



MAINE'S TOP 10

MOST UNWANTED



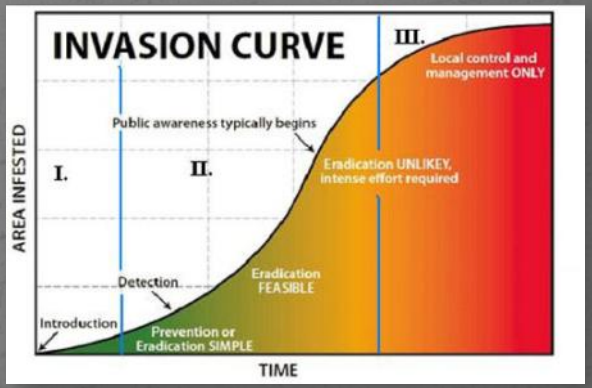


Karen Coluzzi, Maine DACF, Division of Animal and Plant Health, Agricultural Trades Show 2014

New Pest Threats to Maine's Agricultural and Natural Resources

- **"From Away"**
  - Introduced through plant , soil, and SWPM imports

- **Plants have little resistance**
  - No defenses built up against foreign organisms
- **No effective natural enemies**
  - Populations can build unhampered



- **Invasive**
  - Change habitats and alter ecosystems
  - Crowd out or replace native species
  - Damage human activities, costing the economy millions of dollars.

The First 4 - Crop Pests
(no particular order)

Confirmed in Maine

2011

Spotted wing drosophila

2011

European crane fly

not established

Brown marmorated stink bug

not found

Light brown apple moth

The Next 6–- Forest Pests

(no particular order)

Confirmed in Maine

2011

Winter moth

2003

Hemlock woolly adelgid

Emerald ash borer

Brown spruce longhorned beetle

Sirex woodwasp

Asian longhorned beetle

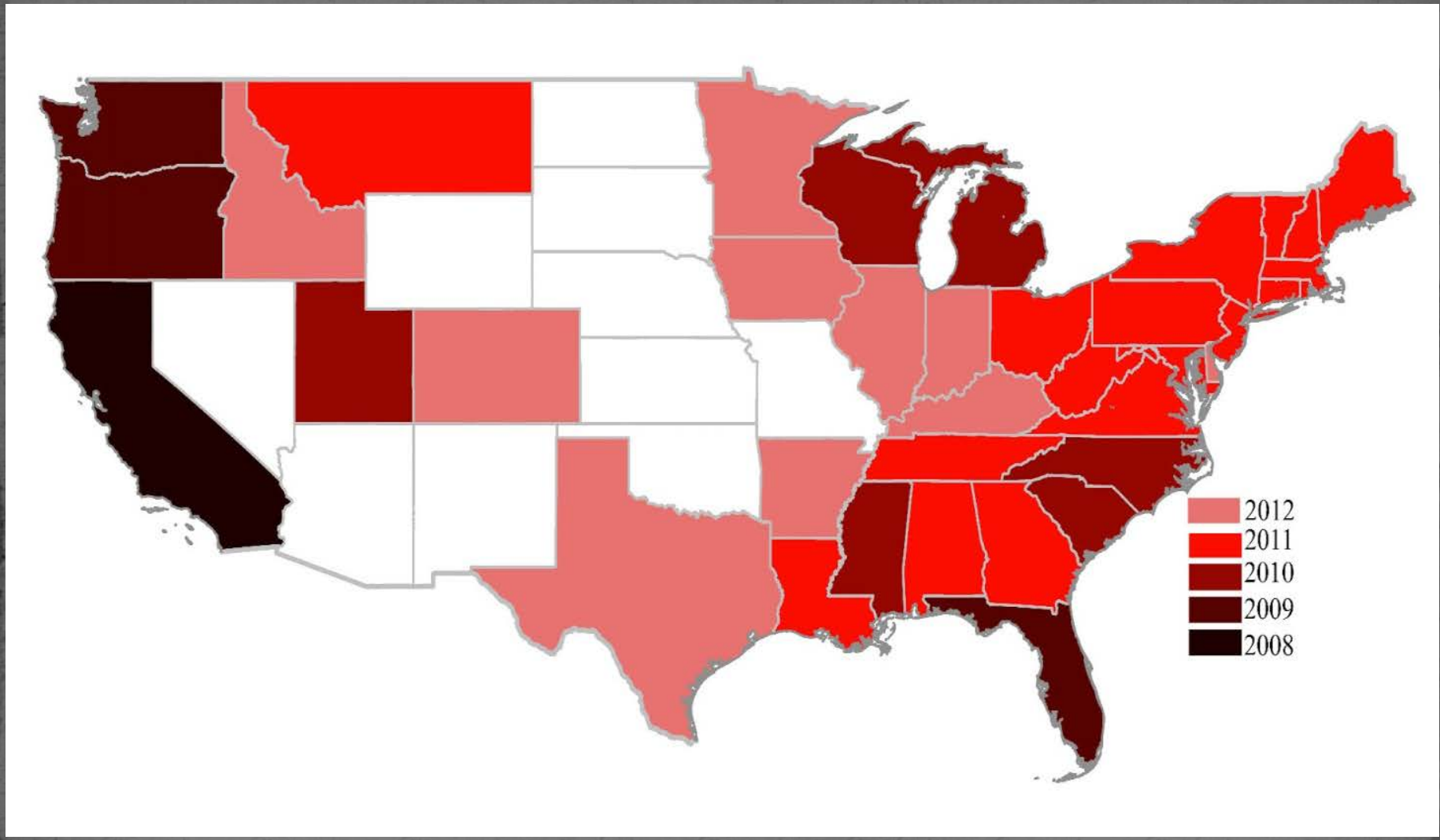
Spotted Wing Drosophila (SWD)

Drosophila suzukii

Beverly S. Gerdeman

From: SE Asia (Japan, Korea, etc.) **How it Got Here:** ?

Where is SWD?

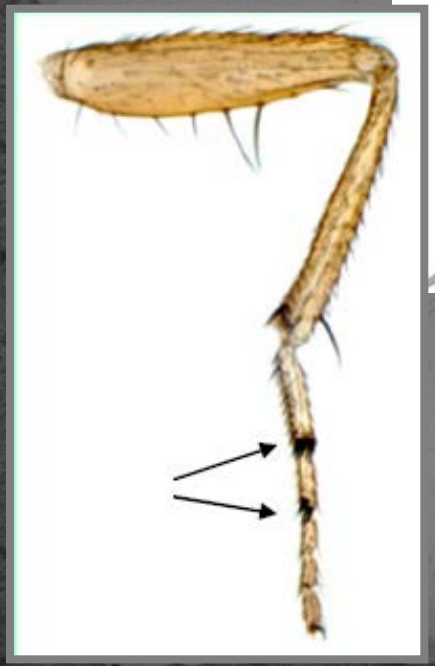


Adapted from Burrack, et al. 2012. Journal of Integrated Pest Management

What is SWD?

vinegar fly

male



G. Arakelian

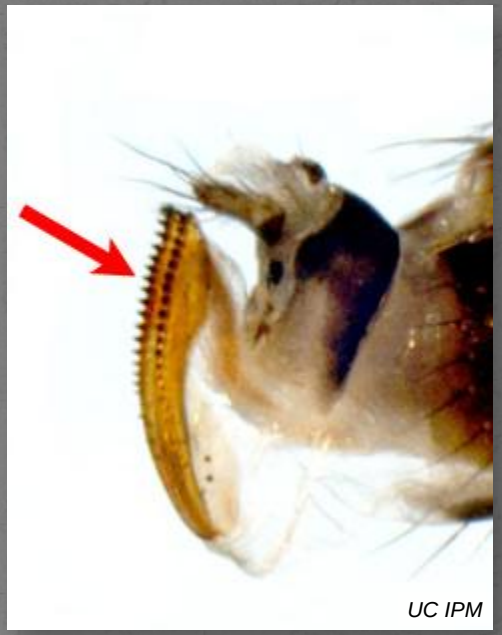
female

All other photos: M. Hauser, CDFA

What does SWD do?

Attacks ripening fruit

- Prefers soft-skinned fruit
  - – blueberry, blackberry, cherry, grape, peach, plum, raspberry, strawberry…
- Will attack harder fruits if skin is broken
  - – apple, pear, tomato, kiwi…


