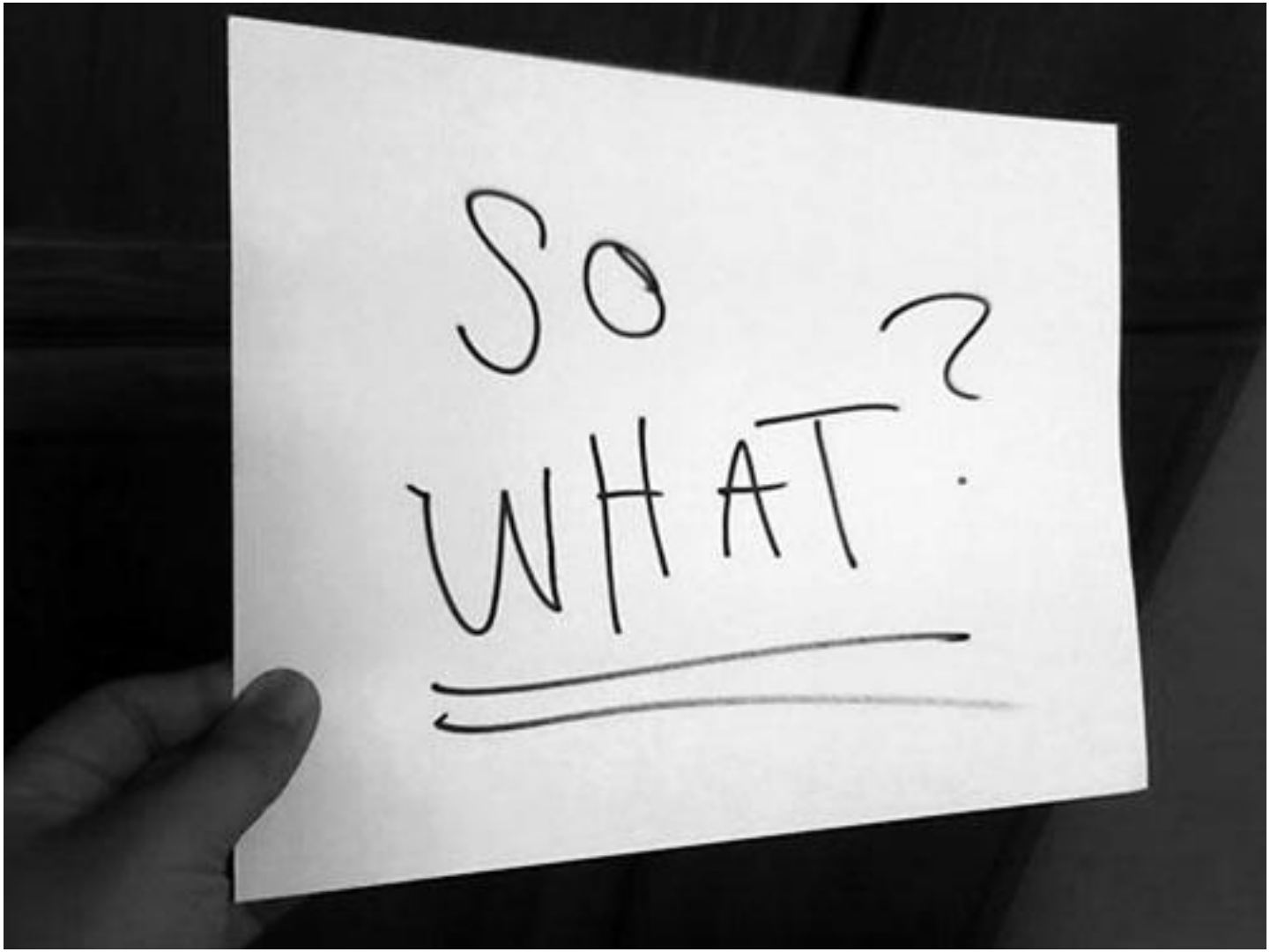
Establishment Variables

- Climate/environment
- Minimum viable population
  - Ensures major climatic events don't eliminate all
- Frequency of pressure
  - 10 introductions of 100 will fare better than 1 introduction of 1000
- Lag period
  - Critical mass needed for exponential phase



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Impacts of Invasives

- Economic
  - Crop yield, property value, mitigation…
- Social
  - Health, recreation, safety…
- Environmental
  - Water quality, fires, less biodiversity…
- Measured in $Billions

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Management of Invasives in the U.S.

- Two broad categories:
  1. Preventing entry of a potential invasive species
  2. Controlling the spread of species already present
- Carried out by different government agencies, depending on what types of damage a species can cause.

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Who Has Authority Over This Tree?

- Homeowner?
- Municipality?
- Utility?
- County Govt?
- State Govt?
- Federal Govt?
- All?

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Why Does It Matter?

- Different shareholders have different goals and objectives:
  - Homeowner = aesthetics, property value, cooling
  - Municipality = minimize liability
  - Utility = preservation of electric reliability
- What if the goals don't align?

