CITY OF OREGON CITY
NATURAL RESOURCES COMMITTEE AGENDA

Community Room, Community Development Building,
695 Warner Parrott Rd, Oregon City, OR
Wednesday, October 8, 2025 at 6:30 PM

Ways to participate in this public meeting:

- *Attend in person, location listed above. Please see the public comment guidelines below.*
- *Attend the livestream of the meeting on the City's YouTube Channel: https://www.youtube.com/user/CityofOregonCity*
- *Register to provide electronic testimony (email ocplanning@orcity.org by 3:00 PM on the day of the meeting to register)*
- *Email ocplanning@orcity.org (deadline to submit written testimony via email is 3:00 PM on the day of the meeting)*

1. **CONVENE MEETING AND ROLL CALL**
2. **APPROVAL OF MINUTES**
   a. Approval of old NRC minutes - 8/10/2022 and 9/14/2022.
3. **PUBLIC COMMENTS**
   Please see the public comment guidelines below.
4. **DISCUSSION ITEMS**
5. **COMMUNICATIONS**
   a. Communications
6. **ADJOURNMENT**

PUBLIC COMMENT GUIDELINES

Complete a Comment Card prior to the meeting and submit it to the clerk. When the Chair calls your name, proceed to the speaker table, and state your name and city of residence. Each speaker is given 3 minutes to speak. As a general practice, the committee does not engage in discussion with those making comments. Complaints shall be addressed at the department level prior to addressing the committee.

ADA NOTICE

The location is ADA accessible. Hearing devices may be requested from the City Recorder prior to the meeting. Individuals requiring other assistance must make their request known 48 hours preceding the meeting by contacting the City Recorder's Office at 503-657-0891.

Agenda Posted at City Hall, Pioneer Community Center, Library, City Website.

Video Streaming & Broadcasts: The meeting is streamed live on the Oregon City's website and available on demand following the meeting. The meeting can be viewed on Willamette Falls Television channel 28 for Oregon City area residents as a rebroadcast. Please contact WFMC at 503-650-0275 for a programming schedule.

City of Oregon City

625 Center Street
Oregon City, OR 97045
503-657-0891

Meeting Minutes - Draft

Natural Resources Committee

Commission Chambers

Monday, August 10, 2022 **6:00 PM**

1. Convene Regular Meeting and Roll Call

Chair Broshot called the meeting to order at 6:09 PM.

Present: 3 - Chair Nancy Broshot, Committee Member Samantha Wolf, and Committee Member Devon Pilney

Absent: 2 - Committee Member Chris Weaver and Committee Member Brian Kvistler,

Staffers: 3 – Planning Manager Pete Walter, Assistant Planner Molly Gaughran, and Assistant Planner Jude Thaddaeus

Jude Thaddaeus and Molly Gaughran, new Assistant Planners, introduced themselves.

2. Interviews for Natural Resources Committee

The Committee interviewed Emily Lisborg, asking her the reasons she wanted to serve on the NRC, her background in natural resources, previous experience on an advisory committee, projects the NRC should pursue, and time commitment. Ms. Lisborg asked about any recommended reading to prepare for serving on the NRC.

There was discussion regarding the updated Street Tree List going to the City Commission on August 17 for approval and the updated Street Tree code going to the Commission in September.

3. Public Comment

None

4. Communications

Committee Member Wolf gave a background on the Emerald Ash Borer and their destruction of native ash trees. Because it was an invasive pest, the wood had to be carefully quarantined. They needed to anticipate what they would do when the Borer came to the City, especially since it was already in Forest Grove. Infestation was not

easily recognizable. She explained the first signs of infestation and recommended training to identify the insect and what to do after it was identified. She thought it would be helpful to have an inventory of ash trees in the City to know how many trees they would need to manage or protect and possibly replant. They also needed processes in place for how to deal with infestation.

It was suggested to add information about this to the City's website and newsletter and put a flyer in utility bills.

5. Future Agenda Items

There was discussion regarding future agenda items including Thimble Creek heritage tree designations, native plant list update and officially adopting the County's list, tree removal code and canopy coverage discussion, fall planting for Friends of Trees, invasive species list, tree inventory, hiring an urban forester, Emerald Ash Borer update from staff, Planning 101, Type III land use applications coming to the NRC, Arbor Day planning, and coordination with PRAC.

Committee Member Wolf discussed the Partners in Community Forestry Conference on November 15-16 in Seattle.

6. Adjournment

Chair Broshot adjourned the meeting at 7:11 PM.

City of Oregon City

625 Center Street
Oregon City, OR 97045
503-657-0891

Meeting Minutes - Draft

Natural Resources Committee

Commission Chambers

Monday, September 14, 2022 **6:00 PM**

1. Convene Regular Meeting and Roll Call

Chair Broshot called the meeting to order at 6:00 PM.

Present: 4 - Chair Nancy Broshot, Committee Member Samantha Wolf, Committee Member Emily Lisborg, and Committee Member Brian Kvistler

Absent: 2 - Committee Member Chris Weaver and Committee Member Devon Pilney

Staffers: 1 – Planning Manager Pete Walter

2. Adoption of the Agenda

The agenda was adopted as presented.

3. Public Comment

None

4. New Business/Discussion Items

412 Logus Street Heritage Tree Failure and Removal – Pete Walter, Planning Manager, said over the weekend a portion of this tree had fallen into the alleyway and caused damage. The tree had been in decline since the ice storm in 2021. The remaining portion of the tree posed an imminent hazard and the owner was requesting to remove it. The tree was on private property. He shared pictures of the tree and discussed the criteria for removal.

There was consensus that there was no way to save the tree and that it should be removed.

Mayor's Monarch Pledge – Mr. Walter said the Parks and Recreation Advisory Committee wrote a letter of support for partnership with the National Wildlife Federation to enhance habitat for the monarch butterfly. He explained the action items included with the pledge. He asked for ideas on how to support the public

outreach effort and improve monarch butterfly habitat. He provided the presentation staff made to the City Commission about the program.

There was discussion regarding resources from Planning to support outreach including a webpage and City's newsletter, plants to support the caterpillars and butterflies, changing mowing schedules, minimizing use of pesticides, encouraging the City and neighborhoods to plant certain plants, involving the schools, integrating changes into master plans, native plant sale at Arbor Day, and demonstration garden at City Hall.

There was support for additional action items including amending the weeding, mowing, and pesticide practices, diversifying the list of plantings in the zoning code and stormwater standards, and looking into the Bee City USA program and better integrated pest management.

Street Tree Code Update – Mr. Walter said Assistant Planner Thaddaeus was going to work on the Street Tree Code after getting formal direction from the City Commission. They would be developing a survey and public outreach. They would also get feedback from City Committees and property owners would be notified. The City Commission would have a work session and survey on the topic and the legislative process would include public hearings. He had the suggested changes to the code from the NRC. He thought a topic to consider was scalable caliper sizes based on tree species from a cost and availability standpoint.

It was recommended to lower the caliper size and prioritize native evergreen species.

There was discussion regarding the definition of a tree, what was allowed in planter strips and how 3 foot planters would not be replanted, Sooty Bark Disease in Maples, root barrier policy, stormwater swales and plantings allowed, and cost benefit of hiring an urban forester to be on staff.

Emerald Ash Borer Update – Mr. Walter said staff added a policy that no ash trees would be planted in new parks or as tree replacements. They were also monitoring for and training staff on what to look for as well as attending meetings on the issue. Information and resources were also on the City's website. A flyer would go into the utility bills as well.

There was discussion regarding information to include on the website and prevention and mitigation plan to slow the spread.

5. Communications

Mr. Walter spoke about heritage tree designations from 2020 and 2022 that still needed plaques and covenants recorded.

There was discussion regarding how the forms and checklist were confusing and that there were new nominations for heritage tree designation.

Mr. Walter gave an update on the Friends of Trees neighborhood planting. The contract was good through 2023 and they would be able to renew for another three years. The next event was November 12 and they needed more tree planters. They

would also be doing a pruning workshop early next year.

There was discussion regarding the status of previous tree plantings.

5. Future Agenda Items

There was discussion regarding future agenda items including Arbor Day preparation, Monarch butterfly program, street tree code, City forester position, Bee City USA program, and planting trees on the empty field on Linn Avenue.

The Committee discussed the Arbor Day event, which would be a dedication and plaque for the City's Hiroshima peace tree at the End of the Oregon Trail Interpretive Center.

6. Adjournment

Chair Broshot adjourned the meeting at 8:04 PM.

625 Center Street
Oregon City, OR 97045
503-657-0891

CITY OF OREGON CITY

Staff Report

To:	Natural Resources Committee	**Agenda Date:**	October 8, 2025
From:	Pete Walter, Planning Manager		

SUBJECT:
Item 5.a. - Communications

STAFF RECOMMENDATION:
Staff and members will provide updates on various subjects including the following:

- Emerald Ash Borer
- City Commission Goals related to the public tree canopy assessment, Bee City USA, and Tree City USA
- Natural Resources Overlay District brochure content

EXECUTIVE SUMMARY:
Thanks for meeting today, we appreciate the continued collaboration on natural resource goals!

- Tree City USA - Community Development to lead goal, data for application due by end of November. Looking to promote the Arbor Day event more in 2026, perhaps in conjunction with a planting day (opportunity to focus this on EAB mitigation, ideas welcome?).
- Bee City USA - Parks is leading the application. Look to include PRAC and NRC in the discussion, then take a draft plan to City Commission for input.
- Tree Canopy Assessment - Focus on city-owned land. Tie this into OC's EAB response plan. Seek other funding sources (grants, etc.) to pay for assessment. Not a full tree inventory, more of a planning and strategy document.
- EAB - PW is inventorying trees in water-quality facilities, several so far. Several items in code may need to be amended to remove ash from native tree lists/stormwater standards, etc. Tree code and city removal process may also need amended.
- Staff will coordinate with ODF for a presentation at a City Commission meeting, then follow up with a work session to discuss strategy. Parks reach out to ODF for scheduling. Clackamas County Disaster Response Program is leading a coordinated response plan including all agencies.

BACKGROUND:

Please review attached materials for further information.

OPTIONS:

BUDGET IMPACT:

Please do not pass this resolution until your city/county has started a Bee City Application and Bee City USA has approved your draft resolution. Upload your draft resolution to your "Application" tab.

Below, you may modify the "Whereas" section of your resolution. The "Now, Therefore" section can be lightly modified, but the commitments cannot be deleted or greatly modified.

Questions? Email beecityusa@xerces.org.

RESOLUTION NO. _____

A RESOLUTION of [your city council or county commission of your city and state] designating [your city or county] as a BEE CITY USA® affiliate.

WHEREAS, the mission of BEE CITY USA is to galvanize communities to sustain pollinators, responsible for the reproduction of almost 90% of the world's flowering plant species, by providing them with healthy habitat, rich in a variety of native plants and free to nearly free of pesticides; and

WHEREAS, thanks to the more than 3,600 species of native bees in the United States, along with introduced honey bees, we have very diverse dietary choices rich in fruits, nuts, and vegetables; and

WHEREAS, bees and other pollinators have experienced population declines due to a combination of habitat loss, poor nutrition, pesticides (including insecticides, fungicides, and herbicides), parasites, diseases, and climate change; and

WHEREAS, pollinator-friendly communities can benefit local and regional economies through healthier ecosystems, increased vegetable and fruit crop yields, and increased demand for pollinator-friendly plant materials from local growers; and

WHEREAS, ideal pollinator-friendly habitat (A) is comprised of mostly native wildflowers, grasses, vines, shrubs, and trees blooming in succession throughout the growing season to provide diverse and abundant nectar and pollen, since many wild pollinators prefer or depend on the native plants with which they co-adapted; (B) is free to nearly free of pesticides, as many pesticides can harm pollinators and/or their habitat; (C) comprises undisturbed spaces (leaf and brush piles, unmown fields or field margins, fallen trees and other dead wood) for nesting and overwintering; and (D) provides connectivity between habitat areas to support pollinator movement and resilience; and

WHEREAS, Integrated Pest Management (IPM) is a long-term approach to maintaining healthy landscapes and facilities that minimizes risks to people and the environment by: identifying and removing the causes of pest problems rather than only attacking the symptoms (the pests); employing pests' natural enemies along with cultural, mechanical, and physical controls when prevention is not enough; and using pesticides only when no other method is feasible or effective; and

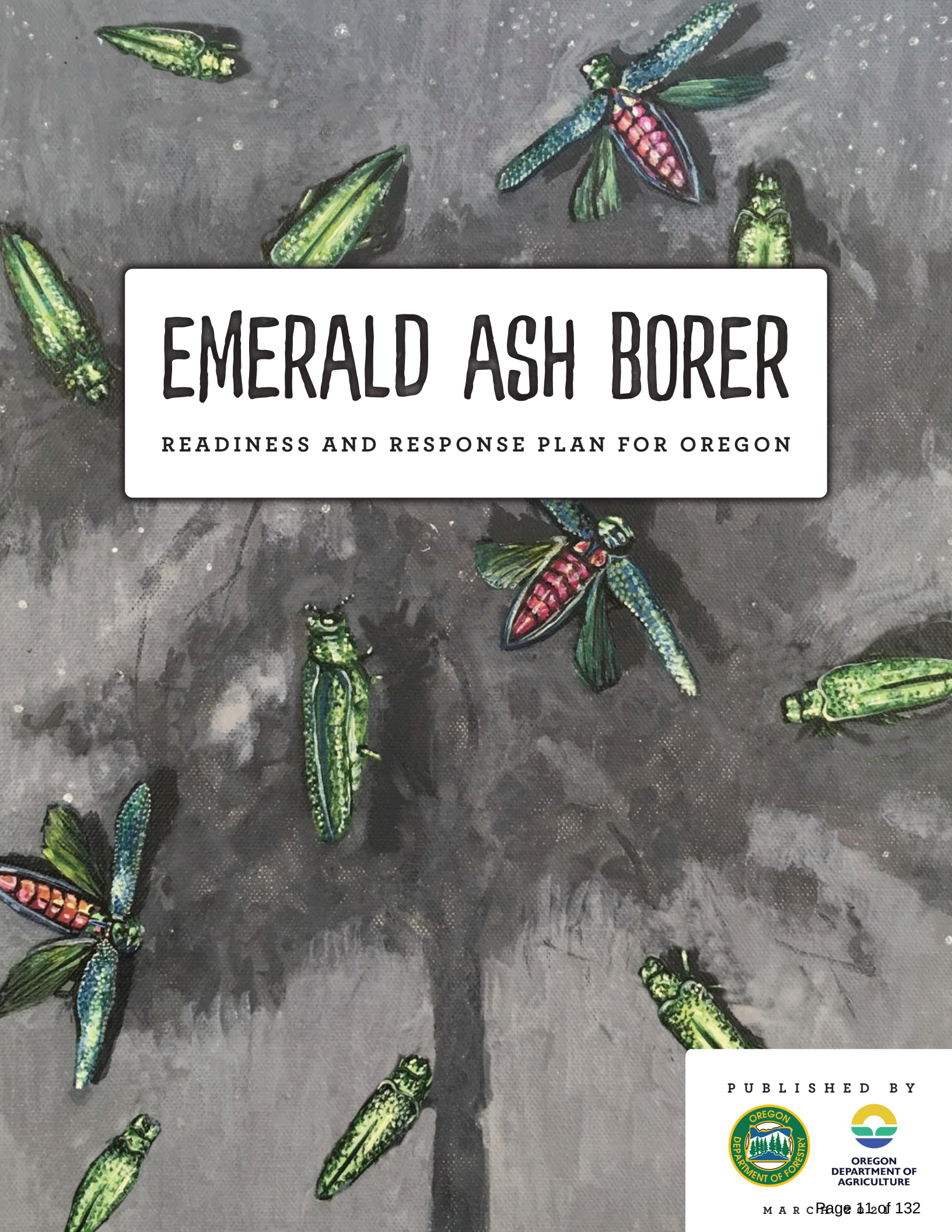
WHEREAS, supporting pollinators fosters broad-based community engagement in environmental awareness and sustainability; and

WHEREAS, [your city or county] should be certified a *BEE CITY USA* community because [this is optional section for you to highlight anything your community has already done or plans to do to conserve pollinators]; and

NOW, THEREFORE, in order to enhance understanding among local government staff and the public about the vital role that pollinators play and what each of us can do to sustain them, [your city or county] chooses to support and encourage healthy pollinator habitat creation and enhancement, resolving as follows:

1. The [your city or county] [appropriate department name] Department is hereby designated as the BEE CITY USA sponsor.
2. The [appropriate position title] of [department above] is designated as the BEE CITY USA Liaison.
3. Facilitation of [your city or county]'s BEE CITY USA program is assigned to the [committee name] Committee.
4. The [committee name] Committee is authorized to and shall:
    a. **Celebration**: Host at least one educational event or pollinator habitat planting or restoration each year to showcase [your city or county name]'s commitment to raising awareness of pollinator conservation and expanding pollinator health and habitat.
    b. **Publicity & Information**: Install and maintain at least one authorized BEE CITY USA street sign in a prominent location, and create and maintain a webpage on the [your city or county name] website which includes, at minimum a copy of this resolution and links to the national BEE CITY USA website; contact information for your BEE CITY USA Liaison and Committee; reports of the pollinator-friendly activities the community has accomplished the previous year(s); and your recommended native plant species list and integrated pest management plan (explained below).
    c. **Habitat**: Develop and implement a program to create or expand pollinator-friendly habitat on public and private land, which includes, but is not limited to, Identifying and inventorying [City or County]'s real property that can be enhanced with pollinator-friendly plantings; creating a recommended locally native plant list to include wildflowers, grasses, vines, shrubs, and trees and a list of local suppliers for those species; and, tracking (by square footage and/or acreage) annual area of pollinator habitat created or enhanced.
    d. **Pollinator-Friendly Pest Management:** Create and adopt an integrated pest management (IPM) plan designed to prevent pest problems, reduce pesticide use, and expand the use of non-chemical pest management methods.
    e. **Policy & Plans**: Establish, through the [City or County], a policy in the [Plan name] Plan of [City's or County's] Comprehensive Plan to acknowledge and commit to the BEE CITY USA designation and review the [Plan name] Plan and other relevant documents to consider improvements to pest management policies and practices as they relate to pollinator conservation, identify appropriate locations for pollinator-friendly plantings, and consider other appropriate measures.
    f. **Renewal:** After completing the first calendar year as a BEE CITY USA affiliate, each February, apply for renewal of [your city or county name]'s BEE CITY USA designation following the format provided by BEE CITY USA, including a report of the previous year's BEE CITY USA activities, and paying the renewal fee based on [your city or county name]'s population.

ADOPTED by the [City Council or County Commission] of the [your city or county name, state], this ___ day of _____, 20__.



EMERALD ASH BORER

READINESS AND RESPONSE PLAN FOR OREGON

PUBLISHED BY

OREGON DEPARTMENT OF FORESTRY

OREGON DEPARTMENT OF AGRICULTURE

MARCH 2020

Authors & Acknowledgements

This Readiness and Response Plan for Oregon was made possible thanks to the considerable input and review that was provided by members of the EAB Advisory Committee and from potentially affected stakeholders throughout the state. We would also like to thank those outside Oregon that shared their experiences and lessons learned from living with EAB, as well as forestry and invasive species experts from our neighboring states (WA, CA, ID) who shared EAB planning updates with us.

SAMARA GROUP

Authored by / Contributing Authors

Leslie Bliss-Ketchum

Robyn Draheim

Marie Hepner

Olivia Guethling *(design)*

Cover Art by Kendra Larson

Printing of the document was funded by USDA Landscape Scale Restoration Grant (15-DG-11062765-715)

Authors & Acknowledgements

The EAB Readiness and Response Steering Committee members are listed below:

Oregon Department of Forestry

Wyatt Williams, Invasive Species Specialist

Christine Buhl, Forest Entomologist

Terry Frueh, Monitoring Specialist

Kristin Ramstad, Urban and Community Forestry Program Manager

Oregon Department of Agriculture

Clint Burfitt, IPPM Manager

Helmuth Rogg, Director

City of Portland: Portland Parks & Recreation

Gina Dake, Botanic Specialist I

Nik Desai, Botanic Specialist I

City of Corvallis: Parks & Recreation

Jon Pywell, Urban Forester

Oregon State University Extension

Amy Grotta, Extension Forester

USDA APHIS

Christopher Deegan, State Plant Health Director

Meg Raabe, Pest Survey Specialist

U.S. Forest Service

Karen Ripley, Forest Entomologist / Forest Health Monitoring Coordinator

TABLE OF CONTENTS

I. PURPOSE STATEMENT

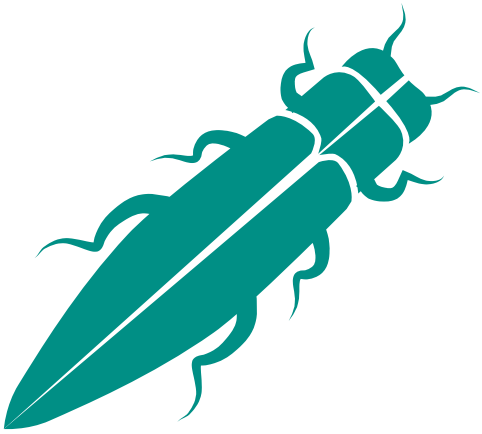
In Oregon, the establishment of emerald ash borer *(EAB)* could devastate whole habitat types, such as ash swales and sensitive riparian zones, as well as reduce urban forest cover. EAB has the potential to cause the local extinction of Oregon's native ash species. The loss of these trees could result in wide-reaching economic impacts, endanger important cultural resources, damage water quality and create direct human health impacts.

Strategies to cope with the introduction and spread of EAB must be identified and implemented prior to introduction and establishment to best protect Oregon resources. Thus, in preparation for the introduction of EAB, The Oregon Emerald Ash Borer Readiness & Response Plan *(plan)* was created to outline important steps, highlight tools and resources already available, and guide the state's approach to handling an EAB infestation at all stages. The Readiness & Response plan is organized into four main categories: Function & Role of Stakeholders, Readiness, Response, and Funding. Each of these four categories include the information and necessary resources to prevent and respond to an EAB introduction.

The Oregon Emerald Ash Borer Readiness & Response Plan was created through the collaborative efforts of a diverse group of stakeholders that would be actively involved and/or impacted by the introduction and establishment of EAB in Oregon. Plan development was initiated by the Oregon Department of Forestry *(ODF)* and the Oregon Department of Agriculture *(ODA)*.

This plan will serve as a guide for the state of Oregon to actively prevent the introduction of EAB and to control and manage any EAB populations that could arrive in the future. The intent of this plan is to capture and elucidate community and stakeholder participation in prevention and readiness efforts, alongside an agency readiness and response plan. It is designed to serve as a tool in helping establish a framework for local EAB preparedness and community action by outlining major issues and providing guidance on how to address them. By fostering EAB resilient communities, this plan may serve as a model for protecting Oregon resources from other invasive forest pests. After feedback is received from stakeholders and user groups, an evaluation of the overall effectiveness of the Oregon plan will be included in future versions. This plan is a "living" document and will be updated as needed to ensure the information within remains accurate and up-to-date.

II. INTRODUCTION AND BACKGROUND



The emerald ash borer *(EAB)* beetle, Agrilus planipennis *(Fairmaire)*, possibly the most destructive forest pest in North America, is a wood-boring pest of ash trees. Since the original discovery in 2002 in the vicinities of Detroit, Michigan and Windsor, Ontario, EAB infestations have been detected in 30 states, with the westernmost infestation reported in Colorado. Native to parts of Asia, it is likely that EAB was transported to the U.S. in solid wood packing material. Considered a devastating non-native pest for its ability to infest all species of ash *(Fraxinus)* with mortality rates of up to 99%, EAB presents a significant threat to ash trees throughout North America. Recent research indicates that all 16 native species of ash in North America are susceptible to EAB infestation. No effective native predators or parasites have been encountered, and, unlike in its native range, EAB aggressively kills both stressed and healthy trees.

