



**NORTH CLACKAMAS**  
**PARKS & RECREATION DISTRICT**

Administration

North Clackamas Parks and Recreation District  
3811 SE Concord Road  
Milwaukie, OR 97267

# EMERALD ASH BORER MANAGEMENT PLAN

## NORTH CLACKAMAS PARKS AND RECREATION DISTRICT

Updated 12/29/2025

# EXECUTIVE SUMMARY

## Background

The emerald ash borer (*Agrilus planipennis*) is a wood-boring beetle of ash, white fringe tree, and olive trees. Emerald ash borer (EAB) was first detected in Oregon in June of 2022 in Forest Grove and as of this writing there are active infestations in Washington, Marion, Clackamas, Yamhill and Multnomah counties. Native to eastern Asia, EAB threatens all 16 native species of ash in North America with mortality rates up to 99%.<sup>1</sup> North American ash trees have no natural defense from EAB, and infected cities can see 50% of their ash trees killed within the first ten years of infestation.<sup>2</sup>

Oregon ash (*Fraxinus latifolia*) features heavily in both our natural and urban ecosystems, successful in a wide variety of soil types. Many of NCPRD's natural areas are ash-dominant riparian forests. Ornamental and native ash trees also serve as shade trees in our maintained parks. Oregon ash is one of the few species that can handle the Willamette Valley wet winter and dry summer environment. EAB's impact on our parks and natural areas will be large; however, NCPRD is actively working with local, state, and federal partners to prepare for the looming threat.

This management plan reflects guidance from state partners, best management practices, and lessons learned from other communities impacted by EAB. As of August 2025, EAB is known to be within 5-10 miles of NCPRD's district boundaries. EAB can be difficult to detect until the host species begins to decline. A proactive approach to managing our ash canopy will protect taxpayer investment and mitigate the loss of canopy in our parks and green spaces.

## Objectives

The following management objectives were created following guidance from the Emerald Ash Borer Readiness and Response Plan for Oregon and guidance from the Oregon Department of Forestry. These goals were also created based on data in NCPRD's recently completed system plan.

1. Prioritize public safety in our parks and green spaces
2. Mitigate canopy and shade loss with selective treatment and replanting
3. Proactive management to protect taxpayer investment in the district

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<sup>1</sup> Bliss-Ketchum, L., R. Draheim, M. Hepner, and O. Guethling 2021. Emerald Ash Borer: Readiness and Response Plan for Oregon. Oregon Department of Forestry and Oregon Department of Agriculture. 9 pp

<sup>2</sup> The City of Portland. (2025, June). *Emerald Ash Borer Response Plan*. Portland.gov. <https://www.portland.gov/trees/documents/eab-response-plan-june-2025>

4. Educate the public on emerald ash borer and NCPRD's efforts to slow the spread.

## Summary

NCPRD will prioritize management strategies that will mitigate anticipated loss of canopy cover while maximizing available resources. The plan includes the following action items:

1. Chemically treat suitable trees with insecticide
2. Preemptively remove ash trees that are not suitable for treatment
3. Manage wood waste responsibly and proactively
4. Provide district residents with information relating to EAB and the resources available for mitigating its impact.

# MANAGEMENT

NCPRD's management of EAB is guided by the principle of slowing ash mortality (SLAM). SLAM is a mitigation program developed in areas where EAB has been present for over 20 years.<sup>3</sup> The emergence and threat of EAB is inevitable, but slowing the progression of ash mortality can spread the ecological and economic impact over multiple decades. Strategies to slow ash mortality include insecticide treatment on applicable trees, removing lower value ash trees, and creating "trap trees" by attracting the insect to chemically treated trees.

NCPRD plans to preemptively remove smaller diameter ash trees that can be removed by staff without contracted tree service professionals. Trees over 8" diameter at breast height (DBH) will be evaluated on a case-by-case basis to determine if they are suitable for insecticide treatment. Trees in natural areas that do not pose a threat to the public will be left as habitat snags.

## Early Preparation

The Oregon Department of Agriculture and Oregon Department of Forestry published The Emerald Ash Borer Readiness and Response Plan for Oregon in 2018. Local ecologists have known that EAB's arrival in Oregon was a 'when' not an 'if' and have prepared accordingly.