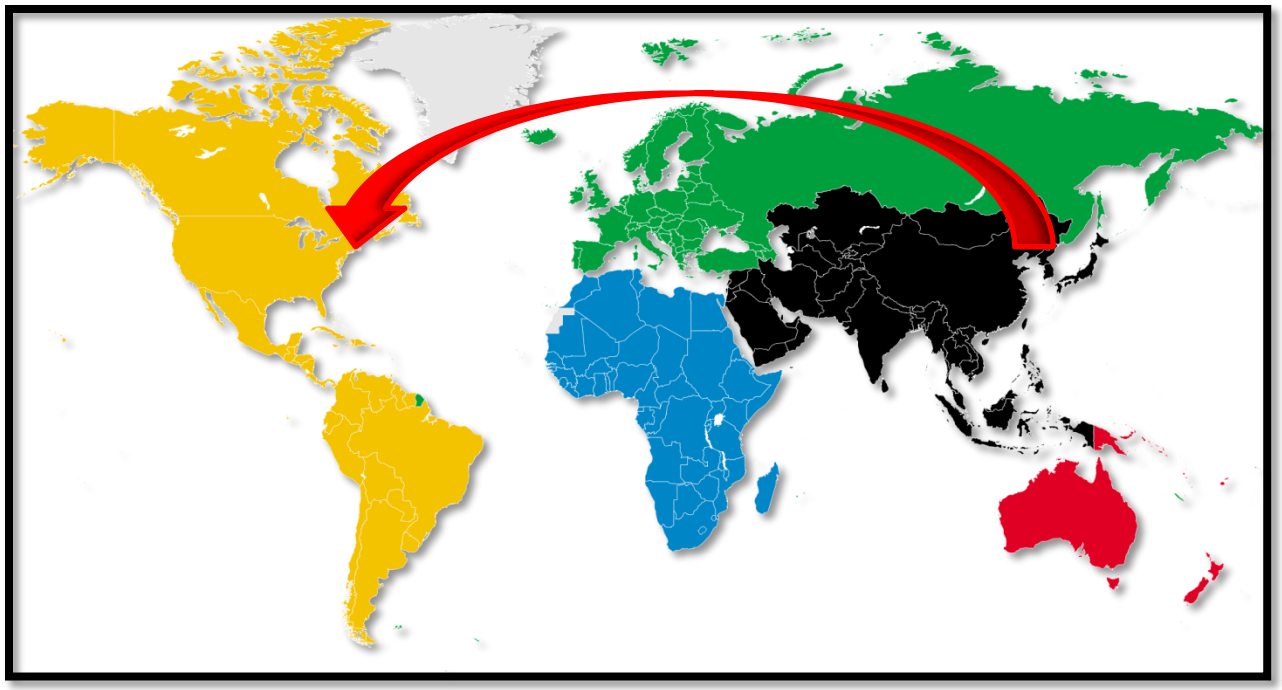
Invasives to the Rescue!

(Only as examples for this presentation…)

- 3 exotic invasive pests illustrate the challenges faced when different shareholders have different goals:
  - Asian Longhorned Beetle
  - Emerald Ash Borer
  - Mountain Pine Beetle

Asian Longhorned Beetle (ALB)

- Destructive wood-boring pest of maple and other hardwoods.
  - *Anoplophora glabripennis*
- Introduced into the United States from wood pallets and other wood packing material accompanying cargo shipments from Asia.



