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Initial Detection of Emerald Ash Borer in Oregon and Rapid Response

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Summary

Emerald ash borer (EAB), a highly destructive invasive insect, has rapidly spread across North America since its introduction in the mid-1990s, causing extensive damage to ash trees. This paper details the detection and control efforts of EAB in northwest Oregon. The establishment of the Oregon EAB Response Task Force and implementation of intensive survey efforts revealed the extent of EAB infestation in the region. Acknowledging the challenges of eradicating EAB, the paper outlines a slow-ash-mortality (SLAM) strategy to limit the spread of EAB and to give affected parties sufficient time to make management decisions. Chemical control of EAB needs to occur before trees experience more than 20% canopy decline. Emamectin benzoate appears to be the most effective chemical to protect trees from succumbing to the invasive insect. Two additional strategies, including the creation of buffer zones and biological control, appear to worth further exploring as viable options to control EAB spread.

INTRODUCTION

Emerald ash borer (EAB), *Agrilus planipennis*, is one of the most devastating invasive insects in North America. EAB was first introduced to Michigan in the mid-1990s, but went undetected until 2002. By 2009, EAB was estimated to have killed 17 million trees, and caused over $25 billion in damage (Kovaks et al. 2009).

In the years since its introduction, it has spread to 36 states, reaching from Rhode Island to Oregon, and from Louisiana to Qubec. Its spread is not random. EAB adults fly relatively short distances, once per year. The primary mode of long-range dispersal is human-aided transport in infested wood material. We believe this is how EAB reached Oregon.

On 30 June 2022, a trained pest detector (and attentive citizen) detected EAB at Joseph Gale Elementary school in Forest Grove, Oregon. The elementary school parking lot had 16 ornamental ash trees planted when the school was built in 2012. All 16 trees showed the unmistakable signs of multi-year infestation, including canopy decline, branch dieback, split bark, D-shaped exit holes, and emerald ash borer adult beetles climbing up the bark. EAB larvae feed under the bark of the tree, eating the phloem tissue. This feeding damage girdles the tree from the inside, making early detection very difficult. Infestations are almost undetectable for at least two years.

Response

On the same day as the report, Oregon Department of Forestry officials were able to visit the site, and confirm the report. A sample was sent to Oregon Department of Agriculture (ODA) and the United States Department of Agriculture for taxonomic identification. Over the 4th of July weekend, Oregon Department of Agriculture officials contacted the elementary school, and requested their arborist destroy the infested trees. On 5 July 2022, ODA began scouting Forest Grove for the presence of EAB. Twenty-six green funnel traps, and two purple prism traps were immediately placed in the area around forest grove by USDA and ODA, respectively. ODA created and distributed a visual survey tool for detecting trees infested by EAB. By August, the Oregon EAB Response Task Force was formed, consisting of members from over 40 organizations.

A crew of four seasonal technicians were hired for the winter 2022-2023 season. Emerald ash borer damage is permenant. Bark splits, dead branches, and woodpecker damage are all visible after leaves drop. As of 8 January 2023, the visual survey has surveyed over 6000 ash trees in and around Forest Grove (**Fig. 1**). In doing so, they have helped to identify the current extent of EAB in Oregon.

Due to how easily emerald ash borer is spread unintentionally in wood, a quarantine was put into effect. Ash (*Fraxinus* spp.), white fringe tree (*Chionanthus virginicus*) and cultivated olive (*Olea europea*) are all viable hosts of emerald ash borer. Transporting woody material of EAB host plants risks spreading this destructive pest to uninfested areas, including Washington, California, Idaho, and the majority of Oregon. As of now, no woody material of EAB host plants can be transported out of Washington County, Oregon.

