California Forest Pest Conditions 2024

FULL 12(e)

A publication of the California Forest Pest Council

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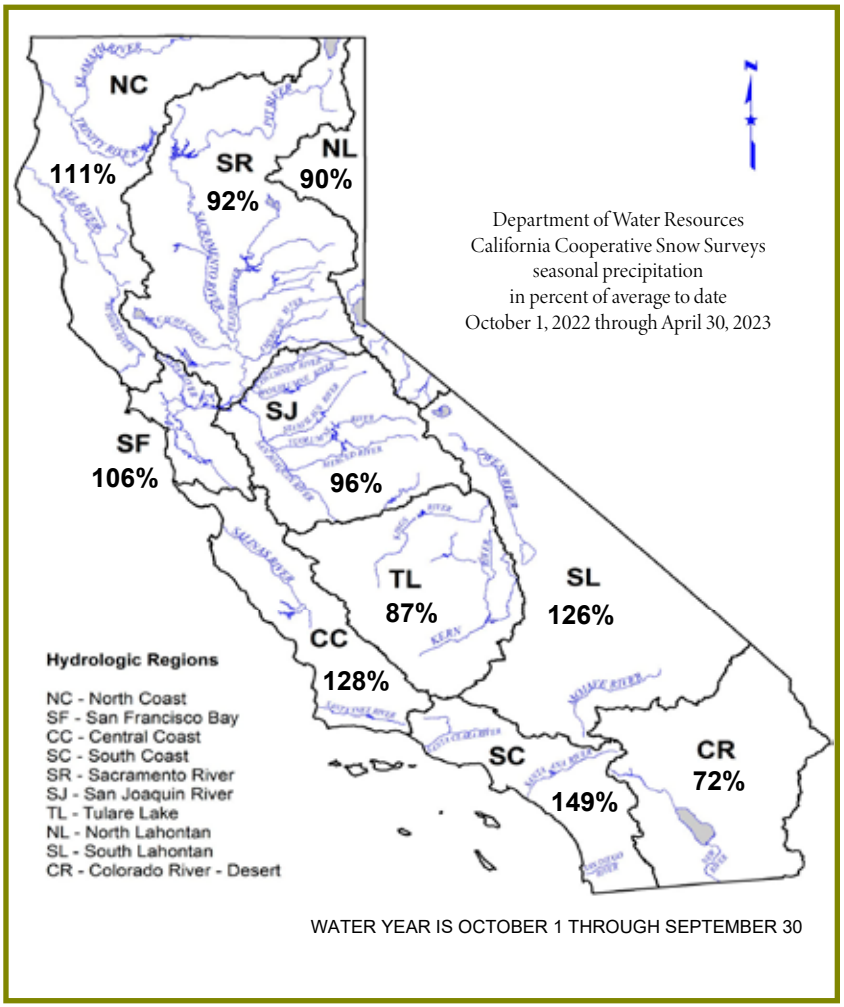
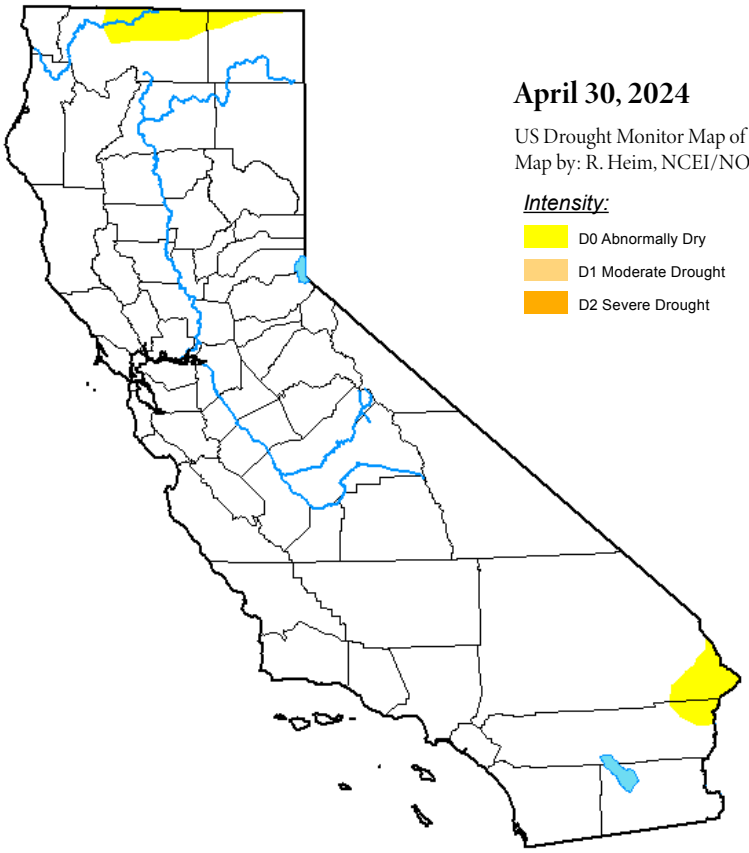
Cover photo:
Aspen defoliation caused by white satin moth, Dismal Swamp, Modoc NF (Modoc County).
Photo Credit: D. Cluck, USDA Forest Service

Statewide precipitation was 93% of average from October 2023 - April 2024, compared to 141% of average for the same time period in 2022 - 2023. In Northern California, forested area rainfall totals were 90 - 111% of average, and Southern California areas were 72 - 128% of average (see map at right). The 2023 – 2024 water year (water year is from October 1 – September 30) aligned with historical averages (1901 - 2000) as the 54th wettest and 76th driest (since 1895). Precipitation was below average in October and November (bottom 1/3 of years on record), but was followed by normal precipitation in January and February, and above average precipitation in February and March (top 1/3 of years on record). Precipitation was normal for April, May, and August and below normal for July and September. (bottom 1/3). While most of the year's precipitation was unexcptional, June was the 7th dryest on record, and the two-month period of June to July 2024 was the 4th dryest on record.



Statewide temperatures deviated signifigantly from historical averages (1895 – 2022) with the 2023 – 2024 water year being the 4th warmest on record. While February, March, and April temperatures were in the normal range, temperatures in every other month were above normal. September was the 6th warmest, December and June were the 3rd warmest, and July was the warmest ever recorded (4.1°F, 5.0°F, 5.8°F, and 6.9°F above average, respectively). The four month period of June to September was the warmest on record (4.8°F above average) (https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/statewide/rankings).



April 30, 2024

US Drought Monitor Map of California
Map by: R. Heim, NCEI/NOAA

Intensity:

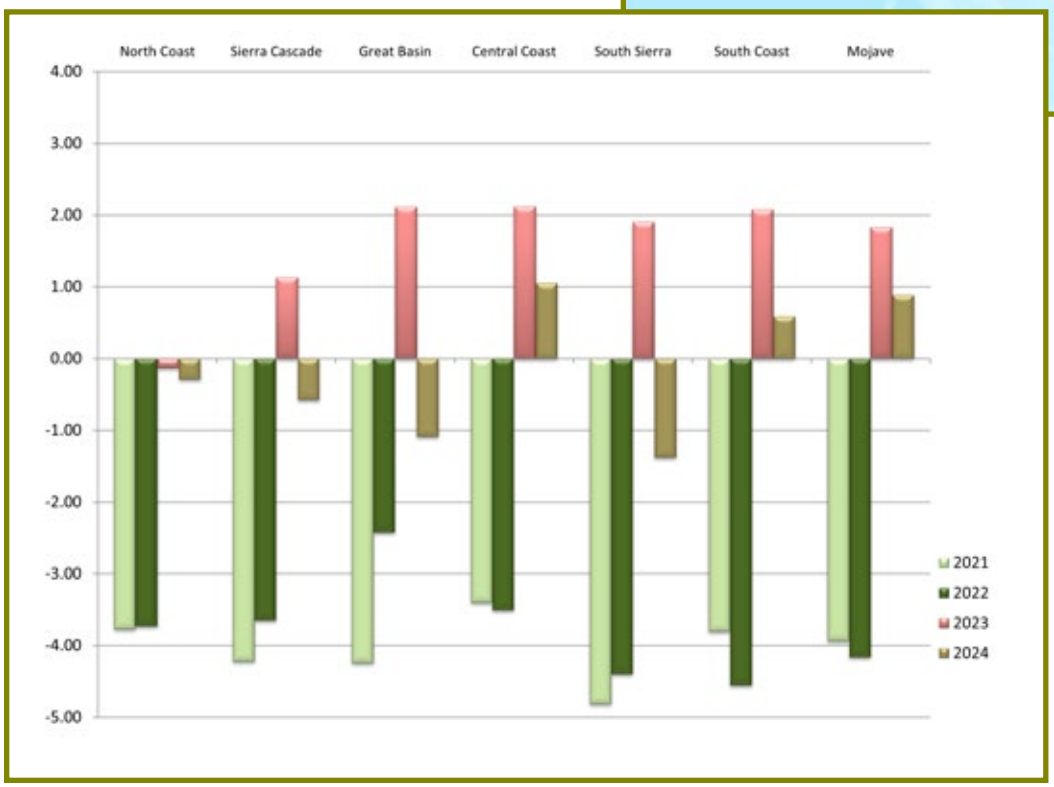
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

Palmer Drought Index

The Palmer Drought Severity Index (PDSI) is an indicator of drought and moisture excess, with negative values denoting degree of drought. For the 2023 – 2024 water year, the yearly average PDSI values ranged from -1.38 in the South Sierras (driest zone) to 1.05 in the Central Coast (wettest zone) (see map). As of September 30, 2024, the northern half of the state and the Southern Sierras had a precipitation deficit, while the southern part of the state and the Central Coast had a moisture surplus.

Climate Divisions for the Palmer Drought Severity Index.
Map by: M. Woods, Forest Service

Palmer Drought Severity Index (PDSI) for California, 2021 - 2024



Palmer Classifications

Value	Description
4.0 or more	Extremely wet
3.0 to 3.99	Very wet
2.0 to 2.99	Moderately wet
1.0 to 1.99	Slightly wet
0.5 to 0.99	Incipient wet spell
0.49 to -0.49	Near normal
-0.5 to -0.99	Incipient dry spell
-1.0 to -1.99	Mild drought
-2.0 to -2.99	Moderate drought
-3.0 to -3.99	Severe drought
-4.0 or less	Extreme drought

Source: National Climatic Data Center, U.S. Department of Commerce, https://www.ncei.noaa.gov/pub/data/cirs/climdiv

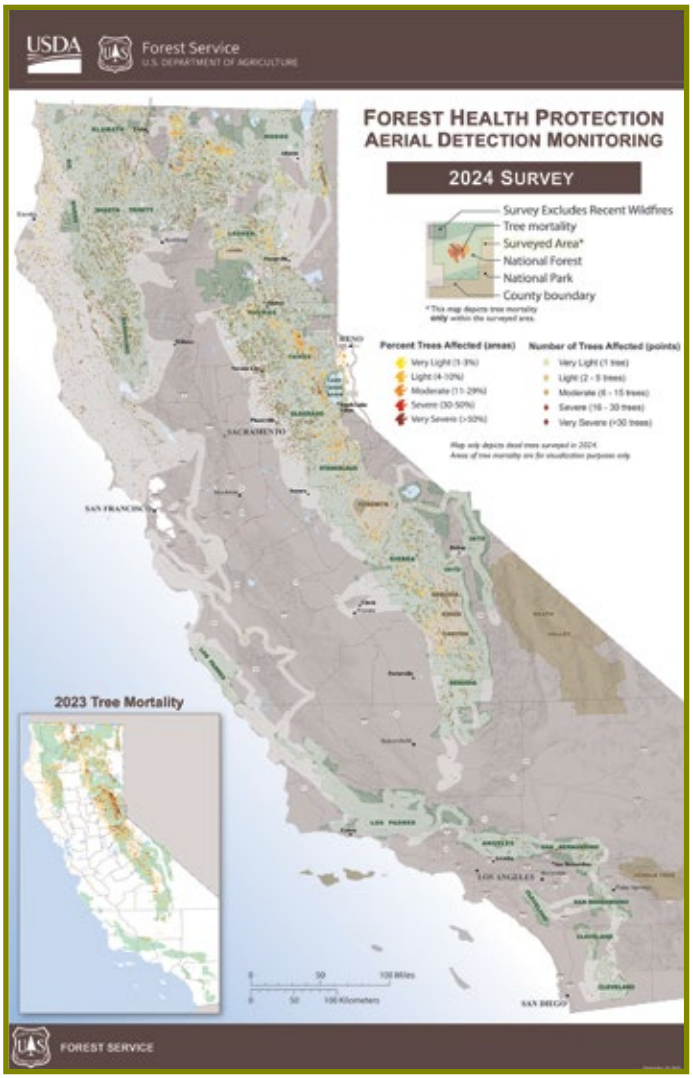
Survey Summary
Acres surveyed 2024: 40.1 million acres
Acres surveyed 2023: 38.2 million acres

The USDA Forest Service, Pacific Southwest Region, State and Private Forestry staff conducts annual aerial surveys throughout forested areas of California to detect recent tree mortality, defoliation, and other damage. Aerial Detection Surveys (ADS) 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 forested areas are surveyed including National Forests (NF), National Parks (NP), and other federal, state, tribal, and private industrial and non-industrial lands.

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).

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.