NCPRD began preparing for EAB's arrival prior to its discovery in Clackamas County. The natural resources team stopped planting Oregon ash in natural areas in 2022. To increase

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<sup>3</sup> Shaw, D. C., Hill, K., Ripley, K., Stark, D., & Williams, W. (2025, May 5). *Monitoring Oregon ash forests in the face of the emerald ash borer: A guide for small woodland owners and managers*. OSU Extension Service. <https://extension.oregonstate.edu/catalog/pub/em-9451-monitoring-oregon-ash-forests-face-emerald-ash-borer>

biodiversity and ecological resiliency, planting plans have included a variety of native tree species that can replace ash in a warming climate.<sup>4</sup>

Staff have attended a variety of workshops about EAB detection and management since 2022. Oregon Department of Forestry held an insecticide tree-injection workshop that NCPRD staff attended in Spring 2025. The natural resources coordinator participates in monthly meetings on EAB for land managers in Yamhill, Marion, and Clackamas counties.

## Inventory

NCPRD's natural resources staff completed an inventory of all ash trees in populated areas of the park district in August 2025. Staff went through areas within 20' of property lines, buildings, or pedestrian access and surveyed all ash trees found. It will be important for the district to work toward a complete tree inventory of all species in high value areas as EAB spreads. Tree inventories serve as a tool to plan for canopy changes and future planting sites. The completed ash inventory allows the district to plan for the cost and impact of EAB on both the district as a whole and individual parks.

### Methodology

The data collected for each tree includes:

- Species
- Sex
- Diameter at breast height (DBH")
- Condition
- Hazard risk
- Targets
- Location

Staff used Survey123, a mobile ArcGIS application to record ash trees at property owned or managed by NCPRD. The survey prioritized trees with the following targets: park user access, structures, infrastructure, and/or property lines. Female trees with fruiting samaras present were noted by staff.

The condition of each ash tree was assessed according to a numerical scale determined by Oregon State University's extension service<sup>5</sup>:

1: Canopy is full and healthy

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<sup>4</sup> Kral, G., & Shaw, D. C. (2025, June 25). *Alternatives to ash in western Oregon: With a critical tree under threat, these options can help fill habitat niche*. OSU Extension Service

<sup>5</sup> Shaw, D. C. (2025, May 5). *Monitoring Oregon ash forests in the face of the emerald ash borer: A guide for small woodland owners and managers*. OSU Extension Service. <https://extension.oregonstate.edu/catalog/pub/em-9451-monitoring-oregon-ash-forests-face-emerald-ash-borer>

2: Canopy has started to lose leaves (thinning) but with no dieback present (dead top; canopy twigs without leaves)

3: Canopy has less than 50% dieback

4: Canopy has more than 50% dieback

5: Canopy has no leaves; epicormic sprouts may be present on trunk

This scale was chosen as a means of quickly assessing a large number of trees for general condition. A variety of factors can cause lower crown decline or leaf loss in ash trees. EAB typically kills trees from the top down. Healthy, mid-to-large diameter trees are the best candidates for insecticide treatment. The quick assessment of each tree's condition provides a base for determining treatment actions at individual parks. Prior to treatment or removal, each tree will have its condition re-assessed by an ISA certified arborist.

## Results

NCPRD staff identified 915 ash trees across its managed properties in the district. The average condition of trees on the aforementioned scale is a '2'; in general, our ash trees are in excellent to good condition. The average DBH" is 10.81". North Clackamas Park hosts our ten largest ash trees with diameters ranging from 38" to 55". 738 of the surveyed trees were found to potentially pose a hazard to nearby targets were they to fail. Most trees are Oregon ash, with only a few developed parks having green ash (*Fraxinus pennsylvanica*) planted during park construction.

North Clackamas Park has the highest density of ash trees with over 200 counted. Three creeks, Mt. Scott, Kellogg, and Camas, flow through the park, which sits in their floodplains. Natural areas intersect maintained areas through the park, leaving pockets of ash and riparian forests.

An undeveloped property in Jennings Lodge, Hull and Swanson, has the second highest number of ash trees. While pedestrian access is not currently a concern, mid to large diameter trees border property lines and power lines along the road.