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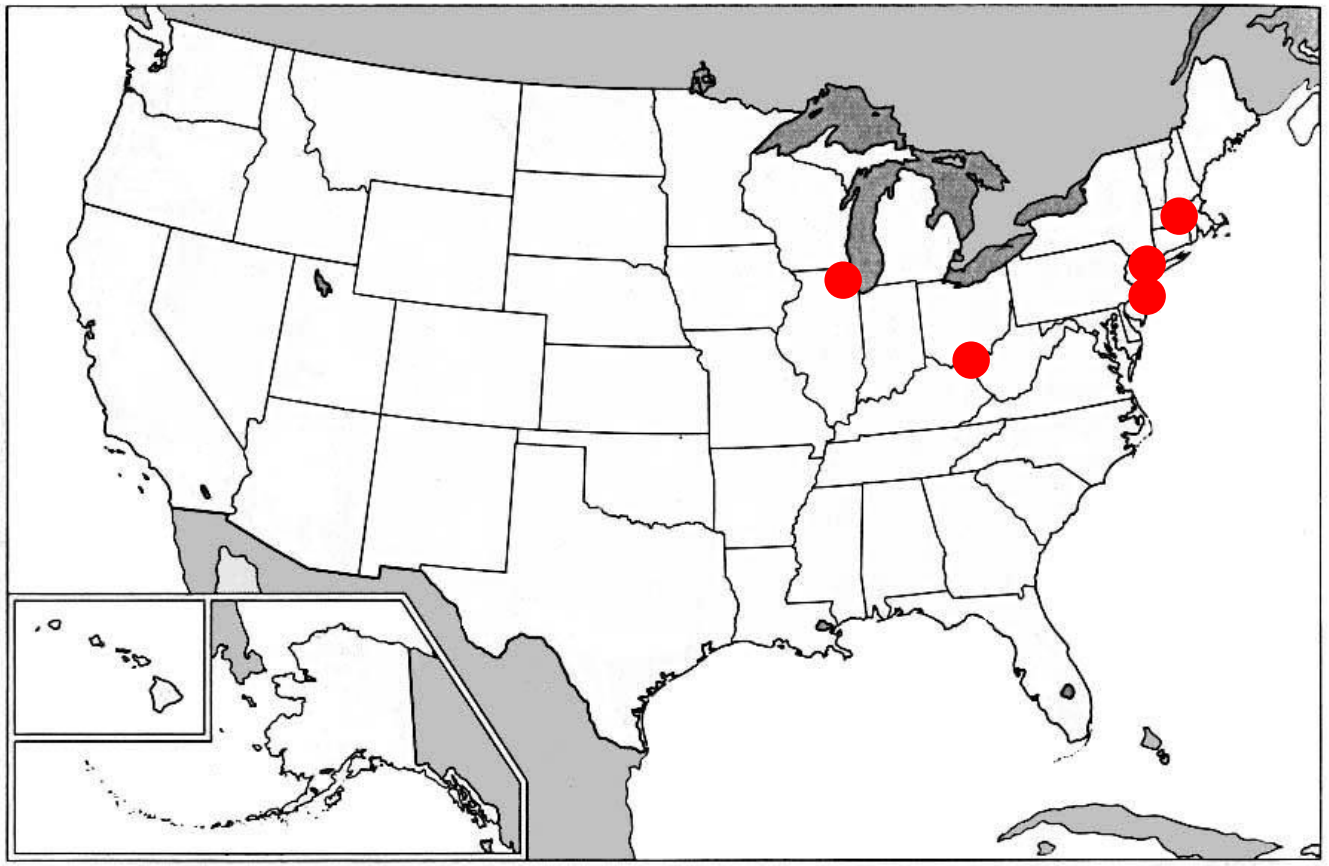
Asian Longhorned Beetle (ALB)

- New York, 1996
- Chicago 1998
- New Jersey 2002
- Massachusetts, 2004
- Ohio, 2011



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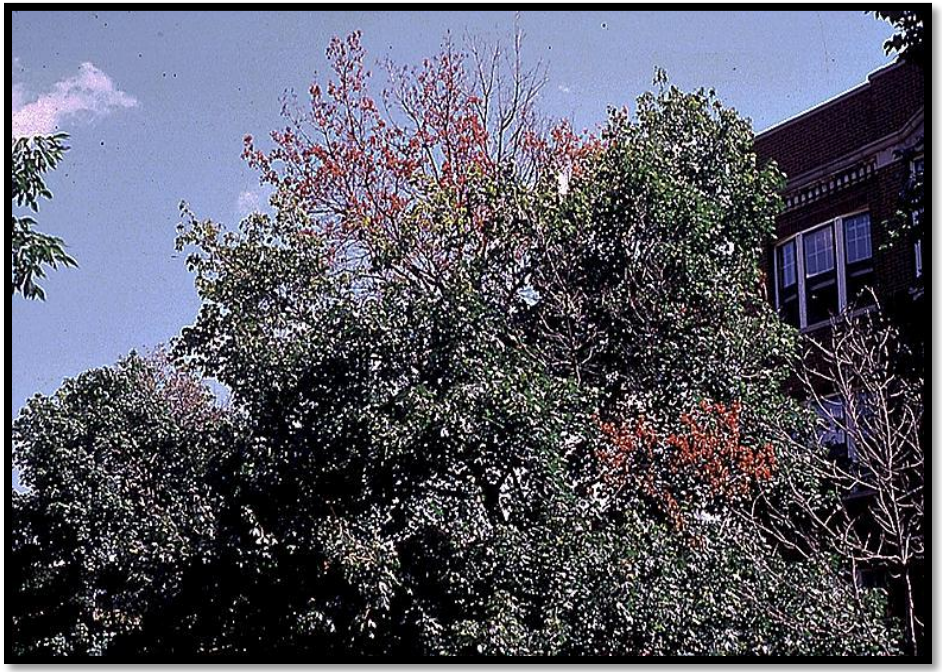
ALB - Hosts

- Highly preferred
  - Sugar, Norway, Red, and Silver maples (*Acer*)
  - Horsechestnut, Buckeye (*Aesculus*)
  - Birch (*Betula*)
  - Willow (*Salix*)
  - Elm (*Ulmus*)

- Moderately preferred
  - Ash (*Fraxinus*)
    - Green
    - White
  - Poplar (*Populus*)
  - Planetree (*Platanus*)

ALB - Damage

- Larvae feed in cambium layer, then sapwood
- Copious sawdust
- Death of trees



ALB – What's at Risk?

