

CALIFORNIA FOREST STEWARDSHIP PROGRAM

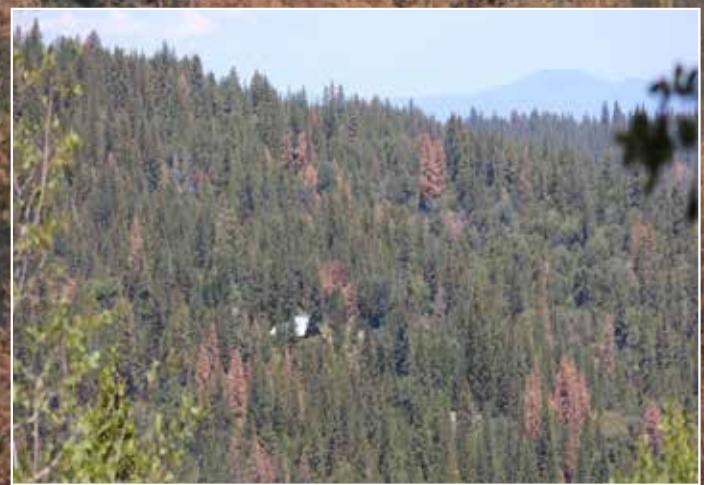
# Forestland Steward

SUMMER 2016

# *Unprecedented!*



February 2016, Fresno County



May 2015, Fresno County

CAL FIRE



Forestland Steward is a joint project of the CA Dept of Forestry and Fire Protection (CAL FIRE), Placer County Resource Conservation District, UC Cooperative Extension, and USDA Forest Service to provide information on the stewardship of private forestlands in California.

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The ideas contained in this newsletter are meant as general information and opinion, not management prescription.

Consult a Registered Professional Forester or a qualified technical advisor (see page 10) for management advice specific to your needs.



# Unprecedented tree mortality in CA

There's that word again...*unprecedented*. The current level of dead trees in California's forests is beyond what we've ever seen before.

In 2014 there were about 3 million dead trees. Last year that number jumped to 29 million, and the latest survey found an estimated 66 million dead trees!

Multiple years of drought, dense forests that increase competition for scarce water, and above-normal temperatures that increase water loss have combined to create this perfect storm.

## It's a party!

Bark beetles aren't bad guys. In fact, they're very important to forest ecosystems. When populations are low, bark beetles can weed out the weaker trees in the forest and open gaps for young trees, in the process creating forest structure, including species and age diversity.

Bark beetles choose trees that are stressed and unable to defend themselves (page 6). When climate conditions cause large numbers of trees to be stressed, the first bark beetles on the scene call their friends and relatives using communication chemicals called pheromones. It's party time!

These are native insects and there's not much we can do to stop this natural cycle once it's begun. When huge numbers of bark beetles attack susceptible trees, it's all over (page 6). The beetles lay their eggs in the phloem (the vascular tissue that carries nutrients and water throughout the tree), and the larvae munch along disrupting this transport system until the tree dies. Typically, this process continues until precipitation returns to normal or above for 1–3 consecutive years, or all susceptible trees are gone. Then, with the aid of natural enemies, the beetle population decreases and the forest regenerates and recovers.

## Unprecedented

What is different this time is the sheer numbers of dead trees and the set of drivers helping to fuel this disaster. Extremely dense forests, changes in fire regime, and climate change are all major factors. Our history of fire suppression has created unhealthy forests with high levels of biomass and competition for water. Several years of drought have exacerbated these unhealthy conditions

and increased the stress on trees. Droughts are expected to happen more frequently due to climate change so bark beetle epidemics will probably increase also.

What is different this time is that there is no guarantee that our forests will return to the old normal. Climate models show temperatures continuing to rise into the next century, which will continue to stress our water systems and the trees in our forests.

## First we react

What can we do? Right now we need to react to the ongoing emergency. Most recommendations are to cut down the dead trees and plant seedlings. Note that it's very important to follow correct procedures for disposing of infested slash and wood so as not to spread the beetles (page 4).

Bark beetles have a neat trick: many transport fungi, bacteria, nematodes, and other associates that help break down trees. Trees killed by bark beetles can decay rapidly and may quickly become hazards.

Because of these very real dangers, it's necessary to remove trees that are a threat to people, homes, structures, power lines, and treat large areas of dead trees that could potentially fuel catastrophic wildfires. But be sure to leave some dead trees as snags for wildlife (page 9).

Lucky for forest landowners, there is money available in the California Forest Improvement Program (CFIP) for some practices, with 90% cost-share for writing your management plan and managing tree mortality (page 11). There are also forestry specialists eager to help you (page 10).

## Then become proactive

What else can we do besides cutting down dead trees and planting new ones? That's the next step of the discussion. Some points to ponder:

- What do we want our forests to look like? As we regenerate the forests, it's critical to take into account the new and expected forest conditions.
- More widely spaced trees will help decrease competition for water and could help large trees avoid the stress that makes them susceptible to beetle attack. Ponderosa pine forests of old were described as park-like, with large trees that were

spaced far apart. Think about spacing as you plan your regeneration projects.