Elevated levels of tree mortality (i.e. more than 1% of forested area affected) caused primarily by insects or diseases were recorded on approximately one million acres. Most of the dead trees were recorded as fir (*Abies* spp.), followed by yellow pine (*Pinus ponderosa*, *P. jeffreyi*, *P. coulteri*), and Douglas-fir (*Pseudotsuga menziesii*).



USDA Forest Service Aerial Detection Survey Results, California, 2024.
Map by: M. Woods, Forest Service

The following information was collected for each area with tree mortality or damage: a) damage type (mortality, top kill, defoliation, branch flagging, dieback, 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. Tree mortality and damage were recorded on a severity scale based on the percent of trees affected within a given area. Severity of mortality and damage was rated as follows: very light (1-3% of mapped area affected), light (4-10%), moderate (11-29%), severe (30-50%), and very severe (>50%). Below we report the estimated number of acres affected and/or severity of mortality or damage within those areas.

**Note: acres of mortality or damage may be noted in more than one bullet below as multiple damage agents can occur in the same location.*

Bark Beetles and Wood Borers

- California/Shasta red fir (*Abies magnifica*, *A. magnifica* var. *shastensis*), white fir (*A. concolor*), and grand fir (*A. grandis*) comprised almost 75% of the tree mortality recorded in 2024. Though still elevated region-wide, mortality decreased from 2022-2023 levels, likely due to two years of ample precipitation.
  - Approximately 5.2 million dead firs across 750,000 acres were detected in 2024, compared to ~24.3 million dead firs across 1.9 million acres recorded in 2023. While mortality of firs has decreased statewide overall, mortality is still common throughout California and widespread in northern and central areas of the Sierra Nevada Range, especially at higher elevations.
  - White fir mortality was widespread but generally light to moderate in intensity and associated with heavily stocked mixed conifer stands.
  - Red fir mortality generally occurred in mature, pure, high-elevation stands at light to severe intensities. Mortality was most intense and widespread in the central Sierra Nevada Range from northern Stanislaus NF (El Dorado County) to the Southern Plumas NF (Plumas County).

- Pine mortality attributed to western pine beetle (*Dendroctonus brevicomis*) remained elevated but was significantly reduced from recent years with ~810,000 dead trees over 150,000 acres in 2024 compared to ~2.9 million dead trees across 330,000 acres in 2023. Mortality was most widespread in the northern interior, especially north and west of the greater Redding area (Shasta County). Mortality also continued but at reduced levels in and around recent high-severity pockets primarily in the northern Sierra Nevada Range.
- Douglas-fir mortality caused by flatheaded fir borer (*Phaenops drummondi*) decreased substantially in 2024 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. Ongoing mortality occurred primarily in the greater Redding area (Shasta County), however mortality continued to decrease in the Coast Range, which had severe mortality in 2022.

Whitebark pine mortality east of Oleary Flat, Warner Mountains, Modoc NF.
Photo by: N. Stevens, Forest Service

- Pine mortality attributed to mountain pine beetle (*D. ponderosae*) remained elevated and increased from an estimated 270,000 dead trees across 36,000 acres in 2023 to ~410,000 dead trees across 67,000 acres in 2024. Mortality was common throughout the state, but was particularly widespread in areas around Mammoth Lakes and Mono County and most severe in limber pine (*P. flexilis*) throughout most of its range in California.
- High-elevation five-needle pine (i.e. limber, whitebark (*P. albicaulis*), western white (*P. monticola*), and foxtail (*P. balfouriana*)) mortality remained elevated but decreased from an estimated 190,000 dead trees across 21,000 acres in 2023 to approximately ~120,000 dead trees across 11,000 acres with mortality in 2024. Whitebark pine was the most heavily impacted of the species. The decrease in high-elevation pine mortality in recent years may be due to lack of viable hosts in many of the affected areas.
- Jeffrey pine (*P. jeffreyi*) mortality attributed to Jeffrey pine beetle (*D. jeffreyi*) or *Ips* spp. decreased from ~170,000 dead trees across 27,000 acres in 2023, to ~71,000 dead trees across 13,000 acres in 2024.
- Goldspotted oak borer (*Agrilus auroguttatus*)-caused oak (*Quercus* spp.) mortality remained low and decreased from ~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 survey occurred in and near the Palomar Ranger District on the Cleveland NF (San Diego County). Oak mortality on the Trabuco Ranger District increased this year, however only some of the observations were recorded as GSOB.
- Pinyon pine (*P. monophylla*) mortality attributed to *Ips* spp. decreased from ~77,000 dead trees across 5,700 acres in 2023 to ~470 dead trees across 160 acres in 2024.

Defoliation

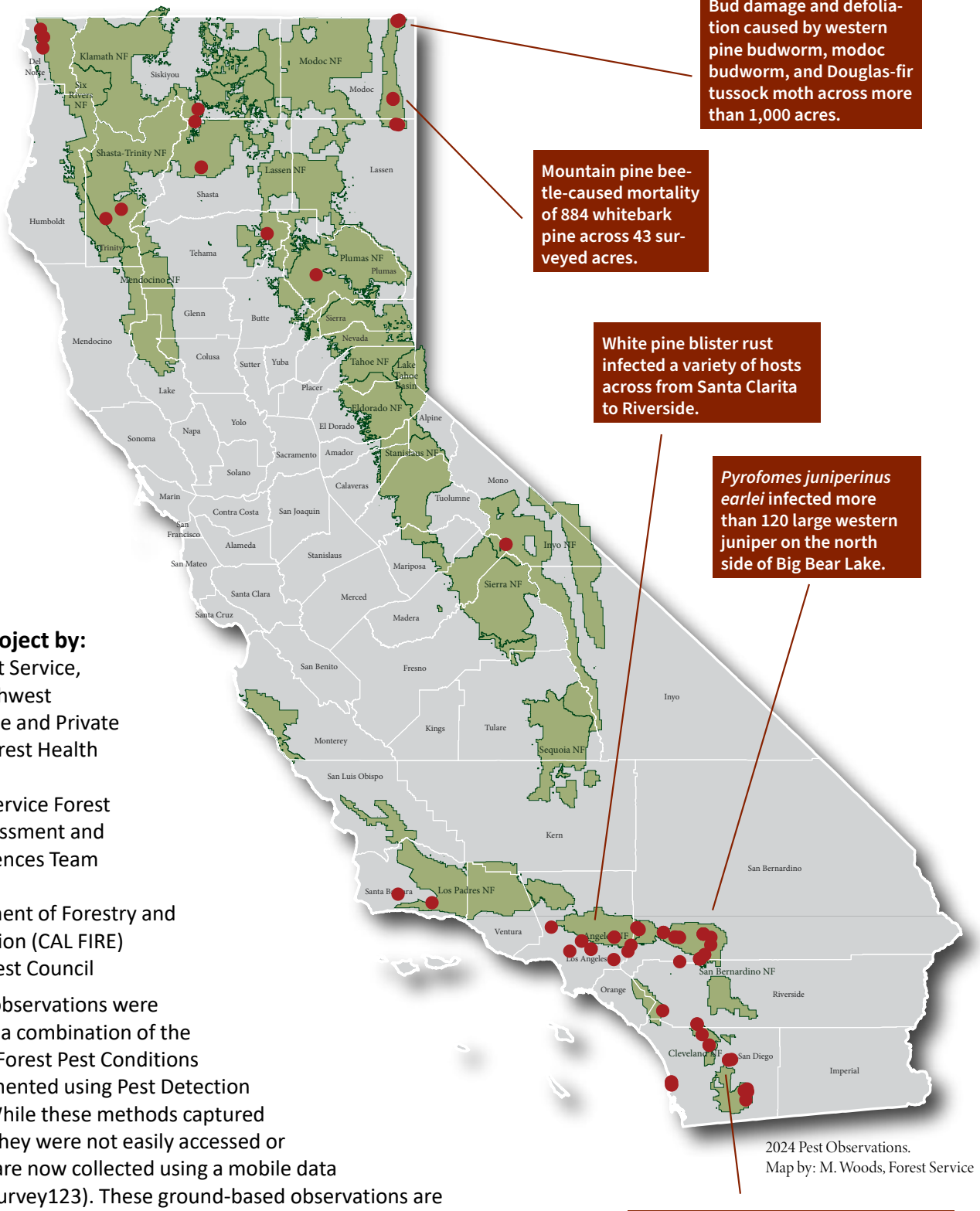
- No fir defoliation caused by Douglas-fir tussock moth (*Orgyia pseudotsugata*) was detected in 2024 compared to approximately 9,600 acres recorded in 2023, primarily located in and around the Plumas NF (Plumas County). However, this area may have been surveyed too early to detect defoliation in 2024 due to large wildfires to the south or not at all due to the Park Fire (429.603 acres, July 2024, Butte and Tehama County).
- Severe defoliation of lodgepole pine (*P. contorta*) by lodgepole needleminer (*Coleotechnites milleri*) was detected across ~530 acres in eastern Yosemite NP and Inyo NF in 2024 compared to ~9,700 acres detected in the same area in 2023 (Tuolumne and Mono Counties).

Diseases

- Tanoak (*Notholithocarpus densiflorus*) mortality attributed to sudden oak death (*Phytophthora ramorum*) increased but remained low with an estimated 12,000 dead trees across 870 acres detected in 2024 compared to approximately 2,300 dead trees across 620 acres in 2023. Several consecutive years of dry spring weather has likely inhibited the spread of this invasive pathogen. Field reports indicate multiple wet spring events in 2022 resulted in new infections of the disease but has not yet resulted in widespread new mortality.

Drought

- Lingering mixed conifer (white fir, Douglas-fir, ponderosa pine, knobcone pine (*P. attenuata*), and incense-cedar (*Calocedrus decurrens*) mortality in the north interior of California, driven by three years of exceptional drought conditions (2020-2022), continued but was greatly reduced. Two years of near-normal precipitation and reduced competition likely helped ameliorate this mortality event.



2024 Pest Observations.
Map by: M. Woods, Forest Service

Collaborative Project by:

- USDA Forest Service, Pacific Southwest Region, State and Private Forestry, Forest Health Protection
- US Forest Service Forest Health Assessment and Applied Sciences Team (FHAAST)
- CA Department of Forestry and Fire Protection (CAL FIRE)
- CA Forest Pest Council

Historically, pest observations were captured through a combination of the annual California Forest Pest Conditions Report and documented using Pest Detection Reports (PDRs). While these methods captured the information, they were not easily accessed or searchable. Data are now collected using a mobile data collection form (Survey123). These ground-based observations are located in an ArcGIS Online (AGOL) feature layer. They are available on request.

For 2024, all observations were submitted via the mobile data entry form and supplement the Aerial Detection Survey data. This map shows the locations of pest observations made by forest health professionals in 2024. The most frequently reported damage-causing agent was white pine blister rust, followed by true mistletoe, brown cubical rot, and Armillaria root disease. The most frequently reported host species was California black oak (*Quercus kelloggii*), followed by California live oak (*Q. agrifolia*).

Native Insects

Bark and Woodboring Beetles

Mountain Pine Beetle (*Dendroctonus ponderosae*)

North Interior

Mountain pine beetle-caused mortality of whitebark pine (*Pinus albicaulis*) continued on Goosenest Mountain, Klamath NF (Siskiyou County). Mortality occurred in groups of 1-3 trees across approximately 40 acres surrounding and within the caldera.

Northern Sierra Nevada

The ongoing mountain pine beetle outbreak in lodgepole pine (*P. contorta*) at Medicine Lake, Modoc NF has resulted in hundreds of dead trees within the 300-acre recreation area and thousands of dead trees within the larger 4,500-acre caldera (Siskiyou County). This high level of tree mortality is a concern for public safety, wildlife habitat, and the aesthetic value of this popular destination. In addition to ongoing beetle repellant (verbenone) applications and green infested tree removal, Modoc NF and Forest Health Protection staff administered insecticides to protect individual, high-value trees from continued beetle attack.

Trunk spraying to prevent mountain pine beetle attacks near Medicine Lake, Modoc NF (Siskiyou County).
Photo by: D. Cluck, Forest Service

Mountain pine beetle activity dramatically increased in the Warner Mountains on the Modoc NF where beetles attacked whitebark pine (>6-inch DBH) and western white pine (*P. monticola*) (>12-inch DBH) in multi-tree groups (Modoc County). The greatest activity was in whitebark pine where ground survey transects revealed 34 separate groups of dead whitebark pine ranging from 2-82 trees. These transects covered 63 acres (<1% of whitebark pine's geographic range) where 882 green infested trees were documented. The transect area appeared to represent conditions found in most of the Warner Mountains which suggests major impacts to whitebark pine over the next few years.

Mountain pine beetle continued to attack and kill fire-injured western white and lodgepole pines near Silver Lake and the Caribou Wilderness, Lassen NF (Lassen County). These trees sustained mostly cambial injury on the lower trunk during the 2021 Dixie Fire (963,309 acres, Butte, Lassen, Plumas, Shasta, and Tehama Counties). As in 2023, several hundred trees over approximately 2,000 acres were infested individually and in small groups of 3-5 trees. In 2024, more trees were attacked in unburned green islands and adjacent stands than in previous years.