- Affected industries:
  - Timber
  - Maple syrup
  - Tree nurseries and greenhouses
  - Tourism
- Estimated national effect:
  - Loss of about 35% of canopy cover, 30% of trees
  - Approximately $669 billion compensatory value
  - Reduction in benefits from trees and wooded areas

ALB - Management

- “That” tree is under the sole jurisdiction of the Federal government’s Animal and Plant Health Inspection Service
- Their ALB Management Program supersedes all other ALB strategies, regardless of shareholder

APHIS Management Program

- The goal of the Program
  - Complete elimination of all reproducing populations of the ALB from the U.S.
- Research showed ALB is not a “strong flier”
  - 80% of trees with egg sites are within 100m of a tree with an exit hole
  - 94% within 200m
  - 99% within 400m
  - 99.7% within 600m
- It can be contained with decisive, consistent action

ALB Management Program Strategies

- Exclusion
  - Legislation
  - Inspection / Enforcement / Deterrence
- Regulatory measures
- Survey / Detection
- **Host Removal**
- **Preventive chemical treatments**
- Outreach / Education
- Restoration
- Research

Scope of Program

- **New York**
  350 sq. km
  - Infested trees: **6,275**
    Total removed: **18,467**
    Treated trees: **587,915**
- **Illinois**
  90 sq. km
  - Infested trees: **1,551**
    Total removed: **1,771**
    Treated trees: **290,991**
- **Massachusetts**
  280 sq. km
  - Infested trees: **20,358***
    Total removed: **30,427***
    Treated trees: **201,914**
- **New Jersey**
  65 sq. km
  - Infested trees: **729**
    Total removed: **21,981**
    Treated trees: **100,726**

Efficacy of ALB Eradication Program

- Illinois
  - Declared eradication April 17, 2008 – after 10 years
- New Jersey
  - Declared eradication March 13, 2013 – after 11 years
- New York
  - Last infested tree detected in Manhattan in 2005
  - Last infested tree detected in Islip Long Island in 2002
- Massachusetts
  - Removals underway to reduce beetle populations.
- Ohio
  - The process just began in 2011

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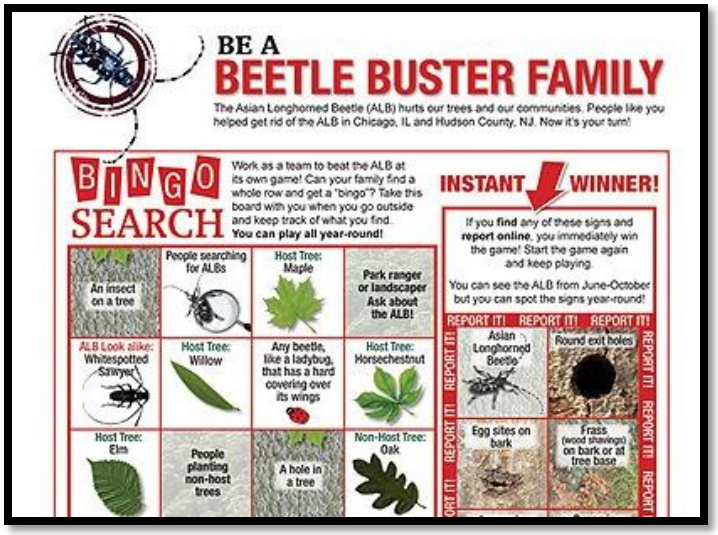
Shareholder Opinions…

- Who wants their tree removed to spare their neighbor's?
- Bethel Ohio Citizens Cooperative:
  - "We are dedicated to achieving a common sense approach to the containment as well as the complete elimination of the **Asian Longhorned Beetle** from our area using the best science and the least destructive methods available."
- Treatments = 99.9% successful

“Benevolent Authority”

- New Jersey Secretary of Agriculture Douglas Fisher:
  - “We could not have accomplished this eradication without this coalition of federal, state, and local agencies, and of course, the citizens of New Jersey, whose vigilance was critical in this fight.”