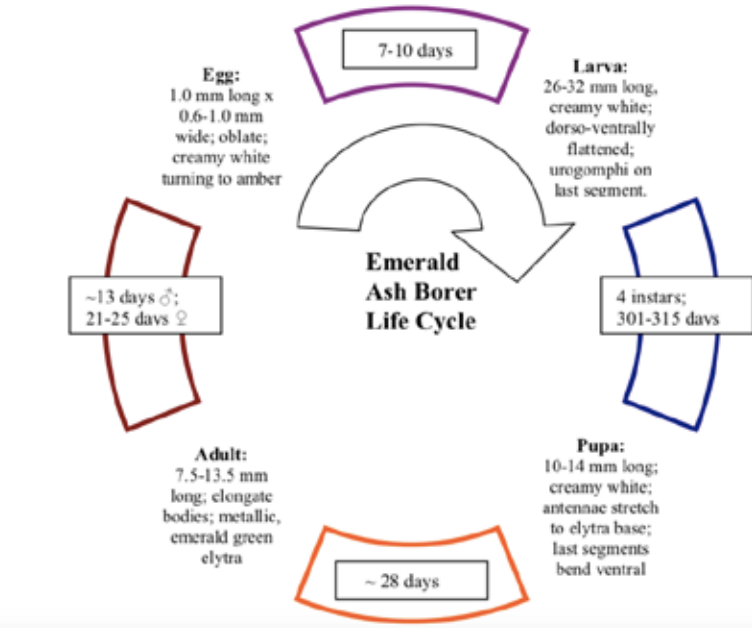
This pest will continue to infest and kill ash trees, harming urban forests and natural areas throughout North America. The primary host for EAB in North America are ash trees which are widespread in the United States, although white fringetree *(Chionanthus virginicus)* and cultivated olive trees *(Olea europea)* may also be at risk. EAB has already killed tens of millions of ash trees and threatens to kill most of the 8.7 billion ash trees throughout North America. Subsequently, the impact on ash in North American forests will be devastating.

Ash Creek is a tributary of the Willamette River. The image shows the creek in its lower reaches within the city of Independence, OR.
Photo credit: Finetooth (2016).

EAB presents a significant concern to the Pacific Northwest where Oregon ash *(Fraxiunus latifolia)* is abundant along riparian corridors in western Oregon and Washington, and where other ash species are widely used by cities and municipalities as good-fit street trees.

Biology and Life Cycle of EAB

EAB is a small *(1/2 inch-long)* metallic-green buprestid, or jewel beetle, that bores into ash trees, feeding on tissues beneath the bark, ultimately killing the tree. EAB is capable of infesting all ash trees in the genus Fraxinus. In its native range in eastern Asia, EAB is typically found at low densities and usually does not cause mortality in healthy native Asian ash trees. EAB is particularly attracted to stressed trees, meaning trees already in a weakened state from damage, such as broken limbs, lack of water, disease or fungal infection.



Emerald ash borer life cycle graphic.
From the USDA Emerald Ash Borer Program Manual (2015).

The EAB has four life stages: egg, larva, pupa and adult *(Figure 1)*. Research suggests that EAB goes through complete metamorphosis in either a one- or two-year life cycle. Low density EAB populations in healthy ash trees tend to complete a two-year life cycle while stressed trees supporting higher larval population densities tend to host a one-year life cycle. It is unknown exactly how the EAB lifecycle dynamics and behavior might respond to the Oregon environment.

Typically, adults begin to emerge in mid to late May with peak emergence in late June. Females usually begin laying eggs about 2 weeks after emergence. Adult EAB prefer to lay eggs on stressed ash, but will readily lay eggs on healthy trees as well. After 1-2 weeks of incubation, eggs hatch and the tiny larvae bore through the bark of the ash tree and burrow into the cambium layer. After feeding for several months, most EAB larvae will overwinter in the outer bark or outer layer of wood. With spring comes the onset of pupation and a new generation of adults will emerge in late

Emerald ash borer emerging from D-shaped exit holes.
Photo Credit: Debbie Miller, USDA Forest Service, Bugwood.org.

spring through D-shaped exit holes chewed in the bark. Adult beetles are capable of flight upon emergence but will spend most of the day feeding on ash leaves in the ash canopy. Within 1-3 weeks they will begin mating and laying eggs and the cycle will begin again.

While EAB are attracted to volatile chemical compounds released by stressed ash trees they are also capable of using those same volatiles to find ash trees when dispersed in mixed-species forests.

THE NORTHERN RESEARCH STATION OF THE US FOREST SERVICE CONDUCTED RESEARCH IN MICHIGAN ON EAB DISPERSAL ABILITY:

"We studied the dispersal potential of EAB using flight mills, which allowed us to measure the distance EAB adults flew. We found that mated females flew further than unmated females and males. The average distance flown by mated females was about 3 km, however, 20% flew >10 km and 1% flew >20 km. These findings demonstrate one of the reasons that eradication of EAB in North America has been unsuccessful."

Natural Areas, Wildlife and Water Quality

The establishment of EAB will likely devastate ash woodlands as well as riparian zones and has the potential to cause the extirpation of an entire species of native ash *(Fraxinus latifolia, Oregon ash).* The Oregon Conservation Strategy has identified Oregon ash as an important characteristic of deciduous swamps and shrubland as well as riparian habitats. The loss of these trees from an EAB infestation could further endanger wildlife that depend on forested wetlands.

In wetter parts of the Willamette Valley, ash is the predominant tree species and the loss of ash trees will likely result in significant changes. Ash provides important food and habitat resources along creeks and rivers where soils can be poorly draining and where seasonally high water-tables can exclude nearly all other tree species. In dense stands of Oregon ash, understory vegetation is often sparse, consisting primarily of sedges. The loss of ash trees caused by EAB mortality is expected to facilitate colonization by invasive plants and lead to once-forested areas becoming shrub- or grasslands. Standing and fallen dead ash biomass can alter soil pH, mineral concentration *(ash is an accumulator of calcium),* and soil moisture levels. The resulting changes in soil chemistry can affect rates of decomposition, nutrient, and water cycling, thus impacting nutrient resource availability for the remaining trees, while gaps in tree canopy can increase soil erosion, stormwater runoff and elevated stream temperatures.

Along sensitive riparian corridors, the resulting increase in water temperature, nutrient runoff and sediment load could be detrimental to Endangered Species Act *(ESA)* listed species *(Table 1; Figure 2).* In the Willamette River, fish species such as Upper Willamette River steelhead, Upper Willamette River chinook salmon, and the Willamette bull trout, as well as the recently delisted Oregon chub, could be imperiled by the effects of an EAB infestation. Other species of concern to the state of Oregon, including freshwater mussels like the winged floater and the Western ridged mussel, and populations of endemic caddisflies may also be negatively impacted by increased water temperature and sediment load.

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

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

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

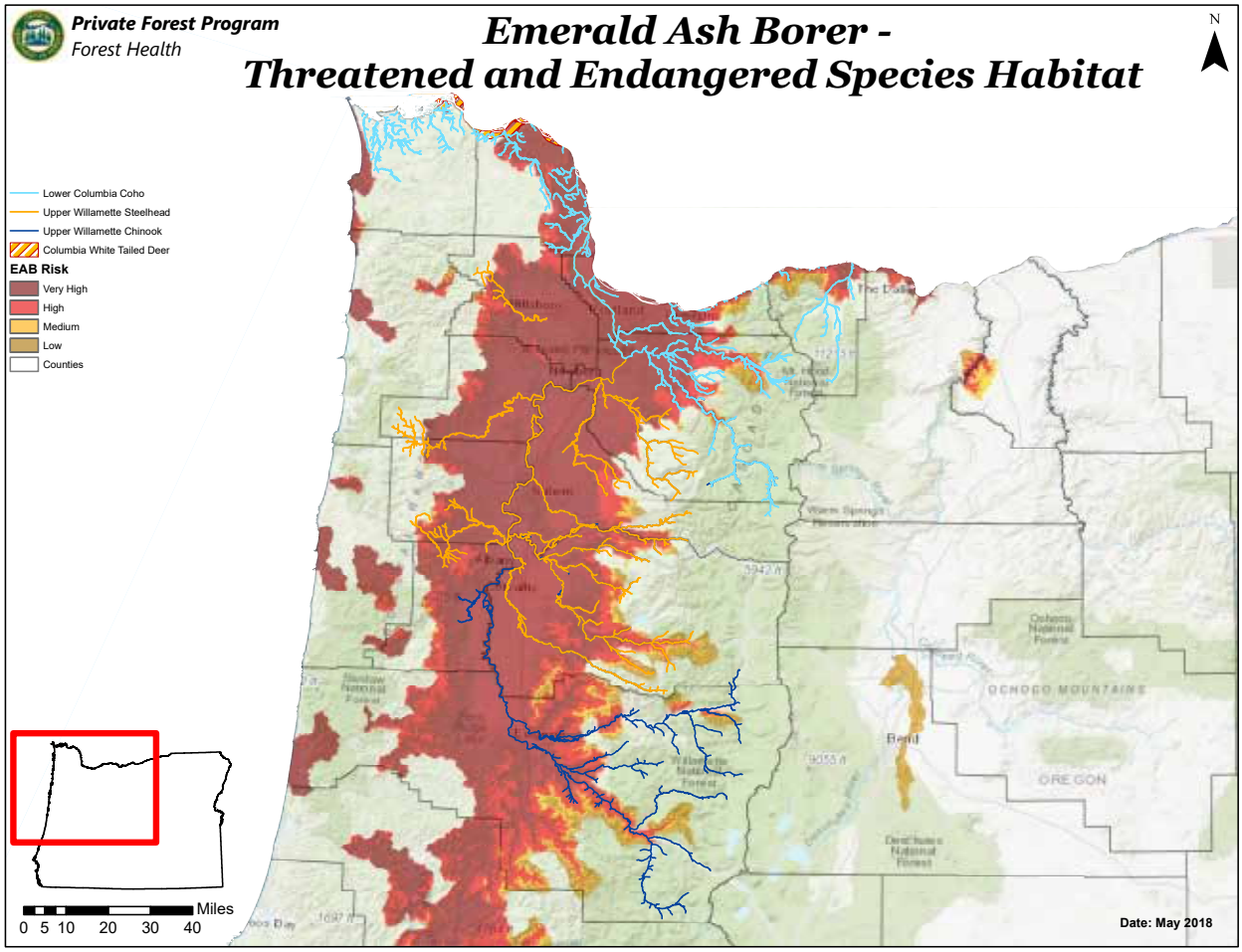


Figure 2. The EAB Threatened and Endangered Species Habitat map shows critical habitat that intersects with EAB risk and the distribution of wild ash in riparian areas of the state. The Threatened and Endangered species includes Lower Columbia Coho salmon (Oregon endangered species, federally threatened species), Upper Willamette Chinook salmon (federally threatened species), Upper Willamette steelhead (federally threatened species), and Columbia white-tailed deer (federally threatened species). Data is not shown for Nelson's checkermallow (Oregon threatened species).

Of the species addressed in the US Fish and Wildlife Service Recovery Plan for Prairie Species of Western Oregon and Southwest Washington, seven of them can be found in wet prairie habitats. Specifically, Nelson's checker-mallow, peacock larkspur, and Bradshaw's desert parsley can be found in Oregon ash swales, in native wet prairies on the edges of ash wetlands, or along streams in the Willamette Valley. The loss of riparian ash stands and swales may affect critical habitat that supports these and other species of concern. Although the effects of EAB-induced ash mortality may temporarily increase open prairie habitat to the benefit of these species, long-term ash loss can result in the establishment of invasive weeds and an increase in detrimental woody shrubs. Habitat destruction, isolation and fragmentation, invasion by non-native plant species, and succession are underscored in the recovery plan as the primary threats to prairie species. EAB-induced ash mortality could counteract this efficacy of existing restoration strategies.

Oregon ash trees also provide a direct benefit to wildlife. The winged fruit (also known as samara) of the ash are utilized as food by a variety of squirrels and mice, as well as birds such as grosbeaks, wood ducks, finches, and more. Many species of insects, including larval butterflies like the two-tailed swallowtail, feed on the leaves of Oregon ash, while twigs and leaves are eaten by deer and elk. The trees themselves are used as nesting sites for birds, roosting habitat for bats, drill sites for sapsuckers, and provide wood for beaver dams.

For all of the reasons listed above, native Oregon ash plays an important role in ecosystem restoration projects where the management goal is restoration of important wildlife habitats rather than mitigating impacts to a single species of concern. Similar incidental benefits hold true for aquatic wildlife as well, given that many large riparian habitat restoration projects include replanting ash. Not only would EAB induced tree loss cause ecological harm, but the loss of ash trees available for restoration projects could also have negative ramifications on the success of local restoration and mitigation efforts.

Economic Impacts

Emerald ash borer has already caused billions of dollars in damages to natural and urban areas in North America. Economic damages attributed to EAB infestations includes loss of ash trees as a source of timber and firewood, lost value of forested areas, lost value of urban tree canopy, costs incurred in removing diseased trees, and costs incurred by diminished trade/nursery industry attributed to EAB quarantine zones as well as the loss of ecosystem services.

While the nursery value of ash trees in Oregon is unknown, according to the Oregon Association of Nurseries plant finder, there are more than 40 growers/wholesalers/retail nurseries that carry one or more of approximately 20 different varieties of ash from rootstock to containers. If EAB is detected in Oregon, the infested areas could be placed under quarantine, meaning that selected materials, including ash nursery stock, will no longer be allowed to be moved out of infested areas and may need to be destroyed to reduce the chances of spreading EAB. According to the U.S. Department of Agriculture, National Agricultural Statistics Service, Oregon is consistently among the top three producers of nursery stock in the country. Due the state's prominence as a top exporter of nursery stock, EAB could have an impact on Oregon's nursery industry beyond just ceasing the sale of ash trees within Oregon. The 2016 ODA estimated value of Greenhouse & nursery products was $909,493,000.

Oregon ash is not considered an economically important timber species. It is not generally managed for timber production and its availability for harvest is restricted by regulations governing forestry practices in wetlands and riparian areas. However, it is moderately hard, machines well, has high impact resistance, and is utilized on a small-scale in tool and furniture making. It is also considered a desirable firewood species because it splits easily and has a high heat value, but because it is a non-durable wood species its value can quickly degrade post felling.

City trees, which include various ash species and other cultivated varieties (cultivars), provide various benefits that increase over the lifetime of the trees. Thus, management decisions that contribute to the long-term health and maintenance of the urban forest are considered a valuable investment. However, the cost of caring for the majority of urban trees falls on private property owners. Once infested trees die, they are quick to rot and become public-safety hazards. While

removal of infested trees can be a significant expense to private tree owners, it can cost cities tens of thousands of dollars to deal with an EAB infestation in a public park or along an ash-lined street. Additional costs incurred may also include loss of ecological services, a drop in property values, and the time and cost of replanting a comparable replacement. The loss of these shade trees will negatively impact both the property owner and the local community.

Ash trees lining a residential street in Portland.
Photo credit: Portland Parks & Recreation Urban Forestry

Investing public resources in prevention and slowing the spread of threats to the urban forest, such as EAB, will help reduce these costs, as will investments in research on EAB biology and management. Managers can assess the costs of prevention versus projected economic damage incurred by EAB as well as compare the costs of replacing infested trees with EAB-resistant species versus inoculation of full-size healthy ash trees.

More difficult to calculate is the economic value provided by the healthy ecological function of natural ash areas and the forested riparian corridors that ash provide, especially those adjacent to agricultural areas.

Urban and Community Forests

While Oregon ash is the only ash native to the Pacific Northwest, other species and cultivars of ash can be found within Oregon's urban forests, widening the impact of an EAB infestation. Extensive research has been conducted to assess the benefits provided by urban forests which include trees in densely populated areas in parks, on streets, and on private property. The benefits of urban forests include reduction of the urban heat island effect, filtering air pollution, increasing property values, reducing stormwater runoff, providing habitat for wildlife, improving human health, and providing aesthetic value.

While urban forests are complex, living resources that have many well-documented positive benefits, there are also costs associated with their management. Since city trees are an important component of a community's green infrastructure and livability, proactive planning for resiliency through increasing species diversity, tracking changes via tree inventories and canopy analyses, and investing in public education on how trees contribute to communities are important components for maintaining the overall health of our urban forests.

THE VALUE OF STREET TREES

Given that trees can increase property values by .08%, the median value of a mature ash tree would be $3,120 in Portland, OR or $2,192 in Eugene, OR. Values are based on the median value of a single family home in Portland, OR ($390,000) and Eugene, OR ($274,000) in June 2017.

Cultural Resources

EAB threatens the cultural heritage of indigenous communities that have traditional uses for Oregon ash. Ethnobotanical records report medicinal and ceremonial uses of ash (leaves, bark, twigs, and roots) in addition to the use of ash trees as fuel. Records and artifacts also show that ash wood was used in the construction of tools, such as poles, canes, and pipes. The Cowlitz used Oregon ash to make canoe paddles and digging sticks. The Karuk used the root fibers of ash trees to weave baskets. Traditional Costanoan tribal wisdom suggested Oregon ash sticks and leaves would repel venomous snakes.

Human Health & Safety

Direct threats to human health and safety from EAB encompass hazards caused by dead and rotting trees, including falling trees and tree limbs, both within cities and in natural areas. Indirect threats, while difficult to quantify, relate to the consequences of losing significant urban tree canopy. City tree canopy can positively impact human health by reducing the urban heat island effect, filtering air and water pollution, and improving human health and well-being. Studies conducted by foresters and epidemiologists with rapid loss of ash trees caused by the EAB in the Midwest suggest that the loss of trees was correlated with increased mortality related to cardiovascular and lower-respiratory-tract illness.

Trees marked for removal due to EAB infestation in Roeland Park, Kansas.
Photo credit: Ryan Armbrust, Kansas Forest Service, Bugwood.org.

III. FUNCTION AND ROLE OF STAKEHOLDERS

There are numerous state agencies that have invasive species functions and key responsibilities as outlined in the Emerald Ash Borer Readiness and Response Plan for Oregon. The following is a summary of general duties of the agencies and groups located within Oregon that may be involved in the eradication and management of emerald ash borer. See Appendix A for agency contact information.

Primary State Agencies

Oregon Department of Agriculture (ODA):

- Lead agency for the state of Oregon for quarantine and enforcement
- Conduct detection surveys of insects, pathogens and plants
- Implement emergency measures at the state level to prevent spread
- Provide laboratory support
- Provide information to the public and media
- Inspect and regulate movement of nursery stock
- Issue and review interstate plant movement permits
- Review international and interstate plant and plant pest movement permits issued by APHIS (Animal and Plant Health Inspection Service)
- Regulate pesticide registration and use
- Provide information to national pest reporting systems
- Administer state rules on intrastate movement of regulated materials
- Collaborate with the U.S. Department of Agriculture (USDA) and other state and local agriculture agencies
- Represent Oregon on national and regional plant boards
- Designate and regulate invasive plant and plant pest species
- Participate as appropriate in an incident command system

Primary State Agencies *(continued)*

Oregon Department of Forestry (ODF):

- Conduct annual aerial surveys of forest health conditions
- Cooperate with state and federal agencies on monitoring and detection surveys and limiting spread of pests
- Identify and control forest pests on state and private forestlands
- Educate forest industry and state land managers and landowners about forest pests
- Communicate with forest industry, managers, and landowners
- Advise and develop forest management protocols for state and private forestlands
- Seek and apply for special funding assistance through the USDA Forest Service or Natural Resource Conservation Service for established forest pests
- Assist with planning for solid waste disposal and or utilization strategies
- Participate as appropriate in an incident command system
- Provide technical assistance to impacted landowners

Oregon Department of Fish & Wildlife (ODFW):

- Assist with other agencies with pest surveys on state lands and share information
- Assist with public education about forest pests
- Cooperate with other agencies to manage forest pests on state lands
- Participate as appropriate in an incident command system

Other Principal Agencies and Partner Institutions

- USDA Animal and Plant Health Inspection Service (APHIS) Plant Protection and Quarantine:
- Maintain and fund Cooperative Agricultural Pest Survey (CAPS) program and surveys
- Provide final confirmation of pest identifications
- Provide pest traps and lures, if available
- Implement emergency measures at the federal level to prevent spread of pests
- Administer quarantines on interstate movement of regulated materials
- Provide international liaison services between individual states and foreign regulatory bodies
- Provide emergency funding for survey and response, as appropriate and available
- Develop and improve survey and control protocols and measures
- Provide survey data repository, if appropriate
- Participate as appropriate in an incident command system

Other Principal Agencies and Partner Institutions *(continued)*

USDA Forest Service (USFS), Forest Health Protection:

- Provide current information and technical assistance for detection surveys and control activities on federal lands
- Evaluate and develop new technologies for pest management
- Implement detection surveys, evaluation assessments, and control measures on federal lands
- Provide information and educational materials
- Coordinate interstate initiatives, as appropriate
- Provide funding through Cooperative Forest Health and other programs to state and private organizations
- Participate as appropriate in an incident command system

Oregon State University (OSU) Research and Extension:

- Share results of relevant research with state and federal agencies
- Conduct research on plant and plant pest biology, ecology, impact, and management
- Coordinate Oregon Forest Pest Detectors training programs
- Provide information through Extension, Master Gardener, Master Woodland manager and other programs
- Participate as appropriate in an incident command system

Oregon Invasive Species Council:

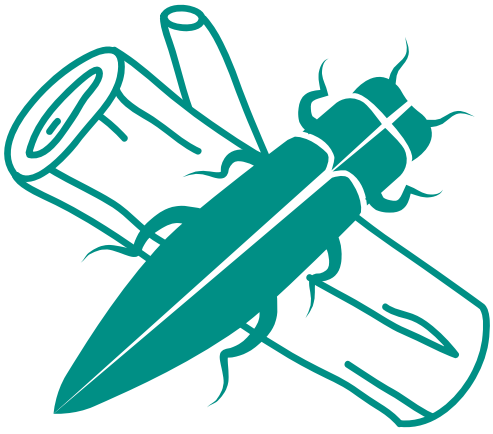
- Coordinate exchange of timely and relevant information among a diverse group of state, federal, local, and non-governmental entities
- Provide information to the public and media
- Manage the Oregon Invasive Species Online Hotline

Other Principal Agencies and Partner Institutions *(continued)*

City of Portland:

- Require permitting, removal, and replacement of infected trees in the city of Portland through authority of the city's tree ordinance
- Provide an inventory of ash trees, using existing street and park tree inventory data
- Promote the Oregon Forest Pest Detector program to City of Portland employees, contractors, and other networks
- Incorporate information on invasive pests into existing outreach efforts, including websites and education programs
- Cooperate with regional partners in planning and response
- Participate as appropriate in incident command system

IV. READINESS



Prior to the arrival of EAB, it is important for the state of Oregon to remain proactive and fully prepared for the arrival of EAB. This includes knowing where ash is located throughout the state, understanding how/where it is likely to be introduced, and identifying the required resources to deal with its aftermath, among other readiness actions. Readiness is broken down into four sections: Risk Assessment, Resilience, Resources for Response, and Detection.

A. Risk Assessment

Assessing and mapping where the greatest risk of EAB establishment is provides a starting point for understanding where in Oregon the economic, environmental, and social impacts of an infestation would be most felt. The risk that a pest such as EAB becomes established in a new location requires an assessment or evaluation of several factors including the risk of EAB being introduced (risk exposure) and the abundance of ash trees in the exposed location. Risk assessments provide information that can be used to maximize the efficacy of both early detection and rapid response efforts. By identifying areas of high risk, outreach campaigns and citizen monitoring efforts can also be targeted to these areas.

1. Distribution of Oregon Ash in Natural Areas

Native Oregon ash distributions have been modeled by ODF and can be used to facilitate targeted detection and control efforts in both wild and managed natural ash habitat (Figure 3; Figure 4). Additional EAB Risk Maps by region can be found in Appendix B.

