



2014 Aerial Survey Results: California



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Forest Service

Pacific Southwest Region

R5-PR-034

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COVER PHOTO

Parts of California including this portion of the Angeles National Forest have been experiencing severe and prolonged drought conditions (See page 6) resulting in widespread conifer mortality either directly or predisposing trees to successful bark beetle attacks. As the drought continues this type of mortality event will likely increase in both extent and severity.

Photo by: Jeffrey Moore, US Forest Service

Prepared by Jeffrey Moore, & Adam Ellis

USDA Forest Service, Region 5

Forest Health Protection

Contributors

Aerial Surveyors:

Zachary Heath

Jeffrey Moore

Bob Noyes

Amy Jirka

Kathy Mathews R4

Chad Nelson R4

Robert Schroeter R6

Robbie Flowers R6

Contributing Editors:

Sheri Smith

Christopher Fischer

Phillip Cannon

Special Thanks to the Pilots:

Pete Datema

Steve Datema

John Litton

David Yeaton

Sam Stigall

Additional Crewmembers and Photographers:

Beverly Bulaon

Tom Coleman

Danny Cluck

Brian Mattos – Yosemite NP

Julie Rhoads - CDF

Lisa Bell – UCCE Sonoma County

Sara Bisbing – Cal Poly SLO

Yana Valachovic – UCCE Humboldt County

Gene Phillips - NDF

Coreen Francis - BLM

Mark Brown - TNF

Eric Burke - TNF

Mary Mayeda - TNF

Laura Morgan – Redwood NP

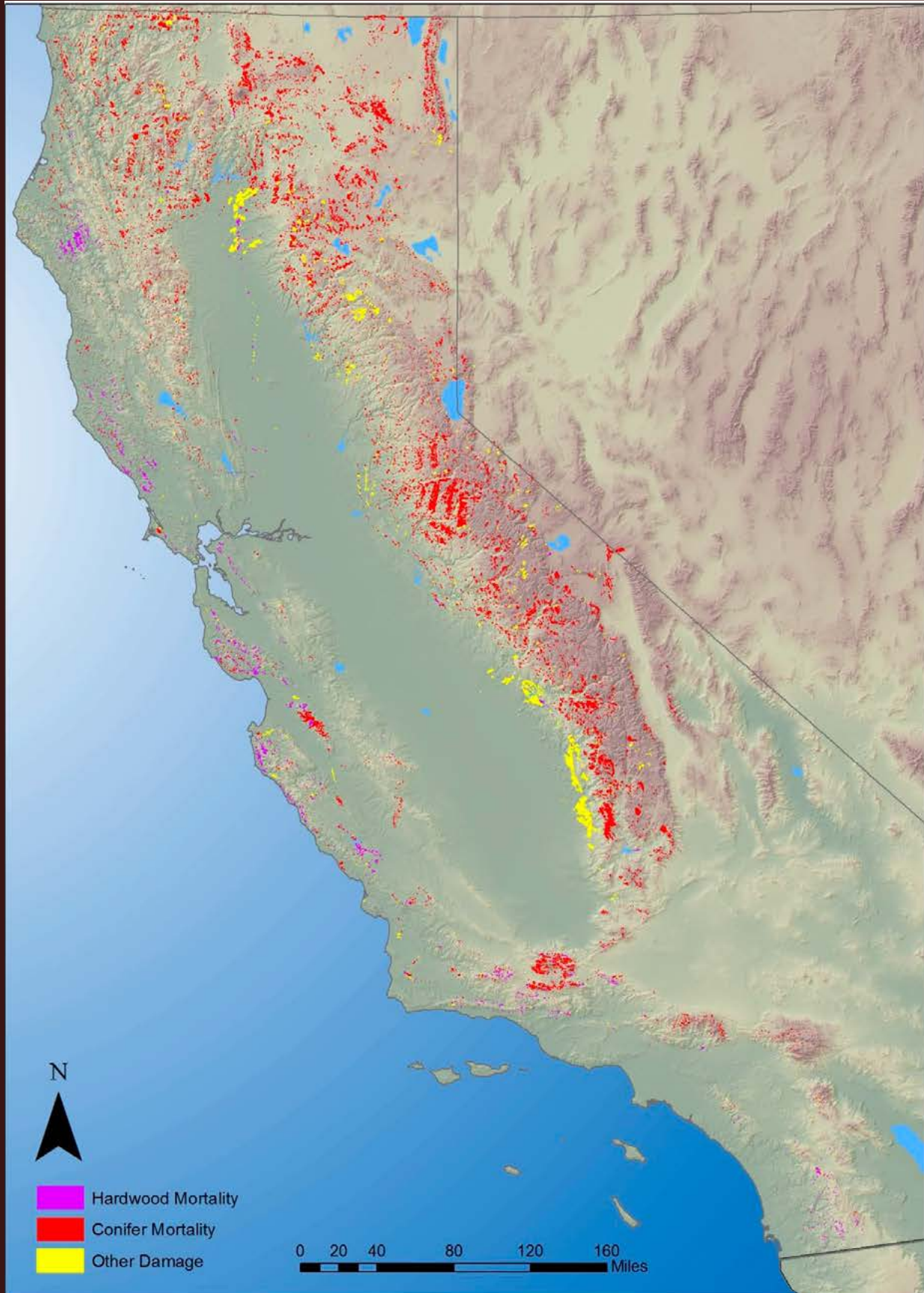
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2014 Aerial Survey Results: California

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Flown Area and Damage Mapped



Overview

Aerial surveys are conducted annually by Forest Health Protection in order to record and map recent tree mortality and current injury using a digital aerial sketch mapping system. Overall, mapped mortality was more than double last year's levels, with about 909,000 acres with elevated mortality (at least one tree per acre) mapped in 2014. An estimated 3.3 million trees were killed. Major trends for the year included an increase in mortality due to bark beetles, especially in areas of the State impacted by the ongoing drought, and a reduction in mortality caused by Sudden Oak Death. The 2014 surveys covered over 44 million acres of California. All National Forests and forested National Parks were surveyed along with State and private lands. Key results include:

- Overall, over 820,000 acres with elevated mortality due to bark beetles or wood borers were mapped, up from 350,000 acres last year.
- Fir mortality attributed to fir engraver increased to 460,000 acres in 2014, from 129,000 in 2013.
- Pine mortality from both western and mountain pine beetle increased in 2014, affecting about 260,000 and 220,000 acres respectively.
- Acres with Jeffrey pine mortality, attributed to Jeffrey pine beetle, pine engraver, California five-spined Ips and California flat-headed borers, increased again this year to over 120,000 acres.
- About 58,000 acres with pinyon pine mortality from pinyon Ips were mapped in California in 2014, a large increase from 2013.
- Nearly 25,000 acres with elevated mortality of gray pine were mapped, similar to last year. However, Coulter pine mortality increased over 10-fold to 13,000 acres.
- Douglas-fir beetle was mapped on the Plumas, Lassen, Shasta-Trinity and Klamath National Forests in 2013, but did not appear active in 2014. Flat-headed fir borer affected almost 16,000 acres of Douglas-fir this year, nearly the same as in 2013.
- Oak mortality from gold-spotted oak borer in San Diego County appeared to increase from previous years, at about 2,600 acres.
- Despite new finds of sudden oak death (SOD) in Humboldt, Trinity and Mendocino Counties, oak and tanoak mortality from SOD was lower than last year, affecting 28,700 acres, compared to over 47,500 acres mapped in 2013. This is still much higher than 2011 levels, however, when only 8,000 acres with elevated mortality were observed.
- Other observed diseases included Port-Orford Cedar root disease, western gall rust, pitch canker, and Cytospora canker on fir.
- Defoliation from Douglas-fir tussock moth was observed on the Plumas and Lassen National Forests, affecting about 28,000 acres. Other defoliator activity included pine scales, lodgepole needleminer, satin moth and Jeffrey pine needleminer.
- About 227,000 acres were mapped as suffering from drought-related mortality in 2014. Symptoms included defoliation, early color change and leaf drop.