UC IPM


Ed Show


UC-CE


BC Ministry of Agriculture

SWD Damage

Oviposition pits

UC-CE

BC Ministry of Agriculture

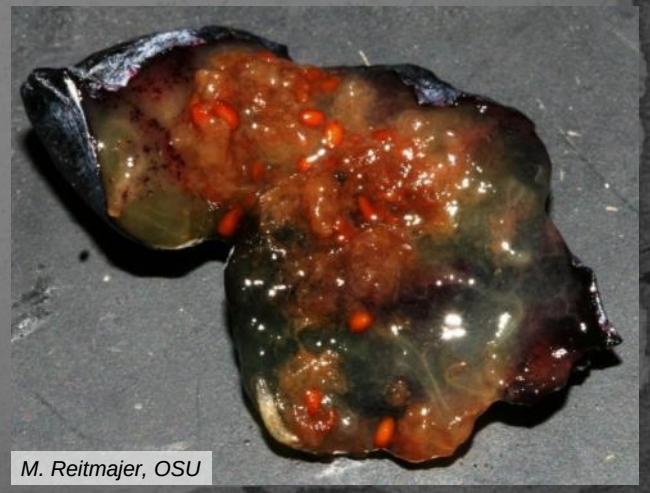
Softening

V. Walton, OSU

BC Ministry of Agriculture

Collapse & Rot

Martin Hauser



M. Reitmajer, OSU

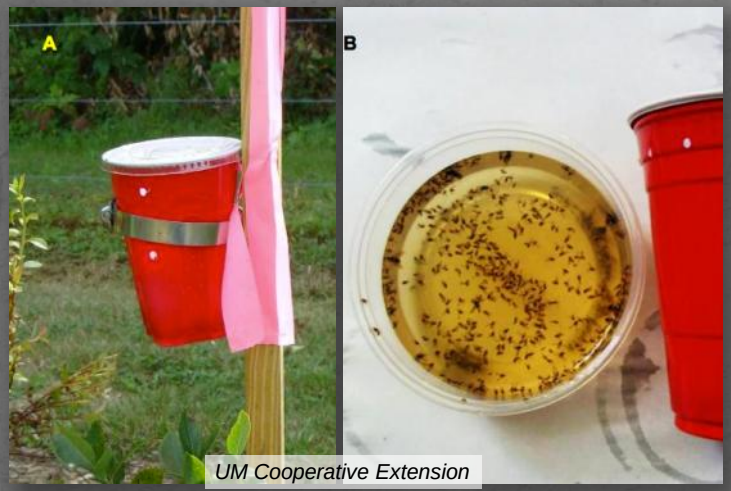
Crops at Risk

Crop Host	Crop Host	Wild Host
Apple	Grapes	American Pokeweed
Asian Pear	Italian Plums	Autumn Olive
Asian Plum	Mulberries	Beach Plum
Blackberries	Nectarines	Climbing Nightshade
Blueberries	Peaches	Crabapple
Boysenberries	Persimmons	Fox Grape
Cherries	Plumcots	Japanese Yew
Cold Hardy Kiwis	Raspberries	Kousa Dogwood
Elderberries	Strawberries	Porcilainberry
	Tomatoes	Wild Rose

This insect has a wide host range but is primarily a pest of berries and some stone fruits (cherry, nectarine, peaches), but may also be found in high tunnel tomatoes.

What You Can Do

Monitor



UM Cooperative Extension

Inspect Crop

Clean up


V. Walton, OSU

Remove and isolate infested and overripe fruit

University of Maine Cooperative Extension

http://umaine.edu/blueberries/factsheets/insects/210-spotted-wing-drosophila/

Four Rules for Managing Spotted Wing Drosophila:

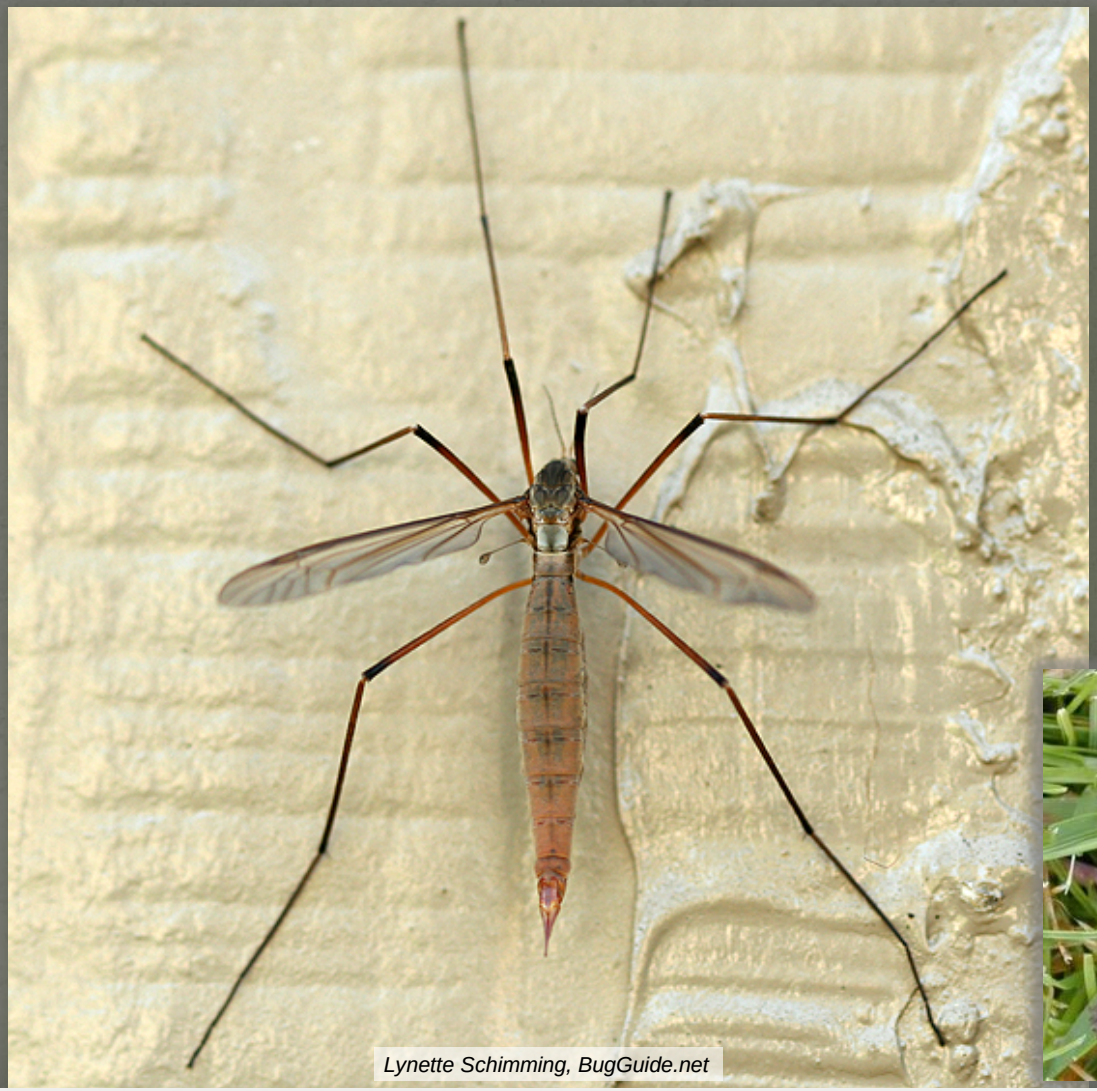
- Spray ripening fruit regularly with an approved insecticide (every 5-7 days).
- Harvest crop frequently and regularly; remove all ripe and rotten fruit from the field.
- Chill all harvested fruit immediately to as close to 33º F as soon as possible; hold in refrigeration until ready to sell.
- Open up the planting through pruning and spacing to improve light and air penetration and reduce moisture and humidity within the plant canopy.

University of Maine Cooperative Extension

http://umaine.edu/highmoor/blog/

European Crane Fly (ECF)

Tipula paludosa



Lynette Schimming, BugGuide.net

Dr. Ruth Mann, http://www.pitchcare.com/magazine/leatherjackets.html

From: NW Europe

How it Got Here: infested soil/sod/turf

Where is ECF?

What is ECF?

Adult crane flies look like large mosquitoes

Lynette Schimming, BugGuide.net

Michael Battenberg, BugGuide.net

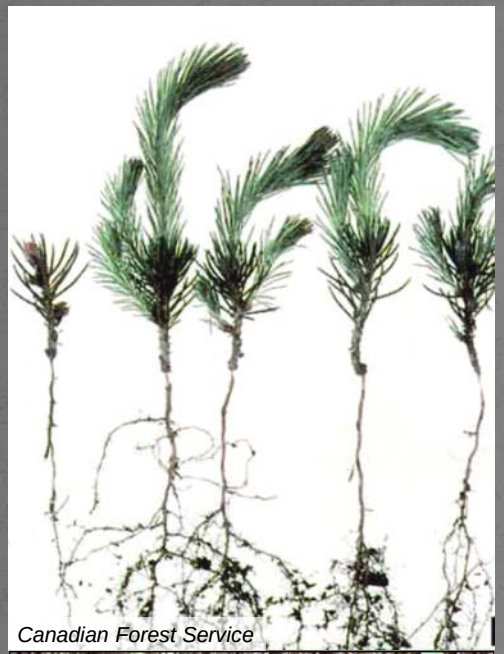
J Byrne, MSU Diagnostic Services

Dave Shetlar, OSU

Larvae (leatherjackets)

Can be seen on surface in spring

What does ECF do?



Canadian Forest Service

- **Pest of lawns and golf courses**
  - larvae feed on roots and above ground shoots of grasses
- **Impacts production systems**
  - sod farms
  - pastures and hayfields
- **General public nuisance**
  - Adults aggregate on buildings
  - look threatening

What to look for

Adults
(short-lived)

Seen late summer/
early fall
(*T. oleracea* can also be seen in the spring)

Emerging from turf
Sides of buildings

Larvae
(aka leatherjackets)

1-3" underground

cay be seen on surface in the spring

Pupal cases

Left on the surface when adults emerge – late summer/early fall

(If pupal cases are seen in spring, then *T. oleracea)*

What to look for

Wolberts.com

Dead patches in turf
(late spring / early summer)