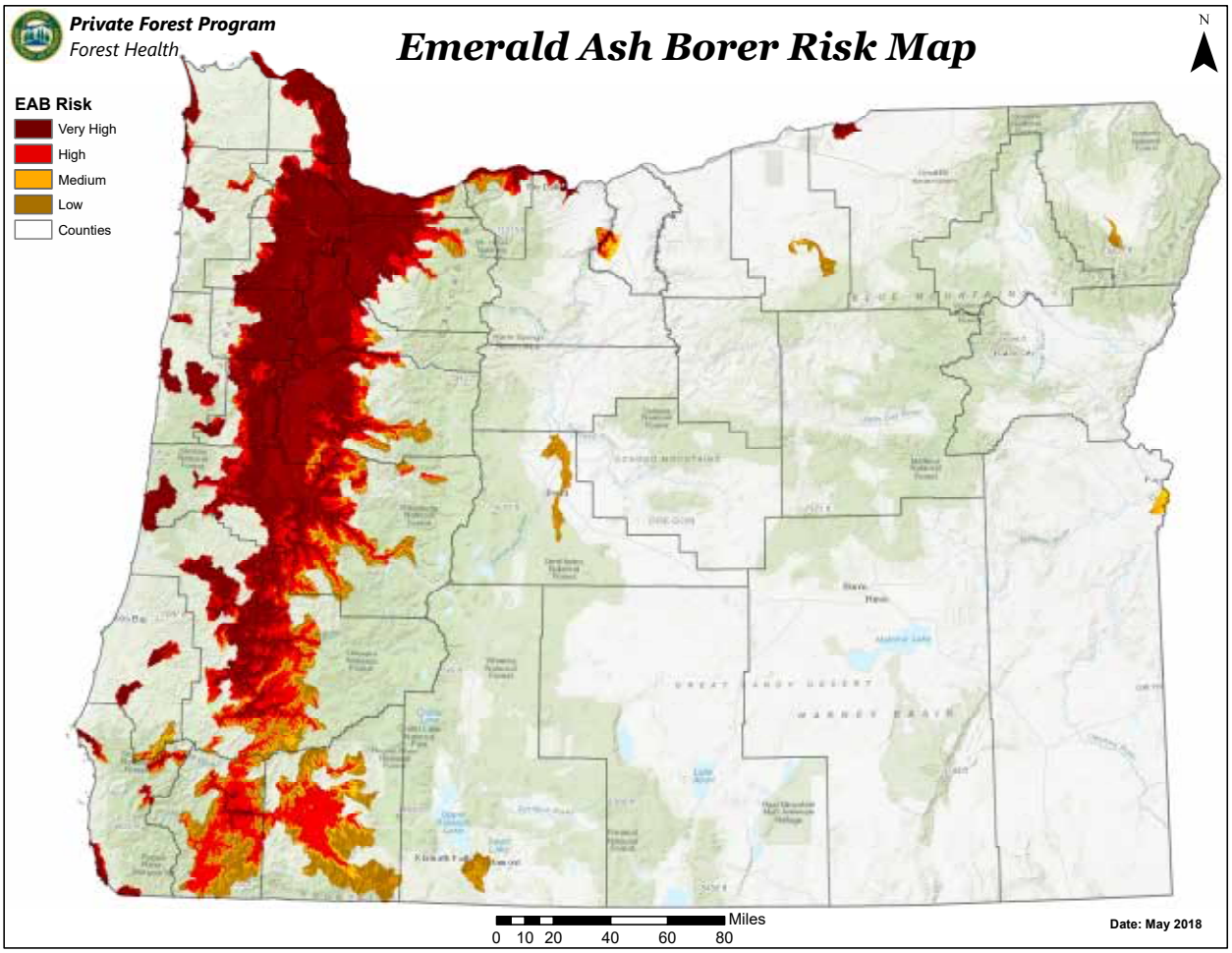


Figure 3. Risk for emerald ash borer *(EAB)* is mapped based upon known occurrences of ash *(Fraxinus sp.)* at the local watershed level (hydrologic unit code 12, or HUC-12) in Oregon. Point data for Oregon's two wild, naturalized species of ash, Oregon ash *(F. latifolia)* and green ash *(F. pennsylvanica),* were used to create the map. Data on ash distribution originated from two sources: the Oregon Plant Atlas, a product of the Oregon Flora Project, and emerald ash borer surveys conducted by the Oregon Department o f Forestry. EAB risk categories were determined based on the frequency distribution of ash by elevation above sea level and corresponding human activities associated with known pathways of EAB introduction and establishment: Very high: ≤1,000' above sea level, High: 1,000 to ≤2,000', Medium: 2,000 to ≤ 2,500', and Low: >2,500'.

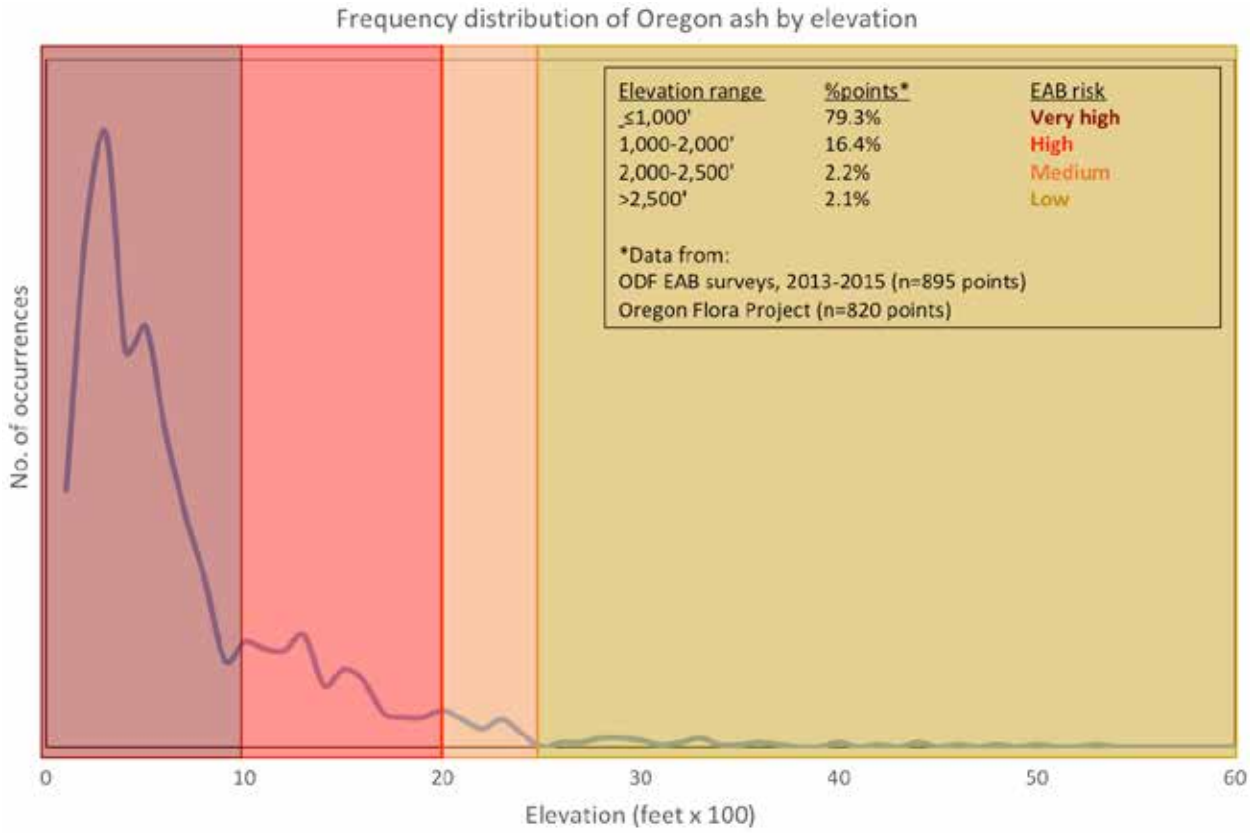


Figure 4. This figure depicts the distribution of wild, naturalized ash (Oregon ash, *Fraxinus latifolia,* and green ash, *F. pennsylvanica)* by elevation and corresponding risk of EAB introduction and establishment. Data on ash distribution originated from two sources: the Oregon Plant Atlas, a product of the Oregon Flora Project (820 points), and emerald ash borer surveys conducted by the Oregon Department of Forestry (895 points). EAB risk categories were determined based on the frequency distribution of ash by elevation above sea level andv corresponding human activities associated with known pathways of EAB introduction and establishment: Very high: ≤1,000' above sea level, High: 1,000 to ≤2,000', Medium: 2,000 to ≤ 2,500', and Low: >2,500'

INFESTATION TIMELINE

Since ash often do not show symptoms during the first years of an infestation, EAB can go unnoticed for several years after it is introduced. Cities already dealing with EAB have estimated that EAB was present for 2-3 years before detection. As local populations enter the fourth year post-establishment, EAB larval densities build high enough to cause rapid mortality of ash trees. Previous studies have suggested that ash populations in forested sites can go from healthy to nearly 100% mortality of mature trees within 6 years of an infestation.

2. Map the Risk of Imported Firewood Transported by Out-of-State Recreationists

The primary interstate pathway by which EAB is thought to be moved long-distances is via the transport of infested firewood by the general public. Using zip codes of out-of-state campers, the risk of potential infested materials movement into federal, state, and private campgrounds has been modeled. These models can help determine the highest risk areas based on locations where native ash distributions and visitors from EAB quarantine areas coincide *(Figure 5)*.

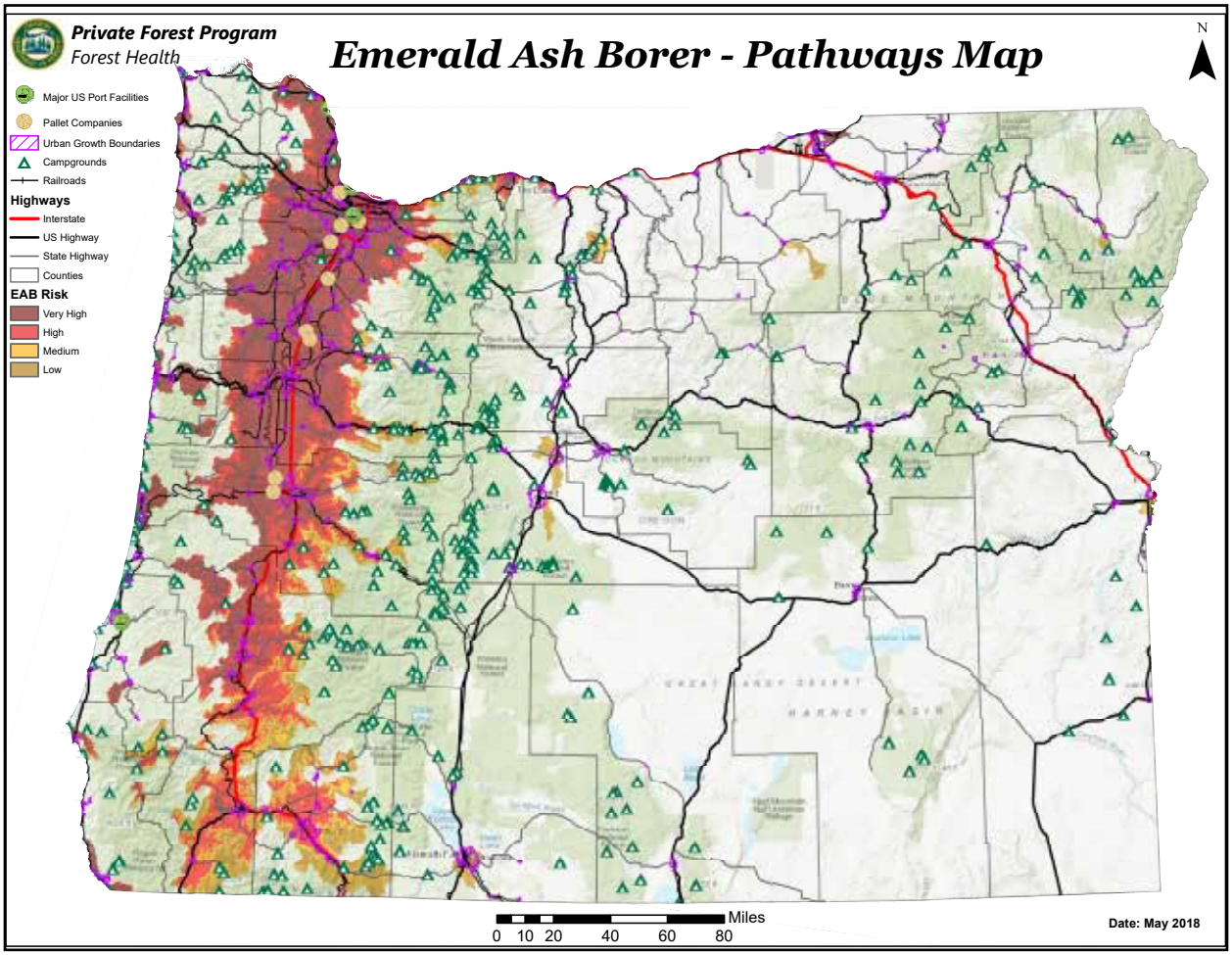


Figure 5. The EAB Pathways map shows all state and federal campgrounds, major U.S. ports facilities, and pallet companies, as well as major railroads and highways – all known pathways for movement of emerald ash borer.

3. Educate groups and industry with high risk of introduction

To increase vigilance for EAB and awareness for how it is transported, recreationalists such as out-of-state game hunters, mushroom hunters, and other backcountry user groups should be provided information on how to not only positively identify EAB, but also ways to decrease the chance of transporting EAB. Additionally, those primarily using wood heat for their homes as well as specialty mills and hobby woodworkers should also be aware of the risk of importing ash from quarantine or near-quarantine areas. Educating local nurseries should also be a priority to ensure they are aware of the potential introduction of EAB through nursery stock.

4. Complete Urban Tree Inventories for Oregon Ash and Other Ash Species

Ash trees can be common in urban and suburban areas. Urban tree inventories allow managers to identify those urban forests that are more vulnerable to invasion and subsequent extensive tree loss, as well as identify high-value urban trees *(such as designated heritage trees)* that may merit protection via prophylactic measures. A list of cities that have completed tree inventories can be found in Appendix C. Tree inventories should be updated and/or refined as appropriate to maintain current inventory data on ash.

5. Estimate the Cost of an EAB Infestation

The estimated cost of an EAB infestation can be calculated using existing tools such as Purdue University's "Emerald Ash Borer Cost Calculator" or the "Emerald Ash Borer Planning Simulator". These tools can provide an estimate of the costs of different EAB management options for specific, high-risk areas such as municipalities.

B. Resilience

The capacity of an ecological system to buffer itself against disturbance is known as resilience. The more biodiversity in urban forests, the more resilient it will be to costs incurred by pests, pathogens, and increasing climate stressors. If managed sensibly, diversity can act as an important buffer against catastrophic tree loss via pests, such as EAB, in forested systems.

EAB RESILIENT COMMUNITY

Prior to a major disturbance, communities can preemptively manage their urban forests in a manner that promotes resilience. A model EAB Resilient Community will have the following components completed, or will have a plan in place to address each:

- **Up-to-date Urban Tree Inventory**
- **Biodiverse urban tree canopy**
- **EAB Prevention Plan and accompanying efforts**
- **Education and outreach**
- **EAB monitoring** *(formal and informal reporting)*
- **EAB Response Plan**
- **Emergency fund**
- **Native ash seed storage** *(if applicable)*

1. Discourage Planting of At-Risk Species

Municipal street tree resources across Oregon recommend planting Oregon ash as well as a variety of other ash species and cultivars. With the growing threat of EAB, municipalities are encouraged to revise their lists with the goal of increasing urban street tree biodiversity. Municipalities should also consider the removal of susceptible *Fraxinus* species and other EAB hosts currently established *(Table 2)*.

For restoration projects located in high risk areas and where ash is heavily used, managers may want to minimize percent ash planting in order to bolster EAB resiliency. Managers may also consider alternative species because of the potential devastation to ash trees after the arrival of EAB.

STREET TREE RESILIENCE THROUGH DIVERSITY

Urban forest species diversity is evaluated using the 10-20-30 rule. This rule recommends that urban tree diversity be composed of no more than 10% of one species, 20% of one genus, or 30% of one family. However, pests with broad host ranges can leave urban areas highly vulnerable to catastrophic tree loss and result in significant long-term costs for removal and replacement of dead and diseased trees. A new 5-10-20 goal has been undertaken by many temperate urban areas in order to bolster the resiliency of urban forests.

For example: According to the City of Portland's 2016 Street Tree Inventory, Ash *(Fraxinus spp.)* represents approximately 4.2% of all street trees in Portland. At under 5% of city-wide street tree diversity, *Fraxinus spp*. are well within the progressive urban forestry guidelines for protecting the urban forest from catastrophic harm from plant pests and pathogens. However, with more than 9,000 ash street trees, the impact of EAB on the urban forest would still be profound, with homeowners potentially incurring considerable costs.

Table 2. Wild and cultivated ash species *(Fraxinus spp.)* in Oregon. Source: Oregon Department of Forestry, 2017.

Latin Name	Common Name	Origin	OR wild populations	OR cultivated/ urban	USDA zones
Fraxinus latifolia Benth.	Oregon ash	OR, WA, CA	●		7–9
Fraxinus pennsylvanica Marshall	green ash	eastern U.S.	●	●	3–9
Fraxinus americana L.	white ash	eastern U.S.		●	4–9
Fraxinus angustifolia Vahl	narrow-leafed ash	Eurasia		●	6–9
Fraxinus excelsior L.	European ash	Europe		●	4–7
Fraxinus nigra Marshall	black ash	eastern U.S.		●	7–10
Fraxinus nigra Marshall	flowering ash	Eurasia		●	6
Fraxinus quadrangulata Michx.	blue ash	eastern U.S.		●	4–7
Fraxinus uhdei (Wenzig) Lingelsh.	shamel ash	Central America		●	8–10
Fraxinus velutina Torr.	velvet ash	Southwestern U.S		●	7–10

**Ash species in bold font are the most common planted and wild ash in the state. Less common species of ash may also be rarely encountered.*

Photo Credit: Kew Gardens.

2. Native Ash Seed Collection and Storage

Collecting and storing native ash seed is essential to preserve the genetic diversity of Oregon ash in preparation for the threat of infestation, and the potential for finding EAB resistance and/or replanting if a successful control measure is found.

To access ash seed collection resources, visit The National Seed Laboratory webpage for Ash. Developing partnerships with local or regional entities for seed collection and storage efforts should also be explored to combine resources and collect from culturally significant ash sources.

ASH SEED COLLECTION

While discussing lessons learned with states already dealing with EAB, Michigan shared that they regret not collecting seeds from their native ash and they have now lost native seed diversity as a result.

Seed collection of native ash for nursery cultivation and use in local restoration projects has already been conducted locally in Oregon. For instance, in 2015 Metro crews planted 42,000 ash trees at Smith and Bybee Wetlands Natural Area that had been grown from seeds collected in summer 2013. Scholls Valley Native Nursery nurtured them for two years in preparation for planting. These efforts can be combined with seed storage guidance to create a viable seed collection of native ash diversity for future use in post-EAB restoration efforts.

3. Pre-emptive Removal of Ash

Since EAB are more strongly attracted to stressed ash, inventoried trees can be prioritized for removal by condition. The cost of pre-emptive tree removal can be estimated above *(see section V. A. 4. "Estimate the Cost of an EAB Infestation").* Municipalit ies may also wish to strike a balance between inoculation and preemptive replacement. If preemptive removal will be conducted, it should be implemented by the time the EAB infestation is within 100 miles *(see also "Integrated Pest Management for Emerald ash borer" Appendix D).*

Guidance for proper disposal should be developed and/or utilized and appropriate ash disposal sites should be identified prior to any removal. More information on wood disposal can be found below in section V. C. 3. "Wood Waste Disposal & Treatment".

POOLING RESOURCES AT THE NEIGHBORHOOD SCALE

For areas with a large number of urban ash that need to be treated or removed, one potential option for landowners to save money is for neighbors to pool together and accept bids from arborists to treat several trees in one area. Arborists may be willing to offer a better price if they are able to treat and/or remove multiple trees in one area at the same time.

C. Resources Needed for EAB Response

Carefully planned treatment, removal, and/or disposal of possibly infested ash is a critical component of containing the spread of EAB. Response actions must consider the origin of the EAB infestation in order to effectively treat, remove, and dispose of ash, and to avoid further spread. Prior to any response, it will be important to determine and clearly communicate who is ultimately responsible for ash treatment and removal in terms of urban, residential, and natural ash locations throughout the state.

1. Pesticide Use and Applicators

Systemic pesticides, such as imidacloprid, dinotefuran, or emamectin benzoate, are most commonly used as a protective treatment against EAB infestation, although they can be used to treat EAB infested trees that still retain >50% of their canopy. Preventive chemical treatments for healthy, uninfested trees can be initiated when known EAB infestations are within 10-15 miles *(see also "Integrated Pest Management for Emerald ash borer" Appendix D).* For more information please visit Insecticide Options for Protecting Ash Trees from Emerald Ash Borer. Certified pesticide applicators can also be found through the Oregon Department of Agriculture's Pesticide Licenses search engine.

2. Tree Removal Resources

When considering tree removal, you will want to utilize qualified arborists and landscape contractors located within your region. Information that can help find and choose qualified arborists near you is available through Pacific NW ISA: Find an Arborist.

3. Wood Waste Disposal & Treatment

Fenced disposal sites can be located on public or private land, with the caveat that the specific location will have to be identified based on proximity to where EAB was first detected, as to not encourage spread of the infestation. The size of the site will be dependent on potential wood volume, proximity to other yards and merchandising activities that will take place and can range from 3 to 10 acres. Treatments to eliminate EAB from these materials include, but are not limited to:

Chipping:

Wood, brush, and stump grindings must be chipped or ground down to a size of no more than 1" in two dimensions *(two of the three measurements- length, width, depth- must be 1" or smaller).* Typical chippers used in tree care operations will not reliably create chips that meet this specification. Chippers equipped with a 1" screen will assure compliance.

Debarking:

At minimum, a complete removal of bark is required. The removed bark *(and any removed wood)* must be chipped down to a maximum size of 1" by 1" in 2 dimensions.

Heat:

Wood must be heated according to established pest or disease specific BMPs. For regulated pests and diseases, the wood temperature must reach 160 degrees F for 75 minutes in the center of the piece.

Ash logs in chipping yard in Southeast Michigan.
Photo Credit: David Cappaert, Bugwood.

D. Detection

Early detection, coupled with rapid response, can stop the spread of new and emerging invasive species before they become established, making it one of the most cost-effective methods for controlling invaders. Early detection of wood boring pests such as EAB is critical to the success of efforts to eradicate the invaders, isolate the infestation, and minimize its impacts to urban and natural areas. Unfortunately, EAB is notoriously difficult to detect and trees may not develop signs for up to four years after the initial infestation.

1. Develop and Support Strategic Detection Trap Surveys

Building capacity for early detection efforts can be done by increasing the number and types of EAB surveys, increasing the efficiency of trapping and other survey methods, prioritizing high-risk areas, training individuals already working in high-risk areas *(such as arborists),* and increasing outreach to the general public in high-risk communities. Early detection capacity can be prioritized and/or expanded across agencies, stakeholders, and communities.

Effectively locating early detection efforts relies on analyzing the sources and pathways with the greatest potential for EAB importation into the area *(campgrounds & recreation areas, nurseries & garden centers, and high-traffic shipping & receiving centers).* Focusing early detection activities in areas where out-of-state firewood and nursery stock are transported is the most effective and cost-efficient strategy. Methodologies and strategies should be adjusted as EAB trapping technology and science advances. Priority targeted survey techniques are outlined below *(see also "Integrated Pest Management for Emerald ash borer" Appendix D).*

Visual Survey:

Looking for the outwardly visible signs and symptoms of EAB. Can also include inspection of nursery stock or firewood .

Professional Assessment:

Arborists contracted to closely examine tree canopies in a given area. Branch sampling or other closer assessment may be made.

"Trap Tree" System:

Artificially wounding *(girdling)* trees to increase stress and make them more attractive to EAB. Requires expendable ash trees, and thus may not be practical.

Attractant-Baited Traps:

Set and monitor Purple Prism Traps *(PPTs).* Surveys can be conducted over a larger area and at considerably less expense than other methods. When purchased in bulk, the purple prism trap and lure *(z-3 hexanol)* can be purchased for under $7.00 per unit. See 2018 EAB Trapping Protocols from USDA APHIS PPQ for more information.