Methodology

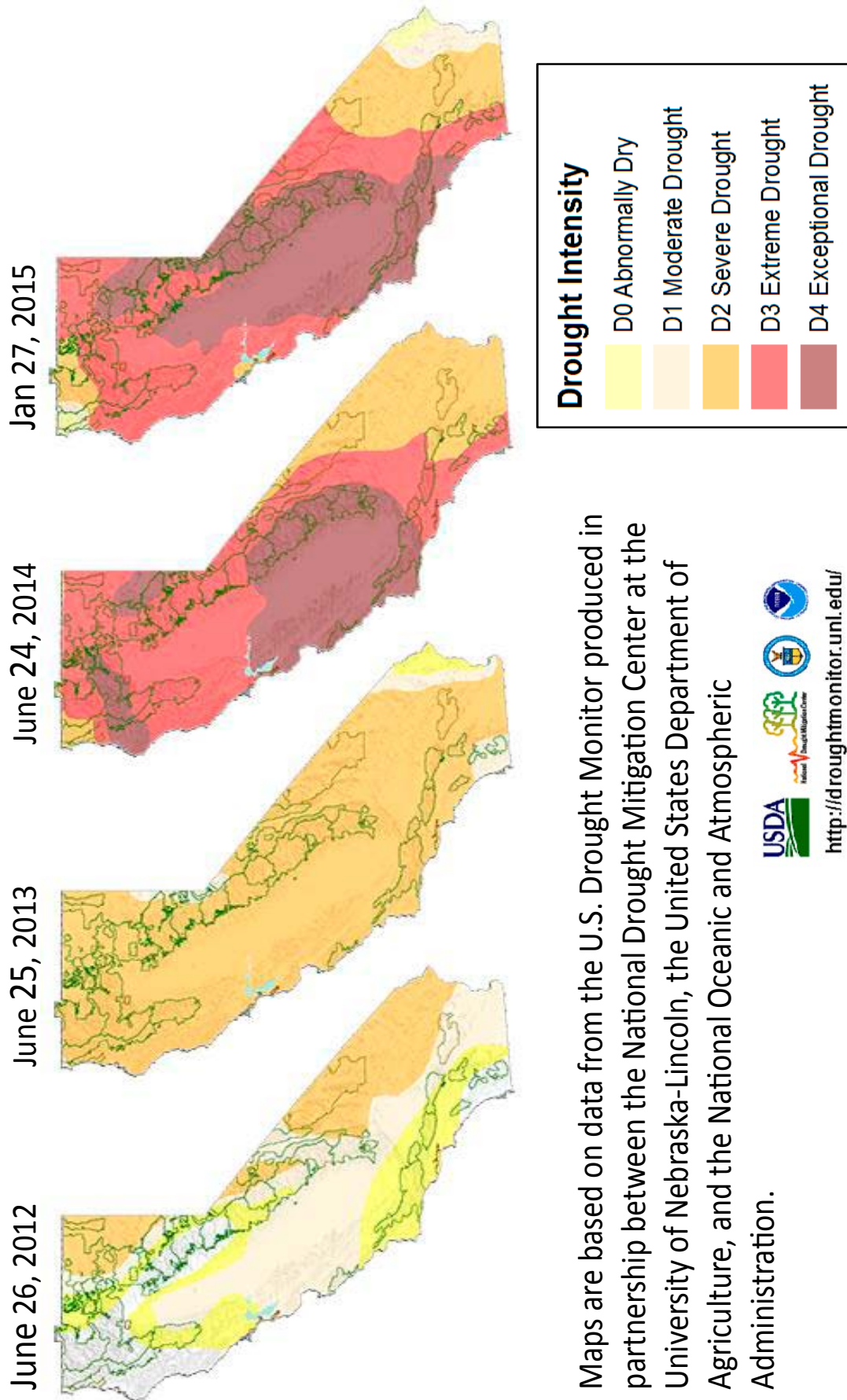
Aerial surveys have been conducted since 1994 to map forest disturbance activity on Forest Service land in California. The 2014 aerial detection surveys took place from April 29th through September 11th, 2014.

Data was collected by eight observers; Zachary Heath, Jeffrey Moore, Bob Noyes, Amy Jirka, Kathy Mathews, Chad Nelson, Robert Schroeter, and Robbie Flowers. Flights were typically flown on a 3.5 mile grid, with two observers mapping out opposite sides of the plane. A total of 22,748 miles were flown over 213 hours, covering more than 44 million acres.

Ongoing Drought Conditions In California

Maps Showing Steadily Increasing Intensity and Multi-year Duration

Regional drought affects are now short term (e.g. agriculture, grasslands) as well as long term (e.g. hydrological, ecological)



Maps are based on data from the U.S. Drought Monitor produced in partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration.



Drought Situation in California, Status and Recent History

The chart below and the map series on the opposite page are based on the U.S. Drought Monitor, a partnership between the National Drought Mitigation Center, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration.

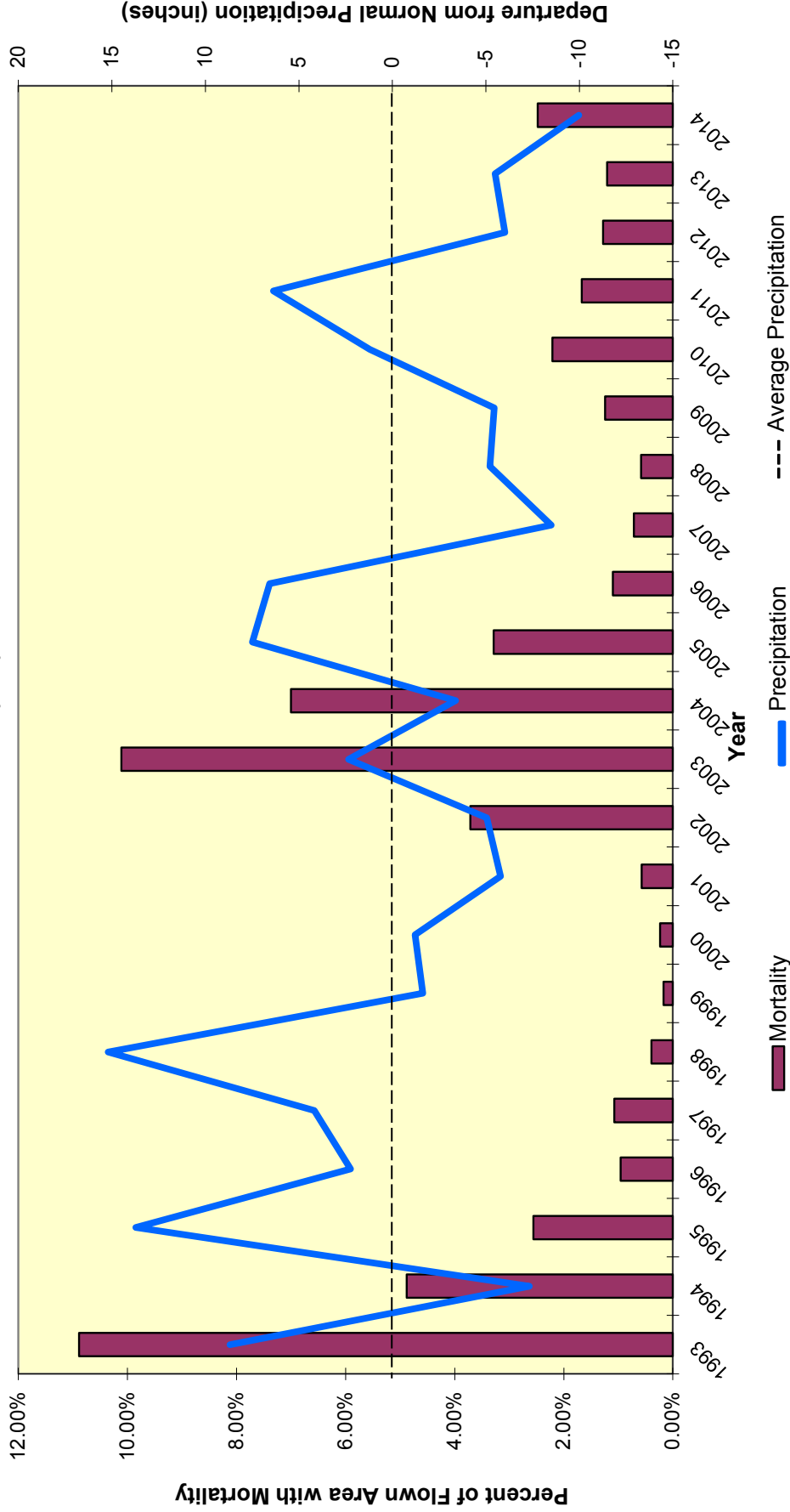
Drought can be long term or short term and the current situation in California reflects both a chronic multiyear drought situation combined with record setting lack of precipitation. January 2015 resulted in no precipitation; the first time in recorded history. Snowpack was almost non-existent in late January 2015 and what little runoff there is will occur early in the growing season. In addition, temperatures have been and are predicted to remain generally above normal over the upcoming growing season according to the NOAA predictions center.