The Trolley Train has 58 ash trees, ranging from small to large diameter. In many portions of the trail, Oregon ash are the only trees present.

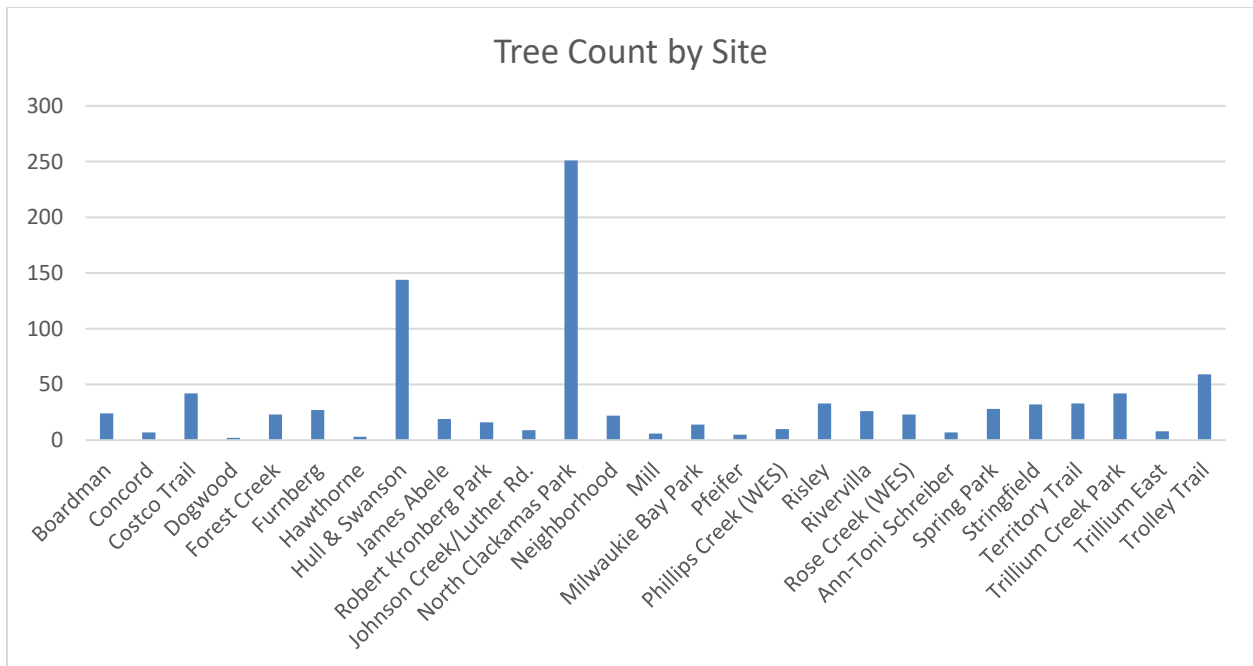


Figure 1. Chart graph of the quantity of ash surveyed at parks

## Management Strategies

There are three main actions that can be taken for each ash tree: remove, treat with insecticide, or let it remain in place. All three actions will play a role in NCPRD’s management dependent on the tree, property, and other factors.

### Decision-making

The management response for each tree will be based both on the data collected during the tree inventory and current conditions at the site prior to removal or treatment. Trees chosen for removal or treatment will be based on the following factors: condition/health, size, location, existing canopy, and risk.

In some cases, perfectly healthy trees may be in a poor location. Trees may be under powerlines, blocking lines of sight for traffic, or have roots that disrupt infrastructure. The inventory allows us to view the trees in the context of the park as a whole and evaluate current canopy, design, and other factors.

### Treatment

Highly effective insecticide treatments for EAB exist when applied properly by a trained and licensed pesticide applicator at the correct time. Research has shown that trunk injections of products with emamectin benzoate can have an efficacy of 95% or greater against EAB.

Insecticide treatment should not significantly impact birds or pollinators.<sup>6</sup> Ash trees are wind-pollinated with treatment typically applied after trees have flowered. Treatment is most effective between May and early July. Treatments will be applied in-house by Oregon Department of Agriculture licensed pesticide applicators beginning in May of 2026.

