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2017 Aerial Survey Results: California

Forest Health Monitoring Program • 1731 Research Park Drive, Davis, CA 95618
www.fs.usda.gov/detail/r5/forest-grasslandhealth

Forest Service
Pacific Southwest Region
R5-PR-034
June 2018

COVER PHOTO
Low elevation pine mortality near Bass Lake on the Sierra National Forest resulting from bark beetles and extreme drought. A mix of mostly older but also more recent dead ponderosa pine trees with relatively few live conifers remaining.
Photo by: Jeffrey Moore, US Forest Service

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USDA Forest Service, Region 5

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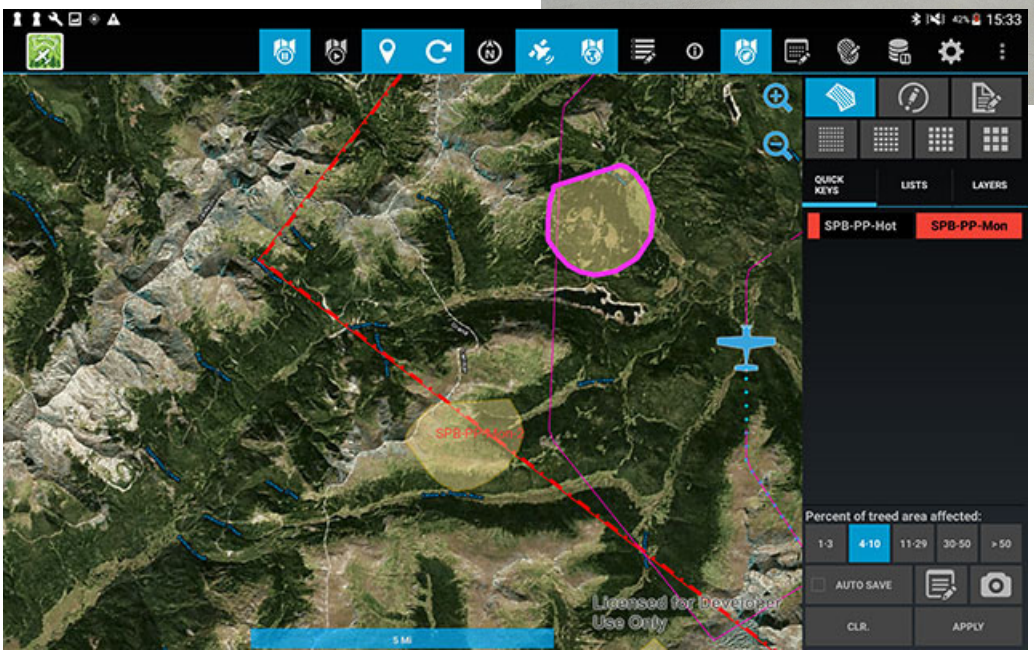


Photo of the Digital Mobile Sketchmapping System (DMSM) used to record tree mortality and damage data

2017 Aerial Survey Results: California

Contents

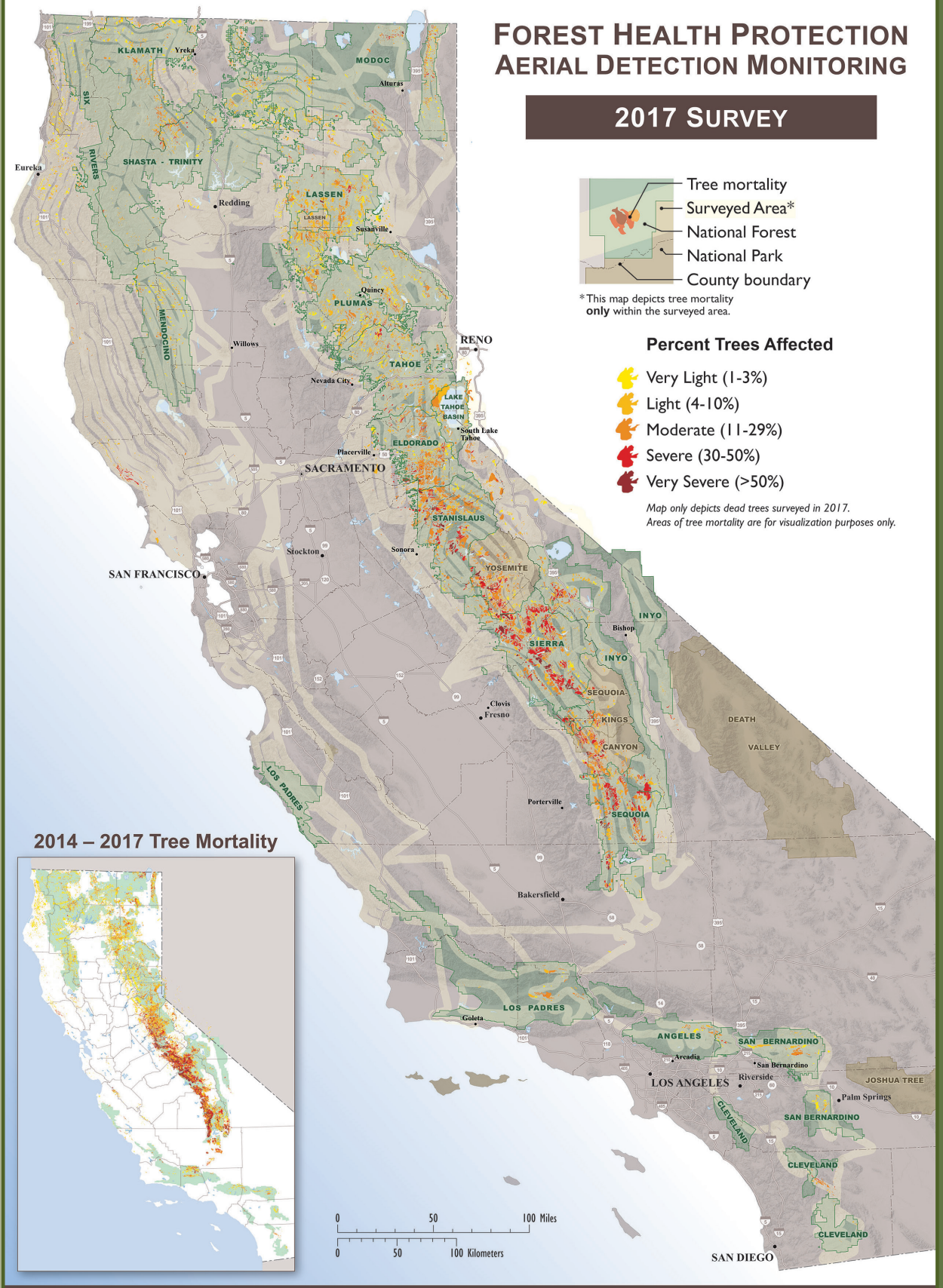
Service Areas

The geographical breakdown for this report is by the R5 State and Private Forestry, Forest Health Protection, Shared Service Area (SSA) configuration which divides the state of California into four different regions (Northeastern, South Sierra, Southern CA and Northern CA), primarily using National Forest boundaries. Several exceptions exist such as the Humboldt-Toiyabe (admin. By R4) and Inyo (admin. By R5) NFs along with the Lake Tahoe Basin MU (admin. By R5) which straddle the state lines between CA and NV as well the Klamath (admin. By R5) and Rogue River (admin. By R6) NFs which straddle CA and OR. For the purposes of this report the SSA areas were expanded to include all land ownerships in CA, as well as the portions of NV and OR administered by R5.

Statewide Damage Mapped

USDA

UNITED STATES DEPARTMENT OF AGRICULTURE



FOREST SERVICE

v2 April 9, 2018

Overview

Aerial Surveys have been conducted annually since 1994 by Pacific Southwest Region (Region 5) Forest Health Protection staff to assess the current health of California forests. Approximately 40 million acres of California were surveyed in 2017 including all national forests, all forested national and state parks, and most forested private lands. However, many isolated forest areas, urban areas, oak woodlands, areas of restricted and controlled airspace such as military installations and other sensitive areas were not surveyed.