- If you have a forest stand that is not yet infested by bark beetles, consider thinning it during times when bark beetle populations are less active (i.e., late fall or late winter) to increase tree vigor in the remaining trees and help prevent future infestation.
- Resilient forests are diverse in many ways: species, age classes, size, spacing, etc. Heterogeneous forests could help deter bark beetle epidemics since each species of bark beetle has its own tree preferences. Avoid large numbers of the same type of tree in one place.
- A changing climate, including prolonged drought and warmer temperatures, is a major driver of the current tree mortality. How do we know the new trees we're planting will be successful in the changing climate? Look at predictions for your area and choose seed stock accordingly.
- What does this tree loss mean for the entire ecosystem: wildlife, soil, understory plants, mycorrhizae, water, carbon, etc? Keep in mind that your forest consists of more than trees.
- With the expected loss of 50% of some of our Sierran forests from tree mortality, we have an opportunity and obligation to make thoughtful decisions based on the best scientific knowledge. The discussion has barely begun.



CAL FIRE

Eastern Madera County, March 2015



CAL FIRE

Eastern Madera County, February 2016

## Meet Stewart McMorrow

Stewart McMorrow, the new Stewardship Forester for CAL FIRE, has an enviable set of duties: he administers the Forest Stewardship Program, which includes Forestry Assistance, CFIP, this newsletter, and other projects. He also manages the L.A. Moran Reforestation Center, which is re-energized with new seedbank

facilities and brand new cone processing equipment. There are even rumors that the nursery may reopen in the near future.

Stewart brings an amazing background to his job. He grew up in California forests and went to school at CalPoly to become a forester. His early career was diverse: Hotshot crewmember for the Forest Service, a salmon restoration

project with AmeriCorps; educational director for the Sanctuary Forest on the Upper Mattole River; Wildlife Manager for State Parks in the Lake Tahoe area; California Forest Project Manager for the Tahoe Conservancy; Forest Fuels Manager with the North Lake Tahoe Fire Department; and then 4 years traveling the world as a verifier for

international carbon sequestration projects, where he verified about 70 projects in 12 countries, including the Borneo and the Amazon.

Coming home was easy. "I became a forester because I grew up in California forests. After working in really interesting places, I realized that our forests are still the most beautiful in the world. I love it here."



Stewart McMorrow, working on one of the many forestry operations he's been involved with.

# FAQs about tree mortality

Bark beetles and drought are creating havoc in California's forests. Together they are a deadly combination. These Frequently Asked Questions (FAQs) provide key information to help you optimize tree health and reduce wildfire risk.

## **Q. What is tree mortality?**

**A.** Tree mortality means that trees have died. Dying is a normal occurrence in natural ecosystems, however, the extended drought and dense forest conditions have caused abnormally high numbers of trees to weaken, which makes them more susceptible to attack from bark beetles. Once a tree has been successfully invaded by bark beetles, it will eventually die.

## **Q. How significant is California's tree mortality from bark beetles and drought?**

**A.** Tree mortality from bark beetles and drought is now over 66 million trees, up from 29 million in 2015 and 3.3 million in 2014. Most tree mortality in California has occurred in the southern Sierra Nevada and the Central Coast.

## **Q. What else is going on?**

**A.** Bark beetles have killed trees across 45 million acres of forest in the western United States in recent years. In addition to the drought and bark beetle infestations, tree mortality is linked to rising temperatures, earlier snowmelt, and forest fires.

## **Q. What are bark beetles?**

**A.** Bark beetles are small insects, generally black (or dark brown), hard-shelled, and approximately 5 millimeters in length—about the size of a grain of rice. Bark beetles tunnel under bark, cutting off the tree's supply of food and water. They can kill a tree in as little as 2–4 weeks in warmer months.

## **Q. How do I identify bark beetles in trees?**

**A.** Look for reddish-brown (or pale yellow or white) pitch tubes in the bark. These  $\frac{1}{2}$ - $\frac{3}{4}$  inch blobs of sap on the outside of a tree trunk are an indication that the tree is under attack. Needles on dying conifer trees and pines begin to turn a reddish-brown. This often starts at the top of the tree and gradually moves down. Other trees may slowly fade from green to brown. Outside of tree: Flaking bark or holes in the bark caused by woodpeckers are good indicators of insect presence.

## **Q. What is the role of bark beetles?**

**A.** Under normal conditions, bark beetles renew the forest by killing older trees and those weakened by disease, drought, smog, or physical

damage. When trees are weakened due to lack of water from drought, they are more susceptible to bark beetle attacks.

## **Q. How do bark beetles attack?**

**A.** Bark beetles bore holes into the tree bark. A normal healthy tree is able to fend off attack by exuding pitch into the holes, pushing the beetles out. But drought-stressed trees can't produce enough pitch to fight off insects. The influx of beetles can quickly overwhelm a tree.

## **Q. How do bark beetles multiply?**

**A.** Beetles lay their eggs under the bark. Larvae feed on the tree's living tissues, inhibiting transport of nutrients and water. One bark beetle infestation can produce several thousand beetles and easily spread to neighboring trees. In addition, beetles release pheromones that attract others. Increasingly successful attacks cause the bark beetle population to explode.

## **Q. Which trees are dying?**

**A.** Ponderosa pine, Jeffrey pine, and pinyon pines are most impacted by bark beetles, but many trees have died just from lack of water in the current drought. Other conifer species—white and red fir, and incense-cedar—are also heavily impacted by the drought. There is also an increase in tree mortality among oaks, although it is primarily attributed to drought, not bark beetles.

## **Q. How do I know if a tree is dead?**

**A.** Early signs may be difficult to interpret, but if bark beetles have successfully attacked a tree, the tree is dead or will die soon. It often takes months for outward signs of mortality to show.

## **Q. What should I do with dead trees?**

**A.** Dead trees may need to be removed. Depending on where they are located, they can be a fire hazard or a hazard to people, homes, buildings, and infrastructure if they fall or if limbs or the top breaks off. Consult a registered professional forester (RPF) or arborist for advice.

