



## Tree Mortality Can Cause Hazardous Conditions

Upon entering Yosemite National Park, you may have noticed patches of discolored trees in otherwise green forests. These parched, brown, dead and dying trees are the result of an ongoing drought, warming temperatures, native bark beetles, and poor forest health. Millions of trees in the southern Sierra Nevada, particularly at lower elevations, have died. In Yosemite, there are an estimated 2.4 million dead trees within about 131,000 acres, especially between 3,000 and 4,500 foot elevations.

Falling branches, limbs, and trees can cause hazardous conditions, and may pose risks to life and infrastructure, especially in developed areas. While in Yosemite, please remain observant of your surroundings, particularly in campgrounds, lodging and picnic areas, roadsides, and while hiking on trails. Contact a park official if you see any potentially hazardous situations.

### KEEP YOUR SAFETY A PRIORITY



**BE AWARE** of your surroundings. Trees, limbs, and branches can fall at any time.



**BE ATTENTIVE** while hiking on trails, looking up and around regularly, especially during high winds.



**BE CAUTIOUS** when selecting a place to park, camp, picnic, or rest. Look for high-risk trees and limbs that can fall.



**BE IN CONTROL.** The increased number of dead trees pose a fire risk. As always, make sure you are in control of your campfire at all times, and that it is completely out when you are finished. Obey all fire restrictions.





## Tree Mortality and What Causes It

Tree mortality simply refers to the death of trees in a forest. Tree mortality is a natural process that often benefits a healthy forest ecosystem. However, the recent tree mortality event is unprecedented, with an estimated 102 million dead trees throughout the Sierra Nevada. The immediate cause of this mortality event is a combination of bark beetles and extended drought. Once trees are weakened by the lack of water, they are much more susceptible to bark beetle attack. Simultaneously, warming temperatures and milder winters during the drought have increased native bark beetle populations. More importantly, this mortality event is really a broader symptom of poor forest health in many areas. Historically, wildfire maintained healthy forests by reducing flammable debris, such as dead twigs and needles, and also reducing the overall number of trees in the forest. After over a century of fire exclusion, many forests have extremely high tree densities that greatly increase competition for limited water supplies during drought.

## A Bark Beetle's Role In Tree Mortality

Bark beetles are similar in size to a grain of rice. Rising temperatures, below-average rainfall, and increased competition for water as a result of fire suppression have interacted to weaken trees, creating ideal conditions for bark beetles to invade. When adult beetles attack a tree, they bring in fungi that can interrupt the tree's transport of water. They then lay their eggs in the thin layer of tissue between the bark and wood of a tree that transports nutrients, which the larvae feed on. When large numbers of beetles attack, the interruption they cause to water and nutrient flow can eventually kill the tree. One pair of mating beetles can produce more than 12 million beetles a year.

## Tree Mortality Forecast

It is possible that tree mortality in California forests will continue for the next three to five years, due to existing trees currently infested by bark beetles or trees that are stressed, weak, and susceptible to bark beetles. Otherwise, it is unknown if high levels of tree mortality will continue in the coming years.

## National Park Service Actions Regarding Tree Mortality in Yosemite

The National Park Service (NPS) has made the safety of Yosemite's visitors and employees its primary concern and has increased staff specifically for identifying and removing hazardous trees. Since 2016, NPS employees and its park partners have removed over 5,000 trees each year that posed direct risk to life or infrastructure, from developed areas such as campgrounds, lodging, picnic areas, roadsides, and housing areas. The NPS has also applied a verbenone, an anti-aggregant pheromone, to healthy sugar pines in developed areas to prevent beetle attacks this year. Outside of developed areas, most of Yosemite is designated wilderness, where NPS allows natural processes to prevail. The NPS has also formed partnerships with the US Geological Survey, US Forest Service, and other academic researchers to study the effects of drought and develop management measures concerning prescribed fires and mechanical thinning, which may lessen drought impacts.