The winter of 2016-2017 was the first above average precipitation year in California since the winter of 2009-2010. Estimated total mortality in 2017 was 27 million trees and though greatly elevated from more normal rainfall years, this was still substantially less than 2016 mortality levels when an estimated 62 million trees died. The drought was most prolonged and severe in central and southern California (see Figure1) and tree mortality was most intense in these areas. It is estimated that 129 million trees have died since 2010.

Survey flights could not begin until early August, weeks later than usual, due to aircraft issues. Additionally large, persistent wildfires were common in 2017 with more than 1.2 million acres burned, making survey conditions less than ideal and causing major delays and logistical challenges. The 2017 aerial survey was not completed until mid-November.

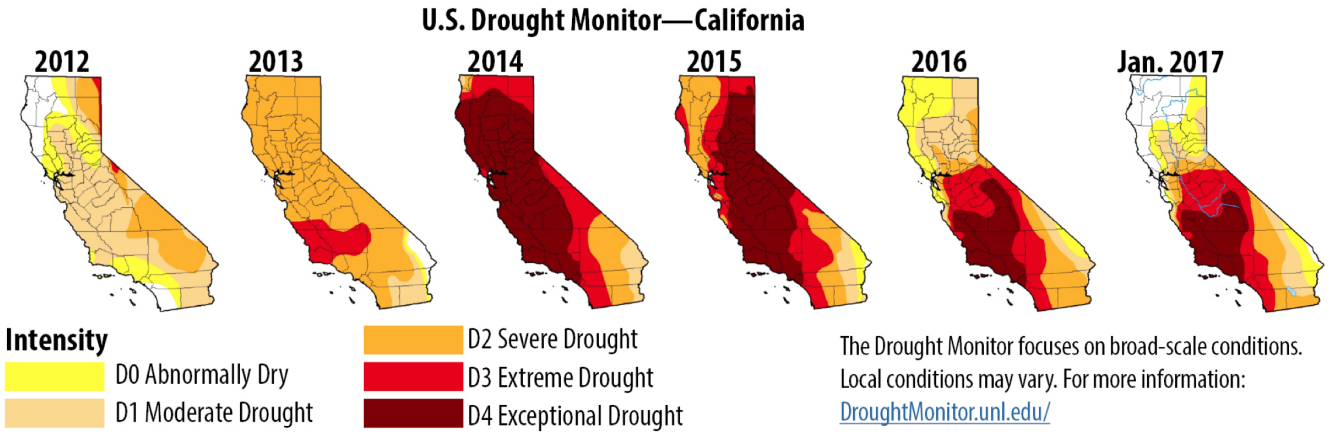


Figure 1. The U.S. Drought Monitor maps of 2012 through early January 2017 illustrate the severity of the drought event in California. Maps are presented from the last water year report date in September. D1 is the least intense drought level and D4 the most intense; D0 areas are not in drought. A full description of each drought severity classification is available from the U.S. Drought Monitor website. Source: U.S. Drought Monitor

In 2017, pine mortality in the southern Sierra Nevada range remained elevated but was greatly reduced when compared to 2016 levels, primarily due to most low elevation pine trees being killed in previous years. In 2017 chronically stressed trees in mid-elevation mixed conifer and high elevation fir habitat types were considerably more affected than in previous years. White fir and California red fir accounted for 89% of the detected mortality. California red fir was often heavily impacted, even at the highest and in the most remote areas, while white fir mortality occurred in large contiguous areas of mixed conifer habitat type and was highly correlated with heavily stocked conditions throughout the interior of California.

Capturing drought-related mortality was again the priority of the survey and high levels of tree mortality (varied tree species) across landscapes was difficult to capture with a high level of accuracy. Therefore, it is highly likely that some tree mortality and other types of damage was missed.

Methodology

A new nationally supported recording system was used by R5 aerial detection survey for the first time in 2017 which utilizes inherently different recording methodologies and also produces a different data structure. In particular, mortality estimates are recorded as a percent of forested area affected severity rating rather than number of trees killed or trees per acre estimates as in previous years. Methodologies were developed to make the new data as compatible as possible with legacy data.

Surveys are typically flown at 90-150 mph at approximately 1,500 feet above ground level in a fixed-wing airplane. Traditionally, surveys were flown on a 3-3.5 mile grid but are increasingly flown on a 4-5 mile grid to save flight time and reduce costs. Surveys utilize a small fixed wing aircraft with two observers looking out opposite sides using computer touch tablets to record current tree injury and recent mortality.

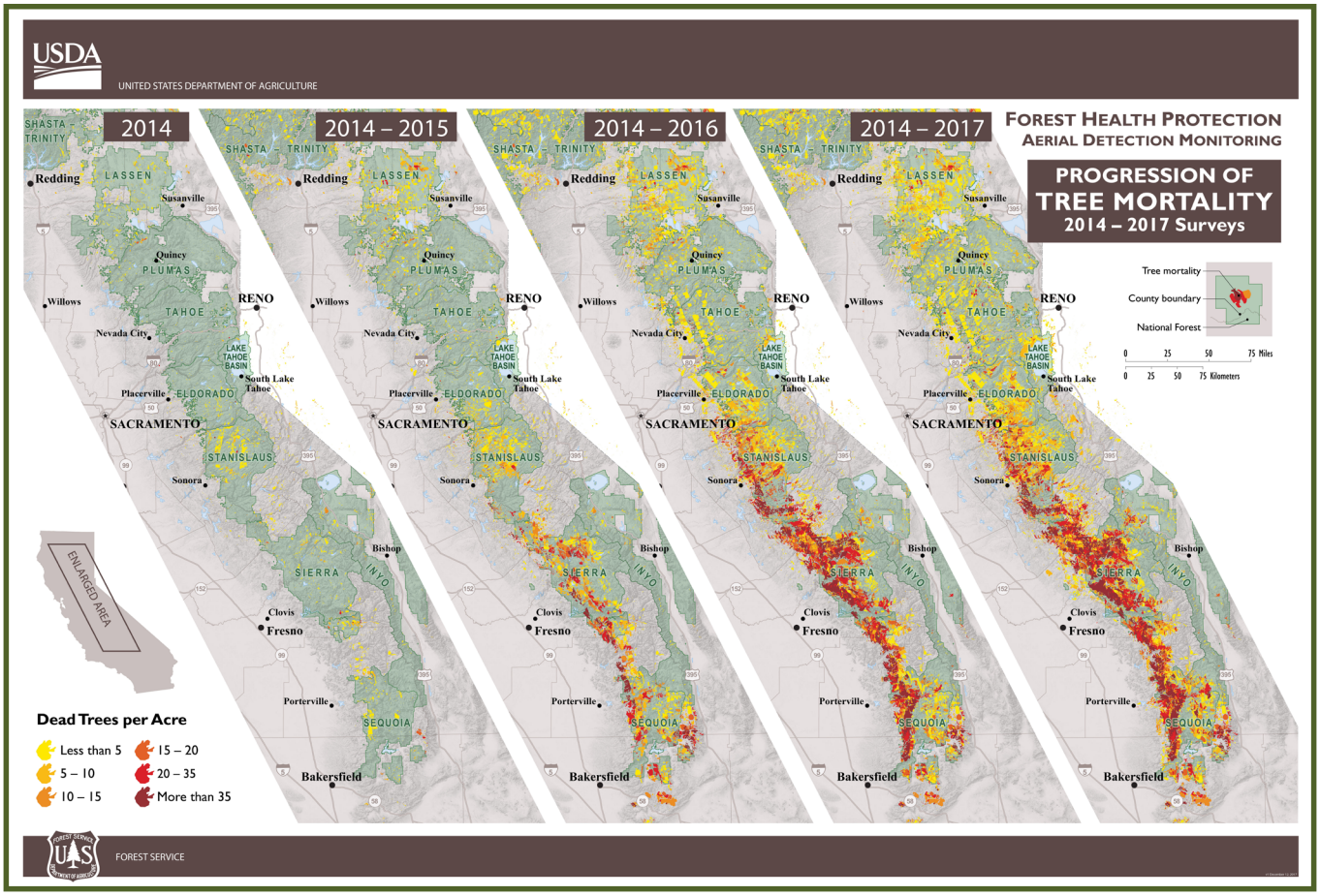


Figure 2. This map shows the cumulative progression of drought induced mortality in the most impacted areas of the Sierra Nevada range of California from 2014-2017. Map on the far right depicts the cumulative mortality over the preceding four years.

