Pest to Watch: Mediterranean Oak Borer

By Kayla Seaforth, Scientific Review by Christine Buhl, Oregon Department of Forestry

Oak woodlands and prairie, once a defining ecosystem of the Pacific Northwest lowlands, have declined by an estimated 90% from historic land cover. Conversion for agriculture and urban development in combination with fire suppression have led to the demise of this extremely productive habitat.

The Mediterranean Oak Borer (MOB) is a species of ambrosia beetle that is native to parts of Europe, western Asia, and Northern Africa. In 2017, scientists found the first known population of the beetle in California, and by 2019 it had spread throughout Central California and was also found in the Willamette Valley.

In its native range it infests weakened or dying oak and beech tree species that are already suffering from drought, other pests, or disease. MOB may be particularly harmful to white oaks in the United States, including Garry/Oregon white oak (Quercus garryana). These beetles have a symbiotic relationship with several species of fungi that can cause oak wilt. The beetles bore into the limbs and drive their tunnels deep into the sapwood. They carry spores of fungi into trees, inoculating their galleries to provide food for their brood. Here, they lay eggs and the fungi clog the water conducting tissue within the tree, leading to wilting. This can cause the death of an entire limb and also spread throughout the whole tree.

Symptoms of MOB infestation include canopy dieback that starts as large sections of red/brown leaves on a whole branch that spread slowly throughout

Death of one limb or a portion of the canopy is characteristic of MOB infestation. Photo Credit: Christine Buhl

the crown. This is most obvious during the summer. In more advanced stages, attacks also occur at the base of the tree in the form of pale boring dust, also called frass, that mounds in bark crevices or at the base of the tree. The entry and exit holes are extremely hard to spot at 1/16th of an inch around, hidden in the grooves of the bark.

In exposed or downed wood, it is possible to see MOB's black stained, branching, and overlapping networks of tunnels throughout the sapwood. Female beetles may be seen on the outside of trees almost all year long. They measure in at approximately 1/8th of an inch. Males are 1/10th of an inch, flightless, and have a rhino-like horn, but are typically present in much fewer numbers than females and stay within trees.

There are several other diseases and pests that may affect oak trees including gall making wasps and flies, squirrels, oak lace bugs, oak leaf phylloxera, oak looper and various other defoliating caterpillars, and other woodboring insects, however most of these are unlikely to cause oak mortality like Mediterranean oak borer does. They also differ from MOB in their signs and symptoms. The Oregon Department of Forestry (ODF) has developed a **fact sheet** that may be helpful in differentiating damage from other pests from that caused by MOB.

According to the Oregon Department of Forestry, the introduction pathway for MOB to the west coast of the United States is unknown. It was first detected in central California in 2017, but is suspected to have been present for several years before then, and was confirmed in Oregon in 2018. Interestingly, the Oregon population is genetically distinct from the California population, indicating that it might have come from a separate introduction. It's likely that both populations travelled to the US on some kind of oak product like raw oak timber, pallets, hobby wood, or crates. One theory is that they hitched a ride on oak staves used to make wine barrels, since the infestations so far have been traced to areas known for winemaking.

Don't Move Firewood!

Many invasive species may be transported on firewood, including MOB. It is recommended that you move firewood no more than 20 miles from its place of origin and take extra care in areas with known invasive species that live in wood. Learn more at **dontmovefirewood.org**.

As pointed out by ODF Entomologist Christine Buhl in a **2024 MOB update video**, Oregon white oak, while drought tolerant, is expected to see a shrinkage of its ideal habitat in the near future due to worsening drought conditions and other impacts of climate change. For a species that is often the only overstory tree in an imperiled ecosystem, the added layer of threat posed by invasive species like MOB is concerning.

Like many other pests that affect trees, MOB has been observed to more frequently attack trees that are already weakened by things like drought, storm damage, root disease, construction and encroaching infrastructure, or other stressors, than it has been observed in healthy trees. However, in California, full scale infestations have been observed even in healthy oaks, as shared by Curtis Ewing in a **2024 presentation**. In California, valley and blue oaks have mostly been affected, and in Oregon infestation has been detected only in Oregon white oaks.

To reduce the likelihood of MOB infestation, in the video linked above, Buhl at ODF recommends reducing stressors that may increase tree stress and susceptibility to MOB. Preventative management actions may include cutting large, unsupported limbs that are likely to break in storms and can provide an entry point for insects and diseases, and avoiding construction or root compaction around at least twice the radius of the tree's dripline. Oaks are often long-lived and tolerate many stressors and injuries over time but they are large trees with large root systems and need space to thrive. In some cases, even drought-tolerant trees such as oaks may benefit from supplemental irrigation such as a slow and deep watering, in the evenings, 1-2 times during the hottest summer months, see **here** for best watering practices. However, if providing supplemental irrigation, water must penetrate deeply for long enough for trees to absorb the moisture as opposed to shallow irrigation provided by sprinklers and soaker hoses in lawns and gardens. Additionally, irrigation should be avoided where there is evidence of fungal decay such as stem or root rots but these can be hard to detect unless they are advanced or conks are visible on the exterior. While not foolproof, these suggestions may reduce other stress factors and lessen individual tree susceptibility to MOB.

