



2024 Aerial Detection Survey Results: California

State & Private Forestry, Region 5
Forest Health Monitoring Program • 1323 Club Dr, Vallejo, CA 94592
www.fs.usda.gov/detail/r5/forest-grasslandhealth

May 2025
R5-PR-039



COVER PHOTO

Severe mostly fir mortality in the Warner Mountains near Bald Mountain, Modoc NF.
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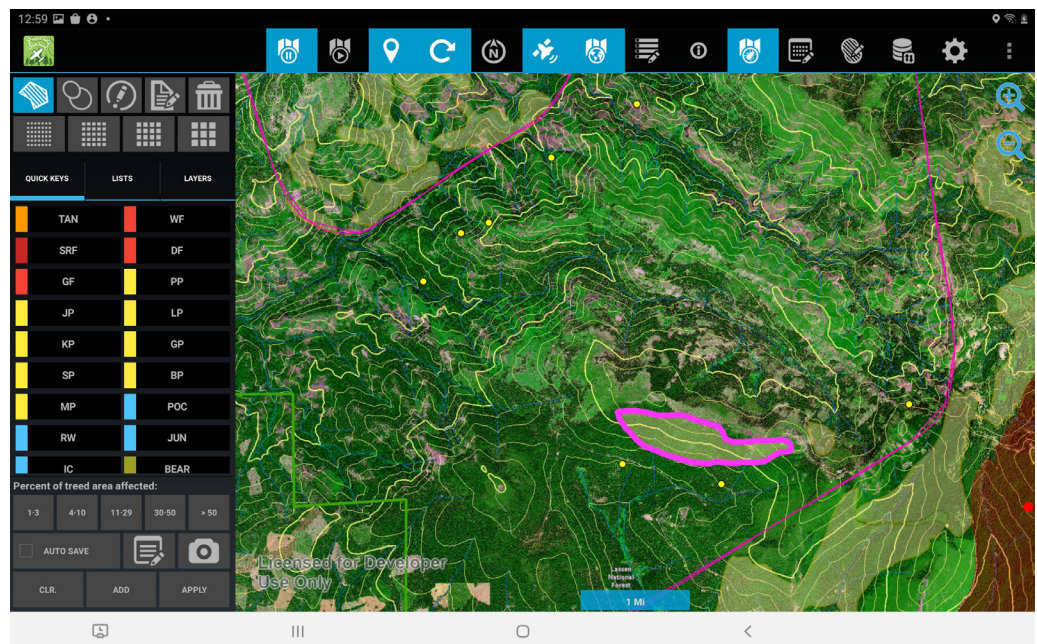
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Screenshot of the Digital Mobile Sketchmapping System (DMSM) used to record tree mortality and damage data

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Overview

The USDA Forest Service, Pacific Southwest Region, State and Private Forestry staff conduct annual aerial detection surveys (ADS) throughout forested areas of California to detect tree mortality and tree damage such as defoliation or dead/dying branches. Surveys are flown in small, fixed-wing aircraft on a 4–5-mile grid pattern with two observers recording from opposite sides of the plane. Most National Forests (NF) and National Parks (NP) in California are surveyed, along with other federal, state, and private forested lands. The objective of this report is to summarize observations from the 2024 aerial detection survey.

*Note: Due to pending updates, post-processing software used for ADS data has not yet been released. As a result, the 2024 ADS database has not yet fully been processed, and the estimates of acres and number of trees are considered interim at this time. Therefore, our 2024 initial reporting is offered in raw form, subject to change, and estimates such as number of trees killed will change.

Approximately 40.1 million acres were surveyed during the 2024 flight season (June - September). Several large areas were excluded from surveys in 2024 due to large wildfires that were active or occurred within the previous two years. Insect and disease activity is difficult to discern in forests that have burned recently. Large active fires early in the 2024 season delayed survey in southern parts of the Sierra Nevada Range as well as later delays due to the 2024 Park Fire (429,603 acres, Butte and Tehama Counties)..

Elevated levels of tree mortality (i.e. more than 1% of forested area affected) were recorded on approximately one million acres, totaling an estimated 6.7 million dead trees. Most of the trees killed were recorded as fir (*Abies* spp.), followed by ponderosa pine (*Pinus ponderosa*), and other

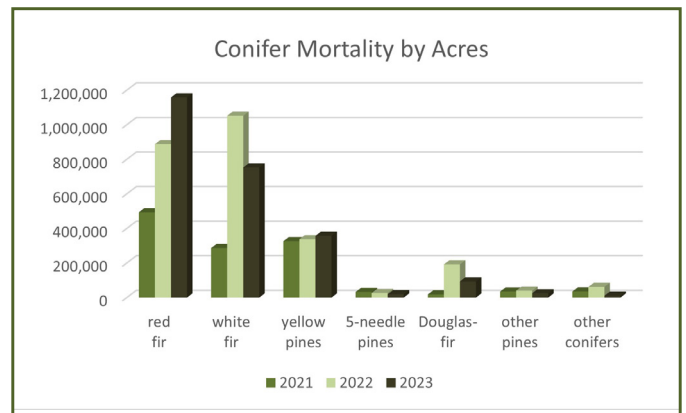


Figure 2. Chart compares the number of acres with conifer mortality from 2022 through 2024.