Affected trees are recorded to species level (i.e. Sugar Pine) wherever possible and damage detected on any tree species is mapped. In areas where two or more tree species are affected or two or damage types co-occurring (i.e. branch flagging and whole tree mortality), the surveyor will map two or more discrete but overlapping polygons for each event and assign a category of either percent forest area affected (mortality) or damage intensity estimate (non-mortality). Since the new systems are limited to one tree host species and damage type per polygon, minor tree species such as sugar pine and incense cedar as well as non-mortality tree damage are significantly underrepresented in the data.

Acres reported in this document may be noted in more than one bullet (on subsequent pages) as multiple damage types, damage agents and host tree species often occur in the same location. Additionally, acres reported have some level of mortality, but not all trees in a mapped area are typically killed. Furthermore, older grey dead trees are ignored since it is assumed this mortality was captured in previous years and are now considered part of the percent of forested area unaffected.

Acres with Mortality and Estimated Number of Dead Trees by Land Ownership

Ownership	Acres	Dead Trees
National Forest (Region 5)*	1,680,000	19,096,000
National Park	264,000	3,584,000
Other National Forest**	54,000	305,000
Other Federal	39,000	133,000
State	25000	145,000
Local	11000	108,000
Private	467,000	3,488,000
Totals	**2,540,000**	**26,859,000**

Acre and tree counts throughout this report have been rounded to the nearest thousand
*Includes an additional 2,000 acres and 6,000 trees detected on R5 LTBMU land in Nevada
**Region 4 National Forest areas located in California

Northeastern California Shared Service Area

Headquarters: Lassen National Forest Supervisor's Office, 2550 Riverside Drive, Susanville, CA 96130

Website: http://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fsbdev3_046723

Entomologist: Danny Cluck (530) 252-6431 dcluck@fs.fed.us

Pathologist: Bill Woodruff (530) 252-6680 wwoodruff@fs.fed.us

National Forests: Modoc, Lassen, Plumas, Tahoe, portions of northwestern Humboldt-Toiyabe (along with R4)

Other Major Forested Areas: Lake Tahoe Basin Management Unit, Lassen Volcanic National Park, Lava Beds National Monument

Background

The northeast quadrant of the state includes the Modoc Plateau, the Southern Cascade and Northern Sierra Nevada Mountain Ranges, the eastern Klamath and Warner Mountains as well as portions of the Great Basin near the Nevada border. Privately owned industrial timberlands are common.

This area of the State had five years of drought and in 2016 was characterized as moderate drought conditions in the north to severe drought conditions in the south. However, in 2017 this area had normal precipitation in the north to substantially higher than normal precipitation further south with Lake Tahoe and surrounding areas receiving close to three times the normal annual precipitation. Although, drought conditions were neither as extreme nor prolonged as southern CA, mortality was again substantially elevated.

Survey Highlights

- Overall mortality in the northeast region of the state went from an estimated 5.5 million dead trees in 2016 to 3.9 million trees in 2017 and from 1.1 million acres of mortality in 2016 to 730,000 acres of mortality in 2017.
- Acres with white fir mortality went from 600,000 in 2016 to 450,000 acres in 2017 and was again closely correlated with high tree densities and occurring over large areas.
- Acres with pine mortality decreased from 790,000 acres with mortality to 123,000 acres with mortality, but pine mortality was still high in some localized areas.
- California red fir mortality increased from 106,000 acres with mortality in 2016 to 174,000 acres with mortality in 2017 and mortality was generally more intense.

Modoc National Forest:

Overall mortality decreased from an estimated 1.5 million trees in 2016 to 500,000 dead trees in 2017; acres affected decreased from 207,000 in 2016 to less than 73,000 acres with mortality in 2017.

- White fir mortality decreased from an estimated 900,000 trees in 2016 to 270,000 in 2017. Acreage affected was about half from 89,000 in 2016 acres to 44,000 in 2017.
- Ponderosa pine mortality, though still elevated from more typical years, decreased from an estimated 630,000 dead trees in 2016 to just 213,000 in 2017.
- Jeffrey pine mortality actually increased somewhat from an estimated 3,000 dead trees in 2016 to almost 25,000 in 2017.

Lassen National Forest:

Overall tree mortality decreased modestly from over 1.3 million dead trees in 2016 to approximately one million in 2017; acres affected dropped from 249,000 to 200,000 acres with mortality.

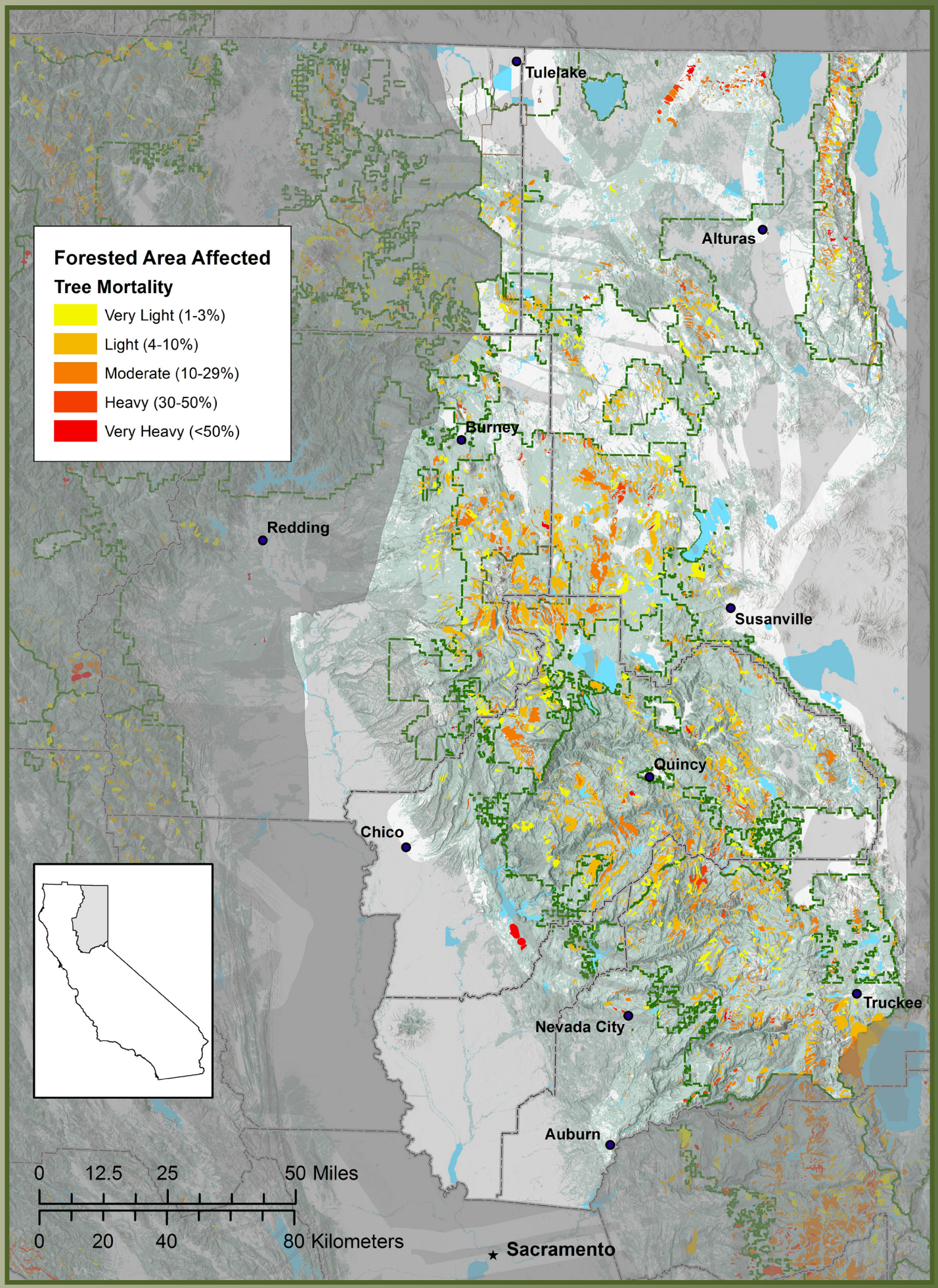
- Likewise white fir mortality decreased 720,000 dead trees in 2016 to 580,000 dead trees in 2017.
- In contrast California red fir mortality increased from 81,000 dead trees in 2016 to 220,000 dead trees in 2017.
- Ponderosa pine mortality decreased from an estimated 470,000 dead trees in 2016 to 220,000 dead trees in 2017.
- Lodgepole pine mortality decreased from an estimated 39,000 dead trees in 2016 to 27,000 dead trees in 2017.