The drought value of prior years was generated by averaging the drought values at the end of June of each year. This point in time was selected because it is a highly active flight time of many bark beetle species and so available water uptake by trees at this time is critical. The one exception to this is 2015 which uses the most recent available. Drought statuses for areas of the Region are as follows with higher numbers indicating more extreme drought conditions as indicated in the map legend and show some areas have gone beyond the extreme (3) classification to the newly created “exceptional (4)” category:

Forest/Park	2012	2013	2014	2015	Drought Discussion
Angeles	0	2.0	3.0	4.0	Western portions of the Forest have been experiencing more severe conditions longer.
Cleveland	0	1.3	2.7	3.1	The most severe conditions have been in the north dipping into the exceptional category.
El Dorado	0	1.9	3.0	3.6	Most severe conditions are to the south and east which corresponds with areas of higher mortality.
Golden Gate/PR	.24	2.0	3.3	2.2	Drought conditions in this area have actually ameliorated somewhat and are now mostly severe
Inyo	1.4	2.0	3.0	3.5	Extreme drought conditions in the east and exceptional in the north and west.
Klamath	.06	2.0	2.9	2.1	Drought conditions in this area have ameliorated somewhat from mostly extreme to mostly severe.
Lake Tahoe Basin	.15	1.0	3.0	4.0	Conditions were not noteworthy prior to 2014, but have since gone from extreme to exceptional.
Lassen	.69	2.0	3.2	3.4	Drought conditions have steadily increased and are now exceptional in the eastern portions.
Los Padres	.17	2.0	3.9	3.9	Exceptional drought conditions occurred here the earliest and persist and were also severe in 2013.
Mendocino	.20	2.0	3.0	3.0	Extreme drought conditions are ongoing.
Modoc	1.9	2.0	3.0	3.1	Extreme drought conditions are ongoing.
Plumas	.40	2.0	3.4	3.5	Extreme drought conditions in the west becoming exceptional further east.
San Bernardino	.36	2.0	2.2	2.3	Ongoing severe drought conditions.
Sequoia	1.05	2.0	4.0	4.0	Long term exceptional drought is ongoing throughout the larger area.
SEKI	1.05	2.0	4.0	4.0	Long term exceptional drought is ongoing throughout the larger area.
Shasta/Trinity	.07	2.0	3.6	3.0	Exceptional drought conditions have actually ameliorated somewhat becoming extreme.
Sierra	.98	2.0	4.0	4.0	Long term exceptional drought is ongoing throughout the larger area.
Six Rivers	n/a	2.0	2.8	1.7	Extreme drought conditions over the southern area of the forest have ameliorated to severe.
Stanislaus	.08	2.0	3.3	4.0	Steady progression from Severe to Extreme to Exceptional drought conditions.
Tahoe	.06	1.8	3.0	3.3	Extreme drought conditions are ongoing.
Yosemite	.80	2.0	3.8	4.0	Long term exceptional drought is ongoing throughout the larger area.

Precipitation vs Mapped Mortality for Region 5

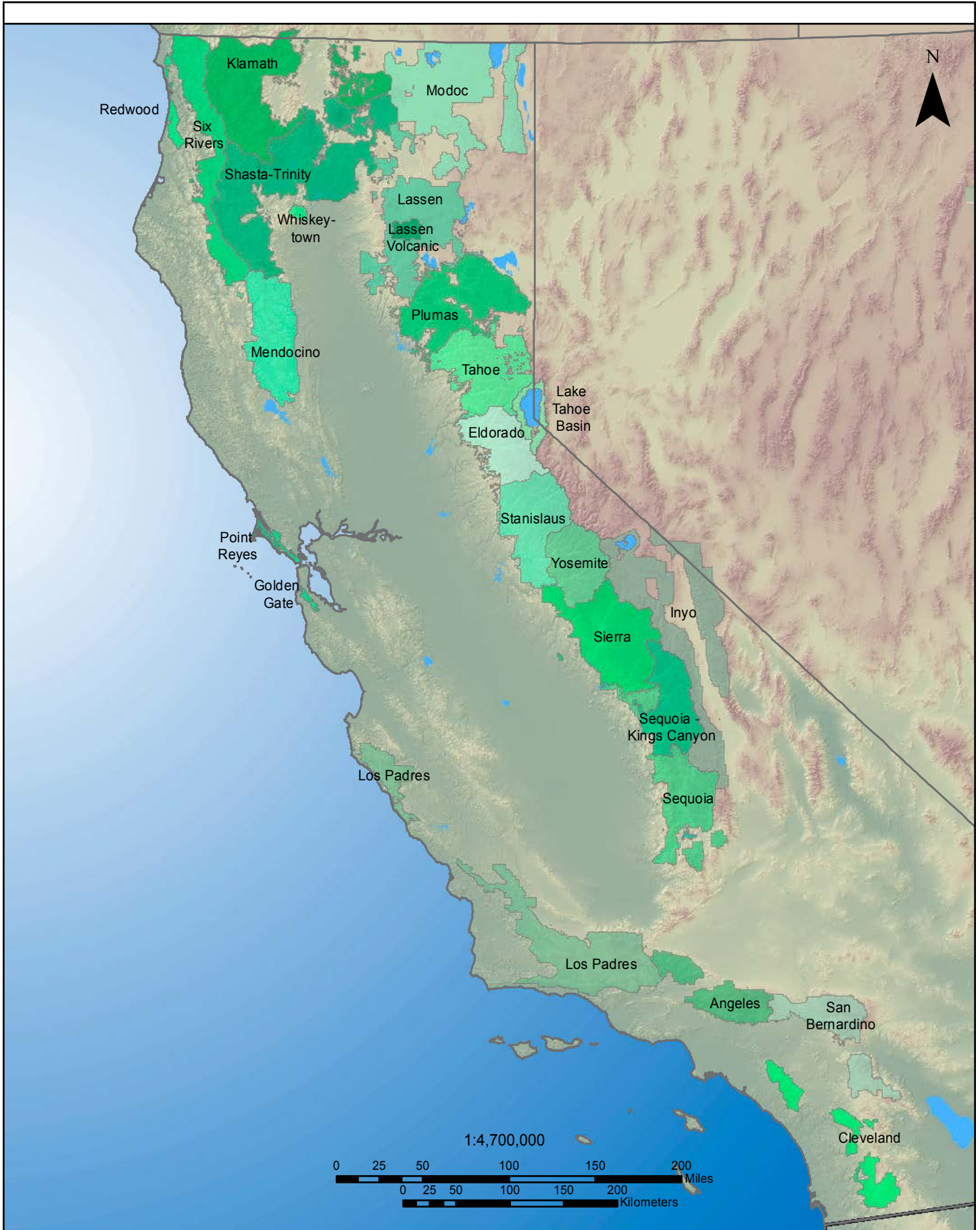
Bark Beetle Mortality only



Acres of biotic-caused mortality, as a percentage of the area surveyed and deviation from normal rainfall. The precipitation data is based on average precipitation for the State of California from 1949-2005 (Precipitation data source: Western Regional Climate Center-California Climate Tracker).

Aerial Survey Results

by National Forests and Parks



Angeles National Forest



Overstory Coulter and Jeffrey pine mortality north of Big Pines Mountain on the Valyermo Ranger District.