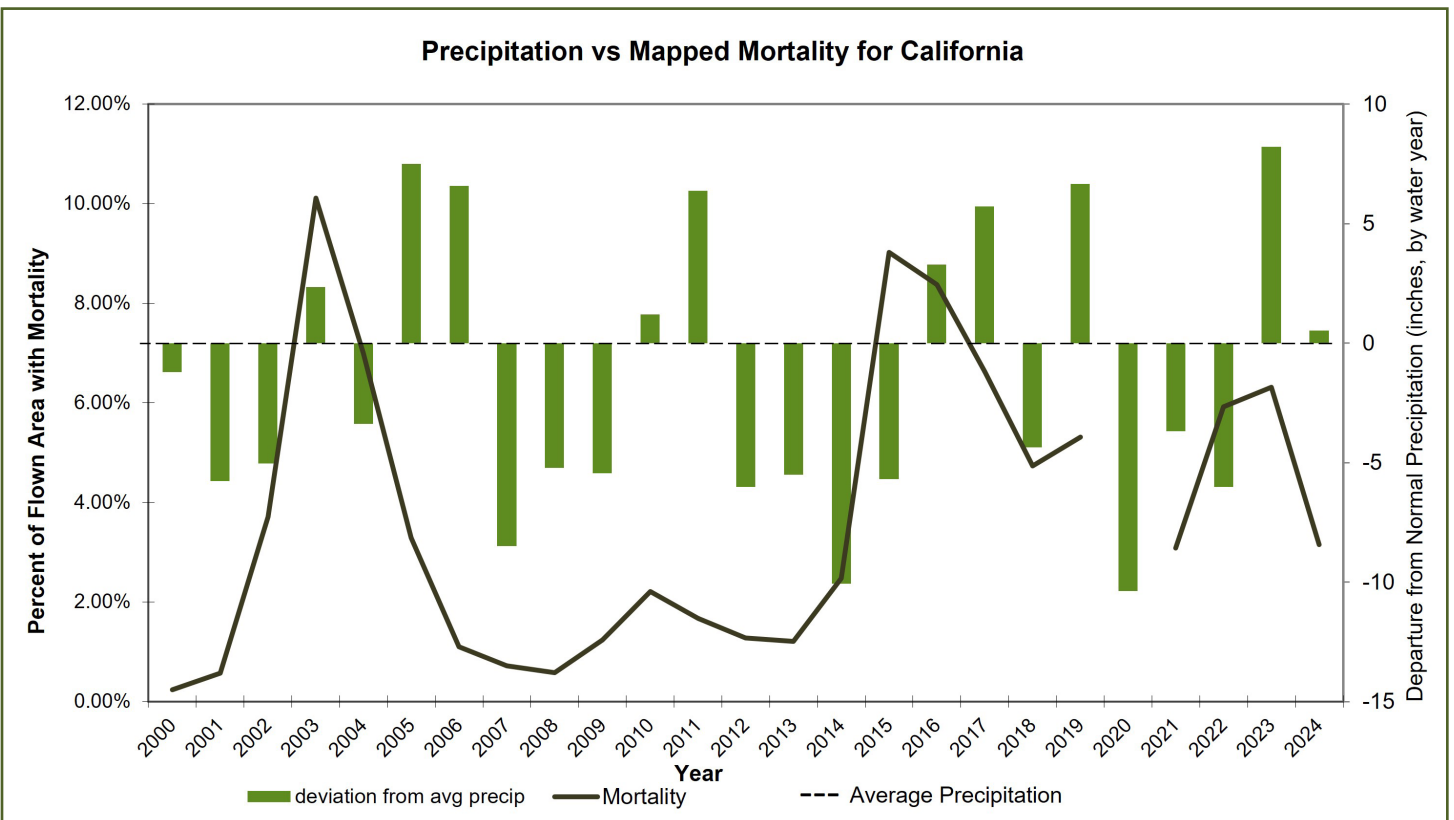


Figure 3. This chart shows the long-term trends in tree mortality and precipitation variability in California since 2000. There is a break in tree mortality data for 2020 because aerial survey was not flown that year due to COVID-19 restrictions.

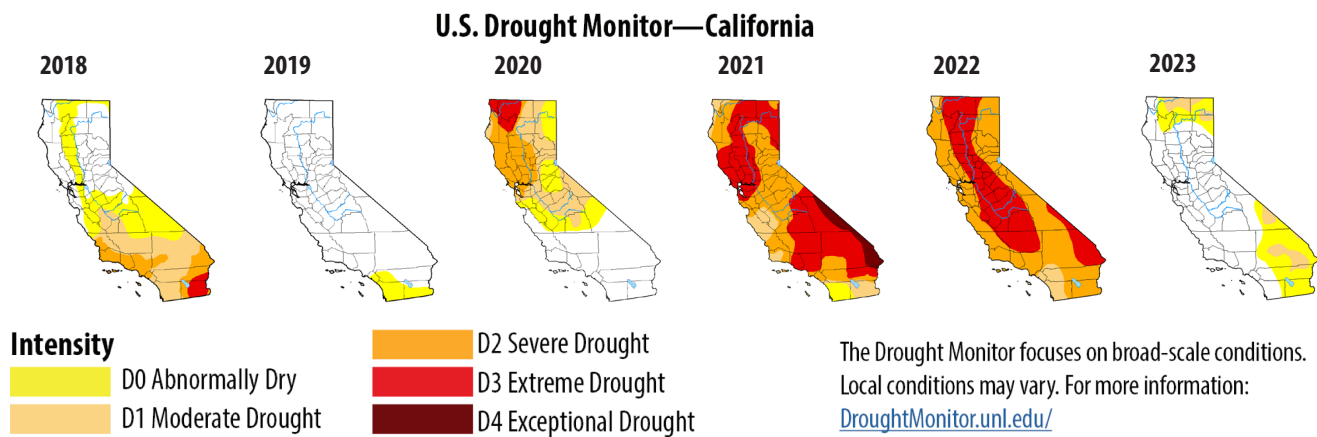


Figure 4. The U.S. Drought Monitor maps of 2018 through 2023 illustrate the severity, range, and ebb and flow of drought in California over the past six years. Maps are presented from the report date in April of each year. D1 is the least intense drought level and D4 the most intense; D0 areas are not in drought. A full description of each drought severity classification is available from the [U.S. Drought Monitor](https://www.drought.gov/). Source: U.S. Drought Monitor

pine species (*Pinus* spp.) (Figure 2). Mortality was particularly severe and widespread in the central Sierra Nevada Range and northern interior California (Figure 1). Despite this, mortality occurred at lighter intensities and in smaller affected areas compared to the past few years.

Elevated levels of tree mortality can be attributed, in part, to the ongoing effects of long-term, intermittent, exceptional drought conditions and subsequent successful bark and engraver beetle attacks. These cumulative effects have resulted in an estimated 246 million trees killed since 2010 (Figure 3).