Plumas National Forest:

Overall tree mortality increased from an estimated 344,000 dead trees in 2016 to more than 555,000 in 2017; acres affected increased from 102,000 to 134,000 acres with mortality.

- White fir mortality increased from an estimated 190,000 dead trees in 2016 to almost 400,000 dead trees.
- California red fir mortality increased from an estimated 34,000 dead trees in 2016 to 14,000 dead trees in 2017; acres affected increased from 9,000 in 2016 to more than 28,000 acres with mortality in 2017.
- Ponderosa pine mortality decreased from an estimated 113,000 dead trees in 2016 to 7,000 dead trees in 2017.

Northeastern California Shared Service Area



Northeastern California Shared Service Area

Tahoe National Forest:
Overall mortality increased from an estimated 358,000 dead trees in 2016 to 640,000 dead trees in 2017; acres affected decreased from approximately 99,000 acres in 2016 to 95,000 acres with mortality in 2017.

- California red fir mortality was the predominant species affected increasing from less than 20 dead trees in 2016 to 335,000 dead trees in 2017.
- White fir mortality increased from an estimated 128,000 dead trees in 2016 to just over 250,000 dead trees in 2017.
- Ponderosa pine mortality decreased from an estimated 227,000 dead trees in 2016 to 31,000 dead trees in 2017.
- Jeffrey pine mortality increased from an estimated 140 dead trees in 2016 to 14,000 dead trees in 2017.

Lake Tahoe Basin Management Unit:
Overall mortality increased from an estimated 72,000 dead trees in 2016 to 168,000 dead trees in 2017; acres affected increase from 12,000 in 2106 to almost 30,000 acres with mortality in 2017.

- White fir mortality was again predominant and had the largest increase from an estimated 51,000 dead trees in 2016 to 111,000 dead trees in 2017.
- California red fir mortality also increased from an estimated 3,500 dead trees in 2016 to more than 44,000 dead trees in 2017.

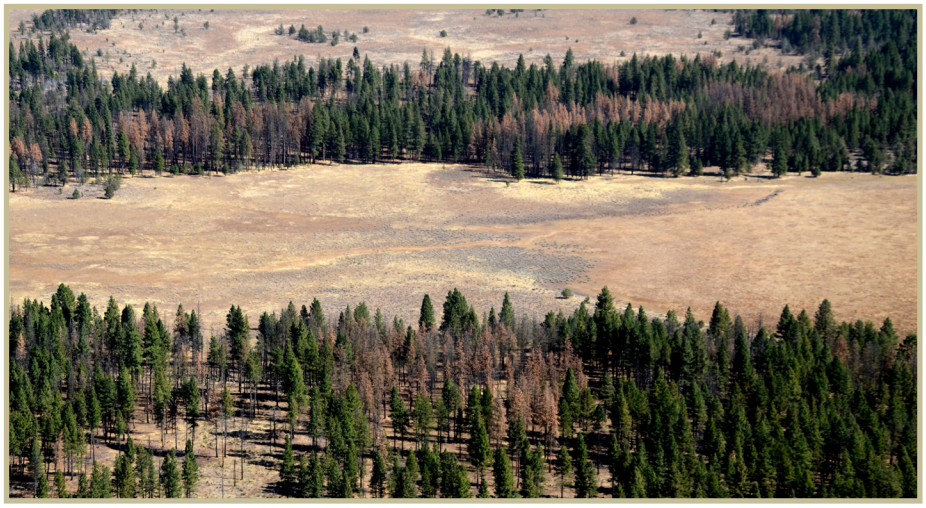
Lassen Volcanic National Park:
Overall mortality decreased from an estimated 147,000 dead trees across 28,000 acres in 2016 to 96,000 dead trees across 26,000 acres in 2017.

- White fir mortality decreased from an estimated 104,000 dead trees in 2016 to 8,000 dead trees in 2017.
- California red fir mortality increased from an estimated 25,000 dead trees in 2016 to 74,000 dead trees in 2017.
- Lodgepole pine mortality decreased from 17,000 dead trees in 2016 to an estimated 13,000 dead trees in 2017.

Acres with Mortality and Estimated Number of Dead Trees by Unit

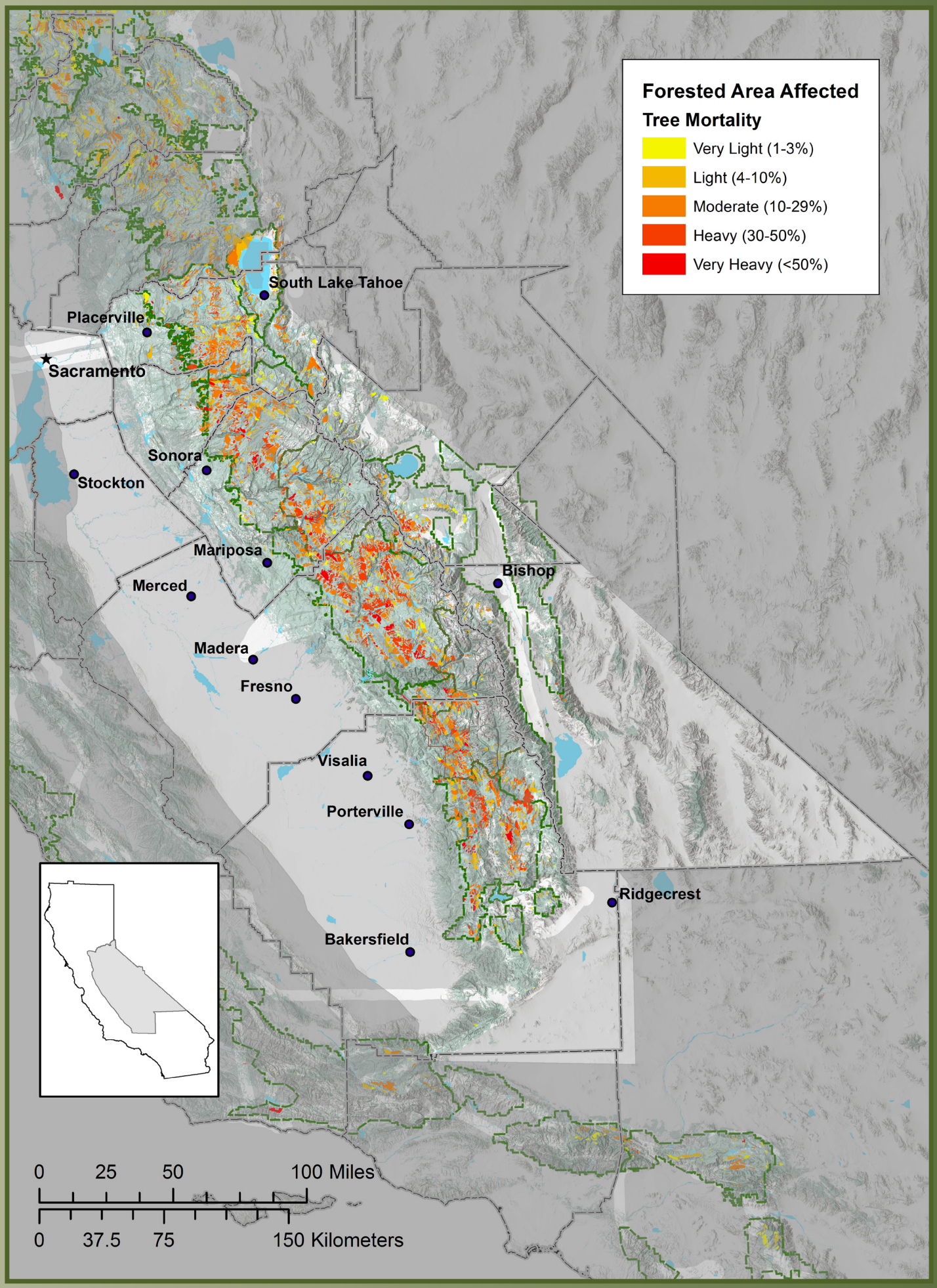
Forest or Park	Within Region 5		Outside Region 5	
	Acres	Dead Trees	Acres	Dead Trees
Lassen NF	197,000	1,058,000	0	0
Modoc NF	73,000	515,000	0	0
Plumas NF	134,000	555,000	0	0
Tahoe NF	95,000	641,000	0	0
Lake Tahoe Basin MU	30,000	168,000	7,000	31,000
Lassen Volcanic NP	26,000	96,000	0	0
Lava Beds NM	0	0	0	0