## **Q. Whose responsibility is it to remove dead trees?**

**A.** On private property, it is the responsibility of the property owner to remove dead and dying trees. Consult an RPF or arborist.

## **Q. Do I need to hire a licensed tree service or can I cut down dead trees on my property?**

**A.** It is highly recommended that you hire a professional to cut down your trees, as tree removal is dangerous. Falling trees can also be hazardous to people, buildings, cars, other trees,

and infrastructure. It is a good idea to make sure you, or your contractor, have adequate liability and damage insurance coverage.

**Q. What do I do with the cut trees?**

**A.** Bark beetles are attracted to freshly cut wood. Either leave the dead trees on your property or have them removed. If you leave them, they need to be properly handled. To use the wood for firewood, cut to the appropriate size and store in a place away from trees. Wood from bark beetle-infested trees can be covered with plastic, following a specific technique to kill the beetles, and left covered for several months (*see Tree Note 3, calfire.ca.gov/foreststeward/pdf/treenote3.pdf*). If wood is not going to be used, lop (or chip and scatter); the smaller pieces the better. Chipping will kill bark beetles and smaller pieces are less of a fire hazard.

**Q. Are there restrictions on the use of wood from diseased trees?**

**A.** If you plan to use a diseased tree for firewood, follow proper storage techniques and make sure the wood is burned locally. Do not transport firewood to another location as it may introduce detrimental insects and disease into a new area.

**Q. Is the wood from dead trees safe to use as mulch around a home?**

**A.** Yes. If chips are from a bark beetle infested tree, chipping and scattering will kill the beetles. Trees dead from drought are also safe to use. If the tree is dead from other insects or diseases, check with an RPF before using around your home.

**Q. Can dead trees be burned?**

**A.** Yes, on permitted burn days. Check with your local fire station, CAL FIRE, or air quality district for details on proper burning requirements.

**Q. Can I use the timber I cut on my property?**

**A.** If you plan to use the wood for yourself, you do not need to file a timber harvest plan (THP) with CAL FIRE. However, if you plan to sell logs or chips from tree removal, or use their value to offset the cost of removal, you must file a THP.

**Q. What are the environmental requirements?**

**A.** An emergency regulation allows for an exemption to cut dead and dying trees of any size without the normal regulatory requirements such as a timber harvest plan, submission requirements, and completion and stocking report requirements.

**Q. Is there a limit to the number of dead trees that can be removed from a property?**

**A.** No. Dead trees in areas surrounding a home,

buildings, or infrastructure should be removed first. Those located near fuel breaks, and within 100' of structures, should also be removed. Some dead trees should be left as snags for wildlife.

**Q. I can't afford to remove my trees, what should I do?**

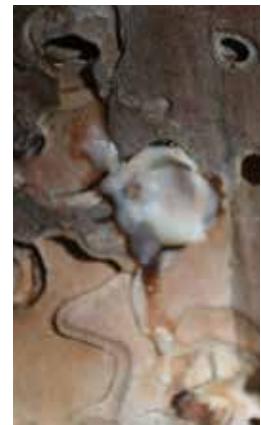
**A.** There may be local efforts to help those needing assistance. Talk to your local Fire Safe Council or local fire department. Cost-share funding is available through CFIP (*page 11*).

**Q. Will the Governor's Executive Order (October 2015; <https://www.gov.ca.gov/news.php?id=19180>) regarding tree mortality provide assistance?**

**A.** Funding for forest landowners is available through the California Forest Improvement Program (CFIP). Talk to a Forestry Assistance Specialist (FAS) at your local CAL FIRE office.

**Q. How do I prevent bark beetles in the future?**

**A.** The best way to prevent bark beetles is by following best forest health practices. Ensure that trees are widely spaced and the number of trees is appropriate for the acreage. This reduces competition for limited water, light, and soil nutrients. Professional chemical treatments are available as a preventive to attacks for high-value individual trees.



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*Pitch from the tree is an important defense against bark beetle attack.*



CAL FIRE

*Bark beetle galleries.*

**Q. What are the long-term consequences of shrinking forests?**

**A.** As forests shrink, less carbon dioxide is absorbed from the atmosphere and stored in the living tissues of the trees in the forest. This means more greenhouse gases will be released from dead trees and enter the atmosphere, and fewer trees will remain to absorb carbon dioxide.

**Q. How can I reduce the risk of wildfire on my property?**

**A.** Be proactive. Create defensible space (*page 10*):

- Remove dead trees, especially around the home.
- Modify vegetation at least 100' around structures.
- Thin overgrown trees and water residual trees as necessary.
- Plant a diversity of tree species, including drought-tolerant species native to the area.

*—adapted from [www.readyforwildfire.org/FAQs/](http://www.readyforwildfire.org/FAQs/)*

# What can you do about bark beetles?

## #1. Identify the trees

The first step in determining if your trees are susceptible to attack by bark beetles is to know what species you have. The principal conifers found in forests in California include ponderosa pine, Jeffrey pine, lodgepole pine, sugar pine, pinyon pine, Coulter pine, white fir, Douglas-fir, red fir, and incense cedar.



Donald Owen, CAL FIRE, Bugwood.org

Mountain Pine Beetle

## #2. Determine the trees' susceptibility

### Individual Tree Susceptibility

Stressed trees are less able to fend off bark beetle attack. Tree stress can result from human activity (construction, paving, excavating, etc.), natural causes (drought, wind, lightning, insect or disease agents, etc.), and competition. The more stressed the tree, the more susceptible it may be. Poor crown condition is often indicative of stress.