Drought Conditions

The drought of 2011 to 2017 was concentrated in central California and most tree mortality occurred in the southern Sierra Nevada Range. In contrast, the 2020-2022 drought was concentrated in north central California and recent mortality has been most intense and widespread in the central Sierra Nevada Range (primarily Plumas to Tuolumne Counties) and the northern interior of the state (primarily Siskiyou, Shasta, Trinity, Tehama and Glenn Counties). Unlike the first exceptional drought, where the early mass die-off occurred primarily in low elevation pine, mortality has primarily affected fir since 2018.

The 2020-2022 period was the hottest, driest three-year interval in California since at least 1895 (National Center for Environmental Information) and was primarily responsible for and closely correlated with the recent mass mortality conditions (Figure 4). Since this intense drought episode, California has generally had normal to above normal precipitation, despite multiple short term drought episodes since 2022.

This two to three-year drought reprieve has not occurred in California since 2013, and associated tree mortality has fallen consistently each consecutive year.

Though much of California’s forests were weakened by chronic drought and other stressors, mortality levels should continue to decline along with beetle pressure. Reduced competition from recent mortality should also favor tree health, even though vast forested areas are still overcrowded, primarily due to fire exclusion.

Methodology

Recent tree mortality and damage was mapped on a mobile device by aerial observers flying in a small, fixed wing aircraft at ≈1000’ above ground level (AGL). Aerial observers searched for visibly dried and discolored foliage, typically yellow to reddish brown. The following

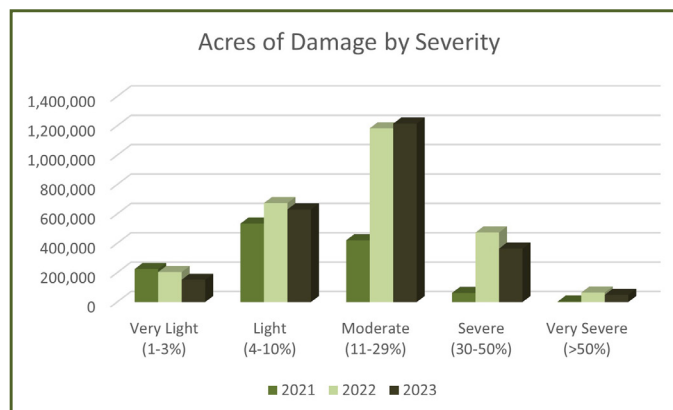


Figure 5. Chart compares the number of acres observed in each severity category from 2022 through 2024.

information was collected for each area with tree mortality or damage: a) damage type (mortality, top kill, defoliation, branch flagging, die back or discoloration), b) percent of area affected (see below for severity scale), c) affected tree species or genus and d) probable damage agent (root disease, bark beetles, etc.). Not all trees in reported acres are dead or damaged. Typically most trees are still healthy.

Tree mortality and damage was recorded on a severity scale based on the percent of trees affected within a given area (Figure 5). Severity of mortality and damage was classified as follows:

Very Light (1-3% of mapped area affected), Light (4-10%), Moderate (11-29%), Severe (30-50%) and Very Severe (>50%).

Surveyors visually detect current tree damage, such as defoliation via the red coloring of chewed, dried foliage and recent mortality by the red or yellow color of the existing foliage on the tree. When a tree dies, it typically appears green and healthy until dry hot conditions ensue. This is known as a “lag effect” and mortality recorded in 2024 likely occurred in summer to fall 2023. Mortality is not recorded once foliage fades to gray or falls off the tree.

ADS is a systematic overview survey accomplished over 2-3 months in the summer, often in difficult mountainous terrain. Damage is sometimes missed.

Below we report the estimated number of acres affected, the severity of mortality or damage, and estimated number of trees affected within those areas (rounded as appropriate).

Acres of mortality or damage may be noted in more than one point, as multiple damage types, damage causal agents and/or species affected can occur in the same location.

State Highlights

In 2024, the number of trees killed, acreage with mortality, and average severity of that mortality all decreased compared to 2023 (Figure 5). Mortality detected in 2024, though still elevated both in intensity and range compared to non-drought conditions, was greatly decreased from 2023 estimates. Tree mortality was common throughout the Sierra Nevada Range; particularly concentrated in the central Sierra Nevada Range and northern interior where recent drought was most intense. Additionally, fir mortality primarily occurred in higher elevations and northern areas of the state (Figure 1).

Bark Beetles and Wood Borers

Fir mortality attributed to fir engraver beetle (*Scolytus ventralis*):

California/Shasta red fir (*A. magnifica*, *A. shastensis*), white fir (*A. concolor*), and grand fir (*A. grandis*) mortality attributed to fir engraver beetle was common throughout the region, typically at light to moderate intensities. Mortality was still elevated compared to pre-drought conditions but was substantially reduced both in extent and severity from 2023 mortality levels. Approximately 750,000 recently killed trees across 5.1 million acres were recorded in 2024 compared to ~24.3 million dead trees across 1.9 million acres in 2023. Mortality continues to be most severe and widespread throughout the central Sierra Nevada Range.

- California and Shasta red fir mortality was, again, most severely affected and typically occurred in high-elevation mature monodominant stands.
- White fir mortality was widespread but generally at light severity and associated with dense mixed conifer stands.
- Grand fir mortality was uncommon, likely since its range along the northern coast did not experience extreme drought conditions.

Note: Red and white fir often occur together in mixed conifer mid-elevation stands and can be difficult to differentiate from the air.

Conifer mortality attributed to flatheaded fir borer (*Phaenops drummondi* prev. *Melanophila*):

Tree mortality attributed to flatheaded fir borer decreased in all host species.

- Douglas-fir mortality caused by flatheaded fir borer in 2024 decreased substantially to an estimated 55,000 dead trees across 16,000 acres, compared to an estimated 800,000 dead trees across 93,000 acres in 2023. Sporadic, light intensity, mortality was common throughout most of its range in California.
- Santa Lucia fir (*A. bracteata*) mortality was detected in only two locations of one tree each in 2024 compared to

the estimated 210 dead trees across 180 acres in 2023.

