Emerald Ash Borer: Managing a New Threat in the PNW

Oregon Department of Forestry
Urban & Community Forestry Assistance Program

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Emerald Ash Borer (EAB)

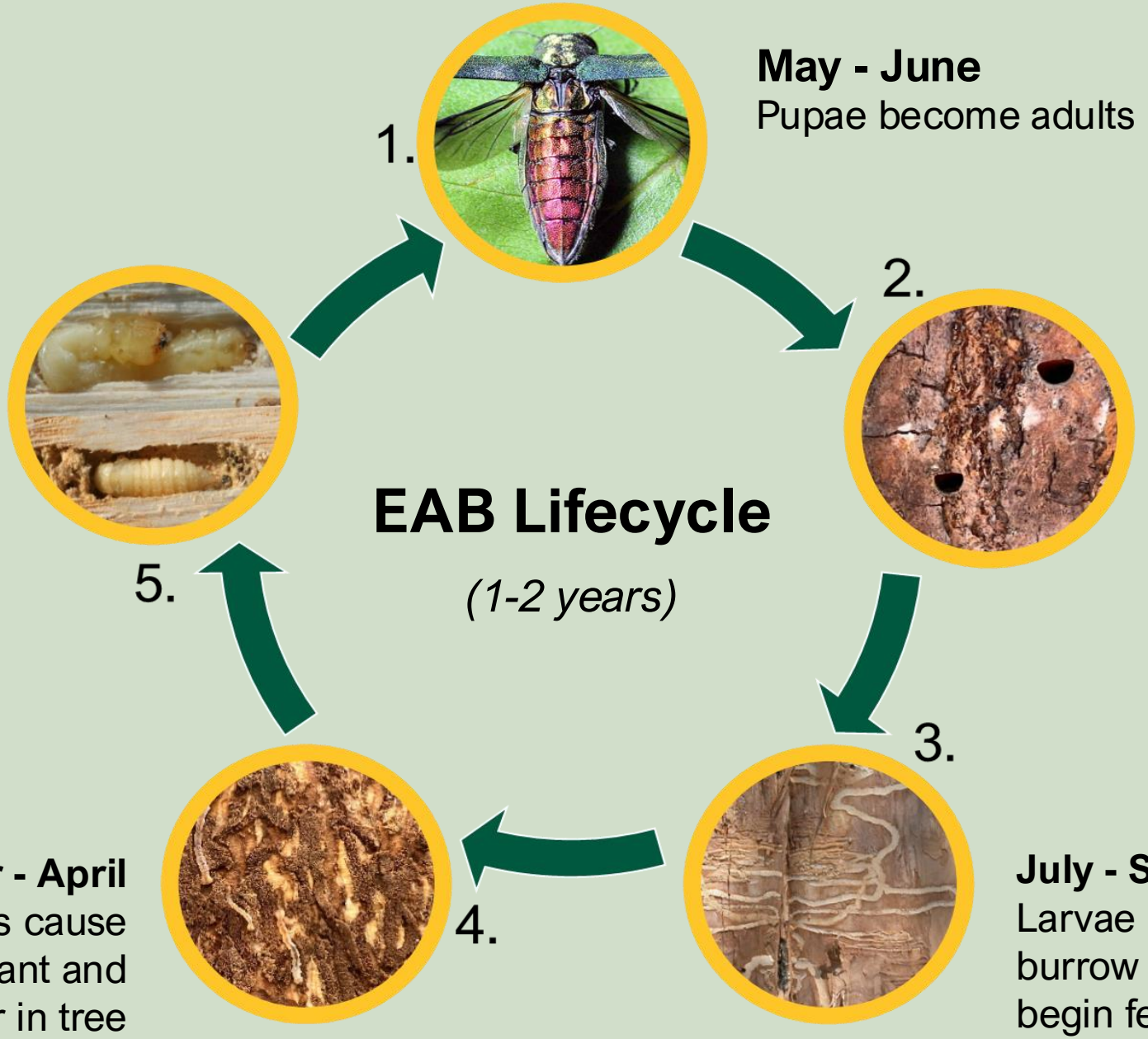
Agrilus planipennis

Invasive and highly destructive woodboring beetle that kills ash trees (*Fraxinus* spp.).

Larvae feed beneath bark, eventually girdling and killing the tree

100+ million trees killed since 1990s, highest cost forest pest in the Americas

EAB Lifecycle



May - June
Pupae become adults

June - August
Adults emerge, mate, lay eggs on bark, and die within 6 weeks

July - September
Larvae hatch and burrow under bark to begin feeding

October - April
Cool temperatures cause larvae to go dormant and overwinter in tree

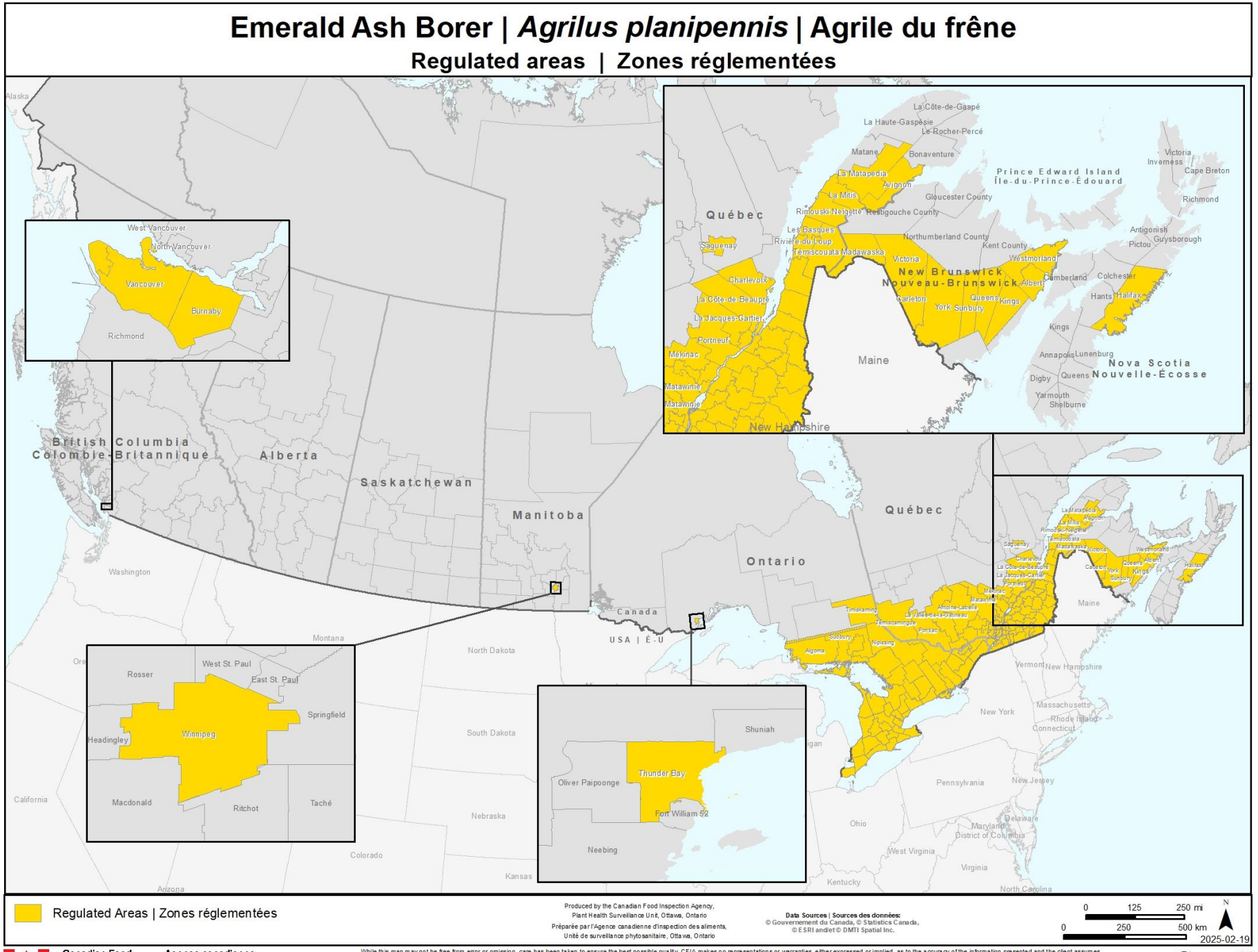
May
Larval lifecycle complete, EAB go deeper into wood for final metamorphosis