Susceptible trees are not always attacked by bark beetles, especially if beetle numbers are low. When beetle populations are high, however, even apparently healthy trees may be attacked. If an individual tree is of high importance for aesthetic or other values, you may want to consider a treatment that may improve its health and vigor and protect it from bark beetle attack.



Steven Valley, OR Dept of Ag, Bugwood.org

Western Pine Beetle

### Stand Susceptibility

A large group of trees or an entire stand can be susceptible to bark beetles. Species composition, tree age, density, drought, root disease, or other attributes can make one stand more susceptible than another.

Widely spaced trees are typically less susceptible than densely growing trees to successful attack by bark beetles. Less competition for water, light, and nutrients facilitates tree growth and vigor, both of which are important in the defense against bark beetles. Stands with a higher diversity of tree ages and species are also typically less impacted, as most bark beetle species have only one or a few hosts, and they generally are particular about the size of trees they attack. Mortality of one tree or a few trees in a stand may be quite acceptable depending on your management objectives.



Erich G. Vallery, USDA Forest Service - SRS-4552, Bugwood.org

Jeffrey Pine Beetle

### Bark beetles and their hosts

Bark beetles often have a preference for specific tree species. In some cases, a single beetle species will attack only one tree type. In other cases, a single beetle species may infest a number of similar tree species.

**Lodgepole, ponderosa, and sugar pine:** These native pines are attacked by *mountain pine beetles*. Ponderosa pines are also attacked by *western pine beetles*, as are Coulter pines. Jeffrey pine is attacked by *Jeffrey pine beetles*. These bark beetles are all very similar in appearance and successful attacks almost always result in tree death. In general, these beetles attack trees that are greater than 8 inches in diameter at breast height (dbh); trees that are weakened by drought, competition, disease, or injury; or trees located near existing beetle-infested trees. *Red turpentine beetles* are common associates in pine trees infested with mountain, western, or Jeffrey pine beetles. They also readily attack fire-injured trees and are often indicative of unhealthy root systems or poor soil conditions. Red turpentine beetle attacks do not always cause tree mortality. Dead or downed pines are rarely infested by any of these pine beetles.

**Singleleaf and other pinyons:** The landscape level pinyon pine mortality that occurred during 2003–2004 was caused by *pinyon Ips*. Severe drought initiated the pinyon Ips outbreak, resulting in extremely high levels of pinyon mortality throughout the west.

**White fir and Red fir:** The *fir engraver beetle* is the principle beetle that attacks white and red fir. Attacks can result in top kill, branch kill, or whole tree mortality. Trees weakened by drought or other stressors are most susceptible. Root disease, most commonly *Heterobasidion* root disease, often associated with fir trees, is a weakening agent.

White fir is much more common in many areas than it used to be. It is a drought-intolerant, shade-tolerant tree that readily regenerates in historically pine-dominated landscapes. High levels of white fir mortality are quite common during protracted or extreme drought periods.

**Incense-cedar:** Incense-cedar trees are rarely killed by beetles alone. Typically, they are stressed by drought or other weather-related stressors (frost) long before they are attacked by bark or wood boring beetles.

**Douglas-fir:** Douglas-fir trees can be killed by the *Douglas-fir beetle*. The Douglas-fir beetle readily attacks down green and fire-injured Douglas-fir trees, and emerging beetles can cause high levels of tree mortality.

### #3. Determine if your trees have been attacked

Many signs and symptoms of bark beetle attack are similar regardless of the tree or beetle species involved. However, some are more prevalent with certain species than others. Death is caused by the combination of beetle attacks, gallery construction and feeding, and staining fungi.

#### Mountain, Western, and Jeffrey Pine Beetles

**Hosts:** Ponderosa pine is attacked by western and mountain pine beetles. Coulter pine is attacked by western pine beetles. Lodgepole and sugar pine are attacked by mountain pine beetles.

Signs of infestation include pitch tubes, small holes through the bark, or boring dust and/or frass (excrement). Most beetle-attacked trees have pitch tubes scattered over the bole (trunk), although not always as in cases of severe drought.

Pitch tubes are typically reddish or whitish (see *mountain pine beetle* photo) in color and vary in size depending on the beetle species. Beetles may attack around mid-bole first and then fill in up and down, so you need to examine the entire bole when looking for pitch tubes. Boring dust (produced by the beetle chewing) and frass (produced by the beetle feeding) is reddish in color but may also be yellowish or white, and is found mixed with resin in the pitch tubes and/or in the bark crevices. If the tree is extremely water-stressed and cannot produce pitch, only boring dust may be visible.

The first symptom of beetle-caused tree mortality is typically fading needles. Needles begin fading and change color over a period of several months. Attacking beetles carry blue-staining fungi into the tree, which spreads throughout the sapwood and interrupts the flow of water to the crown. After one to several months, the sapwood also begins to discolor.

Bark flaking or holes in the bark caused by woodpeckers may commonly be found on infested pine trees. Removing a section of the bark reveals galleries created by beetles and their offspring. Galleries are usually packed with frass.

#### Red Turpentine Beetle

**Hosts:** Most pines

The most reliable external sign that your tree has been attacked by red turpentine beetles is the

presence of large pitch tubes and boring dust or frass on the lower bole and around the tree base. Pitch tubes vary in size, texture, color, and in the amount of boring dust and frass in the resin. Some pitch tubes may be as large as 2 inches across. Galleries between the bark and the wood are internal evidence of attack.