If you suspect a Mediterranean Oak Borer infestation, contact your state invasive species management agency to confirm. If MOB presence is verified, according to the **Oregon Department of Forestry**, the best treatment available

Adult beetle. Credit: Christine Buhl

If you suspect you have found Mediterranean Oak Borer, contact the appropriate management agency to confirm and discuss next steps:

To report suspect Mediterranean Oak Borer in **Oregon,** report it to the **Oregon Invasive Species Online Hotline**

To report suspect Mediterranean Oak Borer in **Washington,** report it to the Washington Invasive Species Council: **pest@agr.wa.gov**

To report suspect Mediterranean Oak Borer in **California,** report it using **this survey** hosted by UC ANR.

is to cut the host tree flush with the ground and the wood should be burned or chipped onsite. If managers chip material, the chips can be spread on site, ideally away from unaffected oaks since it is not yet known whether fungi can survive and spread on this material. Another option is to bury infested material 5-12 inches below the soil surface, though optimal burial depth has not yet been determined by experts. If possible, ODF recommends burning materials in air curtain incinerators to minimize carbon emissions. To date, the use of insecticides and/or fungicides for control of this pest is unproven; evaluation is ongoing and further testing is planned. Progression of MOB infestation and injury or tree mortality was not halted in trees that were treated shortly after MOB was detected.

Currently, MOB is present in at least 7 counties in California (Napa, Sonoma, Lake, Mendocino, Sacramento, Yolo, and El Dorado), according to CALFIRE's Curtis Ewing. In Oregon, infested trees have been found in Multnomah, Marion and Clackamas Counties, with 34 infested trees confirmed and 16 removed, according to the **Mediterranean Oak Borer Survey Dashboard**. So far, MOB has not been detected in trees in Washington, but it has been found on the Oregon-Washington border and the Washington Department of Agriculture and WSU Extension have deployed monitoring traps to detect further spread as early as possible.

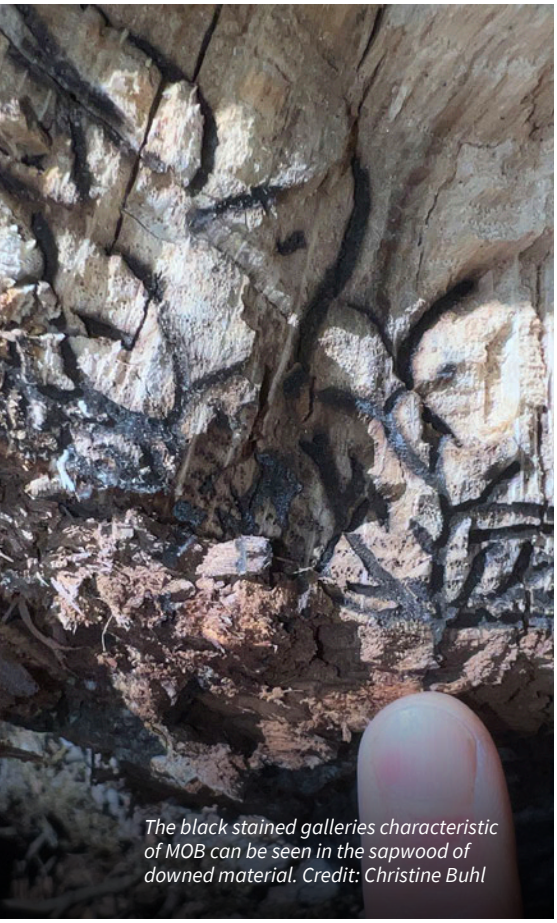
Given the persistent threats to oak woodlands, from the ongoing impacts of climate change to the emergence of new invasive species like the Mediterranean Oak Borer, continued monitoring and management are paramount. By understanding the signs of infestation, reporting suspected cases, and implementing best management practices, we can collectively work to protect these vital ecosystems and the benefits they provide. The future of our oak woodlands depends on informed and collaborative efforts from a committed community of stewards.

Resources for Further Learning

Best Management Practices, published by Oregon Department of Forestry and Oregon Department of Agriculture

2024 Workshop Recordings, hosted by Washington State University Extension's Urban Forest Health Lab

MOB Diagnosis Video by Oregon Department of Forestry



The black stained galleries characteristic of MOB can be seen in the sapwood of downed material. Credit: Christine Buhl

The pale, fine boring dust seen here is typical of an advanced MOB infestation, but may not be detected until the insects have become well established. Credit: Christine Buhl