USDA United States Department of Agriculture

Forest Service

PACIFIC SOUTHWEST REGION

Tree Mortality and Bark Beetles

Frequently Asked Questions

Updated 1/22/2016

Why are millions of trees dying?

High levels of tree mortality are occurring on forested lands in California due to drought and bark beetles.

Although the current drought is the primary catalyst, California's forests are in sync with many other western forests with tree health in serious decline, often compromised by the existence of too many trees competing for limited resources, especially water.

Trees that appear healthy and green during periods of normal or above normal precipitation can become severely compromised and easy targets for bark beetles during periods of drought.

When, where, and the extent to which bark beetle-related tree mortality occurs is influenced by forest stand conditions and weather patterns. A dramatic rise in the number of dead trees follows one to several years of inadequate moisture.

Stressed trees are suitable host material for bark beetles and their successful colonization results in more beetles and higher levels of tree mortality. The more severe and prolonged the drought, the greater the number of dead trees.

Tree losses are expected to continue to increase until precipitation levels return to normal or above normal for one to multiple years.

The Effects so Far

Annually State and Federal Forest Health Specialists conduct tree health assessments and forest monitoring across California.

The numbers of acres affected and numbers of trees killed have increased greatly since 2014. Elevated levels of tree mortality were detected on an estimated 3 million acres in 2015 (includes all agents). An

estimated 25 million trees killed were attributed to bark beetles or woodborers (US Forest Service, Aerial Detection Survey).

Currently, high levels of tree mortality are primarily on the west side of the southern Sierra Nevada range and in the Transverse range.

Tree mortality is greater than 50% of pine species in many areas; as much 80-100% in the heavily impacted areas.

The loss of trees is a significant impact on public lands, in communities and for landowners.

How do beetle outbreaks contribute to wildfire concerns?

Many people get concerned that numerous standing dead trees contribute to the already ominous fire situation in many of our forests.

Typically, beetle-killed trees shed their needles within a few months of dying, so they don't create as big a threat to fire spread as expected, however, high amounts dead trees do present a threat of spotting when a forest fire is burning around them.

Once trees fall, a fire could potentially burn longer and hotter, damaging soils and adversely affecting the site in the long-term.

What is a bark beetle? Where does it live? What does it do?

Native bark beetles act as "agents of change" and play an important role in healthy, functioning forest ecosystems.

Bark beetles are small insects, about the size of a grain of rice, and brown to black in color. Their entire life is spent inside the tree except for a portion of time when beetles emerge to attack trees.

After attack, they emit a chemical (called a pheromone) that attracts other beetles. The beetles then mate and lay eggs in galleries or chambers they construct between the bark and the wood.

Adult beetles carry staining fungi which is introduced into the tree during feeding and gallery construction.

Tree mortality occurs from a combination of the fungi invading the water conducting tissue, and feeding and gallery construction by the adult beetles and larvae.

The primary bark and engraver beetle species of concern in California are in the genera Dendroctonus, Ips and Scolytus. Most of the current tree mortality has been caused by western pine beetle (Dendroctonus brevicomis), mountain pine beetle (Dendroctonus ponderosae) and Ips species.

Why do drought conditions help bark beetles?

Trees possess defense mechanisms that help them fend off attacks by bark beetles. When beetle populations are low and adequate moisture is available, trees have the advantage.

Healthy trees can produce enough resin (pitch) to overcome attacks by "pitching out" beetles that are attempting to bore in through the bark.

During drought or when trees are severely stressed by other factors (competition, diseases), they are not able to produce enough resin to defend against numerous attacks.

Signs and Symptoms of Bark and Engraver Beetle Attacks:

Many signs and symptoms of attack are similar regardless of the tree or beetle species.

External signs of beetle infestation are pitch tubes (combination of pitch, boring dust, frass) small holes in the bark, the presence of boring dust (produced by the beetle chewing) and/or frass (produced by the beetle feeding) and bark flaking by woodpeckers.

Pitch tubes resulting from successful attacks are typically reddish in color and vary in size depending on the beetle species. White or cream colored pitch tubes may be indicative of unsuccessful attacks.

Removing some bark will reveal adult and larval galleries, as well as dead or degraded inner bark. Galleries may or may not be packed with frass.

Trees with large amounts of dry boring dust in bark crevices and/or scattered around the base of the tree are likely dead or dying.

If a tree is infested with beetles, woodpeckers may chip off bark to feed on beetle larvae and pupae.

The first symptom of beetle-caused tree mortality is typically fading needles. Needles on successfully attacked trees begin fading and changing color over a period of several months.

What can homeowners do?

There is nothing that can be done to save a tree once it is infested with bark beetles.

Improving tree growing conditions through selective tree removal (thinning) reduces inter-tree competition for limited water and nutrients. The best time to thin is during non-drought periods.

Know what tree species you have and identify individuals that are most susceptible to drought and bark beetles. Also identify trees for removal that may be hazardous to life or property.

Individual tree treatments such as preventive spraying with insecticides, the use of synthetic products that repel bark beetles, supplemental watering and prompt removal/disposal of infested trees may all be effective depending on the situation and the tree species at risk.

Avoid ineffective and unproven treatments. Treatments such as applying worm castings to the trunk, spraying insecticides into bark beetle entrance/exit holes or applying acephate via an encapsulated implant have no scientific support for being effective.

Do not leave cut green limbs, branches or wood in the vicinity of live trees. Some beetles are attracted to this material and doing so could result in more tree mortality.

Consult with a forest health specialist to determine the best treatments for your trees as there are several factors to consider and pros and cons to every treatment.

Executive Order Talking Points

Provides for environmentally sound ways to use and/or dispose of the increased amount of dead and dying wood

Streamlines statues and regulations in order to help mitigate the hazards associated with widespread tree morality

Expedites efforts to protect public safety by removing falling hazards along public highways and evacuation routes.

Provides equipment for impacted local governments to use in hazard mitigation and disposal

This large scale tree die off has increased California's already high risk of wildfire and poses the added threat of falling hazards to life safety and critical infrastructure. This Executive Order helps coordinate mitigation efforts and directs much needed resources to high priority areas of the state.

Website Resources
PrepareforBarkBeetle.org

Information on resources and a way to contact your local forester.

Managing Bark Beetles in Urban and Rural Trees http://calfire.ca.gov/foreststeward/pdf/treenote19.pdf

Identifying Dead and Dying Conifers on Private Lands in California

http://calfire.ca.gov/foreststeward/pdf/treenote30.pdf

Bark Beetles in California Conifers – Are your trees susceptible?

http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5384837.pdf

2015 Forest Health Alert – Drought and Bark Beetle Caused Tree Mortality in California – contains information for landowners.

http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd490121.pdf

US Forest Service, Forest Health Detection, Aerial Survey Program

http://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fsbdev3_046696