

○ CALIFORNIA

○ APRIL 2011

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Forest Health

2010 highlights

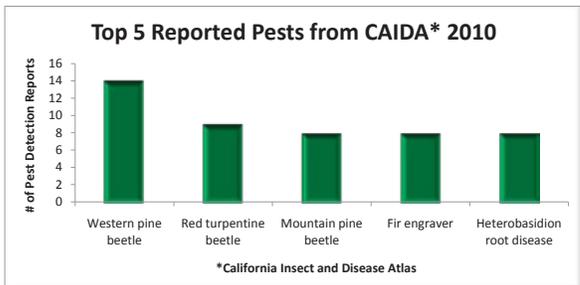
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Forest Resource Summary

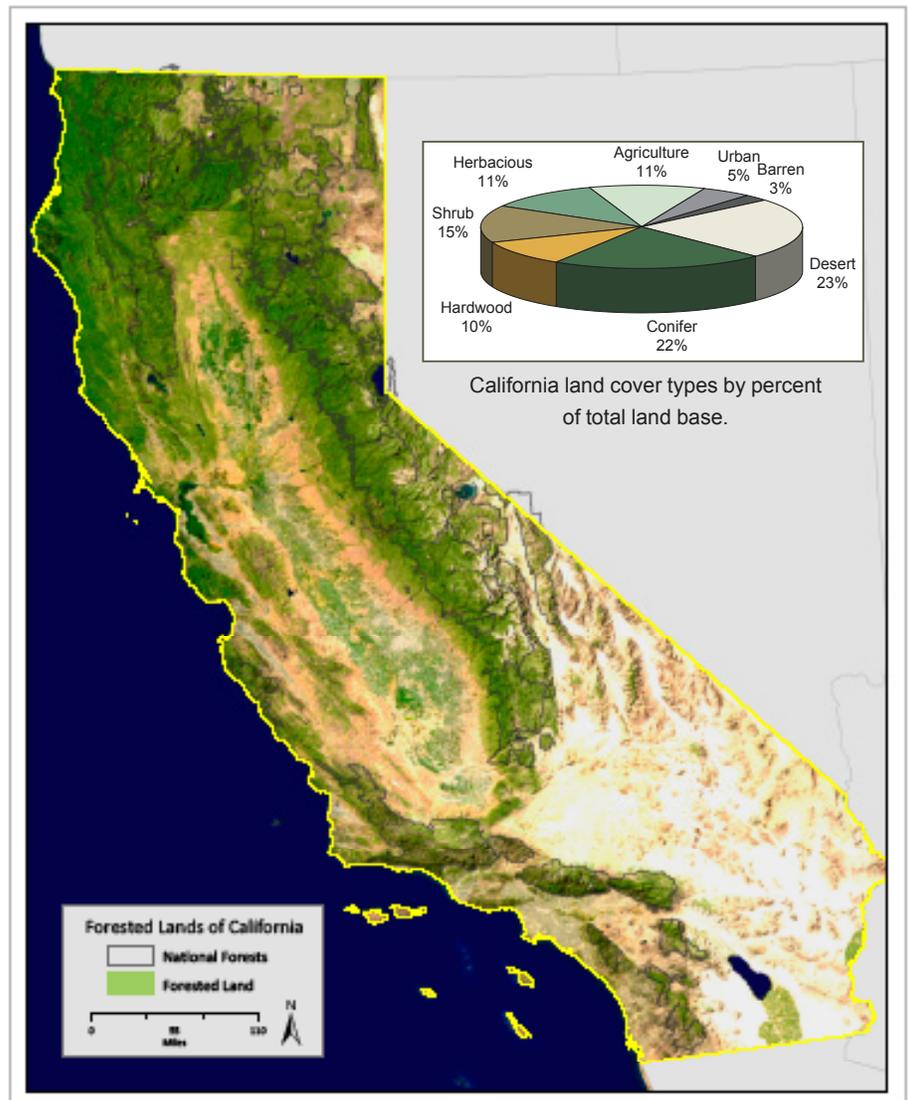
There are 18 National Forests in California, encompassing over 20 million acres. Our National Forests account for 25 percent of National Forest recreation nationwide and about half of the public wildland recreation in California. National Parks and other federal, state, county and private lands comprise the remainder. <http://www.fs.fed.us/r5/>

Region 5 of the USDA Forest Service works cooperatively with federal and state partners to map, measure, monitor and assess the effects of biotic and abiotic agents in California's forests. California's forests are among the most complex and diverse in the nation, with 25 major forest types occurring across 32 million acres of the state.