#### Pinyon Ips

**Hosts:** Most pinyon pines

Crown fading is often the first noticeable symptom of attack. Closer inspection may reveal boring dust and very small pitch tubes. Attacks can occur from early spring through late fall and this beetle can have several generations per year. Galleries groove the inner bark surface and typically radiate from a central chamber. Inspection beneath the bark surface near the tree base during winter months may reveal adults feeding en masse. These beetles readily attack standing green trees and green slash.

#### Other Ips species

**Hosts:** Pines

Most pines are also hosts to many other species of pine engraver (*Ips* sp.) beetles. They are not typically aggressive tree killers, but given the right conditions can cause tree mortality and may be found in the same trees that have been attacked by mountain, western, or Jeffrey pine beetle. Pine engravers tend to attack green pine slash, so prudent slash management can prevent problems.

Small piles of reddish-orange boring dust can readily be seen on tree boles at the attack sites. Pitch tubes are not commonly observed.

Infested trees may fade the same year as the attacks occurred or the following spring. Under the bark, galleries can be frequently be observed in a "Y" or "H" pattern. Depth of scoring on the wood surface and adult beetle size vary by species.

#### Fir Engraver

**Hosts:** White fir and red fir.

Evidence of attack before crown fade is often hard to detect. Boring dust may be present on the bole, but attacks may occur higher up and are not easily observed from the ground. Pitch tubes are not produced on fir trees. Pitch streaming on the bole of the tree is not always indicative of fir engraver attacks. Crown fade may occur before attacks or beetle exit holes are visible. Attacks during



Red Turpentine Beetle

Ladd Livingston, Idaho Department of Lands, Bigwood.org



Pinyon Ips

William M. Ciesla, Forest Health Management International, Bigwood.org



Fir Engraver Beetle

Dave Holland, USDA Forest Service, Bigwood.org



Douglas-fir Beetle

Joseph Benzil, Screening Aids, USDA APHIS ITB, Bigwood.org



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Bark beetle sign.

Most bark beetles have emerged by the time trees have red-brown needles. You may observe other beetles and larvae, but they are of little concern in causing mortality of additional trees. Most are beneficial wood decomposers, not tree killers.

drought periods typically result in whole tree mortality. However, these beetles also can attack strips or portions of the tree resulting in only branch or top kill. Adults excavate galleries that engrave the sapwood and run horizontally, cutting across the grain. Larval galleries extend at right angles along the grain.

This gallery pattern is very distinctive and can be used to identify fir engraver attacks.

#### Douglas-fir Beetle

**Host:** Douglas-fir

The most reliable external sign that your tree has been attacked is the presence of boring dust (reddish-brown in color) near beetle entrance holes, in bark crevices, or around the base of the tree. Galleries under the bark engrave the sapwood with adult galleries running parallel to the wood grain and larval galleries cutting across the grain.

Crown fade may occur the same year of attack or the following spring. Freshly down trees and fire-injured trees are highly susceptible to attack.

#### #4. Decide how to treat trees that have been attacked

Once bark beetles have successfully attacked a tree there is generally nothing you can do to save it. There are no chemical insecticides registered or recommended for killing bark beetles in infested trees. While some trees do survive bark beetle attack, the vast majority are killed. Additional tree mortality in the immediate area may be reduced if trees are removed while still infested. This particularly applies to Jeffrey or lodgepole pines.

Most bark beetles have emerged by the time trees have red-brown needles. Other beetles and larvae may be observed, but they are of little concern in causing mortality of additional trees. Most are beneficial wood decomposers, not tree killers. The tree may be cut down for firewood or left standing for wildlife habitat. The tree should be removed if it is hazardous to people or property.

#### #5. Prevent bark beetle attacks

There are several things you can do to protect your trees from bark beetles. Preventing attack is key because you cannot do anything to save a tree once it has been successfully attacked.

**1.** Thinning trees to a wide spacing is the best

long-term solution to increase tree health and vigor and reduce the likelihood of bark beetle attacks. Thinning can also hamper the bark beetle pheromone communication system that facilitates mass attacks. Residual trees should be the healthiest and most vigorous ones. Increasing age and species diversity will enhance stand resistance to bark beetle attacks and reduce the effects of tree mortality when attacks occur.

Select against trees that have high levels of dwarf mistletoe infection. If you are in a drought-prone area, favor leaving trees that

are more drought-tolerant, such as pines. Contact a forest professional for details on proper thinning methods.

- 2.** Always clean up any recently down trees or fresh slash to avoid creating more beetle habitat.
- 3.** Avoid causing injuries to trees, such as knocking off bark, compacting/excavating soil near trees, or disturbing the root system.
- 4.** Remove all trees that currently contain beetles. The effectiveness of this treatment greatly depends on the bark beetle species, however, removing trees promptly when they have been successfully attacked will reduce the pheromone source associated with attacked trees. All infested green material greater than 3 inches diameter should be chipped, buried, or burned.
- 5.** During severe or protracted droughts it may be prudent to use insecticides to protect unattacked trees. Applied as a preventive treatment, certain insecticides are effective in preventing bark beetle attack. Treatments should be performed by a commercial applicator and limited to high-value susceptible host species.

Watering your trees during severe or protracted drought periods may give your trees a boost, but can also increase susceptibility to root pathogens. Any watering should occur early in the growing season by saturating the soil down to 2 feet near the outer edge of the tree branches. Be careful not to overwater.

