Detection & mitigation of new exotic insect species in Oregon's forests

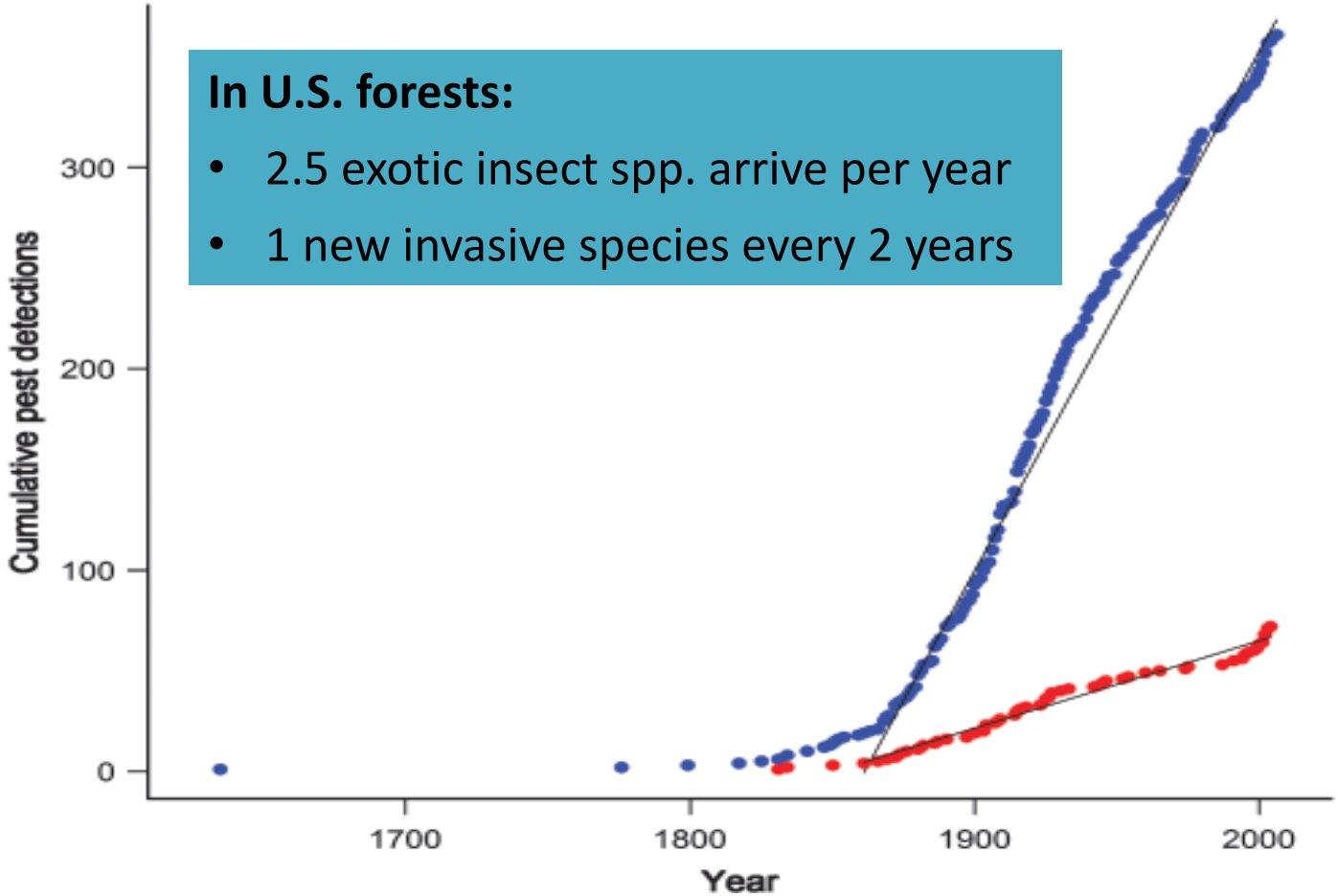
Wyatt Williams, Invasive Species Specialist

February 26, 2020

Oregon Department of Forestry

Promoting and Practicing Sustainable Forestry

Exotic insects are still arriving in the U.S.



In U.S. forests:

- 2.5 exotic insect spp. arrive per year
- 1 new invasive species every 2 years

Blue = All exotic forest insects

Red = Invasive forest insects and disease

Aukema et al. 2010.

Multiple ways to detect insect species:

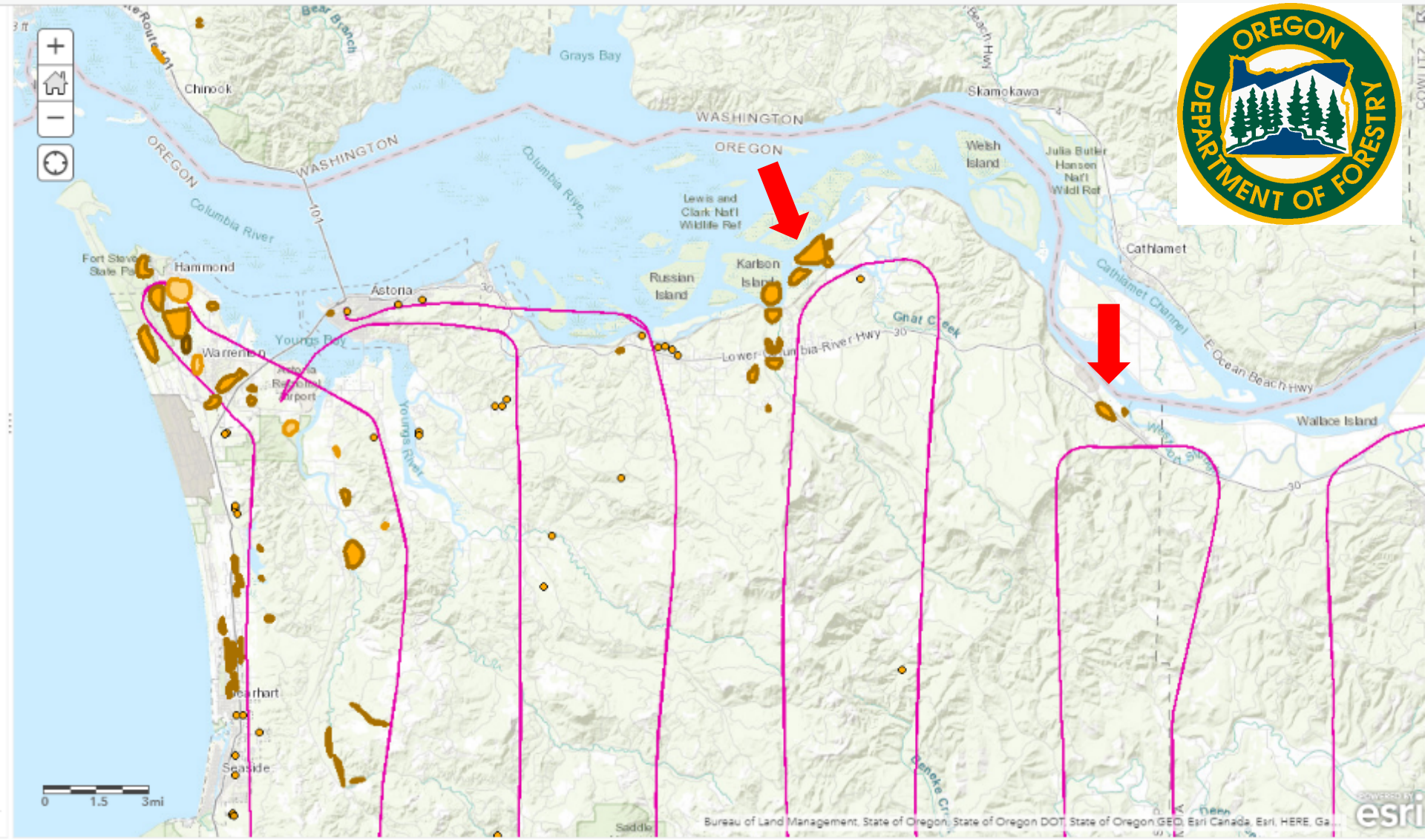
Plus… landowner & public reports

Spruce Aphid

- Introduced to OR in early 1900s
- 1950s: 20,000 acres damage in Coast Range
- 2019: Detected by aerial survey

Donald Owen, California Fire, Bugwood.org

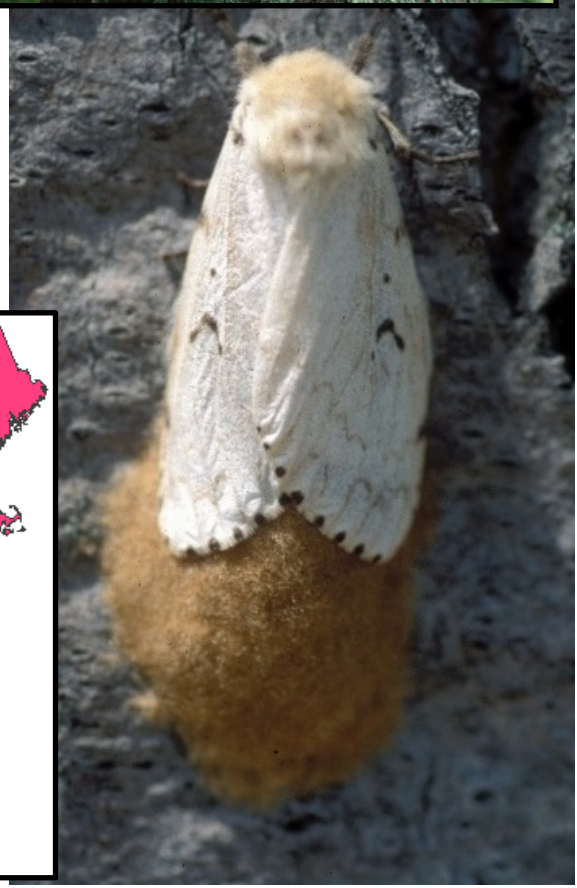
Aerial survey of spruce aphid damage in NW OR, June 2019

