Washington State
EMERALD ASH BORER
Resources & Management Guide

Guidance for Detection, Response, and Long-Term Management

2026

How to use this Guide

The Washington State Emerald Ash Borer Resources & Management Guide is designed as a practical, flexible resource to support prevention and preparedness efforts across Washington state. As of the development of this Guide (Spring 2026), emerald ash borer (EAB) has not yet been detected in Washington. This guide is intended to help communities, agencies, and individuals take proactive steps to reduce risk, strengthen readiness, and plan for a coordinated response when EAB is inevitably detected in the future.

The guide is organized into six chapters that reflect the stages of early awareness, prevention, and preparedness, while also outlining response and management strategies that may be needed later. Each chapter begins with a summary and overview page that highlights key concepts, definitions, and key takeaways, allowing readers to quickly identify the most relevant sections before moving into more detailed guidance.

Readers are encouraged to use this guide as a reference and jump between chapters based on their role and immediate needs, rather than reading it cover to cover. For example:

- **Homeowners and residents** can use Chapters 1 and 2 to understand why EAB is a threat, Chapter 3 to learn how to recognize signs and symptoms and report potential detections, and Chapter 6 to find prevention-focused outreach materials and recommended actions for private property.
- **Educators and trainers** can use Chapters 1 and 2 to build foundational understanding of EAB biology, risks, and pathways of spread, and Chapter 6 to support classroom instruction, workshops, and professional training focused on prevention, early detection, and reporting.
- **Urban forest and resource managers** can rely on Chapter 3 to develop loss prevention and readiness plans, establish survey and monitoring protocols, map ash tree populations, and identify preparedness funding, while Chapter 4 supports coordinated response planning in the event of a future detection.
- **Professional tree care and industry professionals** can reference Chapter 3 for visual survey and trapping guidance, Chapter 5 for preventive treatment options, wood disposal requirements, and best management practices, and Chapter 6 for consistent messaging to clients and communities.
- **News media and journalists** can reference Chapter 6 for communication guidance, key messages, and outreach materials that support accurate public reporting, and may also find Chapters 3 and 4 useful for background information on detection, response, and management efforts in Washington.

By focusing on prevention, early detection, and preparedness, this guide supports informed decision-making before EAB arrives in Washington. Use it as a planning tool, training resource, and reference to strengthen statewide readiness and protect Washington's ash trees over the long term.

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Think You've Seen an Emerald Ash Borer?

Take a photo, note the location, and report it!

Your reports help agencies track the spread of this invasive insect across Washington state.

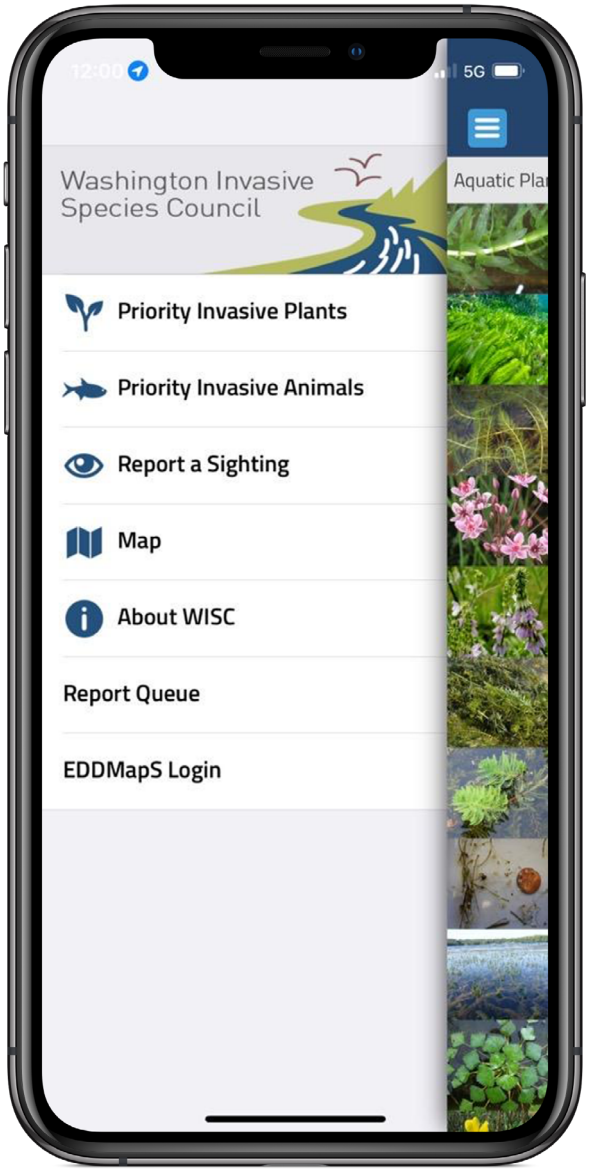
How to Report

You can submit a sighting in any of these ways (all reports are identified and tracked by state agencies):

- **WA Invasives Mobile App:** Report directly from your phone or tablet
- **Online:** invasivespecies.wa.gov/report-a-sighting/
- **Email:** InvasiveSpecies@rco.wa.gov and pest@agr.wa.gov
- **Call:** Washington State Department of Agriculture Pest Hotline: 800-443-6684

Tips for reporting:

- Take a clear, high-quality photo – this is necessary for verification.
- Include the location (GPS coordinates or address) and date if possible.
- If you can safely collect the insect, preserve it in a sealed container, freeze it, or store it in ethanol or isopropyl alcohol. Agencies may request specimens for verification.



Note: Not every report will receive a direct response, but every submission helps track the spread and occurrence of EAB in Washington.

Interagency Working Group

The Washington state emerald ash borer (EAB) interagency working group is a collaborative effort bringing together state, federal, and local partners to address the threat of EAB in Washington. State partners include the Washington Invasive Species Council, Washington State Department of Agriculture, Department of Ecology, Department of Fish & Wildlife, Department of Natural Resources, Washington State Parks, and Washington State University. Federal partners include the United States Department of Agriculture and the USDA Forest Service. Additional stakeholders include Samara Group LLC, the Oregon Invasive Species Council, and the City of Seattle.

Throughout 2025-2026, the working group has met regularly to develop this *Washington State Emerald Ash Borer Resources & Management Guide.* Members were invited to contribute by signing up for writing sections, providing expertise, and helping shape the content. Additionally, there was a review period for all working group members to comment on the development of the draft. The list of writing contributors, organized alphabetically, is provided below:

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SAMARA GROUP

Status and Outlook:
Emerald Ash Borer in Washington State

As of Spring 2026, emerald ash borer (EAB) has not yet been confirmed in Washington, though its presence in neighboring Oregon and British Columbia means it is likely to arrive soon. Federal deregulation of EAB quarantines has shifted preparedness and response efforts largely to state and local agencies, with WSDA providing guidance, training, and technical support, and local governments, urban forestry programs, and land managers playing a critical role in planning and mitigation. Urban areas face particular challenges: many municipalities lack complete tree inventories or the resources to prepare for widespread ash loss. Without proactive management, which can mitigate the loss of ash trees in streets, parks, and yards, we could see near-total mortality within 10-12 years of infestation, creating increased maintenance costs, liability concerns, and gaps in the urban canopy that exacerbate heat island effects. Wood removal, disposal, and replanting may be inconsistently managed, potentially accelerating EAB spread.

Washington's native Oregon ash *(Fraxinus latifolia)* in riparian zones and wetlands will also be heavily impacted. When EAB kills ash trees, it changes the structure of forests and makes it harder for new ash trees to grow. Fast-growing invasive plants, such as reed canarygrass, may take over. Loss of ash trees will affect wildlife dependent on them for food and habitat, including birds, beavers, deer, and elk, and may increase stream temperatures, harming salmon and other aquatic species. Long-term changes to forest composition and successional trajectories are expected, with climate change further influencing which species dominate after ash decline. Overall, EAB is poised to have profound ecological, economic, and cultural impacts across Washington unless proactive monitoring, early detection, and coordinated management are implemented.

Photo Credit: Gosztyla, WA DNR UCF.

Chapter 1: Introduction and Background

AT A GLANCE

The emerald ash borer (EAB) is a small, invasive beetle from eastern Asia. It was first found in the United States in 2002 and has killed millions of ash trees across North America. EAB was found in Oregon in 2022 and in British Columbia in 2024, which means Washington is now at high risk. EAB attacks all species of true ash trees in the *Fraxinus* genus, as well as other species in the olive family *(Oleaceae)*. EAB does not attack mountain ash *(Sorbus americana)*, because it is not a true ash. In Washington and the Pacific Northwest, this includes native Oregon ash *(Fraxinus latifolia)*, which commonly grows along rivers and wetlands, as well as ash trees planted along streets, in parks, and in yards.

HOW TO IDENTIFY EAB

Adults:

- Bright metallic green beetles
- About ½ inch long
- Reddish-purple colored body under the wings

Debbie Miller, USDA Forest Service, Bugwood.org

Larvae:

- Cream-colored and flat
- Live under the bark
- Create winding tunnels that block water and nutrients, which kills the tree

PA Dept. of Conservation and Natural Resources

LIFE CYCLE

EAB takes 1 to 2 years to grow, depending on weather and tree health. Adult beetles appear in late spring and lay eggs in cracks in the bark. The larvae stay under the bark through winter and turn into adults the next spring.

ASH TREES IN WASHINGTON

- **Native:** Oregon ash grows in wetlands and along streams and helps prevent erosion and provides habitat for wildlife
- **Non-native:** White, green, European, and Raywood ash are commonly planted along streets and in city landscapes

HOW EAB SPREADS

- Adult beetles can fly several miles each year to find new ash trees
- People moving infested firewood, logs, or nursery plants
- Beetles can also hitch a ride on vehicles and equipment

PREVENTION & MANAGEMENT

- Check ash trees regularly, especially from May to July
- Do not move ash firewood or possibly infested materials
- Use Slow Ash Mortality (SLAM) plans to help communities prepare and respond

KEY TAKEAWAY

EAB is not established in Washington yet, but it is close. Because all true ash trees are at risk, early detection, good tree care, and stopping the spread by people are the best ways to protect Washington's ash trees.

Chapter 1:
Introduction and Background

SPECIES BASICS

Writing Contributors: Fiona Paquette, Samara Group & Kevin Zobrist, WSU

The emerald ash borer (EAB), *Agrilus planipennis* (Coleoptera: Buprestidae), is an invasive wood-boring beetle from eastern Asia that first appeared in the United States in 2002 near Detroit, Michigan. Since its introduction, EAB has caused near-complete mortality of North American ash trees *(Fraxinus* spp.) across the eastern and midwestern United States (Knight et al. 2013). Its continued expansion into the Pacific Northwest now represents a serious threat to both urban tree canopies and riparian ecosystems in Washington state.

IDENTIFICATION

Adult EAB are about 13 mm (½ inch) long and have a bright, metallic green coloration, with a purplish-red abdomen visible when their wing covers lift (Parsons 2008; McCullough et al. 2015). Their slender, elongated bodies help distinguish them from other jewel beetles common in the United States. See Chapter 1 Additional Resources for more information on EAB lookalikes.

Figure 1.1: Adult EAB compared in size to a nickel (Eric R. Day, Virginia Polytechnic Institute and State University, Bugwood.org).

Figure 1.2: D-shaped exit holes (Daniel Herms, The Ohio State University, Bugwood.org).

EAB eggs are extremely small (about 1 mm), difficult to find, and are rarely seen (Dept. of Entomology Wisconsin). Larvae are creamy white with flattened, segmented bodies that can grow up to about 1-1.5 inches long. They live just beneath the bark of ash trees, where they feed in the cambial layer and create distinctive winding, S-shaped tunnels (galleries) as they move back and forth under the bark. These serpentine galleries are one of the most important signs used to identify emerald ash borer infestations (Purdue Extension). Because eggs, larvae, and pupae are hidden beneath the bark, they are rarely seen unless the bark is removed. When adult beetles emerge from infested ash trees they leave behind small D-shaped exit holes in the bark, another key indicator of EAB activity.

LIFECYCLE

(Adapted from Zobrist, Bomberger, Darr, Glass, Hulbert, & Roberts, 2023)

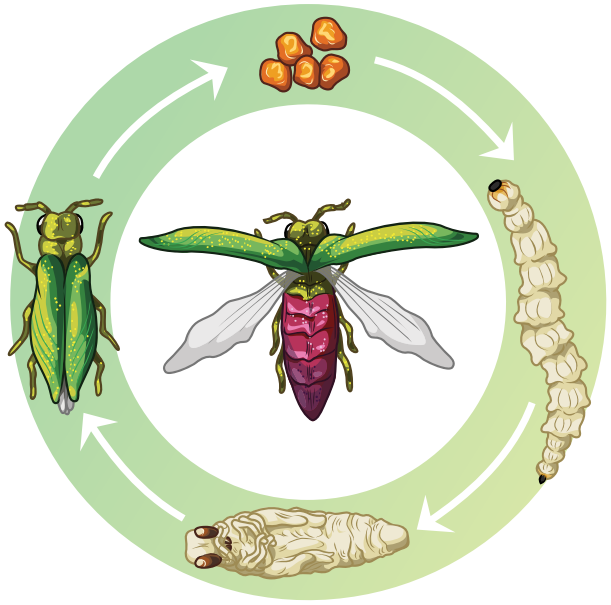

Figure 1.3: EAB life cycle. Adults emerge and lay eggs in bark crevices of ash trees. Eggs hatch and larvae feed beneath the bark. Larvae overwinter in the tree, pupate, and emerge as new adults.

In colder climates, EAB generally has a two-year lifecycle, whereas in warmer climates it is usually a one-year lifecycle (Wei et al. 2007). The mild climate of the western Washington lowlands may tend to support a one-year lifecycle. In a one-year lifecycle, adult EAB emerge from their host trees in late spring. This can begin in May, with peak flight occurring in June or July. The adults will find nearby ash trees and feed on the leaves, but this does little damage to the trees. After about a week of feeding, the adults mate. The mated female will then continue to feed for up to a week before laying her tiny eggs in bark crevices of an ash tree.

The eggs hatch after about two weeks and immediately bore into the tree. The larvae begin feeding on the sugar-rich phloem tissue under the bark. In the early stages of infestation, the feeding creates the distinctly serpentine galleries. As more EAB attack the tree, there is no longer enough space for serpentine galleries, and the galleries become more meandering (Wang, Yang, Gould, Zhang, Liu, & Liu, 2010). It is these feeding galleries that do the most damage to the tree by disrupting sugar flow.

As they feed, EAB larvae develop through four growth phases called instars, shedding their outer layers (molting) between phases. In early fall when the larvae reach their fourth instar, they bore deeper into the tree into the outer sapwood where they will overwinter. In early spring they become prepupae, pupae, and finally adults, at which point they bore out of the tree in late spring or early summer to complete the cycle (Wang et al., 2010).

With a two-year lifecycle, the larvae feed through two growing seasons and do not become fourth instars until the fall of the second year. They then follow the same sequence of maturing to adults that will begin to emerge the following May (Tluczek, McCullough, & Poland, 2011). In addition to climate, tree stress level can also influence whether EAB has a one- or two-year lifecycle. Strong tree vigor will increase the chance of a two-year lifecycle whereas there is an increased chance for a one-year lifecycle in a stressed tree (Villari, Herms, Whitehill, Cipollini, & Bonello, 2016). A two- year lifecycle is more likely in cut wood (Petrice & Haack, 2007).

Figure 1.4: Serpentine galleries left by EAB larvae (Gosztyla, WA DNR UCF).

LIFECYCLE IMPLICATIONS FOR WASHINGTON'S MANAGEMENT STRATEGIES

Several parts of the life cycle directly influence how Washington homeowners and agencies should prepare and respond:

- Adult flight often begins in May and peaks June - July, which means outreach, visual surveys, and reporting efforts are most effective during this window.
- Adults feed on leaves before mating, so foliar damage is not a reliable early indicator. By the time canopy thinning is visible, infestations are usually well underway.
- Eggs are laid in bark crevices, meaning even healthy-looking trees can be infested long before symptoms appear.
- Larval feeding in the phloem is what kills ash, so once larvae are established, chemical treatments are only effective if timed correctly and applied early.
- Overwintering larvae and two-year life cycles in cooler areas mean EAB can persist even when adult activity seems low, reinforcing the need for multi-year monitoring and follow-up. Treatments cannot undo damage already caused by larval feeding, so treatment prior to infestation is advised rather than waiting till trees are showing signs of decline.
- Larvae developing in untreated firewood that is moved to uninfested areas by humans, remain a major pathway for spread. This remains a critical point for both landowners and agencies working to limit human-assisted movement.

These biological details shape everything from how residents should monitor backyard trees to how local and state agencies plan for long-term ecological impacts.

Figure 1.5: EAB larvae develop through four growth phases called instars, shedding their outer layers (molting) between phases. In early spring they become prepupae, pupae, and finally adults (Forestry Images: Debbie Miller, USDA Forest Service, Bugwood.org).

WASHINGTON STATE ASH TREES

Writing Contributors: Ben Thompson, WA DNR UCF & Kevin Zobrist, WSU

Oregon ash *(Fraxinus latifolia)* is the only species of ash tree that is native to Washington state (Zobrist, 2014). It occurs primarily in southwest Washington, extending northward to the Olympic Mountains and Puget Sound including pockets of native growth as far north as Kitsap and south Snohomish counties (Ellenwood, Krist, & Romero, 2015). Oregon ash may also be found beyond its native range where ecological restoration groups, tribes, local governments, or private landowners have planted it.

Oregon ash is a large, deciduous shade tree which grows naturally in lowland areas with wet soils, often adjacent to rivers, creeks, and wetlands that may seasonally flood in winter or become very dry in summer. Often these landscapes are referred to as "riparian areas" or "forested wetlands." Oregon ash typically grows with a narrow, dense crown from a single straight trunk, although multiple trunks are sometimes present (Shaw, 2022). Its leaves are opposite and pinnately compound, usually 5-10 inches (15-30 cm) long with 5-7 elliptical leaflets (2-5 inches long), and its fruits are single-winged samaras that spin in the wind when dispersed. Thanks to its large size and canopy spread at maturity, paired with a tolerance for growing in wet, saturated soils, Oregon ash provides essential shade over salmon-bearing creeks and rivers. This helps regulate water temperatures and maintain optimal conditions preferred by salmon and other aquatic life.

Ash trees are also commonly planted in developed landscapes such as street rights-of-way, parks, schoolgrounds, and private yards in communities across Washington state. This includes the native Oregon ash as well as cultivars of green ash *(Fraxinus pennsylvanica)* and white ash *(Fraxinus americana)*, which are native to eastern North America. Cultivars of European ash species are also used. The non-native North American and European ash trees can be smaller than many native trees, have beautiful fall color, and are considered resilient and adaptable. As a result, these trees have historically been popular choices for urban planting locations in both eastern and western Washington communities. It is common to see entire city blocks planted with ashes as street trees. In some communities in Washington, ash species account for thousands of trees, and in some cases ash trees compose over a third of a city's tree inventory.

All North American and European ash species are susceptible to EAB. Oregon ash, green ash, and white ash are particularly susceptible (Kelly et al, 2020). Two non-ash species are also susceptible: the white fringetree *(Chionanthus virginicus)* and the common olive tree *(Olea europaea)* (Peterson and Cipollini, 2020). These are closely related to ash species, as they are all in the olive family. Neither are native to or common in Washington. Species known as mountain ashes, such as the nonnative European Mountain ash *(Sorbus aucuparia)* that is a common ornamental tree in Washington, are not related to true ashes and are not susceptible to EAB.

Figure 1.6: Oregon ash *(Fraxinus latifolia)* (OregonFlora: Gerald D. Carr; Record ID: 75b1fb83-348e-4f0e-b946-1def039605c5).

EMERALD ASH BORER PEST HISTORY AND PATHWAYS

Writing Contributors: Fiona Paquette, Samara Group

EAB is native to eastern Asia, including China, Japan, Korea, and the Russian Far East (Haack et al., 2022). In North America, EAB was first discovered in May 2002 when adults were reared from declining ash trees near Detroit, Michigan (Haack et al., 2022). Identification was confirmed in July 2002 by Eduard Jendek, a taxonomic expert on Asian *Agrilus* beetles (Haack et al., 2022). By the end of 2002, EAB was found in six southeastern Michigan counties; by 2004, it was found to have spread to 20 counties within Michigan's Lower Peninsula. In subsequent years, infestations expanded into Ohio, Indiana, Illinois, and other states (Haack et al., 2022). By 2025, EAB has been confirmed in 37 U.S. states and the District of Columbia. It has also been found in six Canadian provinces, including British Columbia, just north of Washington state. For the most up-to-date information on where EAB has been found, see the USDA EAB Known Infested Counties interactive map. This online map lets you zoom in to the state level and print or save maps.