Approximately 33% of California is forested and is susceptible to a variety of forest pests depending largely on geographic location, tree species composition, tree stocking, drought, air pollution and other environmental factors.

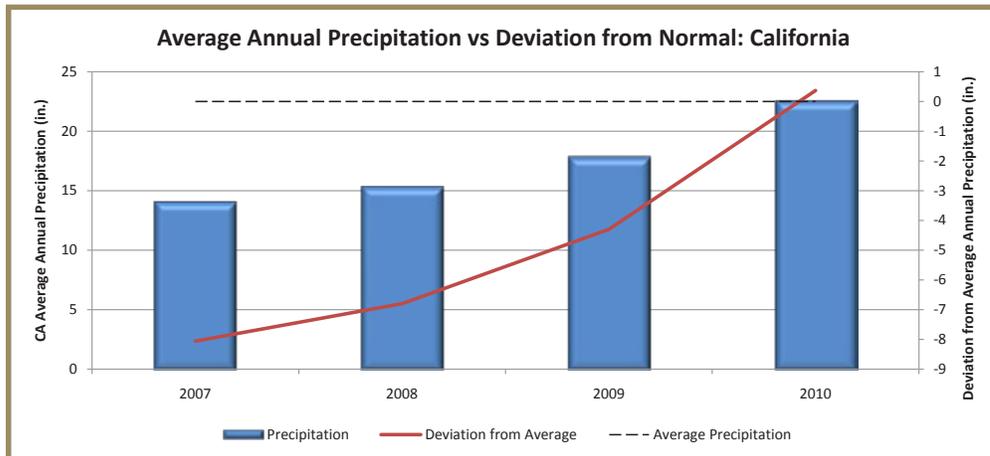


The California Insect and Disease Atlas (CAIDA) contains over 7,500 records of primarily forest pest detections dating from the early 1900's to the present. Information such as host type and specific pest are recorded. This database provides important information about trends in pest activity over time.



When, where, and the extent to which tree mortality occurs is influenced primarily by forest stand conditions and weather patterns. A dramatic rise in the number of dead trees typically follows several years of inadequate moisture. The more severe and prolonged the drought, coupled with dense stands of trees, the more host material is available for pest activity and the potential for greater numbers of dead trees increases.

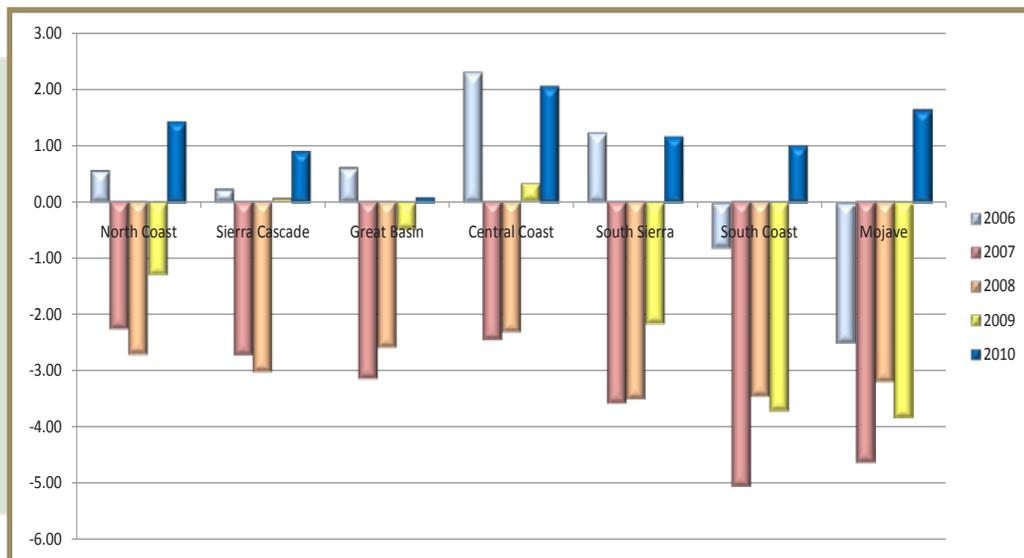
Many areas of the state have been precipitation deficit since 2007, resulting in increases in bark beetle-caused tree mortality over the past three years. For this most recent water year beginning October 1, 2009, precipitation for California averaged close to normal, ending a 3 year drought with about 110% of average overall. However, most of the tree mortality attributed to native bark and engraver beetles this year was due to beetle attacks that occurred in 2009, a year when average seasonal precipitation was just 80% of normal.