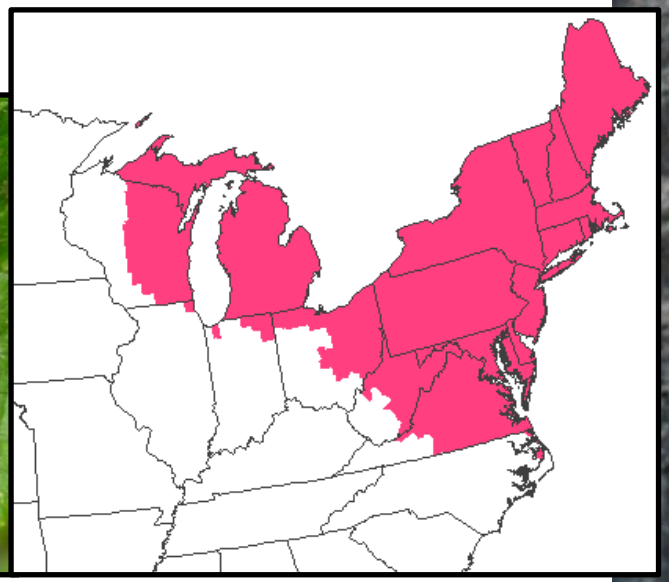


Ground check – July 9

Gypsy moth (GM)

- European & Asian subspecies
- 500+ host species, including DF
- Great tools for detection, eradication





2019 GM eradication - Corvallis

ODA is lead agency

- 4 GM detected in 2017
- 27 GM detected in 2018
- 2019 46-acre treatment area
- May, 2019, two treatments
- 3 GM detected in 2019

Oregon has 100% success rate eradicating GM since 1979

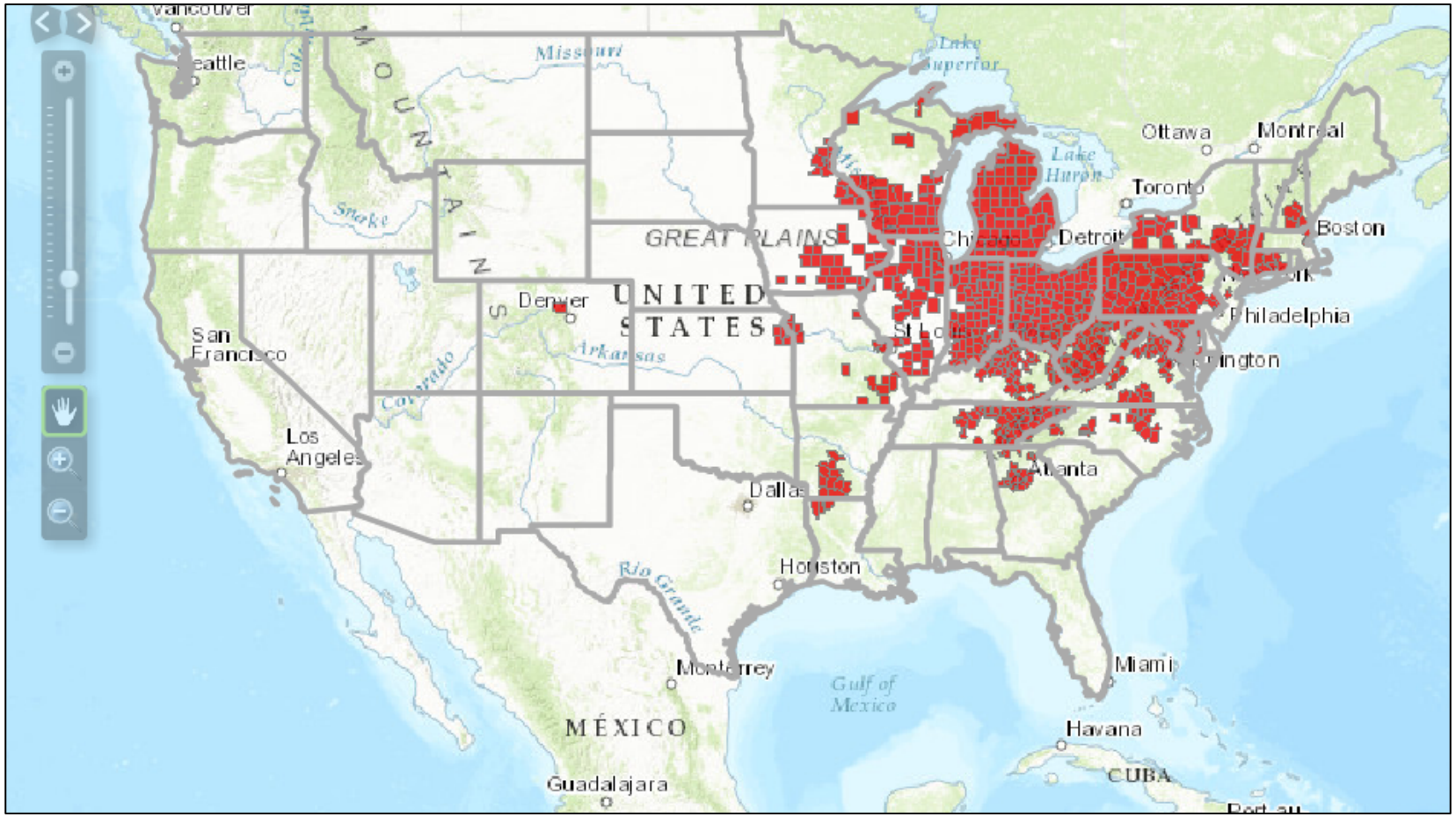
Oregon Department of Agriculture

Emerald Ash Borer (EAB)

- First detected in U.S., 2002
- 100+ million trees killed in 30 states since 1990s
- Costs of $1.7 billion in U.S.

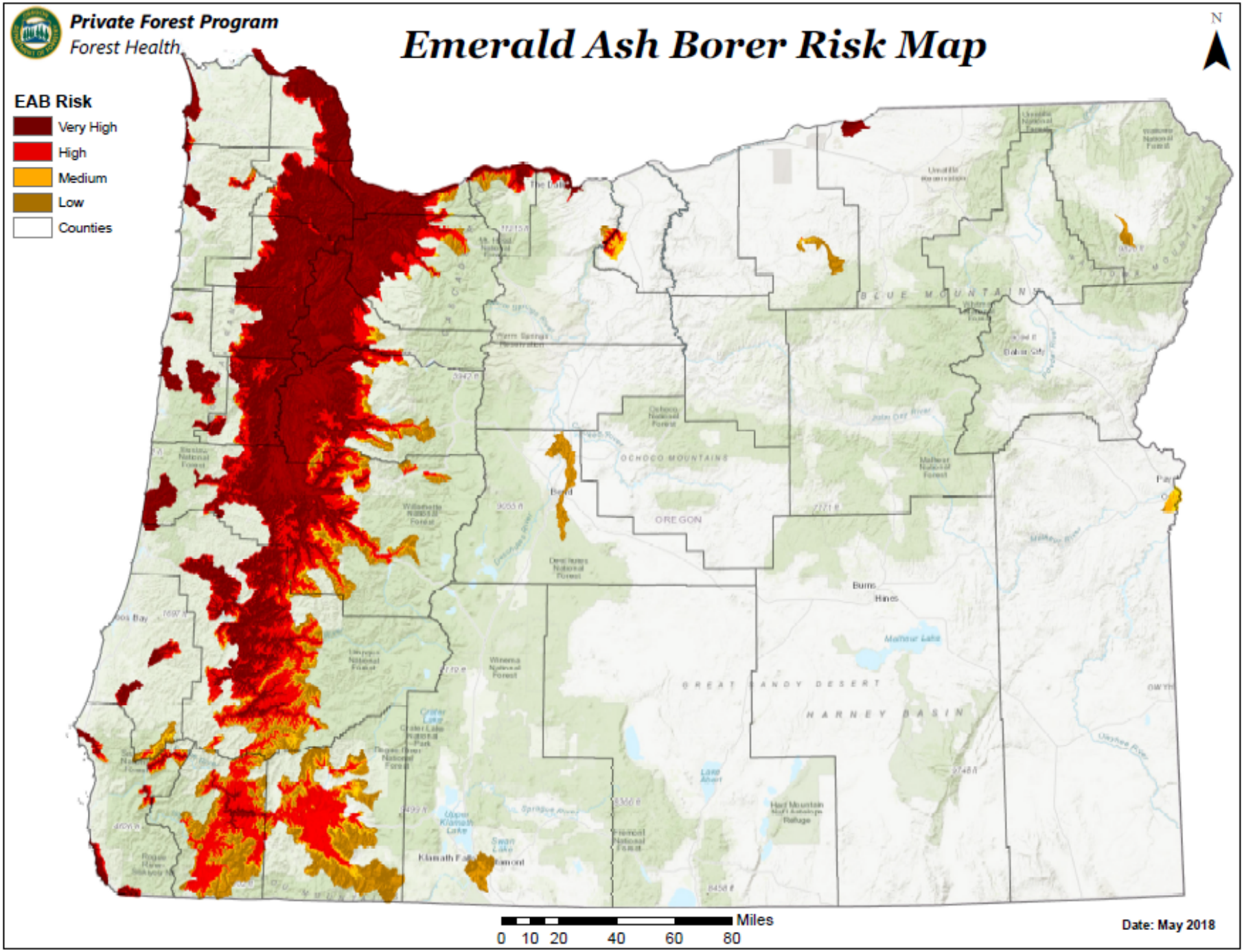
Emerald ash borer (EAB)

2002: one county in Michigan → 2020: >30 states
>95% mortality of ash in some counties



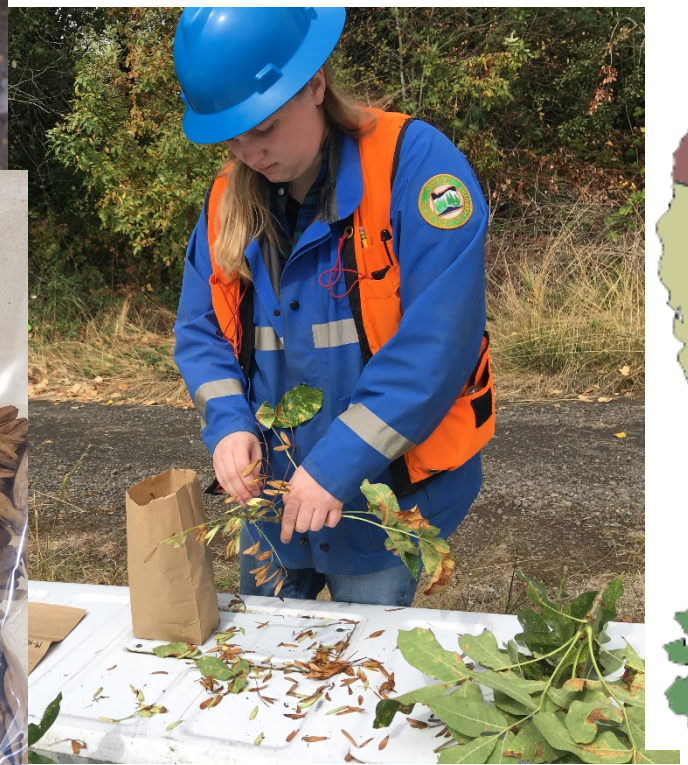
Oregon Ash – a widespread and common tree in Oregon, California, and Washington.