United States Detections

- **2002**: Detroit, MI
- **2012**: 16 states with known infestations
- **2013**: Colorado
- **2022**: Oregon

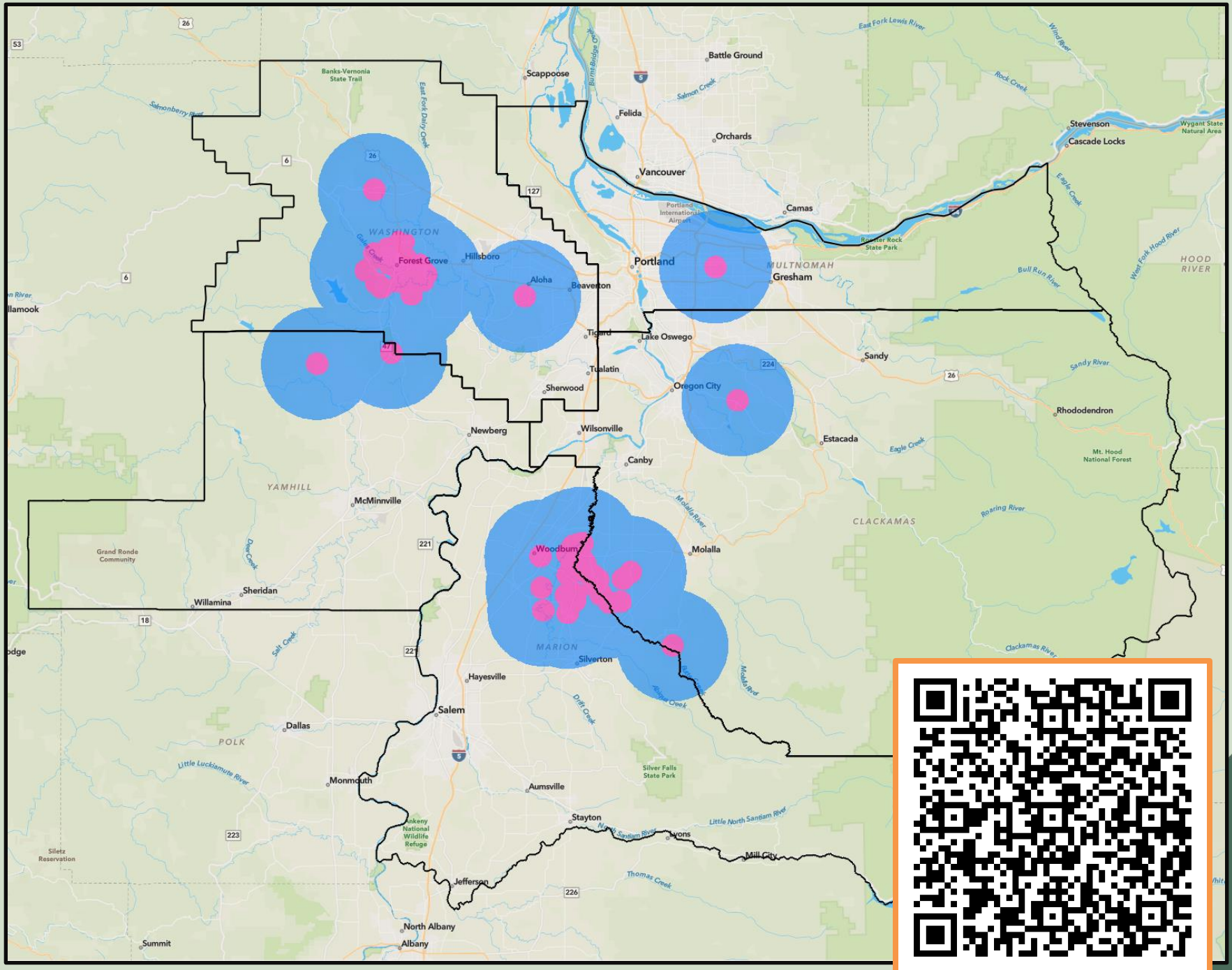
Canadian Detections

- 2002: Ontario
- 2008: Quebec
- 2017: Winnipeg, Manitoba
- 2018: New-Brunswick and Halifax, Nova-Scotia
- 2024: Vancouver, British-Colombia



EAB in Oregon

- 5 infested counties
  - Washington
  - Yamhill
  - Clackamas
  - Marion
  - **Multnomah**
- 9 new positive traps
  - 6 satellite populations
  - Expansion around Butte Creek and Forest Grove
- 9 new positive hotline reports
- Detected in Vancouver, BC 2024

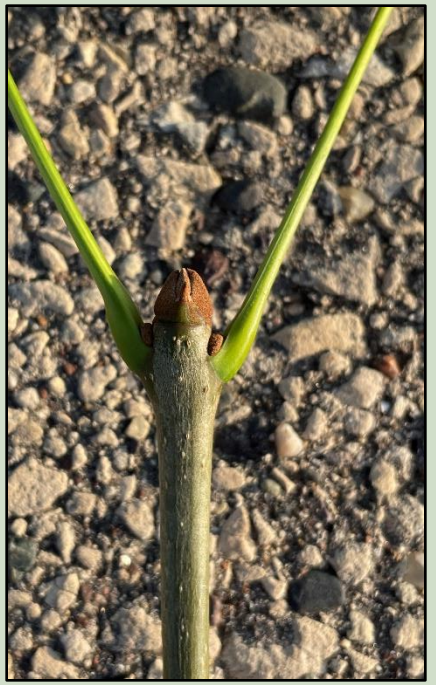


Ash in Oregon: Identification

Furrowed Gray Bark

Fuzzy, Brown & Pointy Buds

Pinnately Compound Leaves



Opposite Branching

Single-Wing Samaras

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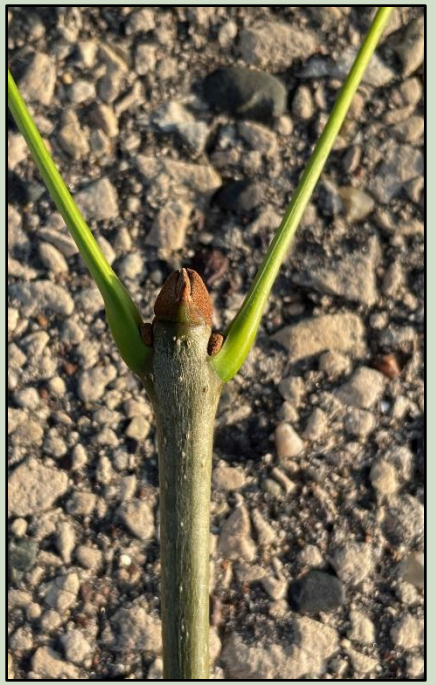