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In April 2010 precipitation was twice the average statewide and heavier in the coastal regions of northern California. Greater precipitation in 2010 could result in less mortality caused by insects and diseases in 2011.

Palmer drought indices for the seven hydrologic zones in California, 2006-2010. The Palmer Drought Index is an indicator of drought or moisture excess and ranges from -6 to +6, with negative values denoting degree of drought. 2010 moisture values overall increased greatly from 2007, 2008, and 2009.



2010 Aerial Detection Survey Highlights

- 44 million acres flown over CA
- 750,000 acres mapped were attributed to bark beetles; double the acreage mapped in 2009, and triple that mapped in 2008
- Gold-spotted oak borer surveys were conducted in San Diego County; oak tree mortality was not as dense as in 2009 but the geographic distribution expanded
- Sudden oak death surveys showed a decrease in mortality in tanoak and coast live oak from last year; however, new locations of SOD were mapped in northern Humboldt County



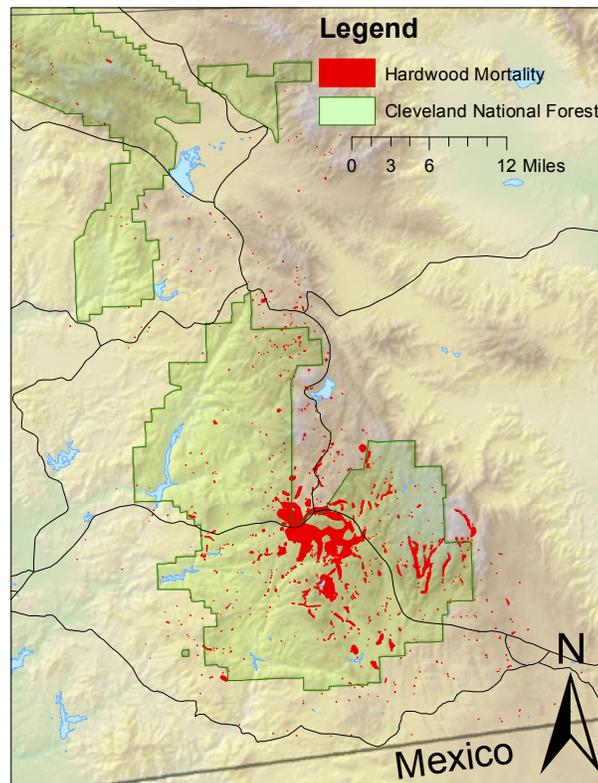


Coast live oak killed by goldspotted oak borer on Ewiiapaayp Reservation. Photo: T. Coleman

Goldspotted Oak Borer (GSOB)

Goldspotted oak borer (*Agrilus auroguttatus*) -caused tree mortality continued in San Diego County in 2010. An estimated 1,532 dead oaks were detected through a special aerial survey in 2010. Coast live oak was the primary tree mapped over approximately 930 acres.

Aerial surveys indicate that this wood borer has been active in San Diego County since 2002, causing the death of roughly 1,500 -2,000 trees per year.



Hardwood mortality, 2002-2010, Descanso Ranger District, Cleveland NF. Map: Zack Heath

Emerald Ash Borer

In the summer of 2010 a truck carrying firewood from Michigan entered the Topaz Border Protection Station. Inspectors examined the firewood and noticed borer holes, galleries, and boring dust on the wood in the truck. The firewood was prohibited entry and the wood was confiscated. D-shaped borer exit holes were found by the border station inspectors along with three dead adult beetles, six suspect larvae and one suspect pupa. All insects were evaluated in the CDFA lab and confirmed as emerald ash borer (*Agrilus planipennis*).