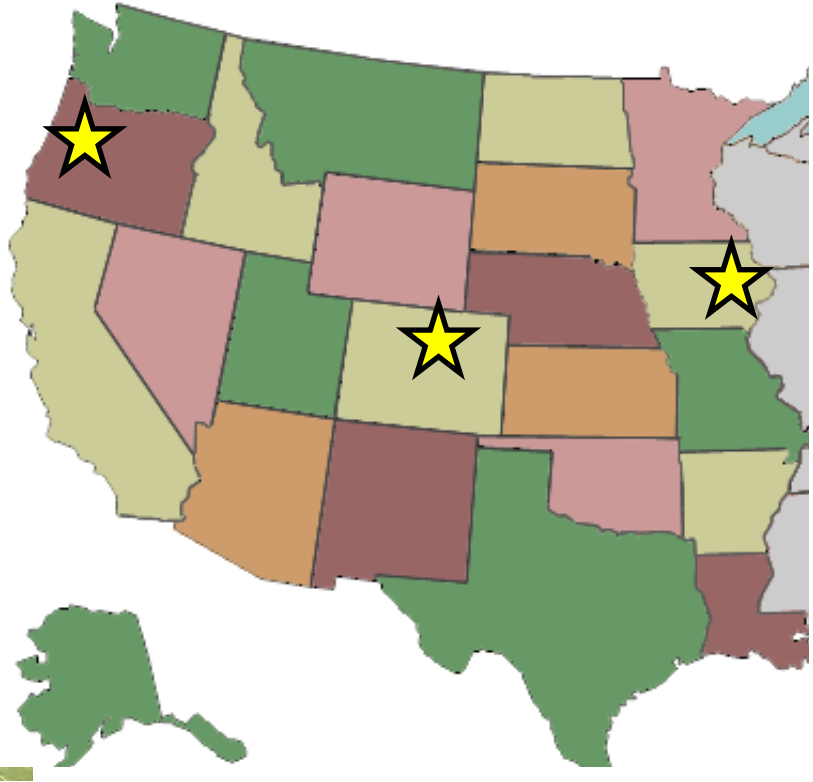
Oregon ash in riparian area

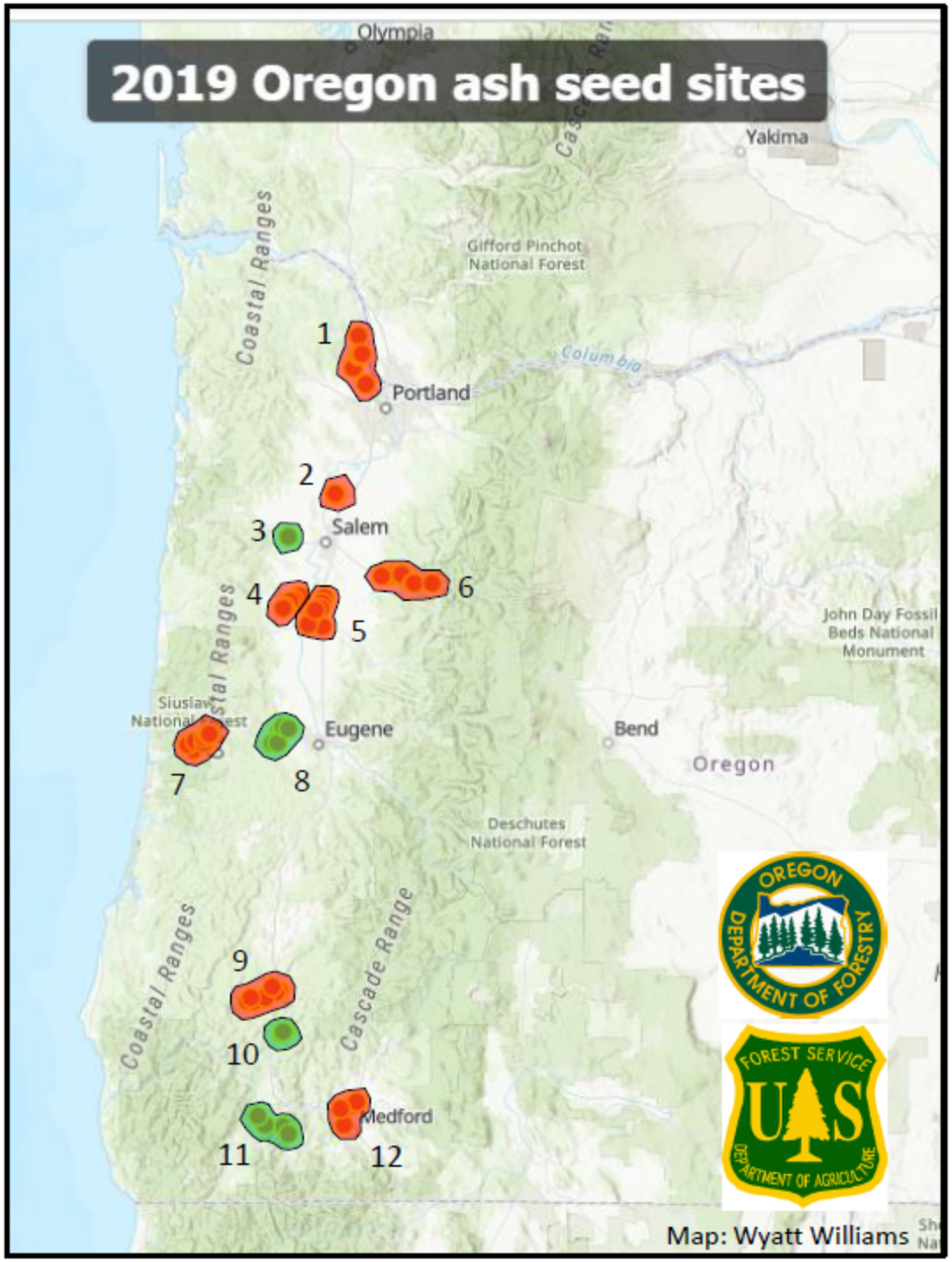

Private Forest Program
Forest Health
Emerald Ash Borer Risk Map
N
EAB Risk
Very High
High
Medium
Low
Counties
OCHOCO MOUNTAINS
OREGON
BLUE MOUNTAINS
GREAT SANDY DESERT
HARNEY BASIN
Burns
Hines
Miles
0 10 20 40 60 80
Date: May 2018

Ash seed for conservation & research

1. USFS Dorena Genetic Resource Center, Cottage Grove, OR
2. National Center for Genetic Resource Preservation, Fort Collins, CO
3. USDA-ARS National Plant Germplasm System, Ames, IA







Legend

= complete

= partial

= mother tree

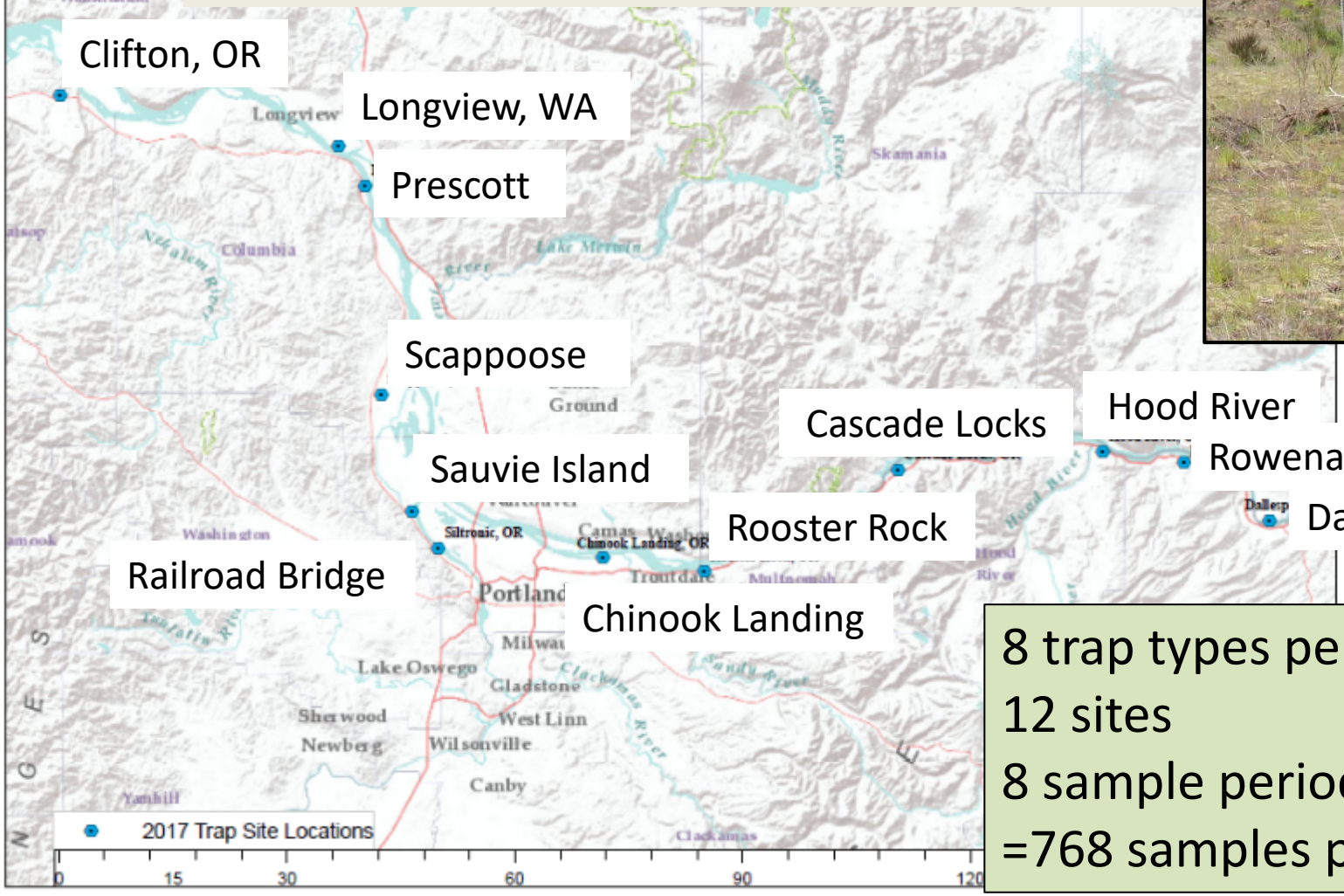
1. Sauvie Island – Columbia River
2. JE Schroeder Seed Orchard
3. Baskett Slough Wildlife Refuge
4. OSU Soap Cr. – EE Wilson WA
5. Albany – interstate sloughs
6. North Santiam River
7. Siuslaw River – Mapelton
8. Fern Ridge Lake
9. Cow Creek – Riddle
10. South Cow Creek
11. Applegate River
12. Rogue River – JH Stone Nursery