As early infestations are difficult to predict, treatment should start once EAB is within 10-15 miles of the park. Trees with more than 30% canopy decline are unlikely to recover even if treated. Injections with emamectin benzoate must be reapplied every two to three years for effective prevention from EAB. Routine treatments can protect an ash tree from EAB over the course of its natural life, but it would be extremely difficult to treat every vulnerable tree with limited staff and resources. The City of Portland plans on treating every healthy ash over 6" DBH in developed city-owned areas. The City of Salem plans on treating every suitable city-owned tree over 12" DBH.<sup>7</sup> NCPRD will look at each park individually, prioritizing healthy large diameter trees, over 8" DBH, for treatment.

Emamectin benzoate is applied at a rate depending on the DBH inch of the tree. Below is the cost of treating each surveyed tree over a two-year period at a rate of \$10/inch of DBH, which is a low rate of labor and chemical for a contracted company. Estimated costs of the chemical for jurisdictions vary between \$2.50 - 10.00 per inch of DBH.

DBH	Count	Cost (\$)
<3"	0	0
3"-6"	312	\$14,040.00
6"-12"	305	\$27,450.00
12"-18"	143	\$21,450.00
18"-24"	62	\$13,020.00
>24"	40	\$10,800.00
	<b>Total</b>	\$ 86,760.00

### Removal

Removing and replacing over 900 trees would have a high upfront cost and immediate impact on tree canopy, shade, park aesthetics, and enjoyment. Below is a rough cost estimate of removing every tree based on the City of Portland's tree removal rate:<sup>8</sup>

DBH"	Count	\$/Tree	Cost (\$)
3"-6"	312	\$1,000	\$312,000

<sup>6</sup> Herms, Daniel et al. Insecticide Options for Protecting Ash Trees from Emerald Ash Borer. <https://www.agriculture.nh.gov/publications-forms/documents/eab-bulletin.pdf>

<sup>7</sup> City of Salem. *Emerald Ash Borer*.

<https://www.cityofsalem.net/community/natural-environment-climate/trees-and-plants/emerald-ash-borer>

<sup>8</sup> The City of Portland. (2025, June). *Emerald Ash Borer (EAB)*. Portland.gov.

<https://www.portland.gov/trees/documents/eab-response-plan-june-2025>

6"-12"	305	\$1,000	\$305,000
12"-18"	143	\$1,000	\$143,000
18"-24"	62	\$3,000	\$186,000
24"-30"	40	\$3,000	\$120,000
>30"	27	\$4000	\$108,000
		<b>Total</b>	<b>\$1,740,000</b>

This cost estimate does not factor in extra charges for dangerous trees, traffic control, or other factors. It is best to remove trees before infestation, as EAB leaves trees brittle and dangerous after as little as two years.<sup>9</sup> Waiting to remove trees after infestation would result in higher costs per tree removed due to the need for specialized equipment.

The rate of EAB infestation spread and ash tree mortality typically outpaces the rate at which trees can be removed.<sup>10</sup> The graph below shows how tree mortality increases exponentially 8 years after initial EAB infestation:

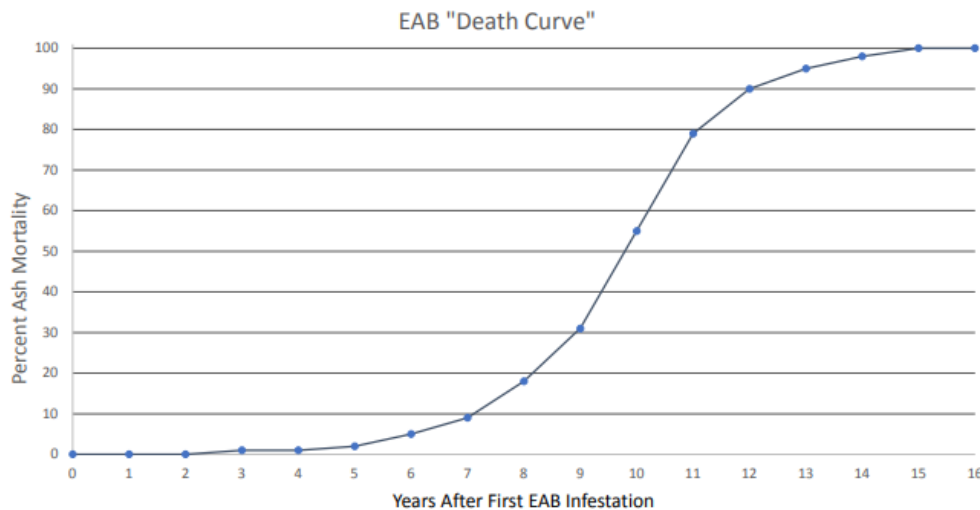


Figure 2. Minnesota Department of Agriculture. (n.d.). Guidelines to Slow the Growth and Spread of Emerald Ash Borer. <https://www.mda.state.mn.us/sites/default/files/inline-files/eabmgmtguidelines.pdf> pp 19

NCPRD plans on removing most smaller diameter ash (under 8" DBH) and those that are not good candidates for insecticide treatment. Unhealthy, stressed, or poorly placed trees will also be considered for removal regardless of their diameter.

<sup>9</sup> Purdue University. (2019, January 24). *Avoiding Deadly Risk of Dying Ash Trees with Timely Tree Removal*. Forestry & Natural Resources. <https://www.purdue.edu/fnr/extension/timely-tree-removal>

<sup>10</sup> Minnesota Department of Agriculture. (n.d.). Guidelines to Slow the Growth and Spread of Emerald Ash Borer. <https://www.mda.state.mn.us/sites/default/files/inline-files/eabmgmtguidelines.pdf>

## Wood Waste Management

Wood waste created by the removal of ash trees will be handled in accordance with the Oregon Department of Agriculture's Permanent EAB Quarantine. Trees removed from managed park and developed areas will be chipped. Trees removed from natural areas will be chipped when possible, or felled, bucked, and laid on the ground to decompose naturally. The public will not have access to the chips to prevent movement of material outside the quarantine area or to uninfected areas. Ideally, trees will be removed outside of the active period of EAB adults (May through September). Trees removed in natural areas will have 50% triclopyr applied to the stump to prevent resprouts and to allow new trees to thrive. If an ash tree in a natural area will not impact infrastructure, pedestrian access, or property lines, it will be left as a habitat tree for wildlife. Trees removed in developed areas will have their stumps ground in the winter.

## Summary

NCPRD plans to preemptively removal smaller diameter ash trees starting in 2026 when adult EAB are no longer flying. Trees over 8" DBH will be evaluated on a case-by-case basis to determine if they are suitable for insecticide treatment. Insecticide treatments with emamectin benzoate will begin in May 2026. Emamectin benzoate is effective for 2 years before treatment needs to be repeated. NCPRD will work with local and state partners to determine treatment intervals as the pest progresses through the area. Larger diameter trees are costly to remove and have immediate impacts on the surrounding area. Unhealthy, larger diameter trees will be removed by contracted arborist crews as funding is available. Removed trees in developed areas will be chipped on site with the chips brought to North Clackamas Park for storage.

# OUTREACH

Public messaging to the community will need to emphasize that EAB is 100% fatal to all untreated ash trees. Treatment is expensive and a long-term commitment, but removals have an immediate impact on the surrounding area. NCPRD plans on mitigating the ecological and economic impacts of EAB by spreading removals out through selective insecticide treatment. In order to communicate this plan to the community, NCPRD will employ multiple tactics.

There will be a landing page on the NCPRD website that will describe the threat of EAB and the strategies used by NCPRD to mitigate the damage. The website will link to Oregon Department of Forestry's EAB webpage for current information. On sites with a high impact, there will be signs that link to the webpage and provide general information on removal or treatment activities. NCPRD will order tree tags to be used on treated trees that will provide a QR code to the same website.

Staff will prepare a general FAQ document as part of a “partner toolkit” that can be shared with partners and community organizations. Additionally, staff will inform the public with social media posts, possibly workshops, and community presentations.

NCPRD messaging should include methods of detecting EAB damage on ash trees, reporting tools, and recommended actions. It is important to emphasize that EAB quickly spreads by moving infested firewood between areas and that the ash materials quarantine should be taken seriously to give jurisdictions, and homeowners, as much time as possible to prepare for EAB infestation.

