



# AERIAL DETECTION SURVEY: 2023 SUMMARY REPORT

Information below is based on data recorded and shared by the USDA Forest Service, R5 State & Private Forestry, Aerial Detection Survey (ADS) program. Surveys are conducted to provide annual estimates of tree mortality and damage and depict broad mortality trends. Most of California's forested areas were surveyed in 2023.

## Highlights from this year's survey

- Total tree mortality remained greatly elevated compared to pre-2018 drought conditions but decreased significantly from 2022 levels. Acres affected decreased only slightly and overall severity levels decreased.
- True fir comprised over 84% of the total mortality and was the second largest tally ever recorded by R5 ADS with the largest being recorded in 2022. Mortality was again particularly severe and widespread in the central Sierra Nevada Range.
- Mortality in several conifer species was again particularly severe and widespread in the north interior, where 2020-2022 drought conditions were most exceptional.
- Ponderosa pine mortality attributed to Western pine beetle (*Dendroctonus brevicomis*) remained a concern but dropped significantly from 2022 levels. An estimated 2.9 million dead trees were detected across 320,000 acres, down from approximately 3.5 million dead trees across 280,000 acres in 2022. Expanded pockets of mortality were common in the central Sierra Nevada Range, but mortality was most widespread and severe in the northern interior.
- Douglas-fir mortality, though still quite elevated, decreased significantly with an estimated 770,000 dead trees across 84,000 acres from approximately 3 million dead trees across 190,000 acres in 2022. Mortality decreased dramatically along coastal areas, but was still severe north and west of the Redding area.
- Mortality attributed to mountain pine beetle (*Dendroctonus ponderosae*) remained elevated but dropped significantly from the previous year. An estimated 260,000 dead trees over 33,000 acres were detected, down from 390,000 dead trees across 40,000 acres in 2022. Within this group, whitebark pine accounted for most of the mortality occurring throughout its range.
- Pinyon pine mortality attributed to *Ips* sp. decreased notably to an estimated 8,700 dead trees across 1,600 acres from ~220,000 dead trees across 16,000 acres in 2022. Mortality was mostly found in the White Mountains of eastern California.
- Tanoak mortality attributed to sudden oak death (*Phytophthora ramorum*) remained low, as several years of dry spring weather has inhibited the spread of this invasive disease.
- Oak mortality attributed to goldspotted oak borer (*Agrilus auroguttatus*) decreased significantly and was concentrated primarily in the Palomar Ranger District vicinity of the Cleveland National Forest.
- Oaks throughout the interior looked much healthier compared to 2022, however, widely scattered grey dead trees were likely killed by recent drought.

## Summary for 2023 Season Aerial Detection Survey

Report Date	December 2023
Flight Dates	July 18th to Oct 7th
Area Flown	California, state-wide
Acres Surveyed	38 million
Acres with Mortality	2.4 million
Acres with tree damage other than mortality	47,000
Estimated number of dead trees	28.8 million

**Disclaimer: Some numbers in this report have not been finalized and are subject to change.**

Tree Species (Groups)	2023		2022		Percent Change	
	Acres	Estimated Trees Killed	Acres	Estimated Trees Killed	Acres	Estimated Trees Killed
Firs	1,900,000	24,000,000	2,390,000	28,000,000	-21%	-14%
Yellow Pines	360,000	3,200,000	340,000	3,800,000	6%	-16%
5 Needle Pines	19,000	180,000	26,000	310,000	-27%	-42%
Douglas-Fir	84,000	770,000	190,000	3,000,000	-56%	-74%
Other Pines	18,000	110,000	39,000	570,000	-54%	-81%
Other Conifer	3,700	19,000	3,300	18,000	12%	6%
Oaks	4,800	53,000	16,000	110,000	-70%	-52%

Online resources:

Pacific Southwest Aerial Detection Program

[https://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fsbdev3\\_046696](https://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fsbdev3_046696)

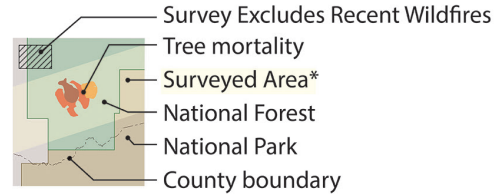
Scan QR code to visit the program web page for reports, maps, and more information about the Aerial Detection Survey program.