Visual signs and symptoms of EAB infestation include canopy thinning (left), epicormic sprouting (right), and woodpecker damage.
Photo credit: Joseph O'Brien, USDA Forest Service, Bugwood

Purple Prism Trap (PPT).
Photo Credit: Kenneth R. Law, USDA APHIS PPQ, Bugwood.org

2. Support and Expand the Oregon Forest Pest Detectors Program

Oregon Forest Pest Detectors (OFPDs) are volunteers that help prevent the damaging impacts of invasive forest pests by monitoring for and reporting potential infestations. Typically, participants already have some baseline knowledge of tree/insect identification and are likely to encounter an infestation as part of their work. Forest Pest Detectors could be: arborists, foresters, landscape contractors, cargo distribution center employees, neighborhood tree volunteers, state park and campground personnel, OSU Extension volunteers, watershed council members, and others in the restoration community. Utilization and support of this program will increase the number of highly-trained EAB detectors. Ways to support the OFPD program include ensuring there is adequate funding for training, increasing the number and locations of trainings *(especially within EAB high-risk areas),* creating incentives that encourage professional trainings, and making the OFPD training program a requirement for campground staff and/or ISA members.

Wyatt Williams from the Oregon Department of Forestry shows a group of OFPD participants insect galleries on samples of ash bark at a field training. Photo Credit: Amy Grotta, Oregon State University Extension Service.

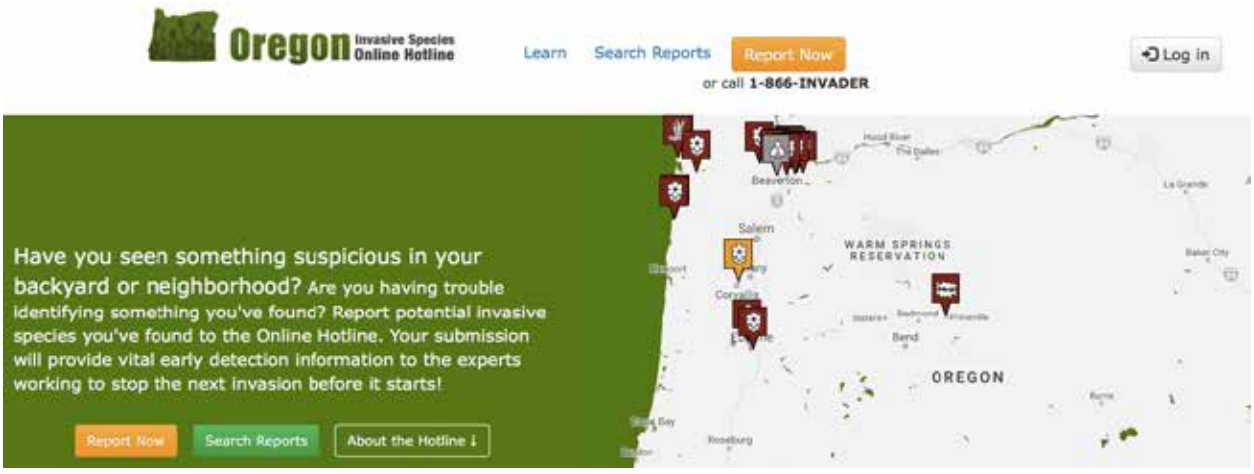
3. Public Engagement

In addition to educating groups of the public that are most likely to unintentionally introduce EAB into Oregon *(campers, out-of-state game hunters, mushroom hunters, etc.)*, these groups should also be encouraged to get involved in detection efforts. This includes active vigilance of EAB and other forest pests when in Oregon, spreading the word to others within their network, and taking the initiative to report any suspected sightings.

4. Reporting

When the presence of EAB is suspected, specific steps must be taken swiftly to ensure the possible detection is responded to in an appropriate and timely manner. Anyone submitting a report should be prepared to give a detailed description of the sighting, including the signs/symptoms observed and the exact location of the ash tree(s). Agency personnel will promptly investigate the suspected EAB infested ash. Below are the required actions if/when EAB is suspected:

> **Agency professionals must immediately contact Oregon Department of Agriculture Insect Pest Prevention & Management (ODA-IPPM) in the event EAB is suspected by emailing plant-entomologists@oda.state.or.us or calling 503-986-4636 / 1-800-525-0137.**
>
> **Members of the general public, conservation groups, volunteers, city workers, or other entities doing surveys are encouraged to report all suspected EAB sighting to the Oregon Invasive Species Hotline by calling 1-866-INVADER or by going to oregoninvasiveshotline.org.**



Screenshot of the Oregon Invasive Species Online Hotline, where users can submit suspected sightings of EAB.

5. Collection, Identification and Verification

It is important that the collection and submission of specimen(s) follow Oregon Department of Agriculture-Insect Pest Prevention & Management (ODA-IPPM) guidelines to ensure specimen quality is not compromised. Contact ODA-IPPM directly to ensure proper collection methods are utilized (plant-entomologists@oda.state.or.us). Specimen(s) collected from suspected ash will be sent to ODA-IPPM for identification at:

Oregon Department of Agriculture
Insect Pest Prevention & Management
635 Capitol St NE
Salem, OR 97301

If the inspection of the collected specimen results in a positive identification, the specimen will then be forwarded to USDA's Systematic Entomology Laboratory (SEL) for further confirmation. The steps laid out in (4) Reporting and (5) Collection, Identification, and Verification must be taken each time EAB is suspected in a new county or region of the state.

V. RESPONSE

Once EAB arrives, swift response actions will be necessary to lessen the overall impact to the state. An understanding of designated agency roles and adherence to thorough communication and coordination of collaborative efforts are key to successfully responding to an introduction of EAB. Response is broken down into eight sections: Stakeholder Actions, Communications Plan, Local Coordination, Investigation, Quarantine/Regulation, Management, Wood Waste/ Utilization, and Restoration & Replanting.

A. Stakeholders Convene to Create Specific Plan

ODA will take the lead in the event of an EAB detection in Oregon and will work together with ODF, OSU Extension, ODFW, USFS, APHIS, local governments, and entities in the detection zone to immediately determine a preliminary plan of action. Items to be addressed will include:

- Identify missing partners that should be at the table
- Identify a communications team to develop a communications plan
- Review details about the detection
- Review existing information on the pest and identify information gaps
- Develop plans for a delimiting survey
- Develop proposals for regulatory activities
- Quarantine determination and boundaries
    - Review State and Federal processes and timing
- Identify staffing and resource needs
- Finalize Incident Command structure and staffing for:
    - Planning and Finance
    - Operations
    - Communications
- Develop Response Team and Utilization Task Force

For more information on the general response, structure, and components necessary to create a preliminary plan of action in the event of an EAB introduction, see the Oregon Department of Agriculture's Plant Health Emergency Response Plan.

B. Communications Plan

In the event of an EAB introduction, efficient communication will be essential to garner the resources and assistance necessary to control the infestation. The primary agencies involved in the detection and announcement of an EAB infestation will compose a unified message to release to the media and interested parties. Communication between locally affected area(s) and their neighboring municipalities as well as between Oregon and neighboring states will be required in an effort to prevent the natural and anthropogenic spread of EAB.

- Develop a communication plan
    - See the Kansas Emerald Ash Borer Readiness and Response Plan for an example of an EAB communications plan
- Identify the Public Information Officer for all media contacts
- Set up contact personnel and website resources for the public in order to address questions and provide more information
- Inform the public
    - Submit a press release *(a sample press release can be found in Appendix E)*
      Host local resident meetings, visit affected residents, or use other outreach techniques to share information as soon as possible and to ensure all local residents are aware of the detection and the actions that will follow
    - Utilize social media to inform and communicate with the public

C. Coordination with Local Government, Landowners, and Tribes

Schedule an emergency meeting with local and tribal government representatives, landowners, regulated industries, utility companies, recreational areas, and others within the affected areas. See Appendix F for a preliminary list of potential outreach groups and collaborative partners. A Community Checklist *(below)* may be useful to discuss possible management actions with community representatives:

- Educate yourself, community staff, and community volunteers on the pest and its potential effects. Go to the Emerald Ash Borer Information Network and USDA APHIS Emerald Ash Borer websites and contact professionals for the most up to date information.
- Convene a Task Force of community decision makers, community volunteers, and agency individuals that can help evaluate potential decisions.
- Gather pertinent street tree and community owned tree documents: Inventories, maps of trees in your community, and applicable ordinances.
- Determine your level of risk: How many susceptible trees do you have? Who is responsible for their management? What is their condition?
- Determine your management strategies: Removal, replacement, treatment with pesticides, or a combination of actions.
- Determine your timeline for implementing management.
- Evaluate your budget for conducting management actions and identify other possible funding sources.
- Determine who will be executing the management: Community staff/employees? Contracted arborists and pesticide companies?
- Create a plan for dealing with/capitalizing on wood waste.
- Determine whether your community will assist with privately owned trees.
- Develop a dissemination plan for community residents and businesses concerning EAB and your decisions.
- Monitor public and private trees for signs and symptoms of EAB infestation

EXAMPLE INVASIVE SPECIES OUTREACH: JAPANESE BEETLE

The largest infestation of Japanese beetles ever found in Oregon was detected in 2016 in the area of Cedar Mill and Bethany of Washington County, Oregon. In response, the Oregon Department of Agriculture (ODA) prioritized public education and outreach efforts as well as consistent communication and coordination between agency professionals, affected landowners and business owners, and landscaping crews in order to maximize support of eradication efforts and lessen the likelihood of transporting Japanese beetle out of the treatment zone. Learn more about this 5-year project here:

http://www.japanesebeetlepdx.info

The Oregon Department of Agriculture team talking with residents of the treatment area during one of the many outreach events in 2017.
Photo credit: Jessica Riehl.

D. Investigation

A delimiting survey and dendrochronology techniques will provide information on EAB population density and dispersal as well as how long EAB has been present. This information can help guide planning and management strategies. Depending on the extent, severity, and age of the infestation, goals of the response efforts could range from complete eradication to slowing the spread of EAB to new areas.

1. Origin and Dissemination

Investigate not only the location and possible pathway of original infestation, but also the likelihood that additional introductions could occur through the same path. Dendrochronology techniques could also be utilized to identify the timeline of the infestation. Trace forward and trace back movement of infested material and associated commodities.

2. Spread

If the infestation is relatively geographically contained and was established within the last three years, then eradication efforts can likely proceed. However, if the infestation is across a large area and/or has been established for four or more years, then quarantine and containment efforts should be enacted in order to slow the spread of EAB to other parts of the state.

3. Delimitation

Determine the extent of the EAB infestation to provide information necessary to make quarantine determinations and establish quarantine boundaries.

E. Quarantine/Regulation – Enforcement and Compliance

If an EAB infestation is detected within four years of arrival, there are several actions that can be taken in an effort to eradicate EAB from Oregon including pesticide treatment and preemptive tree removal. In the event that EAB cannot be eradicated, municipalities within the state of Oregon should shift their focus to managing and containing the local EAB infestation to prevent further spread to nearby areas. Containment efforts follow Emerald Ash Borer Program Manual established by USDA or from research conducted by state or federal agencies.

As of January 14, 2021, interstate movement of EAB-infested materials and products is no longer prohibited by the U.S. Government (USDA Docket APHIS-2018-0056). There are currently no federal restrictions in the movement of ash firewood, nursery stock, or other items across the United States. Under Oregon Administrative Rule, Chapter 603 Division 52, Oregon Department of Agriculture can impose its own quarantine for emerald ash borer which could prohibit items from other states infested with emerald ash borer as well as establish control areas in Oregon if EAB were to establish in the state.

See Appendix G for a list of applicable state and federal quarantine laws and regulations.

EAB infested ash tree removal in Pennsylvania.
Photo credit: Pennsylvania Department of Conservation and Natural Resources- Forestry, Bugwood.org

F. Management

1. Tree Removal for Containment and Local Eradication

Tree removal can be conducted on both infested and uninfested host trees. There may be opportunities where selective removal of trees can remove "stepping stone" trees to protect vulnerable ash population *(i.e. hinder the ability of EAB to spread).*

2. Long Term Management: Biocontrol

Due to the long life cycle of trees and the large number of ash trees and species throughout North America, it will be many years before we know if biological control *(biocontrol)* can effectively protect ash species against EAB. However, biocontrol has been used for over 100 years in the U.S. and has successfully controlled similar invasive insect pests such as gypsy moth, winter moth, ash whitefly, and eucalyptus longhorned borer.

Four species of hymenopteran parasitoids are approved for release as biocontrol agents of EAB in the U.S. and others are currently under consideration. The four approved species are Oobius agrili, Spathius agrili, Tetrastichus planipennisi, and Spathius galinae. It will be important to evaluate these biological control options, specifically in reference to their performance in Oregon ash and common urban street trees in the state.

BIOCONTROL OF EAB

In 2007, Massachusetts released parasitic wasps to kill EAB. One important lesson learned was that the phenology of EAB needs to be considered and compared to that of the parasitoid *(i.e. whether it has a 1 or 2 year life cycle and whether its life cycle lines up with that of EAB).* **Another lesson learned was that there is no "one-size-fits-all" parasitoid. For example, one of the wasps that established well in the North was unable go through thick bark** *(aka large trees),* **while another wasp was much larger and could go through thick bark, but did not seem to establish well. However, there is a new parasitoid species from Russia on the horizon that came out in Spring 2018 and is better synchronized with EAB in the North.**

When selecting release sites, there are specific characteristics to consider in order to ensure the highest probability of establishment. For example, natural areas, at least 40 acres in size, with ash density 25% or higher, that are difficult to manage by tree removal or insecticide treatment and are proximal to areas where EAB is being managed *(such as urban areas),* are good candidates for biocontrol release sites.

Information about EAB biocontrol can also be found at the USDA Forest Service's Biological Control of the Emerald Ash Borer and protocols for EAB biocontrol use in Oregon can be found in Emerald Ash Borer Biological Control Release and Recovery Guidelines.

Spathius galinae, a parasitoid wasp from Russia, has been approved for release to help control the emerald ash borer.
Photo credit: USDA and University of Delaware.

SLOW ASH MORTALITY (SLAM)

In 2008, researchers in Michigan set out to evaluate unsuccessful EAB eradication and quarantine efforts and wound up creating a pilot field project that proposed using a combination of response tools to slow the onset and progression of ash mortality. SLow Ash Mortality (SLAM) is a site-based approach that integrates different management options based on the characteristics of an infested site and seeks to increase the success of EAB responses within the urban tree canopy. SLAM management options include girdling and debarking ash trees, prophylactic insecticide treatment, and selective ash removal. Over a 10-year horizon, simulations showed that annual treatment of 20% of ash trees protected 99% of trees after 10 years, and the cumulative costs of treatment were substantially lower than costs of removing dead or severely declining ash trees.

G. Wood Waste Disposal/Utilization

The EAB response team can convene a Utilization Task Force to identify wood disposal and/or utilization options, investigate resources that are available, and develop best management practices for handling wood waste.

1. Marshalling Yards

Wood collection or marshalling yards have proven to be an effective way to collect infested wood harvested by various groups into one accessible location where it can be sorted, processed, treated, and merchandised. These yards will also play a regulatory role by enabling state and local officials to contain large amounts of affected material and inspect finished products efficiently. Partners, such as ODOT, will play in important role, providing expertise in site locations, equipment, etc.

2. Biofuel, Woodworkers, Landscaping (chips), and Others

The recommended options for utilizing properly treated wood waste include lumber products *(with no bark present),* chipped wood waste for landscaping, trail surfaces, bedding material for farmers, or a carbon source for compost piles. Wood waste can also be used as boiler fuel in a boiler equipped with the appropriate air pollution control equipment *(consult individual boiler owners for required fuel specifications),* or as firewood for wood burning stoves and outdoor campfires *(residential outdoor wood fired boilers are not recommended due to their heavy release of fine particulate matter pollution).*

VI. FUNDING

Eradication and program expenses are often covered by the state with funding through cooperative agreements with USDA APHIS and/or USDA Forest Service. These agencies may provide emergency funds for selected pest management activities and/or for restoration, above any base-level funding for pest detection and surveys. State emergency funds can also be requested by the responsible state agencies. If eradication efforts fail and the pest becomes well established, annual costs for control will likely be incurred by the towns, cities, communities, and landowners. Sources of federal and state funds for control of established populations are uncertain and may be partially dependent on the pest of concern.

Since funding sources are not guaranteed, affected communities should look into multiple sources of potential funding. Actions that could generate funds for EAB detection efforts include implementing a firewood tax, increasing campground fees, or charging students of the OFPD training program, which is currently offered at no charge. Below is a preliminary list of potential partners who could assist in finding and securing funds for control activities:

Preliminary list of potential partners that may provide assistance in finding and securing funds for control activities:

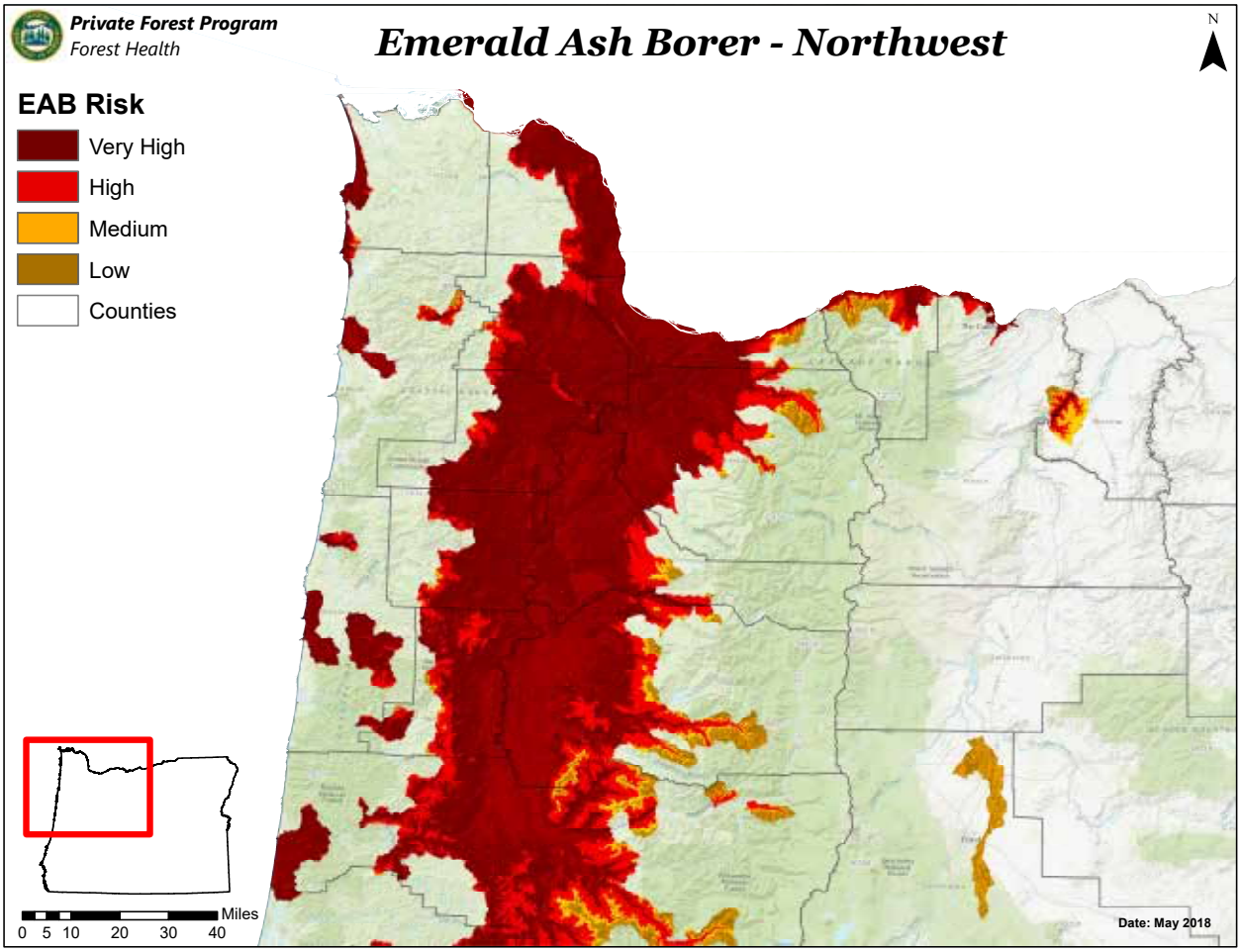
- **APHIS**
- **Forest Service**
- **EBoard**
- **Oregon Invasive Species Council-Emergency Account**
- **Oregon Forest Industries Council**
- **Office of Emergency Management**
- **League of Oregon Cities**
- **Association of Oregon Counties**
- **Marine Board**
- **Bureau of Land Management (BLM)**
- **Oregon Watershed Enhancement Board (OWEB)**
- **State Parks**
- **FEMA**
- **Nature Conservancy**
- **Audubon Society**
- **Builders Association**
- **Oregon Association of Nurseries - Emergency Account**
- **Cost sharing with neighboring municipalities**

VII. APPENDICES

A. Stakeholder group contact info

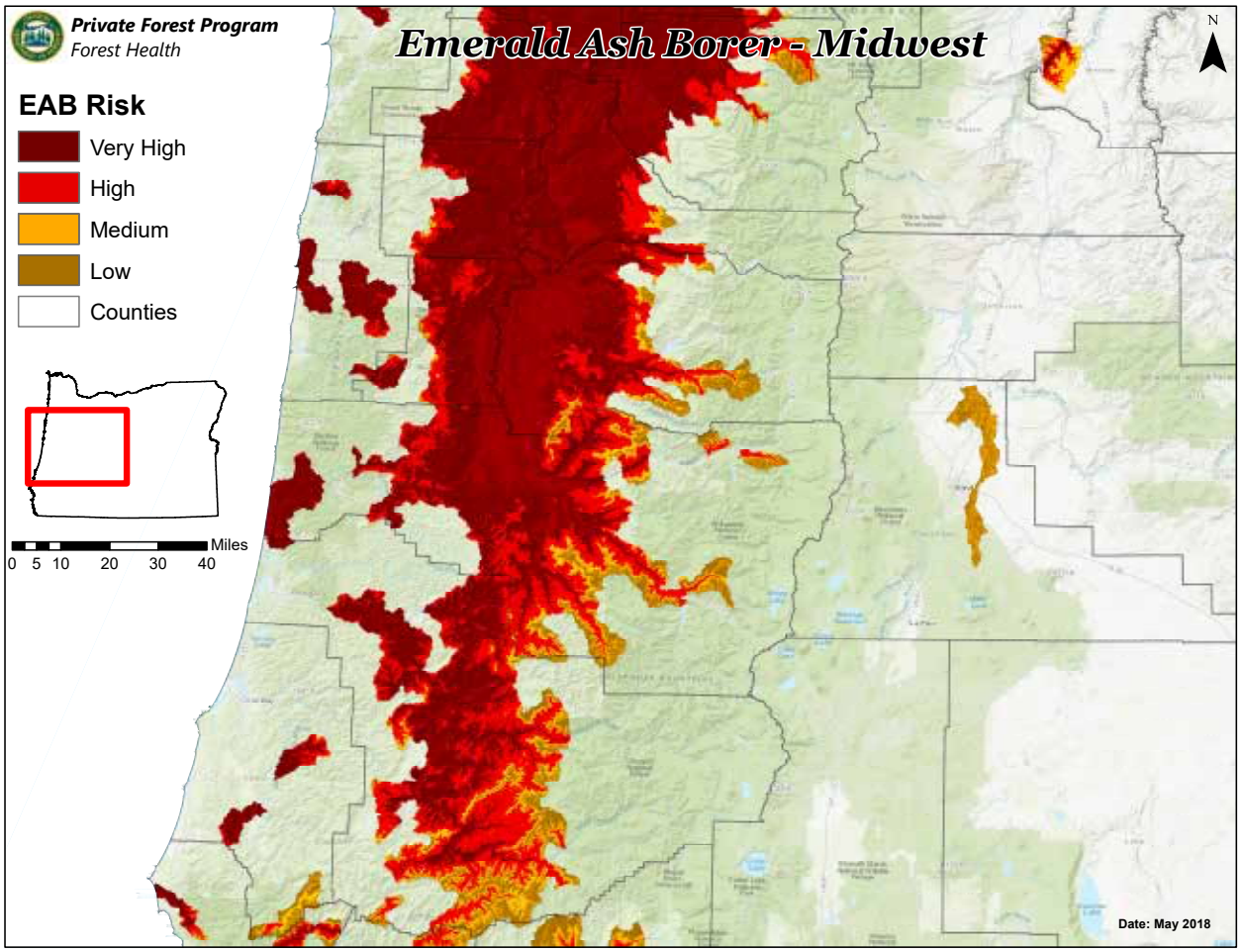
Agency	Title	Phone
Oregon Department of Agriculture	IPPM Program Manager	503-986-4663
Oregon Department of Forestry	Forest Health Program: Invasive Species Specialist	503-945-7472
Oregon Department of Fish and Wildlife	Aquatic Invasive Species/ Wildlife Integrity Coordinator	(503) 947-6308
USDA APHIS	State Plant Health Director	503-326-2814
US Forest Service	Forest Entomologist / Forest Health Monitoring Coordinator	503-808-2674
Oregon State University	Extension Forester	503-397-3462
Oregon Invasive Species Council	Coordinator	971-998-0573
City of Portland: Portland Parks & Recreation Urban Forestry	Botanic Specialist I	503-823-1650