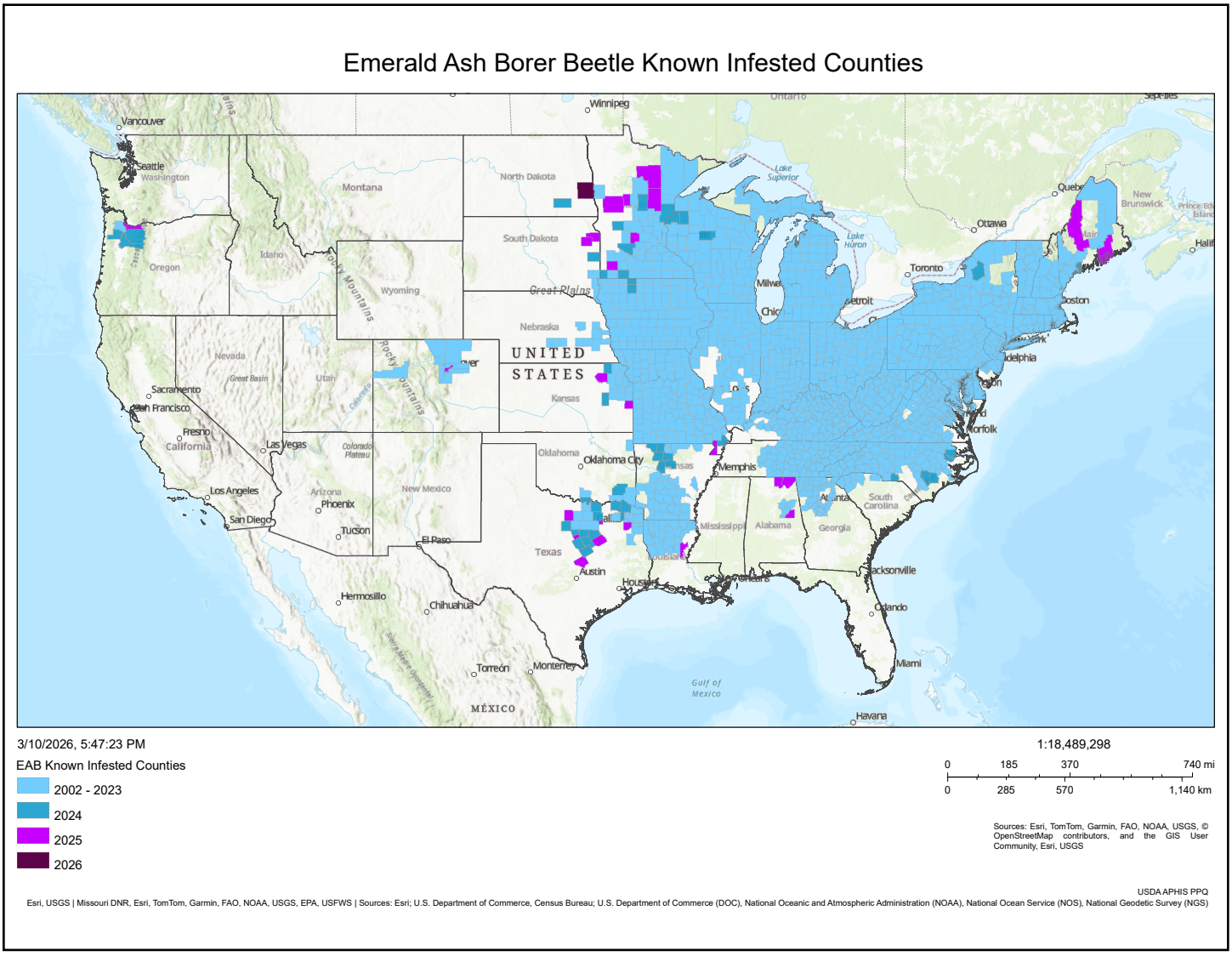

Figure 1.7: USDA APHIS Map of EAB Known Infested Counties (this does not include infestations in Canadian provinces) (USDA APHIS PPQ).

PATHWAYS OF EMERALD ASH BORER SPREAD

EAB spreads both naturally and by humans moving infested wood or nursery stock that hasn't been treated to kill larvae. Natural spread occurs when adult beetles emerge from infested trees and fly to nearby host trees to lay eggs, typically advancing only a few miles per year (Cappaert et al., 2005; Muirhead et al., 2006). Most long-distance dispersal occurs through human movement of infested ash material, including nursery stock, logs, and firewood. For example, infested nursery stock from Michigan introduced EAB to Maryland and Virginia in the early 2000s, and movement of ash logs has contributed to additional long-distance introductions (Haack et al., 2022). Adults have also been documented hitchhiking on vehicles, which may explain frequent establishments along highways, rest areas, and truck stops (Haack et al., 2022; WSU Extension, 2022).

Firewood is a particularly high-risk pathway, as larvae can survive in untreated wood for multiple years (Haack et al., 2022). Slowing the spread of EAB is the focus of integrated strategies such as Slow Ash Mortality (SLAM), which aims to give communities more time to plan and respond by reducing human-assisted movement of infested material and prioritizing early detection (Poland & McCullough, 2010; WSU Extension, 2022). The Don't Move Firewood campaign is a major public outreach effort that encourages people to buy or collect firewood locally and avoid transporting it long distances, see Chapter 6 for more details.

ADDITIONAL RESOURCES

1. Emerald Ash Borer Look-alikes for Washington State

Author/Source: Washington Invasive Species Council
Summary: Resource with photos of common look-alikes to EAB.
Link: https://invasivespecies.wa.gov/wp-content/uploads/2019/08/WA-EAB-look-alike-guide.pdf

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2. Emerald Ash Borer and Its Implications for Washington State

Author/Source: WSU Extension Manual (Zobrist et al., 2023)
Summary: Extension manual providing comprehensive information on EAB biology, impacts, and management in Washington.
Link: https://pubs.extension.wsu.edu/emerald-ash-borer-and-its-implications-for-washington-state

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3. Oregon Ash *(Fraxinus latifolia)* – Silvics of North America

Author/Source: USDA Forest Service
Summary: Detailed species profile of Oregon ash including biology, habitat, and silvicultural information.
Link: https://research.fs.usda.gov/silvics/oregon-ash

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4. Map of EAB Known Infested Counties

Author/Source: USDA APHIS PPQ
Summary: An online active distribution map of EAB known infestations in the United States.
Link: https://www.aphis.usda.gov/plant-pests-diseases/eab/eab-infestation-map

Chapter 2: Impacts of an Emerald Ash Borer Invasion

AT A GLANCE

Ash trees play an important role in Washington's forests, wetlands, cities, and communities. They support wildlife, protect water, provide shade, and are important to Tribal Nations. If emerald ash borer (EAB) spreads in Washington, the impacts would go far beyond losing trees. Forests, wetlands, streams, cities, and cultures would all be affected.

NATURAL AREAS

- Ash dominated forests are most vulnerable from EAB.
- Dead ash trees open the canopy, allowing invasive plants to spread.
- The loss of Oregon ash in riparian areas will reduce shade along streams and wetlands, warming water and lowering habitat quality.
- Warmer streams harm aquatic insects and fish, including salmon.
- The loss of ash trees will impact wildlife that rely on them for shelter and nesting habitat, and will cause ripple effects on aquatic food webs.

Debbie Miller, USDA Forest Service, Bugwood.org

URBAN & BUILT LANDSCAPES

- Ash trees are common in streets, parks, and yards; once infested, trees almost always die.
- Loss of urban ash reduces stormwater absorption, cooling shade, air quality, and erosion control.
- Removing large numbers of trees can change neighborhood characteristics.
- Treating, removing, and replanting trees can cost cities millions of dollars. Homeowners face increased costs, and city planners must balance tree management with limited budgets.

Eric R. Day, Virginia Polytechnic Institute and State University, Bugwood.org.

CULTURAL IMPORTANCE AND TRIBAL IMPACTS

- Oregon ash *(Fraxinus latifolia)* is Washington's only native ash tree.
- It has deep cultural importance for Tribal Nations and Indigenous communities.
- Traditionally, Oregon ash is used for: Medicine, ceremonies, tools, baskets, paddles, digging sticks, containers, firewood and cultural art
- Oregon ash also supports wetlands and wildlife that are part of Indigenous ecological knowledge and traditions.

KEY TAKEAWAY

EAB threatens more than just trees. It affects forests, streams, wetlands, cities, wildlife, local economies, and Tribal cultures. Acting early, planting a mix of tree species, planning ahead, and working closely with Tribal Nations can help reduce long-term damage.

Chapter 2:
Impacts of an Emerald Ash Borer Invasion

ENVIRONMENTAL RISK FROM EMERALD ASH BORER

Writing Contributors: Maria Marlin, WISC & Fiona Paquette, Samara Group

Ash trees *(Fraxinus* species) play many important roles in both natural and urban ecosystems. When emerald ash borer (EAB) causes widespread ash mortality, these roles, and the benefits they provide, can be lost or significantly altered. Ash trees help regulate environmental conditions by improving air quality, providing shade and wind protection, and absorbing stormwater that might otherwise carry pollutants into streams, rivers, and lakes (Schrader et al., 2021).

Figure 2.1: Oregon ash is an important resource for insects, birds, and both small and large mammals (OregonFlora: B. Newhouse, Record ID: 563bf48f-d1a4-4e36-8a07-455a10bd0b6c).

In Washington, native Oregon ash *(Fraxinus latifolia)* plays an especially important role in riparian areas and wetlands, where its roots help stabilize riverbanks and reduce erosion. When ash trees die, soils may become wetter and more vulnerable to erosion or landslides. Ash trees also support ecosystem processes such as nutrient cycling and photosynthesis, and their loss can change the types of plants that grow in an area and the amount and quality of leaf litter on the forest floor.

Terrestrial impacts are wide-ranging and detrimental to the ecosystem as a whole. Mass die offs in forest settings can alter soil bacterial composition, hydrology, and nutrient cycling. As the dead trees fall, new plant species slowly fill in the spaces; unfortunately, such large gaps in the canopy can quickly facilitate the growth of invasive plants (Gandhi & Herms, 2010). Invasive plants that can now proliferate in the less-shaded conditions compete with native plants for resources, further triggering biodiversity loss. Ground-dwelling invertebrates will also be affected by a loss of canopy. Studies have shown that ground beetles in the family Carabidae decreased in abundance, species richness, and diversity following ash mortality (Perry & Herms, 2016).

Ash-dominated wetlands are particularly vulnerable to the impacts of EAB and their loss can have cascading effects on ecosystem function and the wildlife that rely on this habitat (Kolka et al., 2018). Wetlands and riparian areas with pure stands of Oregon ash will be impacted more than areas with mixed tree species stands. Oregon ash is especially well adapted to wetland environments and can tolerate prolonged

flooding, even complete inundation, making it a key species for maintaining wetland hydrology and structure. Widespread ash mortality can therefore lead to shifts in vegetation composition, increased light penetration, and changes in soil moisture and nutrient cycling. These changes will lead to increased invasive species and shrub dominated habitat. As a result, wildlife that depend on complex wetland systems may experience declines due to reduced food availability, fewer nesting and denning opportunities, and loss of protective cover. The degradation of these wetlands will not only impact biodiversity but can also diminish important ecosystem services such as water filtration, flood storage, and temperature regulation (Kolka et al., 2018).

According to Maze et al., 2024, EAB infestation will have severe consequences for aquatic waterways. This recent publication analyzes landscape-level impacts that may result from widespread Oregon ash mortality. The study focuses on salmonid-bearing waterways near Portland, Oregon; this will have parallel results for similar waterways in Washington. The researchers found that the loss of shade trees (Oregon ash) led to varying increases in sun penetrating the water (solar loading). This degrades water quality and increases water temperature. Warmer water temperatures have far-reaching consequences for multiple trophic levels, including small invertebrates and salmonids alike (Quinn et al., 2020). In fact, threatened and endangered fish species are at an elevated risk. As a result of increased water temperature, juvenile salmon have been shown to experience higher vulnerability to predation, higher pre-spawn mortality, and a decrease in growth rates (Marine and Cech, 2004). Multiple layers of the food web will suffer from EAB-induced ash tree mortality. Ash litter falling near or in waterways has been demonstrated as the first or second most preferred food source for insects such as the stonefly *(Pteronarcys* species) and the cranefly *(Tipula* species) (Kreutzweiser et al, 2019). Negative impacts on invertebrate populations will affect the levels up the food chain that rely on them for nourishment.

The loss of ash trees due to EAB will significantly alter forest structure, affecting wildlife that depend on this habitat in different ways. Birds will lose samaras as a food source, but the greatest impact will be the loss of nesting habitat associated with large-diameter ash trees (Maser, n.d.). Mammals such as beavers, which rely on ash for food and habitat, as well as deer and elk that browse on ash seedlings and basal sprouts, would also be affected.

Additionally, EAB will impact urban ecology by causing widespread loss of ash trees that provide food, shelter, and nesting habitat for urban wildlife. Ash trees in cities, which include both native Oregon ash and introduced ash species (see the Mapping Ash Trees Across Washington section below for more details) contribute to urban biodiversity by offering resources in an often inhospitable environment, and their rapid decline can disrupt these ecological relationships with wildlife (Poland & McCullough, 2006). As ash trees die and are removed, urban canopy cover is reduced, leading to increased temperatures and fewer connected green spaces, which can further stress urban wildlife populations. In addition, the loss of these trees may reduce the availability of host plants for certain insect species and the species that depend on them, resulting in broader declines in urban biodiversity.

The impact of ash tree loss on ecosystems will vary from place to place, but areas where ash makes up a large part of the canopy and other tree species are scarce are especially vulnerable. In these cases, ash mortality can strongly disrupt ecosystem functions. Forests with more diverse tree species are generally more resilient and better able to recover (Hill et al., 2018). Maintaining diverse tree canopies is therefore critical to help ecosystems withstand pests like EAB and reduce the long-term environmental impacts of ash loss.

ECONOMIC RISK FROM EMERALD ASH BORER

IMPACTS TO PLANT NURSERIES

Writing Contributors: Scott Brooks, WSDA

Historically, ash trees have been a popular and important species for plant nurseries across the United States, valued for their fast growth, adaptability, and use in landscaping and urban planting. With growing awareness of EAB and its destructive potential, many nurseries are now choosing to limit or stop selling ash trees altogether. As a result, the economic impacts to nurseries once EAB is present in Washington state appear to be small. To better understand these impacts, the Washington State Department of Agriculture (WSDA) conducted an informal survey of nursery owners and managers. Nurseries asked to take the survey include large retailers, landscapers and conservation districts. Sample size was limited, but results indicate an awareness of EAB threats among this industry. Results showed a general awareness of EAB, and that many nurseries do not sell *Fraxinus* species. One respondent said once EAB had moved into the western states, they had preemptively phased out that part of their business and took some financial losses in doing so. But for the most part, nurseries surveyed appear to be situated decently once EAB is detected in Washington. They are prepared to offer alternative species to customers to plant in landscapes and see that as an economic opportunity.

Summary of the Survey Results

- **When asked: Were you aware that EAB has been detected in the Pacific Northwest and is likely to spread to Washington state?** 64% of respondents answered yes, they were aware.
- **When asked: Are ash trees a significant part of your business sales?** Respondents almost all answered in the negative, some mentioned that ash trees used to be significant to their business but not since EAB moved to the western states, and was discontinued. Those that mentioned they do still sell them noted that it was only on customer requests when they refused to substitute with another species.
- **When asked: If ash trees were no longer a viable option to sell or install in your area due to EAB, what would be the economic impact to your business?** Almost all responded that the economic impact would be minimal and that most had already started replacing their inventory of ash trees with other alternatives.

IMPACTS TO HARDWOOD LUMBER MILLS

Economic risk of EAB to hardwood lumber mills in Washington state will be minimal. Research by WSDA revealed that Oregon ash *(Fraxinus latifolia)* is no longer offered by hardwood lumber mills in Washington. At one time, there was a small market for Oregon ash lumber, but supply does not seem to be abundant currently. Red alder and big leaf maple hardwood are the main species milled, with smaller amounts of Oregon oak being offered.

LOSS OF STREET TREES AND THE IMPACTS TO COMMUNITIES

Writing Contributors: Zeima Kassahun, WA DNR UCF

Figure 2.2: Raywood ash in Seattle's Wallingford Neighborhood (WA DNR).

Ash trees *(Fraxinus* species) provide many important ecosystem services, which are the benefits that trees and natural systems provide to people and communities. In cities and towns, ash trees are commonly planted as street and park trees because they are hardy and adaptable. These trees help manage stormwater, improve air quality, provide shade that cools streets and buildings, and create habitat for wildlife. Their roots help stabilize soil, and their leaves contribute to healthy soil through nutrient cycling. Additionally, they are prized for their showy fall colors and tolerance of urban conditions (Colorado State University Extension, 2025). Because ash trees often make up a large portion of urban tree plantings, the loss of these trees from EAB can have significant impacts on community landscapes, infrastructure, and the ecosystem services that urban forests provide.

Figure 2.3: Ash tree treatment and removal signs from the City of Vancouver (WA DNR).

Fraxinus is one of the most commonly planted genera in Washington urban areas, notably green ash *(Fraxinus pennsylvanica)* and white ash *(Fraxinus americana).* According to aggregated tree inventory data from the Washington Department of Natural Resources, Wenatchee and Lacey have high densities of *Fraxinus* trees in city parks and along rights-of-way, making up 20-30% of their inventoried trees. In contrast, cities like Fairfield and Ellensburg have less than 3% ash among their street trees.

The impacts of EAB to urban trees are costly and labor-intensive, with that burden mostly falling on municipalities and private landowners. Once infected with the pest, tree mortality is nearly inevitable, as seen in the Detroit area, where an estimated 5-7 million ash trees succumbed to EAB (Therese and McCullough, 2006). Treatment and tree removals are costly. The United States has collectively spent over $900 million in street tree management costs in the last 30 years due to EAB. Tree managers will have to balance treatment options to optimize expenditures. Depending on a community's values and capacity, some may choose to preserve significant ash trees and can proactively remove less desirable or poorly placed ash trees. A strategy-based tree removal process with spatially defined phases will need to be considered for the large-scale removal of urban ash.

Some studies have suggested modeled decision-

making for homeowners attempting to weigh their options. McKenney and Pedlar (2012), suggest treatment may be the most cost-effective option for homeowners who want to preserve ash, as treatments would incur smaller, gradual payments. On a municipal scale, this option is not as cost-effective as cities are working with larger populations of ash and can consolidate removal and replacements to minimize costs. When possible, preserving healthy native ash trees should still be considered and prioritized, especially where they provide important ecological or community benefits. Inevitably, EAB will impact canopy cover, making it even more difficult for jurisdictions to meet their canopy cover goals. Clearly communicating these goals and management strategies with community members is essential so residents understand the challenges and can support long-term urban forest planning.

CULTURAL IMPORTANCE OF OREGON ASH FOR TRIBAL NATIONS AND INDIGENOUS COMMUNITIES

Writing Contributors: Jessica La Belle, WISC

The tree of primary concern in Washington state regarding cultural importance for Tribal Nations and Indigenous communities is the Oregon ash *(Fraxinus latifolia)*. While other species of ash in the *Fraxinus* genus have been planted ornamentally in urban areas as shade trees, or planted commercially for timber harvest, the Oregon ash is the only native ash tree in Washington state. As such, it has a rich history with the cultures of Tribal Nations and Indigenous communities in the Pacific Northwest.

While many plant health emergencies focus on plants as commodities with commercial or economic value, plants are significant in other ways that cannot be assigned a dollar amount. Oregon ash is a culturally significant ethnobotanical, meaning it is a plant that is important to the historical and modern lives of members of Tribal Nations and Indigenous communities. Culturally significant ethnobotanicals can include plants used in traditional medicine, ceremonies, or for cooking, as well as plants traditionally used to make shelters, bedding, clothing, dyes, baskets, tools, or weapons. They represent a rich cultural heritage that has been under threat in recent history, and many may also be threatened by the introduction of invasive species. Oregon ash is no exception.

Oregon ash as used by Pacific Northwest tribes: In tribes across the Pacific Northwest, Oregon ash is used in traditional medicine by crushing the roots to create salves used to treat wounds, by cold brewing a tea from the twigs to treat fevers, and by using the bark of the tree to purge the body of worms and parasites. Oregon ash is also used in ceremonies amongst various tribes and to create smoking pipes. Some tribes utilize the roots for basket weaving, and young trees are preferred for creating gathering buckets and trays. Older growth trees have historically been used to make canoe paddles, handles, walking canes, and tools like digging sticks, as well as firewood. Additionally, Oregon ash is important to Indigenous communities because of the many ways it supports healthy ecosystems. In wetlands, these trees help hold soil in place and stabilize the land. They also provide food and shelter for many other species, from birds and butterflies to mammals, helping sustain the broader web of life that Indigenous communities have long relied on and cared for.