- Bigcone Douglas-fir (*P. macrocarpa*) mortality decreased from ~60 dead trees recorded in 2023 to 26 dead trees in 2024 and occurred primarily as single trees or small groups within the Transverse and Peninsula Mountain Ranges.

Pine mortality attributed to western pine beetle (*Dendroctonus brevicomis*):

- Ponderosa pine mortality caused by western pine beetle remained elevated but decreased from ~2.9 million dead trees across 330,000 acres in 2023 to an estimated 820,000 dead trees across 150,000 acres in 2024. Mortality occurred throughout its range, and was most widespread in the northern interior, north and west of the greater Redding area (Shasta County). Mortality was generally recorded at light to moderate intensities; however, high-severity pockets were detected in more northern areas.
- Coulter pine (*P. coulteri*) mortality remained low and decreased from ~410 trees across 1,200 acres in 2023 to ~200 trees across 68 acres in 2024. Mortality occurred in small pockets throughout the central Coast and southern California.

Pine mortality attributed to mountain pine beetle (*D. ponderosae*):

Mountain pine beetle-caused tree mortality remained elevated and increased to an estimated 410,000 dead trees across 67,000 acres in 2024 compared to ~270,000 dead trees across 36,000 acres in 2023. Mortality was common throughout the region and areas of severe intensity were recorded in the northern interior, the Warner and White Mountain Ranges and along the crest of the Sierra Nevada Range.

- Limber pine (*P. flexilis*) mortality decreased from ~98,000 trees across 4,300 acres in 2023 to an estimated 49,000 trees across 3,100 acres in 2024. Mortality was common throughout its range and areas of severe mortality were detected along the southern crest of the Sierra Nevada Range and in the White Mountains.
- Lodgepole pine (*P. contorta*) mortality increased from an estimated 95,000 trees across 17,000 acres in 2023 to ~280,000 trees across 55,000 acres in 2024. Mortality was common throughout its range at low to moderate intensities, however areas of severe mortality were detected in northern interior California around Medicine Lake, Southern Warner Mountains, north of Lake Tahoe and in the Mammoth Lakes area.
- Sugar pine (*P. lambertiana*) mortality decreased from ~2,900 trees across 370 acres in 2023 to an estimated 2,600 trees across 850 acres in 2024. Mortality was common as single trees and small groups scattered throughout its range.
- Western white pine (*P. monticola*) mortality increased from approximately 4,400 trees across 1,200 acres to ~7,400 trees across 970 acres in 2024. Mortality occurred from the southern Sierra Nevada crest to the Oregon border but was particularly severe in the northern Warner Mountains and north of Lake Tahoe.
- Whitebark pine (*P. albicaulis*) mortality decreased from an estimated 71,000 trees across 13,000 acres in 2023 to ~66,000 trees across 6,800 acres in 2024. Mortality typically occurred as single trees or small groups throughout the range of whitebark pine, however larger areas of severe intensity mortality were recorded in the Warner Mountains (Modoc County) and around Lake Tahoe (Eldorado and Placer Counties).

Jeffrey pine mortality:

Jeffrey pine (*P. jeffreyi*) mortality attributed to Jeffrey pine beetle (*D. jeffreyi*) decreased from ~170,000 dead trees across 27,000 acres in 2023 to an estimated 71,000 dead trees across 13,000 acres in 2024. Mortality occurred primarily in higher elevations of the Sierra Nevada Range at light to moderate intensities however, several larger areas of severe intensity were recorded in widely dispersed areas.

Jeffrey pine mortality attributed to ips engraver beetles (*Ips* spp.) decreased from ~44,000 dead trees across 2,600 acres in 2023 to approximately 180 dead trees across 59 acres in 2024. Mortality was recorded as single trees or small groups in northern and central Los Padres NF, including a few larger areas of light intensity.

Pinyon pine mortality:

Pinyon pine (*P. monophylla*) attributed to *Ips* spp. decreased from an estimated 77,000 dead trees across 5,700 acres in 2023 to ~470 dead trees across 160 acres in 2024. Mortality was recorded as single trees or small groups concentrated primarily in the White Mountains and in the Mt. Pinos Ranger District (RD) of the Los Padres NF (Inyo and Mono Counties).

Knobcone pine mortality:

Knobcone pine (*P. attenuata*) mortality attributed to California flatheaded borer (*Melanophila californica*) remained consistent with ~5,800 dead trees across 480 acres in 2024 compared to ~4,400 dead trees across 840 acres in 2023. Mortality occurred in small pockets primarily in the north interior and particularly in western areas.

Knobcone pine mortality attributed to *Ips* spp. was not reported in 2024 nor prior to 2022 since no field observations have indicated otherwise. However, field observations along the northern coast and north interior indicate this was the primary causal agent in these areas in 2022 and 2023.

Gray pine mortality:

Gray pine (*P. sabiniana*) mortality decreased from an estimated 790 dead trees across 58 acres in 2023 to ~180 dead trees across 17 acres in 2024 in scattered small pockets throughout the interior of northern CA. The causal agent for gray pine mortality is not well understood and therefore assigned to an unknown agent or drought.

Oak mortality:

Goldspotted oak borer (*Agrilus auroguttatus*)-caused oak (*Quercus* spp.) mortality decreased from approximately 4,300 dead trees across 1,400 acres in 2023 to ~1,700 dead trees across 660 acres in 2024. Most mortality detected via aerial surveys occurred in and near the Palomar RD with scattered small group mortality throughout the Descanso RD, Cleveland NF. Furthermore, increasing mortality was again observed in the northern Trabuco RD, Cleveland NF. In addition, there were GSOB confirmations west of Lancaster on the Los Angeles Gateway RD (Los Angeles County).