http://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fsbdev3_046696
Specific map/data requests can be directed to the FHP staff listed on page 7.



Some older but mostly recent and ongoing ponderosa pine mortality east of Goose Lake on the Modoc NF. Though most mortality within the northeastern shared service area occurred in white fir, moderate sized pockets of pine mortality were also common.

South Sierra Shared Service Area



South Sierra Shared Service Area

Headquarters: Stanislaus National Forest Supervisor's Office, 19777 Greenley Road, Sonora, CA 95370

Website: http://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fsbdev3_046697

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Pathologist: Martin MacKenzie (530) 532-3671 x242 mmackenzie@fs.fed.us

National Forests: Eldorado, Inyo, Sequoia, Sierra, Stanislaus, Southern portions of the Humboldt-Toiyabe

Other Major Forested Areas: Sequoia-Kings Canyon and Yosemite National Parks and Devil's Postpile National Monument

Background

This area of the State includes the bulk of the Sierra Nevada and White Mountain Ranges and has experienced exceptional drought conditions for multiple years. However most of this area received around 150% above normal precipitation in 2017 and current drought conditions are now only abnormally dry in southern areas. A special survey was conducted in June to capture an early assessment of mortality levels in the low elevation pine and oak woodlands. However the snowpack was still deep and results were inconclusive since few freshly faded trees were observed.

Survey Highlights

- White fir was again the most affected tree species but decreased from 1.3 million acres affected in 2016 to 334,000 acres with mortality in 2017.
- California red fir mortality expanded from 290,000 acres in 2016 to 770,000 acres with mortality in 2017. Mortality was generally more intense with activity spreading further north and into higher elevations.
- Pine mortality was significantly reduced from 1.8 million acres in 2016 to 270,000 acres with mortality in 2017.
- New oak mortality was not detected in 2017 down from 140,000 acres with mortality mapped in 2016. • However, oak woodlands are not comprehensively surveyed so mortality is substantially underestimated. Oaks overall looked healthier than they have in many years.
- Mortality in other low level pine such as pinyon and grey pine was rare.

Eldorado National Forest:

Overall tree mortality increased from an estimated one million trees in 2016 to 1.25 million however acres affected decreased from 157,000 to 129,000.

- Most of this increase was caused by an upsurge in high elevation California red fir mortality which increased from an estimated 6,000 trees in 2016 to an estimated 510,000 dead trees in 2017.
- White fir mortality increased from an estimated 320,000 dead trees in 2016 to more than 475,000 dead trees in 2017.
- Ponderosa pine mortality decreased from 570,000 dead trees in 2016 to 246,000 dead trees in 2017.
- Jeffrey pine mortality decreased from 75,000 dead trees in 2016 to an estimated 13,000 dead trees in 2017.

Stanislaus National Forest:

Overall mortality was reduced but still widespread. An estimated 2.4 million dead trees were detected in 2017 compared to 4.9 million dead trees in 2016; acres affected decreased from 234,000 in 2016 to 160,000 acres with mortality in 2017.

- Ponderosa pine mortality decreased from an estimated 3.4 million dead trees in 2016 to 315,000 dead trees in 2017.
- California red fir mortality increased from an estimated 5,100 dead trees in 2016 to 1.38 million dead trees in 2017.
- White fir mortality increased from an estimated 446,000 dead trees in 2016 to 540,000 dead trees in 2017.
- Lodgepole pine mortality decreased from an estimated 278,000 dead trees in 2016 to 2,300 dead trees in 2017.
- Jeffrey pine mortality decreased from an estimated 56,000 dead trees in 2016 to 2,100 dead trees in 2017.

Inyo National Forest:

Tree mortality estimates increased from 492,000 dead trees across 55,000 in 2016 to more than one million in 2017 across more than 84,000 acres in 2017.

- California red fir accounted for much of this increase with over 713,000 dead trees in 2017 from an estimated 67,000 dead trees in 2016.
- White fir mortality decreased from an estimated 545,000 dead trees in 2016 to just over 80,000 in 2017.
- Jeffrey pine mortality increased from an estimated 71,000 dead trees in 2016 to approximately 105,000 dead trees in 2017.
- Limber pine mortality substantially increased from 22,000 in 2016 to over 60,000 dead trees in 2017.

Sierra National Forest:

Overall tree mortality decreased from the estimated 18.6 million dead trees across more than 557,000 acres in 2016 to an estimated 7 million dead trees across 297,000 acres in 2017.

South Sierra Shared Service Area

- The largest decrease was in ponderosa pine from an estimated 9.4 million dead trees in 2016 to 230,000 dead trees in 2017.
- Jeffrey pine mortality decreased from an estimated 1.6 million dead trees in 2016 to 55,000 dead trees in 2017.
- White fir mortality decreased from an estimated 6.2 million dead trees in 2016 to 406,000 dead trees in 2017.
- Conversely, California red fir mortality increased from an estimated 805,000 dead trees in 2016 to 6.1 million dead trees in 2017.
- Whitebark and sugar pine mortality were also up considerably going from an estimated 50 and 700 dead trees in 2016 to 21,000 and 8,800 dead trees in 2017 respectively.
- No new oak mortality was detected in 2017 down from an estimated 207,000 dead trees in 2016.

Sequoia National Forest:

Overall tree mortality decreased an estimated 10 million trees in 2016 to less than 3.5 million trees in 2017 and from 390,000 acres affected to 191,000 acres with mortality in 2017.

- California red fir increased from an estimated 373,000 dead trees in 2016 to an estimated more than 2 million dead trees in 2017.
- White fir mortality decreased from an estimated 2.7 million dead trees in 2016 to an estimated 860,000 dead trees in 2017.
- Ponderosa pine mortality decreased from an estimated 5.5 million trees in 2016 to 286,000 dead trees in 2017.
- Jeffrey pine mortality decreased from 1.4 million trees in 2016 to an estimated 271,000 dead trees in 2017.

Sequoia and Kings Canyon National Park:

Overall mortality decreased from an estimated 3.9 million dead trees recorded in 2016 to 1.5 million trees in 2017 and from 161,000 acres affected in 2016 to 109,000 acres with mortality in 2017.