Questions regarding this report should be directed to Jeff Moore at [jeffrey.moore@usda.gov](mailto:jeffrey.moore@usda.gov) or 916-247-7884.

# FOREST HEALTH PROTECTION AERIAL DETECTION MONITORING

## 2023 SURVEY

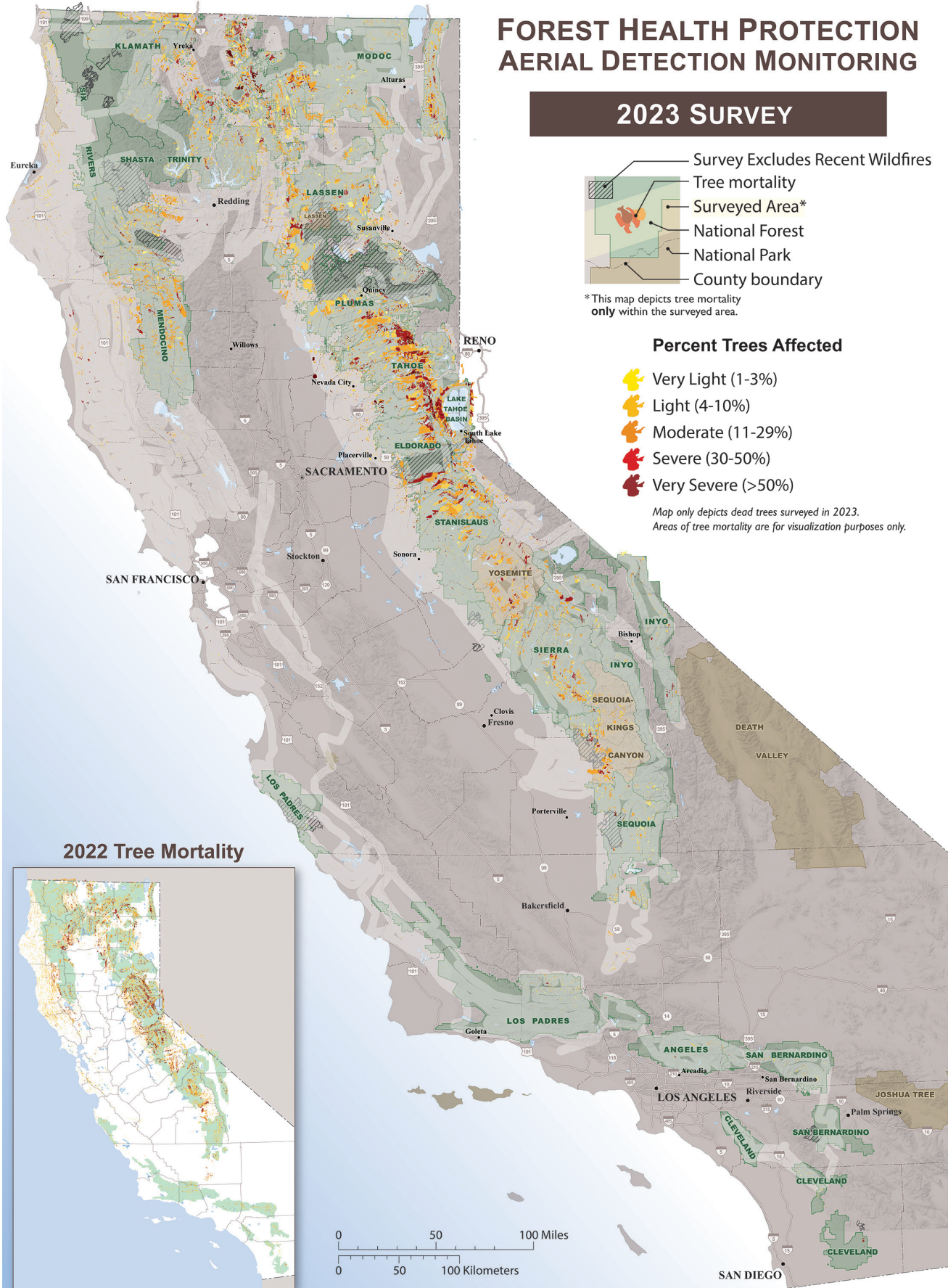


\*This map depicts tree mortality only within the surveyed area.