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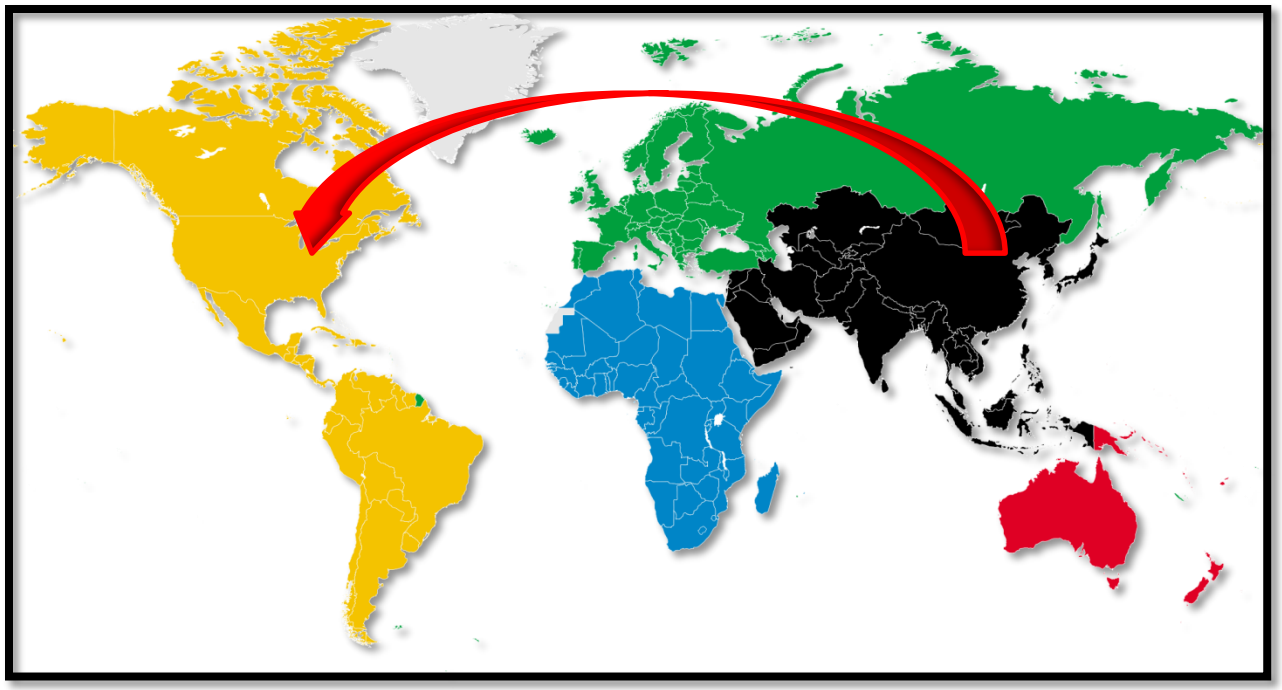
Emerald Ash Borer

- Arrived on crating materials and was first identified in Michigan in 2002



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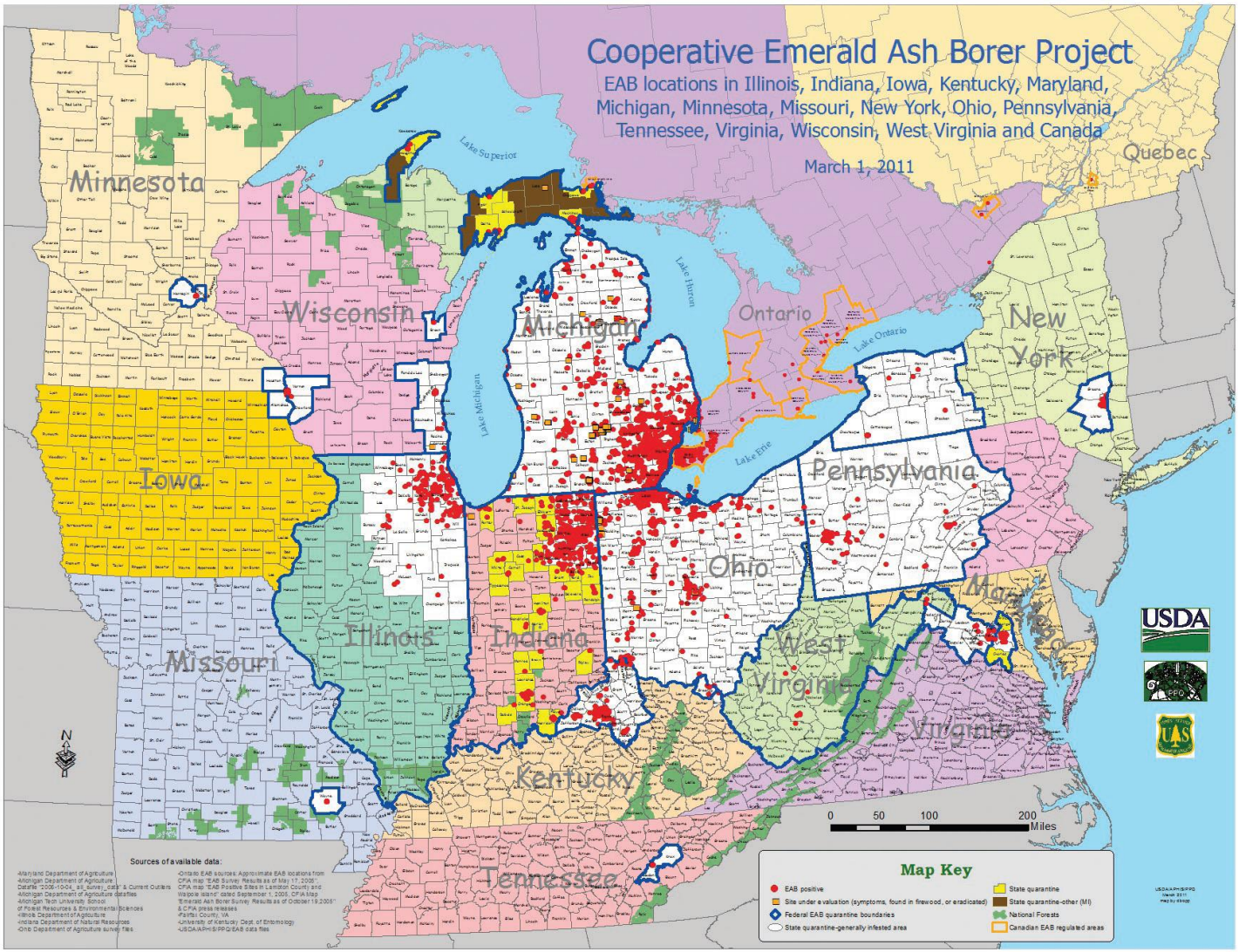
The Basics of EAB