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Single-Wing Samaras

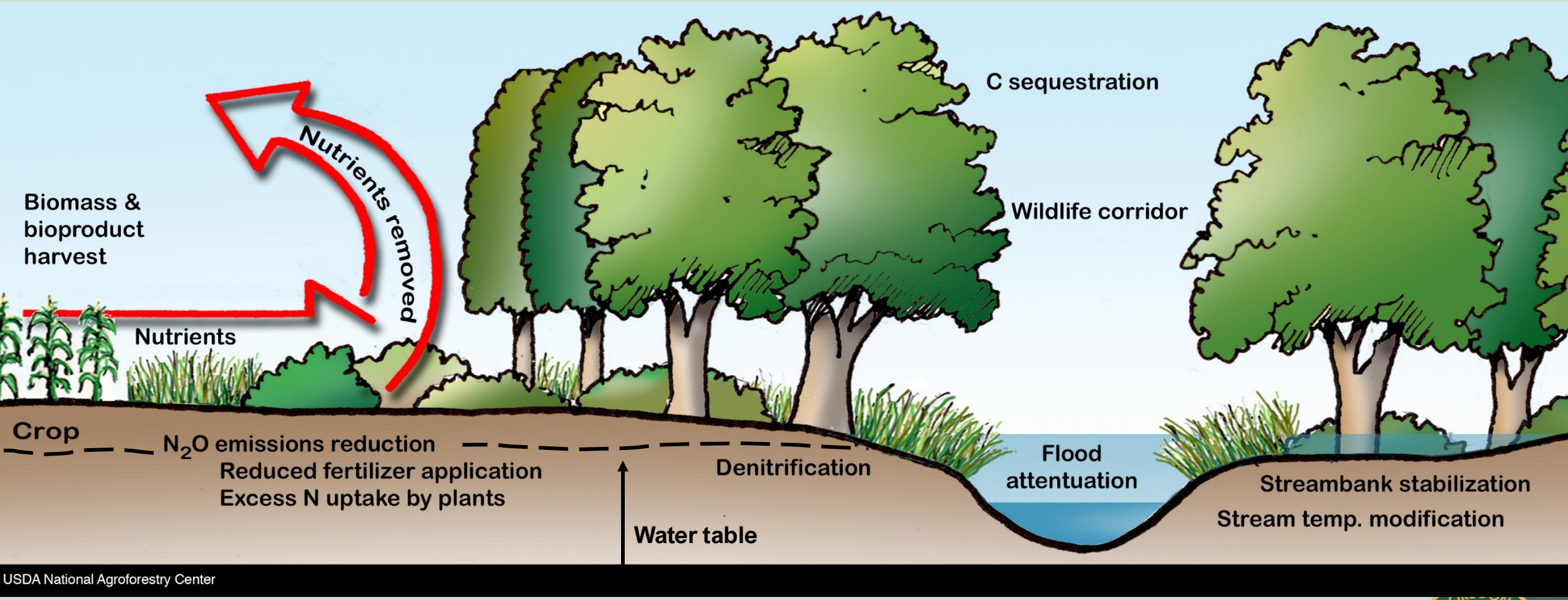
Ash in Oregon: How to ID

Ash in Riparian Corridors

<u>Oregon Ash</u> *(Fraxinus latifolia):*
Oregon's only native ash tree

- Important riparian and wetland tree
- Fragmented and altered landscape
- Critical habitat for threatened and endangered species
- Important cultural resource to Indigenous peoples

Ecological impacts: Ecosystems of Riparian Areas



USDA National Agroforestry Center

Ecological Impacts: Threatened and Endangered Species

Table 1. Oregon threatened and endangered species that will likely be impacted by widespread Oregon ash mortality caused by EAB.

Common Name	Scientific Name	State Status	Federal Status	Potential Impact of EAB
Columbian White-tailed Deer (Lower Columbia River population only)	*Odocoileus virginianus leucurus*		T	Some
Lower Columbia River Chinook Salmon	*Oncorhynchus tshawytscha*		T	Some
Lower Columbia River Coho Salmon	*Oncorhynchus kisutch*		T	High
Lower Columbia River Steelhead	*Oncorhynchus mykiss*	E*	T	Some
Oregon Coast Coho Salmon	*Oncorhynchus kisutch*		T	Some
Southern Oregon Coho Salmon	*Oncorhynchus kisutch*		T	Some
Upper Willamette River Chinook Salmon	*Oncorhynchus tshawytscha*		T	High
Upper Willamette River Steelhead	*Oncorhynchus mykiss*		T	High
Nelson's checkermallow	*Sidalcea nelsoniana*	T**		High
Peacock larkspur	*Delphinium pavonaceum*	E**	E	Some
Bradshaw's desert parsley	*Lomatium bradshawii*	E**	E	Some

* *Listed under the Oregon Endangered Species Act (ORS 496.171 through 496.192)*
** *Listed under Oregon endangered, threatened and candidate plants (OAR 603-073)*
+ *U.S. Endangered Species Act of 1973 (Public Law 93-205, 16 U.S.C. § 1531)*

Ecological impacts: On the ground

Wyatt Williams, ODF

Anacosta Watershed Society

Management Actions

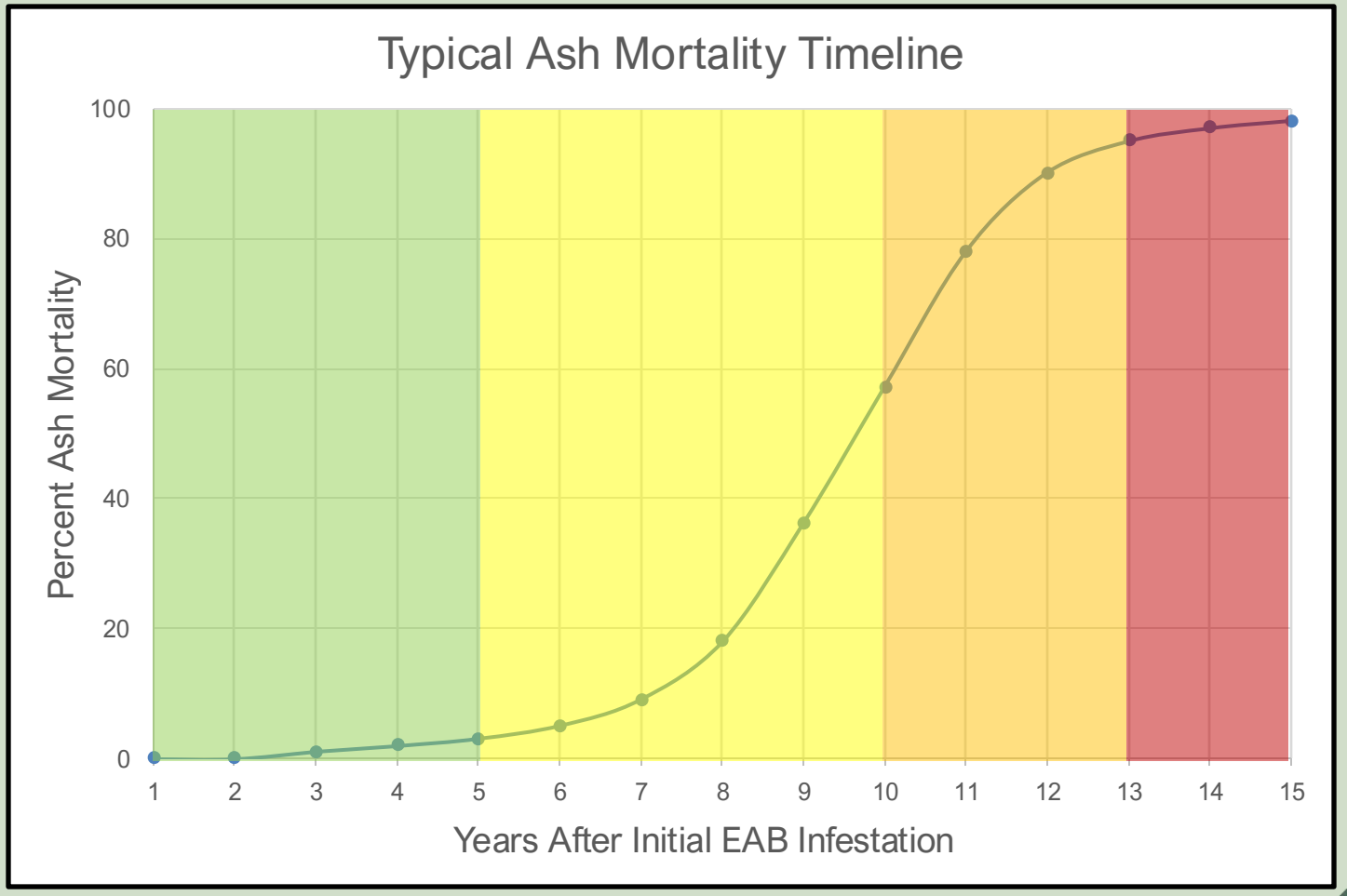
Objectives:

- Assessing impact to your property
- Management action thresholds
- Timing of treatment
- Other considerations

Management Action Threshold

- Balancing Act
  - Spending too much money managing too early

  vs
  - Waiting too long and losing trees and ecosystem functions
- Issues/Considerations
  - How will you find out if EAB is discovered in your area?
  - EAB can have rapid jumps
  - Never too early to be prepared



Developing a Response Plan

Ready
25+ miles

- Learn about EAB impacts
- Find out where your ash are
- Talk to your Forestry Steward about FPA considerations

Set
10-25 miles

- Join and build out local networks
- Begin proactive management actions
- Plug into EAB news for updates on new detections

Go
5-10 miles

- Continue management actions
- File relevant harvest plans with ODF
- Check for conflicts with quarantine

Management Plan

Remove & Replace

- Begin as soon as possible
- Increased demand for landscaped and natural plant species
- Replace small and lower quality trees

Treatment

- Begin when EAB is within 10-15 miles
- Licensed pesticide applicator
- Application window and timing (2-3 years)

Do nothing

- Long term, this will have the highest cost
- In natural areas: heat and invasives increase
- Anticipate water impacts

Selective Removals

Removal strategies

- Trees near infrastructure
  - Homes, barns, and bridges
- Selective thinning to open canopy
  - Increase survival of shade intolerant species
- Create habitat
  - Snags
  - Large woody debris piles for wildlife

Replant

- Underplant with desirable replacements
  - What currently grows at the site?
- Habitat type may change
  - Restoration, conversion or reversion to shrubland or wetland prairie
  - Reach out to your local SWCD or OSU Extension agent

Kral and Shaw | OSU

Replanting: Species choices

- Garry oak
- Western crabapple
- Chokecherry
- Piper willow
- White alder
- Ponderosa pines

Tree species associated with ash, clay soils

- Black cottonwood
- Quaking aspen
- Douglas-fir
- Scouler willow
- Bitter cherry
- Cascara buckthorn

Tree species associated with ash, clay intolerant

- Incense cedar
- California Black oak
- Coastal redwood
- Dawn redwood
- Oregon myrtle

Species for heat adaption trials

Pollinator friendly species

Adapted from Kral and Shaw, 2023 and Hull, 2024

Treatment

Up to 95% effective, depending on treatment type and proper application

Which trees

- Healthy (>70% canopy)
- Medium to large diameter trees
- Prioritize significant trees

When

- Frequency depends on which insecticide and method you use

Cost

- Depends on contractor rate or if you are a licensed pesticide applicator

Oregon Dept of Forestry

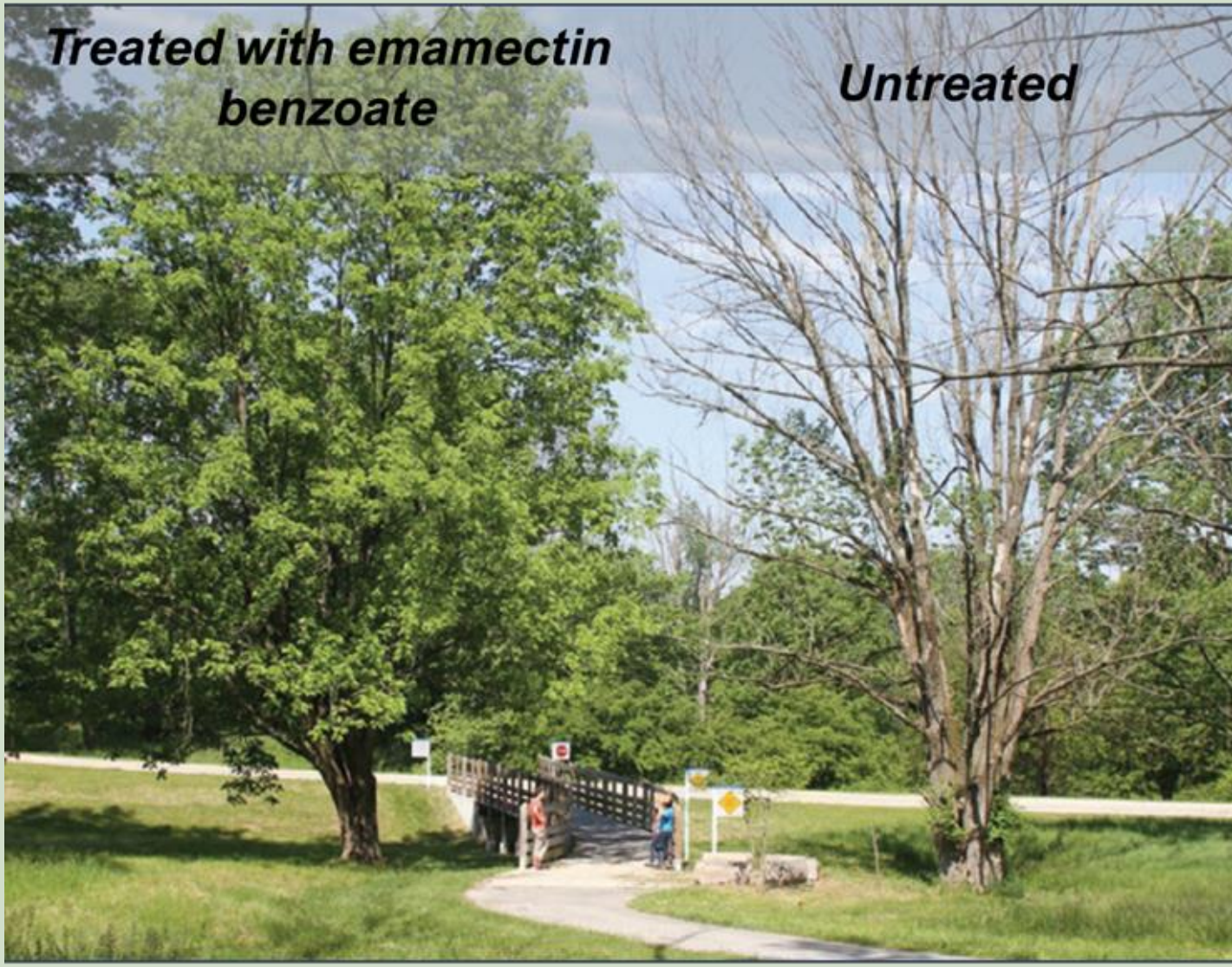
Treatment method: Systemic trunk injection

Emamectin benzoate

- Emerged as the researcher's choice
- Targets all EAB life stages
- EAB mortality: Excellent
- Non-target effects: Low

- Application method & frequency:
  - Systemic trunk injection
  - Once a year every 2-3 years
  - Low volume