Beverly S. Gerdeman

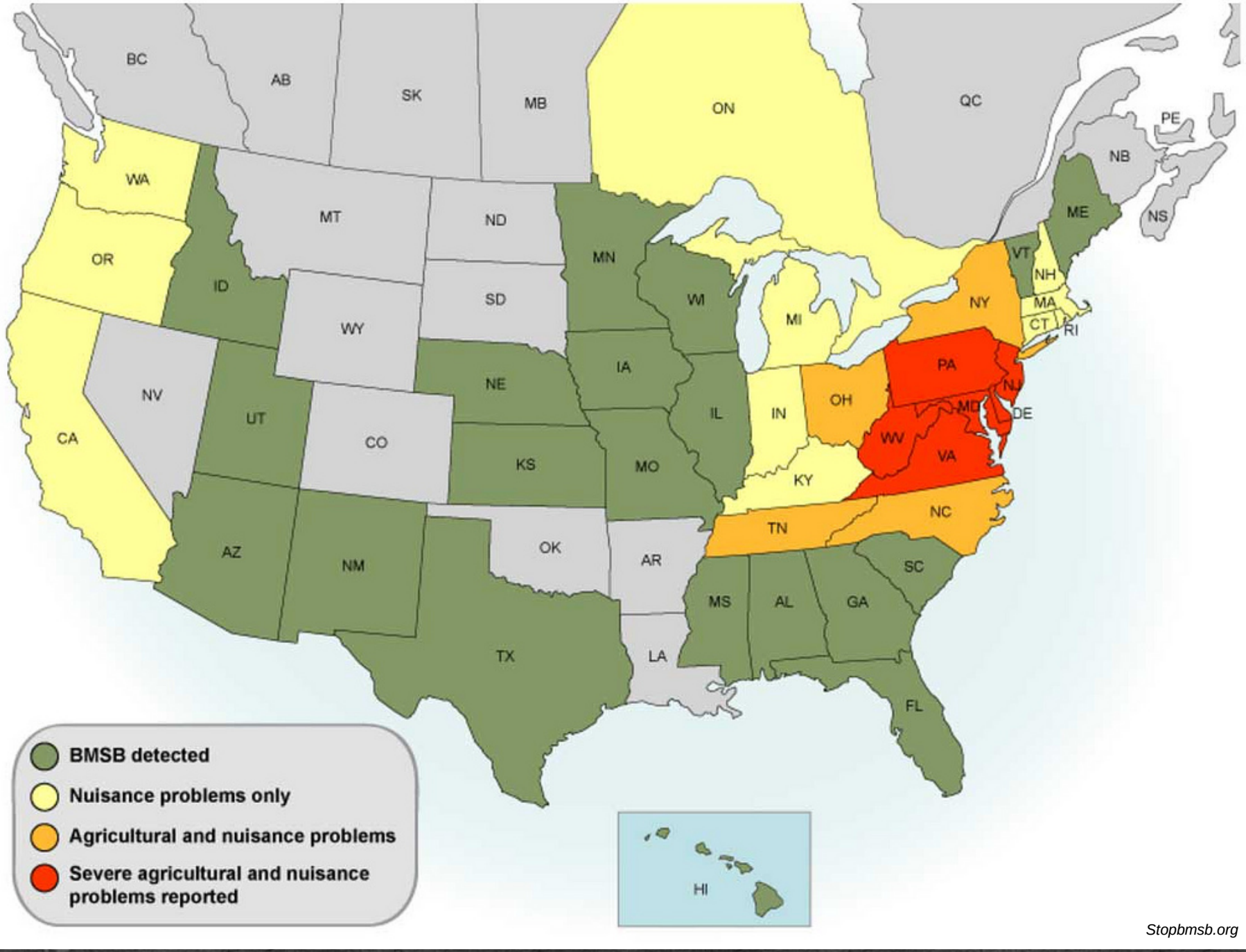
Bird pecks in lawn

Pam Sherratt

Pupal cases sticking out of the ground (late summer / early fall)

From: SE Asia (Japan, Korea, etc.) **How it Got Here:** stowaway in imports?

NOT ESTABLISHED IN MAINE



Stopbmsb.org

What is BMSB?

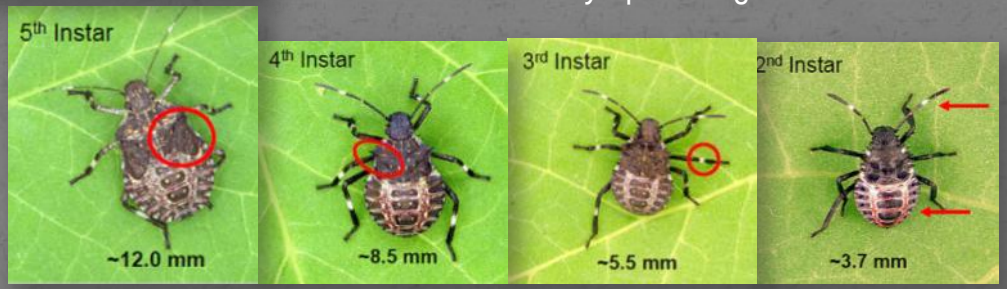
A "true bug" – piercing/sucking mouthparts

Eggs laid on undersides of leaves

D. Shetlar, OSU

Photos: Rutgers Cooperative Extension njaes.rutgers.edu

5 nymphal stages



- 1 generation/year in northeast
- adults overwinter and live 6-8 months

What does it do?

- **Attacks a wide variety of fruits, vegetables, ornamentals and legumes**
  - – over 100 host plants documented
  - – stone fruits, apples, tomatoes, peppers, corn, soybeans, roses, crabapple…
  - – adults and nymphs – pierce the fruit; suck out nutrients

Stephen Ausmus

Chris Bergh, Virginia Tech

UMD Extension

What else does it do?

Steve Ruark,The New York Times

- BMSB is a **home invader**
  - overwinters in buildings/homes
  - emits stinky odor

Recognizing BMSB

Mike Quinn, TexasEnto.net

Melinda Fawver

Brown stink bug (*Euschistus servus*)

Bark stink bug (*Brochymena quadripustulata*)

Brown marmorated stink bug (*Halyomorpha halys*)

BMSB has:

- black and white pattern around abdomen
- white bands on dark antennae
- smooth pronotum

Recognizing BMSB

Wikipedia Commons

Western conifer seed bug (*Leptoglossus occidentalis*) – another home invader

BMSB – shield-shaped

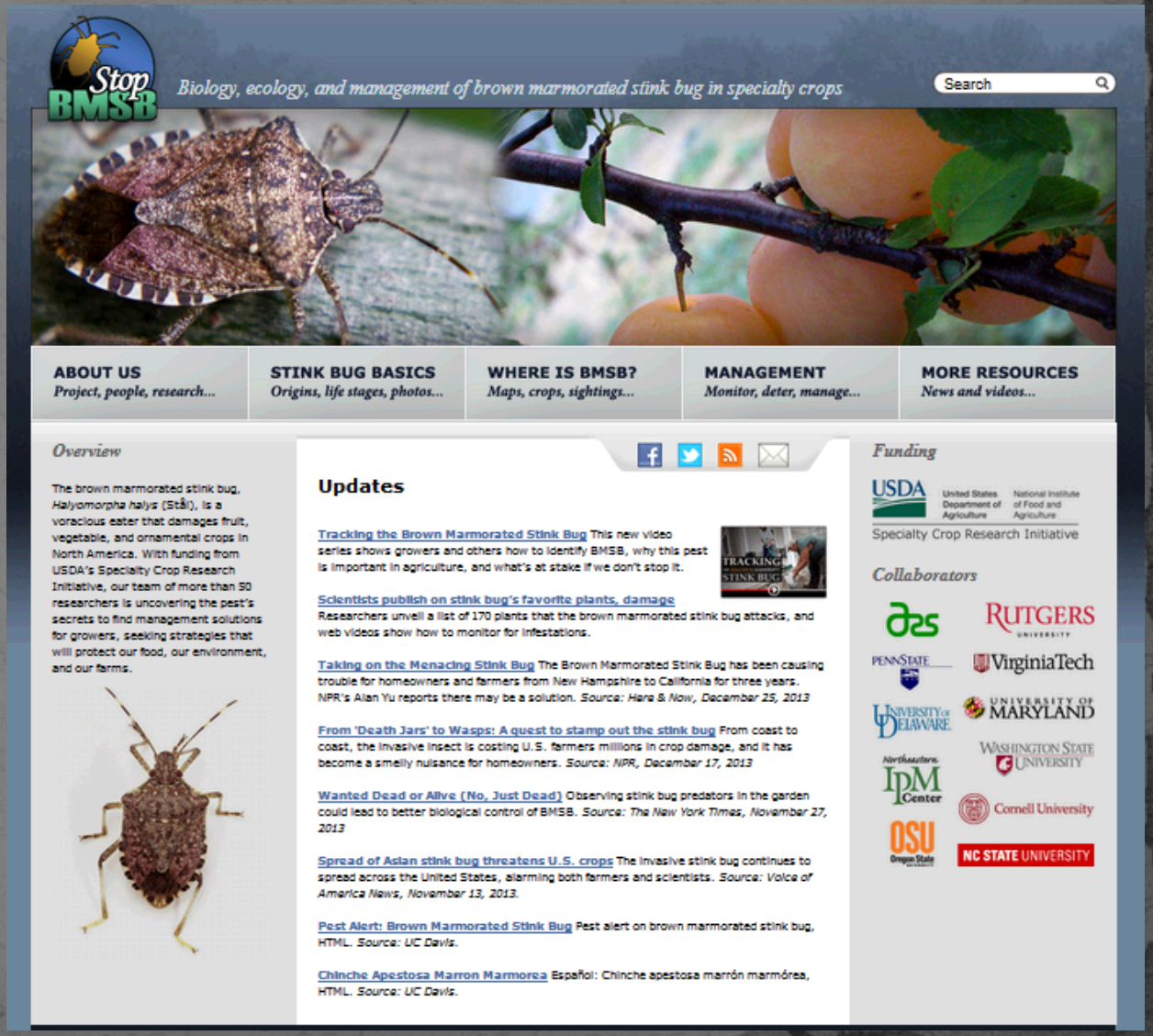
What You Can Do

Learn about BMSB

www.stopbmsb.org

Report suspicious sightings

BMSB is a home invader pest first



Light Brown Apple Moth (LBAM)