Importance of other ash species across the US and impact from EAB: EAB has been sweeping across the United States and leaving a swathe of destroyed ash trees in its wake. Two ash species in the *Fraxinus* genus that are culturally important to tribes across the eastern US have been particularly affected: black ash *(Fraxinus nigra)*, and brown ash or pumpkin ash *(Fraxinus profunda).* These two species have been used by Indigenous peoples for thousands of years in ornate basketweaving and are considered keystone cultural species and culturally significant ethnobotanicals that are central in origin stories for many eastern tribes and First Nations peoples. Both species are invaluable for basketweaving and considered central to the art form in tribes across North America. As the trees fall to EAB, substitutes for black and brown ash have been explored but found lacking for basketweaving. EAB is a direct threat to tribal culture across North America and the Pacific Northwest.

Lessons learned for tribal preservation of *Fraxinus* species from other areas: Steps taken by other tribes in North America to conserve black and brown ash may also help preserve the cultural heritage and role of Oregon ash in the Pacific Northwest. These include harvesting ash before it is infested with EAB, in greater quantity than normally harvested; stockpiling and keeping ash logs underwater, delaying decay while preserving the springy flexible quality of the wood which many tribes require for basketry; freezing or drying partially processed wood that could be rehydrated later; seed collection and storage prior to EAB infestation; and chemical treatment of mature, seed-bearing trees.

ADDITIONAL RESOURCES

1. Emerald Ash Borer (EAB) in Oregon Research Webpage

Author/Source: OISC, OSU, ODF, and ODA
Summary: This resource compiles research on EAB in North America, including peer-reviewed articles, theses, and conference papers, organized by topic and covering areas such as economic impacts and management in natural areas.
Link: https://oregon-eab-geo.hub.arcgis.com/pages/research

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2. WSU Urban Forest Health Lab, Emerald Ash Borer Webpage

Author/Source: Washington State University
Summary: The WSU Urban Forest Health Lab provides resources, including an EAB webpage, that help communities understand the importance of trees and how to keep urban forests healthy.
Link: https://treehealth.wsu.edu/eab/

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3. Tribes Unite in Defense of Culture and Forests

Author/Source: Atmos, Funes, Y. (2023)
Summary: Atmos is a nonprofit media organization that shares stories connecting climate and culture, including coverage of how Indigenous communities are working to protect black ash trees and the cultural practices threatened by EAB.
Link: https://atmos.earth/science-and-nature/tribes-unite-in-defense-of-culture-and-the-black-ash-tree/

Chapter 3: Readiness

AT A GLANCE

Emerald ash borer (EAB) is on the move across the US; Washington's cities and towns, especially those with many ash trees, are at risk. Communities that act early by forming working groups, reviewing policies, diversifying their tree populations, monitoring ash, and setting up detection and response systems can cut costs, protect public safety, and preserve their urban canopy.

BUILDING STRONG, DIVERSE URBAN FORESTS

Once EAB arrives, communities with many ash trees risk losing ecosystem services (see Chapter 2) that support public health and livable neighborhoods. Planning ahead allows communities to assess ash populations, prioritize tree care or removal, and begin planting a wider mix of tree species.

Gosztyla, WA DNR UCF.

TRACKING ASH TREES

Ash trees grow along streams, wetlands, streets, parks, schools, and yards. Knowing where ash trees are helps communities plan removals, replacements, and protection measures. Inventories should include species, location, size, condition, and nearby infrastructure. Even small inventories help build a statewide picture of risk.

REPLACING ASH

As urban ash trees and native ash stands are lost or removed, communities should choose a mix of replacement species that can handle urban stress and also support natural ecosystems.

REPORTING EAB

If you see a suspected EAB, take a photo. Report it immediately by email, app, website, or phone (see page 5). Save the insect if possible.

DETECTING AND MONITORING EAB

Detection efforts should be prioritized in high-risk areas where EAB is most likely to arrive first. Strategies include:

- Visual surveys: One of the most effective early detection tools; any level of effort helps. Field staff and trained volunteers can regularly inspect ash trees for signs of EAB.
- Key symptoms to look for: thinning canopy, dieback, epicormic shoots, basal sprouting, bark splitting, woodpecker flecking, S-shaped larval galleries, and D-shaped exit holes (see Chapter 3).
- Trapping: Purple prism or equivalent traps should be deployed in ash trees annually during adult flight season (May–August).

KEY TAKEAWAY

EAB threatens more than trees. Mapping, monitoring, and early detection are essential. Healthy trees and strong partnerships reduce long-term losses. Additionally, tree diversity is an important defense. Proactive planning puts communities in control, turning potential crises into manageable action.

Chapter 3: Readiness

EMERALD ASH BORER PREPAREDNESS PLANNING

Writing Contributors: Zeima Kassahun, WA DNR UCF & Jamie Lim, Seattle Parks and Recreation

Preparedness planning for EAB should begin before infestations become widespread. Early planning allows jurisdictions to better understand potential impacts, evaluate available resources, and develop response strategies that align with local priorities.

One important component of preparedness is the formation of an interagency or interdepartmental working group. These groups may include representatives from parks departments, public works, planning departments, urban forestry programs, conservation districts, and state agencies. Such groups facilitate coordination of monitoring efforts, information sharing, and public outreach.

Resource planning is also a key part of early preparation. Jurisdictions should assess available staff capacity, operational capabilities, and financial resources that can support monitoring, treatment, removal, and replacement of ash trees. Understanding these resources early allows managers to anticipate gaps and develop strategies to address them before EAB impacts intensify.

JURISDICTION-LEVEL PLANNING

Effective EAB preparedness requires planning at the local jurisdiction level. Each municipality, county, or land management agency will have different levels of ash abundance, staffing capacity, and financial resources. Local planning should therefore focus on evaluating internal resources and developing strategies that reflect those realities.

- **Budget and Resource Assessment:** A critical early step is conducting a budget and resource assessment to understand what funding and operational capacity are available to support EAB management activities.
- **Internal Budget Allocation:** Jurisdictions should review existing urban forestry or vegetation management budgets to determine whether current funding can support EAB-related work such as monitoring, insecticide treatments, removals, and replacement planting. In many cases, EAB response activities will need to be integrated into routine maintenance operations.
- **Resource Capacity:** In addition to financial resources, jurisdictions should assess operational capacity, including staffing levels and infrastructure needed to support response activities. Communities should evaluate whether existing staff have sufficient capacity to perform EAB-related work. This may include: tree inspections and monitoring, insecticide treatment programs, removal of declining ash trees, and replacement planting efforts. In some cases, jurisdictions may need to supplement internal staff with contracted services to manage increased workloads.
- **Planning for Wood Waste:** EAB infestations can result in the removal of a large number of ash trees over a relatively short period of time. As ash mortality increases, municipalities may experience a substantial increase in woody debris from tree removals, including logs, branches, and chips. Without a clear strategy for handling this material, communities may face operational bottlenecks, increased disposal costs, and missed

opportunities to recover value from removed trees. Developing a wood waste management plan early in the EAB planning process can help jurisdictions efficiently manage the volume of material generated during removals while supporting environmental and economic benefits. Proper planning for wood waste management is important for several reasons:

- **Operational Efficiency:** Ash tree removals during an EAB outbreak can quickly overwhelm existing municipal disposal systems. Communities that plan for processing, transportation, and storage of wood materials are better positioned to avoid disruptions in removal operations.
- **Cost Management:** Disposal costs for large volumes of wood waste can be significant. Developing partnerships with local mills, biomass facilities, or wood recycling programs can reduce disposal costs and, in some cases, generate revenue from wood products.
- **Resource Recovery and Sustainability:** Urban wood represents a valuable resource that can be reused for lumber, furniture, flooring, mulch, compost, or bioenergy production. Recycling wood from removed ash trees supports circular economy principles and reduces material sent to landfills.

PLANNING CONSIDERATIONS

Local policies and regulatory frameworks can significantly influence how jurisdictions respond to invasive pests. Jurisdictions should review relevant internal policies, tree codes, and ordinances to determine whether existing regulations support or hinder proactive EAB management. Key considerations include:

- **Internal Policies:** Operational policies governing tree maintenance, removal procedures, and pest management programs should be evaluated to ensure they allow flexibility when responding to invasive pests.
- **Tree Codes and Local Ordinances:** Tree protection ordinances or removal permitting requirements may unintentionally slow proactive management efforts. For example, regulations designed to preserve canopy cover may restrict removal of ash trees prior to infestation or decline. Jurisdictions may consider modifying policies to allow exceptions for invasive pest management.
- **Treatment Chemical Approvals:** Communities implementing insecticide treatment programs must ensure that approved chemicals comply with local pesticide regulations and environmental protection policies. Coordination with regulatory agencies may be necessary when treatments occur near waterways or sensitive habitats.

REVIEW OF PROGRAMS AND PLANS

Reference can be made to a community's urban forest management plan or vegetation plan, if one exists, to assess how local forestry strategies relate to the potential impacts of EAB. Urban forestry programs, staff, and community groups responsible for managing or planting trees should coordinate to integrate goals, strategic plans, and policies addressing invasive pests. Tree maintenance plans should be reviewed with field crews to avoid pruning during EAB adult flight season, ensure proper disposal of ash wood waste, and promote identification of EAB signs and symptoms. Public education and training for tree care workers can support participation in the response strategy, while policies and maintenance plans should be updated to remain adaptable to new information.

MAPPING ASH TREES ACROSS WASHINGTON

Writing Contributors: Daria Gosztyla, WA DNR UCF & Drew Lyons, WA DNR

Mapping existing ash trees and analyzing the collected data are central components of emerald ash borer (EAB) preparedness. Multiple native *Fraxinus latifolia* (Oregon ash) range maps exist for Washington state and illustrate that naturally occurring ash are concentrated primarily west of the Cascades in wetlands and along streams, lakes, and riverbanks as seen in Figure 3.1. An additional reference for tracking Oregon ash is the Burke Herbarium Image Collection. However, the risk posed by EAB extends beyond native Oregon ash. Thousands of planted ash trees and other susceptible species of the olive family (such as white fringetree) are present across Washington's urban, suburban and rural landscapes.

These trees line streets and rights-of-way, shading parks and school grounds, growing in front yards, commercial districts, homesteads and other managed forested spaces. Aggregated urban tree inventory data from more than 68 Washington communities (managed by the Washington Department of Natural Resources) shows that nearly all cities have ash represented in their public tree populations, see Table 1 for a list of ash tree species in Washington state's urban tree inventories. The proportion of ash varies: in some communities, ash makes up only a small fraction of the inventoried trees, while in others, ash has approached 1 in 3 of all recorded trees.

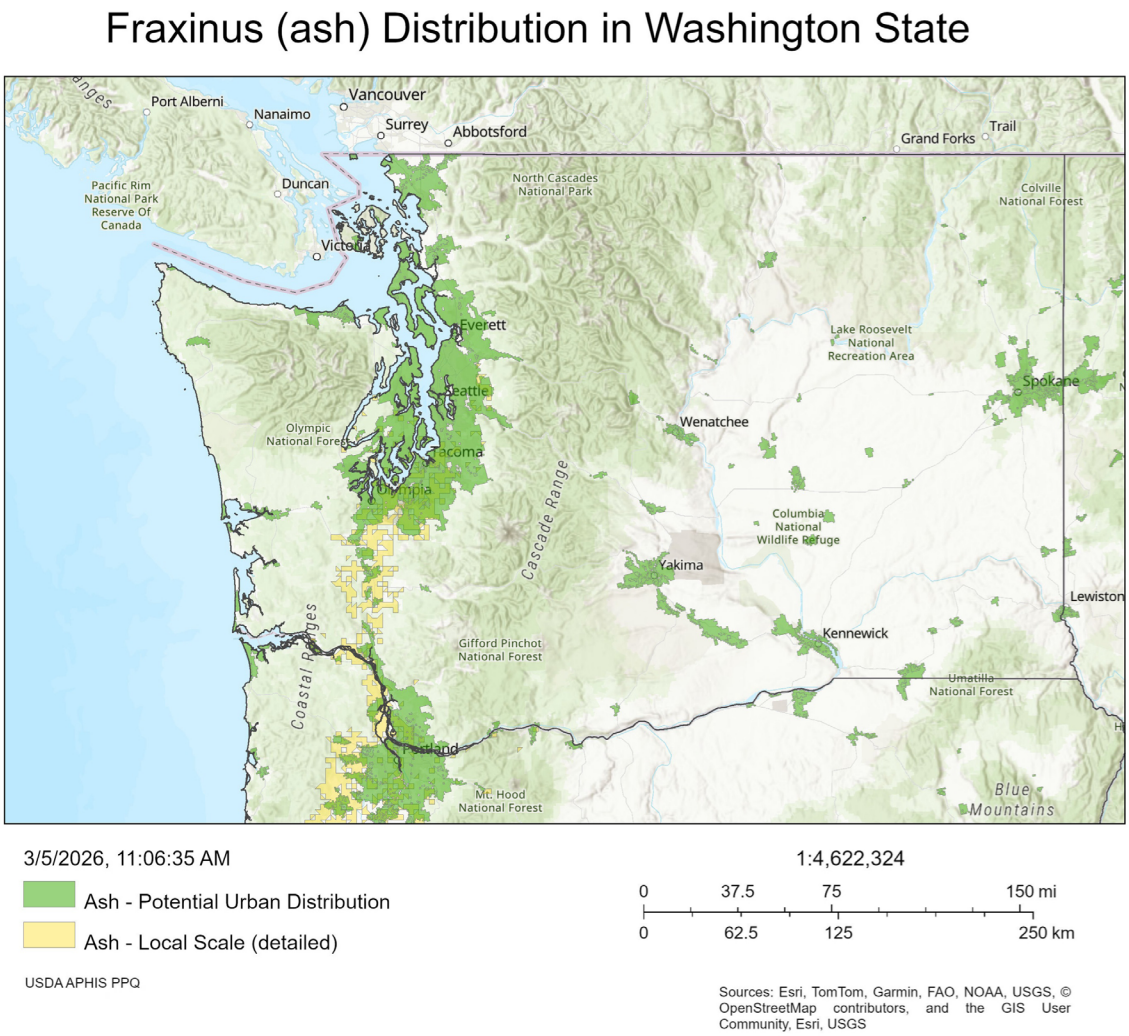

Figure 3.1: Potential urban distribution and local scale ash distribution in Washington state.

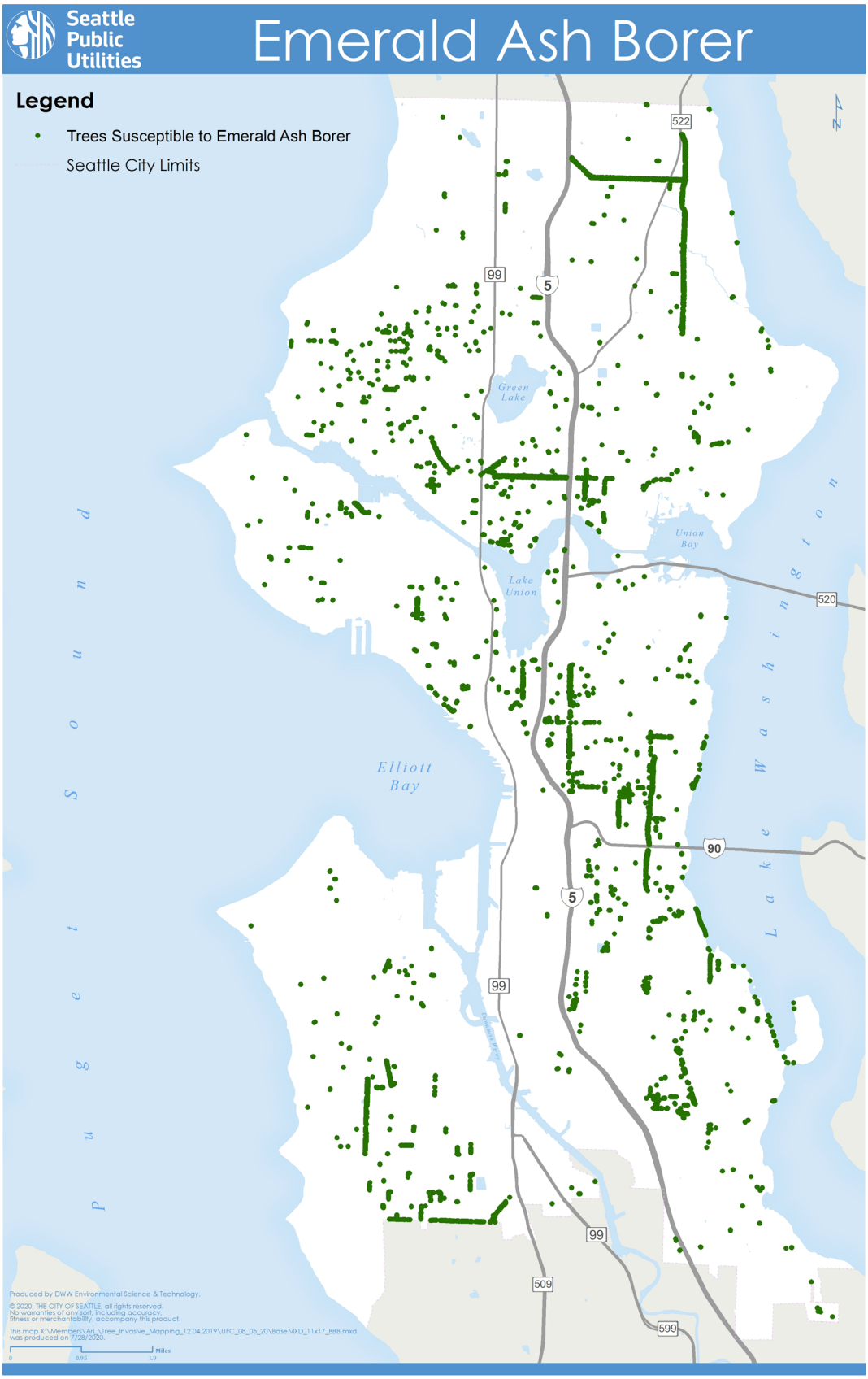

Figure 3.2: Understanding risk: Public trees susceptible to EAB in Seattle, WA. Ash is heavily lined in numerous transportation corridors in Seattle.

To understand and manage EAB risk, communities, land managers and private property owners alike need more than a general awareness that ash trees are present. Instead, they need a current, spatially explicit understanding of the location, condition, and benefits of these trees. One of the most effective preparedness steps is to develop or update a tree inventory and store the data in a geospatial database. At a minimum, this inventory should capture species, diameter, location, condition, and management-relevant attributes (such as proximity to infrastructure, trails or public use areas). This detailed information enables managers to identify high-value ash for possible treatment or utilization, anticipate future hazards, prioritize removals and replacements, and understand where EAB-related impacts are likely to be most severe.

A well-maintained GIS-based (Geographic Information System) tree inventory also serves as a powerful tool for communication and planning. Spatial analyses can highlight neighborhoods, transportation corridors, or land types (such as schools or parks) where vulnerable ash are clustered, as seen in Figure 3.2. This allows managers to target outreach, funding requests, and community engagement. When paired with additional canopy cover data, inventories can reveal places where ash provides critical shade, habitat and environmental benefits. This information supports decisions regarding additional protections, phased removals, or areas where accelerated replanting may be warranted.

Importantly, every updated dataset contributes to a clearer statewide picture of EAB risk. Small forest landowners and other private property owners can play a meaningful role by identifying ash on their land, recording basic information and sharing data with local and state partners. Even simple inventories can help broaden our collective understanding of where ash occurs across Washington's landscapes. Keeping inventory data current, especially for ash, is itself a key preparedness activity and ensures land managers have the clearest possible picture of their risk exposure and management options as EAB spreads.

Table 1: *Fraxinus* (ash) species found in Washington state's urban tree inventories.

Botanical Name	Common Name(s)
Fraxinus latifolia	Oregon ash
Fraxinus americana	White ash
Fraxinus pennsylvanica	Green ash
Fraxinus angustifolia	Narrow-leaved ash
Fraxinus excelsior	European ash
Fraxinus velutina	Velvet ash | Arizona ash
Fraxinus quadrangulata	Blue ash
Fraxinus ornus	Flowering ash | Manna ash
Fraxinus profunda	Pumpkin ash

LOSS PREVENTION PLANNING: DIVERSITY MODERATES IMPACTS ON COMMUNITIES AND ECOSYSTEMS IN THE FACE OF EAB

Writing Contributors: Adam Airoldi, State Parks & Fiona Paquette, Samara Group & Michael Sanborn, WA DNR UCF

NATIVE ASH TREE STANDS

Preserving native Oregon ash *(Fraxinus latifolia)* where possible before the arrival of EAB is an important management goal as these trees play critical ecological roles in riparian and wetland ecosystems by providing shade, stabilizing banks, filtering pollutants, and supporting wildlife habitat. To manage natural areas with native Oregon ash, it is recommended to keep and foster the healthiest trees, while also planting a mix of other native species so the forest remains strong as the ash trees slowly decline (Portland Parks & Recreation, 2025). Prioritize replacing small or stressed ash trees that are unlikely to respond to treatment, while retaining and supporting healthy, well-formed individuals through practices like selective thinning and, for high-value trees, preventative insecticide treatment (Minnesota DNR, n.d.; Portland Parks & Recreation, 2025).