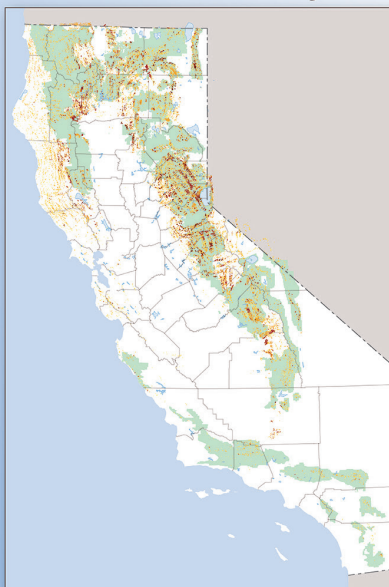
### Percent Trees Affected

- Very Light (1-3%)
- Light (4-10%)
- Moderate (11-29%)
- Severe (30-50%)
- Very Severe (>50%)

Map only depicts dead trees surveyed in 2023.  
Areas of tree mortality are for visualization purposes only.



### 2022 Tree Mortality





## RESULTS BY COUNTY – 2023

County	Estimated Number of Acres with Mortality	Estimated Number of Dead Trees
Alameda	1	3
Alpine	83,000	930,000
Amador	33,000	520,000
Butte	34,000	130,000
Calaveras	23,000	420,000
Colusa	1,700	7,800
Contra Costa	1	11
Del Norte	10,000	31,000
El Dorado	130,000	2,200,000
Fresno	99,000	820,000
Glenn	31,000	250,000
Humboldt	27,000	100,000
Inyo	7,400	160,000
Kern	21,000	130,000
Lake	13,000	79,000
Lassen	110,000	830,000
Los Angeles	1,800	8,700
Madera	45,000	360,000
Marin	1	23
Mariposa	36,000	400,000
Mendocino	51,000	440,000
Modoc	110,000	970,000
Mono	30,000	180,000
Monterey	740	2,200
Napa	330	880
Nevada	83,000	1,400,000
Orange	27	290
Placer	150,000	3,400,000
Plumas	110,000	1,200,000
Riverside	27	520
San Benito	1	6
San Bernardino	2,500	11,000
San Diego	1,500	5,000
San Joaquin	1	2
San Luis Obispo	290	6,300
San Mateo	560	24,000
Santa Barbara	25	220
Santa Clara	47	85
Santa Cruz	170	530
Shasta	190,000	1,500,000

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### RESULTS BY COUNTY – 2023

County	Estimated Number of Acres with Mortality	Estimated Number of Dead Trees
Sierra	170,000	3,200,000
Siskiyou	380,000	5,400,000
Solano	1	9
Sonoma	640	2,000
Stanislaus	1	18
Tehama	120,000	1,100,000
Trinity	120,000	800,000
Tulare	86,000	820,000
Tuolumne	120,000	900,000
Ventura	1,700	11,000
Yolo	1	24
Yuba	3,200	34,000
<b>Total</b>	<b>2,437,663 acres</b>	<b>28,784,621 dead trees</b>

### RESULTS BY NATIONAL FOREST – 2023

Forest	Estimated Number of Acres with Mortality	Estimated Number of Dead Trees
Angeles National Forest	2,200	12,000
Cleveland National Forest	1,500	4,900
Eldorado National Forest	150,000	2,200,000
Humboldt-Toiyabe National Forest	46,000	540,000
Inyo National Forest	41,000	350,000
Klamath National Forest	130,000	2,000,000
Lake Tahoe Basin Management Unit	66,000	1,700,000
Lassen National Forest	200,000	1,700,000
Los Padres National Forest	4,700	37,000
Mendocino National Forest	130,000	1,100,000
Modoc National Forest	140,000	1,300,000
Plumas National Forest	130,000	1,600,000
Rogue River-Siskiyou National Forests	15,000	61,000
San Bernardino National Forest	2,200	8,400
Sequoia National Forest	53,000	360,000
Shasta-Trinity National Forest	250,000	2,600,000
Sierra National Forest	110,000	970,000
Six Rivers National Forest	11,000	67,000
Stanislaus National Forest	150,000	1,600,000
Tahoe National Forest	330,000	6,500,000
<b>Total</b>	<b>1,962,600 acres</b>	<b>24,710,300 dead trees</b>

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