2019 collection summary:
343,00 seeds from 103 mother trees across 12 populations

2019-2020 project goal:
1 million seeds from 300 mother trees across 30 populations

2016-2018 early detection survey

4 new exotic species detected



8 trap types per site
12 sites
8 sample periods, Apr-Sept
=768 samples per year

New exotic species #1

Longview, WA; June 15, 2017 (one specimen)
Native to eastern North America
First record on west Coast
Hosts: Oak, chestnut

Chrysobothris rugosiceps
(Cerambycidae)


J. Basham

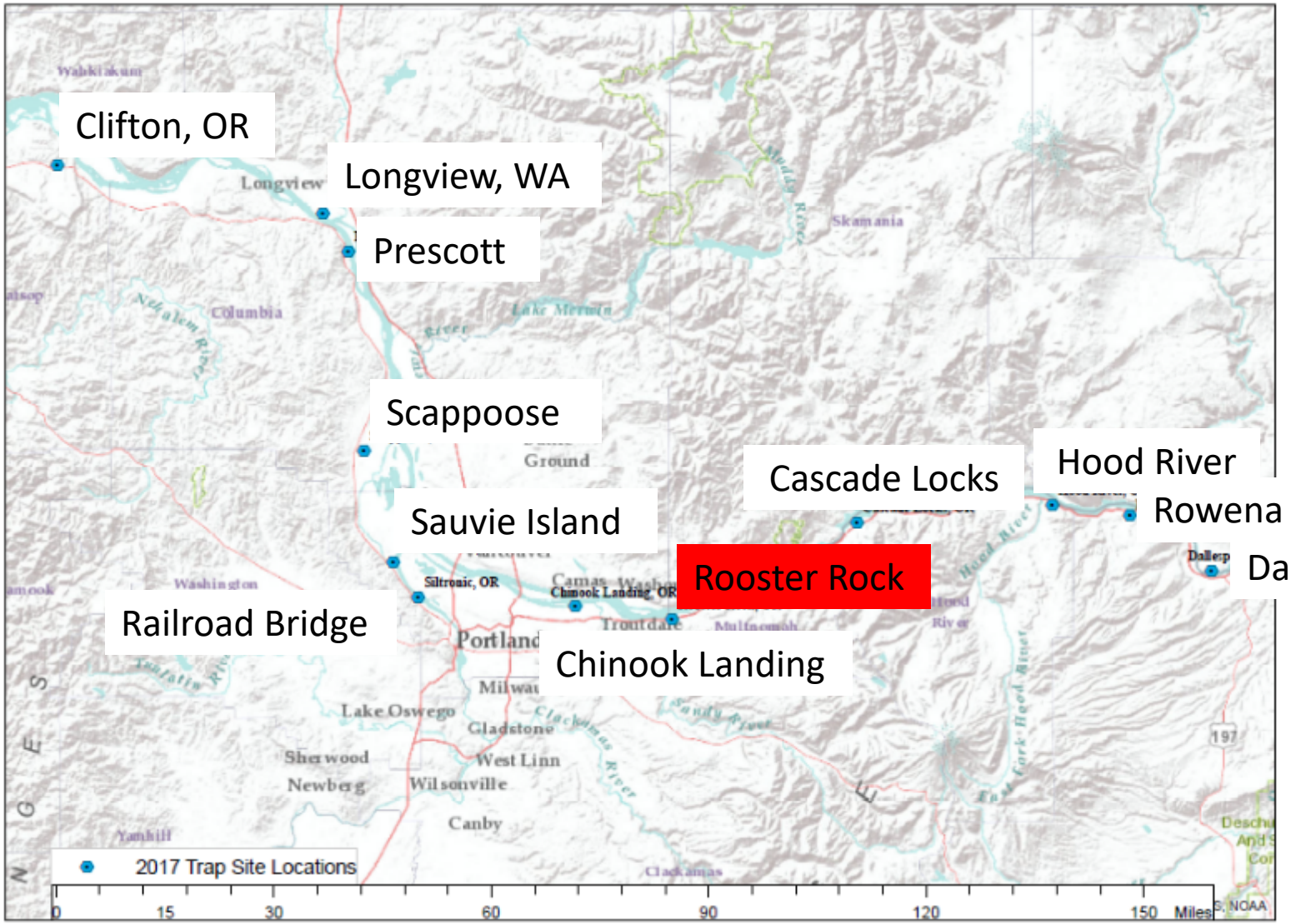
New exotic species #2

Rooster Rock; 2017 and 2018 (over 50 individuals)
Native to Asia
First record in western North America
Hosts: Alder, maple, oak, chinkapin

Cyclorhipidion pelliculosum
(Curculionidae: Scolytinae)

Pest and Diseases Images Library, Bugwood.org

New exotic species #2



Moving in firewood in NE U.S. since 1987.
Pest status unknown

Agricultural and Forest Entomology

Agricultural and Forest Entomology (2017), DOI: 10.1111/afe.12210

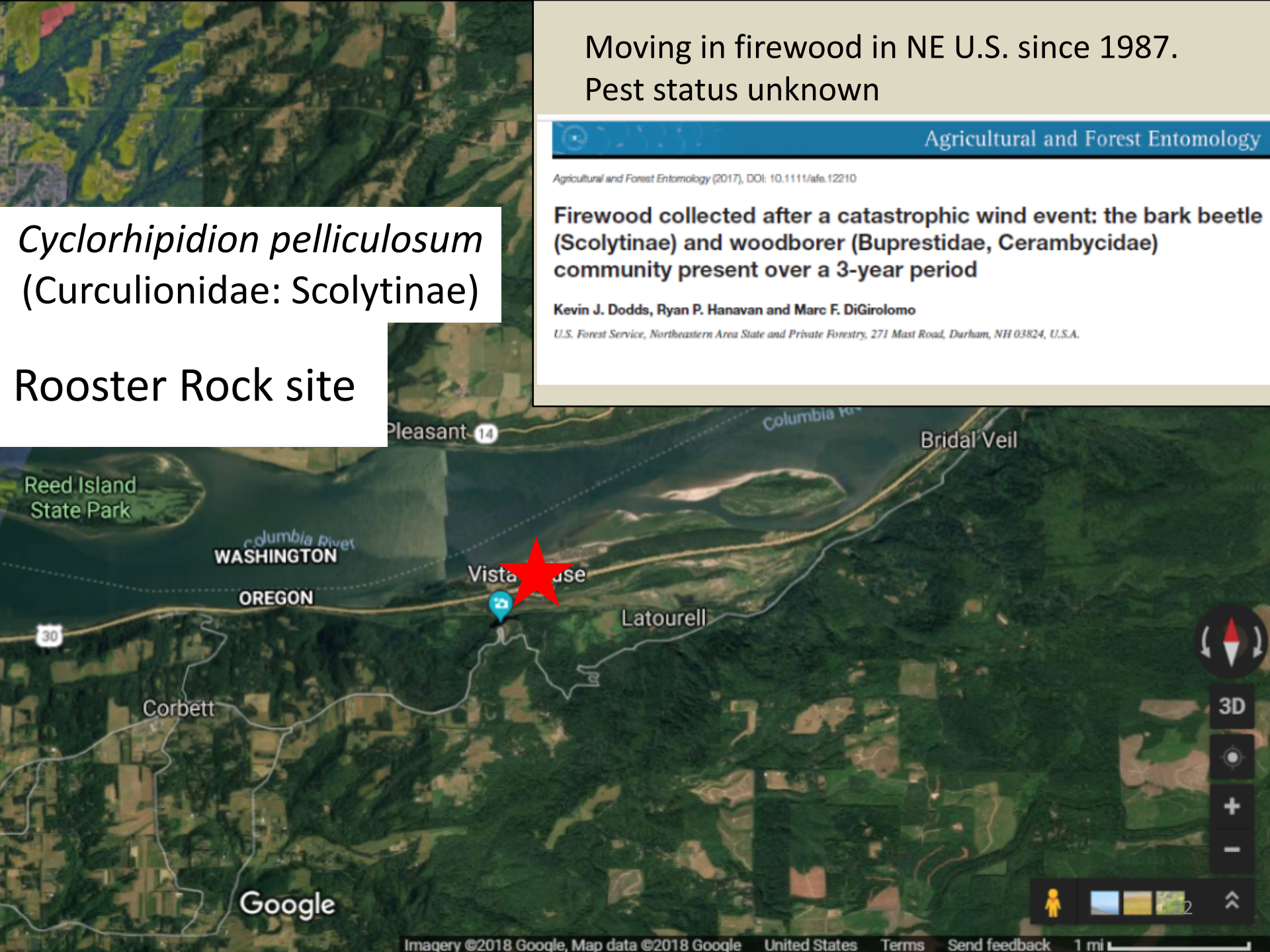
Firewood collected after a catastrophic wind event: the bark beetle (Scolytinae) and woodborer (Buprestidae, Cerambycidae) community present over a 3-year period

Kevin J. Dodds, Ryan P. Hanavan and Marc F. DiGirolomo

U.S. Forest Service, Northeastern Area State and Private Forestry, 271 Mast Road, Durham, NH 03824, U.S.A.