When planning for the loss of native ash tree stands in natural areas, it is important to consult regional native plant lists to identify suitable replacement species that will thrive in local conditions and support wildlife and ecosystem functions. Suggested resources include: WA Native Plant Society, WSU Native Plant Resources, and Native Plants PNW. The table below provides a few examples of native species that could serve as replacements for Oregon ash.

Table 2: Selective list of PNW native plant species organized by ecosystem services as compared to Oregon ash (Hill et al., 2019; Burns et al., 1990; OSU Alternatives to Ash in Western Oregon).

	Oregon ash	Bigleaf maple	Bitter cherry	Black cottonwood	Black hawthorne	Cascara	Chokecherry	Douglas fir	Garry oak	Grand fir	Incense cedar	Ponderosa pine	Quaking aspen	Red alder	Shore pine	Western crabapple	Western redcedar	White alder	Willow
Flood Protection	X	X	X	X	X	X	X						X	X	X		X	X	X
Biodiversity	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Primary Production	X	X		X				X		X		X	X	X				X	X
Climate Regulation	X	X		X				X	X	X	X	X	X	X	X		X		X
Nutrient Cycling	X	X	X	X					X	X			X	X				X	X
Soil Formation	X	X	X	X				X					X	X				X	X
Water Quality	X	X	X	X	X	X	X						X	X	X	X	X	X	X

URBAN AND COMMUNITY ASH TREES

As ash trees are lost or proactively removed, communities should prioritize planting a diverse mix of alternative species that can tolerate urban stressors while continuing to provide shade and pollution control, strengthening resilience to the impacts of EAB. Many urban landscapes, parks, streetscapes, and green infrastructure systems remain vulnerable due to past planting practices that relied heavily on ash. Planning and management decisions today, focused on resilience and incorporating a mix of tree species, can reduce future losses, spread costs over time, and keep urban and rural forests healthy. Thoughtful planting across neighborhoods, parks, and streets ensures that even as ash trees are lost, canopy cover, shade, cooling, and other benefits continue to support livable communities statewide.

Ash has been a standard and ubiquitous street tree across the United States since the 1960s when urban landscapes were denuded and transformed by the loss of American elm to Dutch elm disease. In Washington cities, ash has been widely planted since the mid-20th century as a street and park tree. City planners and urban foresters planted ash to fill gaps in urban forest canopy with good results in shade, aesthetics, and ecosystem services. Unfortunately, the generational loss of a dominant tree species from our urban forests is repeating today with ash across North America. In Milwaukee, Wisconsin alone, over half a million ash trees were removed in the wake of EAB. The lessons from the 20th century can be learned and applied today: plant diverse urban forests and streetscapes for more resilient, sustainable, and vibrant urban forests.

Diversity in urban forests serves to meet communities' needs for environmental, social, health, and economic well-being. Species selection guided by the 10-20-30 rule, or even further by the 5-10-20 rule offers managers a framework for resilience planning. This framework, calling for planting not more than 10 percent of any one species, 20 percent of a single genus, and 30 percent of any one family helps prevent the dramatic losses communities are facing today (Wisconsin DNR). While it is worth noting that most cities, and even many natural forests, fall short of fully meeting the 10-20-30 guideline, and the stricter 5-10-20 rule may be unrealistic in practice, these targets remain a useful guide for promoting diversity and avoiding over-reliance on a few species. In addition, increased species richness (number of species) in any given area offers increased biodiversity not only of the trees planted, but by supporting a wider array of flora and fauna in an expanded urban forest (NC State University).

Species selection can be tailored to the unique growing conditions of urban environments, using the "right tree, right place" approach. In urban forests, the right tree can be decided based on many factors including the desired ecosystem services, size, color, shape, etc. The extreme environment of the urban forest also affects which trees can thrive or even survive in any location. Parking lot islands can be more than fifteen degrees Fahrenheit warmer than surrounding natural areas, urban soils collect pollutants and are compacted by vehicles, pedestrians, and engineering specifications, while tree wells or planting strips offer a fraction of the soil volume available to trees in an undeveloped landscape. In spite of these challenges, many hardy and beautiful tree species suitable to the Pacific Northwest offer planners, architects, landscapers, and managers a suite of species to meet their needs. Beautiful, sustainable, and enduring streetscapes come from intentional design around the diverse palette of trees that will thrive in our urban forests.

Lessons from past and present crises teach us that any individual species can fall victim to insects and disease outbreaks, but that streetscapes planted with diverse species, genera, and families of trees are better able to weather these storms. Site specific conditions will determine the actual selection for which trees to plant in an area.

This guide is not intended to endorse individual species for a specific location, but instead offer tools to help in establishing a vibrant, enduring, and sustainable streetscape with the species best suited to provide ecosystem services and meet environmental and social needs of the area. Seattle Department of Transportation maintains a useful tool for filtering species to site specific criteria: https://public.tableau.com/views/SDOTTreeSelector/Dashboard.

Examples of streetscapes requiring trees with specific characteristics include pocket parks, urban centers, boulevards, and medians. Ash has been widely used because of its tolerance of urban soils, ability to moderate pollution, and shady canopy. As ash is threatened and lost across our communities, selecting alternative species based on ecosystem services offers a systematic approach to filling these gaps.

- **Pocket park:** A small greenspace offers an oasis for people, birds, and animals. Four tree species at this location were selected based on their ability to fill a function for the urban environment and collectively provide ecosystem services that increase indefinitely over the long term. Diversity, even in small pockets, serves to ensure these services to the community can withstand an uncertain future of disease, drought, pests, heat, and storms.

Figure 3.3: Example of a pocket park, specific tree recommendations should be based on local planting guides (Hankinson, Street Trees 2025).

- **Residential neighborhood:** Street trees in our communities help improve physical and mental health, improve children's learning, reduce air and water pollution, moderate extreme temperatures, and reduce costs of stormwater treatment. Residential neighborhoods may have narrow planting areas limited by infrastructure including sidewalks, curbs, foundations, sewer, water, and electrical lines. This cul-de-sac offers an example of alternating species selected to fit between the sidewalk and curb, while providing shade, screening, and green infrastructure services. This design also reduces the chances of disease transmission via roots from one tree of the same species to the next. Landscape architects, planners, arborists, and urban foresters can offer ideas for species that will help every neighborhood thrive.

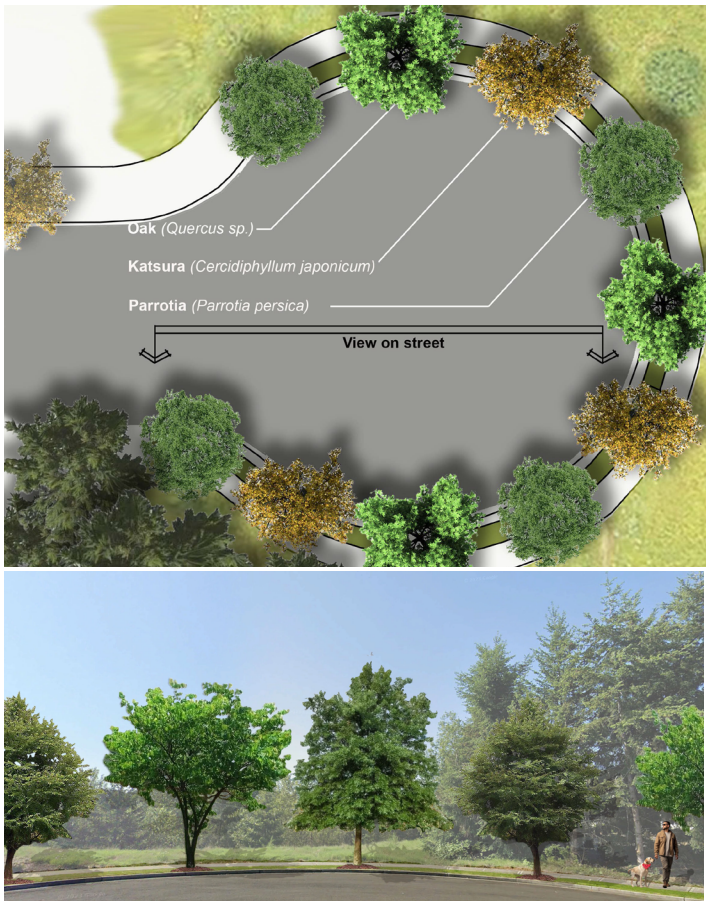

Figure 3.4: Example of alternating species of street trees in residential neighborhoods, specific tree recommendations should be based on local planting guides (Hankinson, Street Trees 2025).

- **Boulevard and median:** Street trees along busy arterials provide opportunity for residents and visitors to feel the vitality, beauty, and resilience of their community. Street trees are shown to reduce traffic speeds, lower stress levels, and increase economic activity in a city center. This example shows a boulevard with trees on both sides and in the center median. Small trees are planted under the electrical lines on one side, while the space in the center is occupied by large shade trees, reducing the urban heat island effect and physically defining the travel lane. Head-on collisions are reduced when there is a physical barrier between opposing traffic, and slower traffic speeds reduce severe injuries. Trees planted along the adjacent parking lot also reduce heat absorbed by cars, pavement, and buildings, making the community more liveable and healthy. Visitors to businesses with tree-lined streets are likely to spend more time and money enjoying the area and supporting the community.

Table 3 (following page) highlights a range of example tree and shrub species organized by the ecosystem services they provide, as in the benefits that they contribute to people and the environment. In urban settings, these services are especially valuable: species selected for urban hardiness are better able to withstand stressors like heat, drought, pollution, and compacted soils; shade trees help reduce urban heat, lower energy costs, and improve human comfort; trees that support habitat provide food and shelter for birds, pollinators, and other wildlife, contributing to urban biodiversity; green infrastructure species assist with stormwater management by intercepting rainfall, improving infiltration, and reducing runoff; and trees suited for small spaces make it possible to expand canopy cover even in constrained urban environments.

This table is intended as a starting point and includes example species compiled from guidance developed by multiple municipal and state agencies, including the City of Seattle, City of Vancouver (BC), Portland, Ellensburg, the City of Camas (WA), and Spokane. Since climate, soils, and site conditions vary widely across Washington, species selection should always be cross-referenced with local tree lists and guidance to ensure the right tree is planted in the right place.

Maintaining a healthy urban tree canopy is essential as ash loss reduces overall cover in many communities. Prioritizing tree diversity, by avoiding monocultures and increasing the mix of non-ash species, will help build resilience to future pests and stressors.

Figure 3.5: Example of street trees in boulevards and medians, specific tree recommendations should be based on local planting guides (Hankinson, Street Trees 2025).

Table 3: Example tree and shrub species that can be used as alternatives to ash *(Fraxinus* spp.) in cities and communities, grouped under categories of ecosystem services, including urban hardiness, shade, habitat, green infrastructure, and resiliency in small spaces.

Tolerant to Urban Stressors	Provides Shade	Provides Habitat to Urban Wildlife	Stormwater / Green Infrastructure	Resilient in Small Spaces
Cork tree	Beech	Buckeye	Sumac	American hornbeam
Elm	Cedar (Cedrus)	Catalpa	Bald cypress	Crapemyrtle
Coffeetree	Cryptomeria	Chestnut	Cascara*	Pacific Dogwood*
Ginkgo	Dawn redwood	Chitalpa	Coffeetree	Golden rain tree
Persian ironwood	Dove tree	Douglas-fir*	Hackberry*	Amur maackia
Linden	Oak, bur	Incense cedar*	Honeylocust	Magnolia
Oak, Italian	Oak, chinquapin	Madrone*	Hornbeam	Mountain ash
Oak, red	Oak, English	Western or Sitka Mountain ash*	Linden	Redbud
Oak, shumard	Oak, willow	Oak, white	Pagoda tree	Serviceberry*
Oak, swamp white	Sassafras	Osage orange	Oak, sawtooth	Silverbell
Chinese pistache	Sequoia*	Persimmon	Oak, scarlet	Snowbell
Planetree	Tuliptree	Pine *	Oak, shingle	Stewartia
Tupelo	Western redcedar*	Spruce*	Parrotia	Strawberry tree
Zelkova	Yellowwood	Walnut	Tupelo	Tree-lilac

*PNW Natives

SURVEY AND DETECTION PROTOCOLS OF EMERALD ASH BORER

Writing Contributors: Jamie Lim, Seattle Parks & Rec & Sven-Erik Spichiger, WSDA

Effective survey and detection protocols are the foundation of emerald ash borer (EAB) preparedness and response. This section outlines recommended approaches for detection, delimiting surveys, and monitoring to support early detection and informed decision-making across both public and private landscapes. Capacity, funding, and available resources vary, so these recommendations are intended to provide a flexible framework that can be adapted to local needs and constraints. Readers are encouraged to consult the Preparedness Funding section for potential funding strategies to support survey and trapping efforts. It is important to note that there is currently no formal statewide EAB response framework in Washington and no single lead agency; successful detection efforts will rely on coordinated action across state, local, federal, academic, nonprofit partners and engaged private property owners.

Survey Objectives

- Detect the presence of EAB in Washington as early as possible to enable rapid response and containment.
- Monitor ash tree health and population changes over time to support adaptive management and prioritization.
- Provide standardized, shareable data to inform decision-making across local, regional, and state partners.
- Support interagency coordination through consistent data collection, communication, and reporting protocols.

Interagency Roles

- State Agencies: Washington Department of Natural Resources (DNR), Washington Invasive Species Council (WISC), and Washington State Department of Agriculture (WSDA) will confirm first positive EAB detections and provide support and resources for response.
- Municipal Partners and Private Property Owners: Cities and counties (e.g., parks departments or transportation departments) as well as private property owners can conduct field monitoring, trap deployment, and data reporting within their properties.
- Academic and Non-Profit Partners: Universities, Cooperative Extension, and community organizations can assist in volunteer training, support the development of research-based resources, and conduct public outreach.
- Federal Coordination: United States Department of Agriculture (USDA-APHIS) will provide diagnostic confirmation and limited technical support including confirming identification and biocontrol releases of parasitoid wasps.

Detection, delimiting surveys, and monitoring can provide the data needed to make informed decisions and assess the effectiveness of management activities. Detection surveys are conducted to determine whether EAB is present in an area. Delimiting surveys are conducted after a detection to define the extent, boundaries, and population characteristics of an infestation. Monitoring involves repeated observations over time to track changes in EAB populations, spread, and management outcomes. Surveys can help identify sites for biological control releases and monitoring can help to gauge the effectiveness of a parasitoid release.

Organizations and private property owners considering survey activities should consider researching available tools and protocols that have been developed for this pest. A good summary can be found in Chapter 5 of the USDA-APHIS EAB Program Manual which was recently updated in 2025. Though updated, there are advances in trapping that are not discussed in the manual. These are important to be aware of as they offer alternatives to the purple panel

traps referenced in the EAB program manual. The manual trap recommendations are based on 2009 research. A USDA Forest Service publication from 2019 offers more trap options depending on what the purpose of an organization's survey is. Before making a choice on trap type, organizations are encouraged to read the publication: Trap design, colors, and lures for EAB detection | USDA Forest Service Research and Development.

Trap designs with high detection rates like baited green/purple double-decker traps, visual survey, and public reporting would be appropriate tools to help determine if EAB is present in an area. Selected traps and visual surveys intended for detection should target sites that are at high risk for introduction to maximize the chance of detection, refer to the Monitoring Prioritization section below. In addition, areas close to known infestations where no detections have occurred should be targeted for public reporting outreach, which will supplement the chance for detections in locations where trapping or visual survey is not being conducted.

To maximize the likelihood of detection and ensure efficient use of resources, trapping should be timed to coincide with periods when adult beetles are actively flying. Adult emergence and flight activity of EAB are closely linked to temperature, making degree-day models a valuable tool for predicting when beetles are present and traps will be most effective. Weekly degree-day phenology maps, provided on the Spatial Analytic Framework for Advanced Risk Information Systems (SAFARIS) website, allow managers to track accumulated heat units and identify when emergence and peak activity are expected to occur across different regions. Using these maps to guide trap deployment and monitoring schedules can improve early detection efforts and help prioritize timing for surveys and outreach.

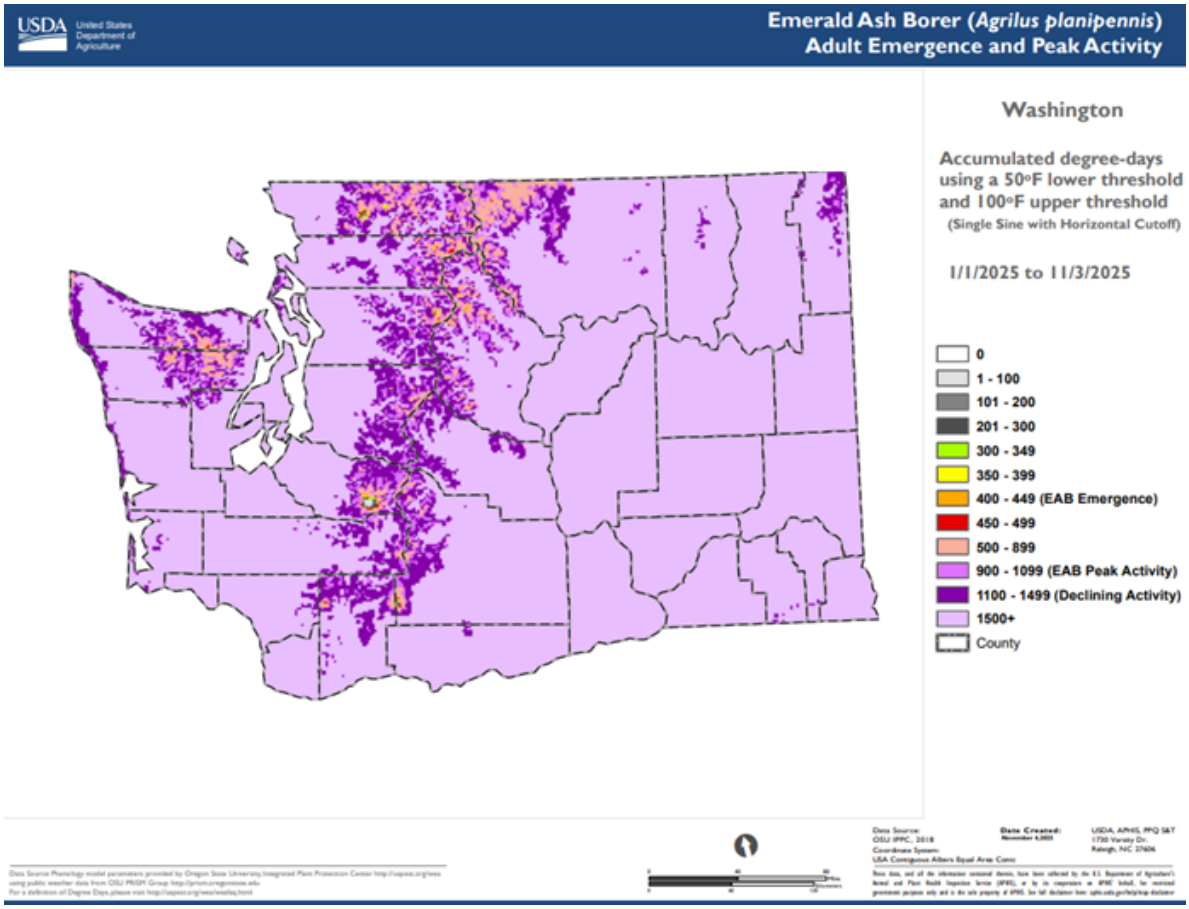

Figure 3.6: Predicted timing of EAB adult emergence and peak activity across Washington based on accumulated degree days, illustrating regional variation in beetle phenology and identifying optimal windows for trap deployment and monitoring.

TRAPPING AND MONITORING METHODS

Early detection of EAB is critical to minimize ecological loss, maintain public safety, and manage fiscal impacts. This section outlines a coordinated, science-based approach to detecting, tracking, and reporting EAB activity across jurisdictions and agencies.