Pitch tubes and frass on whitebark pine caused by mountain pine beetle. Warner Mountains, Modoc NF (Modoc County).
Photo by: D. Cluck, Forest Service

Southern Sierra Nevada

Small patches of 2-3 dead lodgepole and whitebark pine were observed along the ridgelines on the east side of the Ritter Range and Mammoth Crest (Inyo County). Limber pine (*P. flexilis*) mortality was scattered across the White Mountain Range, Inyo NF (Mono County). New, successful attacks by mountain pine beetle were found on four, dead, mature limber pines (>12-inch DBH) across two acres during a ground check in the Ancient Bristlecone Forest near Schulman Grove along Forest Road 4S01 (Mono County). Bark beetle activity in limber pine has been previously observed in this general area. Mountain pine beetle galleries were also observed under the bark of an older, dead bristlecone pine (*P. longaeva*) near the infested limber pines.

Mountain pine beetle activity persisted around Mammoth Mountain and surrounding locations within Mammoth Lakes where lodgepole pine is intermixed with mountain hemlock (*Tsuga mertensiana*) and whitebark and western white pines (Mono County). While mountain pine beetle-caused tree mortality has notably decreased in the Chain of Lakes basin southeast of Lake Mary, as many as one lodgepole pine per two acres showed new symptoms of attack, particularly in the southern areas where beetle activity was reported last year. Two western white pines (~20-inch DBH) were mass attacked and killed in a permit housing tract along Lake Mary Road where hazard trees were recently removed. A ten-acre open forest location in the town of Mammoth

Lakes was treated with pine beetle repellent (verbenone) earlier in the summer after infested and dead trees were removed.

Mountain pine beetle mass attacks were found on six dead, legacy-sized western white pines near Ebbetts Pass Trailhead during a 20-acre ground survey along Highway 4 (Alpine County).

Mountain pine beetle attacks on lodgepole pines, Pine City Campground, east shore of Lake Mary (Mono County). Photo by: B. Bulaon, Forest Service

Western white pines mass attacked and killed by mountain pine beetle, Ebbetts Pass, Stanislaus NF (Alpine County). Photo by: B. Bulaon, Forest Service

Western Pine Beetle

(*Dendroctonus brevicomis*)

North Interior

Widespread western pine beetle-caused mortality of ponderosa pine (*P. ponderosa*) occurred along Highway 299 from Buckhorn Summit to Weaverville within the Shasta-Trinity NF (Trinity County). Trees killed were either observed singly or in pockets of 3-5 dead trees.

Several large groups (>20 trees) of dead ponderosa pine were observed surrounding Yreka on private land along Interstate 5 and Highway 3 into and along Scott Valley between Fort Jones and Etna (Siskiyou County).

Northern Sierra Nevada

Western pine beetle activity was generally low across Northeastern California in 2024, but several areas had ponderosa pine mortality in groups of 2-5 trees. This pattern was observed near both Adin Pass and Fandango Valley (Modoc County), Gold Run Road near Susanville (Lassen County), Schneider Creek Road near Quincy (Plumas County), Highway 172 near Mineral (Tehama County), and Forest Ranch (Butte County).

Southern Sierra Nevada

Western pine beetles killed ponderosa pine trees along the western slopes of the southern Sierra Nevada Range where activity was reported in 2023. Dead trees were widely scattered (<1 tree/acre) and adjacent to main roads where other factors may have contributed to mortality.

Individual dead ponderosa pines were observed throughout the landscape at lower elevations (<4,000 feet) in Amador, Calaveras, El Dorado, Mariposa, and Tuolumne Counties, though no large groups of dead trees were observed.

Southern California

Diffuse mortality (< 1 tree/acre) of ponderosa and Coulter pine (P. coulteri) remained consistent in higher elevation areas between 5,000-7,000 feet in the areas of Mount Pinos (Los Padres NF, Ventura County), Indian and Thomas Mountains on the San Jacinto National Monument (San Bernardino NF, Riverside County), Holcomb Valley (San Bernardino NF, San Bernardino County), and San Gabriel Mountains National Monument (Angeles NF, Los Angeles County). Observed mortality was caused by a combination of both bark beetle attack and Heterobasidion root disease (*Heterobasidion irregulare*). Tree mortality along Forest Service Road 2N10 in the San Bernardino NF is largely associated with cambial injury resulting from the Radford Fire in 2022 (1,079 acres, San Bernardino County).

Jeffrey Pine Beetle (*Dendroctonus jeffreyi*)

Southern Sierra Nevada

The High Sierra Ranger District silviculturist reported Jeffrey pine beetle activity near Huntington Lake, Sierra NF (Fresno County). Jeffrey pine beetle and red turpentine beetle mass attacked a stand of Jeffery pine (*P. jeffreyi*) trees, killing ten large trees (>25-inch DBH). This area had not been recently disturbed, nor had other bark beetle activity been reported there. Ground surveys of the area are ongoing.

Southern California

Scattered Jeffrey pine beetle activity (<1 tree dead/acre), consistent with the past five years, occurred in higher elevation areas between 5,000-7,000 feet, including Mount Laguna (Cleveland NF, San Diego County) and along the Angeles Crest

Highway (Angeles NF, Los Angeles County). Observed mortality is attributed to a combination of both bark beetle attack and Heterobasidion root disease.

Areas previously impacted by bark beetles in the Big Bear area (San Bernardino NF, San Bernardino County) and along the Angeles Crest Highway (Angeles NF, Los Angeles County) were impacted by the Line and Bridge Fires of September 2024 (43,978 and 56,030 acres, respectively) resulting in significant tree damage and loss.. The full impact of the fires on bark beetle activity and populations will not be known for several years.

Red Turpentine Beetle (*Dendroctonus valens*)

Southern Sierra Nevada

Red turpentine beetle pitch tubes were observed on several large ponderosa pines following a prescribed fire in Calaveras Big Trees State Park (Calaveras County). The largest eight trees (>20-inch DBH) in a two-acre survey each had more than 20 pitch tubes at their base. No signs of other bark beetles were observed. Red turpentine beetle activity was limited to trunk char outlines on affected trees and trees were alive at the time of the survey.

Douglas-fir Beetle (*Dendroctonus pseudotsugae*)

North Coast

Infestations of Douglas-fir beetle were observed in individual, large-diameter (>60-inch DBH), windthrown Douglas-fir (*Pseudotsuga menziesii*) trees at Jedediah Smith State Park Campground (Del Norte County) and along the Homestead Trail in Humboldt Redwoods State Park (Humboldt County). The root system of the fallen tree at Humboldt Redwoods State Park was completely decayed by the root-rotting fungus *Phaeolus schweinitzii*. At Bear River Ridge, Douglas-fir beetle attacks were confirmed on large (40–60-inch DBH) Douglas-fir trees at the forest/prairie interface (Humboldt County). Black stain root disease (*Leptographium wageneri*) was also present in attacked trees, suggesting an association with Douglas-fir beetles and disease-stressed trees.

Fir Engraver (*Scolytus ventralis*)

North Interior

Both white (*Abies concolor*) and red fir (*A. magnifica*) mortality continued in the Shasta McCloud Management Unit, Shasta-Trinity NF (Siskiyou County). Mortality was most associated with fir engraver beetle attacks in overstocked stands and was scattered at approximately 2-5 trees per acre over at least 10,000 acres surrounding both the north and south faces of Mount Shasta (Shasta County).

Northern Sierra Nevada

Standing dead white and red fir remained on the eastern slopes of Mt. Lassen from Deer Mountain Road to the southeast, though new mortality appeared to be reduced from prior years, likely due to recent drought relief (Shasta County). However, quantifying new mortality over large areas proved difficult due to prior years' dead trees retaining their dead needle complement for multiple years, especially red fir. The area has extensive infestations of dwarf mistletoe and Cytospora canker (*Cytospora abietis*).

Fresh fir engraver attacks observed on the Tahoe NF near Yuba Pass in 2023 showed high levels of resin streaming, suggesting unsuccessful colonization (Sierra County). These sites were revisited in 2024, revealing that approximately 30% of attacked trees died or had top kill.

Southern Sierra Nevada

True fir mortality in the southern Sierra Nevada continued and more than 1 dead tree/acre was observed at multiple locations. Areas where high levels of mortality were observed in 2022 and 2023 were ground surveyed to assess probable causes of tree death. Fir engraver beetles were observed on half of all standing dead trees. Wood samples taken from the remaining dead trees suggest that mortality may have been caused by woodborer activity and not fir engraver.

Ground checks in red fir-dominant forests on the Eldorado and Stanislaus NFs revealed that true firs of all diameters were killed over the past three years (Calaveras and Placer Counties). Fir engraver galleries were observed on dead trees in two-thirds of the plots surveyed. Heterobasidion root disease was observed in dead stumps, and dwarf mistletoe was present on live and dead trees in only a few surveyed stands.

Similar levels of fir engraver-caused mortality in variable size classes of red fir were observed around 7,000 feet elevation at Rancheria Campground, Sierra NF (Fresno County). Chronic red fir mortality in this area over recent years has resulted in ongoing hazard tree abatement or site closure.

Southern California
Fir mortality caused by fir engraver and Heterobasidion root disease was observed on private inholdings of the San Bernardino NF in Crestline and Twin Peaks (San Bernardino County). Complete fir mortality occurred in 4-5, 1-acre patches. Scattered fir mortality (3 tree/acre) was observed on Cerro Noreste Mountain, Los Padres NF (Kern County).


Fir engraver galleries on a standing dead white fir, San Bernadino NF (San Bernardino County). Photo by: B. Kyre, Forest Service

Flatheaded Fir Borer (*Phaenops drummondi*)

North Interior
Flatheaded fir borer activity in the northern counties decreased compared to 2021 and 2022. Douglas-fir mortality was still widespread in Siskiyou County; however, the primary cause of mortality was identified as lingering drought stress and potential long-term sapwood damage. Bark peeled from multiple fading Douglas-fir trees revealed few flatheaded fir borer galleries, suggesting flatheaded fir borer likely wasn't the cause of early decline. Trees in later stages of decline were heavily infested with flatheaded fir borer, engravers, and round-headed borer.

Northern Sierra Nevada
Douglas-fir mortality caused by drought and flatheaded fir borer declined dramatically because of the wet winter of 2022-2023 and the near normal winter of 2023-2024. Most areas with high levels of tree mortality in Butte and Shasta Counties over the past 2-3 years had little to no tree mortality in 2024.

Spruce Engraver Beetle (*Ips tridens*)

North Interior
Spruce (*Picea* spp.) mortality in South Russian Creek and Blake's Fork drainages in the Russian Wilderness, Klamath NF was first reported in July 2023 and ground surveyed this past summer (Siskiyou County). The 3–5-acre mortality pocket consists of Engelmann spruce (*Picea engelmannii*) in varying levels of decline mixed with ponderosa pine, white fir, and incense-cedar. White fir and possibly spruce were infected by Heterobasidion root disease and *Armillaria* spp. Piles of frass were found along the stem of a recently fallen Engelmann spruce with green foliage. Beetles were collected from the tree and later identified as spruce engraver beetle.


Fallen Englemann spruce log, Russian Wilderness, Klamath NF (Siskiyou County). Photo by: C. Snyder, Forest Service

Pine Engravers (*Ips* spp.)

Southern Sierra Nevada
A severe winter storm in the White Mountains knocked down a live bristlecone pine (~30-inch DBH) that was subsequently attacked by pine engravers (Mono County). Infestation likely occurred in late spring or early summer as no live ips larvae or adults were present. Dead beetles found in galleries are in the process of being identified to species.

Pine engraver activity in pinyon pines (*P. monophylla*) was very low in the southeastern Sierra Nevada, but activity may have been obscured by other damage agents such as pinyon needle scale (*Matsucoccus acalyptus*) or lingering drought effects. Dead trees were not as prevalent in 2024 as in recent years and no new ips attacks were observed in areas where activity was reported previously.

Cedar Bark Beetles (*Phloeosinus* spp.)

North Coast
Cedar bark beetle-caused mortality of incense-cedar (*Calocedrus decurrens*) was observed in Lake, Shasta, and Siskiyou Counties. Tree mortality appeared patchier and more opportunistic compared to recent drought years. The pattern and severity of the attacks suggest that cedar bark beetles may have contributed to the death of some incense-cedar but were not the primary cause of mortality.FULL 12(e)

Foliar Insects

Black Pineleaf Scale (*Nuculaspis californica*)

Black pineleaf scale on sugar pine near Shaver Lake, Sierra NF (Fresno County). Photo by: B. Bulaon, Forest Service

Black pineleaf scale on sugar pine needles.
Photo by: N. Kent, CAL FIRE

Ponderosa pine severely infested by black pineleaf scale, Bear Valley Springs (Kern County). Photo by: K. Edwards, Black Fox Timber Management Group, Inc

Pinyon needle scale, near Cedar Flat, Inyo NF (Inyo County).
Photo by: B. Bulaon, Forest Service

Southern Sierra Nevada

CAL FIRE and Southern California Edison reported a severe black pineleaf scale outbreak on mature sugar pines (*P. lambertiana*) surrounding Shaver Lake, Sierra NF (Fresno County). Affected trees were greater than 20-inch DBH within a one-mile buffer around the lake. Trees were heavily infested with black pineleaf scale, and their thin crowns were visible from a distance. Affected trees displayed a top-down needle loss and discoloration that is distinctive. No other tree species showed signs of infestation, nor were sugar pines outside of the one-mile buffer affected.