- Ponderosa pine mortality decreased from 1.5 million dead trees in 2016 to 90,000 dead trees in 2017.
- California red fir mortality increased from an estimated 277,000 dead trees in 2016 to approximately 1.1 million dead trees in 2017.
- White fir mortality decreased from an estimated 1.1 million dead trees in 2016 to 326,000 dead trees in 2017.
- Jeffrey pine mortality decreased from 860,000 dead trees in 2016 to an estimated 4,500 dead trees in 2017.
- Lodgepole pine mortality also decreased from an estimated 83,000 dead trees in 2016 to 16,000 dead trees in 2017.
- Whitebark and sugar pine mortality both increased from an estimated 200 and near zero dead trees in 2016 to 1,600 and 1,500 dead trees in 2017 respectively.
- No oak mortality was detected in 2017 down from an estimated 22,000 dead oak trees recorded in 2016.

Yosemite National Park:

Overall tree mortality decreased from an estimated 2.4 million trees across more than 131,000 acres in 2016 to 1.9 million dead trees across 116,000 acres in 2017.

- Ponderosa and Jeffrey pine mortality dramatically decreased from an estimated 705,000 and 94,000 dead trees in 2016 to 119,000 dead ponderosa pines and 10 Jeffrey pine trees in 2017.
- California red fir increased from an estimated 154,000 dead trees in 2016 to more than 1.7 million dead trees in 2017.
- White fir mortality decreased from an estimated 700,000 dead trees in 2016 to 1,100 dead trees in 2017.
- Lodgepole pine mortality decreased from an estimated 120,000 dead trees in 2016 to 91,000 dead trees in 2017.

Acres with Mortality and Estimated Number of Dead Trees by Unit

Forest or Park	Acres	Dead Trees
Eldorado NF	129,000	1,251,000
Inyo NF	84,000	1,035,000
Sequoia NF	185,000	3,480,000
Sierra NF	297,000	6,836,000
Stanislaus NF	159,000	2,240,000
Devils Postpile NM	0	2,000
Sequoia-Kings Canyon NP	109,000	1,533,000
Yosemite NP	116,000	1,928,000

http://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fsbdev3_046696

Specific map/data requests can be directed to the FHP staff listed on page 11.

Southern California Shared Service Area

Headquarters: San Bernardino National Forest Supervisor's Office, 602 S. Tippecanoe Ave., San Bernardino, CA 92408-3430
Website: http://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=stelprdb5331503
Entomologist: Andrea Hefty (909) 382-2871 ahefty@fs.fed.us
Entomologist: Stacy Hishinuma (818) 624-8021 shishinuma@fs.fed.us
Pathologist: Melody Lardner (909) 382-2725 mlardner@fs.fed.us
National Forests: Los Padres, Angeles, San Bernardino, Cleveland
Other Major Forested Areas: Channel Islands National Park, Santa Monica Mountains NRA, Pinnacles National Park, San Gabriel and Sand to Snow National Monuments, numerous State and county parks

Background

This service area includes the Peninsular, Coastal and Transverse Mountain Ranges stretching from the Mexican border to the San Francisco Bay. Invasive forest pests are of particular concern and include tree diseases such as sudden oak death, and insects such as goldspotted oak borer and polyphagous/Kuroshio shot hole borers.

The drought conditions in southern California in 2016 was among the worst statewide and categorized mostly in the exceptional drought category with the most severe and prolonged drought conditions along the central coast from Big Sur south to Santa Barbara and east into the Transverse ranges. However in 2017 most of this area received above normal precipitation and drought conditions were downgraded to abnormally dry in the north, moderate inland and severe closer to the coast.

Survey Highlights

- Coulter pine mortality decreased from 18,000 acres with mortality in 2016 to 7,000 acres and an estimated 40,000 trees killed in 2017.
- Jeffrey pine mortality increased from 25,000 acres with mortality in 2016 to 37,000 acres and an estimated 164,000 trees killed in 2017.
- Ponderosa pine mortality decreased from 3,000 acres with mortality in 2016 to 22 acres and an estimated 70 trees killed in 2017.
- Singleleaf pinyon mortality decreased from 2,400 acres with mortality in 2016 to 4,700 acres and an estimated 12,000 trees killed in 2017.
- Tanoak mortality due to Phytophthora ramorum was again quite low and decreased from 650 acres with mortality and an estimated 1,500 trees killed in 2016 to 340 acres and an estimated 1,000 trees killed in 2017. Drought conditions are not conducive to the spread of this disease.
- Oak mortality due to goldspotted oak borer (Agrilus augroguttatus) decreased from 7,300 acres in 2016 to 5,700 acres with mortality in 2017 but estimated trees killed increased from 11,000 in 2016 to 40,000 dead trees in 2017.

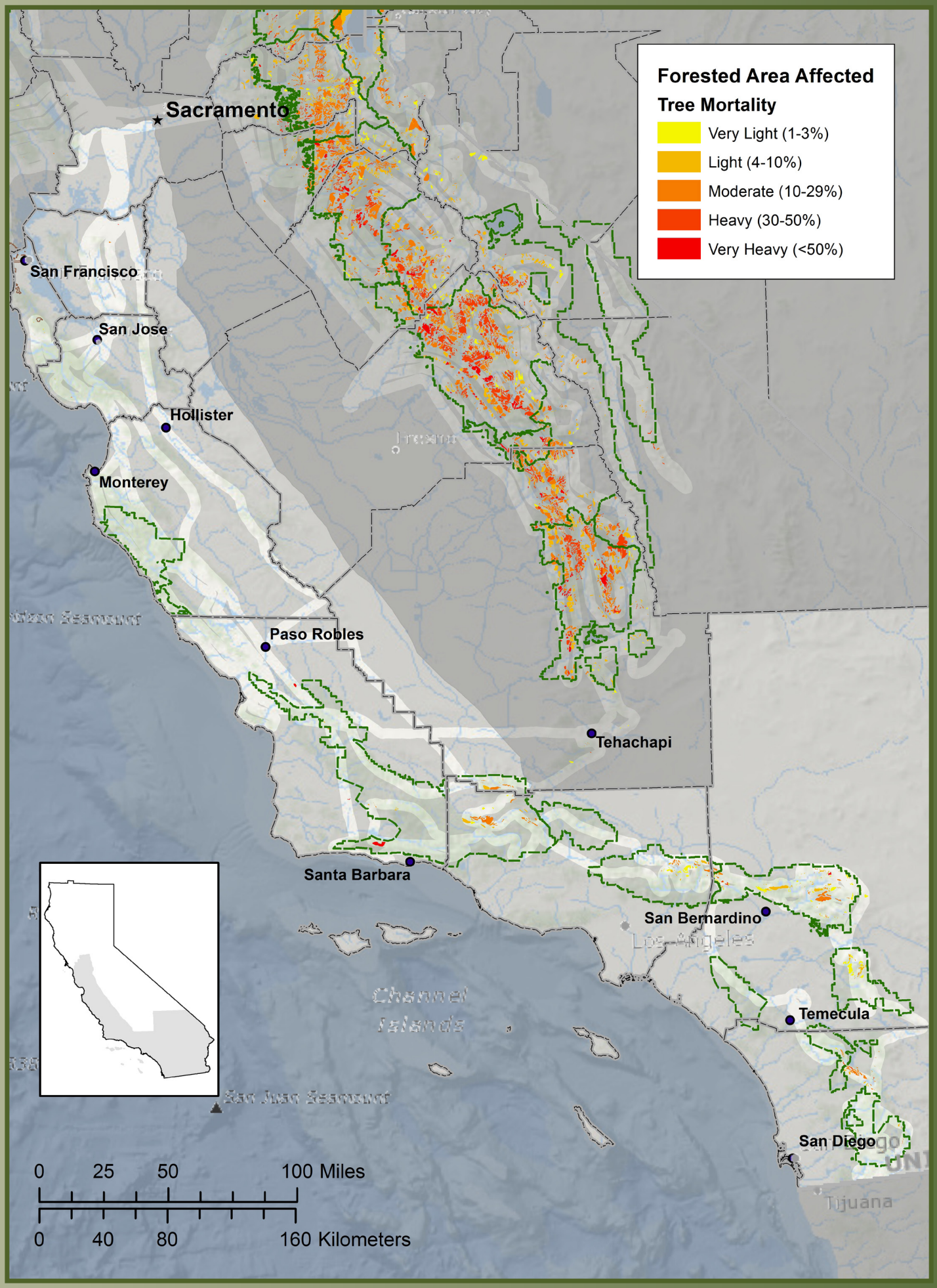
Los Padres National Forest:
Overall mortality decreased from an estimated 260,000 dead trees in 2016 to 114,000 dead trees in 2017; acres affected decreased from 38,000 in 2016 to just over 23,000 acres with mortality in 2017.