- Discovered in 2002

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Humans are part of the problem…

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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.

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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

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The Basics of EAB

- How EAB kills trees:

Adult beetle lands on tree and lays eggs

Eggs hatch and become worm-like larvae

Larvae tunnel through tree's water conducting tissue

Untreated trees thin, decline, and die.

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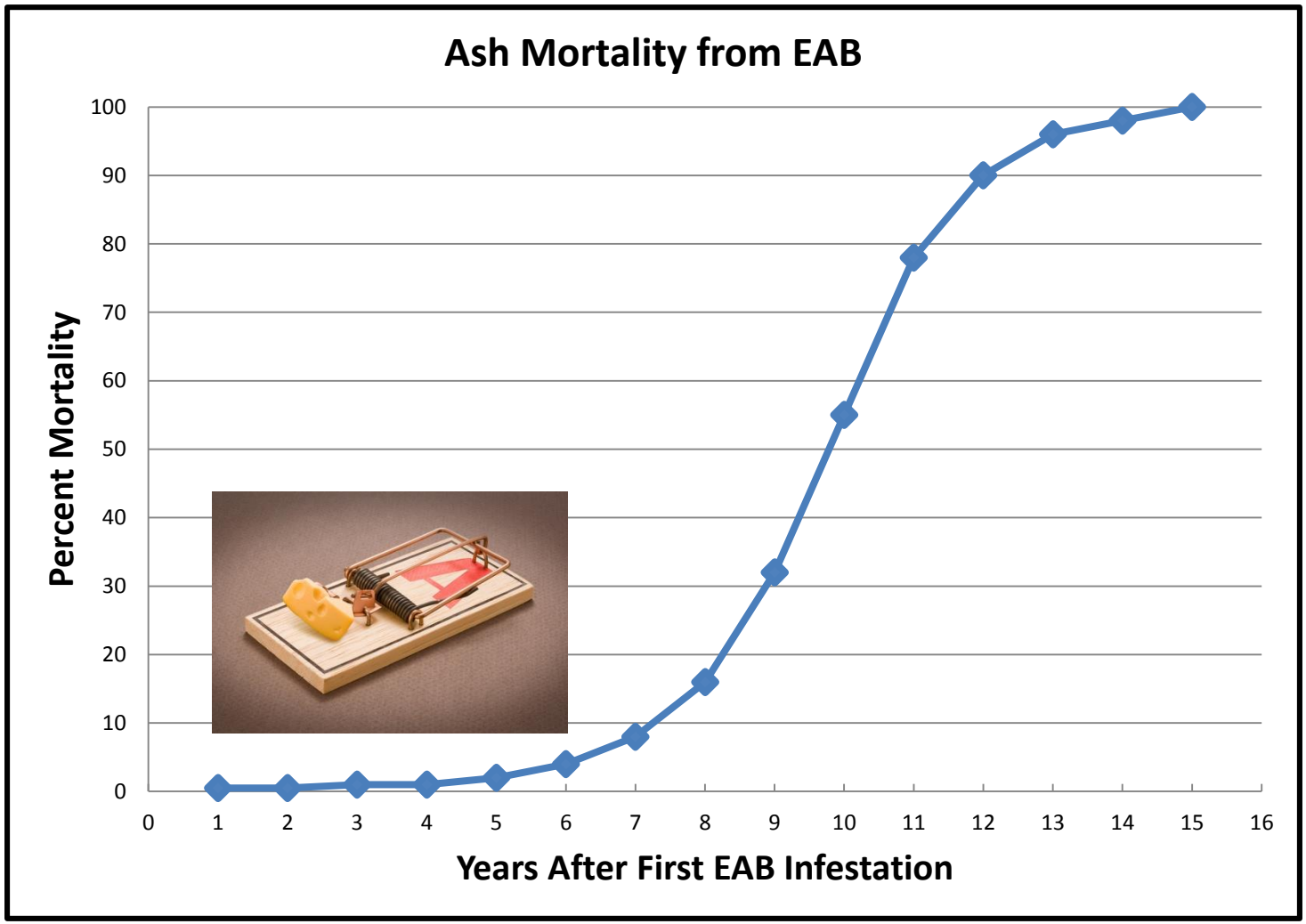
Emerald Ash Borer Effects

2006

2009

A Predictable Pattern of Losses



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EAB - Management

- A national strategy for the management of Emerald Ash Borer does not exist
- “That” tree is regulated at a Federal level
  - Detection, quarantines, removal support
- EAB is <u>actively managed</u> at the municipal and homeowner levels

Why Not a National Strategy?