Monitoring Prioritization

Monitoring and trapping should be prioritized based on risk of introduction, ash canopy composition, and management significance. Recommended target sites include:

- Locations where firewood is brought into the state for recreation such as campgrounds, sports venues, and other day use areas.
- Areas with frequent movement of firewood, nursery stock, green waste, or lumber products (e.g., maintenance yards, industrial sites, ports where logs are exported).
- Areas with high concentrations of ash *(Fraxinus* spp.) trees, including those adjacent to known populations and zones within proximity (≤ 25 miles) of confirmed detections in Oregon, British Columbia, or Idaho.
- Sites where out-of-state vehicles may park like rest areas, roadside pull-offs, truck stops, and restaurant parking lots that are in close proximity to major highways.
- High-value public assets or safety-sensitive areas (e.g., roadsides, recreation areas, utilities).
- Areas where ash trees are displaying signs of dieback/thinning, epicormic sprouting (see below), or mortality.

Monitoring Methods

- **Visual Surveys:** Regular visual surveys are one of the most effective tools for early detection, and any level of effort, no matter how small, is far better than none. Whenever possible, collaborate with local, state, and federal partners to strengthen capacity and coverage. Field staff and trained volunteers can be deployed to conduct systematic visual inspections of ash trees to identify potential EAB signs and symptoms, including thinning canopy and dieback, epicormic shoots, basal sprouting, bark splitting, woodpecker flecking, S-shaped larval galleries, and D-shaped exit holes (Figures 3.7-3.10). Visual surveys are a crucial tool for detecting EAB early and understanding its spread. Focusing on woodpecker and squirrel damage, as well as dieback visible from a distance, can be particularly productive. Survey data should include tree condition ratings, diameter, GPS coordinates, photos, and management jurisdiction. Using standardized digital data forms makes it easier to upload and manage information in Field Maps or other GIS platforms. Cataloging this data not only supports state detection maps but also helps track the spread of EAB over time, improving early detection and response efforts.

Figure 3.7: Ash with thinning canopy (Gosztyla, WA DNR UCF).

Figure 3.8: Bark splitting due to EAB stress (Gosztyla, WA DNR UCF).

Figure 3.9: Images illustrating key signs of an EAB infestation. The left photo shows the characteristic S-shaped larval galleries found beneath the bark, where larvae feed and create winding tunnels. The right photo displays the D-shaped adult exit holes through which mature beetles emerge.

Figure 3.10: Epicormic shoots occur when a tree produces clusters of new shoots from buds that were previously dormant beneath the bark on its trunk or branches. Basal sprouting occurs when a plant grows new shoots from hidden buds near the base of its trunk or roots. Both are often a response to stress or damage.

- **Trap-Based Monitoring:** Purple prism traps or equivalent detection traps (see the list of recommended resources in the Survey and Detection Protocols section above) should be deployed annually during the adult EAB flight period (May–August). Traps should be baited with Z-3-hexenol and placed in ash trees at canopy height within priority monitoring zones. The specific number and placement of traps should be tailored to the situation and the management goals of the landowner or managing organization, considering site conditions, infestation level, and resources available. Recommended methods include:
  - **Installation and Inspection:** Traps installed in early spring, checked at least twice during the season, and removed by fall
  - **Trap Density:** One trap per 1–2 square miles in urban areas, adjusted based on risk level and canopy density
  - **Data Collection:** Each trap site recorded with GPS coordinates, installation and retrieval dates, lure lot numbers, and monitoring results (presence/absence, number of beetles)
  - **Follow-Up:** Positive detections trigger delimitation surveys, which involve additional trapping and visual inspections within a defined radius, typically 1–5 miles, from the confirmed site. These targeted surveys are designed to determine the geographic boundaries of a new infestation and map how far the beetle has spread.

Trap-Based Data Management and Reporting Recommendations

- **Track and Coordinate Trapping Efforts:** Currently, there is no statewide repository for EAB trap data. Local municipalities should systematically document all EAB trapping activities and collaborate with local, state, and federal partners. Any detection in a previously uninfested county should be reported to WSDA immediately.
- **Centralize Monitoring Data:** Monitoring and trap data should be maintained in an interagency GIS database compatible with platforms such as TreePlotter, Field Maps, and other relevant dashboards.
- **Standardize Data Fields:** All data should follow consistent naming conventions, including tree ID, GPS coordinates, survey date, condition code, and detection results.
- **Summarize Data Annually:** Prepare yearly summaries that detail the number of traps deployed, detections recorded, geographic spread, and trends in ash tree condition.
- **Report Confirmed Detections Promptly:** Confirmed EAB detections should be reported immediately to WSDA and WISC who will contact USDA-APHIS.

Other Monitoring Options and Resources

- Trap Trees: A detection tool for EAB: Forest Health & Monitoring: Maine Forest Service: Maine DACF.
- Branch sampling: A strategy to detect EAB: Idaho Department of Lands Forest Health.

Figure 3.11: EAB purple prism trap (Kenneth R. Law, USDA APHIS PPQ, Bugwood.org).

CONTINUOUS MONITORING AND ADAPTIVE MANAGEMENT

Monitoring and trapping protocols should be reviewed annually (or as new science emerges) to incorporate improved trap technology, detection tools, and data management practices. Recommendations for annual reviews include:

- **Evaluate Trap Performance and Coverage:** Assess the effectiveness of trap placement, design, and geographic coverage to ensure monitoring is optimized.
- **Assess Data Reliability:** Review false positive and false negative rates, and confirm the accuracy and consistency of collected data.
- **Review Resource Allocation:** Examine the efficiency and cost-effectiveness of staffing, equipment, and other resources used in monitoring and response activities.
- **Incorporate New Detection Methods:** Explore opportunities to integrate innovative approaches, such as biosurveillance, remote sensing, or other emerging technologies, into monitoring efforts.

Recommendations for public engagement and training surrounding trapping and monitoring include:

- **Expand Volunteer Participation:** Strengthen early detection capacity by involving community volunteers and community science platforms.
- **Enhance Public Outreach:** Develop and distribute clear materials on EAB identification, reporting procedures, and the importance of preventing firewood movement.
- **Conduct Training Sessions:** Host interagency and community workshops on survey and trap protocols, data management, and response readiness.

Understanding Trapping Limitations

Traps are a valuable early detection tool but not a control method. Visual and trap-based monitoring have inherent limitations, including delayed symptom expression and potential under-detection in low-density populations. Therefore, monitoring should be integrated with other management tools and long-term urban and rural forest resilience strategies.

Photo Credit: Kelly Oten, North Carolina State University, Bugwood.org.

PROCESS OF PUBLIC REPORTING

Writing Contributors: Sven-Erik Spichiger, WSDA

The initial detection of EAB in Washington will need to be confirmed as an official sample. An official sample is a physical specimen of a life stage of EAB. The specimen must tentatively be identified by the Washington State Department of Agriculture (WSDA) and then confirmed by the USDA. WSDA is responsible for designating pest status (positive or negative) for the state and for each individual county in Washington for all plant pests including EAB. Full credit is always given to the first detector but the sample must go through WSDA and the USDA to be considered as official. After EAB has been officially confirmed in the state or in an individual county, additional reports from known infested counties in Washington are not required to be taken as official samples.

Public reporting is a critical tool for early detection and effective management of EAB. Agencies, organizations, and individuals who wish to document and report sightings should follow the steps below to ensure accurate verification and timely response. Following these steps ensures reports are accurate, verifiable, and useful for state management efforts.

Public Reporting Process

1. **Document the sighting:** Advise the observer to take a high-quality photo of the insect, as clear images are necessary for verification.
2. **Submit the report immediately:** Provide multiple reporting options for the public:
   - WA Invasives Mobile App – report directly from a phone or tablet.
   - Online: invasivespecies.wa.gov/report-a-sighting/
   - Email: InvasiveSpecies@rco.wa.gov or pest@agr.wa.gov
   - Phone: Washington State Department of Agriculture Pest Hotline at 800-443-6684
3. **Specimen preservation (if possible):** Explain that preserving the specimen may be requested for verification. Recommended methods include:
   - Bagging and freezing the insect, or
   - Placing it in a vial with ethanol (preferred) or isopropyl alcohol.
   - Instruct observers to record relevant details: date, collector name, and GPS coordinates or address where the specimen was collected.

PREPAREDNESS FUNDING

Writing Contributors: Fiona Paquette, Samara Group

Preparedness funding for EAB supports activities such as early detection and monitoring, public education, professional and volunteer training, management planning, and the removal or treatment of infested trees. These activities require investment at multiple levels, from local municipalities and tribal governments to regional collaborations and state agencies. Securing funding requires understanding the diversity of available sources, aligning project objectives with funding priorities, and developing strong proposals.

FEDERAL FUNDING OPPORTUNITIES

The USDA Forest Service offers several funding programs that could support EAB preparedness and response in Washington:

- **Forest Health Monitoring (FHM) Grants:** https://www.fs.usda.gov/science-technology/forest-health-protection/monitoring. These competitive grants support projects that protect forest resources from threats including invasive species like EAB. Eligible activities include monitoring, detection, treatment planning, and community outreach.
- **Urban and Community Forestry Grants:** https://www.fs.usda.gov/managing-land/urban-forests/ucf. Administered through state forestry agencies, these grants fund urban forestry initiatives, including inventories of ash trees, removal and replacement planning, and community engagement efforts.

Strategy Tip: Establish partnerships with regional planning organizations, conservation districts, or port districts to strengthen grant applications and demonstrate broad support.

STATE AND LOCAL FUNDING SOURCES

Washington state agencies provide opportunities that can be aligned with EAB preparedness goals:

- **State Appropriations and Legislative Allocations:** https://dnr.wa.gov/sites/default/files/2025-12/em_leg_2026_legislative_priorities_summary.pdf. The Washington Legislature allocates funding for invasive species management and forestry programs. Engaging with legislators and agency leadership during the budgeting cycle increases visibility and support for EAB-related line items.
- **Washington Invasive Species Council Grants Resources Page:** https://invasivespecies.wa.gov/grants/. This WISC webpage offers a hub of information and grant opportunities supporting projects that prevent, detect, and control invasive species and align well with EAB readiness activities. The funding sources vary per grant.
- **Washington State Urban Forestry Grants:** https://dnr.wa.gov/forest-resilience-division/urban-and-community-forestry#financial. These grants provide funding through the state Department of Natural Resources and partner agencies to support local tree inventories, planting, maintenance, and resilience efforts that strengthen community forests and help prepare for threats like EAB.

Strategy Tip: Work closely with the Washington State Department of Natural Resources (DNR) Urban and Community Forestry Program early in the application process. DNR often provides technical assistance and can help align local proposals with program priorities.

LOCAL GOVERNMENT AND COMMUNITY-BASED FUNDING

Municipalities and counties often support proactive forestry management through dedicated budgets or special funds:

- **Public Works / Urban Forestry Budgets:** Local governments can allocate a portion of their annual budgets for tree inventories, risk assessments, and removal/replacement of ash trees.
- **Urban Forestry Levies and Bonds:** Voter-approved funding mechanisms (levies, bonds) provide long-term, stable support for tree management, including EAB-related work.
- **Municipal capital improvement budgets:** Can provide funding for long-term investments in urban forest infrastructure, including ash tree inventories, removals, replacements, and related EAB preparedness and management projects.
- **Stormwater Assessment Fees:** Fees collected through municipal stormwater utilities have been used to support urban forestry activities where trees contribute to runoff reduction, water quality and green infrastructure goals. These funds can support planting, maintenance and canopy expansion efforts. Resources: Stormwater-Utility-Rates-Supporting.pdf and Funding - Better Ground.

Strategy Tip: Start by researching your local municipality or county to identify available funding programs and the most relevant contacts. Then engage community stakeholders early, this includes residents, neighborhood groups, nonprofits, and local businesses, to build public understanding of EAB risks and the benefits of proactive tree management. Broad community support is particularly important when pursuing voter-approved levies or bond measures, as public awareness and buy-in can make these initiatives successful.

INNOVATIVE AND ALTERNATIVE FUNDING APPROACHES

Partnerships with utility companies, non-profits, corporations, and other sources can unlock additional funding and in-kind resources for EAB preparedness projects. For example:

- **Utility partners** may co-fund street tree inventories if ash trees conflict with power lines.
- **Nonprofit organizations** may offer matching funds or volunteer coordination.
- **Climate resilience or environmental funding initiatives** can help support EAB readiness.

BEST PRACTICES FOR DEVELOPING COMPETITIVE FUNDING PROPOSALS

- Clearly define the problem and link it to Washington's EAB risk profile.
- Set measurable objectives and outcomes.
- Highlight collaborative partnerships across jurisdictions and sectors.
- Provide a detailed, justified budget.
- Demonstrate sustainability and scalability beyond initial funding.
- Start early and meet program deadlines.
- Use templates, examples, and local data (tree inventories, risk assessments) to strengthen the proposal.
- Attend grant workshops or webinars to learn tips and requirements.

ADDITIONAL RESOURCES

1. Ash (*Fraxinus* spp.) Trees in Portland, Oregon

Author/Source: Portland Parks & Recreation (2025)
Summary: Interactive ArcGIS resource documenting Portland ash tree locations and EAB management strategies. Washington municipalities and community groups can use this as a model when developing their own local ash inventories and prioritizing management efforts.
Link: https://experience.arcgis.com/experience/7b723b440b984e1aa8d33b3f39dca3e2

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2. Washington Urban Ash Tree Distribution

Author/Source: Washington State DNR Urban & Community Forestry Program (2025)
Summary: Online statewide ash tree inventory and risk data for EAB.
Link: https://wa-dnr-fr-data-team.shinyapps.io/wa_ash_inventory/

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3. State of Washington Urban Forest Pest Readiness Playbook

Author/Source: WA DNR, USDA FS, WA RCO, USDA APHIS-PPQ, Samara Group, Seattle DOT, WA DOA, WSU Extension
Summary: This resource guides communities in preparing for invasive pests like EAB, helping local managers coordinate with state and federal responders. It supports proactive actions to reduce the risk and costs of long-term infestations.
Link: https://invasivespecies.wa.gov/wp-content/uploads/2020/01/UrbanForestPestReadinessPlaybook.pdf

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4. Emerald Ash Borer Program Manual

Author/Source: USDA APHIS
Summary: Chapter 5 of this reference is especially important for EAB survey procedures, as it outlines how surveys provide critical information on the location, distribution, and movement of EAB.
Link: https://www.aphis.usda.gov/sites/default/files/eab-manual.pdf

Chapter 4: Response Strategies

AT A GLANCE

EAB will affect communities across Washington, even in places that are not prepared to respond. Not all cities, towns, or rural areas have the staff, funding, or information needed to manage EAB. Without planning and action, the impacts of EAB will be widespread, long-lasting, and costly.

IMPACTS IN CITIES AND TOWNS

In communities with little or no EAB management, most ash trees will die within a few years of infestation. Over time, up to 90 - 100% of ash trees may be lost. This sudden loss will strain local governments and reduce the benefits trees provide to residents.

Gosztyla, WA DNR UCF.

IMPACTS TO NATURAL AREAS

Washington's native Oregon ash grows in wetlands, riverbanks, and floodplains. These areas are often hard to access and rarely managed. As EAB spreads, Oregon ash in these sensitive habitats will also decline. Over time, other tree species or invasive plants may take over. This will change how these ecosystems function.

PLANNING AND RESPONSE CHALLENGES

Washington does not have a single lead agency or a statewide response system for EAB. Planning and response depend on cooperation across state, Tribal, and local partners. Communities face several limitations:

- Limited funding
- Different local priorities and policies
- Varying staffing and capacity
- No enforced quarantine, only education and outreach

Because of these challenges, advance planning is critical.

WHAT PLANNING CAN HELP PREVENT

Even without full resources, planning ahead can reduce damage. Communities that prepare can:

- Understand where ash trees are and their condition
- Decide which trees to remove or protect first
- Plan long-term replacement with diverse species
- Reduce safety risks and emergency costs
- Communicate clearly with residents and partners
- Respond faster when EAB is detected

KEY TAKEAWAY

Without action, EAB will cause tree loss, higher costs, safety risks, and lasting damage to cities and natural areas. Early planning, coordination, and clear response strategies can greatly reduce impacts. Preparing now gives communities more control when EAB arrives.

Chapter 4:
Response Strategies

RESPONDING TO EMERALD ASH BORER IN WASHINGTON

Writing Contributors: Zeima Kassahun, WA DNR UCF & Jamie Lim, Seattle Parks and Recreation

Emerald ash borer (EAB) management in Washington state occurs within a unique regulatory and operational landscape. Federal deregulation of EAB quarantines has shifted responsibility for preparedness and response largely to state and local jurisdictions. Prior to 2021, the Department of Agriculture Animal and Plant Health Inspection Service (APHIS) regulated the interstate movement of EAB infected wood products from designated quarantine areas. On January 14th, 2021, the domestic quarantine was discontinued to direct resources and funding towards managing the pest (U.S. Department of Agriculture, 2020). APHIS currently works with state-level partners to manage EAB by providing training and trapping methodologies. APHIS is also researching the use of biological controls to combat EAB. As a result, local governments, land managers, and urban forestry programs play a critical role in planning for and mitigating the impacts of this invasive pest.

On a state level, effective August 18th, 2026, Washington State Department of Agriculture established chapter 16-476 WAC Firewood Exterior Quarantine. Because no single agency leads the statewide response, EAB management in Washington functions as a collaborative, cross-agency effort involving federal agencies, state departments, universities, local governments, and nonprofit organizations. Effective communication and coordination among these partners are essential for monitoring pest spread, sharing resources, and supporting local preparedness efforts.

The purpose of chapter 16-476 WAC Firewood Exterior Quarantine is to prevent the introduction and spread of invasive plant pests, plant diseases, and bee pests that can be transported on or inside untreated firewood. These pests, including but not limited to emerald ash borer, spongy moth, Asian longhorned beetle, pinewood nematode, spotted lanternfly, and other harmful organisms, pose a serious threat to Washington's forests, agriculture, and environment. This rule prohibits the transportation of untreated firewood from outside of Washington into the state for sale or use and establishes treatment, labeling, documentation, and recordkeeping requirements for firewood that is imported. Firewood imported into Washington must be heat-treated to a minimum wood core temperature of 71°C (160°F) for at least 60 minutes or receive an equivalent department-approved treatment and must be labeled to show its source and display the statement "Approved Pest Free." The rule also clarifies the scope of the quarantine by excluding firewood harvested and remaining within Washington, processed wood products such as pellets or compressed wood bricks, and logs or wood products transported for industrial uses such as: sawmills; pulp and paper mills; and biomass or wood composite facilities. Enforcement provisions include civil penalties of up to $5,000 per violation and the authority for WSDA to impound noncompliant firewood under RCW 17.24.091. *(Department of Agriculture, 2026)*

RESPONSE MANAGEMENT STRATEGIES

The best management approach to EAB is dynamic and integrates various management methods (Table 4). Using an integrated pest management (IPM) strategy will help communities, land managers and private property owners balance needs, risk, capacity, preferences, and budgets. There has never been and likely will never be a full scale EAB eradication in North America. Management strategies will need to focus on slowing spread and replacing ash within the canopy. Pest management strategies vary significantly in cost and success rates. Depending on your budget and capacity, consider prioritizing integrated management strategies that focus on reducing spread and minimizing hazard risks from dead or declining ash.

Removal and Replacements: High value individual trees or stands can be prioritized for management, while unhealthy, declining, or poorly placed ash can be identified for removal and replacement. Develop criteria for selecting trees for removal that may include hazard risk, access constraints (equipment, climbing), condition, age, and cost. Many tree managers and property owners operate with limited budgets, so prioritizing removals that have the greatest impact is key. For example, ash along busy thoroughfares are strong candidates for removal to eliminate risk once trees become infected by EAB. If removal is part of the management strategy, beginning early can spread costs over time, slow spread and minimize damages.

Remove *Fraxinus* from approved planting lists or add to prohibited planting lists: Develop long-term proactive replacement strategies. Consider the long-term implications of losing *Fraxinus* in both natural stands or managed landscapes. Identify the desired characteristics of trees within a given space and select replacement species that can meet those needs. See Chapter 3 Loss Prevention Planning Diversity Moderates Impacts on Communities and Ecosystems in the Face of EAB for more details.

Insecticide Treatment: Treatment of high value trees is a good option for desirable and healthy individual trees. Since treatment must occur on a regular basis and for the remainder of the tree's life. The choice to treat a tree should include many considerations, including but not limited to health, age, location, significance, form/structure, proximity to waterways, and size. Contracting out treatment work can be more costly, so consider investing in training injectors to conduct injections in-house. The City of Salem, Oregon found that contracting injection of treating ash trees cost $200,000 while completing the work with 2 city staff only cost about $60,000.