- White fir mortality declined from approximately 137,000 dead trees in 2016 to less than 5,000 in 2017.
- In contrast, Jeffrey pine mortality increased from an estimated 36,000 dead trees in 2016 to almost 120,000 dead trees in 2017.
- Coulter pine mortality decreased from an estimated 56,000 trees in 2016 to 6,500 dead trees in 2017.
- Singleleaf pinyon mortality increased from 2,700 dead trees in 2016 to an estimated 5,400 dead trees in 2017.
- Interior live oak mortality decreased from an estimated 19,000 dead trees in 2016 to less than ten in 2017.

Angeles National Forest:
Estimated total tree mortality increased from 27,000 trees across 3,100 acres in 2016 to 49,000 trees across 12,000 acres in 2017.

- White fir accounted for the largest increase, with an estimated 670 trees across almost 500 acres in 2016 to over 26,000 trees across almost 6,000 acres in 2017.
- Coulter, Jeffrey and ponderosa pine are intermixed on the Forest and mortality collectively decreased from 26,000 trees killed in 2016 to an estimated 5,000 in 2017.
- Singleleaf pinyon mortality increased from no mortality in 2016 to over 600 trees in 2017.
- Douglas-fir/Bigcone Douglas-fir increased from 27 trees in 2016 to over 900 in 2017.

Southern California Shared Service Area



Southern California Shared Service Area

San Bernardino National Forest:
Overall tee mortality increased from an estimated 15,000 dead trees in 2016 to more than 146,000 in 2017, and acres affected rose from 9,000 in 2016 to approximately 29,000 in 2017.

- White fir mortality increased from an estimated 5,000 dead trees in 2016 to almost 115,000 dead trees in 2017.
- Jeffrey pine mortality increased from an estimated 8,000 dead trees in 2016 to 17,000 dead trees in 2017.
- Coulter pine mortality also increased from approximately 700 dead trees in 2016 to almost 7,000 dead trees in 2017.
- Bigcone Douglas-fir mortality increased from one dead tree recorded in 2016 to an estimated 3,600 dead trees recorded in 2017.
- Single-leaf pinyon mortality, which while greatly reduced throughout the rest of the State, increased from just one tree recorded in 2016 to more than 4,000 dead trees detected in 2017.
- The one exception to this overall upward mortality trend was sugar pine mortality which decreased from an estimated 1,200 trees in 2016 to less than 100 dead trees recorded in 2017.

Cleveland National Forest:
Collective mortality increased from an estimated 3,000 dead trees in 2016 to over 17,000 dead trees in 2017 however acres affected were reduced from 3,000 to 1,600.

- White fir mortality decreased from an estimated 140 trees in 2016 to 12 trees.
- Jeffrey, Coulter and ponderosa pine are interspersed on the Forest and collectively mortality increased from an estimated 635 trees in 2016 to over 5,400 in 2017.
- Coast live oak mortality doubled from an estimated 2,000 trees in 2016 to 4,000 (originally reported as 12,000) in 2017 (much of this was attributed to the invasive Goldspotted oak borer where previous activity has been documented, but after 7 years of droughty conditions the actual agent is uncertain).

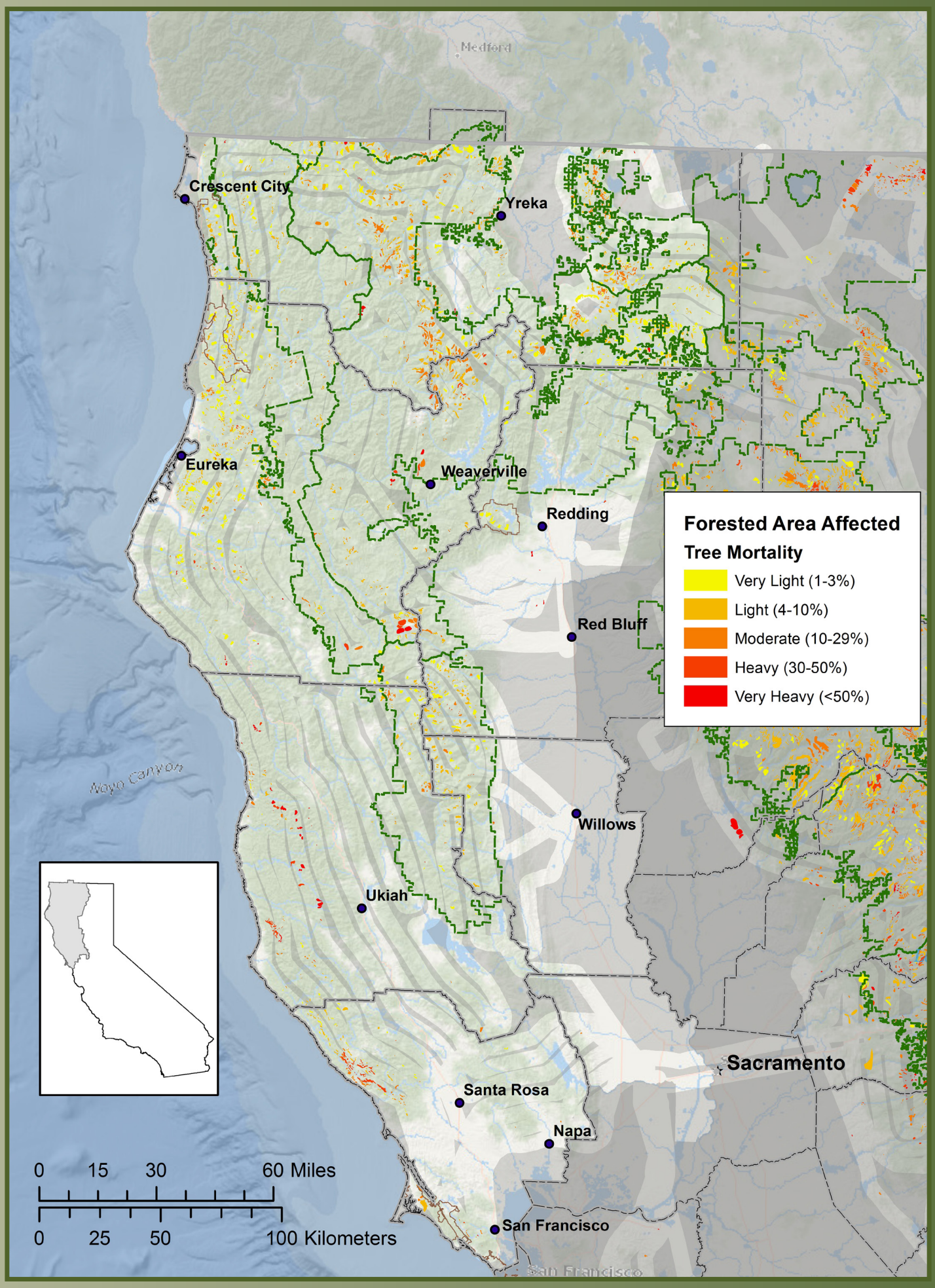
Acres with Mortality and Estimated Number of Dead Trees by Unit

Forest or Park	Acres	Dead Trees
Angeles NF	12,000	49,000
Cleveland NF	2,000	9,000
Los Padres NF	23,000	152,000
San Bernardino NF	29,000	146,000
Pinnacles NP	0	0

http://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fsbdev3_046696
Specific map/data requests can be directed to the FHP staff listed on page 13.