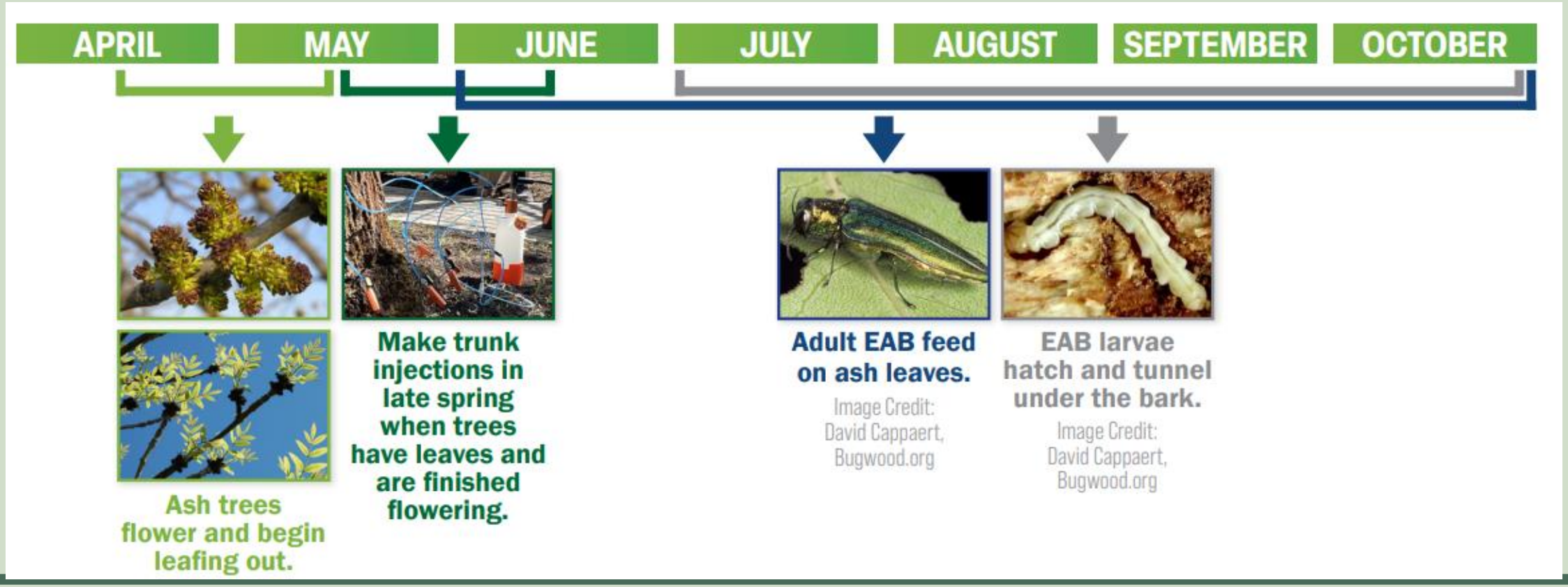
- Should be administered by ***a licensed pesticide applicator*** trained on trunk injection system



Sadof et al., 2023

Treatment: Timing and Action Thresholds

- Timing
  - EAB has been detected within 10-25 miles
  - Treat after leaf-out, but before high heat or winter dormancy
  - May and June are the most effective months to treat
- Tree Health: > 70% canopy
  - Infested trees can be treated if healthy



Do Nothing

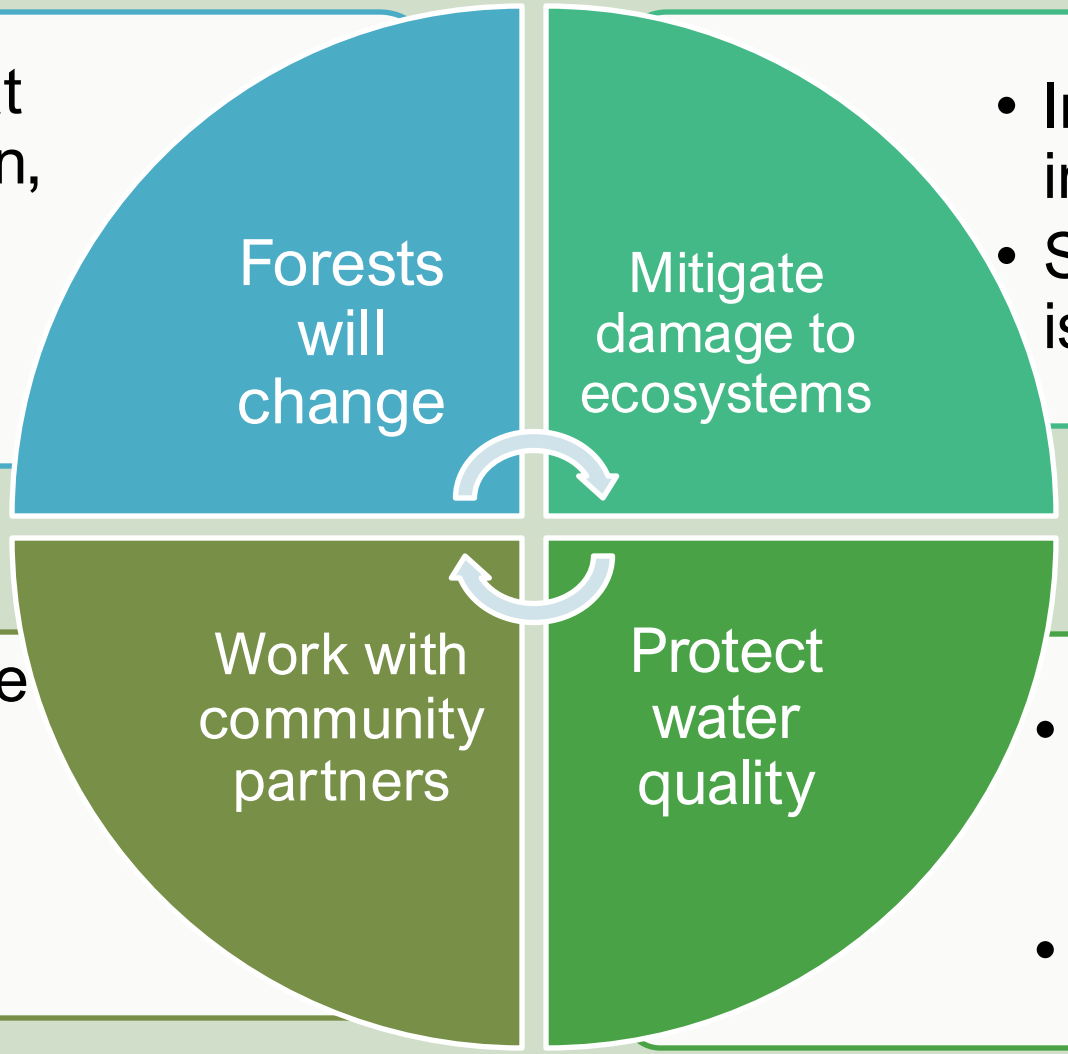
Ash tree die-off will eventually impact:

- Riparian ecosystems
  - Habitat composition
  - Stream temperatures
- Water quality
  - Erosion
  - Total Daily Turbidity Maximums
  - Chemical/excess nutrient pollutants
- Community benefits
  - Air quality
  - Heat
  - Recreation sites
  - Health, mental and physical

Oregonstate.edu

Natural Areas: What Comes Next

- Opportunity for habitat restoration, conversion, or reversion
- Challenge: ash as a keystone species