Cyclorhipidion pelliculosum
(Curculionidae: Scolytinae)

Rooster Rock site



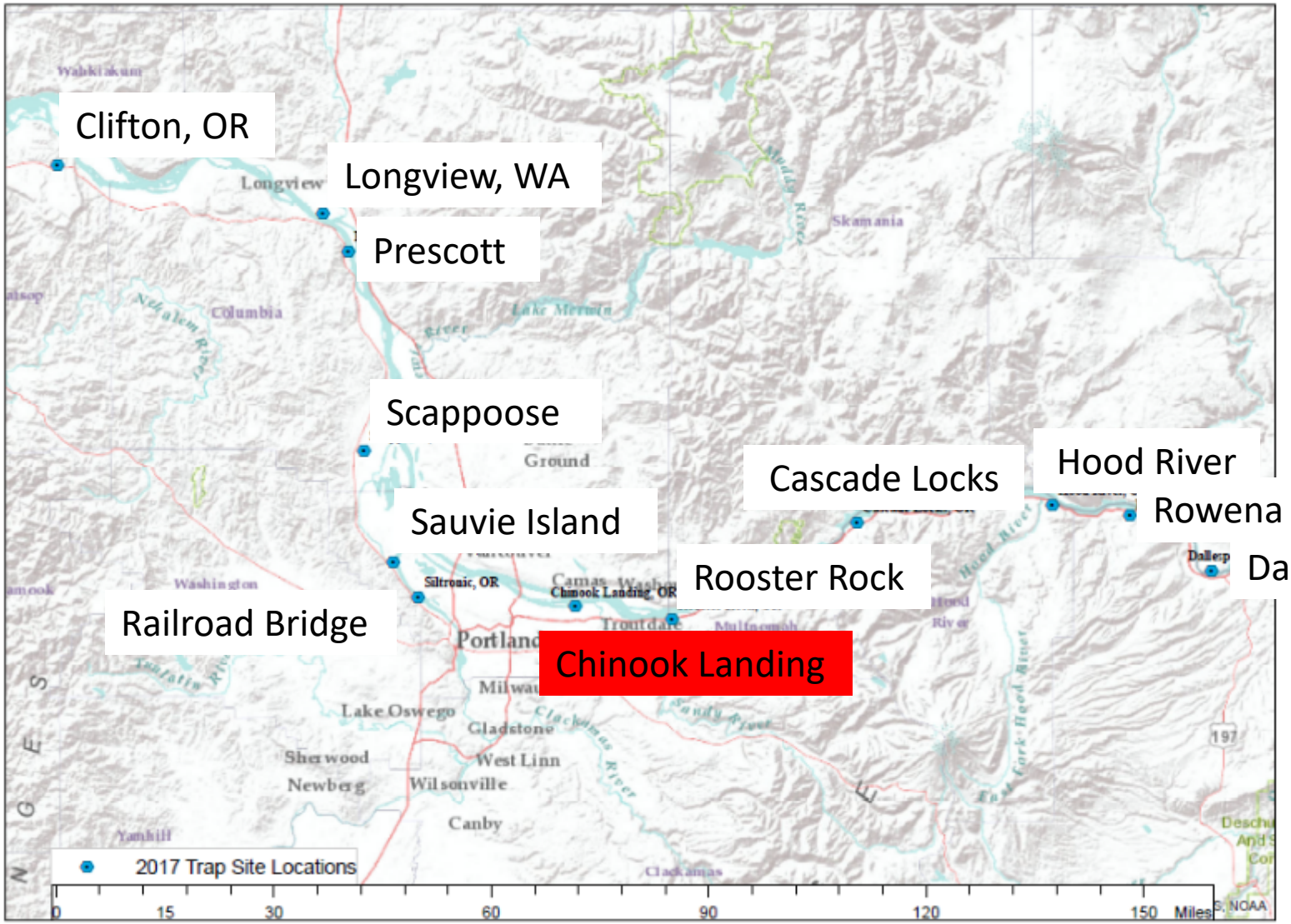
New exotic species #3

Chinook Landing; June 6, 2018 (1 specimen)
Native to Europe
First record in North America
Hosts: oak (and other hardwoods?)

Xyleborus monographus
(Curculionidae: Scolytinae)

Oregon Department of Agriculture

New exotic species #3



New exotic species #3

Chinook Landing site

New exotic species #3

Xyleborus monographus (Fabr.)

- Recently established, Napa Co.
- Associated with oak damage
- Vectors *Raffaela montetyi*
- =Oak pinhole borer,

  Platypus cylindrus

Mycological Progress
May 2004, Volume 3, Issue 2, pp 95–102 | Cite as

Identification of the ambrosia fungus of *Xyleborus monographus* and *X. dryographus* (Coleoptera: Curculionidae, Scolytinae)