Epiphyas postvittana

Nick Mills, University of Berkeley

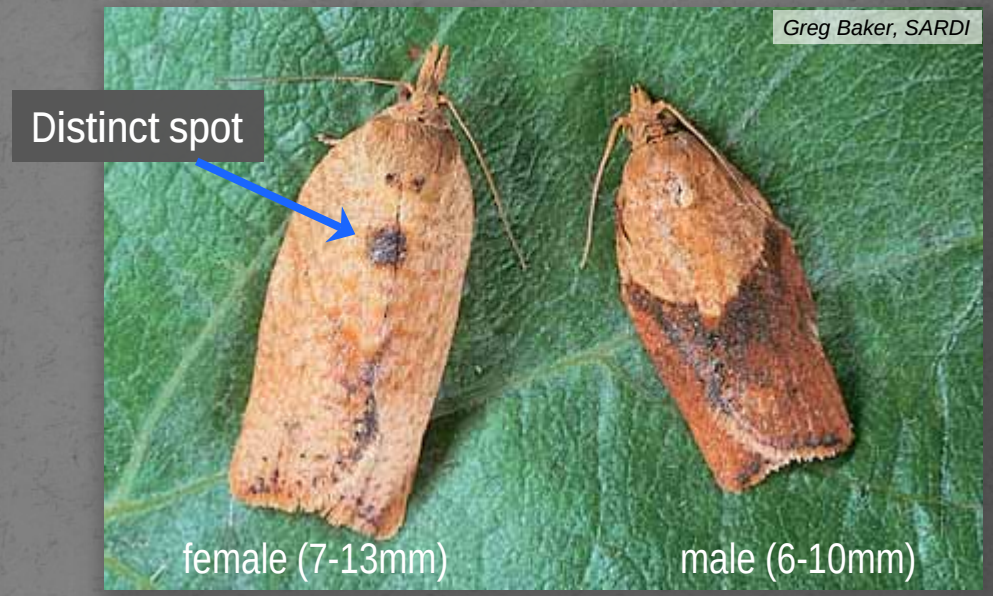
From: Australia **How it Got Here:** ?

NOT FOUND IN MAINE

What is LBAM?

A tortricid moth – "leafroller"

larvae spin silken cocoons



Adult moth coloration is highly variable

Adults hold their wings over their abdomens in a bell shape when at rest

mouthparts resemble a snout.

Currently, only in California and Hawaii
Up to 5 generations a year in CA

What does LBAM do?

Larval feeding on leaves, buds, flowers

- reduces photosynthesis
- deforms growth patterns

Larval feeding on fruit

- scarring; unmarketable
- secondary infections

Larval feeding on ~2000 hosts

- deciduous tree fruits
- subtropical fruits
- berries
- ornamentals
- forest/shade trees

Recognizing LBAM

Adults

Greg Baker, SARDI

~ 3/8” long
bell-shaped
cream to brown coloration
patterns highly variable
females - distinct spot on fold
genital dissections to i.d.

Larvae

University of California Agriculture and Natural Resources

small, narrow
yellowish-green
often in silken shelter

Eggs

California Agriculture 2008, vol 62: 57-61

flat, oval, translucent
appear pale yellow to white
overlapping pattern
upper surface of leaves

Damage

Web a silken shelter to feed
Older larvae roll leaves
Leave scarring on fruit

Not distinctive from other leafrollers

Department of Primary Industries, New South Wales, Australia

HortNET

What can be done

Quarantine infested areas

HI – all
CA – 19 counties

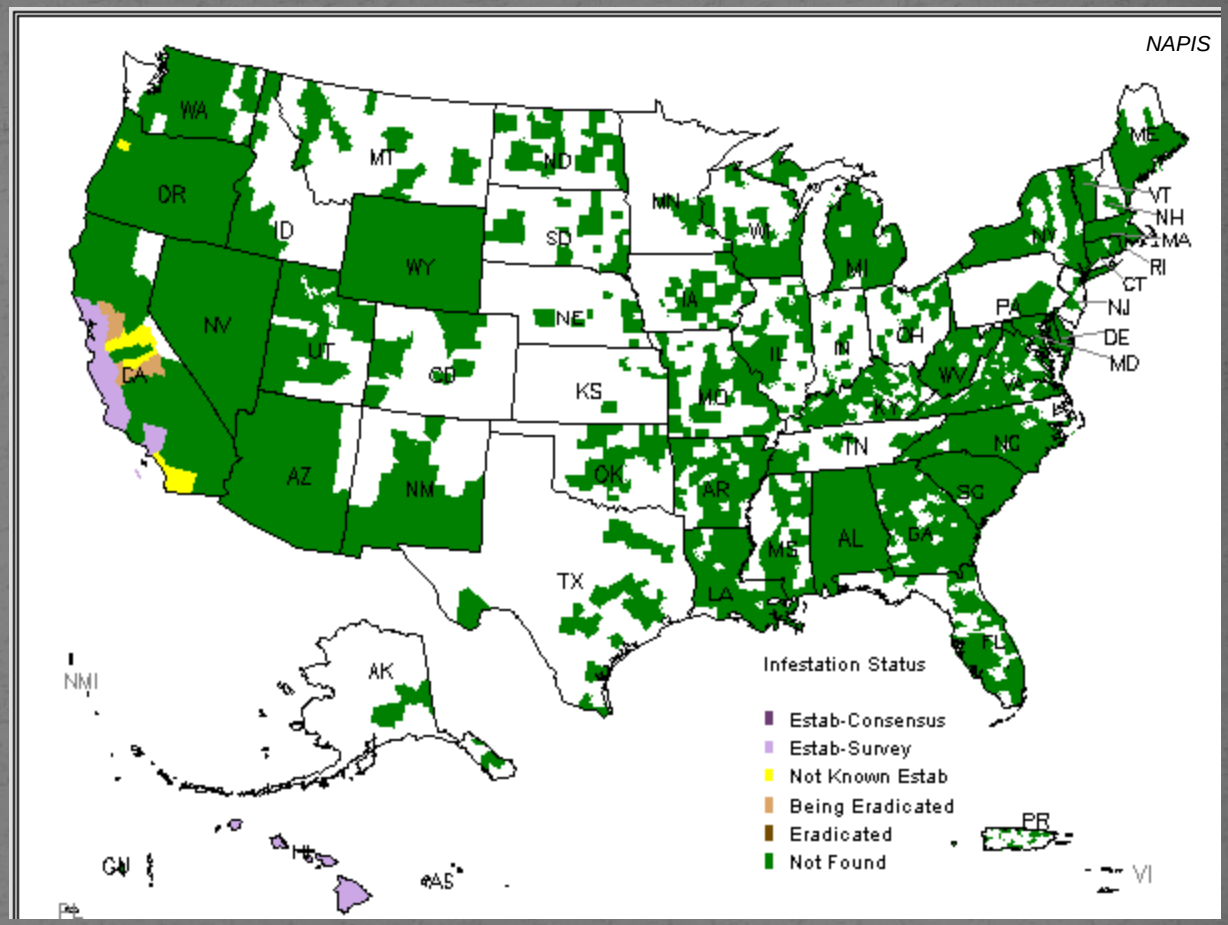
Survey

national survey – pheromone traps

ME – 2008, 2009

Apple, apricot, crabapple, white pine, maple, pear

New management strategy is currently under development



Winter Moth(WM)