Left: Ash firewood from Michigan infested with emerald ash borer. Above: Adult emerald ash borer in ash firewood. Photos: C. Friedman and S. Greenhouse, CDFA, Topaz Border Protection Station, July 2010



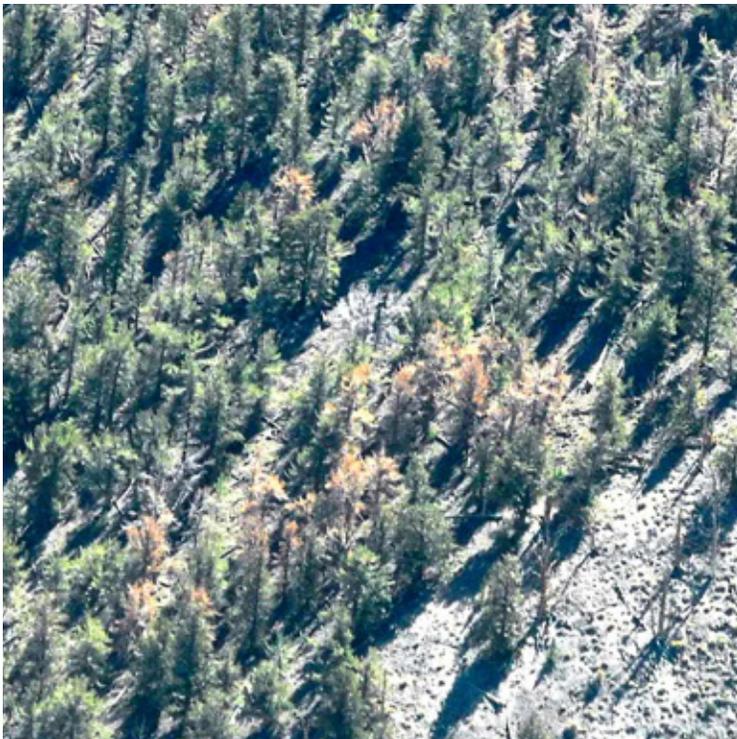
Mountain pine beetle-caused mortality in whitebark, lodgepole, and western white pine, Yellow Mountain, Modoc NF. Photo: D. Cluck

Bark and Engraver Beetles

The number of trees killed by mountain pine beetle, western pine beetle, and fir engraver beetle was much higher in 2010, compared to 2009, in many areas of the southern Cascades, Sierra Nevada, Southern California mountains, and on the Modoc Plateau. Mountain pine beetle caused the highest level of mortality of pines during 2010 compared to other tree killing agents, with continued activity particularly in whitebark pines. Since whitebark pine has such a limited distribution in CA compared to

other western states, the high levels of mortality have increased the level of concern for this species.

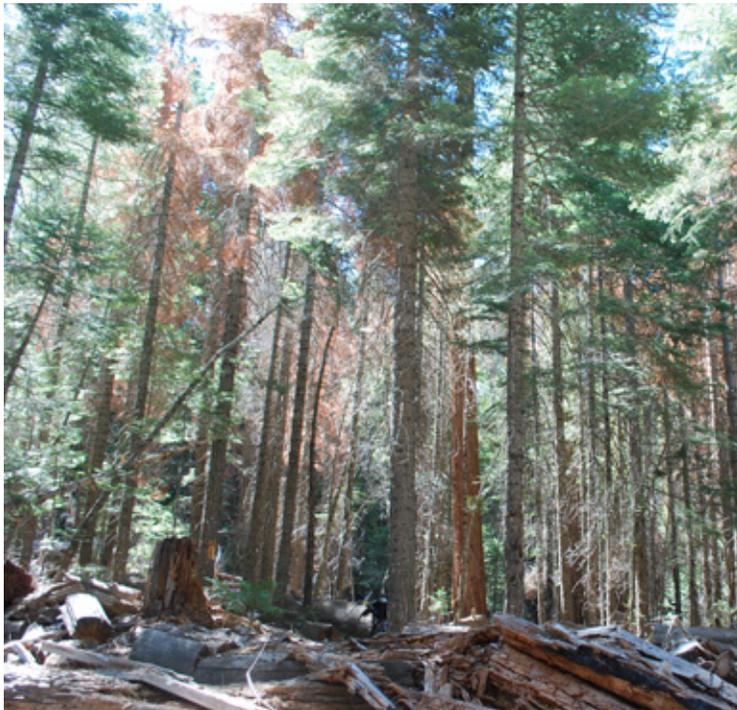
Western pine beetle, in ponderosa pine, increased this year throughout Lassen, Modoc and Shasta counties in large diameter trees. In southern California, there was an increase in Coulter pine mortality attributed to western pine beetle on the Cleveland and San Bernardino National Forests and on the Pauma Reservation.