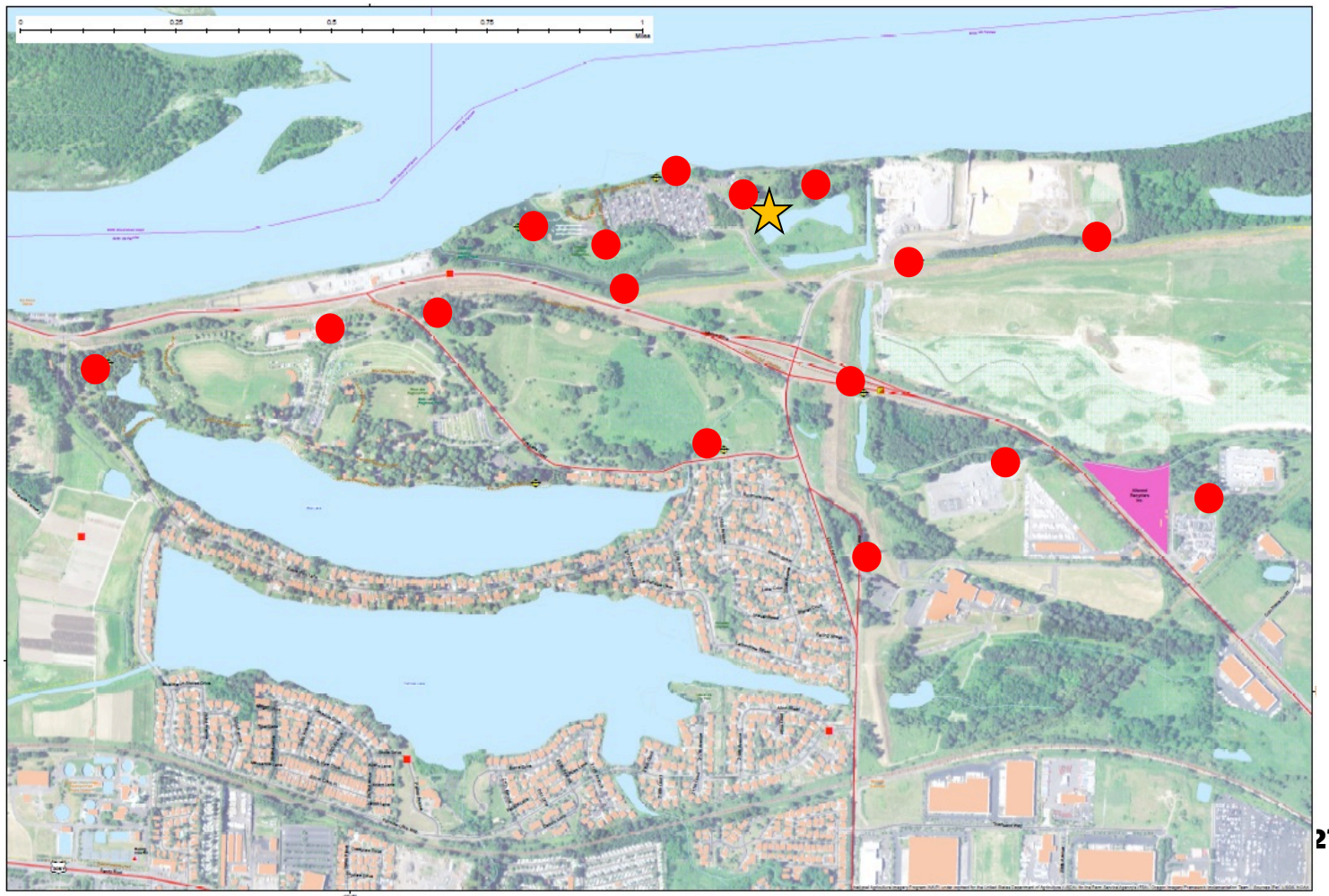
Authors Authors and affiliations

Heiko Gebhardt, Dominik Begerow, Franz Oberwinkler

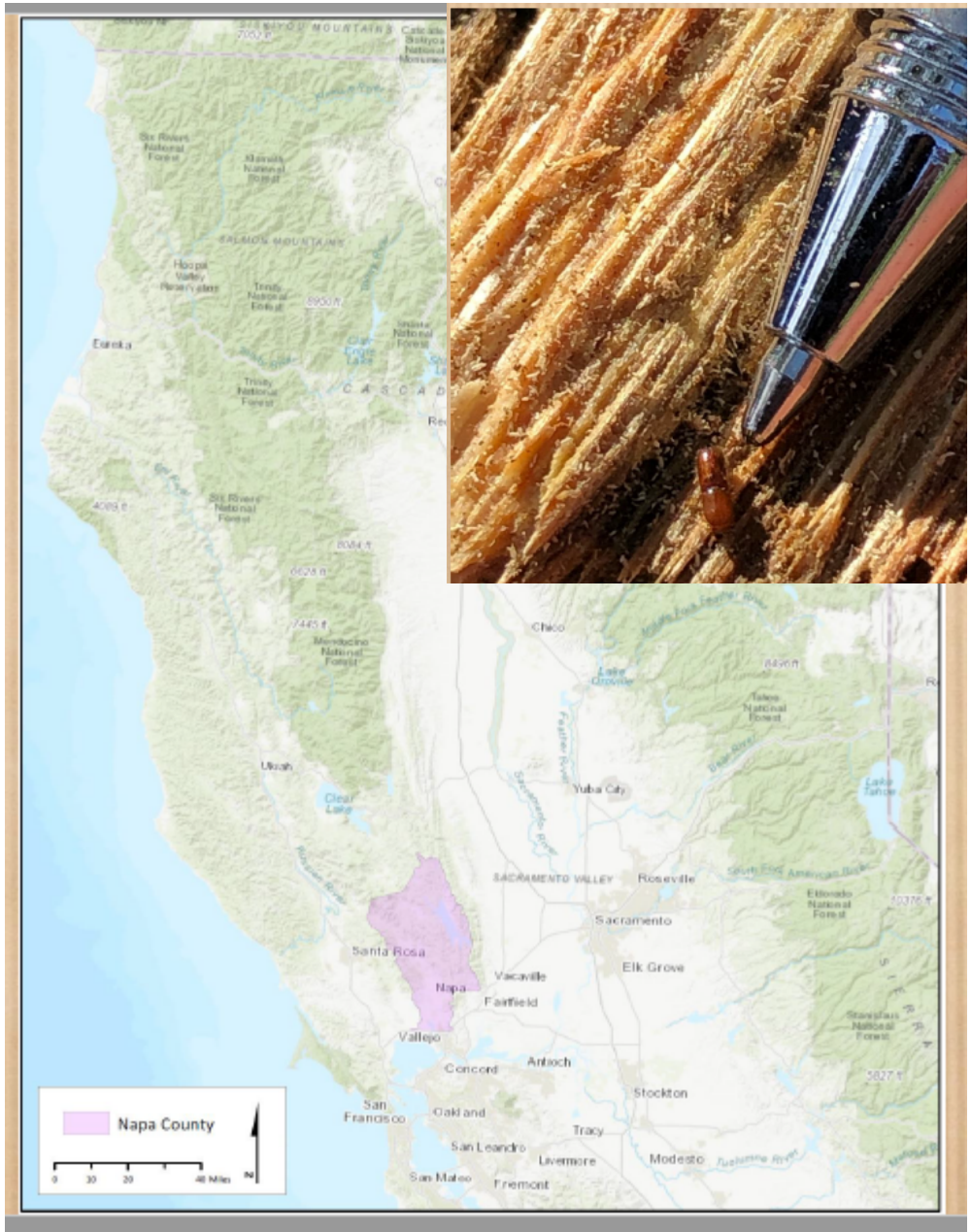
Oregon Department of Agriculture

New exotic species #3

2019 delimitation trapping (ODA)
→None were detected in 2019



Xyleborus monographus causing problems in CA



Xyleborus monographus causing problems in CA

Research underway to (1)identify fungal associates, (2)pathogenicity on white oak species, and (3) distribution of "California oak wilt" – Eskalen & Rizzo (UC-Davis)

Q. lobata (valley oak) distribution

Q. douglasii (blue oak) distribution

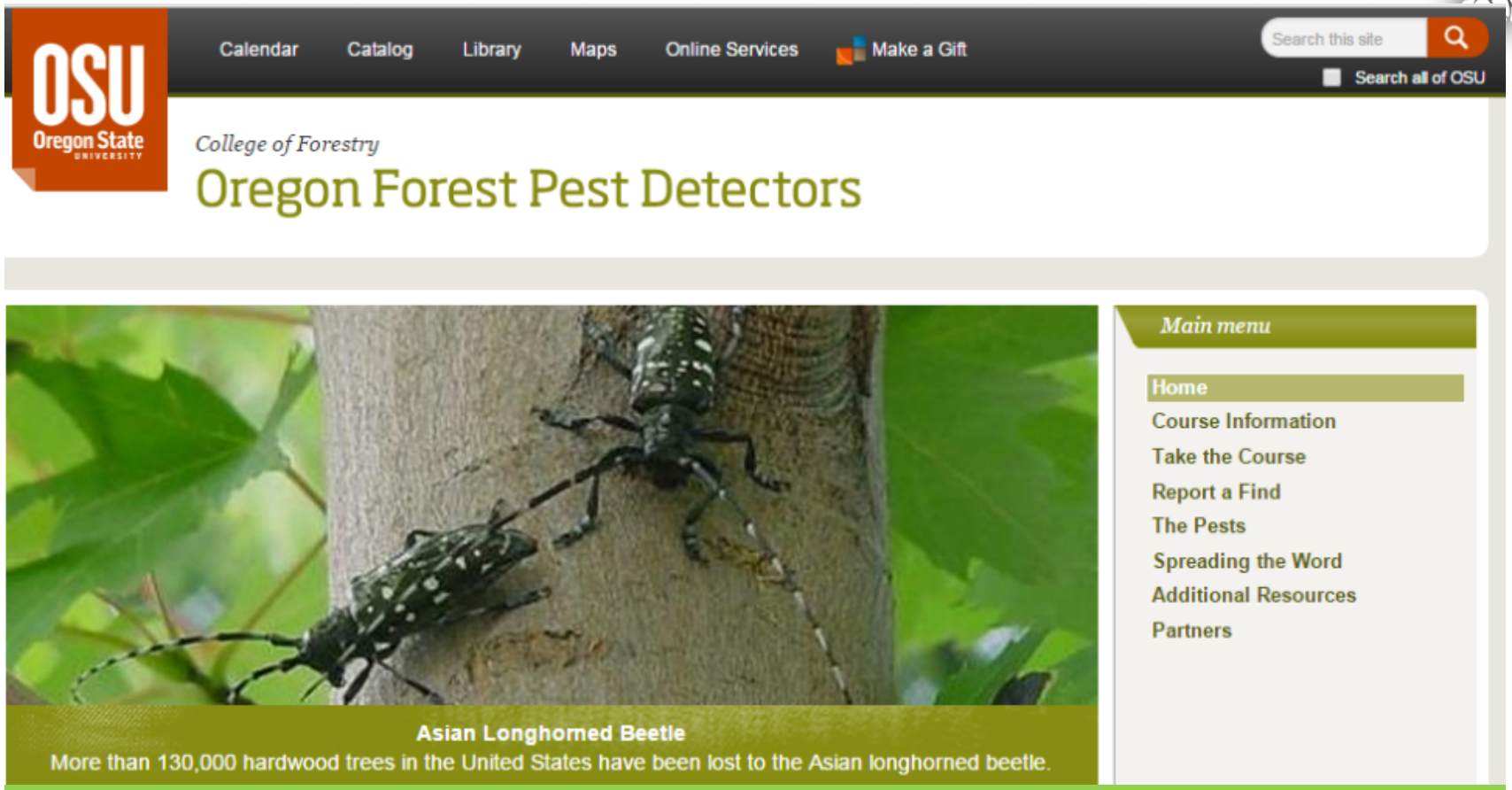
New exotic species #4

Scappoose Airport; May 16, 2018 (1 specimen)
Native to Eurasia
First record in Oregon
Hosts: several hardwood genera

Trypodendron domesticum
(Curculionidae: Scolytinae)

Oregon Department of Agriculture

Oregon Forest Pest Detectors



- Goal: Train <u>professionals</u> who work around trees how to identify key invasive forest pests
- Early detection = better chance of eradication or containment

OFPD leadership

Amy Grotta, 1970-2019
OFPD Project Leader

Brandy Saffell
Former OFPD Coordinator

http://blogs.oregonstate.edu/treetopics/2020/02/07/remembering-amy/

OFPD online course

1 hour total:

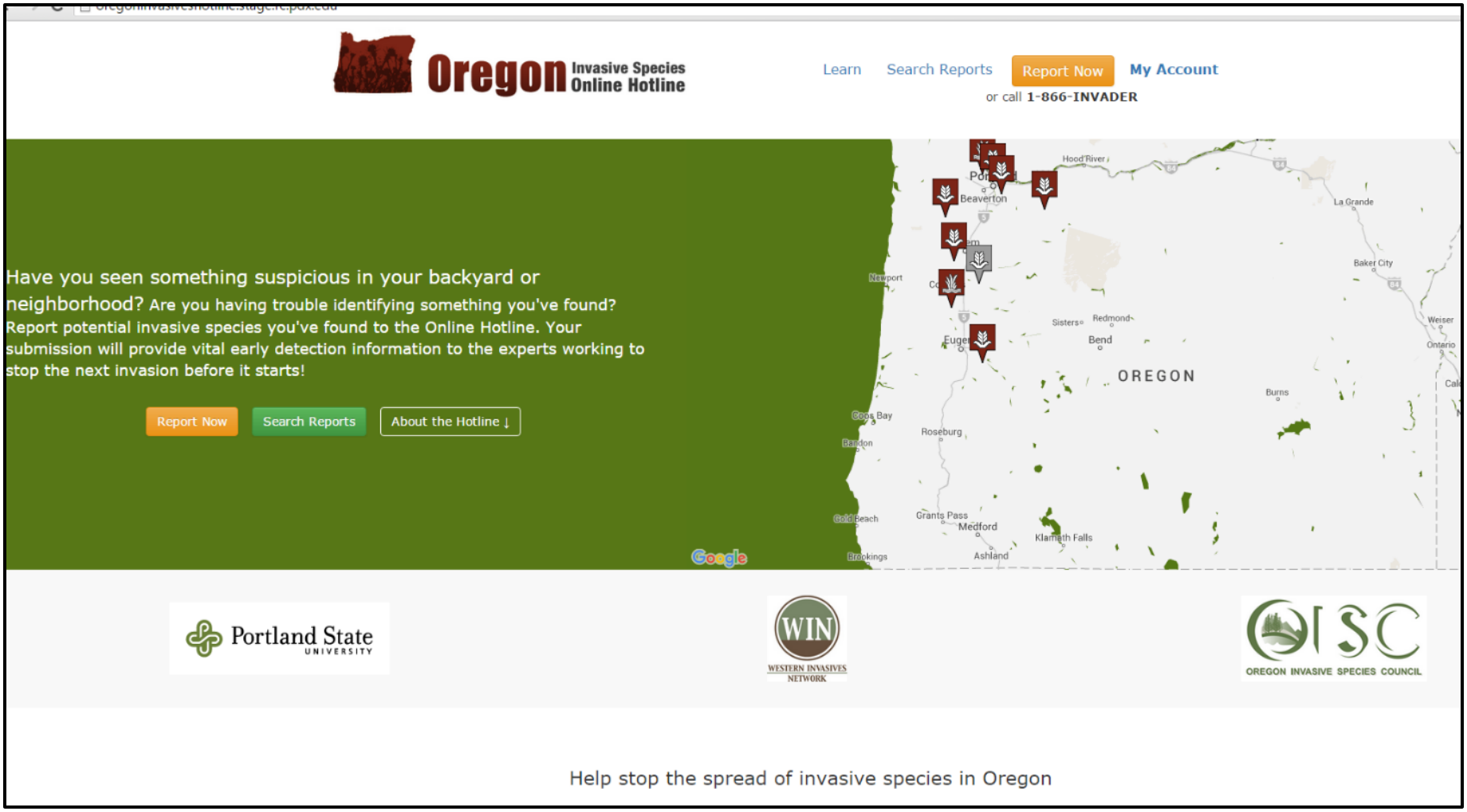
1. Invasive species overview (13 min)
2. Emerald Ash borer (22 min)
3. Asian Longhorn beetle (15 min)
4. How to report (8 min)