## TIMELINE AND COSTS

Tree removal by NCPRD staff will begin in 2026, starting on trees that pose the greatest risk to human safety. As this removal will be done in-house, it is difficult to fully represent the costs. Trees that can be dropped into natural areas will take less time to remove than trees in developed areas that will need to be chipped with their stumps ground. As of the date of this writing, the cost for two natural resource staff members to spend one workday removing trees would be \$1661.92 per day. Beginning in October 2026, staff members will track their time removing trees to get a better idea of the costs over the next ten years. Each tree’s status will be tracked in ArcGIS software.

Replanting will occur on a case-by-case basis. In natural areas, ash that poses a risk will be replaced by native bareroot trees or shrubs with consideration to the impact on surrounding developed areas. In maintained areas, suitable shade trees of at least 1.5” caliper will be installed where appropriate.

The Oregon Department of Forestry confirmed by e-mail that the cost of emamectin benzoate from the two main manufacturers will be around \$2.50/DBH” for in-house treatment. At this rate, the cost of treating all suitable trees for the first cycle (two years) will be \$12,121.25 for 261 trees with an average of \$46.44 per tree. The injection equipment, which should last through several treatment cycles if properly maintained, is between \$1500-3000. Over time, the number of treated trees will decrease as funding is available to use contractors to remove larger trees in declining health.

### Direct Costs for FY 25/26

Date	Item	Type	Cost	Quantity	Total
October 2025 - March 2026	Stump Grinder	Per Day Rental	\$180	2	\$360
March 2026 - May 2026	Emamectin Benzoate	DBH"	\$2.50	4848.5	\$12,121.25

March 2026 - May 2026	Rainbow Eco-Science Q-Connect	Injection Kit	\$1,816.92	1	\$1,816.92
				Total FY 25-26	\$14,298

**Timeline of Treatment Costs over a Ten-Year Period<sup>11</sup>**

Date	Treatment Cost
FY 25-26	\$ 12,121.25
FY 26-27	\$ -
FY 27-28	\$ 12,121.25
FY 28-29	\$ -
FY 29-30	\$ 12,121.25
FY 30-31	\$ -
FY 31-32	\$ 12,121.25
FY 32-33	\$ -
FY 33-34	\$ 12,121.25
FY 34-35	\$ -
Total	\$ 60,606.25

Total chemical costs will need to be evaluated each fiscal year. The cost of insecticide will more than likely increase over time and equipment will need to be replaced. The number of trees treated will likely decrease over time as well, as trees can fail for reasons other than EAB, and some will be selected to be removed by contractors.

Overall, EAB-related costs will need to be incorporated into the budgeting process for the natural resources for each fiscal year. The timeline for removals will need to be flexible to account for changing conditions and the potential that EAB is already in the district, but undetected.

## CONCLUSION

NCPRD’s EAB management plan was developed with the guidance of experts at the Oregon Department of Forestry. The completed ash tree inventory allows NCPRD staff to plan the response for each specific property and adapt as conditions change on the ground. While managing the pest will be expensive and devastating to the landscape, the goals of this management plan intend to mitigate the damage as much as possible. Management responses include selective removal, treatment, and some retention of NCPRD’s existing ash canopy. Staff will prepare a variety of marketing materials to use as outreach to the community.

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<sup>11</sup> In the unlikely scenario that chemical prices and total number of trees stay stagnant

Emerald Ash Borer impacts the entire community. Preparing for EAB's arrival gives NCPRD the flexibility to adapt management strategies as conditions change. Continued partnership with community groups will be vital to the effort. Educating staff and the public will take priority as the pest takes hold in the district. NCPRD plans to provide resilient parks for future generations.

## References

The City of Portland. (2025, June). *Emerald Ash Borer (EAB)*. Portland.gov. <https://www.portland.gov/trees/documents/eab-response-plan-june-2025>

Herms, Daniel et al. Insecticide Options for Protecting Ash Trees from Emerald Ash Borer. <https://www.agriculture.nh.gov/publications-forms/documents/eab-bulletin.pdf>

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