Wildfire smoke and air pollutants that collect around the lake could be affecting predator populations, causing scale numbers to increase and further distribute within crowns. Treatments for scale control are planned for Spring 2025.

Southern California

Black pineleaf scale affected a significant portion of the Jeffrey and ponderosa pine stands in Bear Valley Springs (Kern County). Bark beetle outbreaks were previously reported in the 2,600-acre area and the remaining trees were attacked again by black pineleaf scale in 2024. Over 200 infested trees were removed and many more showed reduced health and vigor In Bear Valley Springs, lack of soil moisture due to drought and high temperatures were most likely the cause of black pineleaf scale infestation.

Pinyon Needle Scale (*Matsucoccus acalyptus*)

Southern Sierra Nevada

The chronic infestation of pinyon needle scale around Cedar Flat along Highway 168 appeared to decrease to endemic levels (Inyo County). Epicormic branching on trees that had lost nearly 70% of their crown was observed at pinyon needle scale monitoring plots established in the area. A couple of trees still showed moderate levels of scale infestation, but older affected trees had less scale presence and were struggling to re-flush. Monitoring in this area will continue as pinyon needle scale is expected to return.

Douglas-fir Tussock Moth (*Orgyia pseudotsugata*)

Northern Sierra Nevada

The white fir defoliation caused by Douglas-fir tussock moth near Bucks Lake and LaPorte, Plumas NF in 2023 was absent in 2024 (Plumas County). However, light to moderate defoliation was observed at northern locations of the Lassen NF where caterpillars were found with no associated

defoliation in 2023. Impacted areas included Morgan Summit and Turner Mountain (Tehama County). It was unclear if frost damage to new white fir foliage in 2023 disrupted populations and led to asynchrony of the outbreak in these areas relative to the adjacent Plumas NF sites.

Light white fir defoliation caused by Douglas-fir tussock moth, Turner Mountain, Lassen NF (Tehama County).
Photo by: D. Cluck, Forest Service

Satin moth caterpillar, Dismal Swamp, Modoc NF (Modoc County).
Photo by: D. Cluck, Forest Service

Satin Moth

(*Leucoma salicis*)

Northern Sierra Nevada

Defoliation of quaking aspen (*Populus tremuloides*) caused by satin moth was detected at Dismal Swamp in the Warner Mountains, Modoc NF (Modoc County). Aspen in the approximately 100-acre stand were nearly completely defoliated.

Aspen defoliation caused by white satin moth. Dismal Swamp, Modoc NF (Modoc County).
Photo by: D. Cluck, Forest Service

Modoc Budworm

(*Choristoneura viridis*)

Northern Sierra Nevada

White fir shoot damage caused by Modoc budworm was observed in the Warner Mountains across several thousand acres. Damage was mostly light but highly variable across the landscape where white fir is the dominant tree species. Bald Mountain, Fandango Peak, Mount Vida, and Yellow Mountain were impacted (Modoc County). Webbing, frass, and dead foliage were associated with infested trees and concentrated in the upper crowns. A few sapling size trees were observed with full crown defoliation.

Sugar pine tortrix

(*Choristoneura lambertiana*)

Northern Sierra Nevada

Shoot damage caused by sugar pine tortrix (known as western pine budworm outside of California) was observed in lodgepole, western white, and whitebark pine in the Warner Mountains (Modoc County). Damage to lodgepole and western white pine was mostly light but variable across a few thousand acres. Yellow Mountain and Dismal Swamp south to Fandango Peak were impacted (Modoc County). Damage to whitebark pine was mild and observed across approximately 1,500 acres

Left: Bud damage from Modoc budworm activity, and Right: Modoc budworm larva, Warner Mountains, Modoc NF (Modoc County). Photos by: D. Cluck, Forest Service

Bud damage on whitebark pine from sugar pine tortrix activity, Warner Mountains, Modoc NF (Modoc County).
Photo by: D. Cluck, Forest Service

Sugar pine tortrix larva on western white pine, Warner Mountains, Modoc NF (Modoc County).
Photo by: D. Cluck, Forest Service

Red humped caterpillars feeding on bigleaf maple, Meadow Valley, Plumas NF (Plumas County). Photo by: D. Cluck, Forest Service

in the upper Pine Creek Watershed (Modoc County). Damage was focused on the upper crown in all host species and associated with webbing, frass, and dead foliage on newly elongating shoots.

Redhumped Caterpillar (*Schizura concinna*)

Northern Sierra Nevada

Bigleaf maples (*Acer macrophyllum*) were partially defoliated by redhumped caterpillar on the Plumas NF (Plumas County). Affected trees were scattered along riparian corridors and roadsides. Notable areas with more than 20 partially defoliated trees included Highway 89 south of Canyon Dam, Bucks Lake Road and Schneider Creek Road near Quincy, and Meadow Valley (Plumas County).

Two-horned Oak Gall Wasp (*Dryocosmus dubiosus*)

North Coast

Damage to coast live oaks (*Quercus agrifolia*) from two-horned oak gall wasp was particularly severe in 2024, with 60% defoliation observed on many trees. Samples from affected trees were received from locations ranging from Big Sur in the south (Monterey County) to the Anderson Valley in the north (Mendocino County).

Fruittree Leafroller (*Archips argyrospila*)

Southern California

Extensive infestations of fruittree leafroller caused approximately 150 acres of scattered and severe California black oak (*Q. kelloggii*) defoliation in the communities of Valley of Enchantment and Lake Arrowhead within the San Bernardino NF (San Bernardino County). The most severe portion of the infestation occurred on the permitted property of Pacific Pines Camp and encompassed approximately ten acres. Though defoliation was drastic, oaks in all affected areas successfully leafed out.

Aspen Leafroller (unknown species)

Southern Sierra Nevada

A light infestation of an unknown aspen leafroller was noted in a two-acre site of quaking aspen along Sherwin Creek and Forest Road 4S08 (Mono county). The insect caused 10-30% defoliation of affected aspen trees, primarily on branch ends, but did not directly kill the trees. No specimens were found for identification. Dead mature aspens were found with large Cytospora cankers

Fruittree leafroller webbing, Pacific Pines Camp, San Bernardino NF (San Bernardino County).
Photo by: B. Kyre, Forest Service

Fruittree leafroller webbing on non-host tree, Pacific Pines Camp, San Bernardino NF (San Bernardino County).
Photo by: B. Kyre, Forest Service

(*Valsa sordida*), suggesting mortality in the overstory was caused by the cankers.

Conifer Aphids
(unknown species)
Southern Sierra Nevada
Twenty acres of sugar pine plantations at Badger Hill, Placerville Nursery were moderately to severely infested with an unknown species of conifer aphid (El Dorado County). The eastern side of the plantation had the most severe signs of infestation with large aggregations of aphids encircling the upper trunks and heavy exudate along the entire length of trunks, limbs, and needles. Smaller groups of 1-3 trees with heavy infestations were found in other sections of the plantation, particularly in trees with overlapping canopies.

Left: Defoliation caused by aspen leafroller, and Right: Close up of leaf damage caused by aspen leafroller, Sherwin Creek, Inyo NF (Mono County). Photos by: B. Bulaon, Forest Service

Left: Conifer aphids on sugar pine, and Right: Exudate caused by conifer aphids, Badger Hill, Placerville Nursery (El Dorado County). Photos by: B. Bulaon, Forest Service

Non-Native and Invasive Insects

Non-Native Inects

Oystershell Scale
(*Lepidosaphes ulmi*)
Southern California
Oystershell scale is currently contributing to aspen decline in Arizona and was identified in California for the first time on three planted aspens on the North Shore of Big Bear Lake, San Bernardino NF (San Bernardino County). Highly infested limbs were removed and the main stems were physically scrubbed to remove adult insects. Naturally occurring remnant aspen stands in the San Bernardino NF were surveyed with no sign of oyster-shell scale.

Adult oystershell scale on the main stem of a planted aspen, Big Bear Lake, San Bernardino NF (San Bernardino County). Photo by: B. Kyre, Forest Service

Blackheaded budworm, Humboldt Bay National Wildlife Refuge (Humboldt County). Photo by: C. Lee, CAL FIRE

Blackheaded budworm, Humboldt Bay National Wildlife Refuge (Humboldt County). Photo by: C. Lee, CAL FIRE

Sitka Spruce Defoliators (various)
North Coast
The widespread Sitka spruce (*Picea sitchensis*) defoliation observed in 2023 and attributed to the non-native spruce aphid (*Elatobium abietinum*), the spruce

Bot canker damage on spruce branch tips, Humboldt Bay National Wildlife Refuge (Humboldt County). Photo by: C. Lee, CAL FIRE

Damage to grand fir caused by balsam wooly adelgid, Lake Earl Wildlife Management Area (Del Norte County). Photo by: C. Lee, CAL FIRE

spider mite (*Oligonychus unguis*), and blackheaded budworm (*Acleris gloverana*) decreased to a small, less than one-acre plot at the Humboldt Bay National Wildlife Refuge along Highway 101 in Loleta (Humboldt County). In affected area, trees growing nearest to a drainage ditch displayed numerous dead and wilted branch tips. The common bot canker fungus *Diplodia mutila* was isolated from the branch tips.

Invasive Insects

Balsam Wooly Adelgid (*Adelges piceae*)

North Coast

Balsam wooly adelgid continued to infest grand fir (*A. grandis*) in areas of the North Coast. Extreme gouting and changes in crown form were observed on individual grand fir trees at the Lake Earl Wildlife Management Area (Del Norte County).

Swelling of branch tips caused by balsam wooly adelgid, Lake Earl Wildlife Management Area (Del Norte County). Photo by: C. Lee, CAL FIRE

Goldspotted Oak Borer (GSOB) (*Agrilus auroguttatus*)

www.gsob.org

Los Angeles County

A newly documented infestation of 170 coast live oaks extended through the 500+ acres of East and Rice Canyon managed by the Mountain Recreation and Conservation Authority. Given the number of infested trees, GSOB had likely been in the area for several years. GSOB-infested trees were also observed in Whitney Canyon Park and the infestation extended into Angeles NF. The host range for GSOB in the western side of Angeles NF is limited to scattered coast live oak present in drainages. GSOB management continued in the community of Green Valley within the borders of Angeles NF, with additional management of infested trees in the drainages of Bouquet Reservoir.

Riverside County

Goldspotted oak borer infestation significantly increased in Mount San Jacinto State Park. Infestations were widespread over the 350-acre area and GSOB were found primarily on California black oak and some canyon live oak (*Q. chrysolepis*). Heavily infested trees were removed.

Goldspotted oak borer activity was confirmed in approximately 528 acres of recreational areas in and surrounding the Idyllwild-Pine Cove communities. These recreational areas include four campgrounds (Fern Basin, Fuller Mill, Humber Park, and Lake Fulmor), Idyllwild Arts, Riverside County Park, and Camp Emerson Boy Scout Camp. Goldspotted oak borer emergence holes were observed on 860 California black oak trees at those sites, 41 of which showed signs of heavy infestation (>50 emergence holes per tree). The San Bernardino NF is working in conjunction with the Mountain Community Fire Safe Council to remove infested trees and protect remaining high value oaks.

San Bernardino County

The most recent satellite infestation of goldspotted oak borer was found in Crestline. The small infestation of approximately five trees was the first confirmed presence of GSOB in the western San Bernardino Mountains.

In addition to Crestline, GSOB presence has now been confirmed in five communities within and adjacent to the San Bernardino Mountains: Big Bear, Forest Falls, Oak Glen, Sugarloaf, and Yucaipa. The majority of the infested trees were California black oak. An oracle oak (*Q. morehus*) was lightly infested in Oak Glen and a single interior live oak (*Q. wislizeni*) was infested in Forest Falls. Oracle oak's susceptibility to GSOB is not fully understood, and interior live oak is not a common host. Evidence of GSOB infestation was found on 22 coast live oaks in a previously un-surveyed 55-acre area in Wildwood Canyon State Recreation Area near Yucaipa, and in 16 coast live oaks in the 225-acre Silverwood Lake State Recreation Area.

Goldspotted oak borer activity was also confirmed in the community of Wrightwood on the San Bernardino/San Gabriel Mountains border, Angeles NF. Beetle populations around Wrightwood may have been impacted by the 2024 Bridge Fire (56,030 acres, Los Angeles and San Bernardino Counties). Surveys are currently ongoing.

The anticipated large-scale dieback of California black oak in the eastern San Bernardino Mountain communities has not yet been observed.

Newly ecclosed adult goldspotted oak borer harvested on August 23 (San Diego County). Photo by: B. Kyre, Forest Service

San Diego County

Goldspotted oak borer is considered widespread in San Diego County on all land including private, municipal, state, Tribal, and federal. Joint management efforts continue to expand between agencies, Tribes, and cooperators.

Ventura County

A small infestation of three coast live oaks (< 20 exit holes each) in Box Canyon was the first presence of GSOB recorded in Ventura County. GSOB was likely introduced through the movement of infested firewood. Surveys and management of infested trees will continue in Box Canyon and surrounding areas.