Mortality Due to Diseases

Oak mortality, primarily in tanoak (*Notholithocarpus densiflorus*) attributed to sudden oak death (SOD) (*Phytophthora ramorum*) increased from ~2,300 dead trees across 620 acres in 2023 to an estimated 12,000 dead trees across 860 acres in 2024. Although this is a modest increase, mortality is still greatly reduced since the spread and impact of SOD is diminished in times of drought (Figure 6). Field reports indicate that a wet spring event in 2022 resulted in substantial new infections however, whole tree mortality has not yet become readily apparent.

Monterey pine (*P. radiata*) mortality decreased from an estimated 1,200 dead trees across 32 acres in 2023 to ~190 dead trees across 38 acres in 2024 mostly attributed to pitch canker but likely the result of a complex of damage causal agents.

Damage Other than Mortality

White fir defoliation caused by Douglas-fir tussock moth (*Orgyia pseudotsugata*) was not observed in 2024, down from ~9,600 acres in 2023 observed southwest of Quincy on the Plumas NF. This area was flown earlier than optimal in 2024 due to large wildfires in other areas necessitating earlier survey. Additionally, field reports of light to moderate defoliation have been reported in northern Lassen NF much of which was not flown in 2024 due to the Park Fire (429,603 acres, Butte and Tehama Counties).

Defoliation of lodgepole pine by lodgepole needleminer (*Coleotechnites milleri*) was recorded on approximately 530 acres in 2024 down from ~9,700 acres observed in 2023 located within Yosemite NP and Inyo NF. This causal agent is chronic in this area of the Sierra Nevada Range and the host appears to be tolerant of this damage with little associated mortality typically observed.

Defoliation of Sitka spruce (*Picea sitchensis*) attributed to spruce aphid (*Elatobium abietinum*), but likely a complex of pathogens, was recorded on approximately 310 acres in 2024 down from 1,700 acres detected in 2023. Defoliation occurred primarily south of Ferndale and near Big Lagoon along the north coast with no associated mortality detected (Humboldt County).

Defoliation of true fir attributed to balsam wooly adelgid (BWA) (*Adelges piceae*) was not documented in 2024 down from ~1,300 acres in 2023 along the northern border, mostly on the Rogue River NF. BWA is an exotic agent causing a

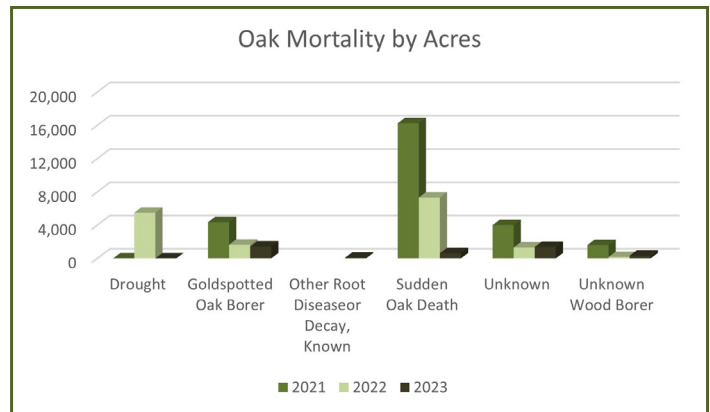


Figure 6. Chart compares the acres with oak mortality caused by various damage causing agents between 2022 and 2024.

chronic infestation situation. Subalpine fir is the most susceptible host, and this species is limited to a few isolated populations in CA. However, Oregon observers did detect BWA near the border.

Defoliation of quaking aspen (*Populus tremuloides*) was observed across 23 acres in 2024 down from more than 1,200 acres mapped in 2023. Defoliation in 2023 was attributed to multiple agents including: *Cytospora* spp., satin moth (*Leucoma salicis*), and frost damage. In 2024, the defoliated area in the northern Warners Mountains was verified as satin moth. The area north of Mono Lake is unverified.

Approximately 370 acres of ponderosa/Jeffrey pine defoliation attributed to dothistroma needle blight (*Dothistroma septosporum*) was detected in 2024 down from ~1,200 acres in 2023 and located along the northern coastal areas. An additional 3,200 acres of crown discoloration attributed to unknown causes were detected primarily in the north interior where the recent drought was most exceptional.

Defoliation of pinyon pine by pinyon needle scale (*Matsucoccus acalyptus*) was not detected in 2024, down from approximately 1,100 acres located in the central White Mountains in 2023 (Mono and Inyo Counties).

Forest Highlights

Note: Graphs for each National Forest show trends of conifer mortality during the past five years, both in estimated trees killed and area affected. Broadleaved trees especially tanoak and other oaks are not included. Note that 2020 is omitted since surveys were not flown that year due to Covid-19 concerns.

Angeles

Tree mortality decreased from ~12,000 dead trees across 2,200 acres in 2023 to an estimated 2,400 dead trees across 660 acres in 2024.

- White fir mortality decreased from an estimated 10,000 dead trees across 1,600 acres in 2023 to ~120 dead trees across 70 acres in 2024, primarily recorded as single trees or small pockets scattered in eastern areas of the Forest.
- Jeffrey pine mortality decreased with ~570 dead trees across 1,200 acres in 2024 compared to an estimated 1,300 dead trees over 560 acres in 2023 recorded primarily as single trees or small groups along with small areas at light intensity. Mortality was scattered throughout northeastern areas of the Forest.

Cleveland

Tree mortality decreased from ~5,000 dead trees across 1,500 acres in 2023 to an estimated 2,000 dead trees across 660 acres in 2024. Mortality was predominantly oak species and typically scattered in single trees or small groups throughout much of the forest.

- Detected oak mortality attributed to goldspotted oak borer decreased from ~3,900 dead trees across 1,400 acres in 2023 to ~1,200 trees across 530 acres in 2024 with most of the forest now affected.
- Oak mortality attributed to GSOB has generally decreased in the Palomar RD where the infestation has been well established likely due to a lack of favorable hosts. However, mortality is becoming more common on the northern Trabuco RD where the infestation is more recent.