B. EAB Risk Maps by Region



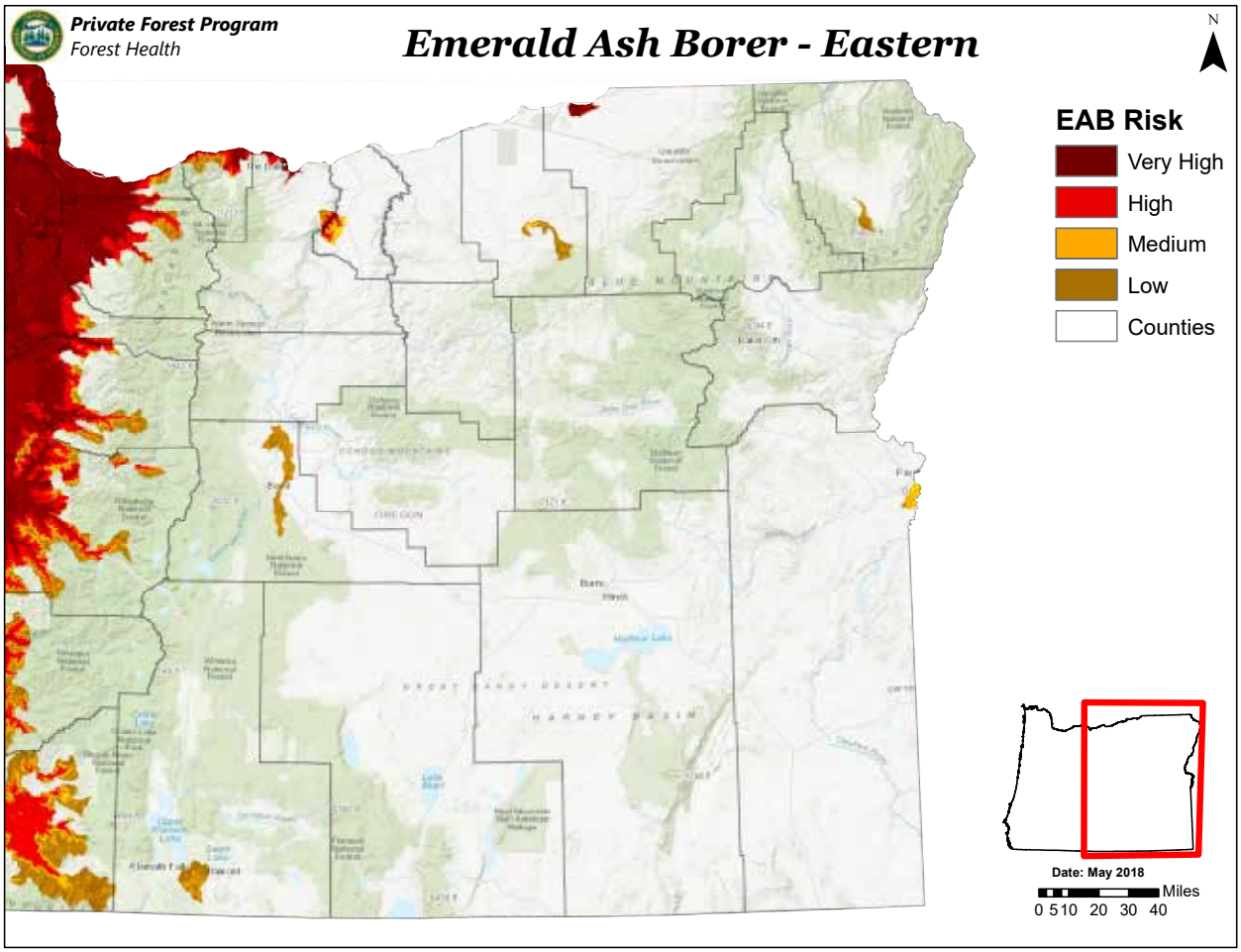
Risk for emerald ash borer (EAB) is mapped based upon known occurrences of ash (Fraxinus sp.) at the local watershed level (hydrologic unit code 12, or HUC-12) in Oregon. Point data for Oregon's two wild, naturalized species of ash, Oregon ash (F. latifolia) and green ash (F. pennsylvanica), were used to create the map. Data on ash distribution originated from two sources: the Oregon Plant Atlas, a product of the Oregon Flora Project, and emerald ash borer surveys conducted by the Oregon Department of Forestry. EAB risk categories were determined based on the frequency distribution of ash by elevation above sea level and corresponding human activities associated with known pathways of EAB introduction and establishment: Very high: ≤1,000' above sea level, High: 1,000 to ≤2,000', Medium: 2,000 to ≤ 2,500', and Low: >2,500'. The EAB risk map is shown in four regional maps for the state of Oregon.

B. EAB Risk Maps by Region *(continued)*



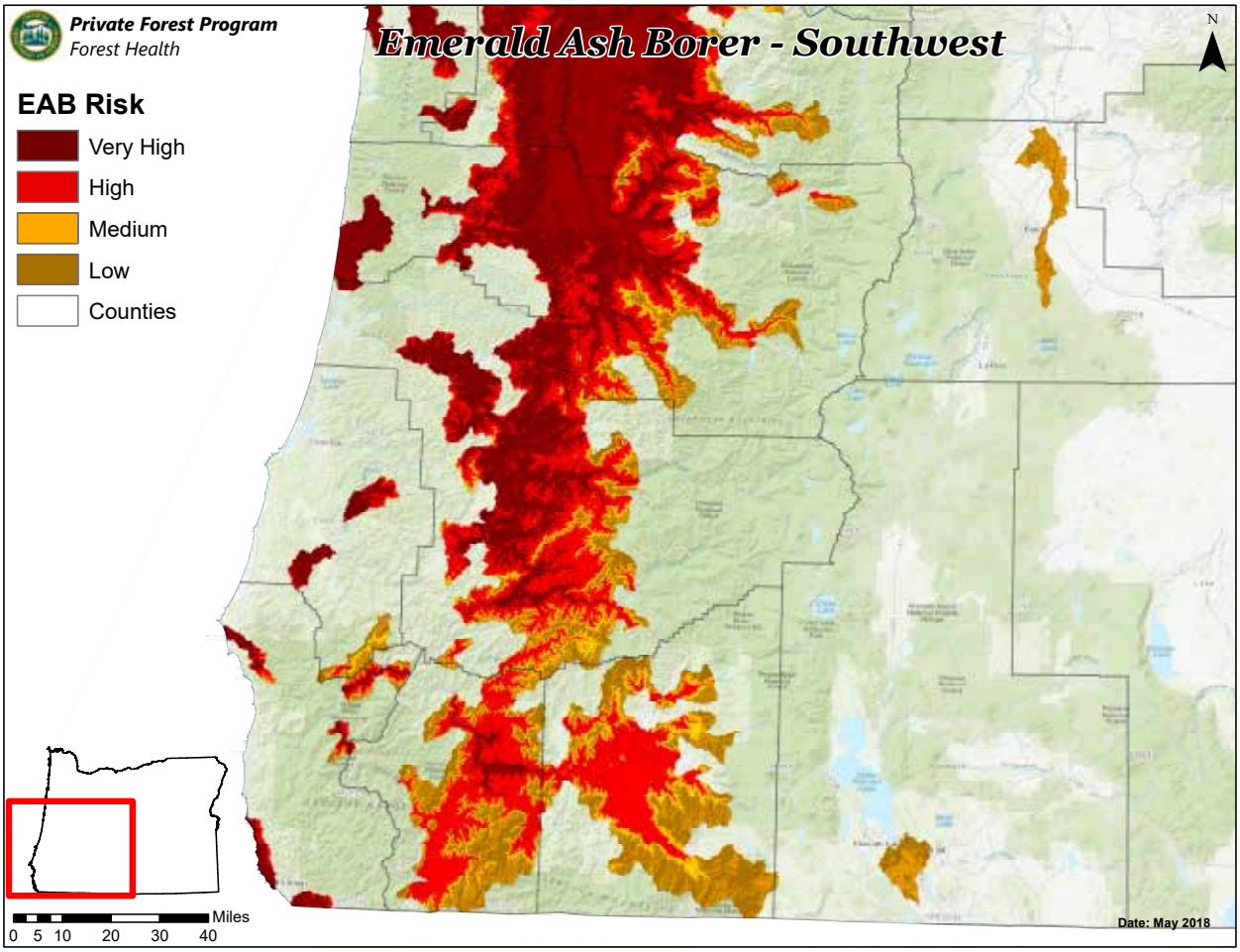
Risk for emerald ash borer (EAB) is mapped based upon known occurrences of ash (Fraxinus sp.) at the local watershed level (hydrologic unit code 12, or HUC-12) in Oregon. Point data for Oregon's two wild, naturalized species of ash, Oregon ash (F. latifolia) and green ash (F. pennsylvanica), were used to create the map. Data on ash distribution originated from two sources: the Oregon Plant Atlas, a product of the Oregon Flora Project, and emerald ash borer surveys conducted by the Oregon Department of Forestry. EAB risk categories were determined based on the frequency distribution of ash by elevation above sea level and corresponding human activities associated with known pathways of EAB introduction and establishment: Very high: ≤1,000' above sea level, High: 1,000 to ≤2,000', Medium: 2,000 to ≤ 2,500', and Low: >2,500'. The EAB risk map is shown in four regional maps for the state of Oregon.

B. EAB Risk Maps by Region *(continued)*



Risk for emerald ash borer (EAB) is mapped based upon known occurrences of ash (Fraxinus sp.) at the local watershed level (hydrologic unit code 12, or HUC-12) in Oregon. Point data for Oregon's two wild, naturalized species of ash, Oregon ash (F. latifolia) and green ash (F. pennsylvanica), were used to create the map. Data on ash distribution originated from two sources: the Oregon Plant Atlas, a product of the Oregon Flora Project, and emerald ash borer surveys conducted by the Oregon Department of Forestry. EAB risk categories were determined based on the frequency distribution of ash by elevation above sea level and corresponding human activities associated with known pathways of EAB introduction and establishment: Very high: ≤1,000' above sea level, High: 1,000 to ≤2,000', Medium: 2,000 to ≤ 2,500', and Low: >2,500'. The EAB risk map is shown in four regional maps for the state of Oregon.

B. EAB Risk Maps by Region *(continued)*



Risk for emerald ash borer (EAB) is mapped based upon known occurrences of ash (Fraxinus sp.) at the local watershed level (hydrologic unit code 12, or HUC-12) in Oregon. Point data for Oregon's two wild, naturalized species of ash, Oregon ash (F. latifolia) and green ash (F. pennsylvanica), were used to create the map. Data on ash distribution originated from two sources: the Oregon Plant Atlas, a product of the Oregon Flora Project, and emerald ash borer surveys conducted by the Oregon Department of Forestry. EAB risk categories were determined based on the frequency distribution of ash by elevation above sea level and corresponding human activities associated with known pathways of EAB introduction and establishment: Very high: ≤1,000' above sea level, High: 1,000 to ≤2,000', Medium: 2,000 to ≤ 2,500', and Low: >2,500'. The EAB risk map is shown in four regional maps for the state of Oregon.

C. List of Oregon Cities with Tree Inventories

Some city inventories may only include city parks and/or street trees. It is recommended that cities work toward complete community-wide inventories and update information at regular intervals as appropriate to ensure accurate information is available.

City Name
Albany
Baker City
Beaverton
Canby
Cannon Beach
Corvallis
Cottage Grove
Dallas
Dayton
Durham
Eagle Point
Estacada
Eugene
Grants Pass
Gresham
Jacksonville
La Grande
Madras
Malin
Metolius
Milwaukie
Portland
Salem
Sandy
Sisters
St. Paul
Sunriver
Tillamook
Tualatin
Turner
Wilsonville
Woodburn

D. Integrated Pest Management (IPM) recommendations for EAB

IPM is a holistic strategy of pest prevention or pest reduction that incorporates economic, ecological, and social values while minimizing impacts and risks to human health, non-target organisms, and the environment. Acceptance of some level of resource loss is central to IPM ideology. Thresholds, either economic or environmental, are established before arrival of the pest and serve to trigger an appropriate management response. The IPM process involves continuous monitoring for the pest in question, understanding the pest's biology and opportunities for control, and responding with an appropriate array of IPM tactics after thoughtful review of ecological and economic consequences of doing so. IPM control tactics include chemical, biological, mechanical, and cultural methods, as well as the option of "doing nothing," or waiting until conditions are more favorable for control to be employed. See Table 3 for available IPM tactics and optimal timing for each. Record keeping, follow-up monitoring and maintaining a flexible response to current pest conditions are keys to success for IPM.

Six step process to decision-making in IPM:

1. Identify the problem or pest with awareness that more than one stressor may be present
2. Determine the severity of the problem
3. Assess management options
4. Select and apply one or more options
5. Measure the efficacy of options applied
6. Record the results; monitor, and follow-up

Table 3. Table of actions and thresholds for common EAB IPM tactics.

IPM Tactic	Action	Threshold/Timing
Monitoring	Trap surveys/trap trees	Annually; Trapping season May-Aug
	Visual surveys	Annually; Reports filed to Hotline
Cultural Control	Promote local firewood	Continuous
	Inventory/document ash in cities	Continuous; best done May-Sept when leaves are on trees
	Remove ash from city street tree lists	Ongoing
	Pre-emptive removal of ash	When nearest confirmed EAB is 100 miles in proximity; dry/debark/use wood ASAP
Mechanical Control	Tree removal and chipping	Active EAB infestation or invasion front (10-15 miles from known EAB population)
	Tree burial or incineration	Active EAB infestation or invasion front (10-15 miles from known EAB population)
Biological Control	Request/release agents from ODA/APHIS	Active EAB infestation or invasion front (10-15 miles from known EAB population)
Chemical control	Systemic insecticides	Active EAB infestation or invasion front (10-15 miles from known EAB population)
	Foliar sprays	Not recommended

Common tactics for emerald ash borer IPM:

Monitoring:

- Purple prism traps, coated with insect-trapping adhesive and baited with lures Z-3-hexenol and Manuka oil, are placed 3-10 m high in ash trees before and during peak adult flight period.
- Girdled "trap trees" – ash trees that have been intentionally killed by mechanical girdling – can be left in place, or bolts of freshly-cut ash stems can be hung in ash canopies or placed in other areas to monitor for attacks by EAB adults.
- Visual monitoring for EAB symptoms on trees and the insect itself are made by the public, private tree care professionals, government natural resource workers, and others. Report suspected findings of EAB to the Oregon Invasive Species Online Hotline: oregoninvasiveshotline.org
- State and federal agencies conduct monitoring surveys for EAB, contingent upon funding. Current quarantine maps for EAB in the United States can be found on the web at
- www.emeraldashborer.info. However, once EAB has been found in a county, surveys by regulatory agencies typically end. Thus, quarantine maps may not adequately reflect the current distribution of EAB.

Cultural control:

- Prevent the spread of EAB by not moving infested firewood, logs, or nursery stock
- Inventory urban forests to understand risks and costs associated with EAB-killed trees.
- Consider omitting or reducing susceptible host tree species (Fraxinus spp.) from lists of approved tree species for community or neighborhood plantings. Plant resistant or non-host tree species.
- Once EAB is nearing close proximity (e.g. 100-200 miles) consider pre-emptive removal of healthy ash trees to spread removal costs across several years. See tool to estimate cost of ash tree removal in IPM References and Further Reading section below.

Mechanical control:

- Timely removal of EAB-infested trees and chipping the infested material to small size – less than 1" on each of two sides
- Burial or incineration of infested wood material if chipping is not possible

Biological control:

- Release and monitor biocontrol agents in areas that are infested with EAB. Since 2007, the U.S. Department of Agriculture has been actively importing and researching several species of EAB parasitoids – insects that feed and develop exclusively on EAB – in attempts to provide population control after EAB has been established in an area. The egg parasitoid, Oobius agrili *(Encytridae),* and the larval parasitoids, Tetrastichus planipennisi *(Eulophidae),* Spathius agrili, and S. galinae *(Braconidae),* have been approved for release. Native parasitoids *(Phasgonophora sulcata and Atanycolus spp.)* have also been shown to attack EAB. Imported biocontrol agents for EAB can be requested through the U.S. Department of Agriculture. See IPM References and Further Reading section below.
- Increase or promote habitats for woodpeckers, which are generalist predators but have been shown to consume up to 30% of EAB larvae in severely infested areas in the eastern U.S.

Chemical control (Table 4):

- Pesticide applicators must read, understand and follow all label directions for pesticides. The pesticide label is the law. Pesticide labels and registrations change frequently, and it is the responsibility of the pesticide applicator – whether professional or home owner – to follow the directions on the label. See Oregon Department of Agriculture Pesticide Program in the reference section for latest regulatory information on applying pesticides.

- Some insecticides, such as neonicotinoids, have been implicated in decline of pollinators. The latest information on safety and legal use of insecticides in Oregon can be found through the Oregon Department of Agriculture Pesticide Program.
- Chemical control options, regardless of delivery system or active ingredient, are only effective when less than 50% of the canopy of an infested tree has been killed by EAB. If the tree has over 50% canopy mortality, it will likely not be able to recover and should be mechanically removed and disposed of properly.
- Trees with trunks greater than 15" diameter at breast height should be treated by a professional applicator.
- Healthy, uninfested trees can be preventively treated with pesticides and protected from EAB when known EAB infestations are within 10-15 miles. Chemical treatments that begin too early waste money and increase the risk of affecting non-target organisms.
- The most effective insecticides for EAB are systemic, meaning they are transported throughout the tree's vascular system. These systemic insecticides, which target both adults and larvae, should be applied in mid-April through May, before the peak flight of adult EAB *(late May through June).* Drought stress greatly inhibits the uptake of systemic insecticides. Supplemental watering, beginning a month or more in advance of treatment, may be needed to increase effectiveness of chemical application.
- Depending on the active ingredient and the particular product, systemic insecticides for EAB can be applied through soil drenching, soil injections, basal bark sprays, or direct injections into the tree itself. Some of these application techniques require specialized equipment and a professional pesticide applicator license.
- Broadcast foliar sprays target adults and are less desirable than systemic insecticides due to the larger volume that needs to be applied as well as the chance for drift and associated non-target effects.
- Systemic insecticides can provide >95% protection against EAB but must be reapplied every 1-3 years. Broadcast foliar sprays must be reapplied every year.

Table 4. Chemical control options for EAB.

Delivery	Active ingredient	Chemical class	Level & extent of control	Applicator	Target
Trunk injection	emamectin benzoate	Macrocyclic lactone	Excellent, 1-3 yrs	Professional	Larvae or adults
	imidacloprid	Neonicotinoid	Very good, 1-2 yrs	Professional	Larvae or adults
	azadirachtin	Botanical	Very good, 1-2 yrs	Professional	Larvae or adults
Soil drench or soil injection	imidacloprid	Neonicotinoid	Good, 1 yr	Home owner or professional	Larvae
	dinotefuran	Neonicotinoid	Good, 1 yr	Home owner or professional	Larvae
Trunk spray	dinotefuran	Neonicotinoid	Very good, 1 yr	Home owner or professional	Larvae or adults
Broadcast foliar spray	bifenthrin	Pyrethroid	Fair, 1 yr	Home owner or professional	Adults
	carbaryl	N-methyl carbamate	Fair, 1 yr	Home owner or professional	Adults
	cyfluthrin	Pyrethroid	Fair, 1 yr	Home owner or professional	Adults

IPM References and Further Reading:

Cost calculator for determining control measures by community or neighborhood:
http://int.entm.purdue.edu/ext/treecomputer/

Log a report of suspected EAB in Oregon:
https://oregoninvasiveshotline.org/

U.S. Department of Agriculture EAB monitoring and biological control program:
https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/pests-and-diseases/emerald-ash-borer/ct_emerald_ash_borer

Academic research on EAB chemical control guidelines:
http://www.emeraldashborer.info/documents/Multistate_EAB_Insecticide_Fact_Sheet.pdf

Oregon Department of Agriculture Pesticide Program:
http://www.oregon.gov/ODA/programs/Pesticides/Pages/default.aspx

E. Sample Press Release

Contact: Jane Doe, <title here>, XXXXXXXXXX

EMERALD ASH BORER FOUND IN <City/Location>, MEETING PLANNED

<City/Location>, OR. –

Emerald ash borer (EAB), an exotic beetle that infests ash trees, was recently discovered in the <City/Location> area. EAB is now considered the most destructive forest pest ever seen in North America and has the potential to create billions of dollars in damages nationwide if not dealt with. The <municipality> is sponsoring an EAB informational meeting on <date, time> at the <meeting location> (<street address>). The public is invited. EAB specialists from <education/information resource> and regulatory specialists from the Oregon Department of Agriculture will be on hand to explain what EAB is and how it will be handled <City/Location>.

"This pest is very destructive, and people should know what to look for and what to do if they find it," says <name, title>. "We will provide information on identifying the pest, the signs and symptoms of EAB infestation, what treatment options are available, and tree species that are good options for replacing ash trees. There will also be information from an Oregon Department of Agriculture representative on EAB regulations and quarantine measures."

For more information, call <Name> at XXXXXXXXXX. Additional EAB information can be found at the EAB Web site: www.oregoneab.info.

####

F. Outreach Groups and Collaborative Partners

The following list includes groups, agencies, institutions, and businesses that may be impacted by the arrival of EAB in Oregon and/or might be interested in receiving and sharing important information related to pre- and post-arrival actions. This is by no means an exhaustive list and is intended only to be a starting point for planning outreach and collaborative efforts.