Quarantine: EAB is inevitable and will devastate ash tree populations across Washington state. Our best options at this point are slowing the spread of the insect to buy response staff as much time to enact their pest management strategy. The more time we have to remove and treat trees, educate the public, and plan, the better our urban forests will fare in the long run.

An effective EAB response strategy is holistic, incorporating variations of the listed approaches while considering available capacity and funding. As the strategy develops, integrated pest management plans should be reviewed to address evolving needs and resources. Potential management options should be evaluated to identify those likely to achieve the greatest impact within the managed landscape. A strong EAB management strategy includes components from each category listed in Table 4. See Chapter 5 for more details on management strategies.

Table 4: The available options for EAB management.

Categories of Management						
Management Methods	**Monitor**	**Limit Movement**	**Remove and Replace**	**Biotic Controls**	**Abiotic Controls**	**No Control**
	Prism traps	"Don't move firewood" campaign	Replace ash with species that have the desired characteristics of ash	Parasitoid wasps	Insecticides	Allow natural ash stands to succumb naturally and leave snags
	Trap trees	EAB wood disposal sites	Planting EAB-resistant ash	Fungal pathogens*		Reactive tree removals
	Branch sampling	Quarantine EAB wood products & waste				
	Visual surveys	Promote on site disposal methods				

*in the research stage

RISKS OF NO STATE RESPONSE TO EMERALD ASH BORER

Writing Contributors: Celesta Collacchi, WA DNR UCF

Proactively preparing and managing for EAB will not be feasible in all areas of Washington, both urban and rural. As a result, the impacts of limited EAB management will be seen throughout the state, and municipalities will need to take on a greater role in preparedness, monitoring, and response. From the urban standpoint, many smaller municipalities may not have the resources to address preparedness, nor have a completed inventory of their urban forest to understand the full effects of losing all ash trees.

Exploring the idea that a municipality has a completed inventory but has not begun any preparation, they would experience ash *(Fraxinus* spp.), olive (*Olea europaea)* and white fringe tree *(Chionanthus virginicus)* deaths within 3 years of infestation and mass deaths of 90-100% of all ash trees within 10-12 years (City of Elk River, n.d.). Without coordinated planning, these losses may occur in concentrated waves, creating sudden increases in hazardous trees, liability concerns, and public complaints as trees decline rapidly and become aesthetically unappealing. Over time, maintenance costs and scheduling may become overwhelming (City of St. Cloud, 2025).

Urban heat islands may grow larger or more intense as ash trees disappear from the overstory. Consequently, vacant planting spaces will increase. If municipalities have access to inventories or software to edit inventories, it would be preferential to do so while removing or assessing ash trees; however, in the absence of a broader strategy, updates may be inconsistent or delayed. Cities already struggling to expand their urban canopy will face additional pressure to prioritize removals while still maintaining planting and routine care (City of St. Cloud, 2025).

Wood removal and disposal would most likely not be thoroughly planned, leading to possible increases in burn permits and the movement of firewood by residents, which may inadvertently accelerate the spread of EAB. Stumps would likely be left due to high removal costs, and in many cases may not be treated to prevent basal sprouting or properly documented. Some ash sprouts can grow three to four feet per year, resulting in a disordered appearance along streets and further complicating replanting efforts (Oregon Wood Innovation Center, n.d.).

In addition to the horticultural varieties of planted ash in urban environments, Washington's native ash, Oregon ash *(Fraxinus latifolia)*, in natural areas will also suffer dramatically from the EAB infestation. The native habitat of Oregon ash coincides with areas of high-water tables, including wetlands and riparian zones. These areas are seen on abandoned properties re-naturalizing, bioretention areas, wetland mitigation sites, unmaintained properties such as the natural areas of urban parks, ponds, rights-of-way, and estuaries or tributaries within or at the outer boundaries of the cities. These sensitive areas are typically not managed because they are delicate and often remote or hard to access, and will fall victim (Oregon Wood Innovation Center, n.d.).

In the natural, nearly pure stands that Oregon ash form in riparian zones, EAB will alter the structure of the forest. After infection, the dead ash will collapse to the forest floor leaving stumps of various heights. Stress epicormics that persist on the stumps as well as basal sprouts will become the next hosts for EAB. Due to Oregon ash's fast growth rate when young, it will likely continue to grow for a few years before succumbing to the pest. The fast growth rate does not affect sexual maturity, which occurs at 30 years of age (USDA Forest Service, n.d.).

Regeneration will shift from sexual reproduction to clonal growth, as saplings and sprouts are repeatedly killed before reaching maturity. Oregon ash has intermediate shade tolerance and can persist in the understory, but the resulting population will likely be short, dense, and poorly formed, resembling a thicket of thin stems (Oregon Wood Innovation Center, n.d.). In the absence of ash, canopy gaps would likely be filled by red alder, black cottonwood, or invasive shrubs. On permanently saturated soils, cottonwood cannot persist and so invasive reed canarygrass or Himalayan blackberry will become dominant, fundamentally altering successional trajectories (Oregon Wood Innovation Center, n.d.).

Figure 4.1: Ash Tree killed by the invasive EAB.

Climate change predictions across Washington include more extreme events such as droughts and floods (U.S. Department of Agriculture, Climate Hubs, n.d.). Areas with rising water tables may see declines in cottonwood and further degradation of the overstory without ash. In drier areas, bigleaf maple may become more dominant, while riverbanks may shift toward willow-dominated systems (Oregon Wood Innovation Center, n.d.). Oregon white oak populations may increase in valleys and prairie settings as ash declines and climate conditions shift, while Douglas-fir competition may decrease (Oregon State University Extension Service, 2020). On the drier margins of ash habitat, forest composition may transition toward Douglas-fir, grand fir, and ponderosa pine (Oregon Wood Innovation Center, n.d.).

In Washington, EAB management relies on a decentralized, multi-partner approach rather than a single lead agency. This structure places greater responsibility on local jurisdictions to take initiative, while coordination among federal, state, and regional partners remains essential for sharing information, aligning efforts, and supporting effective detection, response, and long-term management.

EMERGENCY FUNDING

Writing Contributors: Fiona Paquette, Samara Group

EAB represents a looming ecological and economic threat to Washington state's forests, urban canopies, wetlands, and riparian ecosystems. While preparedness and mitigation planning are ongoing, the state currently lacks a dedicated, unified emergency response funding mechanism specifically tailored to invasive species outbreaks like EAB. This gap underscores the need for local jurisdictions, Tribes, and partner organizations to proactively identify, secure, and coordinate emergency funding through a patchwork of existing federal, state, and regional resources.

THE CHALLENGE: NO UNIFIED STATE EMERGENCY FUNDING FOR EAB

Funding dedicated specifically to EAB response remains limited, and due to its federal deregulation, Washington's eligibility to emergency funding is unclear. Most communities have to use their existing urban forestry budgets and fold EAB work into routine tree care and maintenance. Unlike floods or wildfires, there is no dedicated emergency fund in Washington for invasive species like EAB, which means communities must piece together funding from different sources during an outbreak. This makes early planning and building partnerships especially important before EAB arrives.

STRATEGIES FOR BUILDING EMERGENCY FUNDING READINESS

Pre-Emergency Planning and Documentation: Communities should develop EAB hazard assessments, risk analyses, and response plans before an outbreak. These documents demonstrate need, improve grant competitiveness, and help align proposed activities with the criteria of emergency funding programs.

Interagency and Cross-Jurisdictional Coordination: Forming coalitions among municipalities, counties, tribes, and non-profits enhances credibility for funding requests and enables shared projects that meet broader emergency criteria (public safety, infrastructure protection).

Advocacy for Broader Recognition of Invasive Species Emergencies: Engaging state agencies and legislative bodies to recognize biological invasions as legitimate emergencies worthy of dedicated emergency funding could lead to new programs or the expansion of existing ones to better serve invasive species responses.

POTENTIAL FUNDING OPPORTUNITIES

Washington Emergency Rapid Response (ERR) Grants: The Emergency Rapid Response (ERR) Grants Program (https://www.commerce.wa.gov/err/) administered by the Washington State Department of Commerce provides ongoing funding to support immediate local emergency response and recovery activities following a declared emergency or disaster. While not invasive-species specific, ERR funds can be used to address essential services impacted by an emergency and may be relevant if EAB impacts public infrastructure, health, or safety during a severe outbreak. Key features:

- Up to $3 million per state fiscal year available.
- Funding requests are accepted on a rolling basis until funds are exhausted.
- Eligible applicants include state, federal, tribal, and local governments.
- Projects must address immediate threats to essential services.

Strategy Tip: Early coordination with Commerce staff to frame an EAB emergency in terms of community impacts (e.g., hazards from dead ash trees threatening utilities or transportation) can strengthen eligibility under ERR criteria.

Washington Invasive Species Council Grants and Funding Opportunities: A centralized list of state, federal, and regional funding opportunities relevant to invasive species prevention, detection, and response. This resource (https://invasivespecies.wa.gov/grants/) is particularly useful for identifying non-traditional or cross-sector funding sources during emergency situations.

Public Works Board (PWB) Emergency Construction Funding: Washington's Public Works Board (PWB) administers an Emergency Construction Funding Program (https://www.commerce.wa.gov/pwb/pwb-financing/) that provides loans or grants to local governments for urgent public works projects triggered by unforeseen threats to public health and safety. This can include work to repair or replace infrastructure compromised by emergency conditions. Key features:

- Approximately $7.5 million available in emergency funds each fiscal year.
- Applications accepted year-round until funds are depleted.
- Funding can support critical hazard responses such as dangerous tree removal or stabilization of public spaces.

Strategy Tip: Documenting ash-related threats to right-of-way infrastructure (e.g., roads, power lines, parks) can help justify emergency construction funding under the PWB program.

Federal Emergency and All-Hazards Funding Resources: During an actual EAB invasion, several federal funding streams can be accessed through emergency management frameworks. FEMA Emergency Management Performance Grants (EMPG) and other all-hazards preparedness grants provide support for core emergency management capabilities. While not EAB-specific, these funds can be used for planning, coordination, and response capacity building. (https://www.fema.gov/grants/preparedness/emergency-management-performance).

National Invasive Species Information Center Grants and Funding: A collection of federal invasive species funding programs (https://www.invasivespeciesinfo.gov/subject/grants-and-funding), including emergency response, rapid response, and all-hazards funding mechanisms that may be leveraged during an EAB outbreak.

Strategy Tips: Work with county emergency management offices to align EAB planning and response activities with broader all-hazards preparedness frameworks to unlock federal funds.

Emergency funding for EAB response in Washington state currently resides within broader disaster and infrastructure programs, rather than a dedicated EAB emergency response fund. This fragmented funding landscape requires proactive planning, strategic framing of requests, and sustained collaboration across jurisdictions and agencies. By understanding the available emergency programs, documenting risks effectively, and aligning EAB actions with broader public safety and infrastructure priorities, communities can improve their chances of securing the urgent funding needed when an outbreak occurs.

ADDITIONAL RESOURCES

1. Washington Emerald Ash Borer Priority Species Page

Author/Source: Washington Invasive Species Council
Summary: Provides Washington-specific information on EAB, including current status, impacts, and statewide coordination efforts. Useful for grounding emergency funding requests in state-recognized invasive species priorities.
Link: https://invasivespecies.wa.gov/priorityspecies/emerald-ash-borer/

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2. Emerald Ash Borer Readiness and Response Plan for Oregon

Author/Source: ODF, ODA, Samara Group
Summary: This resource outlines coordinated strategies for prevention, preparedness, response, and funding to address the potential impacts of EAB on forests, ecosystems, and communities. It provides a nearby, regionally relevant model for building a comprehensive, collaborative framework to guide EAB readiness and response efforts.
Link: https://www.oregon.gov/odf/Documents/forestbenefits/eab-readiness-and-response-plan-for-oregon.pdf

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3. Chapter 16-476 WAC Firewood Exterior Quarantine

Author/Source: WSDA
Summary: Website on the WAC 16-476 quarantine, adopted February 20, 2026, which restricts firewood transport to prevent invasive pests like EAB, it includes detailed information on rulemaking, public hearings, submitting comments, and agency contacts through its website.
Link: https://agr.wa.gov/services/rulemaking/firewood-quarantine-081224

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4. Removal of Emerald Ash Borer Domestic Quarantine Regulations

Author/Source: Animal and Plant Health Inspection Service USDA
Summary: The Federal Register provides official notice and details regarding the removal of the domestic EAB quarantine regulations.
Link: https://www.federalregister.gov/documents/2020/12/15/2020-26734/removal-of-emerald-ash-borer-domestic-quarantine-regulations

ADDITIONAL RESOURCES (Continued)

5. Portland Emerald Ash Borer Response Plan

Author/Source: Portland Parks and Recreation
Summary: This plan outlines strategies to slow EAB spread, protect public safety, and preserve urban and riparian ash trees, providing a practical model for Washington communities to plan local response efforts and mitigate ecological and public health impacts.
Link: https://www.portland.gov/trees/documents/eab-response-plan-june-2025/download

Chapter 5: Management

AT A GLANCE

EAB is a serious threat to all ash trees in Washington, from street and park trees to native Oregon ash in wetlands and riparian areas. Without statewide coordination, responsibility falls to homeowners, local governments, and land managers. Untreated ash usually declines and dies within a few years, creating safety hazards, higher removal costs, and loss of canopy benefits like shade, habitat, and erosion control.

PROTECTING TREES

Planning ahead is important. Preventive treatments, especially trunk injections by trained professionals, work best before trees start to die. Other treatments, like soil drenches or bark sprays, can help but are less reliable and may affect nearby plants or pollinators. Treating high-value trees can save them and the benefits they provide.

It is usually not a good idea to cut down healthy native Oregon ash trees before EAB arrives. Removing only trees that are a hazard reduces unnecessary work, saves money, and can slow the spread of EAB.

REMOVAL & REPLACEMENT

For trees that are very sick or dying, removal is often safest. After removal, planting diverse species maintains canopy, reduces pests, and spreads costs. Leaving non-hazardous trees standing is usually better than moving untreated wood that could spread EAB.

Pennsylvania DNR - Forestry, Bugwood.org

HANDLING INFESTED WOOD

Moving untreated ash wood is the main way EAB spreads over long distances. Proper wood disposal (see Chapter 5) slows the spread and protects nearby forests and communities.

Ryan Armbrust, Kansas Forest Service, Bugwood.org.

BIOLOGICAL CONTROL

Some insects and birds naturally help control EAB, like tiny parasitic wasps and woodpeckers. These methods cannot stop EAB, but they can slow it down when used alongside other management steps like treatments or selective removals.

SAFETY CONSIDERATIONS

EAB-infested trees can break unexpectedly. Falling branches and trunks can be dangerous for people and property. Work on these trees should be done by trained professionals.

KEY TAKEAWAY

Managing EAB is about planning ahead and making informed choices. Protect valuable trees, remove only hazardous ones, handle wood safely, and use long-term strategies to keep ash trees and other parts of the forest healthy for the future.

Chapter 5:
Management

EMERALD ASH BORER TREATMENTS

Writing Contributors: Fiona Paquette, Samara Group

Emerald ash borer (EAB) poses a growing threat to Washington state's ash resources, including Oregon ash that occurs naturally in riparian areas and wetlands across western Washington, as well as cultivar or imported ash trees commonly planted in urban neighborhoods, parks, rights-of-way, and windbreaks. With no unified statewide response or treatment program in place, responsibility for management largely falls to individual homeowners, local governments, park managers, and private landowners. Proactive planning is critical, as untreated ash trees typically decline and die within a few years of infestation, creating public safety risks, increased removal costs, and loss of canopy benefits.

NATIVE ASH TREE STANDS

Management of native Oregon ash *(Fraxinus latifolia)* stands ahead of an EAB arrival should emphasize retention, monitoring, and selective intervention, rather than widespread preemptive removal. Current guidance recommends not removing healthy ash trees before EAB is detected locally, especially if their loss is not causing harm to people or property (see Standing Tree Concerns section below) as infestations may take years to arrive and trees can persist for several years after the initial attack (Oregon State University Extension Service, 2023). Maintaining healthy trees by minimizing stress, such as limiting disturbance, avoiding pruning during peak EAB flight season, and protecting hydrologic conditions in riparian zones, can help delay infestation and preserve ecological function (Oregon State University Extension Service, n.d.). In natural areas, where Oregon ash provides critical ecosystem services like stream shading, bank stabilization, and wildlife habitat, a minimal-intervention or "do nothing" approach may be appropriate in low-risk areas without public safety concerns (City of Lake Oswego, n.d.). Selective thinning may also be considered to reduce competition, improve stand health, and prioritize retention of structurally or ecologically important trees.

Figure 5.1: Example of a treated ash tree in a community park (Gosztyla, WA DNR UCF).

Once EAB is established in Washington, management will shift to risk-based and adaptive strategies. Insecticide treatments, such as emamectin benzoate, can effectively protect individual high-value trees but are generally not feasible at the scale of natural riparian forests and require repeated applications over time

(City of Portland, n.d.). In many natural settings, a combination of targeted removal, retention, and passive management is recommended: hazardous trees near trails or infrastructure may be removed, while non-hazardous trees can be left standing to provide wildlife habitat and contribute to nutrient cycling. Removal activities should be timed during dormant periods and paired with proper wood handling to reduce the risk of spreading EAB (Oregon State University Extension Service, n.d.). Managers should also anticipate shifts in species composition, including increased pressure from invasive plants and reduced riparian shading, and consider restoration where appropriate. Overall, best practice supports a site-specific, measured approach, recognizing that while widespread mortality is likely, retaining ash trees as long as possible and avoiding unnecessary preemptive removal can help sustain ecosystem functions and allow time for longer-term management tools, such as biological control, to become effective (Oregon Department of Forestry & Oregon Department of Agriculture, 2021).

In many cases, particularly for heavily infested trees, unmanaged forests, or where long-term treatment costs are prohibitive, removal and replacement may be the most practical management strategy. Removal by licensed tree care professionals is often required due to permitting and safety concerns and is the most effective at preventing further EAB spread from that tree. If Oregon ash trees are proposed to be cut within a wetland, the responsible party will need to notify their ecology regional wetland specialist (https://ecology.wa.gov/water-shorelines/wetlands/tools-resources/contacts-by-subject-region) otherwise this could be reported as a wetland violation. While tree loss can be significant, planned removal paired with replacement using diverse, non-ash species can reduce future pest vulnerability and support long-term canopy resilience. In the absence of a coordinated state response, Washington communities are encouraged to prioritize inventories of ash trees, identify high-value specimens for treatment, and develop localized management plans tailored to their environmental and budgetary constraints.

URBAN AND COMMUNITY ASH TREES

For homeowners, businesses, and community spaces seeking to preserve high-value ash trees, the choice to treat a tree should include many considerations, including but not limited to health, age, location, significance, form/structure, proximity to waterways, and size. Preventive insecticide treatments are currently the most effective option when applied before significant canopy decline. The most reliable treatment is trunk injection, which must be applied by a licensed pesticide applicator in Washington. This process involves drilling small ports into the outer sapwood and injecting systemic insecticide that moves throughout the tree. Depending on the product, injections are applied every 1 - 3 years and have shown high effectiveness when properly administered (Be a Smart Ash, Denver Parks and Recreation). While trunk injections are more expensive and involve minor drilling wounds, they are the preferred option for large or historically significant trees in parks, civic spaces, and residential properties.

Figure 5.2: Licensed applicator performing ash treatment (Gosztyla, WA DNR UCF).

Soil drenches can be applied annually by licensed applicators, or by property owners for trees under 12 inches in diameter at chest height. They are absorbed through the roots but have shown mixed effectiveness in trials and carry a higher risk of non-target environmental impacts. Bark sprays, applied once per year by licensed applicators to the lower trunk, similarly show variable results and pose drift risks to nearby vegetation and pollinators.

Insecticide selection and application methods are critical considerations when managing EAB, particularly because many commonly used products are systemic insecticides within the neonicotinoid class. Though emamectin benzoate (trunk injection) is also an effective and recommended treatment that is in the avermectin chemical family. These products vary in effectiveness, environmental risk, and appropriate use. Research and extension guidance consistently identify emamectin benzoate trunk injections as the most effective and reliable treatment, providing multi-year protection with minimal off-target exposure when applied correctly (McCullough et al., 2020; Herms & McCullough, 2014). In contrast, dinotefuran-based products used in bark sprays or soil applications can be taken up more quickly but typically provide shorter-term control and may pose greater risks to non-target organisms if applied incorrectly (Colorado State University Extension, 2024). While almost all true ash trees *(Fraxinus* spp.) are wind pollinated it is still important to consider carefully the use of neonicotinoids as they can affect insect pollinators using nearby plant resources. Timing applications to avoid flowering periods and minimizing drift or runoff is essential, particularly in urban and riparian environments. The importance of proper application is underscored by a well-documented incident in Wilsonville, Oregon, where the application of a dinotefuran-based insecticide to blooming trees resulted in the unintended death of approximately 50,000 bees (Xerces Society for Invertebrate Conservation, 2013). This case highlights the need for trained applicators, adherence to label requirements, and careful evaluation of site conditions before pursuing spray-based treatments. More detailed resources on pesticide applications for EAB can be found in WSU publications including Emerald Ash Borer and Its Implications for Washington State and Managing Emerald Ash Borer in Washington State.