Overview

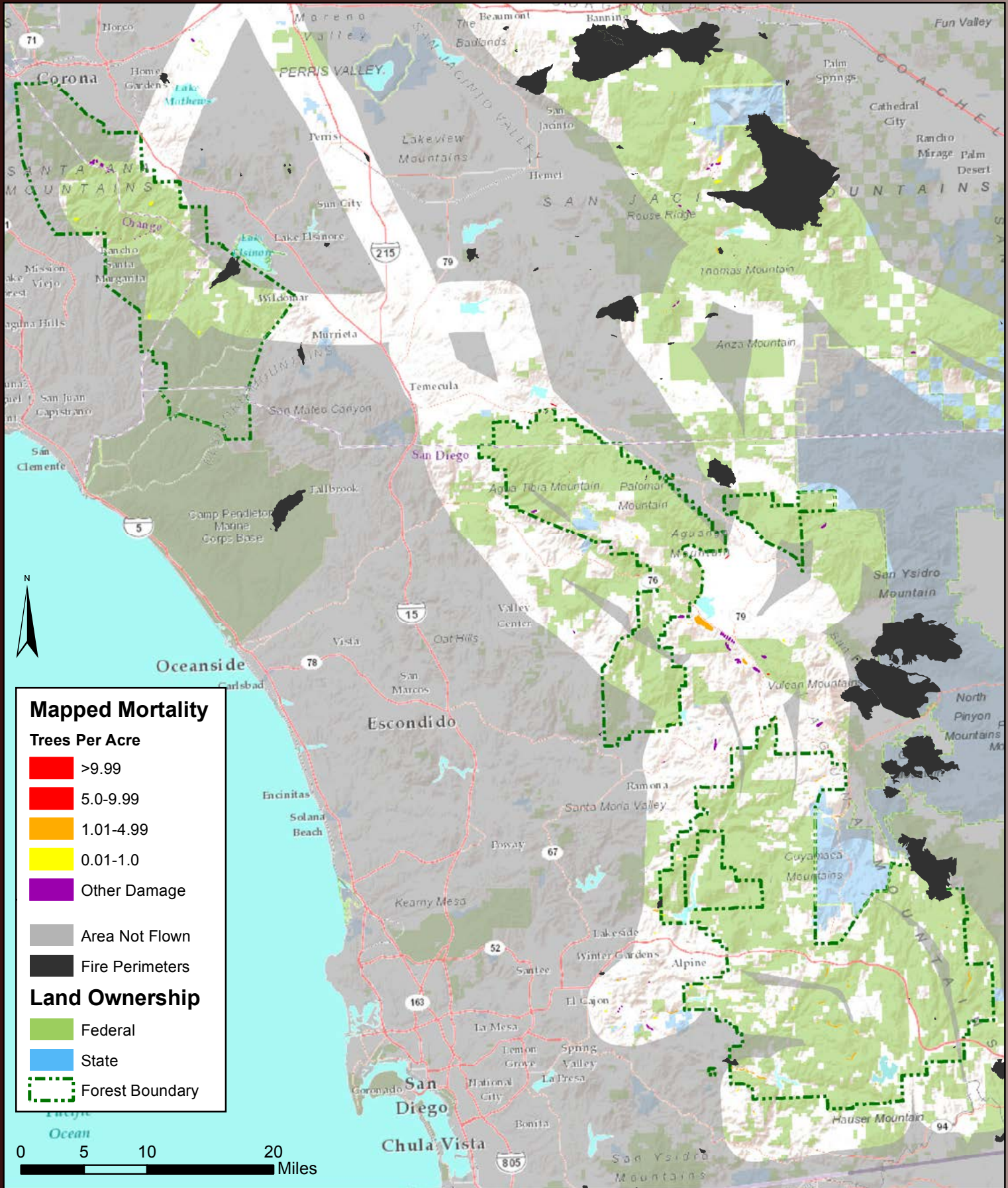
- A total of 4,142 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, a dramatic increase from the 229 acres mapped in 2013.
- Most of this increase is due to mortality in various pine species and attributed to associated pine bark beetle activity though drought was undoubtedly and a major contributing factor.
- In addition, a major increase in oak mortality was also observed which was attributed directly to ongoing severe droughty conditions.
- In particular, expansive areas of Coulter pine, gray pine and coast live oak mortality were recorded North of Sawtooth Mtn on the Santa Clara/Mojave River Ranger District corresponding with some of the most exceptional drought conditions in the region (see Drought page 6)

Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
coast live oak	1,320	5	17
Jeffrey pine	1,103	129	479
Coulter pine	1,018	18	433
mixed conifer	410	1	63
gray pine	209	19	0
sugar pine	87	6	165
pinyon	79	2	1
California black oak	22	0	0
bigcone Douglas-fir	2	4	11
hardwoods	1	2	6
Forest Disturbance other than Tree Mortality			
coast live oak ⁸	762	35	1
Jeffrey pine ^{5 7 8}	9	2	1
hardwoods ¹	2	9	14

¹Defoliation, ²Discoloration, ³Topkill, ⁴Main Stem Breakage, ⁵Flagging

The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types. Therefore it is inappropriate to sum the acreages in this table for overall damage area extent.

Cleveland National Forest



Cleveland National Forest



Recent and older oak mortality caused by goldspotted oak borer (GSOB) near William Heise County Park on the Palomar Ranger District.

Overview

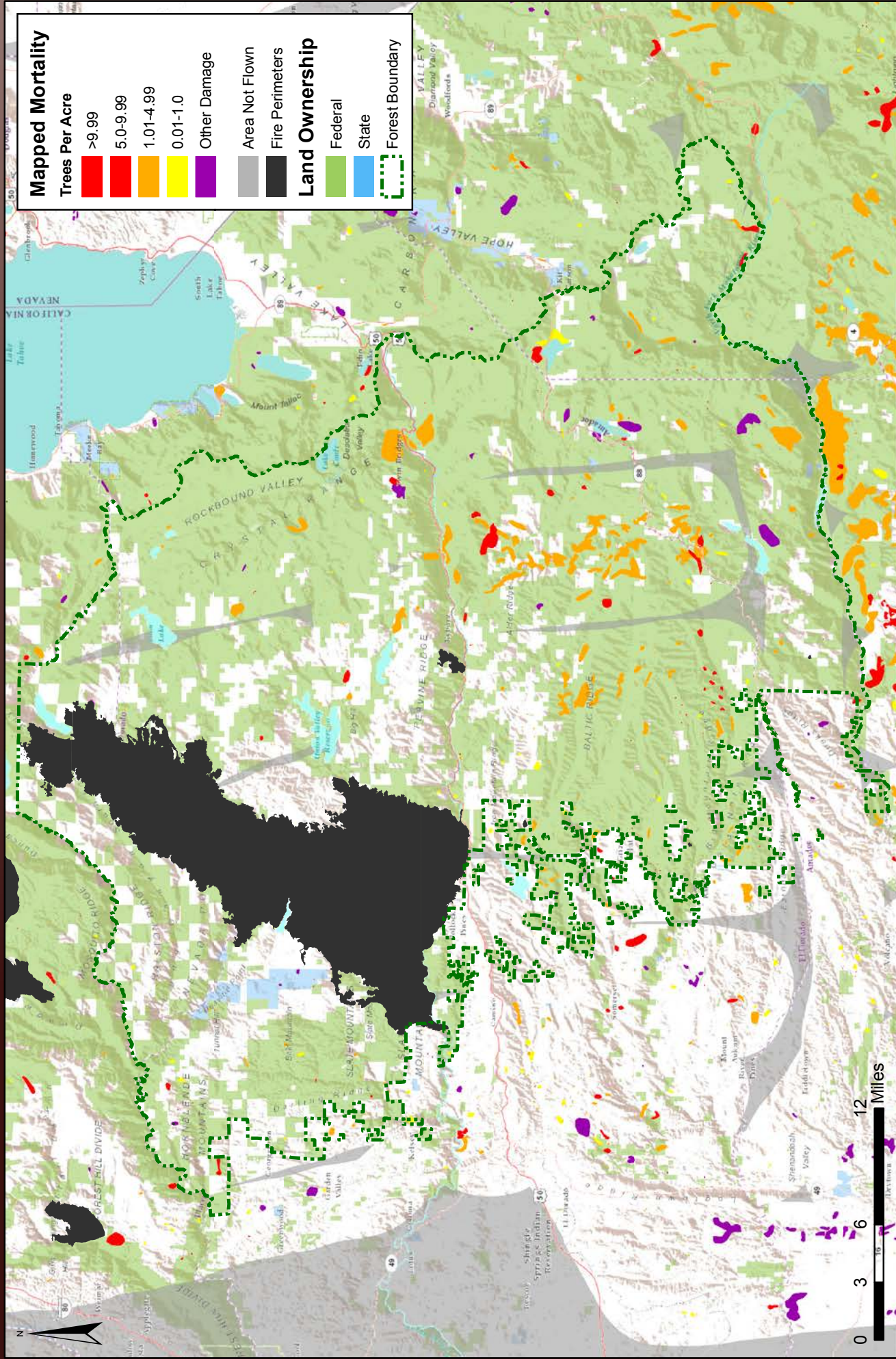
- A total of 1,263 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, a significant increase from the 789 acres mapped in 2013.
- The major disturbance agent was again the invasive golden spotted oak borer causing substantial and widespread mortality of coast live and black oak in a gradually spreading infestation area covering the southern portion of the Forest especially on the Desconso but increasingly on the Palomar Ranger District.
- In addition, a new GSOB infestation was discovered by ground surveys near the northwestern tip of the forest on the Trabuco Ranger District and this area will be more closely monitored in the future.
- Outside of this infestation area, additional scattered oak and coulter pine mortality was detected and attributed to the extreme drought conditions and Ips beetle activity respectively (see Drought page 6)

Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
coast live oak	939	720	1,002
Coulter pine	107	46	18
Jeffrey pine	42	15	10
California black oak	31	2	5
bigcone Douglas-fir	2	1	1
hardwoods	1	1	3
single leaf pinyon	1	1	1
white fir	0	1	1
ponderosa pine	0	1	0
mixed conifer	0	0	0
Forest Disturbance other than Tree Mortality			
California black oak ^{1 3}	155	0	0
hardwoods ¹	0	7	0
Jeffrey pine ⁵	0	7	0

¹Defoliation, ³Discoloration, ⁵Topkill

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Eldorado National Forest



Eldorado National Forest



Scattered overstory ponderosa pine near Sugarloaf Mountain on the Georgetown Ranger District.

Overview

- A total of 25,278 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, a dramatic increase from the 5,244 acres mapped in 2013.
- The most widespread mortality was along Alder Ridge on the Placerville Ranger District and was primarily a mix of pine and fir mortality attributed to bark beetle activity, but predicated by and corresponding with the ongoing extreme to exceptional droughty conditions (see Drought page 6).
- In addition, expanded areas of flagging and top kill in fir indicate a chronic deterioration in this host type in the southern and eastern portions of the forest.

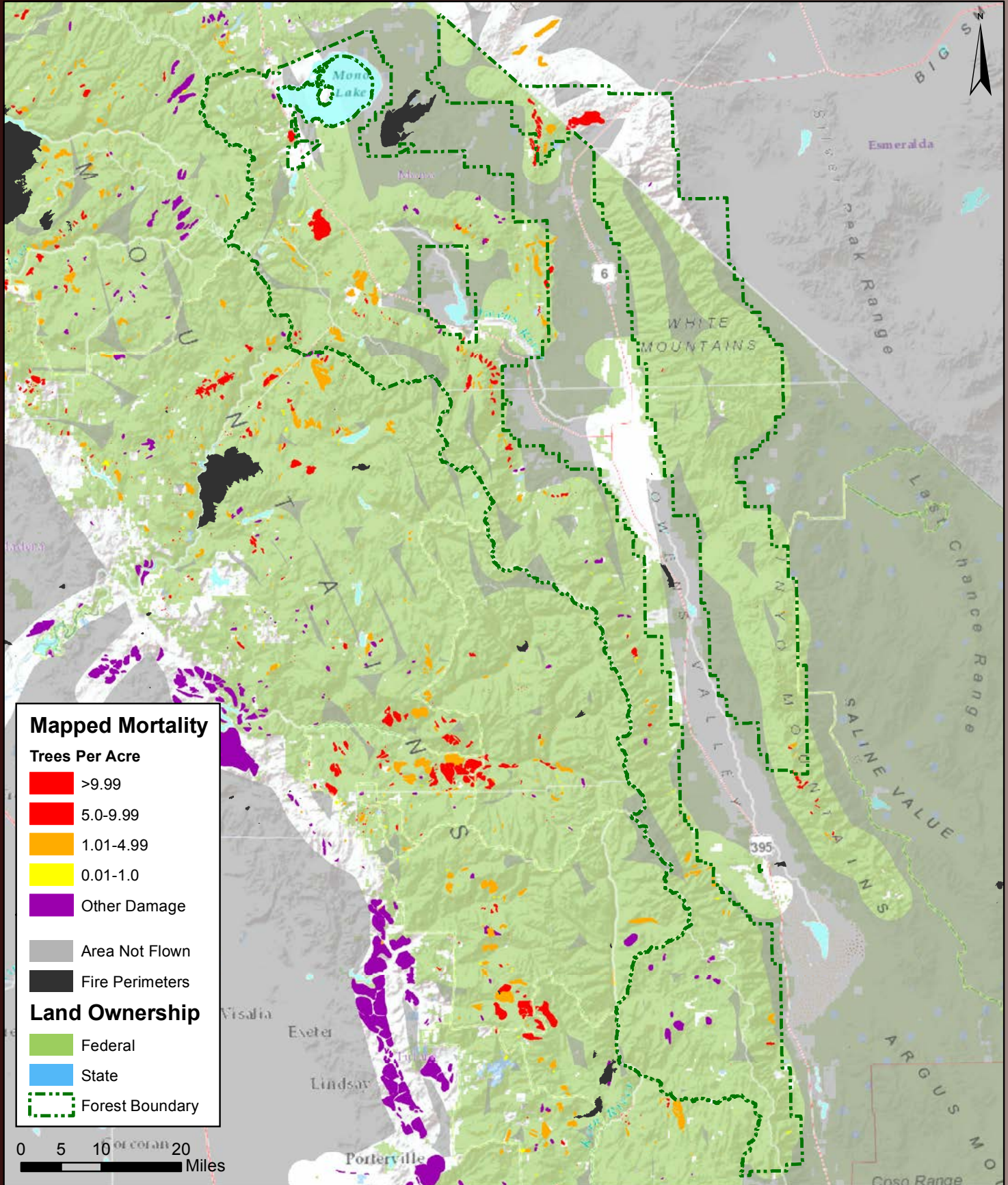
Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
Jeffrey pine	7,334	345	69
sugar pine	5,599	303	857
white fir	4,855	1,882	55
western white pine	3,480	154	102
lodgepole pine	3,266	818	752
ponderosa pine	3,126	1,902	1,194
California red fir	1,232	164	16
Douglas-fir	324	149	1
whitebark pine	129	0	0
knobcone pine	0	17	4
Forest Disturbance other than Tree Mortality			
California red fir ^{5 8}	2,066	67	294
Jeffrey pine ⁵	1	0	0
knobcone pine ¹	0	42	0
white fir ⁵	5	13	0

¹Defoliation, ⁵Topkill, ⁸Flagging

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Inyo National Forest



Inyo National Forest



Overview of older and recent lodgepole and whitebark pine mortality in the June Mountain area on the Mammoth Ranger District.