Asplundh	Oregon Invasive Species Council
Association of Oregon Counties	Oregon Association of Loggers
Audubon Society of Portland	Oregon Association of Nurseries
Beyond Toxics	Oregon Department of Agriculture
Burns Paiute Tribe	Oregon Department of Environmental Quality
City of Albany	Oregon Department of Fish & Wildlife
City of Ashland- City Risk Manager	Oregon Department of Forestry
City of Central Point	Oregon Department of Transportation
City of Eugene: Parks & Open Spaces	Oregon Farm Bureau
City of Eugene: Emergency Management Program	Oregon Forest & Industries Council
City of Medford: Parks and Recreation	Oregon Forest Research Institute
City of Portland	Oregon Health Authority
City of Portland: Urban Forestry Commission	Oregon Interactive Corporation
City of Salem: Parks and Recreation	Oregon Office of Emergency Management
City of Salem: Risk Manager	Oregon Parks & Recreation
Clackamas County: Urban Lumber Program	Oregon Pest Control Association
Clean Water Services	Oregon Refuse & Recycling Association
Coast Fork Willamette Watershed Council	Oregon Small Woodlands Association
Confederated Tribes of Coos, Lower Umpqua & Siuslaw	Oregon State Beekeepers Association
Confederated Tribes of Grand Ronde	Oregon State University
Confederated Tribes of Siletz	Oregon State University Extension
Confederated Tribes of the Umatilla Indian Reservation	Oregon Stream Protection Coalition
Confederated Tribes of the Warm Springs Reservation of Oregon	Oregon Tree Farm
Coos Forest Protective Association	Oregon Watershed Enhancement Board
Coquille Indian Tribe	Pacific Northwest ISA
Coquille Watershed Association	Partnership for the Umpqua Rivers
Covanta - Marion County	PDX Ecologists Unite
Cow Creek Band of Umpqua Indians	Portland Bureau of Transportation

Cow Creek Band of Umpqua Tribe of Indians	Portland Community College
Department of State Lands	Siuslaw Watershed Council
Douglas Forest Protective Association	Society of Municipal Arborists
Eugene Water & Electric Board	Soil and Water Conservation Commission- Deschutes area
Forest Park Conservancy	Soil and Water Conservation Commission- Lower Willamette area
Friends of Trees	Soil and Water Conservation Commission- northern coast area
Greenbelt Land Trust	Soil and Water Conservation Commission- southern Oregon area
Harney County Watershed Council	Soil and Water Conservation Commission- Upper Willamette area
Hood River Soil & Water Conservation District	Southern Oregon Beekeepers Association
Intertwine Alliance	Tillamook Bay Watershed Council
Keep Oregon Green	Tillamook Forest Center
Klamath Tribes	Trees Inc. (Roseburg)
Klamath Watershed Partners	Tualatin Hills Nature Park
League of Oregon Cities	Tualatin River National Wildlife Refuge
Lower Rogue Watershed Council	Tualatin River Watershed Council
Luckiamute Watershed Council	University of Oregon (Exterior Maintenance Customer Service)
Metro	Upper South Fork John Day Watershed Council
Mid-John Day Watershed Council	US Fish and Wildlife Service
Middle Deschutes Watershed Council	USFS Portland
National Firewood Association	USGS
Necanicum Watershed Council	West Multnomah SWCD
Network of Oregon Watershed Councils	Weyerhaeuser
NOAA Fisheries- West Coast	Xerces Society
Northwest Center for Alternative Pesticides	

G. State and Federal Laws for Invasive Species

USDA APHIS

The Plant Protection Act of 2000 (7 U.S.C. 7701 et seq) as amended by the Noxious Weed Control and Eradication Act of 2004 (P.L. 108-412).

USDA Forest Service

Wyden Amendment (P.L. 109-54, Section 434)

USDA APHIS and Forest Service

Executive Order 13112

OR Revised Statutes for Forest Invasive Species

ORS Chapter 527 Insect and Disease Control; Forest Practices
ORS Chapter 561.510 to 561.600 – Quarantine Powers (ODA)
ORS Chapter 569 – Weed Control
ORS Chapter 570 – Plant Pest and Disease Control; Invasive Species
ORS Chapter 571.038 Plant Pest and Disease Emergency Response Fund
ORS Chapter 571.560 Inspection for pest, disease and weed control
ORS Chapter 634 – Pesticide Control

OR Department of Forestry Administrative Rules for Forest Invasive Species

OAR 629-025- 0040 General Forest Recreation Rules (Weed Free Forage)
OAR 629-051- 0210 Management and Control Actions (Forest Insects and Disease)
OAR 629-051- 0220 Costs of Control (Forest Insects and Disease)
OAR 629-051- 0230 Introduced Pests (Forest Insects and Disease)

OR Department of Agriculture Administrative Rules for Forest Invasive Species

OAR 603-010- 0055 Feral Swine
OAR 603-052- 0075 Quarantine; Chestnut Blight
OAR 603-052- 0114 Quarantine; Dutch Elm Disease and Elm Yellows Phytoplasma
OAR 603-052- 0120 Quarantine; Oak Wilt Disease

OAR 603-052- 1080 Firewood Restrictions To Prevent Transport Of Invasive Species

OAR 603-052- 1200 Quarantine; Noxious Weeds

OAR 603-052- 1205 Weed-Free Tree Seedling Nurseries

OAR 603-052- 1230 Quarantine: Phytophthora ramorum

OAR 603-054- 0027 Notification of Imported Trees and Shrubs

OAR 603-056- 0205 Prohibited and Restricted Noxious Weed Seed

OAR 603-057- 0001 to 603-057- 0425 Pesticide Control

OAR 609-010 Oregon Invasive Species Control Account

FOR MORE INFORMATION

Emerald Ash Borer (EAB)

Haight, Robert G.; Kovacs, Kent; Liebhold, Andrew M.; McCullough, Deborah G. 2009. Economic assessment of potential emerald ash borer damage in urban areas in the United States. In: McManus, Katherine A; Gottschalk, Kurt W., eds. Proceedings. 20th U.S. Department of Agriculture interagency research forum on invasive species 2009; 2009 January 13-16; Annapolis, MD. Gen. Tech. Rep. NRS-P-51. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station: 32-33.

Knight, Kathleen S.; Brown, John P.; Long, Robert P. 2013. Factors affecting the survival of ash *(Fraxinus spp.)* trees infested by emerald ash borer *(Agrilus planipennis)*. Biological Invasions 15: 371-383.

Kovacs, Kent F.; Haight, Robert G.; McCullough, Deborah G.; Mercader, Rodrigo J.; Siegert, Nathan W.; Liebhold, Andrew M. 2010. Cost of potential emerald ash borer damage in U.S communities, 2009-2019. Ecological Economics 69: 569-578.

Houping Liu, Under Siege: Ash Management in the Wake of the Emerald Ash Borer, Journal of Integrated Pest Management (2017). DOI: 10.1093/jipm/pmx029

McCullough, D.G., Mercader, R.J. 2012. Evaluation of potential strategies to slow ash mortality *(slam)* caused by emerald ash borer *(agrilus planipennis):* Slam in an urban forest. International Journal of Pest Management 58(1): 9-23.

Poland, Therese M., Yigen Chen, Jennifer Koch, and Deepa Pureswaran. 2015. Review of the emerald ash borer *(Coleoptera: Buprestidae),* life history, mating behaviours, host plant

selection, and host resistance. Canadian Journal of Entomology. 147: 252–262

Rice, K.B. & Klooster, W. n.d. Emerald ash borer invasion of North American forests. Ohio State University Extension- Ohio Agricultural Research and Development Center. Visited July 10, 2017. https://www.nrs.fs.fed.us/environmental_literacy/curricula/TreEab/local-resources/downloads/Background/EAB%20impact%20on%20forests.pdf

Saffell, B. & Grotta, A. 2017. Oregon Forest Pest Detector Watch: Emerald ash borer (EAB). Bilingual Factsheet. Oregon State University Extension Service. Visited February 13, 2018. https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/em9160.pdf

USDA–APHIS. 2015. Emerald Ash Borer Program Manual, Agrilus planipennis (Fairmaire) USDA–APHIS–PPQ–Emergency and Domestic Programs–Emergency Planning, Riverdale, Maryland. 111pp.

USDA-APHIS. 2017. Emerald Ash Borer. Visited June 19, 2017. http://goo.gl/2wZ3BU

USDA-NRS. 2013. Effects of emerald ash borer on forest ecosystems. USDA-Forest Service-Northern Research Station. Visited July 10, 2017. https://www.nrs.fs.fed.us/disturbance/invasive_species/eab/effects_impacts/effects_of_eab/

Wegner, B. 2015. Beware the emerald ash borer: our forests and water quality at risk. Riverkeeper blog- Catskill Watershed, New York. Visited July 10, 2017. https://www.riverkeeper.org/blogs/docket/beware-the-emerald-ash-borer-an-ecological-disaster-in-the-making/

EAB Management Plans

Boulder County. 2015. Emerald Ash Borer Management Plan for Boulder County Managed Ash Trees. https://assets.bouldercounty.org/wp-content/uploads/2017/03/emerald-ash-borer-management-plan.pdf

Colorado Emerald Ash Borer Response Team. 2015 The Colorado Emerald Ash Borer Management Plan Creation Guide: Considerations and Supplemental Resources to Assist with EAB Management Plan Development https://www.colorado.gov/pacific/sites/default/files/atoms/files/Colorado_EAB_Management Planning Guide - June 2015.pdf

Cornell University Cooperative Extension. 2010. New York State Emerald Ash Borer Community Preparedness Plan Development Workbook. https://www.dec.ny.gov/docs/lands_forests_pdf/eabplanwkbk.pdf

Macomb Tree Board. 2014. Macomb, Illinois Emerald Ash Borer (EAB) Management Plan. http://www.emeraldashborer.info/documents/IL/EAB%20Management%20Plan%20Approved%203-26-14.pdf

Michigan Department of Natural Resources. 2008. Emerald Ash Borer Community Preparedness Plan. https://www.michigan.gov/documents/mda/EAB_preparedness_194302_7.pdf

Montana Department of Natural Resources And Conservation. 2015. Emerald Ash Borer Readiness and Response Plan. http://dnrc.mt.gov/divisions/forestry/docs/assistance/urban/final_eab-response-and-readiness-plan-for-the-dnrc.pdf

Nebraska Forest Service. 2015. Nebraska Emerald Ash Borer Response Plan. https://nfs.unl.edu/NebraskaEABResponsePlan.pdf

Perry, S., S. Lovering, and L. Frey. 2014. Emerald Ash Borer Preparedness Plan Johnson, Vermont. http://townofjohnson.com/wp-content/uploads/2014/02/Johnson_EABPreparednessPlan_final.pdf

USDA- Forest Service. 2011. National Response Framework for Emerald Ash Borer. https://www.fs.fed.us/foresthealth/docs/EAB_National_Framework.pdf

Oregon State University. Oregon Wood Innovations Center. Oregon ash. http://owic.oregonstate.edu/oregon-ash-fraxinus-latifolia

Prive, S. 2016. Overstory structure and community characteristics of Oregon Ash (Fraxinus latifolia) forests of the Willamette Valley, Oregon. Master of Science thesis submitted to Oregon State University on May 27, 2016.

Ethnobotanical Uses of Oregon Ash

Bocek, Barbara R., 1984. Ethnobotany of Costanoan Indians, California, Based on Collections by John P. Harrington, Economic Botany 38(2):240-255. As cited by: Native American Ethnobotany: Oregon Ash. Visited November 11, 2017. http://Naeb.Brit.Org/Uses/Search/?String=Fraxinus+Latifolia

Chestnut, V. K., 1902, Plants Used By The Indians Of Mendocino County, California, Contributions From The U.S. National Herbarium 7:295-408. As cited by: Native American Ethnobotany: Oregon Ash. Visited November 11, 2017. Naeb.Brit.Org

Curtin, L. S. M., 1957, Some Plants Used By The Yuki Indians ... Ii. Food Plants, The Masterkey 31:85-94. As cited by: Native American Ethnobotany: Oregon Ash. Visited November 11, 2017. Naeb.Brit.Org

Gunther, Erna, 1973, Ethnobotany Of Western Washington, Seattle. University Of Washington Press. Revised Edition. As cited by: Native American Ethnobotany: Oregon Ash. Visited November 11, 2017. Naeb.Brit.Org

Schenck, Sara M. And E. W. Gifford, 1952, Karok Ethnobotany, Anthropological Records 13(6):377-392. As cited by: Native American Ethnobotany: Oregon Ash. Visited November 11, 2017. Naeb.Brit.Org

Urban Forests

Disalvo, Angie, Julie Fukuda, And Jeff Ramsey. 2017. Street Tree Inventory Report. Report Prepared for The City of Portland, April 2017. 44pp.
https://www.portlandoregon.gov/parks/article/638773

Duh, Steve and Terry Flanagan. 2009. Corvallis Urban Forestry Management Plan 2009. Prepared for The City of Corvallis. 129pp.
https://www.corvallisoregon.gov/modules/showdocument.aspx?documentid=5851

EPA - Urban Heat Island And Urban Forests,
https://Www.Epa.Gov/Heat-Islands/Using-Trees-And-Vegetation-Reduce-Heat-Islands

Livesley, S. J., E. G. McPherson And C. Calfapietra. 2016. The Urban Forest and Ecosystem Services: Impacts On Urban Water, Heat, And Pollution Cycles at The Tree, Street, And City Scale. Journal of Environmental Quality. Vol. 45 No. 1, P. 119-124

Parks and Recreation City of Corvallis. 2017. About Our Urban Forest.
http://www.corvallisoregon.gov/index.aspx?page=1902. Accessed June 27, 2017.

Raupp, Michael J., Anne Buckelew Cumming, And Erin C. Raupp. 2006. Street Tree Diversity In Eastern North America And Its Potential For Tree Loss To Exotic Borers. Arboriculture & Urban Forestry 2006. 32(6):297–304.

Wolf, K.L. August 2007. City Trees and Property Values. Arborist News 16, 4: 34-36.

CITY OF OREGON CITY PARKS AND RECREATION

Safe, Clean, and Green

INTEGRATED PEST MANAGEMENT PROGRAM

Revised

FEBRUARY 2024

TABLE OF CONTENTS

LIST OF APPENDICES

1.0 GENERAL INFORMATION

The purpose of this document is to provide Oregon City employees with an overview of integrated pest management principles and specific policy-based direction for implementing those principles.

1.1 Mission Statement

The mission of Oregon City's Pest Management Program is to manage pests that are harmful to the health, function or aesthetic value of public property in an efficient, effective, and environmentally responsible manner, while paying careful attention to public and employee safety and preventing pollution to state waters to the maximum extent practicable. To accomplish this, the principles of Integrated Pest Management are utilized. This sustainable approach uses multi-faceted strategies that minimize economic, health, and environmental risks.

1.2 Asset

Oregon City is the steward of over 300 acres of public parks, over 7 acres of right-of-way (not including unapproved right of wat and vacant lots), and 349 water quality (WQ) facilities dispersed throughout the city. Oregon City manages these areas with great care through the Parks & Recreation department, Public Works, and landscape contractors. Oregon City also recognizes its responsibilities to its employees, park users, and the general public, and seeks to employ the highest professional standards in the performance of its duties. To best manage pests in public lands, Oregon City personnel and contractors utilize the principles of Integrated Pest Management (IPM).

1.3 Integrated Pest Management

Integrated Pest Management is the primary strategy used by Oregon City in the maintenance of public lands and rights-of-way. Although there are numerous definitions of IPM, Oregon City has adopted the U.S. Environmental Protection Agency's definition for the purpose of this document:

> IPM is the coordinated use of pest and environmental information with available pest control methods to prevent unacceptable levels of pest damage by the most economical means with the least possible hazard to people, property, and the environment. The goal of IPM is to manage pests and the environment so as to balance costs, benefits, public health, and environmental quality. IPM systems use all available technical information on the pest and its interactions with the environment. Because IPM programs apply a holistic approach to pest management decision making, they take advantage of all appropriate pest management options, including, but not limited to pesticides. Thus, IPM is: A system using multiple methods; A decision-making process; A risk reduction system; Information intensive; Cost-effective; Site specific.

This definition is from the Oregon Statutes (ORS 262.1), Chapter 943:

> Integrated pest management' means a coordinated decision-making and action process that uses the most appropriate pest control methods and strategies in an environmentally and economically sound manner to meet pest management objectives. The elements of integrated pest management include: (a) preventing pest problems; (b) monitoring for the presence of pests and pest damage; (c) establishing the density of pest population, which may be set at zero, that can be tolerated or corrected with a damage level sufficient to warrant treatment of the problem based on health, public

> safety, economic or aesthetic threshold; (d) treating pest problems to reduce population below those levels established by damage thresholds using strategies that may include biological, cultural (i.e., preventative), mechanical and pesticidal control methods and that shall consider human health, ecological impact, feasibility and cost effectiveness; and (e) evaluating the effects and efficacy of pest treatments.

Oregon City's IPM process first identifies what, if any, pest needs to be managed, and how best to do it. Key elements are information gathering, informed decision making and routine monitoring of public areas.

The controls used include cultural, manual , mechanical, biological and pesticidal methods. Methods selected to manage specific pest populations are evaluated by licensed and trained Oregon City professionals on a case-by-case basis. The methods employed conform to recognized standards established and endorsed by state and federal regulatory agencies, state educational institutions and organizations such as the Western Integrated Pest Management Center. A few examples of IPM activities within the Oregon City are:

- Utilizing plants and containers with natural resistance to pests.
- Routine maintenance and cleaning of public areas, storm facilities and right-of-way to reduce pests' (such as weeds) access to resources that insure their occupancy.
- Incorporation of prevention measures, such as, mulching of planting beds, airtight food storage, and baited traps..
- Proper application of selected pesticides to control animals and invasive weeds.

Oregon City specialists are skilled in identifying and evaluating pest problems. When pest problems occur that are novel or beyond the scope of in-house experts, advice is obtained from other qualified sources such as state universities, state departments of agriculture, and university extension service experts. Oregon Public Pesticide Applicators license continuing education classes reinforce employee skills and provide current information concerning laws, safety, pests, and IPM methods. Oregon City Parks employees monitor levels of pests in order to arrive at the best solution for managing a pest problem. When pest management methods are implemented by trained IPM personnel, it results in solutions that are economically and environmentally responsible. This provides the public with safe, healthy, and aesthetically pleasing park areas for many uses.

1.4 Pesticide Use

Pesticide is a general term for any substance intended for preventing, destroying, repelling, or mitigating any pest. Pests in Oregon City consist primarily of unwanted vegetation and invasive weeds, but can also include insects, pathogens, rodents, and other organisms. Oregon City personnel prioritize prevention over all other practices and use chemical controls as a last resort. When pesticides are needed as part of an IPM approach, Oregon City minimizes risk by careful product selection and application. Pesticides vary greatly in their toxicological characteristics therefore choice of materials is a key element of good IPM decision making. Oregon City pesticide applicators are required to comply with all pesticide label directions, federal, state, and local pesticide regulations, applicable safety laws, and PP&R policies. Misuse of pesticides will not be tolerated.

1.5 Safety

Appropriate training, and employee adherence to label directives and safety procedures during use a followed by Oregon City employees and contractors. When pesticides are being applied in public areas, notification signs are posted at points of entry to the treated areas as shown in Appendices 2 and 3.

1.6 Laws and Regulations

Oregon City conforms to all applicable pesticide laws and regulations. Oregon City only allows Oregon State licensed Pesticide Applicators to apply pesticides of any kind on public land. Oregon State Department of Agriculture continuing education certification is provided by Oregon City to satisfy state requirements for renewal of employees' applicator licenses.

Once licensed, applicators must accumulate forty credit hours of state approved recertification training over a 5-year period to maintain their license.

For pesticide applications, applicators are required by law to record date of application, time of application, conditions, locations, formulations, amount applied, and area (sq. ft./acres) of application. See Appendix 5 for examples.

2.0 INTEGRATED PEST MANAGEMENT METHODOLOGY

This section discusses the various management strategies that are approved for pest management in the City and describes the criteria for which strategies are most appropriate depending on the situation.

2.1 Approved Pest Management Strategies

The following summary provides examples of management strategies in descending order of priority. Prevention of pest problems is accomplished through good policy, design, plant selection, storage containers, cultural practices, mechanical practices, trapping, biological controls, and use of natural and synthetic pesticides. The following IPM measures are evaluated and considered together so that the best overall pest problem solutions are chosen and implemented.

2.1.1 Policy Measures

Management of pests through adoption of policy can be highly effective and low in cost. Such policies can often eliminate problems before they begin. Some examples are:

- Prioritization of identified vulnerable locations in public areas for control measures. Areas may have varying standards of acceptable care and appearance based on location, funding, and amount of public foot traffic. Careful attention to public desires and needs must be part of this prioritization process.
- Establishment of thresholds for action and tolerance levels for different pests in specific areas are made on a case-by-case basis.

2.1.2 Design, Plant Selection, and Resource Containment

Proper design, plant selection, and means of containing resources are significant cultural (i.e., preventative) methods to avoid pest problems. While no area can be designed to be pest-free, the following are some of the primary strategies considered:

- Using disease- or pest-resistant or tolerant plant species or varieties.
- Using airtight food and food waste containers, especially when stored outdoors.
- Removing pest-susceptible plants and replacing them with pest resistant plants or varieties.
- Eliminating or modifying problematic areas.
- Matching specific plant needs with site conditions to ensure plant health.
- Maintaining species diversity and elimination of monocultures in plantings where applicable.
- Establishing overstory plantings, occluding groundcover plantings, and other design techniques benefiting both the establishment of plants and the reduction of weed problems.
- Providing proper specific growing conditions for optimum plant health and pest resistance.
- Cleaning and sanitizing event areas in a timely manner.
- Adequate site, soil, and grade preparation before landscape installation.
- Using disease-resistant grafting rootstock or scion wood.
- Applying water correctly and efficiently to eliminate over or under watering.

- Using proper timing and use of fertilization to eliminate over and under-fertilization.
- Using aeration, over-seeding, and top-dressing to improve turf health and suppress weeds.
- Raking and debris removal to remove pest sources.
- Pruning and plant removal to promote optimum conditions for plant health.
- Removing diseased, infested, damaged, or dead wood.
- Mulching for weed reduction, water retention, winter protection and root zone improvement.

2.1.3 Mechanical and Physical Controls

- Mechanical clearing of weeds in rough areas.
- Prompt cleaning and sanitization of event areas.
- Hand weeding in shrub beds.
- Mowing of rough turf areas for vegetation control.
- Lethal and non-lethal, chemical-free traps for insects and mammalian pests.
- String trimming to control unwanted vegetation.

2.1.4 Biological Controls

Biological controls involve the introduction of beneficial organisms to disrupt and/or irradicate pests, such as:

- Introducing insect or disease parasitoids, predators, and microbial products to control pests.
- Minimizing the use of disruptive techniques and materials in landscapes that may destroy natural pest control organisms.

2.1.5 Naturally Derived and Synthetically Derived Pesticides

Pesticides are derived from many sources, vary widely in their characteristics, and must be examined individually to evaluate their suitability within the IPM approach. Examples are:

- Placement of pheromone traps.
- Disinfecting materials or equipment to prevent spread of pests.
- Application of naturally and synthetically derived pesticides.

2.2 Criteria for Choosing a Pest Management Method

When choosing a pest management method or pesticide material from Appendix 4, all personnel should consider the following, and any additional factors relevant to the selection.

- Nature of the site
- Erosion susceptibility and potential movement of soil through runoff.
- The intended use and function of the site.
- The feasibility of the method and scope of the problem.
- The relative importance and public expectation of a site or plantings.
- Site conditions such as amount of foot traffic, soil type, grade, drainage patterns, and presence of surface water.

2.2.1 Possible Health and Safety Effects

- Consider both short- and long-term toxicological properties and any other related potential health effects of the materials or methods, both to the applicator and the public.
- Equipment operation safety issues for both the operator and the public.
- Worker safety and worker injury issues involved with carrying out the method.

2.2.2 Possible Environmental Effects

- Consider both acute and chronic toxicity and any other related potential effects of the material or method to non-target organisms including mammals, birds, amphibians, fish, invertebrates, pollinators and other organisms.
- Environmental effects from potential bioaccumulation from materials used.
- Potential impacts to non-target plants, forage, and nesting habitat, from materials or methods.
- Potential impacts to federally listed threatened or endangered species.
- Possible introduction or establishment of invasive plants.
- For natural area invasive plant removal, consider the presence of, and potential impacts to nesting birds in the area to be treated.

2.2.3 Costs

Both short- and long-term costs as they relate to:

- Costs of the material or method.
- Application and labor costs.
- Frequency and quality of pest control.
- Feasibility of using a particular method or product.

2.2.4 Characteristics of the Product

- Target pests and target sites of the product being used.
- Possible residual effect, decomposition pathways, rates, and breakdown products.
- Volatility and flammability.
- Product formulation and package size.
- Leachability, solubility, and surface and soil bonding characteristics of the product.
- Ease of cleaning equipment after use.
- Positive and negative synergistic effects of pesticide combinations.
- Presence of “inert” constituents of the product formulation and their potential effects.

2.2.5 Other Special Considerations

- Application equipment availability.
- Method of delivery.
- Current and anticipated weather conditions.
- Previous pesticide applications to the site and the interval between treatments.
- Possible development of pest resistance to a particular management method or material.

3.0 POLICIES AND PROCEDURES

The following subsections contain the City's policies and procedures for implementing an integrated pest management program.

3.1 Licensing and Training

Policy 1: Certification and Continuing Education

All Oregon City personnel and contractors applying pesticides on public lands shall be certified through Oregon Department of Agriculture examinations.