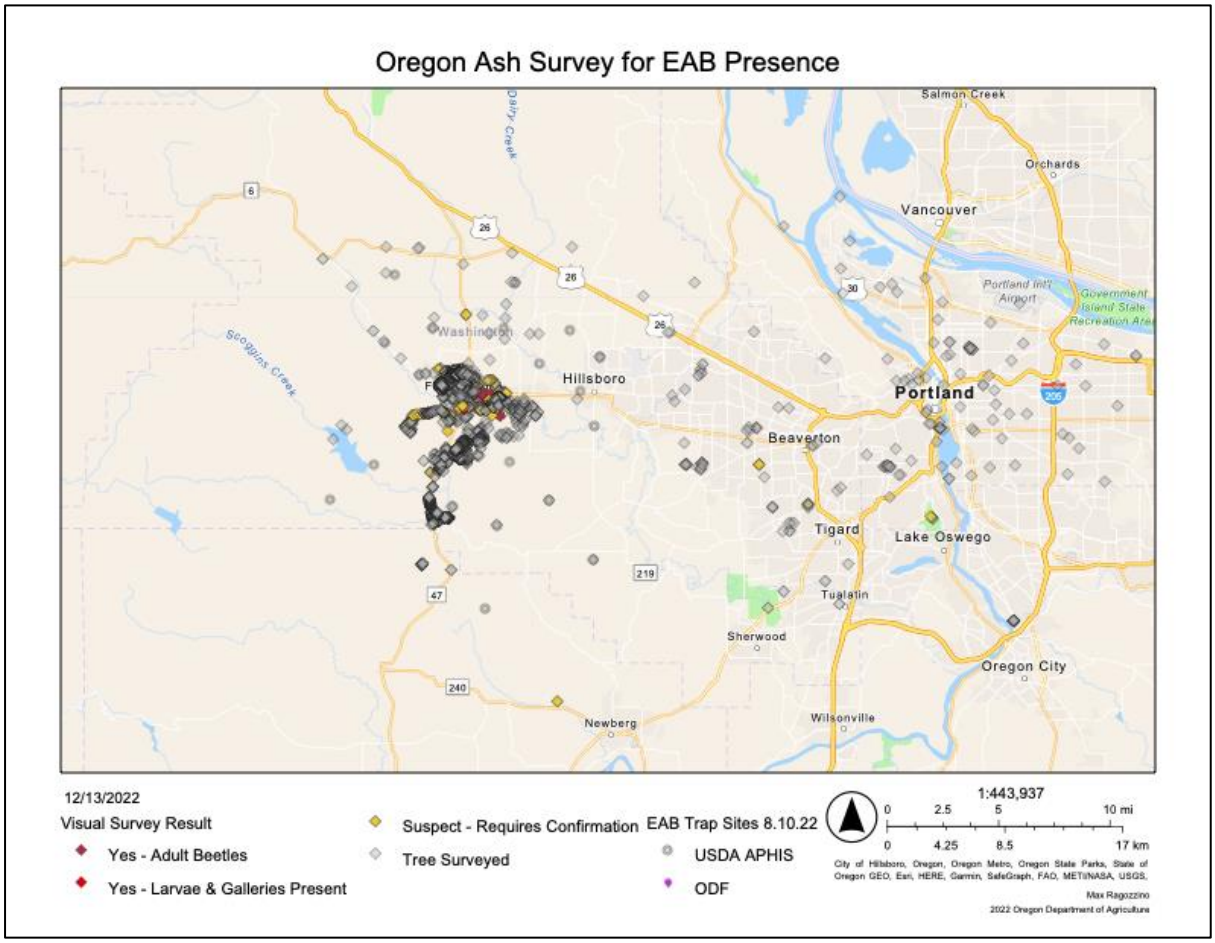

Figure 1. Visual summary of visual surveys for emerald ash borer in the greater Portland area of Oregon.

Planned Control Actions

Based on the response actions to EAB in other states and their related outcomes, we do not believe EAB can be eradicated from Oregon. We will be implementing slow-ash-mortality (SLAM) strategies to mitigate the spread of EAB from Forest Grove, and give growers, land managers, and home owners as much time as possible to make management decisions. SLAM strategies are intensive, and multifaceted. This includes conventional chemical control, creation of "buffer zone" of trap trees, and biological control using introduced natural enemies.

Chemical Control

Treatment applied correctly at the appropriate time of the year can protect trees with low level of infestation. Generally, trees with greater than 20% canopy decline are not considered good candidates for treatment due to the amount of damage already done. If a tree is going to be protected from EAB, treatment needs to occur **before** infestation within the tree has reached this level. Emamectin benzoate, applied via trunk-injection, has provided the highest efficacy of protection against EAB.

Buffer-zone strategies

Three strategies to create a "buffer zone" surrounding the known infested area (McCullough, et al. 2009; McCullough, et al. 2016). They include spring-girdling trees along a corridor to increase their attractiveness to ovipositing EAB. These "trap trees" will be removed and destroyed the following fall. In addition, selected trees in highly attractive positions within the spring-girdled corridor will be girdled and also trunk-injected with insecticide to create trap trees lethal to EAB larvae. Selected mature seed-producing trees will then be trunk-injected to maintain seed production and regeneration at the site.

Trunk-injection treatments are compatible with biocontrol release at nearby sites closer to Forest Grove. EAB parasitoids require healthy larvae for oviposition and will not oviposit in lethal trap trees. Treatments will utilize emamectin benzoate, which will be applied by independent certified contractors.