- Invasive species will increase
- Streambank stabilization issues

- There may already be experts in your watershed or natural areas
- Funding

- Look at current understory and plant communities
- Assisted migration trials

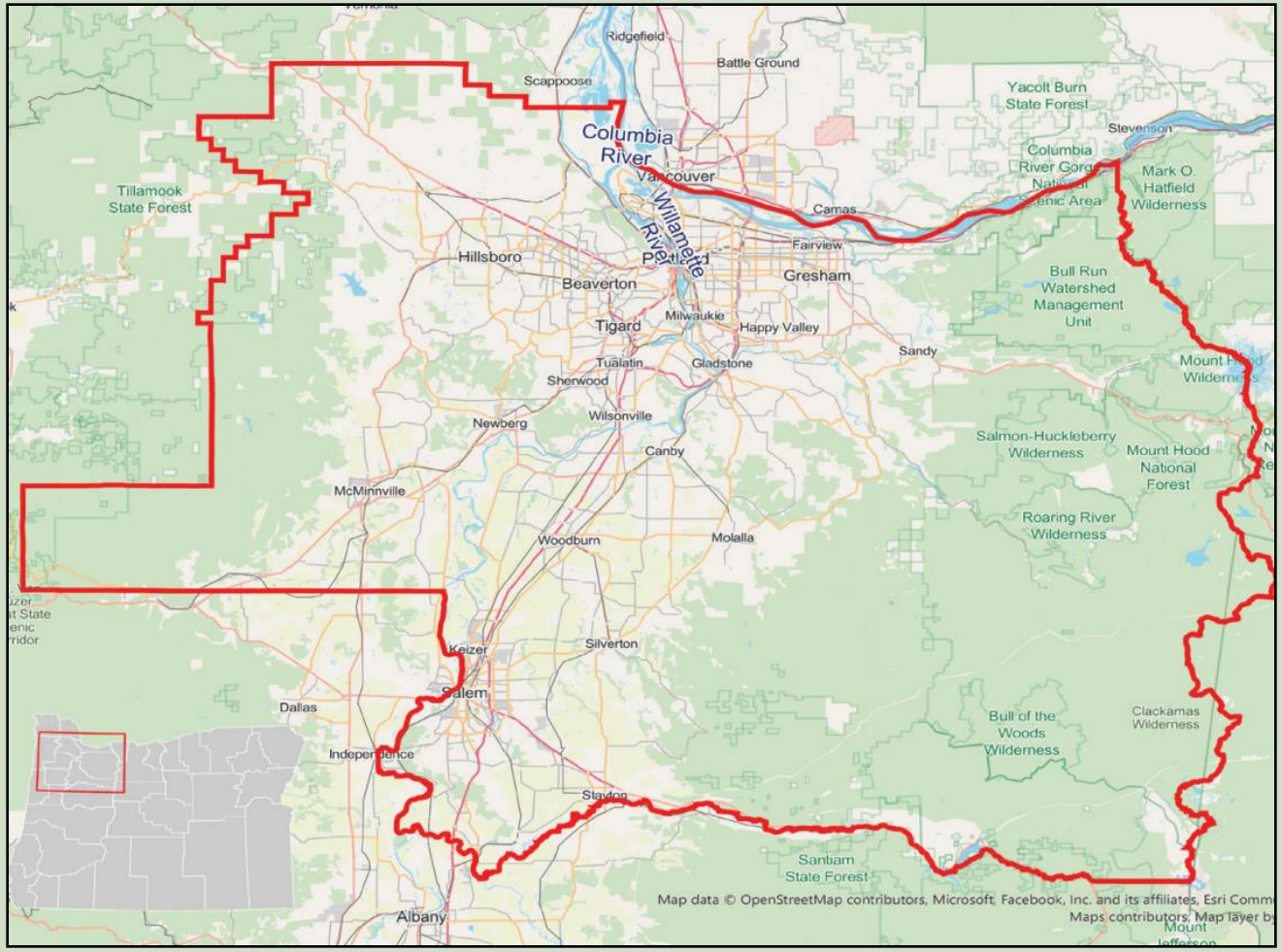
Value of Preparation

- Preparation is cost effective
  - Invasive species control
  - Loss of ecosystem services
  - Protection of infrastructure
- You manage EAB or it will manage you
  - Plan for wood waste management
- Adapted Management
  - Adjusting your management plan to fit new information
- Collaborate with neighbors and community
  - Pooling removals and treatment costs
  - More effective

EMERALD ASH BORER QUARANTINE ALERT

OREGON DEPARTMENT OF AGRICULTURE

Washington, Yamhill, Marion, Clackamas and Multnomah Counties



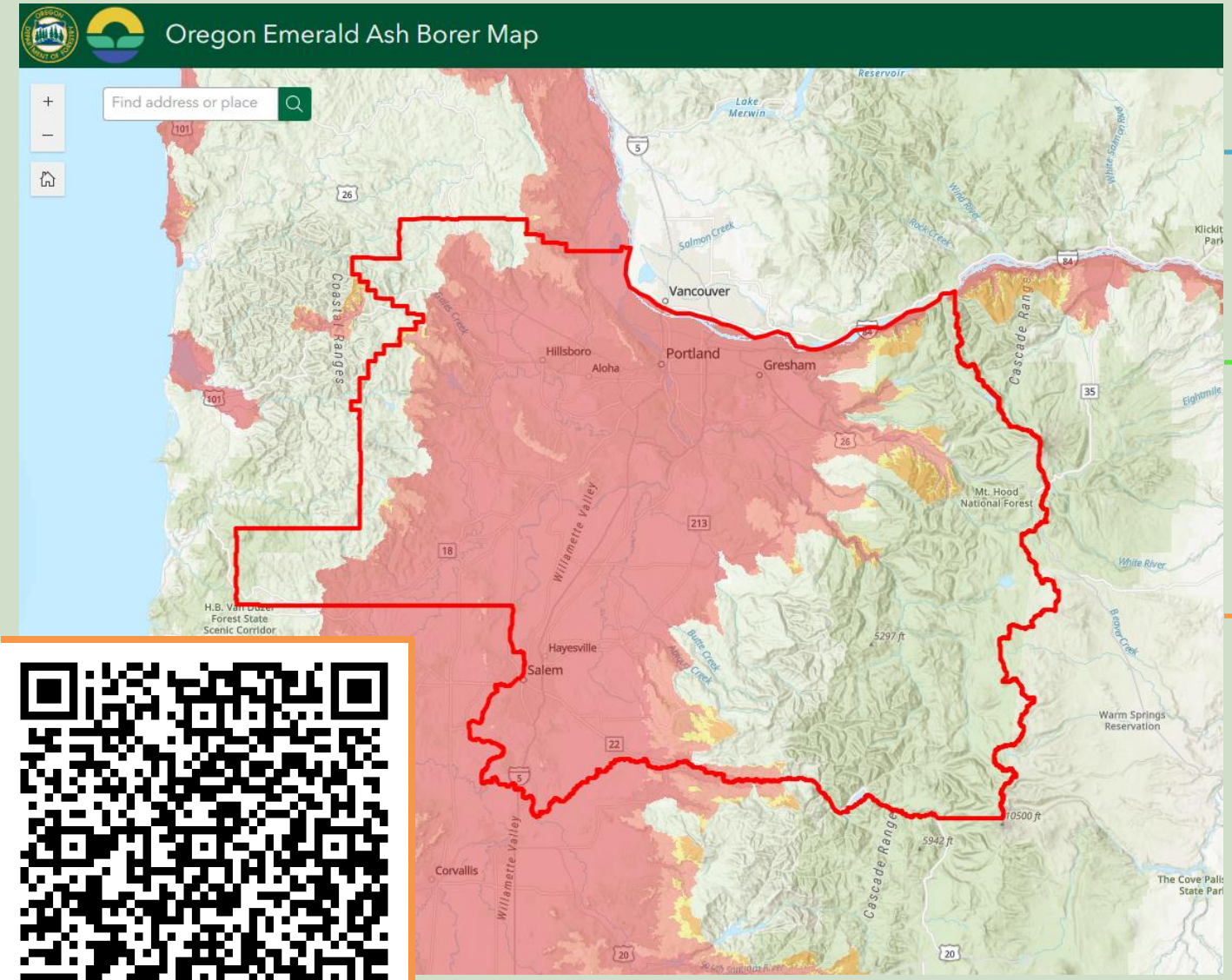
1. Restricts movement of ash, olive material (e.g., logs, nursery stock, chips, etc.)
2. Requires treatment (e.g. chip < 1”) and compliance agreement to move material outside quarantine
3. Limits ash tree removal and pruning to October 1 – April 30

OREGON DEPARTMENT OF FORESTRY

Three Takeaways

1. The best way to help our forests is **Don't Move Firewood**
2. Keep an eye out for signs & symptoms
3. Report EAB if you find any!