Eldorado

Mortality decreased from an estimated 2.2 million dead trees across 150,000 acres in 2023 to ~460,000 dead trees across 59,000 acres in 2024. Mortality was most widespread throughout eastern higher elevations of the forest.

- California red fir mortality decreased from an estimated 2.1 million dead trees across 120,000 acres in 2023 to ~350,000 dead trees across 41,000 acres in 2024, mostly at light to moderate intensities. Areas of mortality in and around Bear Valley within the Calaveras RD were particularly widespread and severe.
- White fir mortality decreased from approximately 66,000 dead trees over 23,000 acres in 2023 to ~16,000 dead trees across 2,500 acres in 2024.
- Ponderosa pine mortality increased from an estimated 24,000 dead trees across 2,900 acres in 2023 to ~66,000 dead trees across 7,500 acres in 2024. Mortality was common as single trees and small groups Forest-wide, but larger areas of mortality were particularly concentrated on the Placerville RD.

Inyo

Mortality decreased from an estimated 350,000 dead trees over 41,000 acres in 2023 to ~110,000 dead trees across 17,000 acres in 2024.

- California red fir mortality attributed to fir engraver beetle decreased from approximately 100,000 dead trees across 17,000 acres in 2023 to ~28,000 trees across 9,200 acres in 2024. Although mortality was common throughout forest, north and west of Monache Mountain on the Mt. Whitney RD was particularly active (Tulare County).
- Though still quite elevated, limber pine mortality decreased from ~100,000 trees across 4,000 acres in 2023 to approximately 54,000 trees across 3,600 acres in 2024. Mortality was scattered throughout its range on the Forest, but mortality was more common on the White Mountains. This was especially the case in the south around Waucoba Mountain (Inyo County).
- Whitebark pine mortality decreased from 32,000 trees across 7,000 acres in 2023 to approximately 11,000 trees across 2,800 acres in 2024. Mortality was commonly scattered in small groups throughout its range on the Forest but areas around Mammoth Lakes were particularly active (Mono County).

- Pinyon pine mortality decreased from an estimated 78,000 dead trees across 5,000 acres in 2023 to ~200 dead trees across 65 acres in 2024.
- No lodgepole pine defoliation was detected in the Yosemite NP area in 2024 down from approximately 1,800 acres detected in 2023. There were, however, several areas of defoliation totaling approximately 530 acres were detected west of Mono Lake.

Klamath

Mortality decreased from an estimated 2 million dead trees across 132,000 acres in 2023 to ~660,000 trees across 100,000 acres in 2024. Mortality of several affected species, though still elevated, was less intense and expansive than recent years. Mortality was typically recorded at light to moderate intensities and activity was more extensive in southern and eastern areas of the Forest. Additionally, almost all the Forest was surveyed for the first time in many years since large wildfire perimeters are excluded from survey for two years.

- Shasta red fir mortality decreased from approximately 990,000 dead trees across 51,000 acres in 2023 to ~360,000 dead trees across 56,000 acres in 2024. Mortality was mostly recorded as single trees or small groups. Some larger areas were detected, generally at lighter intensities.
- White fir mortality decreased from approximately 770,000 dead trees across 56,000 acres in 2023 to ~100,000 dead trees across 19,000 acres in 2024.
- Ponderosa pine mortality decreased to approximately 100,000 dead trees across 15,000 acres from ~220,000 dead trees across 18,000 acres in 2023.
- Jeffrey pine mortality increased to approximately 34,000 dead trees across 4,100 acres from 4,700 dead trees across 1,500 acres in 2023. Mortality was scattered Forest-wide with southern and eastern areas being most active.
- Douglas-fir mortality decreased to ~13,000 dead trees across 2,600 acres in 2024 compared to approximately 34,000 dead trees across 4,300 acres in 2023. Mortality was scattered throughout the Forest, mostly at light to moderate intensities.

Lake Tahoe Basin

Mortality decreased from an estimated 1.7 million dead trees across 66,000 acres in 2023 to ~220,000 dead trees across 21,000 acres in 2024. Mortality was most elevated west and south of Lake Tahoe (Eldorado County).

- California red fir mortality decreased from approximately 1.6 million dead trees across 63,000 acres in 2023 to ~200,000 dead trees across 18,000 acres in 2024 and was by far the most impacted species.
- Whitebark pine mortality increased to approximately 11,000 dead trees across 1,300 acres from an estimated 3,700 dead trees across 470 acres in 2023. Mortality was located primarily along the Carson Mountain Range.

Lassen

Mortality decreased from an estimated 1.7 million dead trees across 200,000 acres in 2023 to ~370,000 dead trees across 79,000 acres in 2024. Mortality was common throughout surveyed areas of the Forest. The Almanor RD in the southwest was mostly not surveyed due to the 2024 Park Fire (429,603 acres, Butte and Tehama Counties) and other recent fires.

- White fir mortality decreased from approximately 760,000 dead trees across 30,000 acres in 2023 to ~220,000 dead trees across 47,000 acres in 2024 and was more concentrated in eastern areas.
- Ponderosa pine mortality decreased to approximately 80,000 trees across 21,000 acres from an estimated 170,000 trees across 30,000 acres in 2023. Mortality was scattered Forest-wide at light to moderate intensities, but generally more extensive in eastern areas.
- California red fir mortality decreased from approximately 720,000 dead trees across 67,000 acres in 2023 to ~52,000 dead trees across 8,200 acres in 2024 scattered throughout the Forest at light to moderate intensities, particularly within the Thousand Lakes Wilderness on the Hat Creek RD (Shasta County).

Los Padres

Mortality decreased from an estimated 37,000 dead trees across 4,700 acres in 2023 to ~4,600 dead trees across 740 acres in 2024. Most of the mortality occurred on the Monterey RD in the north and the Mount Pinos RD in the east.