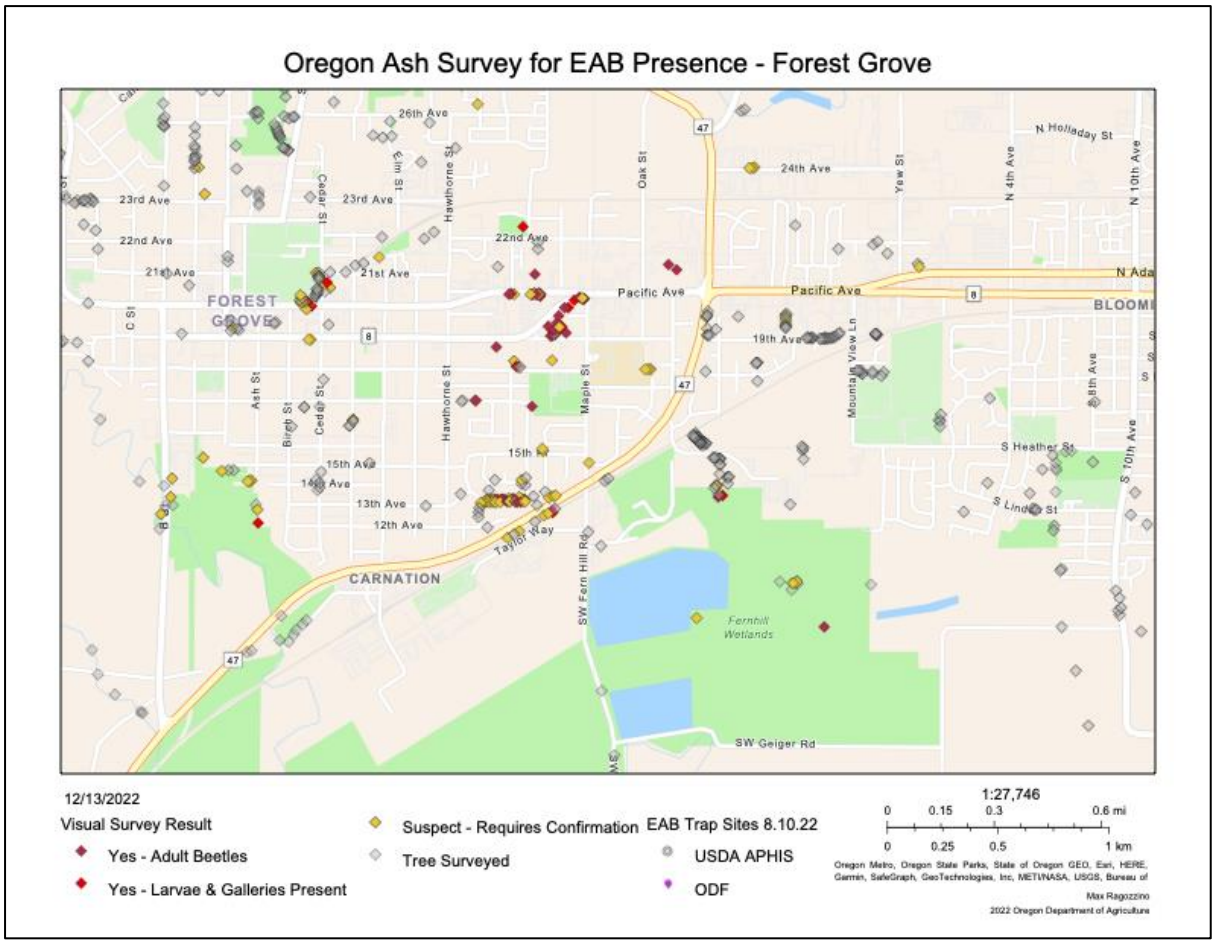

Figure 2. Visual summary of visual surveys for emerald ash borer presence in Forest Grove, Oregon.

Biological Control

Four species of introduced biological control agent have been introduced to North America against EAB. Three species which attack EAB larvae, *Spathius agrili, Spathius galinae*, and *Tetrastichus planipennisi*; and one species that attacks EAB eggs, *Oobius agrili*. Each of these species attacks EAB in a different niche. EAB infesting larger mature trees are heavily targeted by *Spathius* species, while EAB infesting saplings are more heavily targeted by *T. planipennisi*.

Both Gales Forest Grove and Fernhill Wetlands are planned release sites for the introduced biological control agents for EAB. Degree-day models suggest that *S. galinae*, *T. planipennisi*, and *O. agrili* will be suitable for release in Oregon. Within each site, we measured the diameter at breast height of ash trees to determine specific release locations for each species.