EAB Resources: Oregon EAB Map



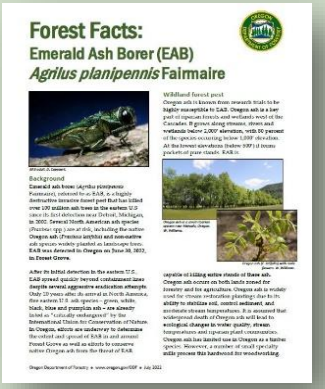
Track EAB status and get management recommendations based on proximity

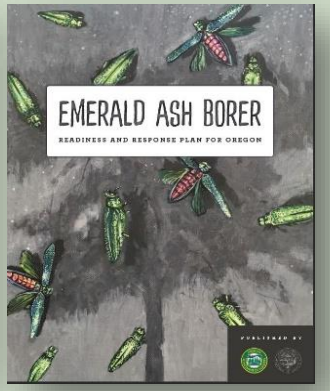
Check out layer list for features like trapping data, previous visual surveys, and more

Understand EAB potential using the hardwood map layer and risk areas base layer

Link: https://www.OregonEAB.com

EAB Resources: OregonEAB.com





State Resources

- Oregon's EAB Readiness and Response Plan
- ODF Forest Health Website
- Biological Control for EAB

Identification and Fact Sheets

- Ash Identification
- EAB Look-Alikes
- EAB Fact Sheet
- EAB Quarantine
- MOB Fact Sheet

OSU EAB Resources

- Oregon Ash: Insects, Pathogens, and Tree Health
- Alternatives to Ash in Western Oregon
- Recommendations for Tree Protection Against EAB

Management Resources

- 10 Recommendations for Managing Ash
- Managing Northeastern Forests Threatened by EAB
- EAB Management Review
- EAB Insecticide Treatment Fact Sheet

Report Invasive Species

- Reporting Potential EAB Insects or Infestations

Wood Use

- Resource Directory of Wood Waste Professionals
- What To Do with Ash Wood

Other Forest Management

- Find an Arborist
- Tree Risk Management

EAB Resources: Where to Report

United States – USDA APHIS

- Report.EAB@usda.gov
- 1-866-322-4512

Oregon

- oregoninvasiveshotline.org
- 1-866-INVADER

Washington

- invasivespecies.wa.gov
- Download the app – Washington Invasives

Idaho

- Idaho Invasive Species Hotline
- 1-877-336-8676

Canada – Invasive Species Centre

- invasivespeciescentre.ca
- 1-866-463-6017

British Columbia

- bcinvasives.ca/take-action/report/
- 1-800-563-7711
- Download the app - Report Invasives

Ontario

- Ontario Ministry of Natural Resources and Forestry
- www.eddmaps.org
- 1-800-667-1940

Thanks!