For more information or to take the free class,
http://pestdetector.forestry.oregonstate.edu/

Stats on the OFPD since 2015

Oregon Forest Pest Detectors	
# of students	552
# of workshops	35
# field courses installed	13
# counties impacted	20
# hotline reports	27

Oregon Forest Pest Detectors and the **Oregon Invasive Species Council** Hotline:

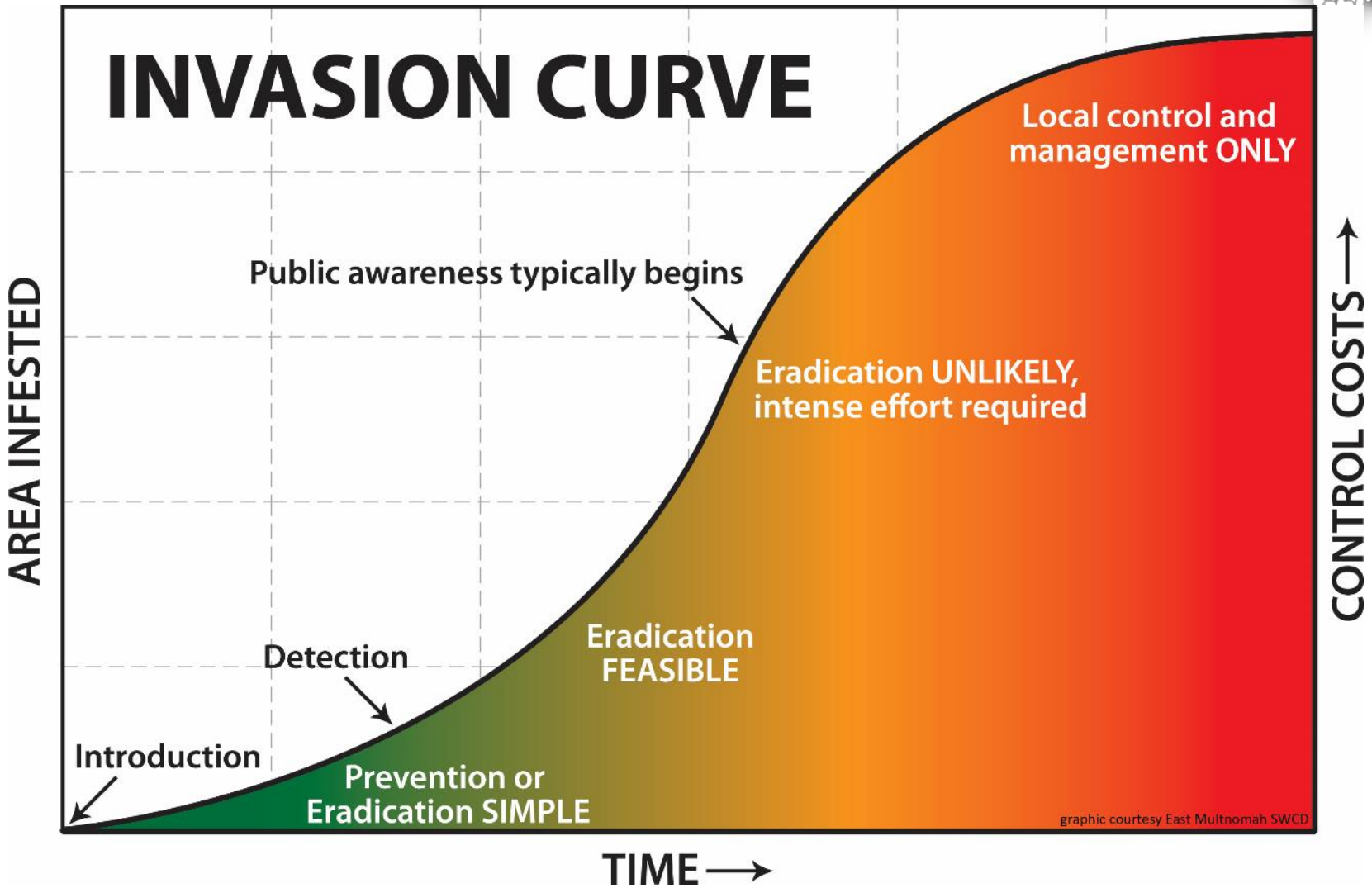


In 2019, Oregon Forest Pest Detectors report <u>new exotic species</u>! *Agrilus cyanescens*

Twinberry (*Lonicera involucrata*) with dieback

Agrilus cyanescens

Prevention & early detection are key



Thank you for listening!

Wyatt Williams
Invasive Species Specialist
Oregon Dept. of Forestry
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Detection/mitigation is part of a sound IPM strategy

Preventative
Quarantines
Weed laws
Education

Cultural
Seed banking
Planting timing
Mixed stands

Chemical
Pesticides

Other
Do nothing

Mechanical
Cutting
Fire
Flooding

Biological
Insects
Disease
Grazing

→ **IPM**

Extra slides

Forestry: <u>$5.2 billion GDP</u> in Oregon
Let's be ready for next invasive species

Paul Sauders

IPM and Oregon law

Chapter 634 Pesticide Control

634.650 (1) Definition of IPM:

"Integrated pest management" means a science-based decision-making process that (a) identifies and reduces risk from pests…(b)prevents unacceptable levels of pest damage…and poses the least possible risk to people, property, resources and the environment; and (c) focuses on the prevention of pests through a combination of techniques…

634.650 (2) Definition of Pest:

"Pest" means any animal, pathogen, plant, or similar organism which can cause disease or damage to crops, trees, shrubs, grasses, humans, animals or property.