Area east of Sunshine Mtn. on the Cleveland NF where goldspotted oak borer has been active for several years.

Northern California Shared Service Area



Northern California Shared Service Area

Headquarters: Shasta-Trinity National Forests Supervisor's Office, 3644 Avtech Parkway, Redding, CA 96002

Website: http://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=stelprdb5327569

Entomologist: Cynthia Snyder (530) 226-2437 clsnyder@fs.fed.us

Pathologist: Pete Angwin (530) 226-2436 pangwin@fs.fed.us

National Forests: Klamath, Mendocino, Shasta-Trinity and Six-Rivers along with minor portions of Rogue River - Siskiyou

Other Major Forested Areas: Redwood National Park, Golden Gate, Smith River and Wiskeytown NRAs, Berryessa Snow Mountain and Muir Woods National Monuments, Hoopa and Round Valley Indian Reservations, King Range NRCA, Point Reyes National Seashore and several State Parks

Background

The Northern California Shared Service area stretches from the San Francisco Bay north to the Oregon border and east to the Modoc Plateau. Forests along the north coast of California are the most productive and diverse ecosystems in the region and highly productive industrial timber production land is common. Most of the area is of lower elevation with the exception of the Trinity Alps and Mount Shasta which stretch up past the alpine ecotone.

This area has been least affected by the drought and drought conditions in 2016 were already mostly subsided with mild drought conditions along the coast to moderate conditions further inland. In 2017 the area received above normal to well above normal precipitation thus no part of this area was experiencing drought conditions in 2017. Correspondingly, drought-related tree mortality was minimal except for the eastern most areas within the Modoc Plateau.

Survey Highlights

- White fir mortality decreased from 293,000 acres with mortality in 2016 to 141,000 acres with mortality and an estimated 520,000 trees killed in 2017.
- California red fir mortality increased from 96,000 acres with mortality in 2016 to 107,000 acres and an estimated 486,000 trees killed in 2017.
- Jeffrey pine mortality decreased from 55,000 acres with mortality in 2016 to 1,400 acres and an estimated 3,300 trees killed in 2017.
- Ponderosa pine mortality decreased from 330,000 acres with mortality in 2016 to 38,000 acres and an estimated 162,000 trees killed in 2017.
- Tanoak mortality attributed to Sudden Oak Death (Phytophthora ramorum) increased from 10,000 acres and 27,000 trees killed in 2016 to 17,000 acres and an estimated 212,000 trees killed in 2017.
- Overall mortality, not attributed to damage caused by bear feeding in young plantations, was minimal along the coast.
- Levels of oak and gray pine mortality in the interior were also minimal.

Klamath National Forest:

Overall mortality increased from an estimated 407,000 dead trees in 2016 to over 455,000 trees killed in 2017; conversely, acres with mortality decreased from 175,000 acres to 94,000.

- California red fir mortality increased from an estimated 102,000 dead trees in 2016 to 251,000 dead trees in 2017.
- White fir mortality increased from an estimated 116,000 dead trees in 2016 to 155,000 trees killed in 2017.
- Ponderosa pine mortality decreased from an estimated 97,000 in 2016 to 42,000 trees killed in 2017.
- Jeffrey pine mortality decreased from 40,000 dead trees in 2016 to 5,000 dead trees in 2017.
- Douglas-fir mortality decreased from 3,000 dead trees in 2016 to 2,000 dead trees in 2017.
- Sugar pine and western white pine decreased from 37,000 and 6,000 in 2016 to 20 and 10 dead trees in 2017 respectively.

Shasta-Trinity National Forest:

Tree mortality declined from an estimated 370,000 dead trees in 2016 to 309,000 dead trees in 2017 and from 175,000 acres affected in 2016 to 76,000 acres with mortality in 2017.

- California red fir mortality increased from an estimated 92,000 dead trees in 2016 to 142,000 dead trees in 2017.
- White fir was the second most common tree species affected and was estimated at 120,000 dead trees in 2016 and 124,000 dead trees in 2017.
- Ponderosa pine mortality decreased from 121,000 dead trees in 2016 to 38,000 dead trees in 2017.
- Whitebark pine mortality decreased from an estimated 5,000 dead trees in 2016 to 2,600 dead trees in 2017.

Northern California Shared Service Area

- Jeffrey pine mortality decreased from an estimated 8,600 dead trees in 2016 to 40 dead trees in 2017.
- Douglas-fir mortality decreased from 2,700 dead trees in 2016 to 140 dead trees in 2017.
- Knobcone and lodgepole pine mortality decreased from an estimated 1,900 and 2,200 dead trees in 2016 to 300 and 800 dead trees in 2017 respectively.

Six Rivers National Forest:

Overall mortality decreased from an estimated 73,000 dead trees across more than 37,000 acres to 53,000 dead trees across 18,000 acres in 2017.

- White fir mortality was again the most common tree species affected but decreased from an estimated 21,000 dead trees in 2016 to 13,000 dead trees in 2017.
- Douglas-fir mortality decreased from an estimated 9,500 dead trees in 2016 to 7,800 dead trees in 2017.
- California red fir mortality increased from an estimated 500 dead trees in 2016 to 14,000 dead trees in 2017.
- Jeffrey pine mortality increased from less than 10 dead trees to an estimated 3,000 dead trees in 2017.
- Knobcone pine mortality decreased from an estimated 11,000 dead trees in 2016 to 3,700 dead trees in 2017.
- No lodgepole pine mortality was detected in 2016, an estimated 1,800 dead trees were recorded in 2017.

Mendocino National Forest:

Overall mortality decreased from more than 184,000 dead trees in 2016 to less than 114,000 in 2017, similarly acres affected decreased from 67,000 to an estimated 36,000 acres with mortality in 2017.

- White fir mortality increased from just over 50,000 dead trees in 2016 to an estimated 82,000 in 2017.
- California red fir mortality increased from an estimated 5,000 trees killed in 2016 to more than 10,000 dead trees in 2017.
- Ponderosa pine mortality decreased from an estimated 127,000 dead trees in 2016 to 17,000 in 2017.
- Knobcone pine mortality increased from an estimated 1,300 dead trees in 2016 to approximately 1,700 dead trees in 2017.
- Douglas-fir mortality increased from 400 dead trees in 2016 to an estimated 1,800 dead trees in 2017.

Golden Gate National Recreation Area:

Tanoak mortality likely caused by Sudden Oak Death (*phytophthora ramorum*) decreased from an estimated 130 dead trees in 2016 to 80 dead trees in 2017.

Point Reyes National Seashore:

No significant forest health issues were detected in 2016, an estimated 6,000 dead bishop pine and 250 dead tanoak were recorded in 2017.

Redwood National and State Park:

No significant forest health issues were detected.

Whiskeytown National Recreation Area:

Overall mortality decreased from an estimated 6,700 dead trees in 2016 to 4,200 dead trees in 2017, however acres affected increased from 1,300 in 2016 to 3,300 acres with mortality in 2017.

- White fir mortality increased from 5 dead trees in 2016 to an estimated 4,200 dead trees in 2017.
- Ponderosa pine mortality decreased from an estimated 6,700 trees killed in 2016 to 4,000 dead trees in 2017.

Acres with Mortality and Estimated Number of Dead Trees by Unit

Forest or Park	Acres	Dead Trees
Klamath NF	94,000	455,000
Mendocino NF	36,000	114,000
Shasta-Trinity NF	76,000	309,000
Six Rivers NF	18,000	52,000
Golden Gate NRA	0	0
Muir Woods NM	0	0
Point Reyes NS	2,000	6,000
Redwood NP	7,000	14,000
Whiskeytown NRA	3,000	4,000

http://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fsbdev3_046696

Specific map/data requests can be directed to the FHP staff listed on page 17.