Aerial view of limber pine mortality, Inyo Mountains. Photo: Z. Heath



Western pine beetle-caused mortality in ponderosa pine plantations, Sierra NF. Photo: B. Bulaon



White fir mortality due to fir engraver beetle, Heterobasidion root disease, and overstocking, Yosemite NP. Photo: B. Bulaon

Fir engraver attacks resulted in a substantial increase in top kill and whole tree mortality in 2010 across thousands of acres of white fir in many forests in northern California. Fir engraver beetle activity was also higher in the Sierra Nevada range compared to 2009. **Defoliators**



Defoliation of white fir caused by Douglas-fir tussock moth, San Bernardino NF. Photo: T. Coleman

Douglas-fir tussock moth defoliation continued for the second year across approximately 190 acres on the San Bernardino NF. Average defoliation levels are approaching 30-50% on white fir. Trees experiencing two years of defoliation showed higher levels of defoliation (70-90%). Significant tree mortality was not observed in the outbreak area, but could increase if populations persist.

Canker Diseases

Pitch canker remains a problem for both planted and native Monterey pines in coastal California from San Diego to Sonoma, and is causing extensive shoot damage and tree mortality in Bishop pine stands on Point Reyes National Seashore. Approximately 40% of all pines at the Point Reyes site have at least a small amount of dieback and 5% of all pines in the area have died from this disease.

Severe branch flagging on red fir associated with cytospora canker is widespread throughout the Sierra Nevada Range.



Branch flagging caused by cytospora canker and dwarf mistletoe infection on red fir, Yosemite NP. Photo: L. Mortenson



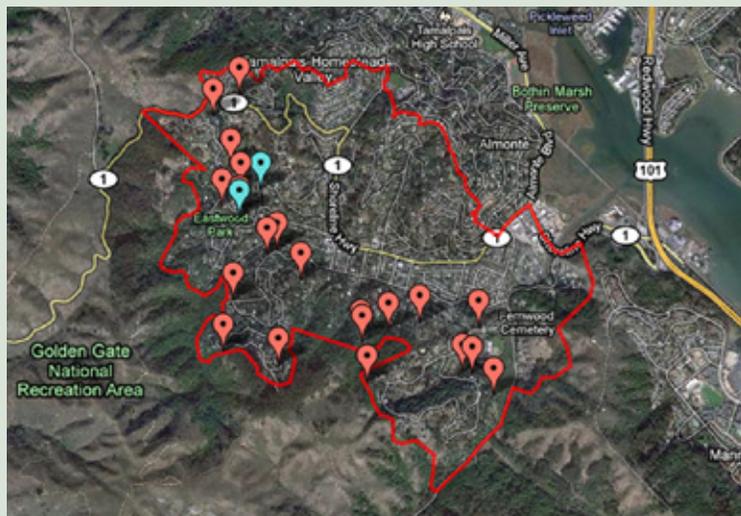
Tip and branch mortality on Bishop pine caused by pitch canker infection, Los Padres NF. Photo: B. Oblinger

Sudden Oak Death

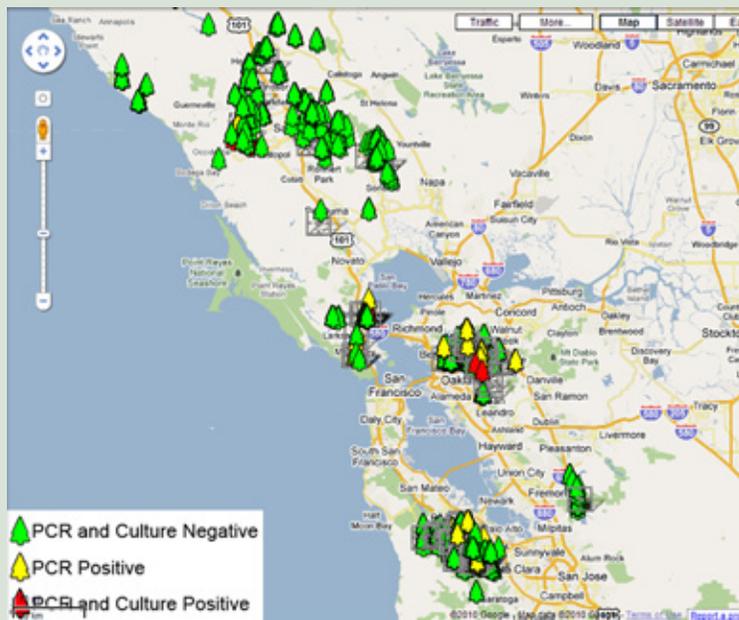
Dry conditions over the past several years limited the spread of the disease within already established locations. However, two new discoveries found in northern Humboldt County expanded the geographic range of this disease. Two new locations were detected via stream surveys along Redwood Creek and in the Mattole Watershed.