—adapted from *Bark Beetles in California Conifers: Are Your Trees Susceptible?* [www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5384837.pdf](http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5384837.pdf)

# Seasonal Actions

Here's what you can do seasonally to reduce your risk of wildfire and promote tree health:

## Winter

- ✓ Check property for dead or bark beetle-infested trees.
- ✓ Weather permitting, winter is the best time to remove those trees and dense undergrowth.
- ✓ Trim up trees for vertical clearance as part of your home's defensible space. If not feasible in winter, plan now to do so when weather permits.
- ✓ If you're planting trees this spring, plan ahead now and plant locally native trees.

## Spring

- ✓ Prepare defensible space.
- ✓ Remove dead and bark beetle-infested trees.
- ✓ Bark beetles are most active now and in summer—be careful not to damage remaining trees as fresh wood attracts beetles.
- ✓ If possible, remove freshly cut wood. Otherwise, cover, lop or chip infested wood—and do not place near healthy trees.

- ✓ Following an extended period of little to no rain, sparingly water high-value trees. Use best watering practices.
- ✓ Now is the time to plant new trees, as long as irrigation is available.

## Summer

- ✓ Remove dead and dying trees.
- ✓ Follow spring guidelines as beetles are very active in summer as well.
- ✓ Be especially careful with power tools—one spark can start a wildfire. If planting trees in fall, plan ahead now and plant locally native trees.

## Fall

- ✓ If planting trees, wait until the weather cools and fall rains have increased soil moisture.
- ✓ Fall is one of the best times to remove dead and dying trees, and dense undergrowth.
- ✓ Water high-value trees only if significantly less than average rainfall this season; otherwise, do not water.

—[www.readyforwildfire.org/Seasonal-Actions/](http://www.readyforwildfire.org/Seasonal-Actions/)

# Don't forget that wildlife need snags

If enhancing wildlife habitat is important to you, consider keeping dead trees on your forested lands. Standing dead trees in a forest are called *snags* and many species of wildlife depend on snags for their survival.

Owls, hawks, and eagles use snags to perch and to support their nests. Cavity nesters such as woodpeckers, mountain bluebirds, and chickadees nest in the snag cavities. Chipmunks, squirrels, and other mammals use snags as homes. Bats use areas under loose bark for roosting. Fungi, mosses, and lichens commonly grow in the decaying wood of a snag. Insects chew through the decaying wood, creating tunnels and chambers. Moths and ladybird beetles, and many species of reptiles and amphibians, hide under the bark.



Immature bald eagle on a snag.

Steven Katovich, USDA Forest Service, Bugwood.org

With so many animals and plants living on and in a dead tree, other animals frequently come there to feed. If a tree in your forest does not have the potential to endanger people or property, consider leaving it standing for wildlife.

—from *Bark Beetles in California Conifers: Are Your Trees Susceptible?* [http://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5384837.pdf](http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5384837.pdf)

see also: *Snags, Bark Beetles, and Cavity-Nesting Birds: Conservation and Management in Ponderosa pine forests of the Pacific Northwest.* <https://abcbirds.org/wp-content/uploads/2015/05/Cavity-nester-booklet.pdf>

## A valuable tool: Tree Mortality Viewer

Wondering how severe the tree mortality is near you? We now have a powerful new tool to help understand what is happening.

The Tree Mortality Viewer is a map of California that shows the results of aerial tree mortality surveys from 2012–2015. You can use the map to see how tree mortality has worsened over time.

In addition, digital maps of the 2-tiered high hazard zones are available. Tier 1 addresses potential threats to people, buildings, and infrastructure from falling dead trees. Tier 2 high hazard zones address broader fire risk and forest health considerations from this severe tree die-off. Other information can be displayed on assets and threats. Find roads, pipelines, water supply flumes, and communities, as well as fire threat, water stress, land ownership, vegetation, and biomass facilities.

Go to [egis.fire.ca.gov/TreeMortalityViewer/](http://egis.fire.ca.gov/TreeMortalityViewer/) to learn about risks to your property and surrounding area.

## Resources

# Bark beetles, dead trees, fire...oh, my!

### Sobering Facts

- One mated pair of beetles could result in many thousands of beetles in just a few generations.
- Bark beetle larvae feed on the tree's tissues, cutting off water and nutrients.
- Even if the drought were to end this year, the bark beetle epidemic will last 3 to 5 more years.
- In some areas of CA, 80–90% of trees have died.

**Bark Beetles and Dead Trees.** Lots of resources from CAL FIRE to help you learn about the bark beetle epidemic and ways to improve forest health. [www.readyforwildfire.org/Bark-Beetles-Dead-Trees/](http://www.readyforwildfire.org/Bark-Beetles-Dead-Trees/)

**Tree Mortality: 29 million and counting.** YouTube video produced by the California State Association of Counties in May 2016. [youtu.be/g5KXjG4bcwQ](https://youtu.be/g5KXjG4bcwQ)

**California Tree Mortality Task Force.** [fire.ca.gov/treetaskforce/](http://fire.ca.gov/treetaskforce/)

**Tree Mortality Task Force facebook page** <https://www.facebook.com/California-Tree-Mortality-Task-Force-716343781799796/>

**Tree Notes.** Look through the titles here. There are several notes related to bark beetle tree mortality, including #3, #9, #10, #13, #19, #28, #30, and others. [calfire.ca.gov/foreststeward/treenotes](http://calfire.ca.gov/foreststeward/treenotes)

**What landowners need to know before removing trees.** Brochure includes permitting

options for landowners. <https://app.box.com/s/ji5gq81hu0hng097jzheef2lmeqwy54n>

**Our changing forests.** Website created by the Forest Service with up-to-date articles, video, lots of information and resources. [www.fs.usda.gov/CATreeMortality](http://www.fs.usda.gov/CATreeMortality)

**Ready for Wildfire.** Website to help forest landowners prepare for and prevent wildfire.

- **Be Ready:** Create and maintain defensible space and harden your home against flying embers.
- **Get Set:** Prepare your family and home ahead of time for the possibility of having to evacuate.
- **Be Ready to GO!** Evacuate when necessary. [www.readyforwildfire.org](http://www.readyforwildfire.org)

**Evacuating yourself and your family.** Preparation tips so that you're ready in case the worst happens. Create a plan, assemble an emergency supply kit, make arrangements, and other helpful info. [www.ready.gov/evacuating-yourself-and-your-family](http://www.ready.gov/evacuating-yourself-and-your-family)

## Technical Assistance

Many agencies are available to provide technical assistance, referrals, information, education, land management plan assistance, and advice.