Operophtera brumata

Tom Murray, BugGuide.net

Maine Forest Service

P. Johnson

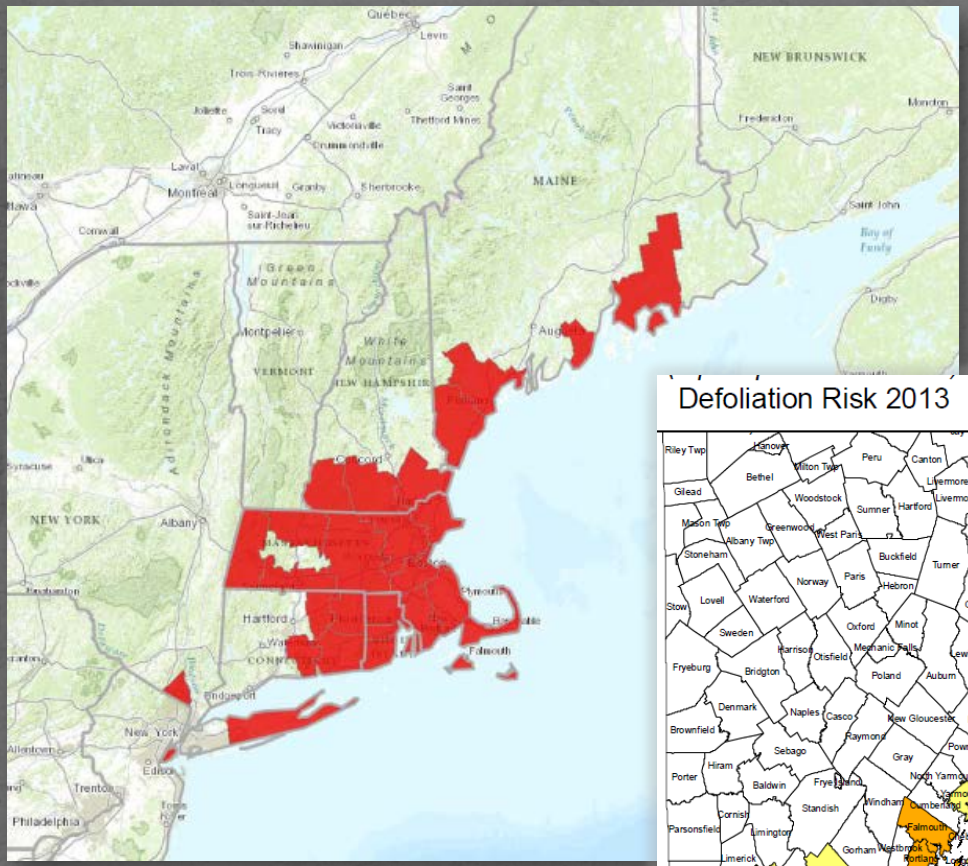
Maine Forest Service

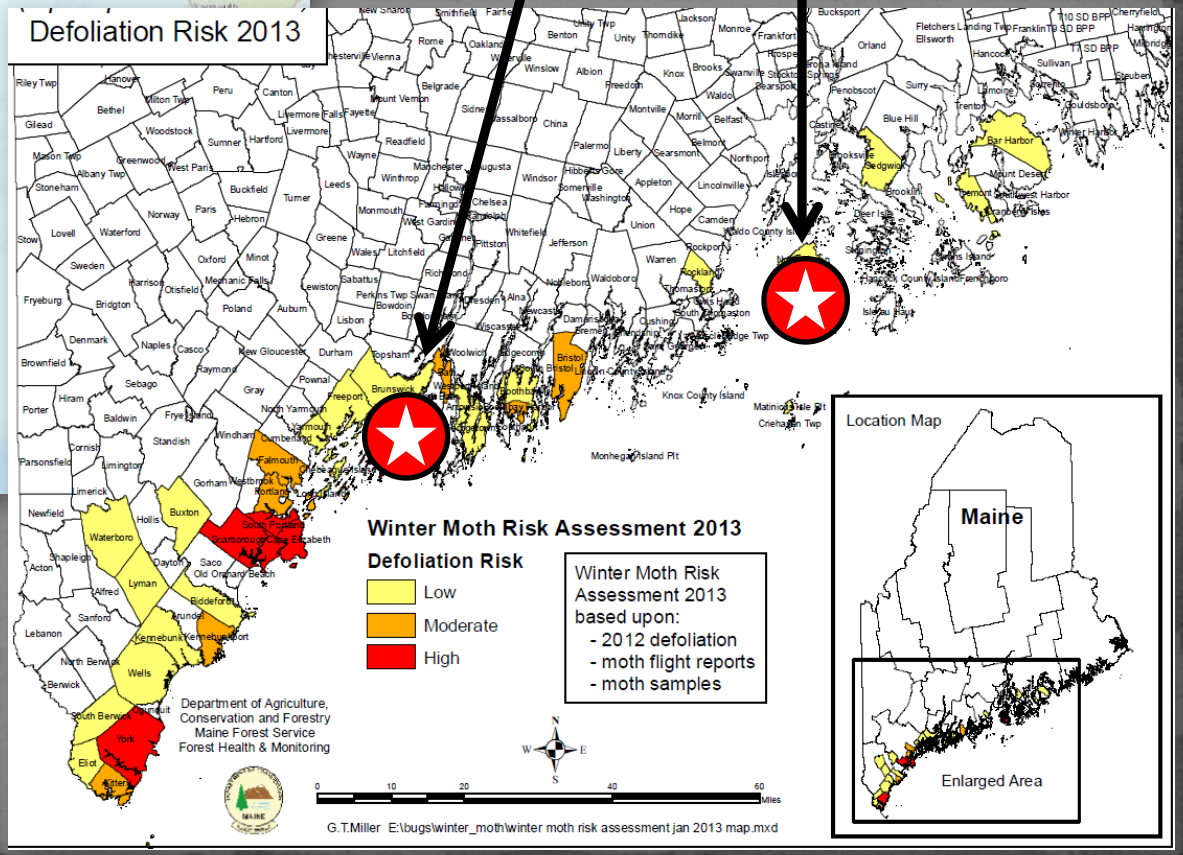
From: Europe

How it Got Here: ?

Where is winter moth?

2012: Defoliation noticeable in Harpswell and Vinalhaven





What is WM?

Geometrid moth; “inchworm”

Tom Murray, BugGuide.net

Nov - Jan

Waltham Services

Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org

Dec - Apr

Maine Forest Service

Hannes Lemme, Bugwood.org

Jun - Nov

Cape Cod Times/Steve Heaslip

Apr - Jun

What does WM do?

Larvae feed in early spring

- On newly forming buds
- Then free-feed on expanded foliage
- Causes “swiss cheese” effect

P. Johnson

Defoliate hardwood trees and shrubs

- 89,000 acres in 2011
- Extensive oak mortality
- Problems seen in highbush blueberries, cranberries, apple orchards…

Favored hosts:

- oak
- apple
- maple
- birch
- basswood
- blueberry
- cherry

Back Bay Garden Club

Maine Forest Service

Winter Moth vs. Bruce Spanworm

Steve Dunbar , BugGuide.net

- *Operophtera brumata*
- Exotic
- Prefers oak, apple, maple, birch, blueberry
- Population growth exponential
- Adult moths

Females longer wings stubs

- *Operophtera bruceata*
- Native
- Prefers maple, beech, birch, poplar
- Occasional outbreaks
- Adult moths

Females shorter wing stubs

All other photos: Maine Forest Service

What You Can Do

Do not move plants from landscape

- Especially from known infested areas.
  - The cocoons of winter moth are in the soil from June through November
  - You cannot see them
- Never move apple tree seedlings
  - Eggs are on trees

Maine Forest Service

Know the origin of your plant sale plants

- Do not buy if from along Maine coast or southern New England
- Inform neighbors not to dig up and distribute perennials

Help defoliated trees

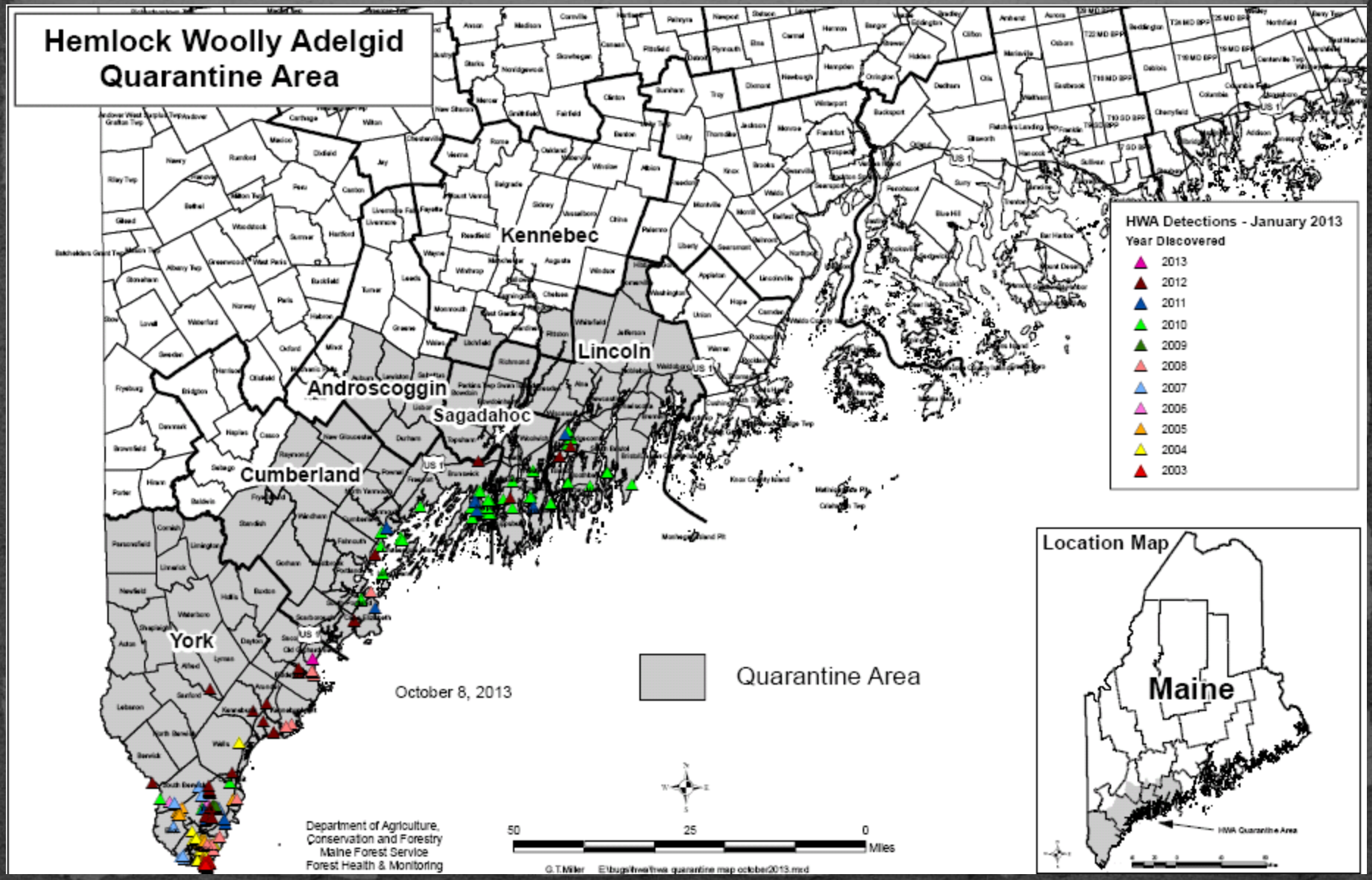
- Trees must put out a second flush of growth in order to survive
- May need to water them if there is little rainfall