Notorious invaders to Oregon's forests

White pine blister rust

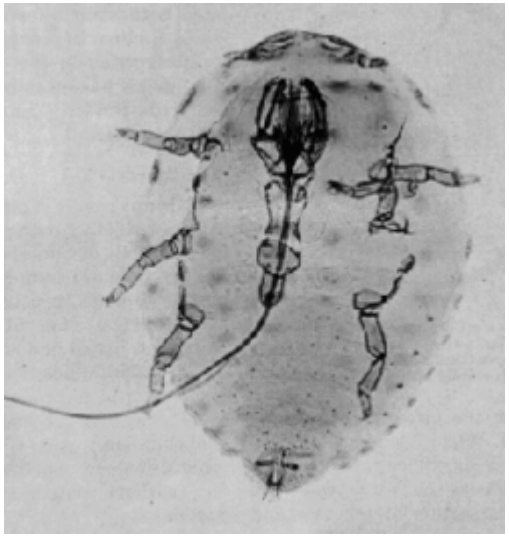
- Introduced **1910** in Oregon

Balsam woolly adelgid

- Introduced **1930** in Oregon

Port-Orford-cedar root disease

- Introduced **1952** in Oregon



Sudden oak death

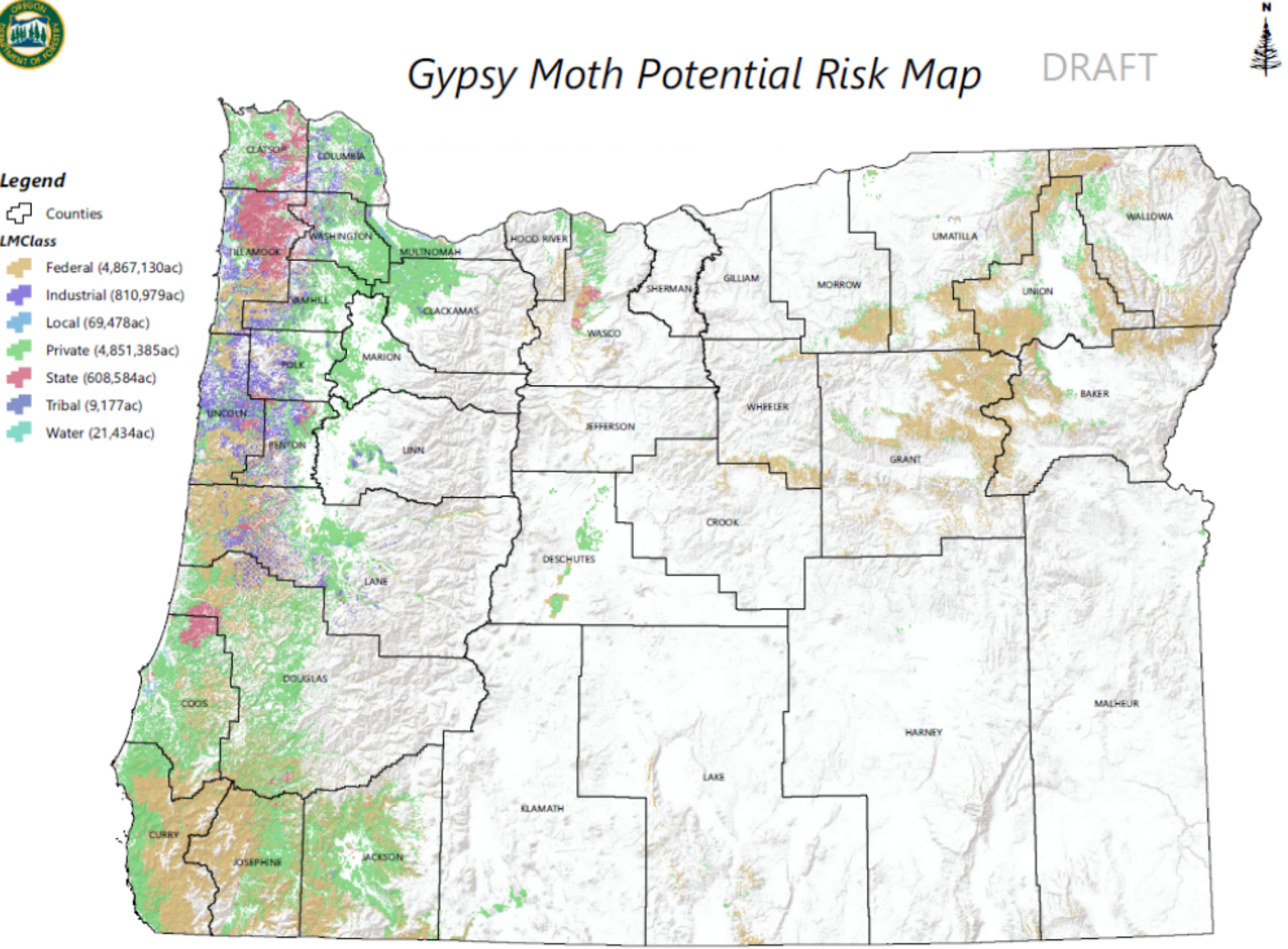
- Detected **2001** in Oregon

West side PNW exotic insect pests

Insect	Guild	Status	Hosts
BWA	Terminal	**Established in PNW**	True fir
Spruce aphid	Foliage	**Established in PNW**	Spruce
Gypsy moth	Foliage	**Detected & eradicated in PNW**	Oak, conifers
EAB	Wood borer	Rapidly spreading across U.S.; not in PNW	True ash
ALB	Wood borer	Isolated populations in eastern U.S.	Maple, others
GSOB	Wood borer	In California	Oak
PSHB	Ambrosia	In California	Hardwoods
Ambrosia beetles	Ambrosia	Rapidly spreading across U.S.	Wood, all types

Gypsy Moth Potential Risk Map

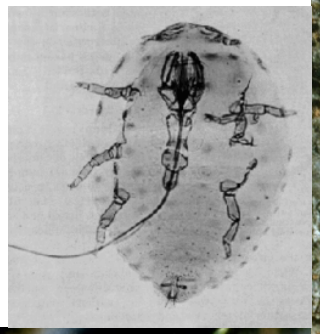
DRAFT



Planning for the inevitable

Oregon's Plan for EAB, released May 2018:
http://www.OregonEAB.info/

Balsam Woolly Adelgid (BWA)



- Introduced in OR in 1930
- Hosts in PNW: True firs
  - Subalpine fir
  - Pacific Silver fir
  - Grand fir
- Attacks buds, terminal branches
- Causes gouting, mortality

Ladd Livingston, Idaho Dept of Lands, Bugwood.org

Invasive woodborer survey

STDP project:

"Improving Early Detection of Exotic Invasive Wood Boring Insects at High Risk Areas in Oregon and Washington"

Proposal submitted:

FY2015

Total amount awarded:

$90,000

Field work:

2016-2018

Traps/lures

1. **UHR alpha-pinene, UHR ethanol** (Scolytinae: bark beetles)
2. **UHR ethanol** (Scolytinae: ambrosia beetles)
3. **Monochamus lure set** (Cerambycidae: *Monochamus* spp.)
   (alpha-pinene, Ipsenol, Ipsdienol, Monochamol, Ethanol)
4. **Exotic Ips lure set** (Scolytinae: Ips typographus)
   (2-methy-3-buten-2-ol, cis-verbenol, Ipsdienol)
5. **Oak pinhole lure set** (Curculionidae: Platypodinae: *Platypus cylindrus*) (leaf alchol, ethyl alcohol, sulcatol, sulcatone)
6. **Pine shoot beetle lure set** (Scolytinae: *Tomicus piniperda*)
   ((-) alpha-pinene, trans-verbenol, myrtenol)
7. **Control** (no lure)
8. **Green leaf volatiles** (Buprestidae) (Z-3-hexenol, Manuka oil)

Traps 1-7: black funnel; Trap 8: green funnel

2016-2017 Results – species richness

	Native	Exotic	Total	% total
Buprestidae	26	3	29	14.9
Cerambycidae	83	4	87	44.8
Platypodinae	1	0	1	0.5
Scolytinae	55	15	70	36.1
Siricidae	5	1	6	3.1
Xiphydriidae	0	1	1	0.5
Totals	170	24	194	--
% total	87.6	12.4	--	--

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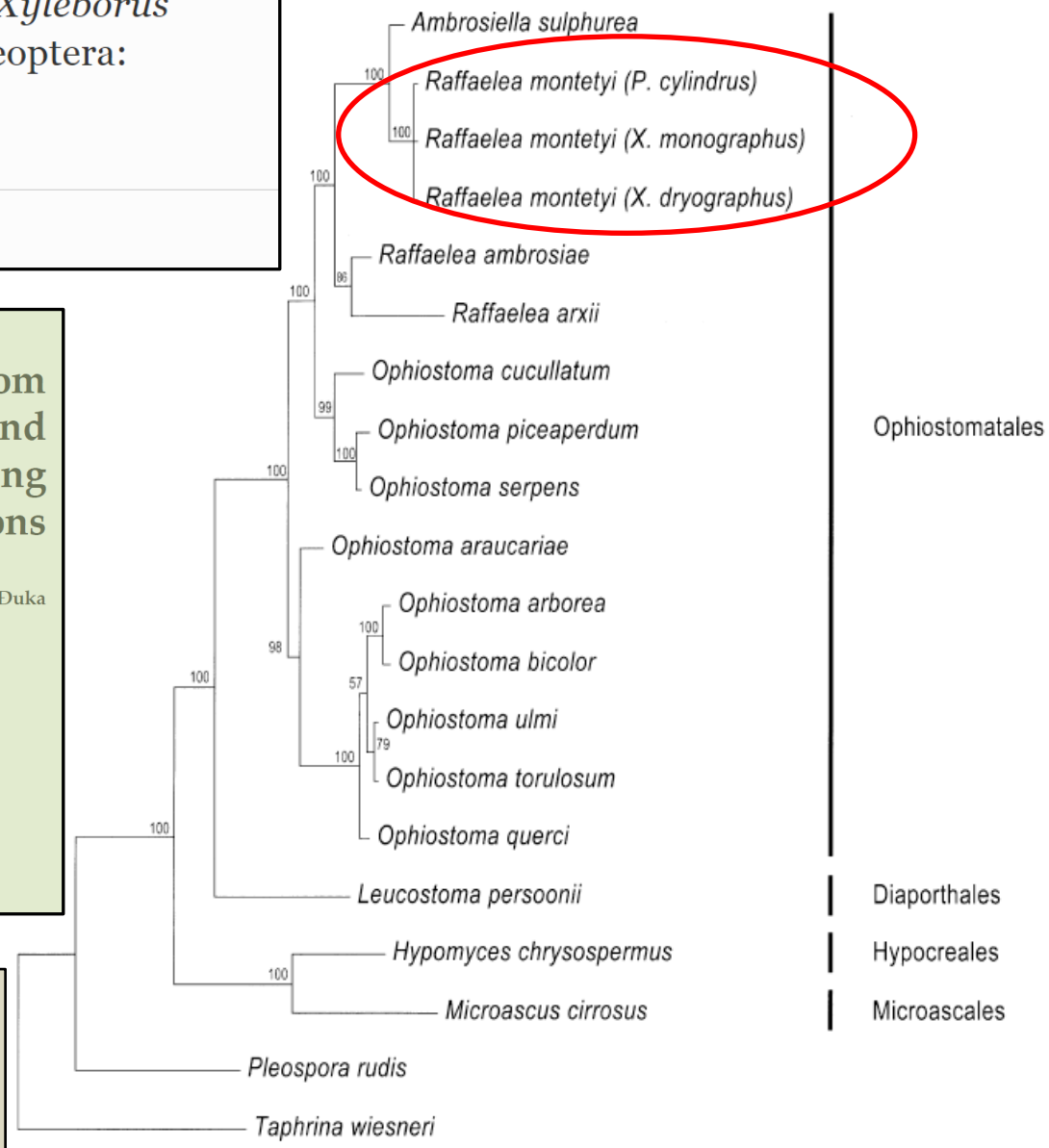
Integrated Oak Timber Protection from Ambrosia Bark Beetles: Economic and Ecological Importance in Harvesting Operations

Milivoj Franjević, Tomislav Poršinsky, Andreja Đuka

"*Xyleborus dispar, Xyleborus monographus, Xyleborus saxesenii*…cause damage to oak roundwood" in Croatia.

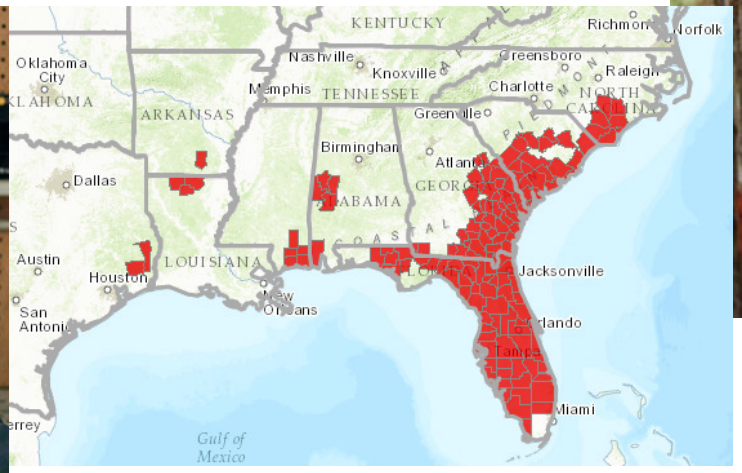


Xyleborus monographus:
Potential hardwood pest?

Laurel Wilt (*Raffaela lauricola)*

- Another exotic *Raffaela*…
- Vectored by ambrosia beetle…
- First detected, 2002, GA

Ron Billings



Ambrosia beetles

Fungus farmers

Sometimes the fungus is pathogenic