- Oak mortality increased to ~2,700 trees across 80 acres from an estimated 2,500 trees across 310 acres in 2023. Mortality was scattered forest-wide but occurred mostly on the Monterey RD and Mount Pinos RD. Some of this mortality was attributed to SOD on the Monterey RD, but most was left unknown since due to unverified field observations in those areas.
- Jeffrey pine mortality decreased from approximately 23,000 dead trees across 1,900 acres in 2023 to ~180 dead trees across 60 acres in 2024.
- Pinyon pine mortality decreased from approximately 1,900 dead trees across 11,000 acres in 2023 to ~220 dead trees across 100 acres in 2024.
- White fir mortality increased to an estimated 930 trees across 390 acres in 2024 from approximately 30 dead trees in 2023.

Mendocino

Mortality decreased from ~1.1 million dead trees across 130,000 acres in 2023 to ~110,000 dead trees across 25,000 acres in 2024. Mortality was common throughout but was generally more widespread in central areas.

- Ponderosa pine mortality decreased from approximately 650,000 dead trees across 72,000 acres in 2023 to ~80,000 dead trees across 16,000 acres in 2024. Mortality was common Forest-wide.
- Shasta/California red fir mortality decreased to an estimated 11,000 dead trees across 2,700 acres from approximately 54,000 dead trees across 6,500 acres in 2023. Mortality was more common in northern areas of the Forest.
- White fir mortality decreased from approximately 260,000 dead trees across 36,000 acres in 2023 to ~16,000 dead trees across 5,800 acres in 2024. Mortality was more concentrated in central and northern areas.

Modoc

Mortality decreased from an estimated 1.3 million dead trees across 140,000 acres in 2023 to ~480,000 dead trees across 87,000 acres in 2024. Mortality was mostly concentrated in far western areas and the Warner Mountains (Modoc County).

- White fir mortality decreased from approximately 940,000 dead trees across 96,000 acres in 2023 to ~250,000 dead trees across 61,000 acres in 2024. Mortality was most extensive in the Warner Mountains, Medicine Lake (Siskiyou County), and east of Big Valley (Modoc County). High stand density is likely associated with mortality in these areas.
- Ponderosa pine mortality decreased from approximately 100,000 dead trees across 24,000 acres in 2023 to ~41,000 dead trees across 9,200 acres in 2024. Mortality was scattered at light to moderate intensities in many areas. The largest pockets were located north of Medicine Lake.
- Lodgepole pine mortality sharply increased from approximately 7,800 trees across 2,000 acres to ~79,000 trees across 6,900 acres in 2024. Mortality was mostly concentrated in areas around Medicine Lake as well as southern Warner Mountains.

Plumas

Mortality decreased from an estimated 1.6 million dead trees across 130,000 acres in 2023 to ~340,000 dead trees across 69,000 acres in 2024. Mortality was most widespread and intense in south central and northwestern areas of the Forest. For the first time in many years, virtually the entire Forest was surveyed in 2024 since large wildfire perimeters are excluded from survey for two years.

- California red fir mortality decreased from approximately 1.1 million dead trees across 70,000 acres in 2023 to ~170,000 dead trees across 25,000 acres in 2024 and was particularly concentrated in south central areas.
- Ponderosa pine mortality increased from an estimated 53,000 trees across 9,200 acres in 2023 to ~79,000 trees across 15,000 in 2024 typically scattered in moderate sized pockets throughout the Forest.
- White fir mortality decreased from approximately 370,000 dead trees across 53,000 acres in 2023 to ~84,000 dead trees across 25,000 acres in 2024 and closely correlated to overly dense forest conditions.

San Bernardino

Mortality decreased from an estimated 8,400 dead trees across 2,200 acres in 2023 to ~2,200 dead trees across 830

acres in 2024. Mortality was typically widely scattered and light in severity, with the most active areas located south of Big Bear Lake.

- White fir mortality decreased from approximately 5,300 dead trees across 1,100 acres in 2023 to ~320 dead trees across 130 acres in 2024.
- Jeffrey pine mortality remained unchanged from approximately 1,200 dead trees across 430 acres in 2023 to ~1,300 dead trees across 370 acres in 2024, primarily located in Big Bear Valley (San Bernardino County).
- Substantial amounts of defoliated oak attributed to fruit tree leafroller were detected in areas around Lake Arrowhead (San Bernardino County).

Sequoia

Mortality decreased from an estimated 360,000 dead trees across 53,000 acres in 2023 to ~78,000 dead trees across 15,000 acres in 2024. Most of the mortality was light to moderate in severity with higher elevation, mature, and dense mixed conifer forest most impacted.

- California red fir mortality decreased from approximately 140,000 dead trees across 27,000 acres in 2023 to ~52,000 dead trees across 11,000 acres in 2024.
- White fir mortality decreased from approximately 130,000 dead trees across 11,000 acres in 2023 to ~3,800 dead trees across 1,300 acres in 2024.
- Ponderosa pine mortality decreased from approximately 48,000 dead trees across 7,700 acres in 2023 to ~11,000 dead trees across 780 acres in 2024.

Shasta-Trinity

Mortality decreased from an estimated 2.6 million dead trees across 260,000 acres in 2023 to ~730,000 dead trees across 100,000 acres in 2024. Mortality was more extensive and severe in northeastern areas of the Forest.

- Shasta/California red fir mortality decreased from approximately 1.4 million dead trees across 74,000 acres in 2023 to ~440,000 dead trees across 42,000 acres in 2024. Mortality was common in high elevation areas but was particularly concentrated east of Summerville on the Weaverville RD (Trinity County).
- White fir mortality decreased from approximately 570,000 dead trees across 89,000 acres in 2023 to ~110,000 dead trees across 26,000 acres in 2024.
- Ponderosa pine mortality decreased from approximately 360,000 dead trees across 57,000 acres in 2023 to ~170,000 dead trees across 31,000 acres in 2024 scattered throughout most of the Forest.
- Douglas-fir mortality decreased from approximately 280,000 dead trees across 32,000 acres in 2023 to ~3,800 dead trees across 2,800 acres in 2024 scattered throughout most of the Forest.

Sierra

Mortality decreased from an estimated 970,000 dead trees across 110,000 acres in 2023 to ~310,000 dead trees across 60,000 acres in 2024 mostly at light to moderate intensities and occurred primarily in higher elevation mixed conifer stands.