Procedures

Maintaining a license requires the applicator must accumulate a minimum of 40 hours of state accredited supplementary education over a 5-year period, with no more than 15 hours accumulated in any given year. Ultimate responsibility for maintaining a valid license lies with the applicator. Oregon City keeps pesticide applicators informed of approved education to meet continuing certification and licensing requirements. State licensing requirements and status may be found at the Oregon Department of Agriculture's website: http://www.oregon.gov/ODA/PEST/ Seasonally employed staff members are not permitted to apply pesticides on public land.

3.2 Pest Management Procedures

Policy 2: Management Methods for Pest Problems

Oregon City staff and contractors shall monitor plant health status, landscape conditions, presence of unwanted vegetation, and evidence of unwanted animals indoors or outside.

Procedures

Appropriate thresholds will be assessed to determine action levels on a site-by-site basis. Cultural and manual controls will always be considered first when assessing a site. If a pesticide is chosen as the best method for pest management, licensed applicators shall choose an appropriate course of action. The suitability of the material, nature of the site, potential health and safety effects, potential environmental effects, overall costs, characteristics of the product and any other special considerations related to the situation shall be taken into account in this process. After control measures have been implemented, the site will be revisited to assess any impact and the efficacy of the measures taken.

Policy 3: Waterways Pest Management

Oregon City recognizes the special importance of the rivers, streams, ponds, water quality facilities and wetlands that fall under City stewardship. The sensitive nature of such habitats, their plant and animal communities, and their direct link with other waterways require an established policy to ensure their health. Clear guidelines and limitations are specified regarding maintenance methods and materials for waterways and public lands adjacent to them.

- Proper planning and management decisions begin the IPM process.
- Cultural (i.e. preventative) methods of vegetation and pest management are the primary focus of all policies in this IPM but is especially important near waters of the State.
- Mechanical means of vegetation and pest management are secondary, and will be utilized where feasible.
- Biological methods of vegetation and pest management are tertiary, and must be considered before chemical means.
- Botanical and synthetic pesticides will be used only when no other feasible methods exist, and must be approved for application in or adjacent to aquatic environments

Procedures

Definitions

Buffer zones are corridors of land that extend 25 feet from waters edge. Anticipated seasonal or weather related changes affecting water level will be included in the decision making process when dealing with buffer zones. High water line is the highest possible water level that would be expected during a 5-year period.

Application Equipment Used

Pesticide delivery will be carried out by hand with direct, low volume, single wand sprayers, wiping, daubing and painting equipment, injections systems, or drop spreaders. Typically, this is done by backpack sprayers, but may also include sprayers with larger fill tanks as long as the same kind of hand application methods are used. These methods of delivery result in low volume applications and low pressure spraying. This minimizes the formation of fine mists that might be carried off target. These practices ensure that applied materials will reach targeted plants or targeted soil surfaces.

Pesticide Drift

Managing drift is of particular importance when surface waters are nearby. Equipment used in the application shall employ all necessary methods to limit drift. Nozzle size, pressure regulation, droplet size, and height of spray wand, are all techniques that can be modified to reduce unwanted drift of pesticides.

Pesticides Available

To more clearly regulate any possible aquatic impacts, the pesticides available for use in buffers and aquatic sites will be reduced in scope from the general park list. Only the pesticides specifically listed within this policy may be used within buffer zones. Choice of pesticides utilized take into account any possible effects on aquatic life as well as tendencies to move in the environment.

Materials allowed in certain circumstances in buffer zones:

- Post emergent herbicides:
  - Glyphosate products: Roundup Pro, Rodeo, Ranger Pro, Cornerstone, Etc.
  - Triclopyr products: Vastlan, Brush and Vine, or other amine formulations only
  - Approved surfactant (R-11, LI 700 or equivalent)

- Aquashade (acid blue 9, acid yellow 23)

Record Keeping Requirements

All regular application record keeping requirements will be adhered to for all pesticide applications. This includes date and the time intervals of the application, temperature and wind conditions, location of application, materials used, concentrations used, amount applied, coverage rate, equipment used, applicator information and license number.

Policy 4: Notification of Pesticide Use at a Site

Oregon City shall inform visitors of pesticide application sites through use of signage.

Procedures

Signs are posted at time of application. They are placed in clearly visible locations such as entrances or trail heads, and/or application site perimeters. Signage ensures visitors will become aware of hazards before coming in contact with them. OC Signage includes basic information about the application and appropriate contact numbers for those desiring more details about the pest problem and the approach being used. An example of signage can be found in Appendix 2.

Re-entry specifics will be listed if required by the label. Signs shall be removed after the re-entry specifications have been met. For most products, re-entry is limited to dry time of liquid or until particulates have settled from a dry or granular application.

Policy 5: Pesticide Application on Public Property

Pesticides must be used only on sites and targets specified in the label. Higher dosages, higher concentrations, or more frequent applications than the label allows are not permitted. Directions for use, safety, mixing, diluting, storage, and disposal, as well as any restrictions on re-entry must be met.

Procedures

The following criteria shall be met when applying pesticides:

- The label is the law.
- Personal Protective Equipment shall be used wherever indicated by the product label and it must be maintained in a workable and safe condition.
- Spray equipment shall be maintained in a safe and useful condition, and equipment shall be calibrated regularly.
- Anti-siphoning devices shall be used when filling large spray tanks.
- Pesticides shall be applied only when appropriate weather conditions exist.
- Notification signs shall be posted in areas where pesticides are being applied.
- All applications shall be recorded on approved application record forms.

Applicators may:

- Apply a pesticide at any dosage, concentration, or frequency less than that listed on the labeling.
- Use any equipment or method of application not prohibited by the labeling.
- Mix a pesticide or pesticides with a fertilizer if the mixture is not prohibited by the labeling.
- Mix two or more pesticides, if all the dosages are at or below the recommended rates and such combinations are not contraindicated on the label.

Policy 6: Pesticide Application Record Keeping

Oregon City records and retains records of all pesticide applications performed on public land.

Procedures

Appropriate forms for tracking pesticide usage will be provided by Oregon City. Each application event will require an application form to be completed. Each operating unit shall keep a record file related to pesticide applications by their own personnel and in a centralize location for audit purposes. These records shall be retained for no less than 3 years. The following information must be included on the recording forms for each pesticide application by Oregon City:

- Date of application
- Name of applicator
- State license number
- Work unit
- Application start and end time
- Temperature
- Wind conditions
- Equipment used
- Park or site
- Specific area treated
- Target pest
- Total area treated if applicable
- Names and EPA numbers of all products applied
- Total amount of dilute pesticide applied
- Coverage rate where applicable
- Mix ratio or percentage of dilute mixture

Applications on different dates or at different locations must have their own application record. They cannot be combined on one record. (See Appendix 6 for examples of record keeping forms.)

3.3 Pesticide Material Management

Policy 7: Use of Pesticide Solutions and Rinses

Pesticide solutions and rinses should be applied according to the label directions, and to legal target sites so there are no pesticides remaining.

Procedures

Pesticide material management shall be accomplished by accurately gauging the amount of pesticide needed for the job. Oregon City Parks promotes the use of advance planning to minimize the number of times it is necessary to switch pesticides in spray equipment. In order to reduce the amount of excess rinsate, it is the policy of Oregon City to rinse equipment only at the end of the spray cycle, or when changing to pesticides that are incompatible with those in the tank. It is a legal requirement to fully label all tanks and sprayers containing pesticides prior to use and to make sure labels are maintained for tanks and sprayers containing leftover pesticides at the end of each day.

Following are some considerations to make before beginning an application to assure the proper amount of pesticide is mixed.

- Weather conditions and predictions.
- Acreage/square footage of the job site.
- Calendar: special events, mowing, irrigation, etc.
- Type and size of the equipment appropriate to do the job. When applying the pesticide use the following procedures to reduce and safely store the rinse solution. These are secondary to label information and State and Federal regulation.
- Mix only enough pesticide solution to do the job that day.
- Use up all pesticide, applying until the tank is empty, or no more solution is coming through the nozzle.
- Affix to the tank or sprayer all legal labels for the products used. Also mark the current concentration for each product, the date, and the name of the applicator. Maintain labels on containers if leftover pesticides remain at the end of the day.
- When resuming spray applications at a future date, either use the leftover material, or add dilution water and circulate the mix thoroughly before adding new concentrate.
- If spray tank rinsate is created, store the labeled rinsate as make-up water for the next day. The next day's pesticide should be compatible or the same. The same labeling requirements described above pertain to the rinsate mix as well.

Rinsing and/or cleaning of the sprayer may be necessary if the following conditions apply:

- It is necessary to use a pesticide incompatible with that previously used.

Before long term storage of equipment, use the following rinse process:

1. Read the pesticide label. The following should not conflict with label information or State or Federal regulations. Contact your supervisor if you see a conflict or have questions.
2. Wear protective clothing, as listed on the label when handling pesticides, pesticide containers, or pesticide equipment.
3. Fill the spray equipment approximately 1/4 full with clean water. Shake or agitate so that all inside surfaces are washed. If possible use the spray hose to rinse the inside surface of the tank. These procedures should coincide with all labels.
4. Spray the rinse water out of the spray equipment onto an approved target area. Rinse water should be run through all hoses, booms, etc. Filters should be cleaned. Because of the dilute nature of the pesticide in the rinse water, a coarse spray can be used and is recommended to save time. Do not "pond" or saturate the soil.
5. If the tank is to be stored, repeat step 3 and 4 above until the tank is clean.

Policy 8: Storage of Pesticides

Pesticides and pesticide containers shall be kept in secure and safe locations in accordance with existing laws.

Procedures

Pesticides shall be kept in a secure location and, if possible, in a temperature-controlled, well-ventilated area. Areas used for storage shall be labeled and designated for use by work unit supervisors.

Pesticides shall be safeguarded from environmental damage such as extreme temperature, photodecomposition or moisture. All pesticides in storage shall be inspected regularly and, if necessary, rotated on the shelf to assure that the oldest dated items are used first.

Central warehousing of pesticides shall take place at the Fir Street Yard facility. In the fall of each year, satellite pesticide storage areas for individual zones and work units shall be cleaned of unwanted products and products shall be disposed of properly.

Pesticides being transported shall be appropriately and safely secured in the vehicle. Only licensed applicators shall transport pesticides. Appropriate spill response supplies must be immediately available.

Pesticides shall not be transported in passenger cabs of vehicles where alternatives exist, such as truck beds, truck boxes or vehicle trunks.

Policy 9: Recycling of Empty Pesticide Containers and Disposal of Unusable Pesticides

Oregon City shall dispose of pesticides and empty pesticide containers in accordance with all State, Federal, and label requirements.

Procedures

Pesticide labels must be read prior to use. The following steps should not conflict with label information or state and federal regulations. Contact your supervisor if you determine a conflict or have other questions. Always wear protective clothing when handling pesticides or pesticide containers, as directed on the label.

For non-rigid containers including bags, sacks, and boxes

1. Pesticide material must be emptied into application equipment to the extent made possible by physical agitation of the container.
2. Visually verify that residues have been removed.
3. Conduct multiple-rinses of non-rigid containers such as paper lined with plastic or foil.
4. Place the bag/sack/box in a plastic bag and mark as to the contents in a plastic bag and mark as to contents.

Recycling of rigid containers such as plastic, glass, or metal

1. Pesticide material must be emptied into application equipment to the extent possible by pouring, then visually verifying that the residues have been removed.
2. The container must be rinsed with clean water until clean. All rinse water should be poured into the spray equipment for future use. Empty the pesticide and all rinsates into the sprayer before the full amount of diluting water is added to the spray equipment.
3. Remove lid and booklet label from clean container.
4. Bring cleaned containers to Fir Street yard for recycling pickup.

Disposal of Unusable Pesticides

Unusable pesticides are ones that: 1) are damaged through vaporization, freezing, infiltration of moisture into containers or photo decomposition; 2) have exceeded their shelf life; or 3) have visually changed their composition or structure.

1. The Maintenance Manager should be informed of plans to dispose of pesticides and of results of the disposition.
2. The applicator will contact the ODA, the manufacturer or dealer and/or a licensed consultant to find out if the product usable.

3. If the pesticide has less activity due to long storage, moisture, or freeze damage, follow the recommendations of the dealer, manufacturer, or licensed consultant and use procedures in this policy as they apply for disposal.
4. Follow recommendations of the dealer, manufacturer or licensed consultant. Applicators shall not transfer damaged or altered pesticides to another party for use. Arrange for disposal of the pesticide in a manner recommended by DEQ.
5. Applicators are responsible for arranging for the disposal of pesticides and a record of the disposals should be kept on file for a minimum of three years.

Disposal of Pesticides with Completely or Partially Canceled Registrations

1. The Maintenance Manager shall keep up-to-date on the pesticide regulatory news and respond to pending actions appropriately to minimize or eliminate stocks of unusable pesticides.
2. If unusable pesticides remain in stock, Oregon City will follow recommendations of the regulatory agencies, manufacturer or dealer in finding a legal user for the pesticide. If the pesticide is unopened and/or still retains its integrity it may be possible to transfer the pesticide to a legally registered bureau, agency, or group to use.
3. It may be necessary to dispose of the pesticide in a manner recommended by Oregon DEQ.

3.4 Safety Measures and Emergency Response

Policy 10: Use of Protective Clothing and Equipment

Personnel engaged in the use of pest management tools, equipment, or materials shall follow all clothing and equipment requirements required to ensure their safety.

Procedures

When using pesticides, the label directives for use of PPE must be adhered to. Use of related power and mechanical equipment must be accompanied by appropriate PPE as determined by equipment manuals or supervisor's directives.

Required personal protective equipment appropriate to satisfy specific pesticide label requirements shall be provided by Oregon City to employees for their use. Label mandated PPE may include, but are not limited to: respiratory protection, eye protection, coveralls, rain gear, mixing aprons, chemically resistant boots, and gloves. Time will be made available during the work shift to wash up before breaks and at the end of the work shift. The applicator is responsible for cleaning, storing, and maintaining PPE and equipment in a safe and useful manner.

If applicators apply organophosphate and carbamate insecticides in amounts and frequencies determined by health professionals to require cholinesterase blood tests, Oregon City will provide funding for tests. Testing monitors the potential depletion of the enzyme cholinesterase in the blood, indicating exposure to the insecticides. General use of this class of pesticides has been eliminated with only as small set of products for specific uses.

Policy 11: Emergency Information Concerning Accidental Pesticide Exposure

Oregon City will inform applicators of proper procedures to be taken in case of pesticide exposure.

Procedures

Anyone inquiring about pesticide exposure will be referred to their own personal physician, Oregon Poison Center (OPC), or the Pesticide and Analytical Response Center (PARC). A list of these authorities and their phone numbers are listed in Appendix 1.

Material Safety Data Sheet information about all hazardous substances in the workplace is available to all personnel for their own use. This information includes symptoms of exposure, and procedures for handling overexposure to individual pesticides. If symptoms of illness occur during or shortly after applying pesticides, the OPC should be contacted or the individual should receive medical attention immediately.

Non-emergency questions received by Oregon City shall be referred to the Maintenance Manager.

Additional procedures include the following:

- Use advanced planning to avoid emergencies and to expedite aid should an accident occur.
- Be informed of the symptoms of exposure and the decontamination steps necessary in case of accidental exposure.
- Use all safety procedures and protective gear as recommended on the label.
- Have a copy of the appropriate label available when applying or transporting pesticides (concentrated and dilute.)

In case of a medical emergency related to suspected pesticide exposure

- Handle any emergency situation as per First Aid instructions, or label and MSDS.
- Call for emergency backup if necessary.
- Refer to Oregon Poison Center. 1-800-222-1222
- Take a label for reference for medical personnel if it is necessary to leave the site.
- Inform your supervisor as soon as possible.
- Inform the Maintenance Manager as soon as possible.

In response to a non-emergency inquiry

- Respond to questions to the best of your ability.
- Refer detailed or technical questions to the Maintenance Manager.
- Inform your supervisor.

Policy 12: Pesticide Spill Response

This policy outlines the objectives, training requirements and procedures Oregon City personnel should follow in response to an emergency release of pesticides. This applies to all Oregon City staff and Contractors involved in applications of pesticides, handling of pesticides, or acting in a communications response role during a spill incident. The primary method by which Oregon City Parks reduces pesticide spills is through prevention. Through planning, preparation, adherence to good work practices, and increased awareness of the potential results of a spill, the possibility of a spill occurring is minimized.

Procedures

Department of Transportation (DOT) and the Public Utilities Commission (PUC) regulate the transport of hazardous waste resulting from a spill and the release of chemicals during transport. The Environmental Protection Agency (EPA) and the Oregon Department of Environmental Quality (DEQ) regulate contamination of water, land, and air resulting from an emergency release of a hazardous material. They are also concerned with proper disposal of waste generated from a spill. If a spill should enter the Willamette and Columbia Rivers, or an immediate tributary the US Coast Guard should be contacted. The Occupational Safety and Health Administration (OSHA) is concerned with the proper training and protection of workers handling hazardous materials. These regulations are incorporated into the procedures outlined here.

Should an emergency release of a pesticide occur, Oregon City personnel will respond in accordance with all governmental regulations, including those of DOT, EPA, DEQ, OSHA, and this policy. In performing emergency activities following a spill, protection of both employees and the public, is of great concern, as is protection of property and the environment.

Small spills of dilute pesticides, spills of material with granular formulations, and lower toxicity materials are regulated through OSHA standards. Hazard Communication applies to incidental spills that present a low potential of hazard to the worker, the public, and the environment.

Emergency Response, applies to incidents with a high degree of hazard such as large spills of dilute material, pesticides with higher toxicity, and concentrates in a confined space. An incidental spill becomes an Emergency Response when:

1. The release or spill significantly impacts another agency's functions,
2. The incidental spill precipitates evacuation or curtailing of work,
3. The event causes a negative impact on neighboring facilities or the community,
4. The spill involves a coordinated effort by local first responders.

Anyone transporting pesticides will receive training and equipment that will allow them to respond to incidental spills. Spills that require an Emergency Response will be handled by a local HAZMAT team.

DEQ enforces several regulations pertaining to spill reporting and clean up, hazardous waste storage, and disposal. If a serious emergency occurs and the local fire department has been called in, or if there has been a spill that extends outside Public facilities that could reach surface water,

the National Response Center and the Oregon Emergency Response System (OERS) must be called. If the amount of pesticide spilled exceeds one pound in any 24-hour period the release must be reported to OERS. If it exceeds the amount listed in the Code of Federal Regulations List of Hazardous Substances and Reportable Quantities, the spill must be reported to the National Response Center. If the spill occurs on an impervious surface, is fully contained, and is properly cleaned up for disposal the Maintenance Manager will determine whether these agencies should be contacted. Ensuring pesticides do not pollute state waters is a primary concern. Procedures outlined here focus on recovery and reuse of as much of the spilled pesticide as possible. Any absorbent or other contaminated material from which the spilled pesticide cannot be recovered is hazardous waste and must be labeled, stored, and disposed of properly.

Spill Prevention

Oregon City personnel will employ a variety of practices to reduce the potential of a pesticide spill. These will include the following:

- *Purchasing.* When procuring chemicals, a factor in determining which chemical formulation to purchase will be the ease with which it can be cleaned up in the event of a spill. Types of packaging and formulations that may help to prevent a spill from occurring will be factors as well. Characteristics of the pesticide, such as toxicity and reactivity that may affect the seriousness of a spill, will also be considered.

- *Preparation.* Planning, training, acquisition, and maintenance of equipment and supplies is done to reduce the risk of a spill occurring. For example, regular preventative maintenance will be done on sprayers, replacing hoses and valves before they wear out.

- *Work Practices.* Oregon City personnel use practices that minimize the potential for a spill to occur, and ease clean up. For example, pesticides will be placed in a leak-proof container while being transported.

  If release of a pesticide occurs, the following guidelines should be followed. Do not clean up the spill if you are not properly trained, don't have proper protective equipment or if doing so would endanger your health or safety.

  #### *Assess the Situation*

  A. If the release is out of control:

     1. Tell bystanders to remain at a safe distance.

     2. Call **911**. Ask for fire, describe the situation as a hazardous materials spill. If there are injured people, ask for an ambulance. If chemical injury is involved, be certain that a copy of the label accompanies the victim.

     3. Assist injured people. Remove contaminated clothing immediately.

     4. Determine whether there is an imminently hazardous situation that you can take steps to correct.

     5. Notify your supervisor.

6. If the spill is on a roadway, set up DOT reflectors upwind of spilled materials and divert traffic if possible.

7. Remain on site and update the Maintenance Manager every 15 minutes.

B. If the release is controllable and there are no injuries, tell bystanders to remain at a safe distance and initiate control and clean up procedures.

Control the Spill

1. Put on protective equipment.

2. Do not allow the material to enter a drain. Survey the area to see if there is a need to place a dam to protect a sewer drain or another waterway. If the pesticide does enter a drain, reduce the flow as much as possible, and call DEQ's Northwest Regional Office 503-229-4263, immediately.

3. Stop the flow of the chemical.

   - If the spill is from a leaky container, position the container to prevent additional spillage.
   - If the spill is from a leaky valve, isolate the valve and depressurize the tank.
   - If the spill is from a broken hose shut off valve or pump it may help to loop the hose back into the tank.
   - If there is a rupture, use duct tape or any other material (such as rags or a patch) to stop the flow of a chemical.

4. Contain the spill using absorbent material. Call the Maintenance Manager to request additional supplies, resources, and assistance if needed.

5. Change or add to your protective equipment as necessary. Put contaminated protective equipment in a plastic bag to transport to Fir Street Operations center for cleaning. Follow proper decontamination procedures for protective equipment.

Clean Up the Spill

1. For dry material, sweep up the pesticide.

2. For a liquid spill, remove material using a wet vacuum where possible. Other useful materials include absorbent dikes, pillows, and towels.

3. For concentrate spills on pavement, after picking up as much as possible, contain the area and wash the pavement with a small amount of water. Absorb or vacuum this diluted pesticide and reclaim it.

4. If the soil has been contaminated, contact the Maintenance Manager. Your supervisor, and you will determine to what degree cleanup should proceed. You may be asked to remove the contaminated soil. If so, scoop up enough soil to completely remove the pesticide. Place unusable material in a container labeled "Hazardous

Waste". Up to 220 pounds, about half a barrel, of hazardous waste resulting from a spill can be transported by the applicator or transporter to Operations Center.

5. Have the Spill Incident Report ready so that your supervisor can evaluate the situation.

Reclaim the Pesticides

1. Reclaim the chemical on site if possible. Sift dried material to remove debris and return it to its proper packaging. Reclaim liquid material that has been absorbed through rinsing absorbent material. Use the rinsate on a target site, or label and store it for future application.

2. Any pesticide recovered but not reclaimed on site will be processed at an authorized facility. The absorbent material will be dried and reused.

3. Hazardous waste must be stored in a labeled container at an authorized facility. It will be transported to a waste management facility for disposal.

Document the Incident

1. Complete a Pesticide Spill Incident Report (Appendix 6).

2. File one copy with supervisor

Maintenance Manager Responsibilities

Maintenance Managers will visit all spill sites and supply materials requested by the crew. Managers will assist in cleanup, if not yet completed, ensure the site is completely clean , help recover the pesticide, and arrange for disposal. Managers will document the scene, talk to homeowners, emergency response crews, and photograph the site.

Pesticide Spill Kit Response Equipment

The Maintenance Manager must restock any used spill kit as soon as possible to prevent the spread of any future spills. The following items must be immediately available to all persons applying or transporting pesticides:

1. A binder that includes:
   - Chemical labels for materials being transported
   - MSDS for chemicals being transported clipped to front of binder
   - Shipping papers when necessary
   - Pesticide Spill Response Procedures and Incident Report
   - A DOT Emergency Response Guidebook
   - Emergency phone numbers

2. A cell phone, if there is the potential of a spill occurring that would require assistance.

3. Personal protective equipment appropriate for handling the pesticides being applied or transported in the event of a spill.

4. An eyewash either on the truck or on site and immediately available in the case of an emergency.
5. Tools and supplies to make repairs to the application equipment and to stop leaks.
6. A means of picking up spilled material. Depending on the formulation this may include absorbent material, broom and dustpan, or shovel.
7. Plastic recovery bags and ties for the material and for contaminated personal protective equipment.
8. A jug of water and detergent.