EAB TREATMENT COST COMPARISON

Developing a cost comparison of EAB management options can help communities and landowners make informed, long-term decisions about treatment and removal strategies. A useful approach is to compare per-tree and program-level costs across common options such as removals, trunk injections, and annual spray or soil treatments, while also accounting for factors like tree size, number of trees, treatment frequency, and ongoing maintenance needs. Costs can vary significantly depending on whether work is contracted or completed in-house, and some communities may reduce long-term expenses by investing in staff training and certification to perform trunk injections internally. Resources such as Purdue University Extension EAB cost calculator (https://entm.purdue.edu/treecomputer/) provide detailed breakdowns of EAB treatment effectiveness and relative costs, which can serve as a foundation for building side-by-side comparisons. Predicting out these costs, particularly for homeowners, municipalities, and organizations will help in weighing tradeoffs between preserving high-value trees and managing broader canopy impacts.

BIOLOGICAL CONTROL OF EMERALD ASH BORER

Writing Contributors: Fiona Paquette, Samara Group & Kevin Zobrist, WSU

Biological control (biocontrol) is the use of other organisms to control pests like EAB through predation and parasitization. In terms of predation of EAB, this is done by bark foraging birds like woodpeckers that eat EAB larvae (Flower at al., 2014). Woodpeckers can cause high mortality of EAB, but this is not enough to stop an infestation or tree damage because the woodpeckers do not show up until later stages of infestation when EAB numbers are high and extensive damage has already been done (Jennings et al., 2013). Predation by woodpeckers may be most useful as a detection aid, as excessive woodpecker activity on an ash tree can serve as an indicator of EAB infestation (McCullough, 2020).

Parasitization of EAB is primarily done by tiny, stingless, parasitoid wasps that lay their eggs inside EAB eggs or larvae. There are four parasitoid wasps from EAB's native range in Asia that are approved for release in the U.S. for biocontrol of EAB. Duan et al. (2023) summarize their relative effectiveness.

- ***Tetrastichus planipennisi*** – this parasite of EAB larvae has shown to be highly effective at establishing populations of itself and reducing EAB population, but it is limited to smaller trees because its short ovipositor cannot penetrate the thick bark of larger trees.
- ***Spathius agrili*** – this parasite of EAB larvae has shown poor effectiveness and may not be well suited for use in North America.
- ***Spathius galinae*** – this parasite of EAB larvae has shown to be highly effective at establishing populations of itself and reducing EAB population and it can control EAB on larger trees with thick bark because of its long ovipositor.
- ***Oobius agrili*** – this parasite of EAB eggs has some effectiveness at controlling EAB populations but not as much as *Tetrastichus planipennisi* or *Spathius agrili.*

Overall, *Spathius galinae* is particularly promising as a single biocontrol agent (Duan et al., 2022). Ultimately, though, the combination of *Spathius galinae, Tetrastichus planipennisi,* and *Oobius agrili* may be the most effective at suppressing EAB (Duan et al., 2023).

Figure 5.3: *Spathius galinae* (top) and *Spathius agrili* (bottom) (T. Booth USDA; Gould et al., 2024).

Future biocontrol of EAB may include naturally occurring species of fungi that can parasitize and kill EAB. Several strains of fungi have been identified that cause high mortality in EAB (Johny et al. 2012). However, there are logistical challenges with delivery and avoiding non-target species including the parasitoid wasps used for biocontrol (Lyons 2015).

Since EAB is no longer considered a federal quarantine pest in Washington, the state's forest management agencies, including the Department of Natural Resources, WSDA, State Parks, and others have the option to implement biocontrol programs. Washington's participation in biocontrol would prioritize new areas and counties, as these are considered high priority for releases. Agencies managing forested lands would work closely with the EAB Biocontrol Program group to identify suitable release sites, provide long-term monitoring, and coordinate necessary permitting or reporting to federal partners if required. A minimum time commitment of 4–5 years is expected, including two years of releases and at least two years of post-release monitoring, to ensure parasitoids can establish and contribute to population suppression (Gould et al., 2024).

Parasitoid releases follow detailed protocols to maximize establishment success. *Oobius agrili* is released during the EAB egg-laying season, while larval parasitoids *(Spathius and Tetrastichus)* are released when mature EAB larvae are present. Releases are spread across multiple weeks to ensure that parasitoids encounter the correct life stages, and sites are selected based on ash density, tree size, and climatic suitability for each species. More details can be found in Gould et al., 2024, https://www.aphis.usda.gov/sites/default/files/eab-field-release-guidelines.pdf.

Extensive research and environmental review have confirmed that these parasitoids primarily target EAB and pose minimal risk to people, pets, or non-target species. Experience in other states shows that parasitoids can establish in new areas, parasitize significant portions of EAB populations, and contribute to long-term ash survival. By combining biological control with ongoing monitoring, public outreach, and other management actions, Washington can help reduce EAB impacts while maintaining healthy urban and forested ecosystems for the future.

Figure 5.4: Adult Braconid wasp *(Spathius* spp.) (Forestry Images: David Cappaert, Bugwood.org).

WOOD DISPOSAL AND REUTILIZATION

Writing Contributors: Heidi Asplund, WA DNR UCF

WOOD DISPOSAL

Creating and implementing a plan to properly dispose of EAB infested wood is crucial to prevent and contain the spread of this invasive pest. Following best management practices for this wood protects forests, neighborhoods, and ecosystems. EAB kills nearly all untreated ash trees, leading to loss of canopy cover, wildlife habitat, and biodiversity. Proper wood disposal will slow the rate EAB colonizes new areas (EAB ArcGIS Hub).

Most females lay eggs in trees near where they emerged. When EAB is inadvertently transported on infested untreated wood, it accelerates the pest's natural expansion speeds, causing new outbreaks (EAB ArcGIS Hub). To prevent this expansion, it is important to avoid moving untreated ash wood. According to New York State's Department of Environmental Conservation, "Most long-distance movement of EAB has been directly traced to ash firewood or ash nursery stock." Transportation of untreated ash products (woodchips, mulch, lumber) also contributes to EAB's proliferation in new areas.

Properly disposing of EAB infested wood can also help reduce economic loss. Municipalities spend tens of thousands of dollars removing and replacing trees killed by EAB. Homeowners and businesses also face costs for tree removal, property damage prevention, and replacement landscaping. Controlling the spread of EAB saves money by reducing the number of trees that need treatment or removal. It also gives people more time to implement treatment options, spreading that cost out over the long run rather than all at once.

Methods for properly disposing of EAB infested tree parts are discussed below. To reduce the spread of EAB, avoid removing ash trees, or other susceptible trees, or transporting potential EAB infested wood material (branches, woodchips, firewood, logs, etc.) between April 1 and September 30 (Gorman et al., 2022). Although, Wang et al. (2010) found that EAB' peak flight season is June through July with flight ending by September, because temperatures and other factors can cause EAB's flight season to fluctuate, April 1 through September 30 should be considered the active flight season for the removal and transport of EAB susceptible trees and wood.

Branches: Branches one-inch or greater (>2.5 cm) have been observed to host EAB egg-laying (Petrice, 2011). Methods of treating branches include but are not limited to:

- **Aging:** Two years after ash trees have been harvested the wood will have dried to the point EAB can no longer survive in it (Wisconsin EAB Program).
- **Chipping:** To reduce EAB from colonizing branches they should be chipped to one-inch in two dimensions (two of the three measurements – length, width, and depth – must be one-inch or smaller). EAB larvae have not been found to survive in this size of wood chips. (McCullough et al., 2007). Most chippers used in tree care operations will not create this size of woodchips. Chippers that utilize a one-inch screen will ensure the woodchips are the correct size (Wisconsin EAB Program). To lessen the chances of spreading EAB to uninfested areas, all woody debris should be removed from equipment used to chip wood before transporting it (Recommendations, 2016).
- **Burning:** Branches and other EAB infested tree parts may be burned or air-curtain incinerated where regulations allow this treatment. An air curtain incinerator may be a good choice for burning this wood, because these portable units reduce particulate pollution and produce briquettes and biochar as outputs. Briquettes may be used as a source of wood-based energy

(Lee & Han, 2017) and biochar has been used, successfully, as a soil amendment (Yadav, 2023).

- **Landfills:** approved for receiving EAB woody debris is another option for disposing of this material.

Logs: EAB larvae live under the bark and in the outer one-inch layer of sapwood of ash trees and other EAB susceptible trees. Removing the bark and at least a one-inch layer of the underlying sapwood will eliminate EAB larvae in logs (Wisconsin EAB Program). The bark and sapwood must be chipped, aged, burned, or transferred to a landfill as discussed in the "Branches" subsections above.

Stumps: Ash stumps may be ground, treated with herbicide, burned where regulations allow, or removed. Ash tree stumps commonly grow adventitious stems (suckers). EAB can repopulate stems that are larger than one inch (Petrice, 2011). Stump treatment may not be possible for trees in natural areas and other areas. It also may not be economically feasible to treat all stumps. When possible, removing or treating stumps will reduce EAB re-infestations.

WOOD REUTILIZATION

Firewood: Ash wood may be repurposed into firewood. To reduce the spread of EAB, harvesting trees for firewood should be completed between October 1 and March 31 (Gorman, A., et al. 2022). Moving untreated ash firewood is a common method of long-distance movement of EAB which creates new EAB infestations. Firewood should not be moved more than 10 miles from where the trees were harvested to reduce EAB's movement (EAB ArcGIS Hub). Below are methods to reduce EAB populations in firewood:

- **Containment:** Poland et al., suggest that firewood, "double-bagged entirely (but loosely) in contractor grade 4-mil plastic bags is an inexpensive and effective method for preventing the spread of EAB." More information about ash firewood may be found at https://www.dontmovefirewood.org/.
- **Aging:** Ash firewood may be aged for two years onsite to ensure no larvae survive. EAB's life cycle is one to two years depending on climate and other factors (Haack, et al. 2015). Combining containment and aging of firewood may further reduce EAB's populations.
- **Heat treatment:** Research found that sanitizing firewood by heating it to a core temperature of 133°F (56°C) and maintaining this core temperature for 30 minutes resulted in complete mortality of EAB (Haack, 2022).

Wood Chips: Ash wood repurposed to wood chips should be chipped to no larger than one-inch on two sides as mentioned previously in the Branches section. Like firewood, if possible, ash wood should be processed in the areas where trees have been harvested between October 1 and March 31, to avoid EAB emergence during its active flight season. To lessen the chances of spreading EAB to uninfested areas, all woody debris should be removed from equipment used to chip wood before transporting it. (Recommendations, 2016).

Products: EAB infested logs that are properly treated can be reutilized into products such as furniture, flooring, art, and other products (Donahue, 2020) (Brashaw et al., 2012) (Out of the Ashes, 2020) once milled and kiln dried. Reutilizing EAB infested wood may be a good way to sustainably repurpose EAB infested wood to its highest and best use.

Figure 5.5: A public-private partnership in Rochester, Minnesota, between a local business owner and the University of Minnesota Extension Southeast Regional Sustainable Development Partnership and other partners led to a parklet constructed using EAB infested ash wood outside the business owners' restaurant. The wood was repurposed into flooring, benches, and planters (Donahue, 2020) (Becca Haugen, Twelve Ten Photography) (top and bottom left). In Ann Arbor, Michigan ash trees killed by EAB were used as posts supporting a column in one of the wings of the Traverwood library branch (McKee, 2009) (Traverwood Library, Justin Maconochie Photography) (bottom right).

The Chicago Tree Project nonprofit began in 2014 when the Chicago Park District staff were trying to figure out what to do with the thousands of EAB infested trees within its parks. After approaching the nonprofit Chicago Sculpture International (CSI), a collaborative was formed between Chicago Parks and CSI to create vibrant public art from sick and dying trees - the Chicago Tree Project was born. Trees throughout Chicago's parks are transformed into sculptures by artists. Park visitors encounter these art pieces which cover a variety of themes from scientific to spiritual. The sculptures remain until the transformed trees are no longer secure.

These public and private partnerships to repurpose ash trees dying from or killed by EAB can enhance community spaces and demonstrate sustainable practices. Re-utilizing ash trees by creating value added products may also defray some of the removal costs. By timing ash tree removals and wood transport to avoid EAB's active flight season and using best management practices for the removal, sanitation, and re-utilization of ash wood, communities can become active partners in slowing the spread of this destructive pest.

Milling: Portable sawmill operators can mill wood onsite to prevent the wood from being moved to uninfested areas. The milling process separates the usable inner sapwood and heartwood from the bark and outer sapwood where EAB larvae live. The bark and inner sapwood must be chipped to the appropriate size (see the Wood Chips section above), burned, aged, or transported to a landfill approved for receiving it (see Branches section above). The minimum diameter and size of logs for processing will differ between sawmills. Check with your provider to determine the necessary size (Brashaw et al., 2012). Washington State University Extension Forestry maintains a list of small-scale professional sawyers at https://forestry.wsu.edu/sawmilldirectory/.

Figure 5.6: Chicago Sculpture International: Gary Keenan, Transformation, Jackson Park, Chicago, 2020

STANDING TREE CONCERNS RELATED TO ASH REMOVAL AND MANAGEMENT

Writing Contributors: Adam Airoldi, State Parks & Michael Sanborn, DNR

Trees colonized by EAB could eventually become high risk or a hazard to the public, property, and tree maintenance workers. When trees are attacked and the greater cambium tissue is girdled by larval feeding, moisture loss occurs in the wood, eventually decreasing wood fiber strength. This infested ash becomes brittle, splinters easily, and is prone to cracking and fracturing. In combination with existing structural defects, EAB related tree failures can be unpredictable.

In a study by Persad et al. (2013), the structural and material properties of infested ash were compromised as early as two years after initial infestation, and basal decline was found to occur with advancing infestation. Compromised branches may fracture close to points of stem attachment, while dead stems (boles) may fail close to the ground due to physical or gravitational force. For example, an infested five-inch diameter branch may fail under the same force as a healthy one-inch diameter branch (Walsh, 2019). The unpredictable nature of damaged wood should cause concern and expedite management decisions to chemically treat, remove, or find other mitigation options for trees.

Dead ash on sites with limited equipment access will pose the greatest hazard for safe tree work operations. Due to the possible decrease in wood strength or other existing defects, pre-climb inspections and job-safety analysis should be conducted before removal or pruning work is started. Part of an inspection may include a visual survey looking for signs and symptoms like upper crown leaf thinning, blonde bark areas caused by woodpecker damage, bark cracking, water sprout or adventitious growth, and dead branches. To catch early infestations, branch sampling can be used to help identify populations that may be in the upper crown. Ryal, Fidgen & Turgeon, (2011) describe removing select branches from the upper south area of tree crowns and peeling off bark using a wood working draw knife to reveal existing larval galleries.

Large drop zones (1.5 to 2 times the height of a tree) are recommended to protect people and objects from shattering wood when parts hit the ground. Low impact rigging techniques should be used to prevent excessive loading and premature breakage. Life support rope climbing systems (with or without climbing spurs) are not recommended to be used in ash trees with more than 20% crown dieback (Ball, 2017). When possible, a slightly less dangerous option may be for life support systems to be secured in tall, healthy neighboring trees that allow for acceptable rope work angles to access ash trees of concern. Trees assessed as not safe to climb *should* be accessed and worked on using equipment such as elevated work platforms, cranes, mechanized forestry machines, or heavy equipment to improve worker safety.

Figure 5.7: Dead standing ash stem that failed at the base (Wisconsin DNR).

In rural and natural areas, dead standing trees can be left alone if their eventual failure poses little risk to people or property. Trees left in place will eventually deteriorate, becoming perfect wildlife habitat for birds, reptiles and insects. Additionally, many landowners and municipalities may not be able to afford removal or chipping of EAB-infested ash trees, and in

most cases, leaving standing or downed trees in place is a better alternative to transporting untreated or infested wood. In the case that dead ash in natural forest areas becomes a high or extreme risk to people or unmovable targets, heavy equipment should be used to safely knock down trees as part of risk mitigation. Consider residual risk and liability for any standing or downed ash tree parts, including stumps, that are left in urban and natural areas.

To improve the safety of workers, municipal tree managers and tree contractors should follow American National Standards Institute (ANSI) Z133 Safety Standards, and ANSI A300 Tree Care Standards to help guide employees in safe and industry accepted tree work practices. For planning and preparation, municipalities should create a regional list of qualified tree care contractors that can service private property owners and city properties. Many qualified contractors are credentialed as Certified Arborists through International Society of Arboriculture (ISA) and Certified Tree Safety Professionals through Tree Care Industry Association (TCIA).

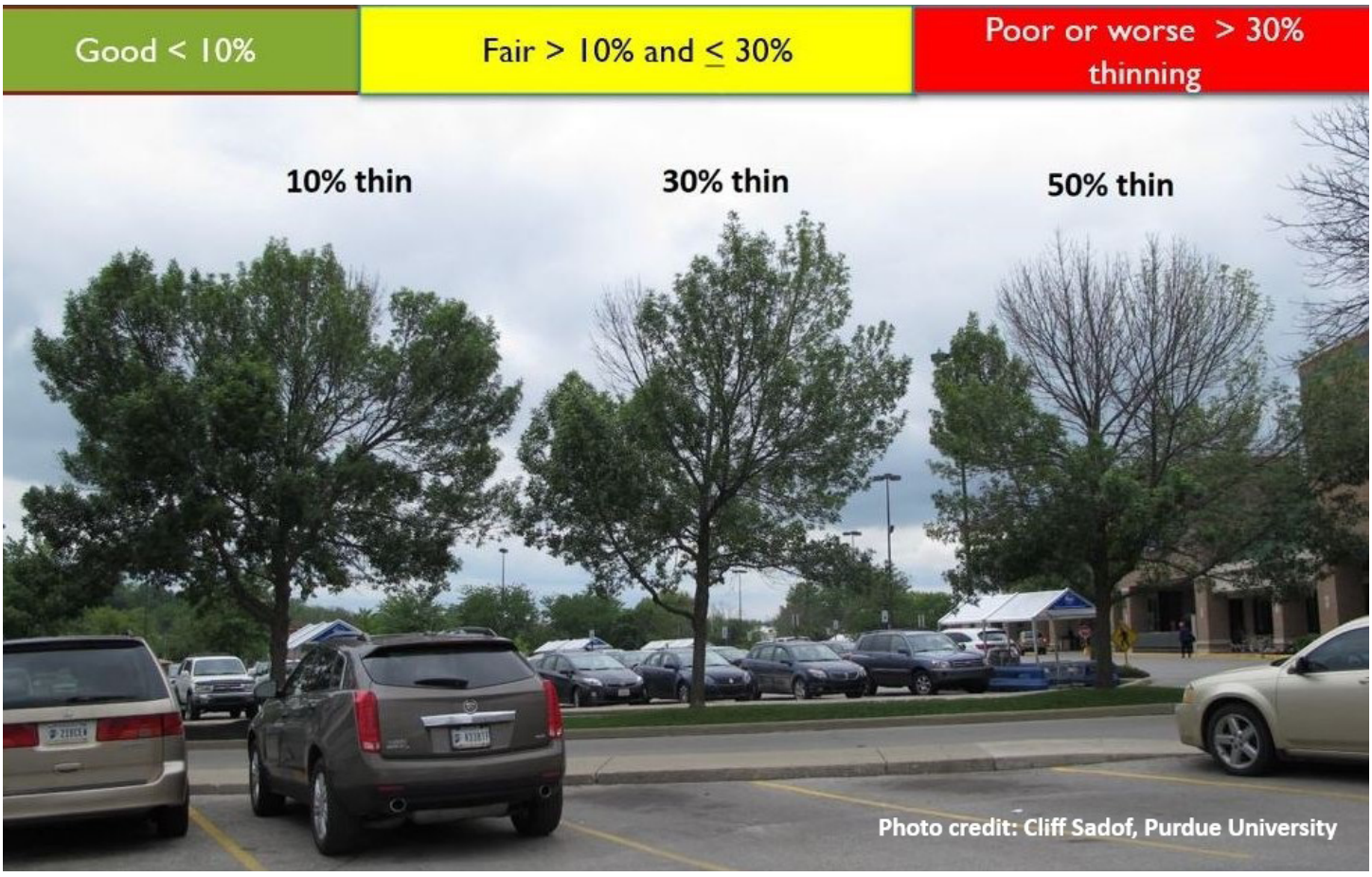

Figure 5.8: The progression of branch thinning due to EAB infestation (Purdue University).