Ground surveys to sample vegetation in the Tamalpais Valley section of Mill Valley were conducted; twenty-one of twenty-three sampled trees in this area tested positive for *P. ramorum*.

Community outreach to engage the public in issues relevant



Positive *P. ramorum* locations in Tamalpais Valley, shown in red. Map: J. Alexander



Sampling by citizen scientists in nine communities in the Bay Area. Map: J. Alexander

to SOD in the local area helped train 148 citizen scientists. These citizen scientists surveyed their local areas and sent in leaf samples for analysis. Close to 1,000 unique trees were sampled highlighting positive finds in Atherton, Orinda, Woodside and Healdsburg.

Port-Orford-Cedar Root Disease

This year marked the confirmation and spread of Port-Orford-cedar root disease into the Trinity River watershed, the last major uninfested watershed throughout the host range.

Anthraxnose and powdery mildew caused severe leaf injury in natural stands of California sycamore throughout the state in forest and ornamental settings following spring rains.



Symptoms of sycamore anthracnose on California sycamore. Photo: P. Zambino

Damage caused by Animals

Damage caused by bears continues in redwood stands in coastal northern California. This year's damage may be worse than usual as berry production was very low and bears resorted to stripping more bark.



Other animals such as squirrels were prevalent and noted on big leaf maples in north-western California, girdling branches and stems causing branch, top and whole tree mortality.

Ponderosa pine girdled by squirrels, Lassen NF. Photo: D. Cluck

California is home to 4,200 native plant species and is recognized internationally as a “biodiversity hotspot”. Approximately 1,800 non-native plants also grow in the state, 200 of which are recognized as being invasive. Yellow starthistle (YST) is the most widespread invasive plant in California, as well as one



Treatment of yellow starthistle continues near the entrance to Yosemite NP. This photo shows rappelling gear used in treating YST on steep slopes. Photo: W. West, UCCE

of the most ecologically and economically damaging. Containment strategies, as well as eradication using both chemical and manual methods, occurs throughout counties in the Sierra foothills and most other bioregions in California.

Eradication is also ongoing for aggressive invaders such as saltcedar, thistles including musk, scotch and Italian and several different knapweeds. Efforts to involve the public in a citizen scientist program using smartphone technology is being implemented in the Santa Monica Mountain National Recreation area to identify the locations of invasive weeds and map their spread through time. For information on the *What's Invasive* application go to: <http://whatsinvasive.com/index.php/about>.



Eradication is the objective of this longstanding treatment area on USFS and Sierra Pacific Industries lands, Silver Creek, El Dorado County. Photo: D. Bakke



Saltcedar (tamarisk) patch along the Santa Ynez River, Santa Barbara County. Photo: D. Chang, Santa Barbara County



Foliage in the top half of this black oak was frost killed coinciding with bud break, Quincy, CA. Photo: D. Cluck

Snow, Frost, and Wind Injury

Severe winter storms in northwestern California during the early months of 2010 caused hundreds of acres of snow breakage, especially near Mt. Shasta and Weed in contiguous 30-40 year old ponderosa pine plantations. Many pines in dense stands were affected by the heavy, wet snow late in the spring.

Black oaks throughout most of northeastern California were hit with a late frost that coincided with bud break. The cold temperatures caused injury mostly in the top half of tree crowns. Late frost also caused premature leaf loss on California black oak on Mt. Laguna on the Cleveland National Forest.

Contacts and Additional Information

If you have questions about forest insect and disease activity in California, please contact personnel in one of these regional or field offices:

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