Federal Gov't

- EAB cannot be eradicated like ALB

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Evolving Information

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
- Management Plan/Decision Making
- **Treatments**
  - **To save trees**
  - **To stage removals for later budget cycles**
- Removals
- Wood Utilization
- Replacement

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EAB Summit – December 2010

- Gather top researchers and industry experts at one table to identify consensus points for managing EAB
  - Organized by a vendor company
- Identify key challenges in the management of EAB for municipalities and private companies

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Outcome = Consensus Document

- “We the undersigned strongly endorse ash tree conservation as a critical component of integrated programs to manage emerald ash borer (EAB) in residential and municipal landscapes.

- Cost-effective and environmentally sound EAB treatment protocols are now available that can bring healthy ash through peak pest pressure with full, functioning canopy.”

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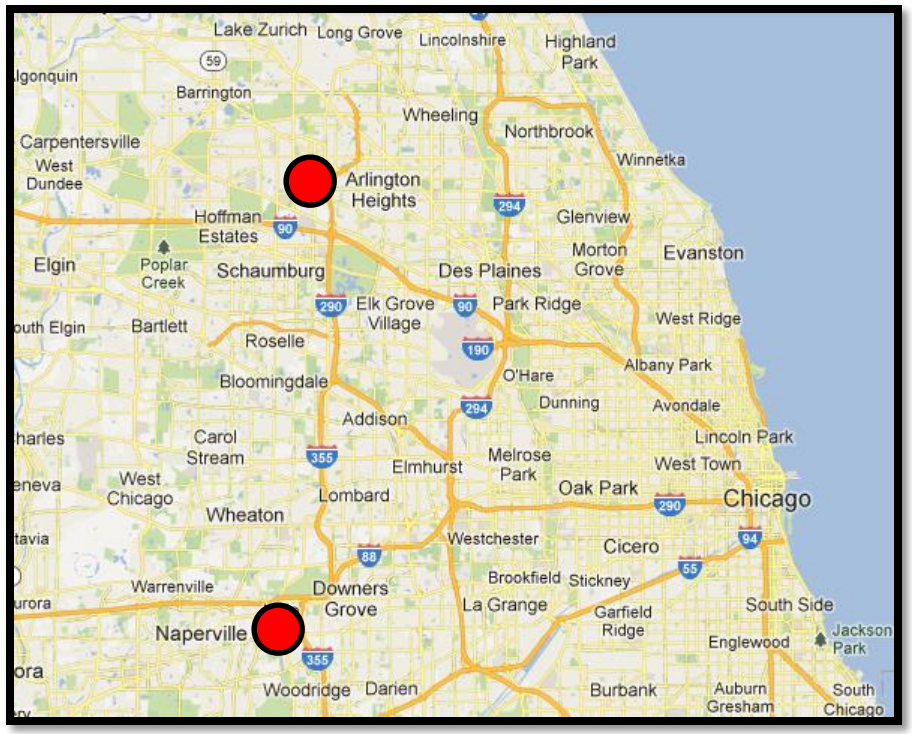
Close Proximity, Different Approaches

- Naperville, IL
  - City is treating 15,000 municipal trees
- Arlington Heights, IL
  - City to remove 12,000 municipal trees
  - Treat 800 trees
  - $100 incentive to homeowners who treat parkway trees
- World's apart - 48km apart



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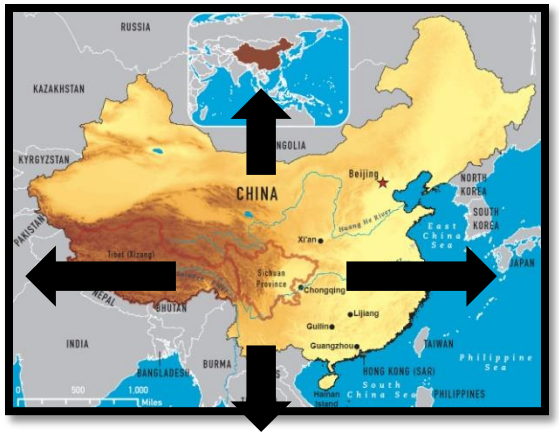
Mountain Pine Beetle

- *Dendroctonus ponderosae*
- Native to western North America…
- Wait!! Native??
- No ocean journeys?
- Not from China?