Invasive Shot Hole Borer (ISHB) (*Euwallacea fornicatus* and *E. kuroshio*)

http://www.iscc.ca.gov/ishb.html

http://www.ishb.org

Los Angeles County

In 2024, approximately 368 parks were inspected for invasive shothole borer and other tree pests. Twenty-nine surveyed parks were found to have light to moderate ISHB infestation. These included Polliwog Park (Manhattan Beach), Reservoir Hill, Ruth Caruthers, and Saddleback Parks (Cerritos), Eisenhower Memorial Park (Arcadia), Blaisdell Ranch, El Barrio, Memorial, and Rancho San Jose Parks and Oak Park Cemetery (Claremont), Lakewood Parks and Recreation Center (Lakewood), Mills Park (La Verne), Centennial Heritage and Finkbiner Parks (Glendora), Hermosillo and Robert White Parks (Norwalk), Monterey Park (Monterey), Encanto and Glenn Miller Parks (West Covina), Country Hollow, Ganesha, Snow Creek, and Walnut Ranch Parks (Pomona), Puente Park (La Puente), Ronald Reagan Park (Diamond Bar), Creekside and Sycamore Canyon Parks (Walnut), and Arroyo North and South Parks (Azusa). The majority of infested trees were sycamores (*Platanus* spp.) and some were palo verde (*Parkinsonia* spp.).

Multiple Los Angeles County Parks and city parks had heavy to severe infestations: Whittier Narrows Recreation Area (El Monte), Hollydale Park (South Gate), Brookside Park (Pasadena), Banna Park (Covina), Walnut Creek (Baldwin Park), Loma Alto County Park (Altadena), Crescenta Valley County Regional Park (La Crescenta), and Juan Bautista de Anza Park (Calabasas). Infested trees included sycamores, coast live oaks, cottonwoods (*Populus fremontii*), box elders (*Acer negundo*), California buckeye (*Aesculus californica*), palo verde, willows (*Salix* spp.), and valley oak (*Q. lobata*).

In December 2023, California State Parks discovered an extensive ISHB infestation in Tapia Park, Malibu Creek State Park in Calabasas. More than 100 infested trees were found across approximately 60 acres. While tree surveys continue, California

State Parks found approximately 30 ISHB amplifier trees in this park, which includes a large riparian forest. Most infested trees were box elder, coast live oak, California sycamore (*Plantanus racemosa*), cottonwoods (*Populus trichocarpa* and *P. fremontii*), red and arroyo willows (*Salix laevigata* and *S. lasiolepis*), and ash (*Fraxinus dipetala*).

San Bernardino County
ISHB was detected on traps placed in Devils Canyon, but no infested host trees have been observed yet.

Ambrosia Beetle (*Euwallaceae interjectus*)
Central Coast
Severe beetle-induced tree mortality was reported in the city of Felton along the San Lorenzo River adjacent to Henry Cowell Redwoods State Park (Santa Cruz County). While box elder was the primary host, California sycamore, willow, and coast live oak were also affected. Initially, the infestation was thought to be invasive shothole borer, but the beetles were later identified as *Euwallaceae interjectus*. Though the beetle can be found in Hawai'i and in southeastern parts of the United States, this is the first observation of *Euwallaceae interjectus* in California. Given the number of trees impacted and the presence of multiple amplifier trees, it is likely that the beetle had been present in the area for several years.

Mediterranean Oak Borer (*Xyleborus monographus*)
Northern California
Mediterranean oak borer continued to spread and is now confirmed in seven counties: El Dorado, Lake, Mendocino, Napa, Sacramento, Sonoma, and Yolo.

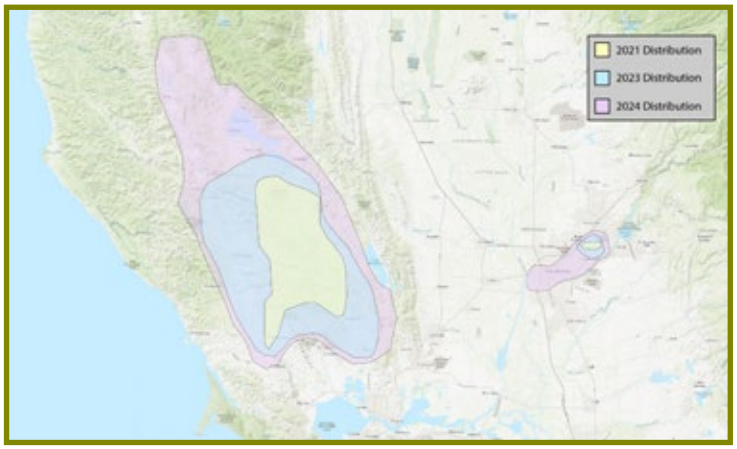
Imported Willow Leaf Beetle (*Plagiodera versicolora*)
North Coast
Feeding by imported willow leaf beetle on native willows was common in Del Norte and Humboldt Counties in 2024. Beetles skeletonize willow foliage, often causing the entire tree crown to appear dark brown as though the tree is dying; however, damage is usually transient.

Emerging Pest Highlights

The following exotic invasive pests are not currently causing widespread damage to trees in California but have been caught in monitoring traps or intercepted at airports and agricultural checkpoints and therefore pose a potential risk.

Spongy Moth (*Lymantria dispar dispar*)
Southern California
Between October 4, 2023, and July 22, 2024, the California Department of Food and Agriculture (CDFA) confirmed that 16 adult spongy moths were trapped in the City of Calabasas (Los Angeles County).

Delimitation traps were placed at a minimum density of 25 traps per square mile. The success of the eradication program is monitored by intensive trapping for two seasons following any



Distribution of Mediterranean oak borer from 2021 through 2024.
Map by: C. Ewing, CAL FIRE

Feeding of imported willow leaf beetle on willow leaves (Humboldt and Del Norte Counties).
Photo by: C. Lee, CAL FIRE

Euwallaceae interjectus damage on boxelder, Felton CA (Santa Cruz County).
Photo by: B. Woodward, UCANR

Adut dotted paropsine leaf beetle.
Photo by: C. Gnadt, Irvine Public Works and Sustainability

Dotted paropsine leaf beetle larvae feeding on eucalyptus leaves.
Photo by: M. Porter, Marks Tree Service & Consulting

potential treatment activities. An egg mass survey was conducted between September and October 2024. This included a visual inspection of all properties in up to a 400-meter radius around the moth detection sites. No egg masses were found during the survey.

Dotted Paropsine Leaf Beetle (*Paropsis atomaria*)

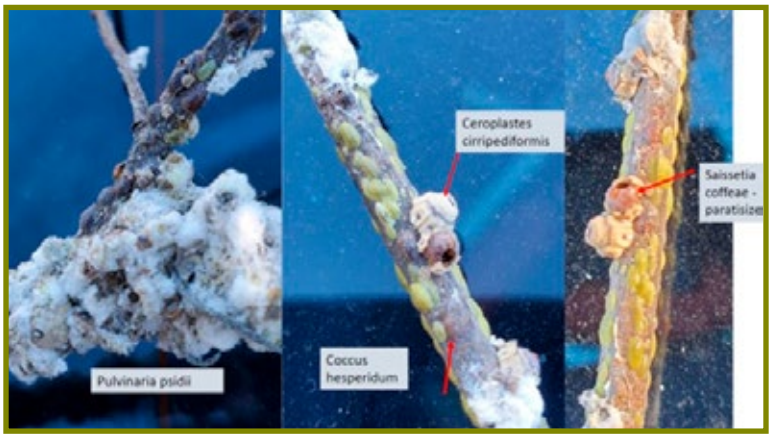
Los Angeles County

Heavy infestations of dotted paropsine leaf beetle were observed at Whittier Narrows Recreation Area, a residence in Beverly Hills, Starshine Park (Diamond Bar), near Kanan Road (Agoura Hills), Calabasas, and Temple City. Dotted paropsine leaf beetle infested 1,527 eucalyptus (*Eucalyptus globulus*) trees in the cities of Anaheim, Fontana, Glendale, Lakewood, Norco, Rolling Hills, Tustin, and La Habra, and Pomona.

A moderate infestation of dotted paropsine leaf beetle impacted eucalyptus trees throughout El Dorado Regional Park, Long Beach. Nearly 100 adult beetles were collected as bycatch in early detection traps set in the park and maintained from May-August.

Riverside County

Over 1,500 eucalyptus trees were heavily infested and had significant dieback in Temecula, Norco, and Jurupa Valley in Riverside County. Dotted paropsine leaf beetle was first found in Los Angeles County in 2022. Since then, it has spread to Orange, Riverside, San Bernardino, San Diego, and Ventura Counties. Populations are in high numbers throughout its range in Southern California. Dotted paropsine leaf beetle's host trees include at least 20 *Eucalyptus* and *Corymbia* species. Among them are red gum (*E. camaldulensis*), silver gum (*E. cladocalyx*), and lemon scented gum (*C. citriodora*). *P. atomaria* feed on foliage of its host trees, notching them or consuming the entire leaves. Stressed mature and young, newly planted trees are especially vulnerable to dieback and death.



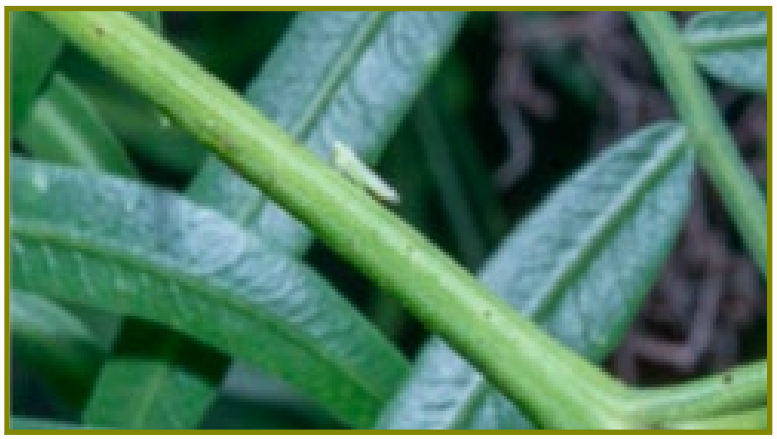
Four genera of scale insects on California pepper tree.
Photo by: K. Parkins, West Coast Arborists, Inc.

Other Highlights

Pests of California Pepper Tree (*various*)

Southern California

The California pepper tree (*Schinus molle*) is a non-native evergreen commonly planted in municipal areas in Southern California due to its fast-growing, drought-resistant nature. Although it could be considered an undesirable invasive that can displace native plants, the decline of pepper tree



Empoasca sativae perched on young green twig of *schinus molle* (Los Angeles County).
Photo by D. Hodel, UCCE

health along city streets and in parks would negatively impact communities who rely on its shaded canopy.

Four scale species damaged California pepper trees in Los Angeles County. Damage was concentrated on 120 trees growing in a forested area in Laguna Hills. Crowns were thin throughout the stand with necrotic foliage and twig dieback. Symptoms are consistent with extensive scale populations which cause yellowing, defoliation, and loss of plant vigor. The four scales were later identified as hemispherical scale (*Saissetia coffeae*), barnacle scale (*Ceroplastes cirriepediformis*), green shield scale (*Pulvinaria psidii*), and brown soft scale (*Coccus hesperidum*). Like other soft bodied insects, scales excrete honeydew, which serves as a sugary medium for sooty mold to grow. Sooty mold blackens the leaf, causing a decrease in photosynthesis activity and the vigor of the host.

Severe canopy thinning of *Schinus molle* displaying distorted branch growth (Los Angeles County). Photo by D. Hodel, UCCE

California pepper trees heavily infested with a leafhopper identified as *Empoasca sativae* were found in Los Angeles, Orange, Riverside, and San Bernardino Counties. This leafhopper is polyphagous and native to the United States. Symptoms of infestation were general yellowing and necrosis of distal leaves and leaf drop of new leaves. As feeding continues, severe canopy thinning occurs at the top periphery, resulting in bare leaf rachises, malformed or distorted new growth, and twig growth somewhat like witch's broom. Trees that were completely defoliated died.

Diseases

Root Diseases

Armillaria Root Disease (*Armillaria* spp.)

The winter of 2023-2024, with its frequent and heavy precipitation along the north coast, brought prolific fruiting of *Armillaria* mushrooms and rhizomorphs. Along with *Heterobasidion occidentale*, *Armillaria altimontana* was associated with deterioration and mortality of white fir (*Abies concolor*) near Eskimo Hill (Shasta County), while *Armillaria gallica* was associated with similar conditions for coastal grand fir (*A. grandis*) in Eureka, Fortuna, and Trinidad (Humboldt County). In late November, *A. gallica* was fruiting abundantly from living and dead red alders (*Alnus rubra*), beneath living Sitka spruces (*Picea sitchensis*), and associated with overmature fruit trees (*Prunus* sp.) near Trinidad (Humboldt County). *Armillaria nabsnona* produced copious mushrooms and rhizomorphs near and on both dead and living red alders in locales ranging from upper Myrtle Creek and the North Fork of Rowdy Creek (Del Norte County) to Headwaters Forest in Humboldt County. A yet-to-be-identified *Armillaria* species was associated with scattered coast live oak (*Quercus agrifolia*) windsnap at Mount Burdell (Marin County) and Helen Putnam Regional Park (Sonoma County), as well as western hemlock (*Tsuga heterophylla*) windthrow in the understory of old-growth redwoods (*Sequoia sempervirens*) in Redwood National Park (Humboldt County) and Jedediah Smith State Park (Del Norte County).