CHECKLIST OF MATERIALS THAT MAY BE NECESSARY TO CARRY DEPENDING ON THE TYPE OF PESTICIDE AND ITS VOLUME:

- ☐ An extra protective suit
- ☐ Extra gloves
- ☐ An extra set of clothing
- ☐ Waterless soap
- ☐ Absorbent dikes, pillows and towels
- ☐ Squeegee
- ☐ Whisk broom
- ☐ Dustpan
- ☐ Hard bristle brush to loosen material
- ☐ Duct tape for temporary repair
- ☐ Patching material
- ☐ Quill and hose
- ☐ 2 freestanding signs warning of danger
- ☐ Warning tape
- ☐ DOT reflectors or flares
- ☐ Strainers
- ☐ Bucket
- ☐ Flat and pointed shovels

It is the responsibility of the applicator or transporter to ensure they carry the items necessary should there be a spill.

3.5 Special Situations

Policy 13: Turf Broadleaf Weed Management

This policy defines the management of weeds in managed turf areas in Oregon City and the use of any selective turf herbicides by any applicator. Turf plays various important functions in our parks. When an area has been determined to be maintained as turf, it is the policy of Oregon City to do so primarily through the implementation of proper planning, cultural, and mechanical practices. These practices are generally adequate to keep the population of turf broadleaf weeds at acceptable levels. At certain sites these practices alone may not be adequate to keep broadleaf weeds at acceptable levels. An acceptable level of turf quality and tolerance of weed infestation varies with the site.

The establishment and maintenance of quality turf requires a proper site, good root zone conditions, optimum fertility levels, adequate irrigation, correct mowing practices, and other

factors. Oregon City relies primarily on attention to these cultural factors in maintaining turf and minimizing the density of weeds. Adherence to good cultural practices aids in development of healthy stands of turf which resist establishment of weeds. Oregon City has found that in most turf areas, tolerance of weed presence is possible, and precludes the need for further intervention, such as applying selective herbicides. However, these materials can be effective tools to reduce or eliminate populations of weeds in turf as part of an overall program of turf health maintenance in special areas where higher quality of turf is required.

Examples of turf health practices currently employed by Oregon City:

- Proper siting
- Site and soil preparation
- Drainage improvements
- Pruning of adjacent plants for increased sunlight penetration
- Proper selection of grass seed varieties
- Core aeration
- Overseeding
- Mulch mowing to leave clippings on site
- Mowing at the proper height and frequency
- Proper irrigation practices
- Proper fertilization
- Application of selective broadleaf herbicides

Procedures

The threshold at which turf weed controls may be necessary shall be determined on a case-by-case basis. Some factors to consider are location, public expectation, manner of activities taking place on the turf, the history of previous control attempts, and stresses placed upon the site. Management efforts must consider and employ all applicable cultural and mechanical methods as components of a plan to return the turf to acceptable level of quality. Methods include reducing soil compaction, improving soil structure, over-seeding, increasing drainage capacity, and encouraging healthy and vigorous turf growth through proper fertilization.

Special Considerations

Use of broadleaf herbicides in turf requires their application to sites that have varied and direct public uses, often involving children and pets. These applications must be carefully planned to allow for careful adherence to the pesticide label directives, and to minimize any potential impacts on turf users.

Time of Day

Applications should be made during the best time of day to avoid public endangerment, high temperatures, and wind. For most situations this requires applications as early in the day as possible. Applicators should consider off-schedule timing, such as shifting work hours to begin several hours early before conditions and turf use makes applications problematic. Applications

may also need to take place over several days to avoid spraying too late in the day. Minimizing public inconvenience and concern is of paramount importance.

Signage

Notification signage is of utmost importance in turf applications. The nature of a typical turf site is open and with easy public access. This may necessitate the placement of many notification signs around the perimeter. As stated in the Policy 3: Notification of Pesticide Use at a Site, signage should be adequate to inform any park user approaching the area. Applications of herbicides to our park turf sites are uncommon and may not be anticipated by park users. They should receive adequate notice that an application is taking place before they reach the site. Signs must remain in place and the public must be kept out of treated areas until the sprayed surfaces are completely dry. This effort must be made by the applicators to inform and keep people and their pets out of these treated areas until these reentry requirements have been met.

Seasonal Timing

Spring and fall months at beginning of rain breaks, where weed growth is active are ideal times for pesticide applications. Conditions leading to turf stress, such as dry and hot weather, and peak visitor seasons are not ideal for application.

Drift

Minimizing drift is critical in turf broadleaf weed applications. Avoid use of boom sprayers to decrease the potential for drift and use a backpack sprayer instead. Applications should cease if any drift inducing condition becomes apparent. Use of appropriate pressure, correct nozzles and other techniques should be employed to minimize creation of small spray particles that may drift.

Targeted Applications

Whenever possible, spot spraying turf weeds should be employed over broadcast applications.

Policy 15: Vegetation Management in Playground Areas

Play structures underlaid by deep wood chip surfaces function in special roles that heighten sensitivity to our pest management practices and materials. This policy addresses approved vegetation management methods and materials in these specific areas. Oregon City requires adherence to this policy when they are undertaking weed management activities playground areas and their immediate borders or margins.

Procedures

Oregon City seeks to minimize any potential impacts to our park users while still providing responsible, effective, and efficient care for our facilities. Playground areas in particular focus attention on our activities and require a special set of best management practices to benefit both Oregon City Parks and park users.

The deep chip layers that serve as a safety cushion for falls also act as an effective weed control mulch and reduce the need for other active weed control measures. Herbicides will not be used to control vegetation in play areas or their margins. Weed control in these play areas will be accomplished primarily using the wood chip mulch. To function as both a safe surface for play and as an effective

weed barrier, this chip layer should be kept at the established minimum depth for playgrounds. If the mulch layer is not adequate for weed control, it should be amended as soon as is practicable. Mulch layers that have broken down over time and provide a medium for good weed growth should be replaced or amended with fresh chips.

Manual weeding is usually adequate to keep weeds from establishing within the chipped areas. Effort shall be made to respond quickly to weed presence so that this kind of control will be feasible and efficacious.

Use of powered weed control equipment, such as line trimmers and tillers, may be used in chipped areas to control weeds, however, this kind of equipment should not be used when nearby park users may be put at risk.

Playground/turf interface borders will be maintained by hand or mechanical means. Establishment of a structured border is preferred where possible as it provides a lower maintenance interface between play areas and turf. These structures also reduce weed and turf infiltration.

The only pests that will be regularly controlled in wood chipped play areas are weeds and other unwanted vegetation. The need to control other pests, such as insects or diseases, is not expected. One exception would be the presence of venomous stinging insects such as yellow jackets. In these circumstances the use of a targeted insecticide to eliminate the immediate safety hazard may be required.

Policy 16: Moss Management

Moss is beneficial and naturally occurring in the Northwest, but it can also cause water damage and slipping hazards on impervious surfaces, such as, roofs and parking lots. Moss loves moist and shady conditions.

Procedures

Reduce moss growth by pruning branches that shade roofs and remove leaves, pine needles and branches from impervious surfaces reduce shade and moisture retention. Once the debris is removed from the impervious surfaces, a garden hose or wet broom can be used to push moss off the affected area. Pressure washers can also be used parking lots and side walks, but are not recommended roofing materials especially tar shingle roofs.

Eco-friendly chemicals

Liquid application during a dry spell is considered best practice and if using powdered chemicals avoid applying when rains greater than 0.05 inches are forecasted in the immediate future. Potassium salts of fatty acids and ammonium salts of fatty acids are low-hazard active ingredients to look for. A long-term solution involves installing metallic zinc strips on the roof. These metal strips slow or even stop the growth of moss for years at a time.

Chemicals to avoid

Many off the shelf moss-removal chemicals can cause harm to Humans, pets, and other native plants. Hazardous chemicals include Ammonium sulfate, copper sulfate, ferric and ferrous sulfates, sodium pentachlorophenate, zinc chloride, and zinc sulfate. Keep your eyes peeled for these ingredients.

Policy 17: Venomous Insect Management

Acceptable practices for managing venomous insects such as hornets, wasps, yellow jackets, and honeybees in Oregon City public property are defined in this practice. While insects will not always cause problems, their presence in some locations can create immediate and serious safety issues. Individuals with bee and wasp venom allergies pose as life threatening situations if they are stung. To properly address these safety concerns, park employees may be faced with the need to apply insecticides within a short time frame. These control activities and use of insecticide require adherence to the special rules outlined in this practice.

Procedures

Background: Wasps, hornets and yellow jackets may quickly establish nests above and below ground in both natural areas and developed property. European honeybees form above ground nests and may also form swarms when seeking new nest sites. Not every wasp or bee nest creates a problem for our users or staff. Public threat is dependent on insect species, nest location, time of year and other factors. Yellow jackets and some wasp species can be particularly aggressive towards people, especially near their nests. Other wasps, such as paper wasps are less aggressive and are more benign depending on location of their nest. Honeybee swarms generally do not create a large stinging potential as bee behavior is altered during this time. Nest location is also important when determining threat. Nests located near walkways, buildings, playgrounds or similar sites are more problematic than those located in remote areas. Nests in areas where vegetation management or restoration planting is being carried out can also create problems. Wasp behavior may also vary with the time of year. Yellow jackets will exhibit increased defensive behavior as the season progresses. Normally, yellow jacket and paper wasp colonies only live one season. Honeybee nests usually persist from year to year.

Evaluation: When wasp or bee nests are discovered on Oregon City property, staff should evaluate the safety threat they pose. If the nest is considered to create a safety hazard for park users or staff, demarcation and control measures should take place. Nests that create an immediate hazard, such as those near playgrounds, community centers, walkways, trails and work sites, should be addressed as soon as possible. Other criteria that may constitute a hazard are nests that have been disturbed and nests sites with aggressive individuals. Nests occurring within inhabited structures such as community centers create an immediate safety hazard and control of these should be immediately referred to a qualified professional contractor.

Demarcating nests or swarms:

Where possible, nests or swarms that present an immediate public hazard should be marked by either signage, cones, taping, flagging or by other means so that the area of danger can be avoided by visitors, contractors, and employees. Markings should stay in place until the nest is eliminated or the swarm is removed.

Honeybee swarms and nests:

When discovered, honeybee swarms should be marked as described above until the bees have been collected. Qualified bee removal contractors should be contacted to collect the swarm. Honeybee swarms should not be sprayed with insecticides. Unless location of the nest presents a hazard,

honeybee nests should be tolerated wherever possible. If removal is required, qualified contractors should physically remove nests when feasible.

Spraying wasp and hornet nests:

Aerosol jet stream products labeled for use on wasp and hornet nests can be effective against both yellow jackets and paper wasps, but they must be used with extreme caution. Wasps will attack when they sense an application to their nests, and even freeze-type products are not guaranteed to stop every individual. For this reason, extreme caution must be used when nest applications are taking place. The following practices should be adhered to:

- Nests should be sprayed at night or before dawn, when all members of the hive are present and most docile. Daytime spraying is not recommended except in certain emergency cases where the public is not placed at risk from resultant increased hive activity.
- Nests should not be disturbed before treatment. Disturbed nests should not be approached.
- Nest location should be marked as described above. Demarcation must be left up until the nest has been eradicated.

Approved applicators

Park staff with valid ODA pesticide applicator licenses with an insecticide category endorsement should be the designated employees carrying out applications. However, there may be instances where these employees are not available, and a nest presents an immediate health and safety threat to the public and staff. In these instances, available personnel with ODA pesticide applicator licenses of any category are approved to use jet spray wasp and hornet products to treat nests. In rare emergency safety situations where no licensed personnel are able to respond in a timely fashion, other personnel may be approved to carry out an application, but only if they have had prior supervisor approval, prior training in the safe use of these sprays, and instruction in the proper management of wasps and bees. Staff members with known wasp or bee allergies will not carry out any wasp or bee control.

Use of traps

When yellow jackets are a continuing serious problem at a site from year to year, use of commercial traps to target emerging queens in the spring can be considered. Trapping queens during the 30- to 45-day emergence period has the potential to provide an overall reduction in the yellow jacket population for the season. The more traps put out in spring on an area-wide basis, the greater the likelihood of reducing the number of nests later in the summer. Usually one trap per acre is adequate in spring for depletion trapping of queens. Use of traps to reduce yellow jacket numbers later in the season is considered ineffective.

Policy 18: Rodents and Indoor Pest Management

This policy establishes management procedures for burrowing rodents such as moles and gophers. Management of these pests is focused on mechanical trapping for removal and differs greatly from typical landscape pest management and brings with it a specific set of issues that must be addressed to ensure park visitor and employee safety.

Procedures

Moles and gophers can create turf and landscape problems due to their tunneling and mounding activities. While tunneling and mounding can be tolerated in many areas, in some sites the aesthetic damage from these activities cannot. This soil disturbance can also present trip hazards, particularly in turf areas. Mounds can also create mechanical problems for mowers.

Mechanical control of burrowing rodents such as moles and gophers are allowed with an Ornamentals and Turf category endorsement of the Oregon Public Pesticide Applicators license currently held by our staff and contractor licensees. Where a demonstrated need exists, and supervisors have directed that control actions should take place, then gophers and moles may be mechanically trapped in tunnels by Oregon City and associated contractors. To ensure that park visitors are not put at risk by trap placement, the following rules must be adhered to for all trap uses.

1. Once placed, traps shall be covered by a wood barrier or hard plastic cover, such as an irrigation valve box cover, which then must have a weighted device placed on the board or cover such as a sandbag or concrete block. Signage warning the public must also be attached to a barricade and placed over the wood barrier or cover.
2. Once a trap has been placed the applicator must check the trap within 24 hours to determine if a mole has been caught or the trap is still active. The signage on top of the trap must be checked in the morning and the afternoon to confirm no tampering has occurred to sign or trap.
3. No traps shall be placed within 100 ft of playgrounds.
4. No trapping shall occur over the weekends or holidays.
5. Setting levers must be used to compress scissor type trap springs.

4.0 REFERENCES AND RESOURCES

1. American Phytopathological Society. Compendiums: Flowering Potted Plant Diseases, Ornamental Foliage Plant Diseases, Rhododendron and Azaleas Diseases, Rose Diseases. APS Press, 1983-1995.
2. Dreistadt, S.H., J.K. Clark, and M.L. Flint. Pests of Landscape Trees and Shrubs: An Integrated Pest Management Guide. 2004. University of California Press. 2nd edition. Oakland, CA.
3. Bragg, Dave, et al. Pacific Northwest Insect Control Handbook, revised annually. Extension Services of Oregon State University, Washington State University, and University of Idaho.
4. Johnson, W. T., Lyon, H. H., Insects That Feed on Trees and Shrubs. Cornell University Press, 1988.
5. Pscheidt, Jay W. et al. Pacific Northwest Plant Disease Control Handbook, revised annually. Extension Services of Oregon State University, Washington State University, and University of Idaho.
6. McDonald. Sally A., Applying Pesticides Correctly. North Carolina State University, US Department of Agriculture, and US Environmental Protection Agency.
7. Pirone, Pascal P., Diseases and Pests of Ornamental Plants. John Wiley & Sons, 1978.
8. Sinclair, W. A., Lyon, H. H., and Johnson, W. T. Diseases of Trees and Shrubs, 1987. Cornell University Press.
9. Williams Ray D. et al, Pacific Northwest Weed Management Handbook, revised annually, Extension Services of Oregon State University, Washington State University, and University of Idaho.
10. Bobbitt, Van M. et al. Pacific Northwest Landscape Integrated Pest Management Manual. Washington State University, 1999.
11. Byther, Ralph S. et al. Landscape Plant Problems Washington State University, 2000.
12. Fisher, G., J. DeAngelis, C. Baird, R. Stoltz, L. Sandvol, A. Antonelli, E. Beers, and D. Mayer (eds.). Pacific Northwest Insect Management Handbook. Cooperative Extension Services of Washington, Oregon, and Idaho. Revised annually.
13. Sinclair, W.A., H.H. Lyon, and W.T. Johnson. Diseases of Trees and Shrubs. 2005. Cornell University Press. 2nd edition. Ithaca, NY. ISBN: 0-8014-1517-9.
14. Costello, L.R., E.J. Perry, N.P. Matheny, J.M. Henry, and P.M. Geisel. Abiotic Disorders of Landscape Plants: A Diagnostic Guide. 2003. Regents of the University of California, Division of Agriculture and Natural Resources. Publication 3420.
15. L. Burrill, S. Dewey, D. Cudney, B. Nelson, R. Lee, and R. Parker. Weeds of the West. 1996. Whitson, T. (Editor). Washington State University Cooperative Extension. WYWSWS001.
16. Disease Compendia of American Phytopathological Society
17. Compendium of Apple and Pear Diseases. 1990. Jones, A.L. and H.S. Aldwinckle (eds.). APS Press. St. Paul, MN.
18. Compendium of Conifer Diseases. 1997. Hansen, E.M. (ed.) and K.L. Lewis. APS Press. St. Paul, MN.
19. Compendium of Flowering Potted Plant Diseases. 1994. Daughtrey, M.L., R.L. Wick, and J.L. Peterson. APS Press. St. Paul, MN.
20. Compendium of Rhododendron and Azalea Diseases. 1986. Coyier, C.L. and M.K. Roane (eds.). APS Press, St. Paul, MN.
21. Compendium of Rose Diseases and Pests, 2nd Edition. 2007. Horst, R.K. APS Press. St. Paul, MN.

Internet Links

Pesticide Information

California Department of Pesticide Regulation
http://www.cdpr.ca.gov

CDMS Label and MSDS site
http://www.cdms.net/manuf/manuf.asp

EPA Pesticides Program
http://www.epa.gov/pesticides/

EPA Pesticide registration documents
http://www.epa.gov/pesticides/reregistration/status.htm

EPA Inerts Program
http://www.epa.gov/opprd001/inerts/

EXTOXNET, an Internet based pesticide informational site maintained by O.S.U.
http://ace.orst.edu/info/extoxnet/

National Pesticide Information Center
http://npic.orst.edu/index.html

Oregon Dept. of Agriculture Pesticides Division
http://www.oregon.gov/ODA/PEST/

Integrated Pest Management Information

Integrated Plant Protection Center (IPPC) Oregon State University:
http://ippc.orst.edu/dir/

IPM & Related Sites in Oregon and Pacific Northwest
http://ippc.orst.edu/oregonIPM.html

IPPC- PNW Handbooks, weather data, IPM links
http://pnwpest.org/

National Integrated Pest Management Network
http://www.reeusda.gov/nipmn/

OSU Pacific Northwest Nursery IPM website
http://oregonstate.edu/Dept/nurspest/index.htm

PP&R IPM Program website
http://www.parks.ci.portland.or.us/IPM/ipm.htm

Washington State Pest Management Resource Service
http://wsprs.wsu

APPENDIX 1
IMPORTANT TELEPHONE NUMBERS

APPENDIX 1 IMPORTANT TELEPHONE NUMBERS

Emergency

Fire, Ambulance, HAZMAT **911**

Oregon Poison Center- 24 hours Daily 1-800-222-1222

DEQ Northwest Regional Office 503-229-4263

Horticultural Services Communication Center 503-823-1636

Oregon Emergency Response System 1-800-452-0311

National Response Center 1-800-424-8802

CHEMTREK: an industry emergency spill information service 1-800-424-9300

Informational Phone Numbers

NPIC: National Pesticide Information Center 1-800-858-7378

Provides general information on pesticide products, including safety, health, environmental effects, clean up and disposal. 6:30 am: 4:30 PM PDT 7 days a week excluding holidays

Oregon Department of Agriculture 503-986-4635

Provides information on pesticide products and registration, conducts pesticide use investigations, and applicator licensing and certification. Weekdays 8:00 AM: 5:00 PM.

To Report Pesticide Exposures

Pesticide Analytical and Response Center (PARC) 503-731-4025

Provides confidential investigations, consults with health care providers and provides clean up and exposure prevention information. Weekdays 8:00 AM: 5:00 PM.

APPENDIX 2
UPCOMING PESTICIDE APPLICATION NOTICE

PESTICIDES WILL BE APPLIED TO THIS PARK SITE ON

DATE: _____

CHEMICAL APPLIED: _____

PARK WILL BE CLOSED

_____

Questions call the Parks office at 971-204-4602

APPENDIX 3
PESTICIDE APPLICATION NOTICE

PESTICIDES HAVE BEEN APPLIED AT:

_____

DATE: _____

CHEMICAL APPLIED:

_____

IF YOU HAVE ANY QUESTIONS, PLEASE CALL OREGON CITY PARKS AT 503-496-1201

APPENDIX 4
EPA REGISTRATION NUMBERS

APPENDIX 4 EPA REGISTRATION NUMBERS

Casoron	#400-168
Confront	#62719-92
Cornerstone Plus	#1381-192
Crossbow	#62719-260
Foundation	#2217-921-2935
Gallery	#62719-145
Garlon 3A	#62719-37
Glystar Original	#42750-61
Milestone	#62719-519
Nufarm Cheetah Pro	#228-743
Pendulum	#241-416
Ranger Pro	#524-517
Roundup Custom	#524-343
Scythe	#10163-325
Sedgehammer	#81880-1
Simazine 4L	#19719-60
Snapshot 2.5 GT	#62719-175
Speedzone	#2217-833
Sureguard	#59639-120
Surflan	#70506-44
Trimec Classic	#2217-543
Tordon RTU	#62719-31
Q4 plus	#2217-930

APPENDIX 5
PESTICIDE SPRAY APPLICATION RECORD

CITY OF OREGON CITY PARKS DEPARTMENT
PESTICIDE SPRAY APPLICATION RECORD

APPLICATOR NAME _____ LICENSE NUMBER _____

APPLICATION 1	LOCATION (Park & Address)	CHEMICAL (Product Name / Formulation / EPA Reg. #)	MIX RATION (Ex. 2 gal/100 gal)
Date	Specific Area Treated	Include Adjuvant	
Time In	Total Area Treated	Total Amount Applied	
Time Out	(Acres, Sq Ft, Etc.)		
Temp	Equipment Used	Coverage Rate	
Wind			

APPLICATION 1	LOCATION (Park & Address)	CHEMICAL (Product Name / Formulation / EPA Reg. #)	MIX RATION (Ex. 2 gal/100 gal)
Date	Specific Area Treated	Include Adjuvant	
Time In	Total Area Treated	Total Amount Applied	
Time Out	(Acres, Sq Ft, Etc.)		
Temp	Equipment Used	Coverage Rate	
Wind			

APPLICATION 1	LOCATION (Park & Address)	CHEMICAL (Product Name / Formulation / EPA Reg. #)	MIX RATION (Ex. 2 gal/100 gal)
Date	Specific Area Treated	Include Adjuvant	
Time In	Total Area Treated	Total Amount Applied	
Time Out	(Acres, Sq Ft, Etc.)		
Temp	Equipment Used	Coverage Rate	
Wind			

APPENDIX 6
PESTICIDE SPILL INCIDENT REPORT

APPENDIX 6 PESTICIDE SPILL INCIDENT REPORT

Name_____ Date _____ Phone number _____

Location of incident _____

Time release occurred _____ Temperature _____ Weather_____

Chemical(s)_____ Dilute____ Concentrate ____

Approximate amount released_____

What caused the release?_____

Are there any injuries or chemical exposures? Y/N _____ Has 911 been called? Y/N _____

Are there any emergency response personnel on the scene? Y/N _____

If yes, who? Fire ____ Police ____ Ambulance ____ HAZMAT ____

Is the pesticide near a drain or other waterway? Y/N_____ Is the drain protected? Y/N _____

Surface spilled on (soil, asphalt etc.) _____

Are there any special problems? _____

_____

_____

_____

Other applicators/transporters on site? _____

Approximate amount recovered _____

Witnesses

Name_____ Address _____ Phone _____

Name_____ Address _____ Phone _____

Name_____ Address _____ Phone _____

Injuries or exposures

Name_____ Address _____ Phone _____

Name_____ Address _____ Phone _____

Name_____ Address _____ Phone _____

Has an accident report been filled out? Y/N____ Type_____

Other_____

Name of person filing this report _____ *Date* _____