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Mountain Pine Beetle

- Often a secondary invader
- Once a pine beetle-infested tree dies, decay agents erode stem and root strength, eventually allowing the tree to fall.
- Toppling trees can contact power lines, causing outages and reducing electrical service reliability.
- Dead or dying trees adjacent to power lines also present an elevated risk of wildfire ignition and other serious public safety issues.

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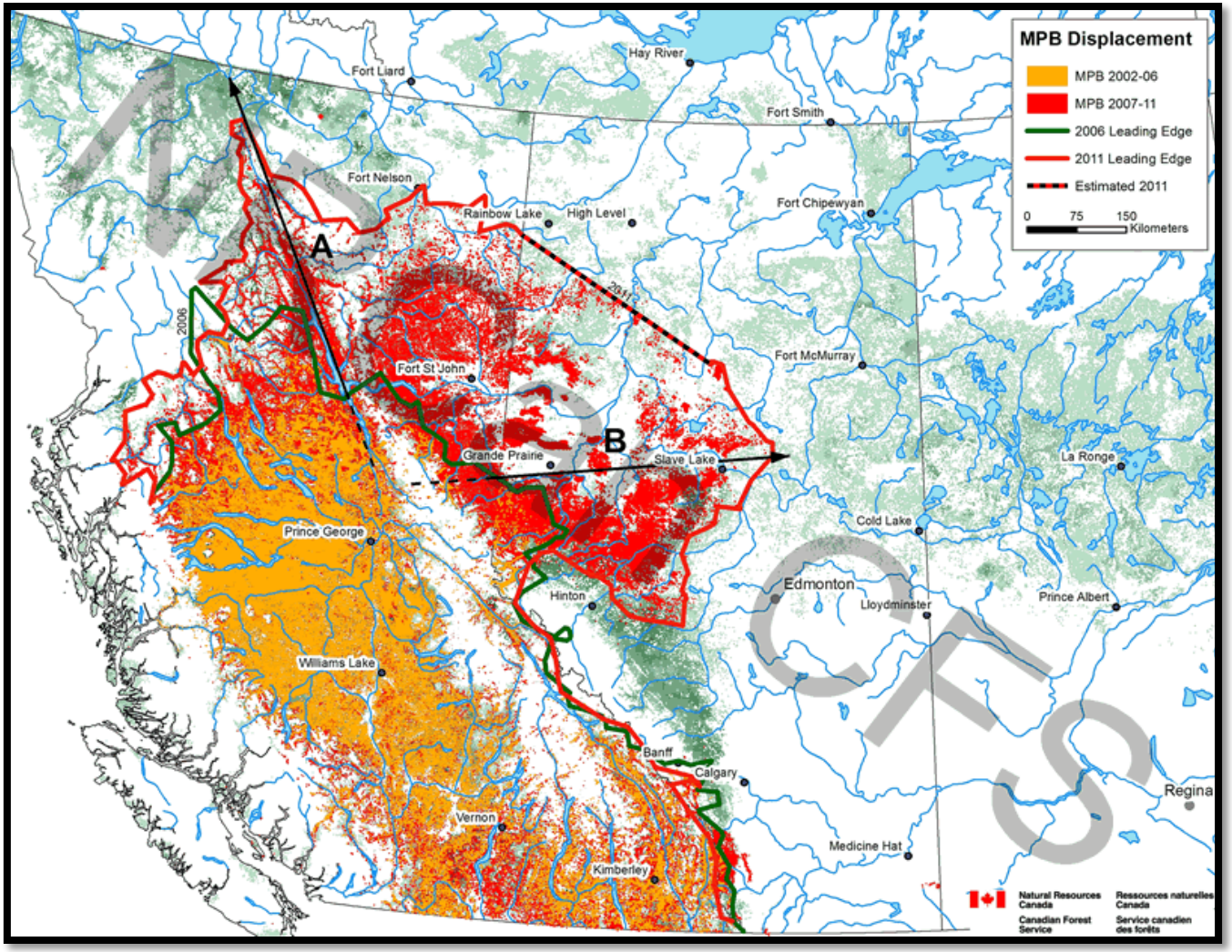
Mountain Pine Beetle



- The invasion of a native species into new habitats is similar to an exotic invasion

MPB - Management

- “That” tree was regulated at a Federal level
- MPB is actively managed at the utility and landowner level

Mountain Pine Beetle - BC Hydro

- The Response:
  - To mitigate these risks, BC Hydro developed the Forest Health Issues Program Team.
  - The team works with landowners, government agencies, and other stakeholders to plan and implement the safe felling and management of beetle-infested trees.
  - The focus of the program is to identify, prioritize and safely cut down hazard trees, up to one-and-a-half tree lengths from primary distribution lines on Crown or private lands

BC hydro

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In Summary - The Future

- Invasives are changing the environment
  - The solutions of today may not work tomorrow
- There are many stakeholders and they listen at different "frequencies"
- Partnerships
  - Municipalities
  - "Invasive Clubs"
  - Government entities
- Do not be "in it" alone…

Thank you!

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