Rhizomorphs of *Armillaria nabsnona* on outside of red alder trunk in the McKinleyville Community Forest (Humboldt County). Photo by: C. Lee, CAL FIRE

In the oak woodlands of Marin and Sonoma Counties, many coast live oak clumps contained two to three stems that diverged just above ground level, and the wind pushed one or more of these stems over while leaving one upright. *Armillaria mycelium* was consistently found at the bases of the snapped stems. *Armillaria gallica* was isolated from both declining Douglas-firs (*Pseudotsuga menziesii*) and dying blueblossom (*Ceanothus thyrsiflorus*) plants in an area of Humboldt Redwoods State Park where a prescribed fire was implemented in 2005 to manage sudden oak death disease (*Phytophthora ramorum*) and subsequently led to stress-related mortality of many Douglas-firs (Humboldt County).

An unidentified *Armillaria* species was also found actively killing California black oak (*Q. kelloggii*) sprouts along Dry Creek Road in the Alexander Valley (Sonoma County). Fresh mycelial fans were found at the base of the sprouts, but no rhizomorphs were observed. An unidentified *Armillaria* species was also found infecting two mature Monterey pines (*Pinus radiata*) that have been slowly declining for over two years along Highway 101 at Crannell, north of McKinleyville (Humboldt County). An unknown *Armillaria* species (or more than one) helped create pockets of mortality in red fir (*A. magnifica*) that were also infected by dwarf mistletoe (*Arceuthobium abietinum* f. sp. *magnificae*) near Little Boulder and Boulder Lakes in the Trinity Alps (Trinity County); the *Armillaria* appeared to be the sole mortality agent for some of the smaller red firs as determined by observations of mycelial fans completely encircling the root collars.

California black oak sprouts killed by active Armillaria along Dry Creek Road in Sonoma County. Photo by: C. Lee, CAL FIRE

In northeastern California, *A. altimontana* was present in western Lassen NF. *A. gallica* was present in central Tahoe NF and elsewhere in the southern Sierra Nevada Mountains on various hosts.

In 2023, the Forest Service felled and chipped or removed declining and hazardous conifers in Robinson Flat Campground. Red fir trees that were previously infected with Heterobasidion root disease were heavily infested with dwarf mistletoe and exhibited rhizomorphs of *Armillaria* root disease (likely *A. gallica*).

Fruiting bodies of *Heterobasidion occidentale* on grand fir at Lake Earl Wildlife Management Area near Crescent City .Photo by C. Lee, CAL FIRE

Coast redwood sapling growing from a nurse log infected with *Heterobasidion occidentale* in the Arcata Community Forest, Arcata. Fruiting body of the fungus is visible beneath the base of the sapling. Photo by C. Lee, CAL FIRE

Heterobasidion Root Disease

(*Heterobasidion occidentale* and *H. irregulare*)

Heterobasidion occidentale continued infecting coastal grand firs. Locations included Lake Earl (Del Norte County), where the pathogen was fruiting abundantly in September, the Arcata Community Forest, and Sequoia Park in Eureka (Humboldt County). In the latter two locations, *Heterobasidion* presence was associated with the gradual selective elimination of very large grand firs from redwood-dominated forests. Although coast redwoods appear more resilient to the effects of the root rot, fruiting bodies and typical laminated white decay were also seen on many stumps of these trees as well as on the roots of windthrown trees in both the Arcata Community Forest and on private industrial timberland in Del Norte County, indicating that the pathogen can contribute to tree failure. The stringy-to-laminated decay was observed on the bases of western hemlocks snapped in the wind during the winters of 2023-2024 in the Walker Road area of Jedediah Smith State Park (Del Norte County), where decline of large western hemlocks was also associated with *Pseudoinonotus dryadeus*, western hemlock dwarf mistletoe (*Arceuthobium campylopodum*), and web blight caused by *Rhizoctonia* sp. *Heterobasidion* was also observed inhabiting living giant sequoias (*S. giganteum*) at Mountain Home State Forest (Tulare County) that were exhibiting decline symptoms after the 2020 Castle Fire (170,648 acres, Tulare County).

Wind-snapped western hemlock stump near Walker Road in Jed Smith State Park, showing typical *Heterobasidion occidentale* decay. Note large white pockets of mycelium at lower right. Photo by C. Lee, CAL FIRE

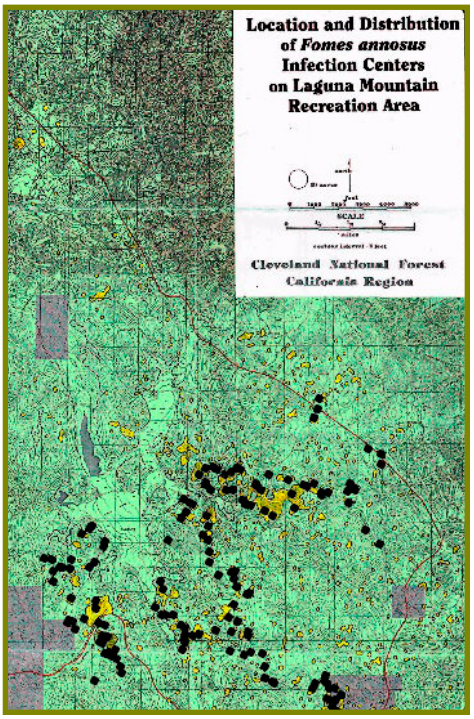
Heterobasidion root disease caused by *H. occidentale* was found associated with recent and older white fir mortality and infecting standing green trees next to summer home tracts in the Mill Creek area, Lassen NF (Tehama County). Fire line construction during the Park Fire (429,603 acres, Butte and Tehama Counties) damaged several white fir, revealing decayed roots and trunks.

The Forest Service has monitored the presence of *H. irregulare* infecting Jeffrey pine (*P. jeffreyi*) in the Mt. Laguna area on the Cleveland NF since at least 1942. In 1977, a Biological Evaluation was published with polygons marking the extent of *H. irregulare*. The polygons were re-evaluated in 2004 with minor revisions. In

Asexual bodies of *Heterobasidion occidentale* growing from a sampled giant sequoia core from Mountain Home State Demonstration Forest . Photo by C. Lee, CAL FIRE

August 2024, the area was surveyed again and the findings were consistent with past studies in that the long-term effects of the root disease did not change the dominance of Jeffrey pine even though host mortality was considerable in the area over the past 80 years. The long-term effects of the disease may lead to increased susceptibility to stresses from drought, insect attack, and wildfire survival.

The original 1977 (revised 2004) map with the polygons of recorded Heterobasidion root disease centers in yellow.



The 2024 point survey with black dots overlayed on the 1977 map, of where Heterobasidion root disease was observed. Note that not all of the original polygons were surveyed but all the polygons that were surveyed had HRD.

Non- Native Phytophthora Root Rots (*Phytophthora* spp.)

Non-native, soilborne *Phytophthora* species were detected in 2024 in association with mortality of several tree species. In the areas of Caspar and Albion, both *P. cinnamomi* and *P. cambivora* were associated with gradual decline and mortality of Monterey pine, shore pine (*P. contorta*), and chinquapin (*Chrysolepis chrysophylla*) (Mendocino County). In Marin County, *P. pseudosyringae* was associated with mortality of bay laurels (*Umbellularia californica*). *Phytophthora lateralis* killed Port-Orford-cedars (*Chamaecyparis lawsoniana*) in numerous locations in Del Norte County.

Black Stain Root Disease (*Leptographium wageneri*)

Symptoms of black stain root disease were identified on a large dead Douglas-fir that was felled along Bear River Ridge in coastal Humboldt County. The felled log was attacked by Douglas-fir beetle (*D. pseudotsugae*), and next to the felled tree was another mature standing green tree with a severely thinning crown that also had pitch tubes indicative of Douglas-fir beetle attack.

Ilyonectria Root Disease (*Ilyonectria* sp.)

The fungal genus *Ilyonectria* is associated with decline and mortality of conifers stressed by flooding and other hydrological changes in the north coast. In 2024, it was identified in a stand of pygmy cypress (*Hesperocyparis pygmaea*) that had been dying for years along Mitchell Road near Fort Bragg (Mendocino County). The cypresses are also consistently decayed by a fungus causing a brown cubical decay identified as *Coniophora puteana*. Although *C. puteana* was recently identified as the cause of a sapwood rot in fire-damaged coast redwoods, it appeared to also decay the heartwood and rot roots in these cypresses, as it was detected in incipient decay in medium-sized roots.

Tomentosa-like Root Rot (*Onnia subtriquetra*)

In 2024, *Onnia subtriquetra* fruited abundantly on both dead and living bishop (*P. muricata*) and shore pines in Humboldt and Mendocino Counties. This fungus was observed fruiting from roots in the ground near Caspar, thus supporting previous suggestions that the fungus functions as a root pathogen as well as a stem decay pathogen (Mendocino County). Although in this stage it appears similar to *Onnia tomentosa*, cause of tomentosus root rot, *O. subtriquetra* can be distinguished by its restriction to pine hosts and by the hooked setae found within the pore surface, as opposed to the straight setae characteristic of *O. tomentosa*.

Stand of nearly completely dead pygmy cypress along Mitchell Creek Road near Fort Bragg. Mortality was associated with *Ilyonectria* sp. and the decay fungus *Coniophora puteana.* Photo by C. Lee, CAL FIRE

Brown cubical rot produced in cypress sapwood and heartwood by the fungus *Coniophora puteana* along Mitchell Creek Road near Fort Bragg. Photo by C. Lee, CAL FIRE

Non-Native Canker Diseases

Sudden Oak Death (*Phytophthora ramorum*)

In 2024, sudden oak death (SOD)-caused mortality did not greatly increase in California wildlands. In the north coast, tanoak (*Notholithocarpus densiflorus*) mortality, most likely caused by *Phytophthora ramorum*, was recorded on approximately 3,400 acres (1,376 ha) at very light to moderate intensities, occurring mostly in Mendocino County. In the Central Coast, tanoak mortality was detected across approximately 30 acres (12 ha) west of Alder Peak on the Monterey Ranger District, Los Padres NF. Mixed-oak (*Quercus* spp.) mortality was detected across about 640 acres (259 ha), but the observed pattern indicated most of the mortality was not likely caused by *P. ramorum*. Mortality was widely scattered in the southern Bay Area and in the Los Padres NF, although the cause of death for these oaks has not been officially identified.

Group of fruiting bodies of *Onnia subtriquetra* growing from bishop pine roots near Caspar. Photo by C. Lee, CAL FIRE

Although conditions were not conducive to large-scale mortality from *P. ramorum*, conditions for spread were most likely assisted by the warm and rainy weather at the end of winter in the coastal counties. One indicator was the presence of *P. ramorum* symptoms on several small Douglas-fir trees at Sunset Beach along the Russian River between Guerneville and Forestville (Sonoma County). Douglas-fir symptoms typically only exhibit during heavy rainfall while buds are producing new foliage in the spring. Another new detection with signs of rapid spread was at the bottom of Peavine Ridge in Humboldt Redwoods State Park (Humboldt County). Numerous dead tanoaks and understory sprout material indicated the rapid spread of the pathogen, although scattered symptoms did persist up to the top of the ridge, where one *P. ramorum*-infected tanoak sprout was collected near some of the largest and healthiest-looking tanoak groves known to exist in northern California.

Douglas-fir branch tip dieback from infection with *Phytophthora ramorum.* Photo by C. Lee, CAL FIRE

The SOD Blitz, coordinated by the UC Berkeley Forest Pathology and Mycology Lab, detected the NA2 variant of *P. ramorum* in several Bay Area locations in 2024. Approximately 150 bay laurel leaves collected from approximately 30 trees in five different locations were infected by the NA2 lineage, and these findings were distributed as follows: San Mateo County (two large multi-tree outbreaks), Alameda County (one medium-sized multi-tree outbreak and one single-tree finding) and Contra Costa County (one single-tree finding). It is unclear why this lineage appeared for the first time simultaneously in widely scattered locations in 2024.

P. ramorum also continued to spread in Del Norte County in 2024. Although large expansions were not seen, new isolated infestations were identified, including near the headwaters of Rowdy Creek and along Peacock Creek. The NA2 variant of *P. ramorum* was detected in the latter location, along with the EU1 variant, meaning the two strains are intermingled in this location.

Pitch Canker Disease (*Fusarium circinatum*)

Pitch canker is a fungal pathogen that infects many species of pine (*Pinus* spp.) and Douglas-fir and causes infected trees to exhibit branch end dieback and pitch flow from cankers. Torrey pines (*P. torreyana*) in Torrey Pine State Natural Reserve were free from pitch canker until 2023, but since then this pathogen has spread widely in the Reserve and beyond. Torrey pine is the nation's rarest pine tree and only grows in natural groves at Torrey Pine State Nature Reserve (San Diego County) and on Santa Rosa Island in the Channel Islands National Park (Santa Barbara County). Infected Torrey pines are found widely in the Reserve and beyond and have dead branch tips with reflexed needles covered in pitch. Along with pitch canker, symptoms of Diplodia tip blight (*Diplodia pinea*) were also seen. Diplodia tip blight causes dieback of new shoots during wet conditions when needles are

Torrey pine infected with pitch canker exhibiting branch dieback with extensive pitching from canker. Photo by K. Corella, CAL FIRE

Torrey pine infected with *Diplodia* tip blight with dead grey needles remaining on the tree. Photo by K. Corella, CAL FIRE

emerging in the spring. Symptoms of *Diplodia* were brown or grey and remain attached to the stem. Small fruiting bodies at the base of the needles are also seen with *Diplodia* and are not seen with pitch canker infestations.