Overview

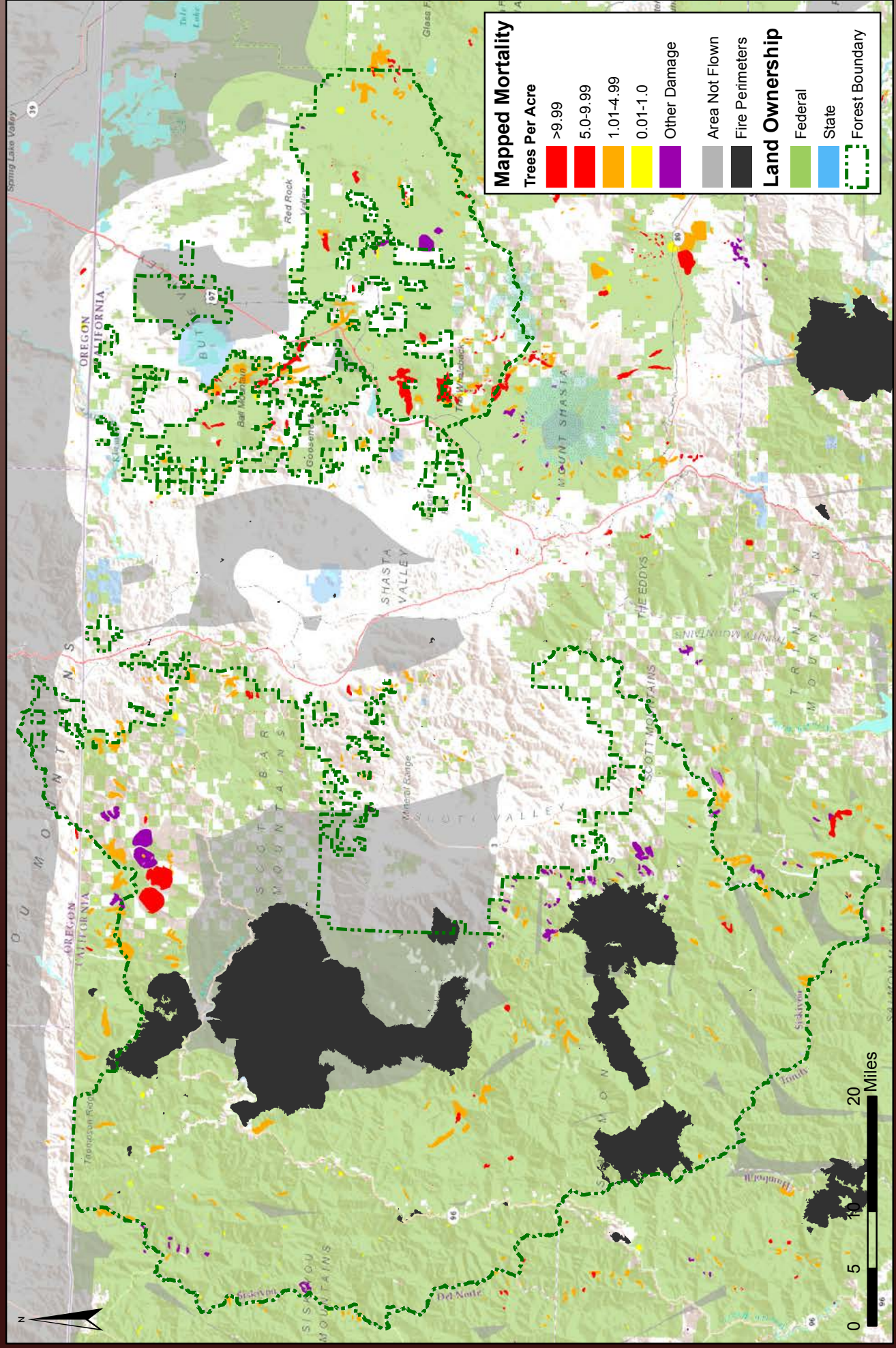
- A total of 37,847 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, approximately double the 16,293 acres mapped in 2013.
- Even after several years of outbreak conditions, mountain pine beetle activity in lodgepole and whitebark pine continues around June Mountain killing many of the remaining live trees.
- Expansive areas of pinyon and juniper mortality were newly detected within the eastern portion of the Mono Ranger district and around Banner Ridge on the White Mtn. Ranger District where extreme to exceptional droughty conditions overcame even these highly tolerant trees (see drought page 6).
- Additional areas of this host type are to be surveyed for the first time in 2015.
- Other areas of increasing activity include Mammoth Mtn. and Mt. Morgan in mixed pine and fir on the Mammoth and White Mountain Ranger districts respectively.

Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
single leaf pinyon	12,804	1,620	1,288
whitebark pine	10,166	4,494	4,759
lodgepole pine	6,115	3,541	2,050
juniper	3,381	0	0
Jeffrey pine	2,526	4,164	3,127
white fir	1,751	1,627	107
California red fir	1,500	832	113
limber pine	446	403	942
bristlecone pine	3	157	4
western white pine	2	95	0
Forest Disturbance other than Tree Mortality			
lodgepole pine ¹	2,536	0	0
white fir ⁵	1,053	140	0
quaking aspen ⁴	1,162	449	2,575
hardwoods ^{3, 4}	687	0	0

¹Defoliation, ²Discoloration, ³Dieback/Decline, ⁴Topkill

The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types. Therefore it is inappropriate to sum the acreages in this table for overall damage area extent.

Klamath National Forest



Klamath National Forest



Large areas of scattered ponderosa pine and white fir mortality east of Ball Mtn. on the Goosenest Ranger District.

Overview

- A total of 82,203 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, more than double the 30,372 acres mapped in 2013.
- Mortality in all major conifer species increased substantially but most notably in white fir and ponderosa pine despite modestly improving drought conditions.
- It may be that the third year of serious drought conditions (see drought page 6) have generally weakened trees and made them susceptible to increasing populations of bark beetles.
- Areas of activity were scattered throughout the forest but of particular concentration include substantial activity around Devil Peaks on the Oak Knoll Ranger District as well as throughout much the Goosenest Ranger District.

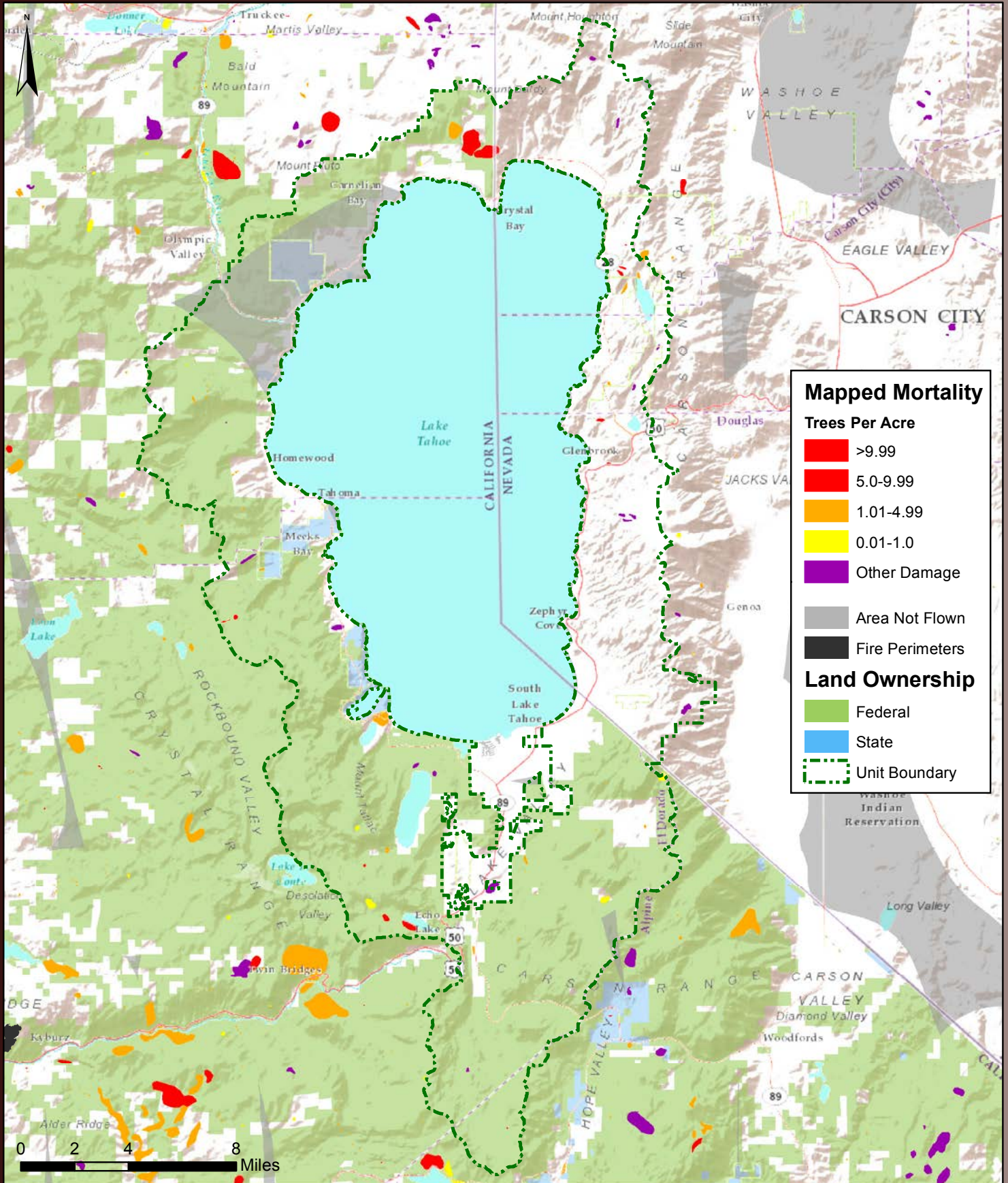
Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
white fir	35,485	2,642	14,930
ponderosa pine	22,274	4,393	7,711
California red fir	16,880	7,156	10,393
fir	6,753	1,301	1,608
lodgepole pine	4,957	2,959	8,679
Douglas-fir	2,998	1,045	2,176
sugar pine	860	1,437	4,673
whitebark pine	115	0	68
knobcone pine	66	240	367
mixed conifer	2	533	746
Forest Disturbance other than Tree Mortality			
California red fir ⁸	11,285	10,335	9,313
ponderosa pine ⁹ *	700	110	89
Douglas-fir ³	0	83	15
quaking aspen ¹	0	40	0