**California Stewardship Helpline**  
1-800-738-TREE; [ncsaf@mcn.org](mailto:ncsaf@mcn.org)

**California Dept of Forestry & Fire Protection**  
Stewardship Forester  
[Stewart McMorrow](mailto:Stewart.McMorrow@fire.ca.gov), [Stewart.McMorrow@fire.ca.gov](mailto:Stewart.McMorrow@fire.ca.gov)

**CAL FIRE Forestry Assistance Specialists (FAS)**  
(find the FAS for your county at [calfire.ca.gov/resource\\_mgt/downloads/ForestAdvisorList.pdf](http://calfire.ca.gov/resource_mgt/downloads/ForestAdvisorList.pdf))

**Guy Anderson** (Fresno, Imperial, Inyo, Kern, Kings, Los Angeles, Madera, Mariposa, Merced, Mono, Monterey, Orange, Riverside, San Benito, San Bernardino, San Diego, San Joaquin, San Luis Obispo, Santa Barbara, Tulare, Tuolumne, Ventura) 559-243-4109

**Scott Bullock** (Santa Cruz) 831-335-6741

**Jill Butler** (Alameda, Lake, Marin, Napa, San Francisco, San Mateo, Solano, Sonoma, Yolo) 707-576-2935

**Brook Darley** (Glenn, Shasta, Tehama, Trinity East) 530-224-2438

**Damon Denman** (Siskiyou) 530-842-3516

**Dave Derby** (Butte) 530-872-6334

**Adam Frese** (Stanislaus) 209-532-7424

**Ivan Houser** (Lassen) 530-257-8503

**Mary Huggins** (Alpine, Amador, Calaveras, El Dorado, Nevada, Placer, Sacramento, Sierra, Sutter, Tahoe Basin, Yuba) 916-718-6258

**Al Klem** (Plumas) 530-283-1792

**Jonathan Pangburn** (San Benito) 559-243-4109

**Dawn Peterson** (Colusa) 530-528-5199

**Ed Orre** (Contra Costa, Santa Clara) 408-206-3704

**Jim Robbins** (Del Norte, Humboldt, Trinity West) 707-726-1251

**Don Schroeder** (Modoc) 530-294-5110

**California Association of RCDs**  
916 457-7904; [staff@carcd.org](mailto:staff@carcd.org)

**Natural Resources Conservation Service (NRCS)**  
State Forester; 530-792-5655

**UC Cooperative Extension Forest Advisors**

**Mike De Lasaux** (Plumas, Sierra) 530-283-6125; [mjdelasaux@ucdavis.edu](mailto:mjdelasaux@ucdavis.edu)

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**Susie Kocher** (El Dorado, Amador, Calaveras, Tuolumne) 530-542-2571; [sdkocher@ucdavis.edu](mailto:sdkocher@ucdavis.edu)

**Rick Standiford**, Specialist 510-643-5428; [standifo@berkeley.edu](mailto:standifo@berkeley.edu)

**Bill Stewart**, Specialist 510-643-3130, [billstewart@berkeley.edu](mailto:billstewart@berkeley.edu)

**Yana Valachovic** (Humboldt, Del Norte) 707-445-7351; [yvala@ucdavis.edu](mailto:yvala@ucdavis.edu)

**USDA Forest Service**

**Paula Randler**, Forest Legacy & Stewardship 707-562-8910; [pbrandler@fs.fed.us](mailto:pbrandler@fs.fed.us)

# Calendar

## September 28

**Field Trip: Clark Fire in the Indiana Summit Research Natural Area**

**Location:** Indiana Summit Research Natural area  
**Contact:** Christina Restaino, cmrestaino@ucdavis.edu, (530) 903-255

**Information:** [www.cafiresci.org/events-webinars-source/indianasummitfieldtrip](http://www.cafiresci.org/events-webinars-source/indianasummitfieldtrip)

## September 29

**Beetle Kill Community Meeting**

**Location:** Alta Fire Hall, 33950 Alta Bonny Nook Rd

**Notes:** 7 pm. Meeting to hear what local agencies are doing, along with landowner responsibilities. Experts from CAL FIRE, Placer Sheriff Office, OES, RCDs, NRCS, Fire Safe Council, and others.