Maine Forest Service

From: Japan

How it Got Here: ornamental plantings

HWA is now found in 5 Maine counties



What is HWA

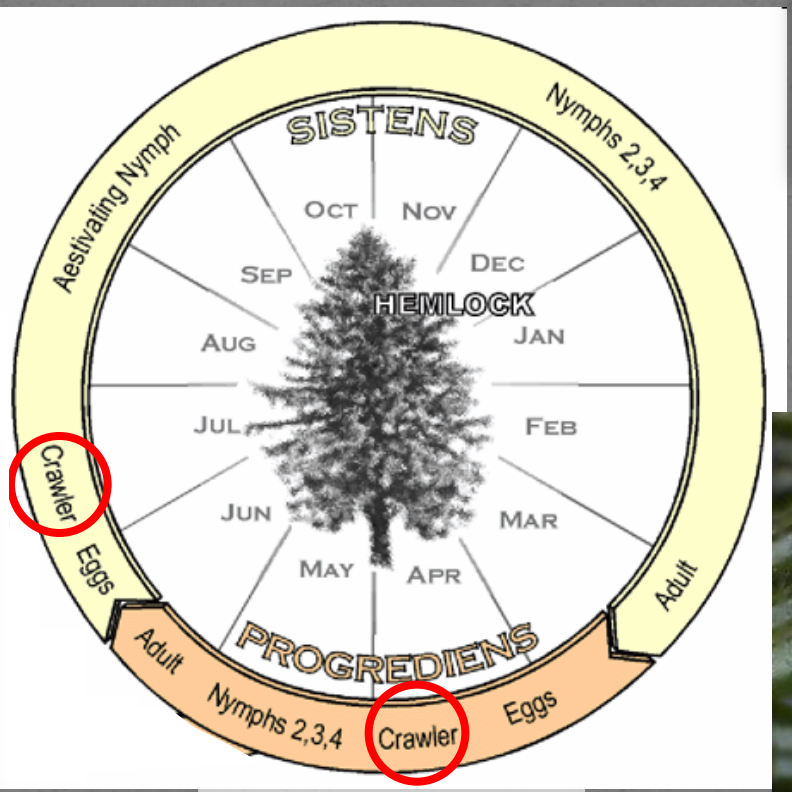
An aphid-like, sap-sucking insect

USDA Forest Service

Feeding nymph

Dormant in summer

Maine Dept. of Agriculture, Conservation & Forestry



Vince D'Amico & Michael Montgomery

2 generations / year
spreads more easily during crawler stage

Older nymphs/adults produce "woolen" balls (fall/winter)

USDA Forest Service

What Does it Do?

Adults, as well as the nymphs, **suck sap** from young twigs on **hemlock trees (Eastern and Carolina)** and cause the hemlock needles to dry out and drop. This **defoliation** can cause the hemlock tree to die within 4-10 years (in the north).

USDA Forest Service

Recognizing HWA

From Afar

USDA Forest Service, Bugwood.org

Up Close

Look at undersides of needles

Maine Forest Service

White woolly masses:
Most visible November thru July

Maine Dept. of Agriculture, Conservation & Forestry

European Woodwasp

Sirex noctilio

Merintia via Flickr

From: Europe **How it Got Here:** SWPM

NOT FOUND IN MAINE

What is Sirex?

A wood-boring wasp

Bernard Slippers, FABI, University of Pretoria

Steven Valley, Bugwood.org

female

Vicky Klasmer, Bugwood.org

Steven Valley, Bugwood.org

male

2 year lifecycle in northeast N. America
adults are active mid-summer to mid-autumn

What does Sirex do?

Attacks **PINE**

- Monterey and loblolly (Australia and S. America)
- Red, scotch, and white (N. America)
- Has caused 80% mortality in Australian pine plantations
- Huge threat to southern U.S.

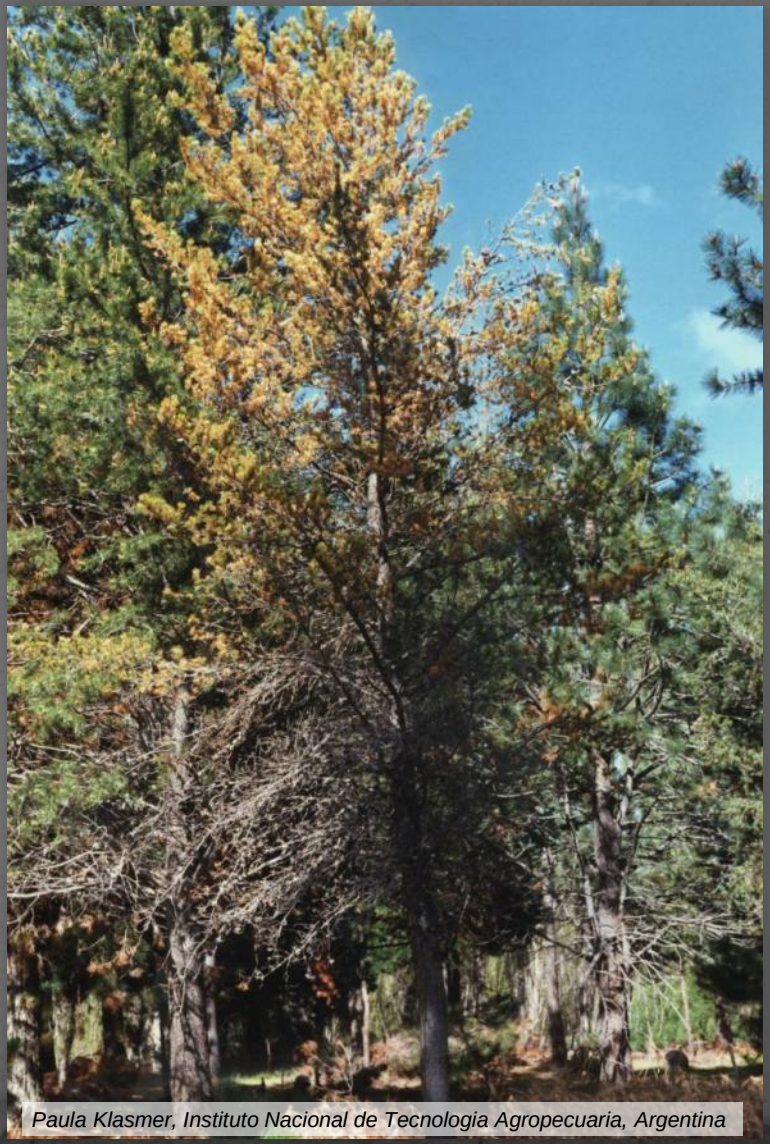
Injects a **toxic mucus** and **wood-decay fungus** (*Amylostereum areolatum*)

Strong flier

Easily moved with infested logs, nursery stock, Christmas trees, woody debris, etc.

Recognizing Sirex

Crown chlorosis



Paula Klasmer, Instituto Nacional de Tecnologia Agropecuaria, Argentina

Needle browning / droop

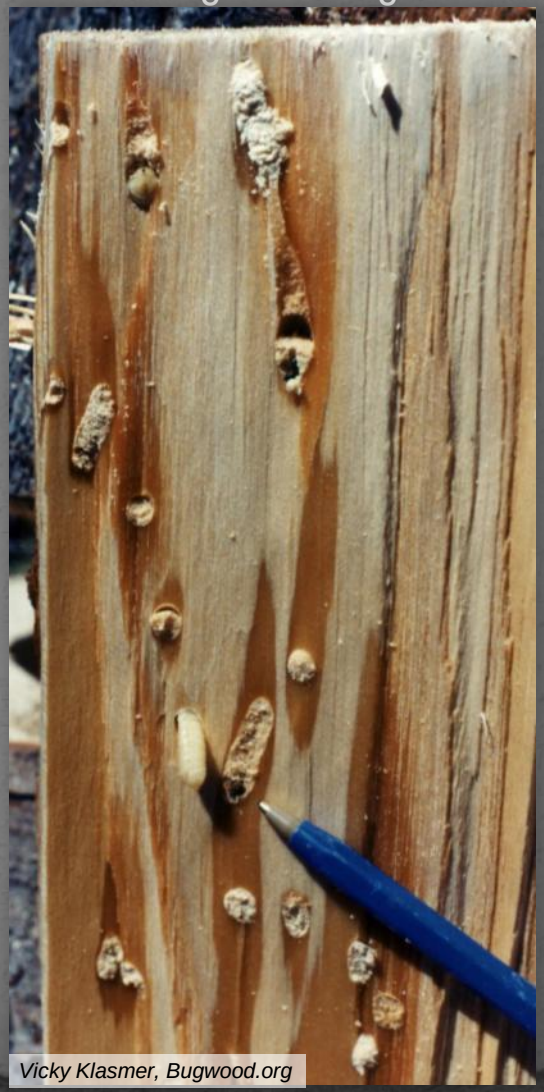
Dennis Haugen, Bugwood.org

Recognizing Sirex

Resin flows

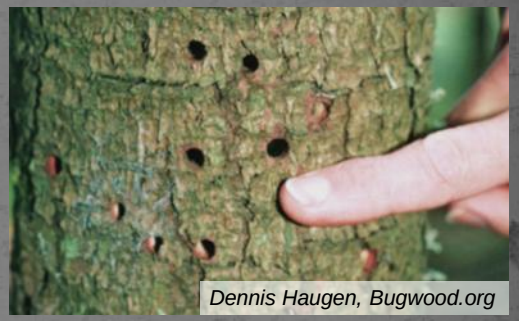
Dennis Haugen, Bugwood.org

Frass-filled tunnels and fungal staining



Vicky Klasmer, Bugwood.org

Round exit holes <1/4”



Dennis Haugen, Bugwood.org

Adult females get stuck during egg-laying

Brown Spruce Longhorned Beetle (BSLB)