Greater Shot Hole Borer Complex (*Fusarium floridanum* and *Euwallacea interjectus*)

In October 2024, a new infestation of invasive shot hole borer complex was discovered near the town of Felton (Santa Cruz County). It was originally thought to be an extension of the known infestation in San Jose (Santa Clara County). However, close examination of the insect and fungus indicated they were not the same species that already exists in California. The insect portion of the complex is *E. interjectus*, an invasive ambrosia beetle larger than the two invasive shot hole borers already in California. The fungal associate is *Fusarium floridanum*. Together they make up the greater shot hole borer complex originally from Southeast Asia that was introduced into Hawai'i, Louisiana, and Texas on three separate occasions. The complex is established in the Southeastern United States, however this was the first infestation in the Western United States. The full host range is not yet known, but the complex attacked boxelder (*Acer negundo*), California sycamore (*Platanus racemosa*), arroyo willow (*Salix lasiolepis*), red willow (*S. laevigata*), coast live oak, and black cottonwood (*Populus trichocarpa*). The host list is similar to those of the two other invasive shot hole borer complexes. The fungal partner of the complex acts as a food source for the insects, but unfortunately many *Fusarium* species act as common plant pathogens, as is true in this case.

Torrey pine infected with pitch canker at Torrey Pines State Natural Reserve. Both needle necrosis and chlorosis were visible.
Photo by C. Barnes, Forest Service

Native Canker Diseases

Botryosphaeria and Related "Bot" Cankers (various fungi)

Isolations of "bot" canker fungi were less common in the north coast in 2024 than in previous years, likely due to the lack of drought stress on host plants, however some canker fungi associated with damage were observed. In Tolowa Dunes State Park, *Macrophomina phaseolina* was responsible for extensive dieback of some stands of bearberry/kinnickinick (*Arctostaphylos uva-ursi*) (Del Norte County). *Macrophomina phaseolina* is a well-known pathogen of various agricultural crops and is particularly associated with arid soils; although Del Norte County has a moist climate, the sandy dunes on

Fusarium floridanum on box elder in Felton, California.
Photo by S. Lynch, UC Davis

Damage to kinnickinnick associated with stem cankers caused by *Macrophomina phaseolina* at Tolowa Dunes State Park. Photo by C. Lee, CAL FIRE

Cankers caused by *Neofusicoccum arbuti* on madrone stems in Humboldt Redwoods State Park. Photo by C. Barnes, Forest Service

which these shrubs grow are very fast-draining. In this area, kinnickinick serves as the exclusive habitat for the seaside hoary elfin (*Incisalia polia maritima*), a sensitive and threatened butterfly species.

Branch dieback of coast redwoods caused by the "bot" canker fungus *Neofusicoccum luteum* was observed at Partington Cove and McWay Falls in Julia Pfeiffer Big Sur State Park (Monterey County). Extensive sprout dieback was also associated with *Botrytis* sp.

In a large stand of pure madrone (*Arbutus menziesii*), near the top of Peavine Ridge in Humboldt Redwoods State Park, the "bot" canker pathogen *Neofusicoccum arbuti* produced numerous cankers on madrone trees.

Canker-causing fungi were identified in association with basal stem and root cankers on 10-20 acres of declining coyote bush (*Baccharis pilularis*) plants on the first ridge inland from the ocean in Watsonville (Monterey County). The fungi were identified as *Diatrype* sp. and *Cadophora* sp. These fungal genera contain both saprotrophic and pathogenic fungi, and both are known as pathogens of agricultural crops such as grapevines. An unknown woodboring insect appeared to have used the fungal cankers as entry points to cause more damage to the coyote brush stems; despite the widespread dieback, many of the stems were attempting to produce new epicormic sprouts.

Foliar Diseases

Swiss Needle Cast

(*Nothophaeocryptopus gauemannii*)

An outbreak of Swiss needle cast affected Douglas-fir trees in a 500-800-acre area in central Humboldt County where Highway 299 crosses Redwood Creek. Affected trees displayed typical chlorotic and reddish needles in the older needle cohorts. In general, the outbreak appeared to be centered on Highway 299; trees growing high up the slope near the highway appeared more affected than trees in the Redwood Creek canyon bottom.

Mature Douglas-fir showing symptoms of Swiss needle cast along Chezem Road, Humboldt County. Photo by C. Lee, CAL FIRE

Small Douglas-fir showing symptoms of Swiss needle cast along Highway 299, Humboldt County. Photo by C. Lee, CAL FIRE

Tubakia of Oaks and Tanoaks (*Tubakia californica*)

Although locally severe in some areas, defoliation symptoms caused by the Tubakia fungus on tanoak were generally less apparent in early 2024 than in previous years along Highways 101 and 299 in Humboldt and Mendocino Counties. However, symptoms were more apparent in many areas by early fall (e.g., Mount Burdell in Marin County), suggests that although conditions

for pathogen spread were suitable during the winter and early spring, symptom appearance and severity may be closely related to tree water stress conditions.

Scattered tanoak twig dieback caused by *Tubakia californica* along the South Fork Eel River/Highway 101 corridor near Richardson Grove State Park. Photo by C. Lee, CAL FIRE

Lower-crown defoliation symptoms caused by *Tubakia californica* on coast live oak at Mount Burdell Preserve .
Photo by C. Lee, CAL FIRE

Calonectria Leaf and Twig Blight

(*Calonectria californiensis*)

Intense symptoms caused by this *Calonectria californiensis* were observed on tree and shrub hosts in 2024, likely related to the heavy precipitation in late winter and early spring. Bay laurels were the most heavily impacted, with extensive defoliation observed from Marin County north into southern Oregon. Generally, symptoms in bay laurels began in the lowest parts of the crown and then progressed upward until only a small section of the upper crown retained a full complement of leaves; however, many bay laurels immediately began to produce new leaves to replace the killed ones, with small leaves apparent by the end of spring. In some locations, extensive *Calonectria*-caused defoliation was associated with invasion by other pathogens and eventual tree death. Mortality at a 2-acre *Calonectria*-defoliated grove of bay laurels in San Anselmo was associated with the presence of *Phytophthora pseudosyringae* in the soil (Marin County). Approximately 5-10 dead mature bay laurel trees near Monte Rio with *Calonectria*-caused defoliation also had root rot caused by *Ilyonectria* sp. (Sonoma County).

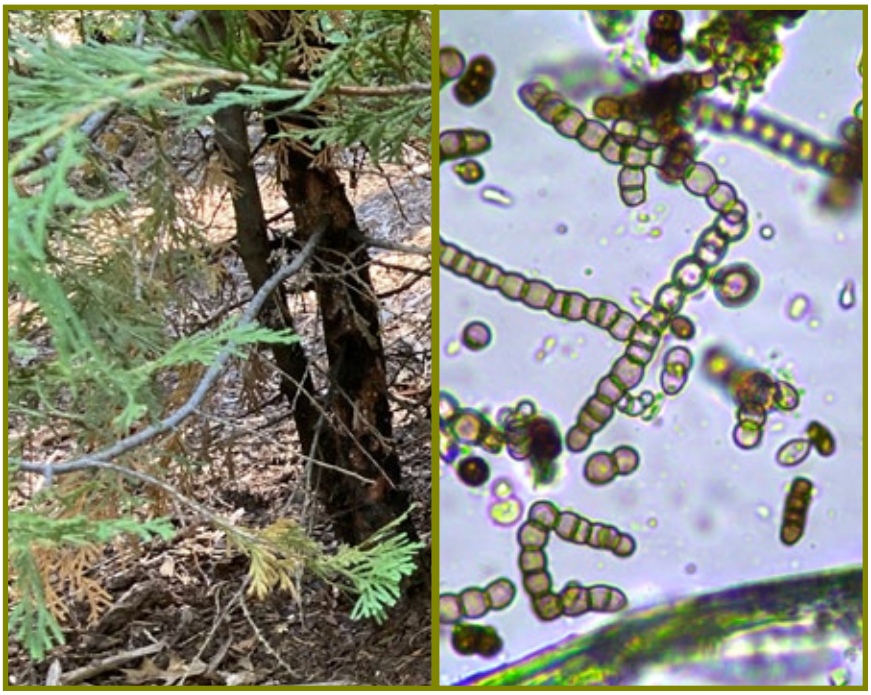
Nearly complete defoliation of California bay laurel caused by *Calonectria californiensis* in Jedediah Smith Campground. Photo by C. Lee, CAL FIRE

Tanoaks in many locations were also damaged by *Calonectria californiensis*. One prominent place was in Redwood National Park, where understory tanoaks in old-growth redwood-dominated stands had extensive whole and partial-leaf necrosis.

Partial-leaf and whole-leaf necrosis caused by *Calonectria californiensis* on understory tanoaks beneath a stand of old-growth redwood along the Bald Hills Road, Redwood National Park.
Photo by C. Lee, CAL FIRE

Bay laurels (large, rounded, shrublike tree crowns) showing extensive browning attributable to *Calonectria californiensis* on Bear River Ridge.
Photo by C. Lee, CAL FIRE

Sooty Bark Disease (*Capnocybe spongiosa* (syn. *Arthrobotryum spongiosum*))
A severe case of sooty bark disease was found on incense-cedar (*Calocedrus decurrens*) in a campground and nearby locations along the Rim of the World Scenic Byway (Highway 18) in the San Bernardino NF (San Bernardino County). Most of the incense-cedar had some sooty bark, and seedlings had the most severe infections. Tops of several large incense-cedar had fallen into the campsite during a windstorm and all had sooty bark. Sooty bark disease is a superficial infection of the foliage that can interfere with photosynthesis.



Images of sooty bark disease on incense-cedar at a campground in the San Bernardino NF. (right) Sooty bark on a small cluster of seedlings. (left) Spores indicative of sooty bark at 40X, right.
Photos by: C. Barnes, Forest Service

Rust Diseases

Pinon Rust (*Cronartium occidentale*)
Pinon rust was found on restoration gooseberry (*Ribes* spp.) plants in Malibu Creek State Parkin Calabasas (Los Angeles County). No surveys were conducted for host trees. Malibu Creek State Park contains a 14-mile principal watercourse of the Santa Monica Mountains that ends in Malibu Lagoon.

Pinyon pine rust was also found on species near the creek in East and River Canyons located in Newhall at the beginning of the trailhead (Los Angeles County). Host trees of this pathogen are not present in the immediate area and no survey was conducted for symptoms on pinon trees.

White pine blister rust (*Cronartium ribicola*)
White pine blister rust was observed on 11 whitebark pine (*P. albicaulis*) along three miles of ground survey transects in the upper Pine Creek watershed in the Warner Mountains (Modoc County). Infections were found on upper trunks and branches and associated with sap flow, top and limb mortality, and squirrel chewing damage. Aecia were found on one of the infected trees. Most infections appeared to have been present for many years and none occurred on saplings or seedlings.

Cankers typical of those caused by white pine blister rust were observed on several young sugar pines (*P. lambertiana*) on the Tangle Blue and Lake Eleanor trails in the Trinity Alps (Trinity County). Some cankers were associated with stem deformation, some were associated with individual branch flagging, and some were associated with whole-sapling mortality.

Damage to high elevation whitebark pine was typical along the eastside of passes over the Sierra Nevada throughout the Range. Most showed feeding damage from squirrels that is typical with blister rust infections. The disease appeared to have been present for several years even though white pine blister rust had not been previously reported from the eastside of the Sierra Nevada Range.

A survey of the Ancient Bristlecone Pine (*P. longaevea*) Forest in the White Mountains did not detect any blister rust infections (Inyo County). A single tree appeared to have squirrel chewing damage often typical with rust infection, but no aeciospores were found. The dominant shrub under the trees in the stand was a species of gooseberry, however no infections were found on the leaves of the Ribes.

Basal canker, symptom of white pine blister rust, on a recently killed sugar pine sapling on the Tangle Blue Lake trail, Trinity Alps . Photo by: C. Lee, CAL FIRE

Rust on Oak (*Cronartium* sp.)
A few leaves of valley oak (*Q. lobata*) with minor rust infections were collected in Buellton (Santa Barbara County). The rust fungus was sequenced using the ITS region. The closest match was from a non-published study on *Cronartium quercuum* infecting six oak species in Indiana. The next closest match was to a sequence with one additional base difference on a sample collected in California in 1998. The rust fungus was only identified as *Cronartium* sp. Additional gene sequencing may help resolve whether it is *C. quercuum* or a new species.

Heart and Sap Rots

Ganoderma (*Ganoderma tuberculosum*)
Ganoderma cf. *tuberculosum* was found on several species of oak in the San Gabriel mountains and in northeastern suburban areas of Los Angeles. The *Ganoderma* caused tree death and hazardous conditions in the populated areas. DNA sequence was used to determine the specific species of *Ganoderma* involved.