## September 28–29

**California Nevada Hawaii Forest Fire Council**

**Location:** South Lake Tahoe, CA

**Information:** [www.cafiresci.org/events-webinars-source/category/california-nevada-hawaii-forest-fire-council-fall-2016](http://www.cafiresci.org/events-webinars-source/category/california-nevada-hawaii-forest-fire-council-fall-2016)

## October 5

**Lecture: Ecological and evolutionary responses of forest trees to a changing world**

**Location:** UC Davis

**Information:** [www.cafiresci.org/events-webinars-source/category/ecological-and-evolutionary-responses-of-forest-trees-to-a-changing-world-lecture](http://www.cafiresci.org/events-webinars-source/category/ecological-and-evolutionary-responses-of-forest-trees-to-a-changing-world-lecture)

## October 18–21

**Natural Areas Conference: Climate Change Adaptation and Natural Areas Management—Turning Words to Action**

**Location:** UC Davis Alumni Center, Davis, CA

**Information:** [naturalareasconference.org](http://naturalareasconference.org)

## November 1–2

**Board of Forestry Meeting**

**Location:** Resources Building, Sacramento, CA

**Information:** [bofdata.fire.ca.gov/](http://bofdata.fire.ca.gov/)

## November 2–5

**California Invasive Plant Council Symposium**

**Location:** Tenaya Lodge, Yosemite

**Information:** [www.cal-ipc.org/symposia/index.php](http://www.cal-ipc.org/symposia/index.php)

## November 14

**Fire Smoke Symposium**

**Location:** Long Beach, CA

**Information:** [www.iawfonline.org/2016SmokeSymposium/index.php](http://www.iawfonline.org/2016SmokeSymposium/index.php)

## November 16–19

**CARCD Annual Conference: Urban and Rural: Tying the Partnership Together**

**Location:** Ontario, CA

**Information:** [carcd.org/annual\\_conference0.aspx](http://carcd.org/annual_conference0.aspx)

## CFIP cost-share for landowners

This year, there is money available to assist landowners in accomplishing a broad range of management projects, including dead tree removal after bark beetle attack. CFIP (California Forest Improvement Program) received over \$3 million for the 2016 fiscal year.

CFIP grants are available statewide and can fund a full suite of activities: Management Plans, Registered Professional Forester (RPF) supervision, site preparation, planting, pre-commercial thinning, pruning, follow-up, release, and conservation practices; e.g. forest road repair and upgrading, if it protects, maintains, or enhances fish and wildlife habitat.

You will need an RPF to help you develop a Forest Management Plan if you don't already have one. CFIP will cover 90% of the cost of the new Forest Management Plan. This Plan is the blueprint to help you manage your forest to achieve your personal goals and objectives.

CFIP also pays 90% of disaster management activities, such as insect, disease, and fire projects, and 75% of nondisaster projects.

To get started with CFIP, contact your local Forestry Assistance Specialist (FAS) (*see page 10*), who can answer questions and assist with the application process. They may know of other funding options as well.

For more information and all the documents/application material, go to [calfire.ca.gov/resource\\_mgt/resource\\_mgt\\_forestryassistance\\_cfip](http://calfire.ca.gov/resource_mgt/resource_mgt_forestryassistance_cfip).

## How can Forestland Steward newsletter serve you?

Comments / Suggestions: \_\_\_\_\_

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To save on printing costs and paper, we encourage you to get the e-version of Forestland Steward. Check here for an email copy instead of a hard copy.

Fill out this box and send it to CAL FIRE, Forestry Assistance, P.O. Box 944246, Sacramento, CA 94244-2460. Fax: (916) 653-8957; email: [Stewart.McMorrow@fire.ca.gov](mailto:Stewart.McMorrow@fire.ca.gov). For address changes, please send this box or contact Stewart McMorrow...be sure to reference Forestland Steward newsletter.

*NOTE: For address updates or to make comments or suggestions about this newsletter, please contact [Stewart.McMorrow@fire.ca.gov](mailto:Stewart.McMorrow@fire.ca.gov). A limited number of extra printed copies may be available. Please send your shipping information and the number of copies you would like to [Stewart.McMorrow@fire.ca.gov](mailto:Stewart.McMorrow@fire.ca.gov) or mail your request directly.*

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## Have a forestry question? Call the Helpline first

Have a forestry question? Don't know where to start? The California Forest Stewardship Helpline (800-738-8733 (TREE)) is here to help.

The CA Stewardship Helpline is getting a makeover after several years of service. It is staffed by a Registered Professional Forester (RPF) to provide a point of contact for people with questions or concerns about California's forests and forest management.

Dr. Richard Harris, former UC Cooperative Extension Forestry Specialist, RPF, and contractor to NorCal SAF, will respond to calls and e-mails and provide information on tree mortality and referrals to local service providers and other resources.

There are lots of reasons to call the Helpline. With the current and expected long-term catastrophic tree mortality in the Sierra Nevada and elsewhere there is more need than ever for public outreach and education about California's forests. The Helpline will also help answer general questions and concerns about forests and forestry.

The Helpline will not promote commercial interests. If you are looking for a referral to professional services, you will receive a standard list of providers, such as a list of Registered Professional Foresters or arborists that work in your area.



**CALIFORNIA FOREST STEWARDSHIP HELPLINE** 

**HOT TOPIC: TREE MORTALITY INFORMATION**

*For questions about your forest:*

• Management	• Water Quality	• Education	• Wildlife
• Fire Hazards	• Taxes	• Fisheries	• And more...

call 1-800-738-TREE  
A Registered Professional Forester (RPF) is available for your questions.  
<http://calfire.ca.gov/foreststeward/> - email: [forestryhelp@gmail.com](mailto:forestryhelp@gmail.com)

All inquiries are confidential. (Selected callers may be requested to provide personal information so that follow-up monitoring on the effectiveness of the Helpline can be conducted.)

The Helpline is supported by grants from the U.S. Forest Service State and Private Forestry.

**Call: 800-738-TREE (8733)**  
**Email: [forestryhelp@gmail.com](mailto:forestryhelp@gmail.com)**