- California red fir mortality decreased from approximately 850,000 dead trees across 92,000 acres in 2023 to ~290,000 dead trees across 54,000 acres in 2024.
- White fir mortality decreased from approximately 31,000 dead trees across 8,100 acres in 2023 to ~1,500 dead trees across 1,200 acres in 2024.
- Lodgepole pine mortality decreased from approximately 32,000 dead trees across 4,000 acres in 2023 to ~12,000 dead trees across 4,400 acres in 2024.

Six Rivers

Mortality decreased from an estimated 67,000 dead trees across 11,000 acres in 2023 to ~50,000 dead trees across 12,000 acres in 2024. Mortality was common at light to moderate severities in southern areas of the Forest.

- White fir mortality remained unchanged from 2023 levels with approximately 19,000 dead trees across 4,000 acres in 2024.
- Ponderosa pine mortality decreased from approximately 33,000 dead trees across 5,000 acres in 2023 to ~5,800 dead trees across 1,300 acres in 2024.

- Douglas-fir mortality decreased from ~10,000 dead trees across 1,600 acres in 2023 to approximately 2,800 trees across 610 acres in 2024.

Stanislaus

Mortality decreased from an estimated 1.6 million dead trees across 150,000 acres in 2023 to ~680,000 dead trees across 69,000 acres in 2024. Mortality was most widespread and severe in central to eastern regions of the Forest.

- California red fir mortality decreased from approximately 1.2 million dead trees across 110,000 acres in 2023 to ~640,000 dead trees across 55,000 acres in 2024. Both high elevation pure stands and high elevation mixed conifer stands were impacted.
- White fir mortality decreased from approximately 300,000 dead trees across 39,000 acres in 2023 to ~16,000 dead trees across 6,500 acres in 2024.
- Lodgepole pine mortality increased from 6 dead trees recorded in 2023 to ~19,000 dead trees across 5,600 acres in 2024.

Tahoe

Mortality decreased from an estimated 6.5 million dead trees across 330,000 acres in 2023 to ~1.2 million dead trees across 120,000 acres in 2024. Mortality was reduced at lower elevations but remained expansive at moderate to severe intensities along central, high elevation areas of the Forest.

- California red fir mortality decreased from approximately 6 million dead trees across 290,000 acres in 2023 to ~1.1 million dead trees across 100,000 acres in 2024.
- White fir mortality decreased from approximately 160,000 dead trees across 22,000 acres in 2023 to ~32,000 dead trees across 9,500 acres in 2024.
- Ponderosa pine mortality decreased from approximately 360,000 dead trees across 15,000 acres in 2023 to ~13,000 dead trees across 2,700 acres in 2024.
- Lodgepole pine mortality increased from 69 dead trees recorded in 2023 to ~28,000 dead trees across 7,800 acres in 2024.

Acres with Mortality and Estimated Number of Dead Trees by Forest (2024)

National Forest	Acres	Dead Trees
Angeles National Forest	720	2,400
Cleveland National Forest	650	2,000
Eldorado National Forest	59,000	460,000
Fremont-Winema National Forest	30	260
Humboldt-Toiyabe National Forest	19,000	120,000
Inyo National Forest	17,000	110,000
Klamath National Forest	100,000	660,000
Lake Tahoe Basin Management Unit	21,000	220,000
Lassen National Forest	79,000	370,000
Los Padres National Forest	730	4,600
Mendocino National Forest	25,000	110,000
Modoc National Forest	150,000	480,000
Plumas National Forest	69,000	340,000
Rogue River-Siskiyou National Forests	9,100	48,000
San Bernardino National Forest	3,500	2,200
Sequoia National Forest	16,000	80,000
Shasta-Trinity National Forest	100,000	730,000
Sierra National Forest	61,000	310,000

National Forest	Acres	Dead Trees
Six Rivers National Forest	15,000	50,000
Stanislaus National Forest	69,000	680,000
Tahoe National Forest	120,000	1,200,000

The numbers of acres and trees throughout this report have been rounded as appropriate.

* Includes acreages outside of California, but within the National Forest boundary.

Acres with Mortality and Estimated Number of Dead Trees by County (2024)

County	Acres	Dead Trees
Alameda	41	350
Alpine	41,000	530,000
Amador	10,000	67,000
Butte	6,000	19,000
Calaveras	6,300	40,000
Colusa	250	690
Contra Costa	480	4,400
Del Norte	4,800	17,000
El Dorado	48,000	350,000
Fresno	58,000	290,000
Glenn	7,400	36,000
Humboldt	8,300	70,000
Inyo	2,700	47,000
Kern	1,800	11,000
Lake	4,600	17,000
Lassen	83,000	360,000
Los Angeles	510	2,300
Madera	21,000	94,000
Marin	240	1,300
Mariposa	13,000	61,000
Mendocino	12,000	56,000
Modoc	50,000	240,000
Mono	4,600	26,000
Monterey	100	540
Napa	200	560
Nevada	29,000	230,000
Orange	150	580
Placer	47,000	530,000
Plumas	54,000	260,000
Riverside	40	220
San Benito	25	25
San Bernardino	980	2,300
San Diego	610	1,900
San Luis Obispo	28	150
San Mateo	24	130

County	Acres	Dead Trees
Santa Barbara	81	2,800
Santa Clara	62	62
Santa Cruz	94	94
Shasta	35,000	180,000
Sierra	68,000	680,000
Siskiyou	240,000	1,700,000
Solano	8	8
Sonoma	330	1,200
Tehama	12,000	56,000
Trinity	43,000	180,000
Tulare	40,000	200,000
Tuolumne	47,000	300,000
Ventura	150	320
Yuba	4,000	16,000

The numbers of acres and trees throughout this report have been rounded as appropriate.

Citation

Williams, A.P., Cook, B.I. & Smerdon, J.E. Rapid intensification of the emerging southwestern North American mega-drought in 2020–2021. *Nat. Clim. Chang.* 12, 232–234 (2022). <https://doi.org/10.1038/s41558-022-01290-z>