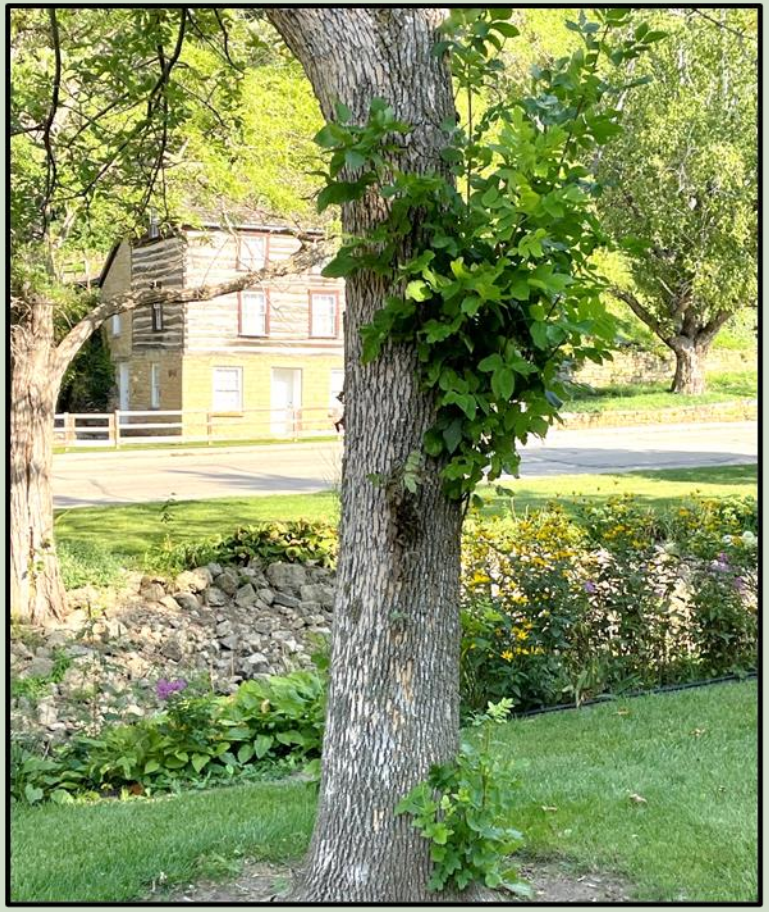
Kat Bethea *and* **Matt Mills**

InvasivePests@odf.oregon.gov
OregonEAB.com

Oregon Department of Forestry
Urban and Community Forestry Assistance Program

EAB Signs & Symptoms

Thinning crown and canopy decline



Epicormic sprouting or shoots

Woodpecker damage

EAB Signs & Symptoms

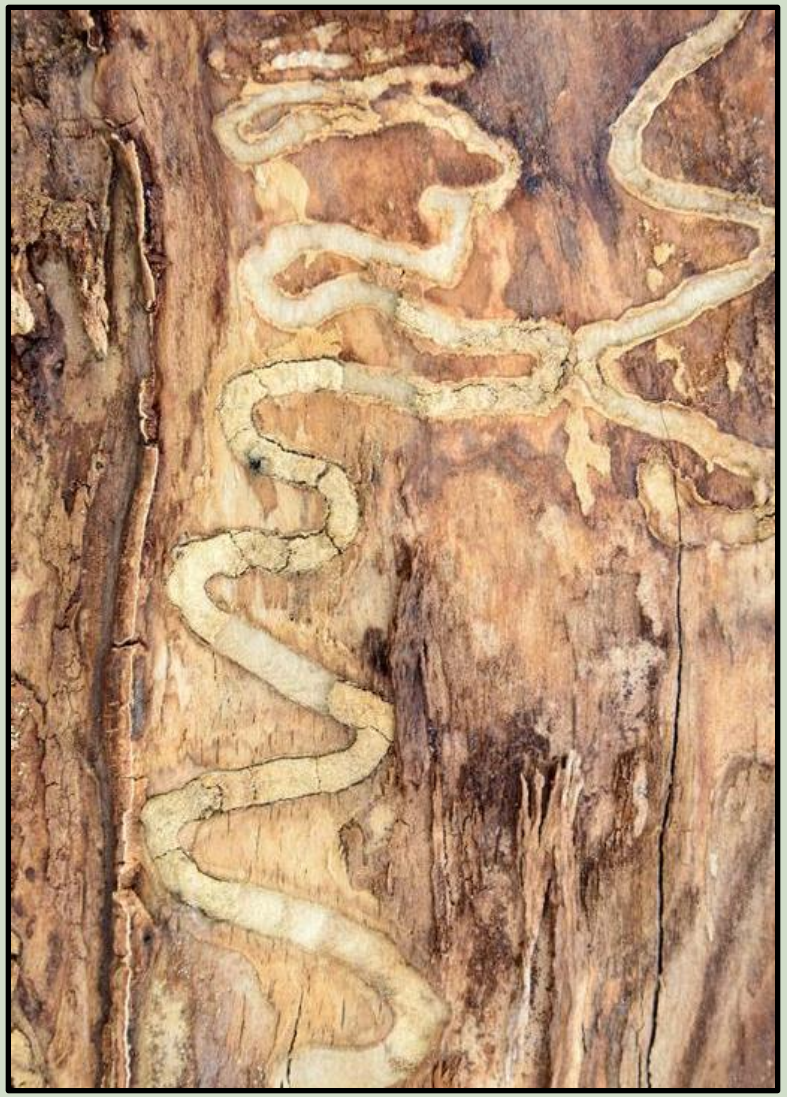
Thinning crown and canopy decline

Epicormic sprouting or shoots

Woodpecker damage

EAB Signs & Symptoms

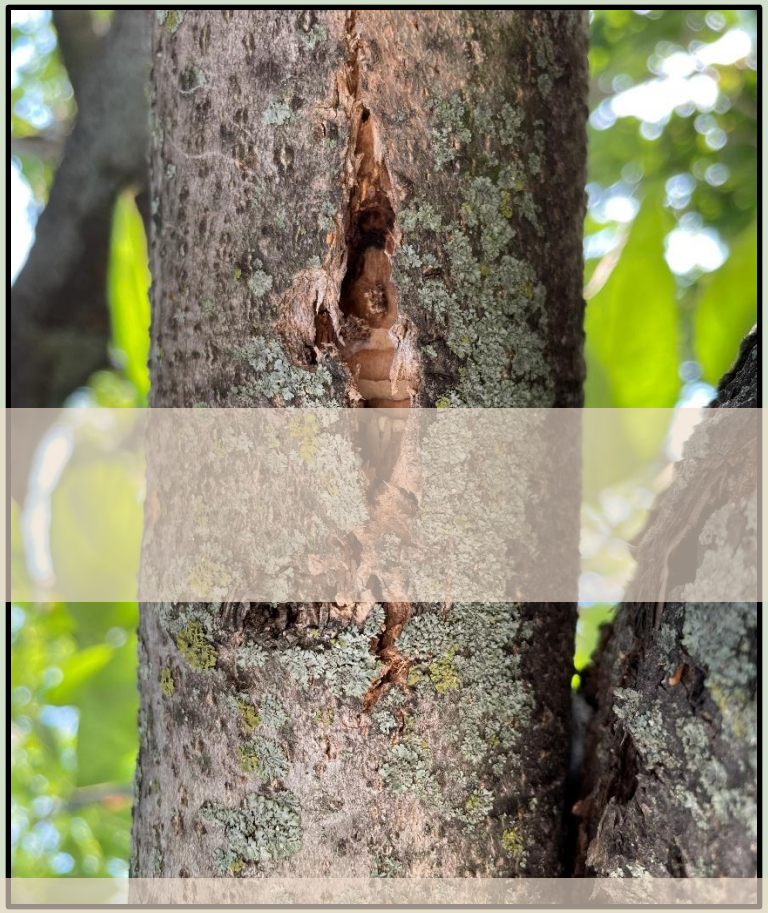
Bark splits



Serpentine galleries

D – shaped exit holes

EAB Signs & Symptoms



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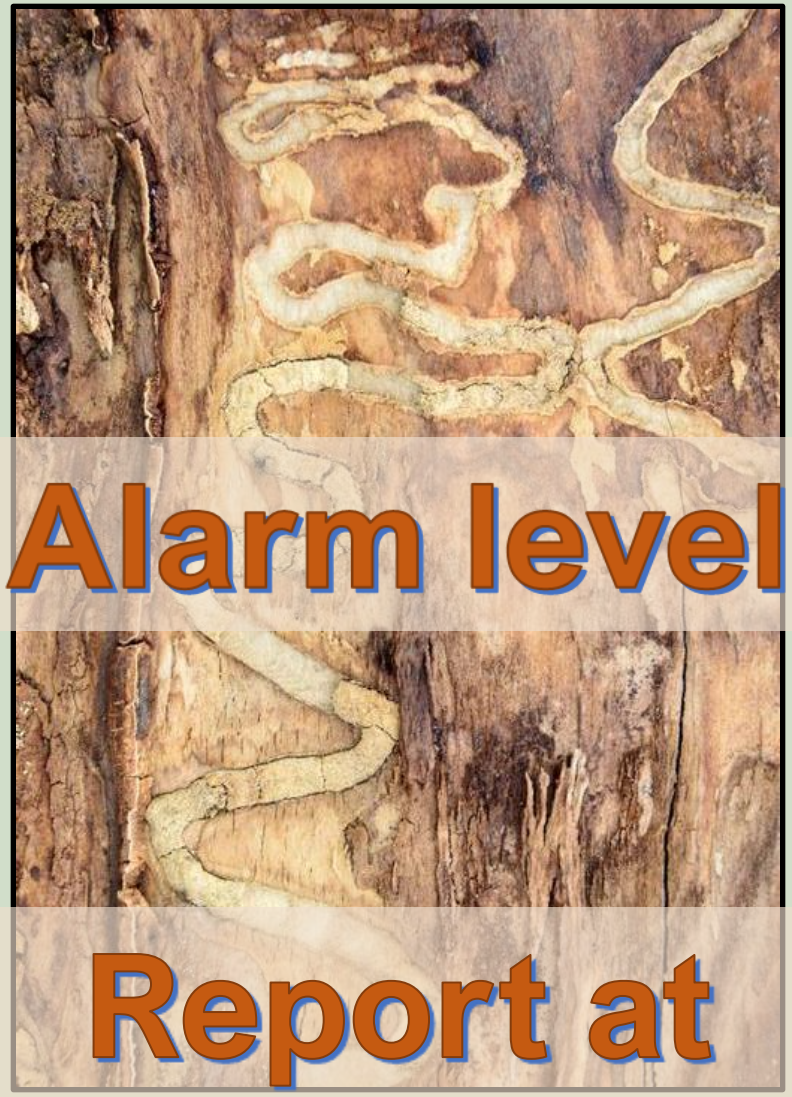

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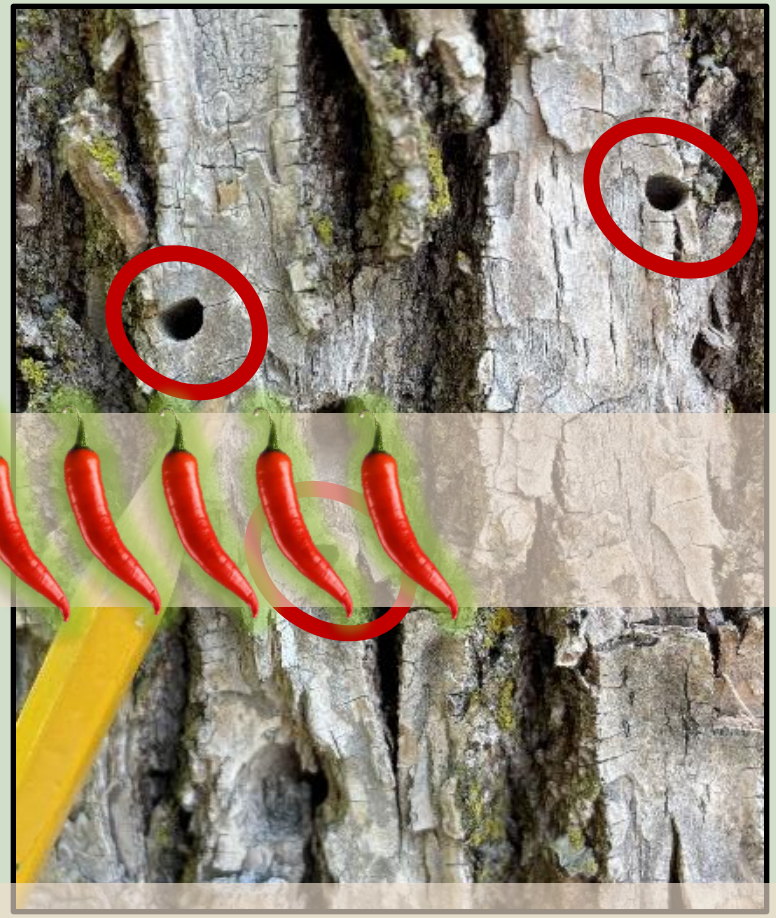

D – shaped exit holes

Alarm level

Report at

https://oregoninvasiveshotline.org/

How to Report

Report using Oregon Invasive Species Hotline

Take photos of symptoms

Add tree location