ADDITIONAL RESOURCES

1. Emerald Ash Borer Treatment Options

Author/Source: Be a Smart Ash, Denver Parks and Recreation
Summary: This resource offers clear, user-friendly information on general EAB treatment options. Interactive animations help users understand how treatments work and what steps are involved in managing infestations.
Link: https://beasmartash.org/what-can-i-do/emerald-ash-borer-treatment/

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2. Biological Control for Emerald Ash Borer (FAQ Fact Sheet)

Author/Source: USDA-APHIS (2020)
Summary: USDA fact sheet summarizing biological control options for EAB.
Link: https://www.aphis.usda.gov/sites/default/files/faq_eab_biocontrol.pdf

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3. Rochester Parklet Showcases Sustainable Reuse of Urban Ash Wood

Author/Source: Donahue, M. (2020)
Summary: This website highlights a project reusing ash wood from urban trees killed by EAB for community parklets.
Link: https://extension.umn.edu/rsdp-happenings/rochester-parklet-showcases-sustainable-reuse-urban-ash-wood

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4. The Urban Wood Network Website

Author/Source: Urban Wood Network
Summary: A non-profit operating in Washington state and throughout the country, assists customers with re-utilizing EAB infested wood by connecting them to individuals and companies that treat, process, and create end-products with it.
Link: https://urbanwoodnetwork.org/

ADDITIONAL RESOURCES (Continued)

5. And They Came Tumbling Down: Stability of Infested Ash Trees

Author/Source: Ball, J. (2017)
Summary: A video presentation examining the structural stability of ash trees infested with EAB and the risks of tree failure.
Link: https://mediahub.unl.edu/media/7289

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6. Dealing with Ash Trees: When to Climb, and What to Do If You Can't

Author/Source: Walsh, T. (2019)
Summary: A video presentation offering practical guidance for handling hazardous ash trees affected by EAB.
Link: https://www.youtube.com/watch?v=YZgo9lpS7ds&t=979s

Figure 5.9: Ash trees marked for removal due to Emerald Ash Borer infestation in Minnesota.

Chapter 6: Outreach and Education

AT A GLANCE

Early detection and effective management rely on an informed public. By raising awareness among residents, volunteers, and community groups, outreach helps people recognize signs of infestation, report sightings, and support proactive tree care, ultimately reducing the spread and impact of EAB in Washington's urban forests. This chapter guides how to share information about the EAB to raise awareness, encourage action, and help protect ash trees. It covers planning, audience priorities, messaging, and long-term education strategies.

COMMUNICATIONS PLANNING

- Define goals, audiences, methods, timeline, and budget.
- Assign lead agencies and coordinate implementation.
- Monitor progress and adjust as needed.

PRIORITY AUDIENCES

- Public: Homeowners and residents.
- Professionals & Industry: Arborists, nurseries, landscapers.
- Government & Agencies: State, county, city staff, parks, utilities.
- Special Groups: Tribes, Master Gardeners, educators, nonprofits, media.

OUTREACH STRATEGIES

Before EAB Detection:

- Train staff and community partners.
- Share educational materials and reporting guidance.
- Prepare for potential tree removals and costs

After EAB Detection:

- Confirm through official agencies.
- Inform the public via press releases, social media, and meetings.
- Encourage reporting and maintain transparency about impacts.

EDUCATION & TRAINING GOALS

- Build long-term capacity to detect, report, and manage EAB.
- Provide accessible training and materials to all communities.
- Focus on core skills: ash identification, EAB detection, reporting, management practices, and community engagement.

KEY TAKEAWAY

Effective EAB outreach requires coordinated communication and education before and after detection to build awareness, support early detection and reporting, and empower communities to protect and manage ash trees.

Chapter 6:
Outreach and Education

COMMUNICATIONS PLAN

Writing Contributors: Fiona Paquette, Samara Group & Karla Salp, WA State Dept of Agriculture & Maria Marlin, WISC

The purpose of this Communications Plan is to guide how information about emerald ash borer (EAB) is shared, both internally and externally, to achieve specific awareness, engagement, and behavior-change goals. The plan is designed to support those who teach, manage, work with, or are responsible for ash trees by providing clear, consistent, and actionable information. It aims to build understanding, strengthen skills, and support informed decision-making across education, planning, management, and on-the-ground response efforts, while also encouraging early detection, reporting, and adoption of recommended management practices.

Coordination Process

1. **Development of the outreach and communication plan**
   - ✓ Identify priority audiences
   - ✓ Identify key decision makers for tree management (private and public land within your local jurisdiction)
   - ✓ Define goals and objectives
   - ✓ Identify outreach methods and communications tools
   - ✓ Identify timeline and budget for outreach efforts
2. **Identify lead organization(s) responsible for facilitating communications**
   - ✓ Establish a centralized resource hub for all communications materials and guidance.
   - ✓ Define a lead agency and, if appropriate, create subcommittees to manage outreach, media, and training tasks.
   - ✓ Build flexibility into roles and timelines to allow adaptation when unexpected events occur.
3. **Implement plan**
4. **Analyze and evaluate plan progress**

Priority Audiences for Outreach

- Local municipalities and planning staff
- Plant nurseries and nursery professionals
- Forest nonprofits and organizations (e.g., Washington Friends of Farms and Forests)
- Foresters and tree farm operators
- State and national park and forest staff
- Arborists and urban forestry professionals
- Tribal governments and tribal natural resource staff
- Master Gardeners and volunteer horticulture educators
- News media (local and regional outlets, journalists, and reporters)
- Professional trade associations
- Nursery industry associations
- Arborist and pest management organizations (e.g., Washington State Pest Management Association)
- Technical and community colleges with arboriculture or forestry training programs
- Public and private utility employees
- Anglers and fisheries organizations (e.g., Northwest Indian Fisheries Commission)
- Environmental consultants (especially those working on wetland mitigation sites with Oregon ash)
- Transportation agencies and staff (e.g., Washington State Department of Transportation, focused on early detection)
- Conservation districts
- Managers of public and private conservation lands
- Wood reuse and wood utilization companies or programs
- Land trusts and land conservation organizations
- Small forest landowners
- Pest control and tree treatment companies
- Environmental education organizations

Grouping Audiences by Role

- Educators & Trainers: Provide instruction and guidance to build awareness, knowledge, and skills in communities and professional networks.
- Urban Forest & Resource Managers: Oversee planning, maintenance, monitoring, and management of public and community forest resources.
- Professional Tree Care & Industry: Apply technical expertise to identify, manage, and treat pest threats, and ensure compliance with regulations and best practices.
- Homeowners, Residents & Community Members: Observe and report potential pest activity on private property and implement recommended management practices.
- News Media: Share timely and accurate information with the public, raise awareness about EAB impacts, and help communicate reporting and management guidance. Media and communications should be prepared to repeat key messages with each new detection, clarifying that the process is cyclical and updates will be necessary for each affected community.

Suggested Outreach and Engagement Strategies Prior to EAB Detection in Washington

- Develop pre-vetted, ready-to-use outreach materials for municipalities, arborists, and educators, including pocket guides, videos, and infographics.
- Coordinate media and agency roles to ensure consistent, unified messaging and create a coordinated response to misinformation.
- Plan multi-channel outreach: in-person workshops, social media, traditional media, and other targeted communications.
- Clarify reporting structure and key partners for communication.
- Assess potential scale of impact in your community and plan whether to contain or limit it.
- Train staff to identify ash trees, recognize EAB signs and symptoms, and follow proper reporting channels.
- Prepare communities for potential costs of removals and share management plans.
- Brief council or leadership on exceptions needed for current ordinances and emergency scenarios (e.g., vendor flexibility for wood waste).
- Provide guidance on enabling private ash tree removal where appropriate.
- Identify Public Information Officers for media contacts and maintain contact personnel for public inquiries.
- Establish website resources for the public to access information and materials.
- Translate outreach materials into local languages to ensure accessibility.

Suggested Outreach and Engagement Strategies After EAB Detection in Washington

- Use a centralized hub to post press releases, educational materials, and updates for public and municipal audiences.
- Reinforce consistent messaging across all agencies; provide repeated communications for each affected community.
- Confirm detections through the appropriate agency (WSDA) before public announcements.
- Provide clear guidance to municipalities on immediate actions, including assessment, reporting, and prioritization for treatment or removal; caution against large-scale preemptive ash removal.
- Inform the public via press releases, social media, and local resident meetings or direct outreach.
- Translate outreach materials into languages spoken locally.
- Encourage continued vigilance and reporting of new detections.
- Maintain transparency throughout the response.
- Communicate the potential impacts of EAB on natural lands, salmon habitat, and culturally important resources.

TARGETED OUTREACH EFFORTS

Writing Contributors: Elizabeth Walker, WA DNR UCF & Jessica Farmer, Seattle Public Utilities & Ali Lakehart, Seattle Public Utilities, & Maria Marlin, WISC, & Fiona Paquette, Samara Group

KEY MESSAGES PRIOR TO AN EAB INVASION IN WASHINGTON STATE

These key messages are grouped by themes to help Washington's main audiences prepare for EAB **before it arrives.** Educators and trainers can build awareness and skills in communities, urban forest managers can plan for monitoring and long-term tree management, tree care professionals can prepare for detection and treatment, and homeowners, residents, and community members can watch for signs and follow recommended practices. News media play an important role in sharing timely information and raising public awareness about EAB and reporting options. Because EAB cannot be eradicated once it becomes established, prevention and early detection are critical. Together, these messages provide clear actions to help slow the spread of EAB, protect trees and ecosystems, and support early detection and coordinated response efforts across Washington.

Table 5: Key messages prior to an EAB invasion in Washington state, organized by key theme.

Key Theme	Key Messages Prior to an EAB Invasion in Washington State
Awareness, Prevention, and Action for EAB	• EAB is present in Oregon and British Columbia and is expected to reach Washington. • EAB kills nearly all true ash trees; mountain ash is not affected. Ash is common in forests, wetlands, streets, parks, and yards. • EAB threatens urban ash trees, natural areas, riversides, and culturally important resources. • Early detection and quick response can help slow ash tree loss. • Learn to identify ash trees and signs of EAB infestation. • Report suspected EAB immediately with a clear photo via the Washington Invasives app, invasivespecies.wa.gov, or email. • Do not move firewood or ash wood, EAB can hide inside and spread. • Know your trees by completing a tree inventory. • Plant a mix of tree species and avoid new ash plantings.
Preparedness and Team Action for Urban Forest Pests	• Learn the State of Washington Urban Forest Pest Readiness Playbook and follow its recommended actions to be prepared for pests in urban forests. • Use the Playbook to train your team and coordinate with colleagues so everyone is ready, knowledgeable, and actively involved in early detection and rapid response. • Spread the word to others (staff, partners, family, and friends) because more eyes on trees help catch pests early.
Protecting People, Culture, and the Environment from EAB	• EAB damages forests, wetlands, and riversides, which are important for fish, wildlife, and water quality. Healthy ash trees help keep streams shaded and clean. • Losing ash trees can impact tribal cultural sites and resources used in traditional practices. • EAB can cause economic losses, including tree replacement costs and impacts on businesses that rely on healthy forests. • Local tree ordinances and management plans help reduce risks and guide protection efforts. • Early detection and rapid response protect the environment, cultural resources, and local economies. • Everyone can help: watch for EAB signs, report suspected infestations, and follow local management guidance.

KEY MESSAGES AFTER AN EAB INVASION IN WASHINGTON STATE

These key messages are grouped by themes to guide Washington's main audiences in responding to EAB **after it has been detected.** Educators and trainers can share updated information and best practices with communities, urban forest managers can implement management and mitigation actions, tree care professionals can identify, treat, and remove infested trees, and homeowners, residents, and community members can take steps to protect their trees and report new infestations. News media play an important role in sharing timely updates, raising public awareness, and helping communicate reporting and management guidance. Since EAB cannot be eradicated once it arrives in Washington, all efforts focus on slowing its spread and minimizing impacts on trees and ecosystems.

Table 6: Key messages after an EAB invasion in Washington state, organized by key theme.

Key Theme	Key Messages After an EAB Invasion in Washington State

Immediate Action and Response After EAB Detection	• The highly destructive EAB has been detected in Washington. We are asking residents to be alert and continue to report suspected sightings. Please try to provide a clear photo of the insect.
	• You can make a report via one of the following options:
	  • On your tablet or mobile device with the free Washington Invasives app
	  • Online at invasivespecies.wa.gov
	  • Email: If you encounter a social media EAB report or EAB report on another platform (such as iNaturalist), please send a screenshot, link, or as much information as possible to invasivespeciesinfo@rco.wa.gov
	  • If you have a physical specimen, try to save and preserve it. The Washington State Department of Agriculture may ask for it to verify the identification. To preserve a specimen, you may bag and freeze it. Alternatively, place it in a vial with ethanol (preferred) or isopropyl alcohol. Be sure to also note the date, collector name, and GPS coordinates if possible.
	• If you are a municipality or landowner near a confirmed detection, consider beginning a cost analysis of preemptive removal/replacement vs. treatment. Prioritize ash trees most suitable for treatment by considering which trees are most significant to the community and/or provide the most ecosystem services.

Sustained Management, Diversification of Trees, and Planning for EAB Impacts	• EAB is unlikely to be eradicated once it arrives, so long-term management is essential to protect urban and forested areas. • Monitoring ash trees regularly helps detect infestations early, which improves treatment success. • Insecticide treatments can protect high-value ash trees, but they must be applied correctly and repeated as recommended. • Removing heavily infested or weakened trees can reduce spread and protect nearby healthy trees. • Diversifying tree species in cities and forests helps reduce the overall impact of EAB and strengthens long-term ecosystem health. • Work with trained professionals, follow local regulations, and use guidance from state and tribal resources for effective management. • Community involvement is key: report new infestations, care for treated trees, and support planning efforts to maintain healthy forests over time.

COMMUNICATIONS TOOLS

Multiple communication tools, apps, websites, email, social media, and training materials, will be used to reach priority audiences with key messages about EAB, from preparation and reporting to long-term tree management. Strategies include:

- Ensure a mix of communications channels: traditional media, social media, in-person events, and printed materials (pocket guides) for both general public and municipal staff.
- Ensure outreach channel and strategy is tailored to the audience you are attempting to reach.
- Tailor key messages in content and complexity for the audience you are attempting to reach.
- Coordinate outreach with local municipalities and agencies before public announcements.

Table 7. Suggested communication strategies, by communication channel type.

Communications Channels	Communications Strategy
Email/ newsletter updates/text messages	Direct, timely updates to targeted stakeholders
WSU extension materials	Trusted educational resources (both print and online materials)
Social media	Broad engagement and awareness through alerts and updates
Information distributed at local nurseries	On-the-ground outreach (general)
Information distributed direct to key audiences including households	On-the-ground outreach select audiences
Workshops and webinars	Education, interactive training and skill-building
Targeted media	Focused messaging for specific audiences through advertisements and articles

EDUCATION MANAGEMENT PLAN

Writing Contributors: Fiona Paquette, Samara Group & Jessica Farmer, Seattle Public Utilities & Joey Hulbert, WSU Plant Pathology

The purpose of the EAB Education Management Plan for Washington state is to build long-term public and professional capacity to detect, manage, and adapt to EAB impacts. It outlines clear goals, identifies priority audiences for training, and establishes the core competencies needed to ensure that professionals, community members, and partners can effectively detect, report, and manage EAB as it spreads. It is important to acknowledge that educational efforts will need to adapt and repeat for each community experiencing a new detection.

Long-Term Goals And Objectives

- Capacity-building: Ensure staff, arborists, and volunteers have ongoing access to high-quality training for detection and management.
- Resource development: Maintain an up-to-date library of educational materials that are accurate, accessible, and standardized.
- Behavioral outcomes: Promote proper reporting of suspected EAB, encourage best practices for tree treatment and removal, and increase compliance with disposal recommendations.
- Equity and access: Provide educational resources and training to all communities, including tribal governments, non-English speakers, and underserved areas.

Key Audiences For Long-Term Education Efforts

- Municipal/County public works staff
- Parks and natural-area crews
- Utility vegetation management teams
- Tribal natural resource departments
- Certified arborists and tree-care companies
- WSU Extension Master Gardeners and volunteers
- Homeowners adjacent to known ash areas
- Nursery and landscaping professionals
- Schools, youth programs, field-based community groups

Table 8: Core competencies define the essential knowledge, skills, and abilities that participants need to detect, respond to, and manage EAB effectively. These competencies are tailored to the specific roles and responsibilities of each audience, ensuring that all partners can contribute meaningfully to long-term EAB management efforts. By aligning competencies with audience roles, the program can prioritize training and materials to address the skills most relevant to each group.

	Core Educational Competencies
Ash Identification	• Ability to recognize ash species present in Washington state, including native ash and cultivars. • Understanding the distinguishing characteristics of ash trees in urban, suburban, and natural landscapes. • Primarily targeted to municipal crews, arborists, contractors, Master Gardeners, and volunteers involved in field surveys. Homeowners and educators may receive simplified identification skills for basic recognition and reporting.
EAB Detection & Symptoms	• Recognize signs and symptoms of EAB infestation, including canopy thinning, bark splitting, D-shaped exit holes, and serpentine galleries under the bark. • Differentiate EAB damage from other pests or environmental stressors. • Focused on professionals conducting surveys and inspections, while homeowners and volunteers receive training in early detection and when to report.
EAB Biology & Lifecycle Awareness	• Understand the lifecycle of EAB and how it affects ash trees over time. • Recognize periods of highest vulnerability for detection, treatment, and management. • Emphasized for municipal staff, arborists, utility crews, and educators to guide management decisions, with homeowners receiving an overview to understand timing of signs and interventions.
Reporting & Communication	• Know how and where to report suspected EAB sightings, including state hotlines, online reporting forms, and local agencies. • Communicate effectively with colleagues, homeowners, and the public about EAB risks, management options, and regulatory requirements. • Relevant to all audiences; professionals need to follow formal reporting protocols, while homeowners, volunteers, and educators need clear guidance on how and where to report suspected infestations.
Management Practices	• Apply best practices for managing infested or at-risk trees, including proper removal, disposal, treatment, and replacement strategies. • Understand regulatory requirements for handling and transporting ash wood and debris. • Targeted to municipal crews, arborists, contractors, and utility staff responsible for treatment, removal, and disposal. Homeowners may be taught options for treatment or removal in a residential context.
Community & Professional Engagement	• Participate in coordinated monitoring, detection, and training programs. • Support public education and outreach initiatives to increase awareness and prevent spread. • Emphasized for all audiences to encourage participation in coordinated monitoring, training, and outreach programs, and to foster collaboration across agencies, organizations, and communities.

Effective outreach and education are critical to preparing Washington communities for EAB and supporting coordinated response efforts once it is detected. By providing clear, consistent, and actionable information, training key audiences, and leveraging multiple communication channels, including a centralized resource hub, partners can build awareness, strengthen skills, and encourage early detection and reporting. Lessons from other states, like Oregon, highlight the importance of pre-vetted materials, unified messaging, municipal engagement, and flexible strategies that adapt to each new detection. Together, these efforts help slow the spread of EAB, protect trees and ecosystems, and ensure that professionals, communities, and the public are prepared to respond effectively at every stage of an invasion.

ADDITIONAL RESOURCES

1. Emerald Ash Borer in Oregon

Author/Source: OISC, OSU, ODF, and ODA
Summary: An EAB Hub website for Oregon state. This can be used as a template for future website outreach in Washington, as well as a good reference site for updated EAB information.
Link: https://oregon-eab-geo.hub.arcgis.com/

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2. How to Spot and Slow Emerald Ash Borers in Your Community

Author/Source: Xerces Society (2023)
Summary: Practical guide for communities to detect and reduce EAB spread in local trees.
Link: https://xerces.org/blog/how-to-spot-and-slow-emerald-ash-borers-in-your-community

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3. Pocket Guide to Identifying Emerald Ash Borer

Author/Source: Oregon Department of Forestry
Summary: Printable outreach material with quick facts about ash trees in the Pacific Northwest and signs of an EAB invasion.
Link: https://www.oregon.gov/odf/forestbenefits/Documents/eab-pocket-guide-january-2024.pdf

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4. Don't Move Firewood Website

Author/Source: Don't Move Firewood
Summary: The Don't Move Firewood campaign is a major public outreach effort that encourages people to buy or collect firewood locally and avoid transporting it long distances. The campaign's website is a helpful resource for learning about firewood risks and local regulations. It also features an interactive firewood map covering the United States and Canada, where users can click on a state, province, or territory to learn about local rules and how to be a responsible firewood user.
Link: https://www.dontmovefirewood.org/map/

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