Tetropium fuscum

Václav Hanzlík, www.biolib.cz

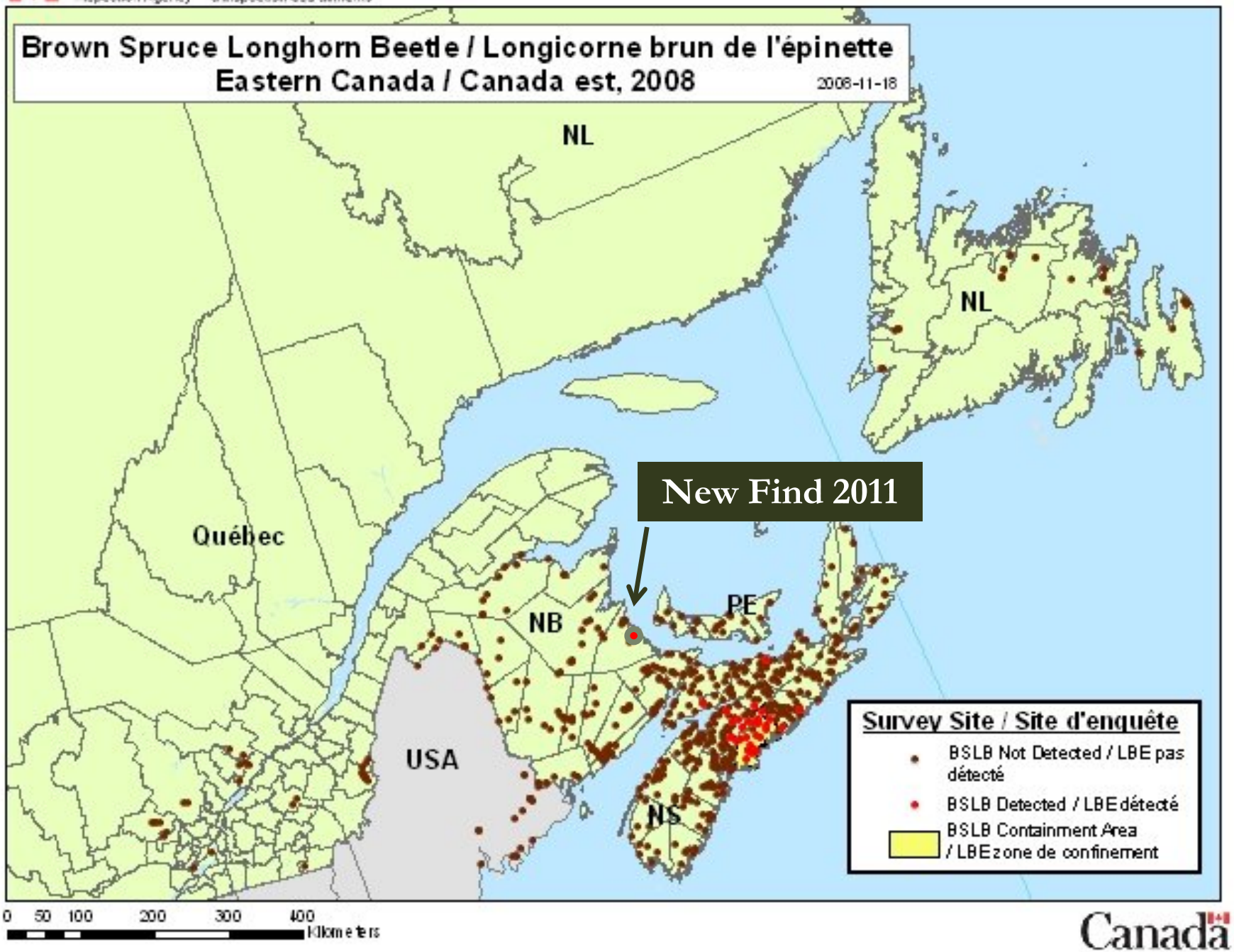
Natural Resources Canada, Bugwood.org

UGA5331011

From: Europe

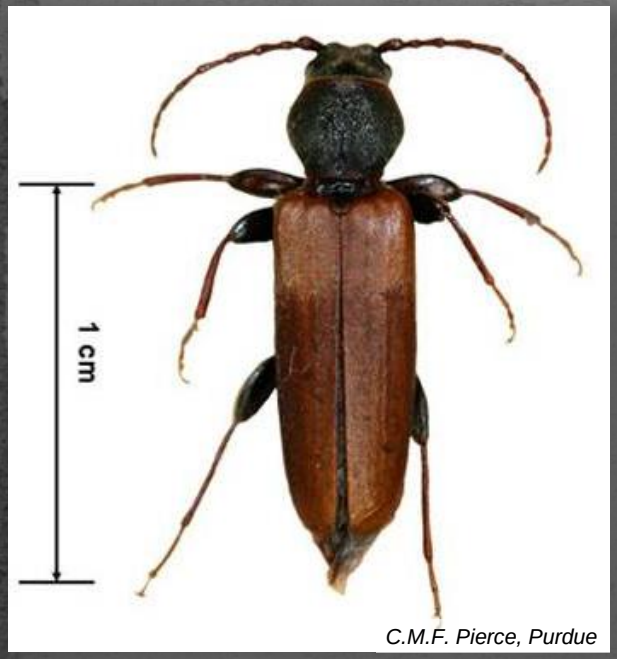
How it Got Here: SWPM

NOT FOUND IN MAINE


Canadian Food Inspection Agency
Agence canadienne d'inspection des aliments
Brown Spruce Longhorn Beetle / Longicorne brun de l'épinette
Eastern Canada / Canada est, 2008
2008-11-18
NL
NL
New Find 2011
Québec
NB
PE
USA
NS
Survey Site / Site d'enquête
BSLB Not Detected / LBE pas détecté
BSLB Detected / LBE détecté
BSLB Containment Area / LBE zone de confinement
0 50 100 200 300 400
Kilometers
Canada

What is BSLB?

A wood-boring longhorned beetle



C.M.F. Pierce, Purdue

Adults active June-August

Natural Resources Canada

Christopher Adam, BugGuide.net

Overwinter in tree as larvae

Canadian Forest Service, Bugwood.org

Pupa in cambium layer

- 1-2 year lifecycle in northeast N. America
- adults are active mid-summer to mid-autumn

What Does BSLB Do?

Attacks **SPRUCE**

- Red, white, Norway
- Sometimes fir, larch, and pine
- In Nova Scotia, attacks healthy red spruce stands
- Reinfests until tree dies

Vector of *Ophiostoma tetropii*, a wood-stain fungus.

McNabs Island, N.S. – infested spruce trees easily toppled during Hurricane Juan, 2003

Recognizing BSLB

yellowing foliage / crown dieback

resin flow

Stanislaw Kinelski, Bugwood.org

L-shaped pupal chambers

oval exit hole < ¼”

Emerald Ash Borer (EAB)

Agrilus planipennis

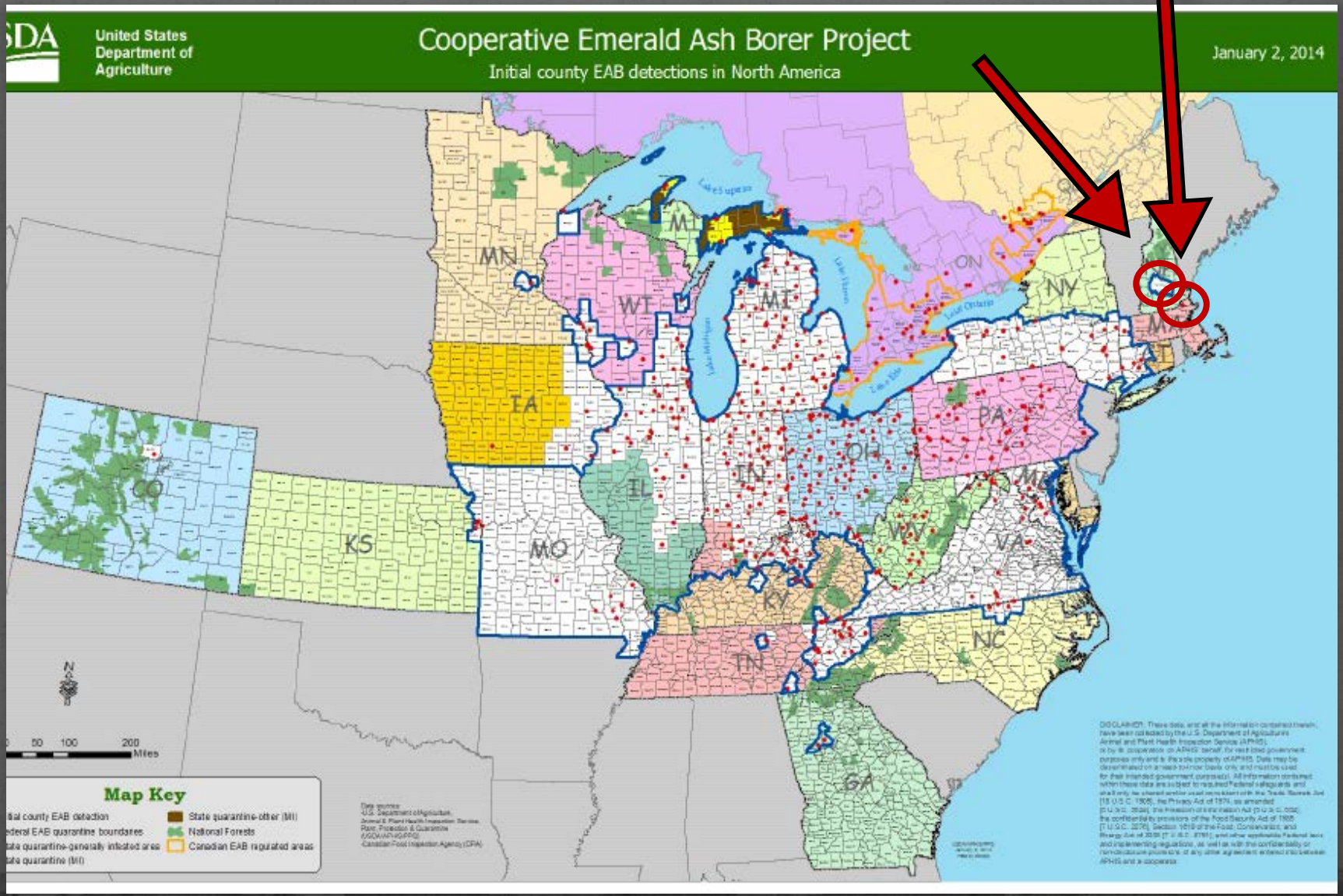
David Cappaert, Michigan State University, Bugwood.org

Troy Kimoto, Canadian Food Inspection Agency, Bugwood.org

From: Asia **How it Got Here:** SWPM

NOT FOUND IN MAINE

- EAB is now in 22 states
- Closest infestations to Maine – Concord, NH and N. Andover, MA



What is EAB?