Pyrofomes (*Pyrofomes juniperinus* var. *earlei*)
In the 2022 California Forest Pest Conditions report, *Pyrofomes juniperinus* var. *earlei* was reported on Sierra juniper (*Juniperus grandis*) on roughly 10-15% of the trees at the Big Bear Discovery Center in the San Bernardino NF. In 2024, the appearance of fruiting bodies had increased to 30-40% or more. Most of the *Pyrofomes* infected trees also had mistletoe (*Phoradendron densum*). The presence of older and younger conks indicates the disease has been in the area for some time.

Bacterial Diseases

Acute Oak Decline (various bacteria)
Acute oak decline caused by several bacterial species was found at multiple location in Los Angeles County: Victory Park (Pasadena), Chatsworth Nature Preserve (Chatsworth), a private residence in Hasley Canyon (Castaic), Walnut Creek Nature Park (Baldwin Park), and a private lake (Calabasas). Approximately a dozen coast live oaks were impacted. All were in decline, but no mortality was seen at the time of sampling. Symptoms included bleeding on trunk, deterioration of inner and outer bark, thinning canopy, chlorotic leaves, and bleeding at the base of trees. Isolated bacteria from the samples were all associated with acute oak decline including *Gibbsiella greigii*, *Rahnella victoriana*, *Brenneria* sp. aff. *Izadpanahii*, and *Brenneria* sp. aff. *Goodwinii*.

Bacterial Wetwood (several bacterial species)
Bacterial wetwood was found on white fir in a campground in the San Bernardino NF. While bacterial wetwood is typically not considered harmful to the host tree, some trees did have a “slime flux” that caused decay and damage. The offensive odor created by the large number of white firs with wetwood made camping unpleasant.

A young bright orange fruiting body (center), and an older maroon fruiting body (bottom left) of *Ganoderma* cf. *tuberculosum* on a coast live oak at the San Gabriel Canyon Environmental Education Center on the Angeles NF.
Photo by: C. Barnes, Forest Service

Pyrofomes juniperinus var *earlei* on Sierra juniper. The incidence of conks on Sierra juniper has increased noticeably over the past two years.
Photo by: C. Barnes, Forest Service

Acute oak decline symptom of bleeding on the trunk of an infected coast live oak. Photo: Rachel Burnap, Los Angeles County Agricultural Commissioner/Weights and Measures

Mistletoes

Dwarf Mistletoes

(*Arceuthobium* spp.)

Heavy infestations of Douglas-fir dwarf mistletoe (*A. douglasii*) were observed on Douglas-firs growing along the Tangle Blue Lake Trail in the Trinity Alps (Trinity County). Some were associated with pockets of mortality.

Western hemlock dwarf mistletoe (*A. tsugense* ssp. *tsugense*) was observed infesting a stand of grand fir in Caspar (Mendocino County) Many of the firs had been windthrown over the 2023-2024 winter, and *Heterobasidion occidentale* root disease and *Ganoderma* spp. heart rots were also present.

Bacterial wetwood with some yellow slime flux in the center on a white fir in a campground in the San Bernardino NF.
Photo by: C. Barnes, USDA Forest Service

Western hemlock dwarf mistletoe on grand fir branch near Caspar .
Photo by: C. Lee, CAL FIRE

Numerous deforming stem cankers caused by dwarf mistletoe plants (*Arceuthobium* sp.) were observed on young red firs ringing Little Boulder Lake in the Trinity Alps (Trinity County). It is likely that many more trees were infected before the 2022 River Complex of wildfires (199,359 acres, Siskiyou and Trinity Counties) that killed most of the surrounding red firs. It is unknown which mistletoe species is infecting the red firs at this location, since only first-year mistletoe shoots were seen on the cankers.

Extensive infestations of coastal dwarf mistletoe (*Arceuthobium littorum*) were observed on Monterey pines in their native habitat at Point Lobos State Natural Reserve near Carmel (Monterey County) and on shore pine in the pygmy forest near Fort Bragg (Mendocino County).

First-year shoots and old basal cups of dwarf mistletoe plants associated with a stem canker on Shasta red fir near Boulder Lake, Trinity Alps. Photo by: C. Lee, CAL FIRE

Chlorophyll Photobleaching (CPB)

Severe and extensive chlorophyll photobleaching was observed on landscape trees, *Ficus benjamina*, in coastal Southern California from San Diego to Santa Barbara. *Ficus benjamina* have a vase-shaped or rounded canopy with upright or spreading branches and in California lack the aerial roots and support columns of those in tropical locales. Photobleaching is complex and results from prolonged exposure to excessive light which causes physiological changes resulting in decreased photosynthetic activity. With overly pruned trees under high light intensities along with other predisposing factors such as sudden temperature changes, drought, and root pathogens, photoinhibition damage is often unavoidable. The plant can counteract damage with several repair mechanisms; however, the rate of repair determines whether photoinhibition leads to significant damage. CPB is a rare, uncommon, sudden, and catastrophic event. Leaves emerge green but lose varying amounts of chlorophyll. Affected leaves do not recover. CPB can occur on any leaves, but older ones are usually more susceptible.

Chlorophyll photobleaching on *Ficus benjamina*. Photo: Donald Hodel, UCCE Los Angeles County

Heat Damage

A short but intense heat wave during early July 2024, brought widespread heat damage to newly flushed foliage in Humboldt County. The damage was observed throughout the county and most readily seen on Douglas-fir (*Pseudotsuga menziesii*), presumably because most Douglas-fir foliage was at a susceptible developmental stage. It was most obvious on southern and western aspects and in exposed locations.

Heat damage was also occasionally seen on hardwood plants, e.g., on manzanita (*Arctostaphylos* spp.) species at Little Boulder Lake, Trinity Alps (Trinity County).

Heat damage to Douglas-fir shoots along Highway 101 near Garberville and Redway . Photo by: C. Lee, CAL FIRE

Heat damage to manzanita leaves at Little Boulder Lake, Trinity Alps. Photo by: C. Lee, CAL FIRE

Porcupines (*Erethizon dorsatum*)
Small sugar pines (*Pinus lambertiana*) with bark gnawed off mid-trunk at Upper Canyon Creek Lake in the Trinity Alps were most likely damaged by porcupines (Trinity County). Adult porcupines continue to be observed periodically at Lake Earl Wildlife Management Area (Del Norte County), but little to no damage is typically seen on trees at this location.

Small rodents (Various spp.)
Feeding by Douglas-squirrels (*Tamiasciurus douglasii*) and/or woodrats (*Neotoma* spp.) on treetops and branches was conspicuous in many areas of Mendocino, Humboldt, and Del Norte Counties in 2024. Bigleaf maple (*Acer macrophyllum*) and coast redwood (*Sequoia sempervirens*) were particularly targeted by these rodents.

Mapping and Treatment of High Priority Invasive Species in the Upper Santa Ana Watershed

In collaboration with the Inland Empire Resource Conservation District (IERCD), the Forest Service made progress in mapping and treating high priority invasive species in the Upper Santa Ana Watershed. The target invasive species for these projects included Spanish broom (*Spartium junceum*), *Arundo donax*, fennel (*Foecniculum vulgare*), and tree of heaven (*Ailanthus altissima*) across the Mill Creek and Cajon Creek sub-watershed areas (San Bernardino County). These highly invasive species distribute seeds and propagules in a downstream direction, allowing for efficient removal and destruction of these target species by IERCD staff working downstream from the highest elevation populations.

In 2024, a total of 2,179 individuals of Spanish broom were treated across the Mill Creek area. The treatments occurred over the course of multiple days along Highway 38 south of Angelus Oaks. Additionally, 1,657 GPS location points were collected to visualize the extent of the treatments.

Spanish broom. Photo by: Joseph DiTomaso

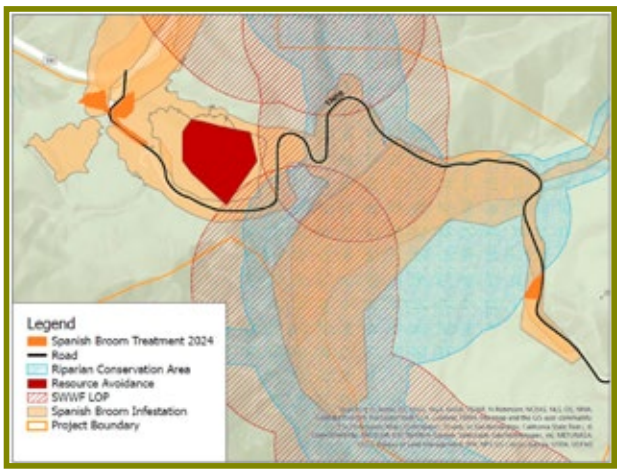
Map of GPS location coordinates for Spanish broom individuals treated across Mill Creek. Map by: IERCD

Forest Health Protection – Invasive Plants Grants

The California Invasive Plants Council (Cal-IPC) continued improving the CalWeedMapper tool and the development of a climate-matching tool (CMT).

CalWeedMapper prioritizes invasive plant species for rapid response at the landscape level and currently relies on a static map of each plant's distribution. This project will add functionality to track changes over time, allowing planners to prioritize work based on documented spread, show progress of control work, and demonstrate the cost of inaction. A beta version has been released, showing snapshots of weed distribution over time and allowing the user to see how a weed has spread and/or how management has increased or decreased. The CMT makes use of global climate datasets and global species distribution data available through the Global Biodiversity Information Facility (GBIF 2021) to assess a plant's potential for spreading to a new region. The potential to spread is based on whether that plant is known to grow in other parts of the world that have similar climatic conditions. Cal-IPC collected input from those who need climate matching for their weed risk assessments, including participants at the National Association of Invasive Plant Councils meeting and partners in Washington, Oregon, Nevada, and Arizona. The CMT beta version is available here.

Cal-IPC utilized other Forest Health funds to assemble a list of potential invasive plant projects on national forests across California, focusing on projects that complement partner work being done on adjacent lands in high priority areas. One pilot project was implemented in May, 2024 in coordination with the San Bernardino National Forest. Cal-IPC sub-contracted with the Southern California Mountains Foundation to treat Spanish broom on 0.84 acres of the Santa Ana Fuel Break. Cal-IPC is currently planning subcontracts for projects to be implemented in 2025.



2024 herbicide treatment locations of Spanish broom in the Santa Ana Fuel Break

In 2024, scientific publications concerning California forest pests and wildland conditions included:

Belisle, W.H.; Rooney-Latham, S.; Soriano, M.C.; Grünwald, N.J.; Blomquist, C.L. 2024. First report of *Phytophthora ramorum* causing leaf spots on *Cornus capitata* (Evergreen Dogwood) in the United States. *Plant Disease* 108(4): https://doi.org/10.1094/PDIS-12-23-2638-PDN

Bustamante, M.I.; Elfar, K.; Carachure, C.; Adaskaveg, A.; Kabashima, J.N.; Shogren, C.; Eskalen, A.; Lynch, S.C. 2024. Etiology of pine ghost canker in Southern California urban forests. *Plant Disease* 108(4): https://doi.org/10.1094/PDIS-08-24-1718-SR

Cansler, C.A.; Wright, M.C.; van Mantgem, P.J.; Shearman, T.M.; Varner, J.M.; Hood, S.M. 2024. Drought before fire increases tree mortality after fire. *Ecosphere* 15(12): e70083. https://doi.org/10.1002/ecs2.70083

Cheng, Y.; Oehmcke, S.; Brandt, M.; Rosenthal, L.; Das, A.; Vrieling, A.; Saatchi, S.; Wagner, F.; Mugabowindekwe, M.; Verbruggen, W.; Beier, C. 2024. Scattered tree death contributes to substantial forest loss in California. *Nature Communications* 15(1): e641. https://doi.org/10.1038/s41467-024-44991-z

Dye, A.; Houtman, R.; Gao, P.; Anderegg, W.R.L.; Fettig, C.J.; Hicke, J.; Kim, J.B.; Young, K.; Riley, K. 2024. Carbon, climate, and disturbance: A review of mechanisms, challenges, and tools for understanding aboveground forest carbon stability in an uncertain future. *Carbon Balance and Management* 19: 35. https://doi.org/10.1186/s13021-024-00282-0

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The California Forest Pest Council (CFPC), a 501(c)(3) non-profit organization, was founded in 1951 as the California Forest Pest Control Action Council. Membership is open to public and private forest managers, foresters, silviculturists, entomologists, plant pathologists, biologists, and others interested in the protection of California's urban and wildland forests from injury caused by biotic and abiotic agents. The Council's objectives are to establish, maintain, and improve communication among individuals who are concerned with these issues. These objectives are accomplished by:

1. Coordinating the detection, reporting, and compilation of pest injury, primarily from forest insects, diseases, and animal damage.
2. Evaluating pest conditions, primarily those of forest insects, diseases, and animal damage.
3. Making recommendations on pest control to forest managers, protection agencies, and forest landowners.
4. Reviewing policy, legal, and research aspects of forest pest management and submitting recommendations to appropriate authorities.
5. Fostering educational work on forest pests and forest health.

The California Board of Forestry and Fire Protection recognizes the Council as an advisory body in forest health protection, maintenance, and enhancement issues. The Council is a participating member in the Western Forest Pest Committee of the Western Forestry and Conservation Association.

This report was prepared by Forest Health Protection, USDA Forest Service, Pacific Southwest Region and the California Department of Forestry and Fire Protection with other member organizations of the Council.

2024 Field Tours: Weed Tour, Northern California, June 19-20

2024 Annual Meeting: November 12-13, UC Davis, virtual option

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