A wood-boring metallic (jewel) beetle

~ ½" long metallic green

We are very small

Pennsylvania Dept. of Conservation an Natural Resources

Adults active May-August

D. Cappaert, MSU, Bugwood.org

Flat larvae; creates S-shaped galleries

Maine Dept. of Agriculture, Conservation & Forestry

Overwinter in tree as larvae

1-2 year lifecycle in N. America
adults are active late spring to mid-summer

What does EAB do?

Attacks **all species of ash** (*Fraxinus*) in North America.

Kills trees in as little as 2 years.

- Girdles the tree by extensive feeding in the cambium layer.

Spreads easily in firewood

- 75% of new infestations due to infested firewood.

Mike Kelley via Flickr

USDA APHIS PPQ, Bugwood.org

Recognizing EAB

From afar

Woodpecker activity!!!

Crown dieback

Epicormic shoots

Recognizing EAB

Up close

Bark splitting

Michigan Dept. of Agriculture, Bugwood.org

S-shaped galleries under bark

John Obermeyer, Purdue

EAB

NOT EAB

Pennsylvania Dept. of Conservation an Natural Resources

D-shaped exit holes

Asian Longhorned Beetle (ALB)

Anoplophora glabripennis

City of Bowling Green, OH

USDA Forest Service

MA Dept. of Agricultural Resources

From: Asia

How it Got Here: SWPM

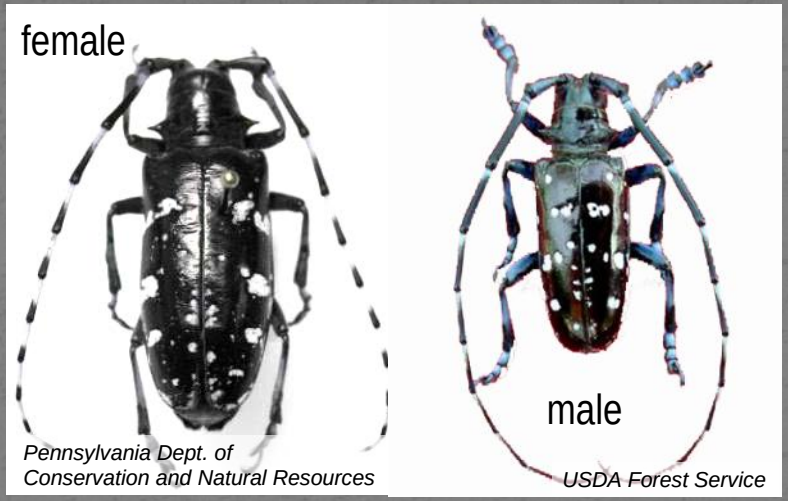
NOT FOUND IN MAINE

What is ALB?

A wood-boring longhorned beetle

USDA Forest Service

Overwinter in tree as larvae



Pennsylvania Dept. of Conservation and Natural Resources

USDA Forest Service

Pennsylvania Dept. of Conservation and Natural Resources

pupa

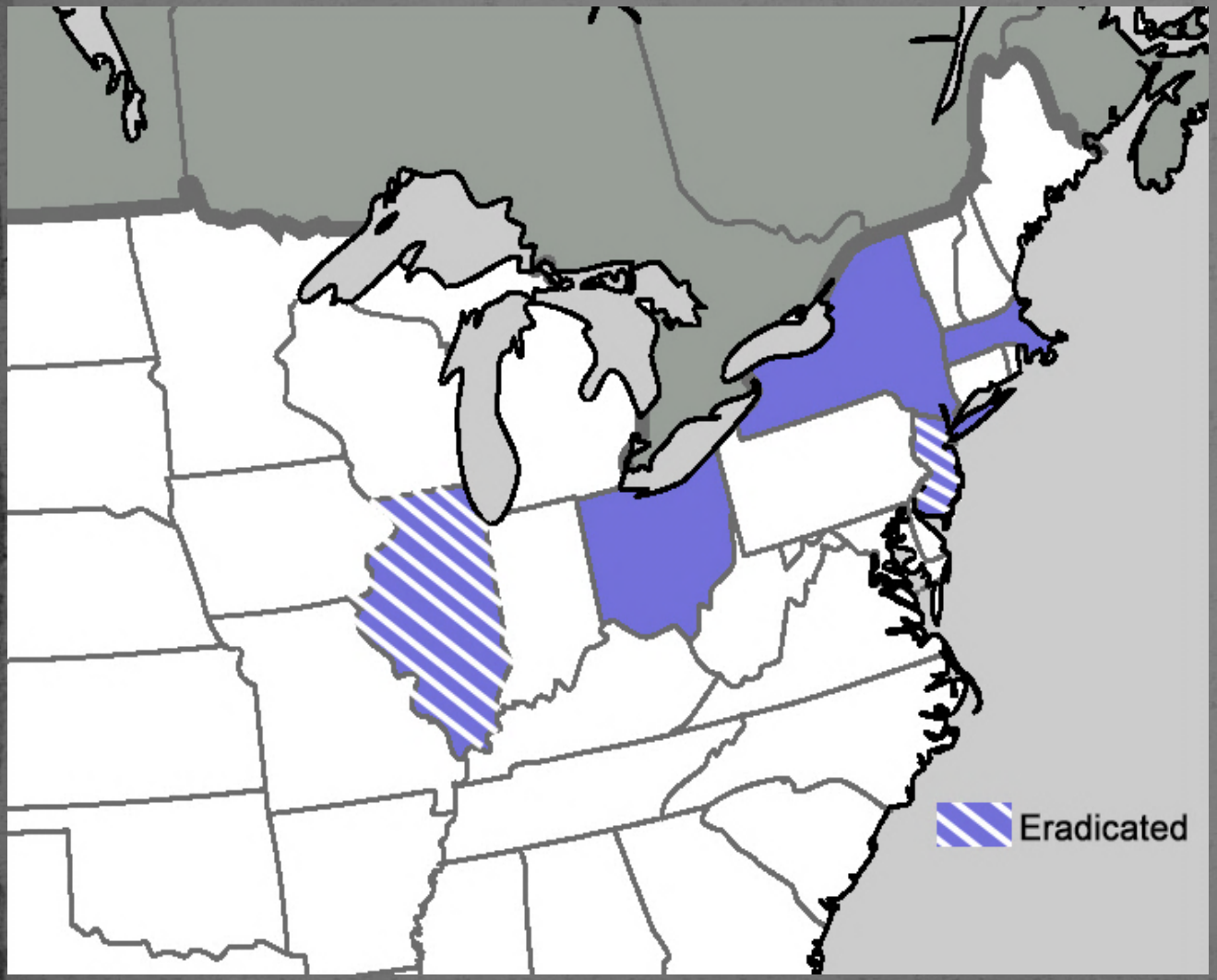
USDA Forest Service

USDA Forest Service

Adults active July - October

1-2 year lifecycle in N. America
adults are active mid-summer to early fall

Where is ALB?



Currently in,

- New York (1996)
- Massachusetts (2008)
- Ohio (2011)

Eradicated from,

- Illinois
- New Jersey
- Toronto, Canada

What does it do?

Attacks **healthy hardwood trees**

- Preferably maple
- But also elm, willow, birch, horsechestnut...

Weakens, eventually killing, trees

- Girdles the tree by young larvae feeding in the cambium layer
- Compromises structure by older larvae boring into heartwood

Can spread in firewood

- Some Ohio and Long Island infestations

Recognizing ALB

Signs on trees

City of Cambridge, MA

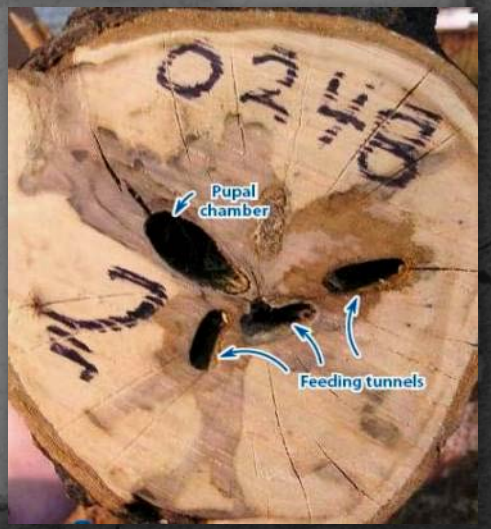
Egg-laying sites

MA Dept. of Natural Resources

Dean Morewood, Health Canada

Adult feeding damage

Large tunnels and galleries



Pennsylvania Dept. of Conservation and Natural Resources

Recognizing ALB

Asian longhorned beetle

Christine Peterson, AP

ELYTRA
Shiny black

ANENNAE
Stark B/W contrasting bands

SPOTS
Distinct white

LEGS
Blue tinge

Hardwoods

White spotted sawyer

N. Slainesville, BugGuide.net

ELYTRA
Dull black

ANTENNAE
Dim B/W contrasting bands

SPOTS
indistinct off-white or none

LEGS
no tinge

Conifers

For further information, or to report any of these insects, call:

Maine Department of Agriculture, Conservation and Forestry; 287-3891

James E. Appleby, University of Illinois

Questions?