¹Defoliation, ³Discoloration, ⁸Flagging

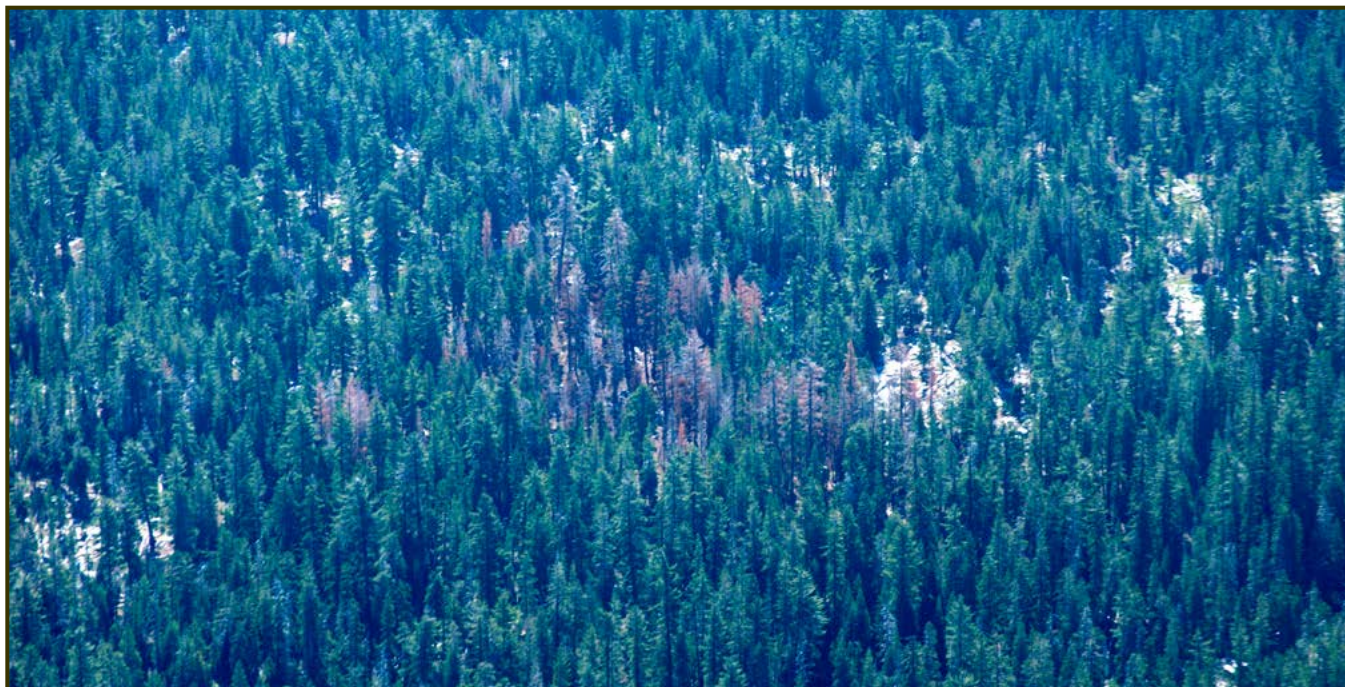
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Lake Tahoe Basin Management Unit



Lake Tahoe Basin Management Unit



Pocket of Douglas-fir mortality south of Lost Corner Mountain on the East rim of the Basin.

Overview

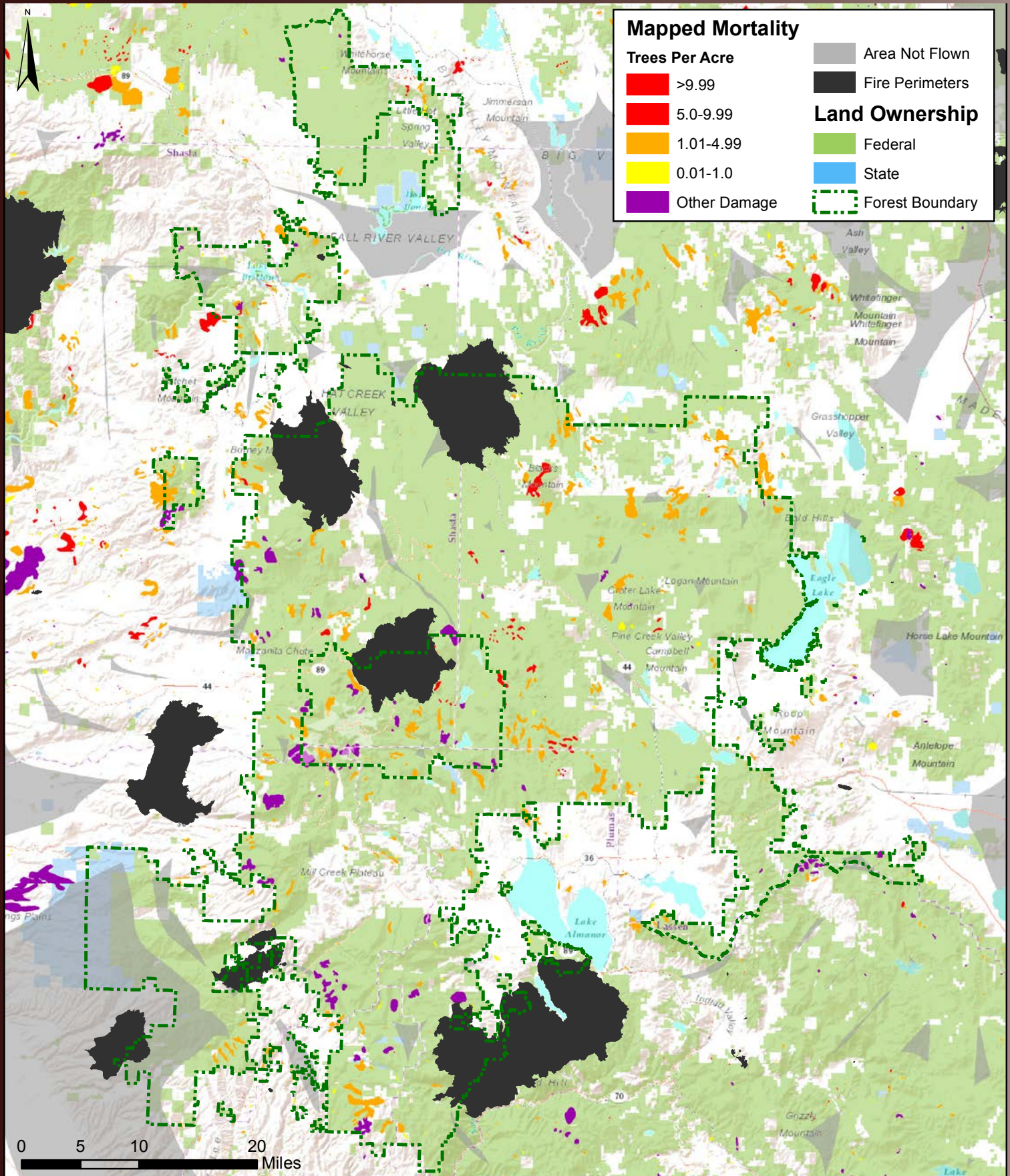
- A total of 2,118 acres with recent tree mortality or other damage were observed in 2014, a marked increase from the 758 acres mapped in 2013.
- Drought conditions have recently gone from extreme to exceptional, but prior to 2014 were only moderate and insect populations likely did not increase as early as in other areas (see drought page 6).
- Most of the recorded damage was in fir especially around Martis Peak on the north side and to a lesser extent around Emerald Bay State park to the south of the lake.
- Other areas of note are ongoing lodgepole mortality around Rubicon Reservoir and Ralston Peak to the west and south of the lake respectively.

Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
white fir	1,052	283	10
lodgepole pine	308	314	217
fir	267	0	1
Jeffrey pine	200	45	161
whitebark pine	119	0	5
California red fir	23	42	32
western white pine	8	52	8
sugar pine	3	137	260
knobcone pine	3	0	0
mixed conifer	0	1,624	1,376
Forest Disturbance other than Tree Mortality			
quaking aspen ^{1 4}	89	22	211
mixed conifer ¹¹	45	1,624	1,376
California red fir ⁸	26	27	982
white fir ^{5 11}	47	0	0

¹Defoliation, ⁴Dieback, ⁵Topkill, ⁸Flagging, ¹¹Old Fire

The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types. Therefor it is inappropriate to sum the acreages in this table for overall damage area extent.

Lassen National Forest & Lassen National Park



Lassen National Forest



Increasingly intense lodgepole pine mortality in the Caribou Wilderness on the Almanor Ranger District.

Overview

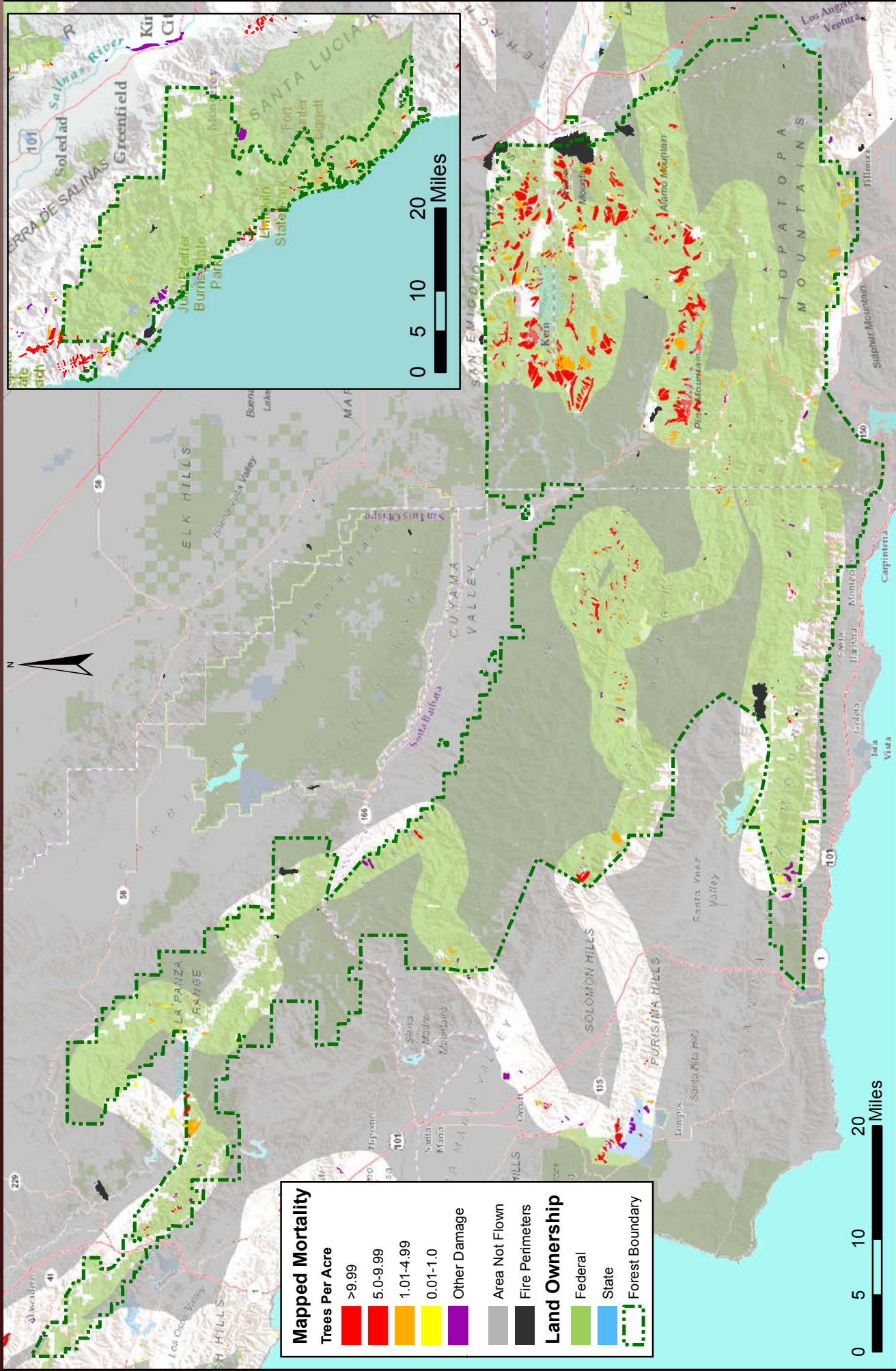
- A total of 84,509 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, a significant increase from the 40,081 acres mapped in 2013.
- Drought conditions though extreme did not correspond to as much of an increase in overall mortality as some other areas nor have drought conditions worsened as much as many other areas (see drought page 6).
- Mortality did increase substantially in most major tree species with the exception of gray pine which showed very little new mortality.
- In particular, red fir was generally more impacted both in terms of mortality and Cytospora extent and severity.
- Likewise within the Lassen Volcanic National Park, red fir mortality and flagging was more severe and was the primary disturbance mapped occurring on 5,384 of the 7,016 acres recorded. Lodgepole pine mortality was also quite significant.

Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
white fir	46,864	23,058	10,742
ponderosa pine	28,627	11,750	21,383
California red fir	12,441	2,616	1,752
sugar pine	4,040	1,051	18,531
lodgepole pine	2,368	3,176	2,331
Jeffrey pine	1,585	13,122	114
Douglas-fir	998	714	1
grey pine	5	836	1
pine	1	47	0
western white pine	0	29	854
Forest Disturbance other than Tree Mortality			
California red fir ⁸	11,644	877	3,833
white fir ^{1 3 5}	4,983	213	6,323
quaking aspen ⁴	225	2	0
California black oak ³	143	603	0

¹Defoliation, ²Discoloration, ³Dieback/Decline, ⁴Topkill, ⁵Flagging
(numbers do not include Lassen Volcanic National Park)

The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types. Therefor it is inappropriate to sum the acreages in this table for overall damage area extent.

Los Padres National Forest



Los Padres National Forest



Fairly intense Jeffrey pine mortality north of Escapula Peak and Tecuya Ridge on the Mt. Pinos Ranger District.

Overview

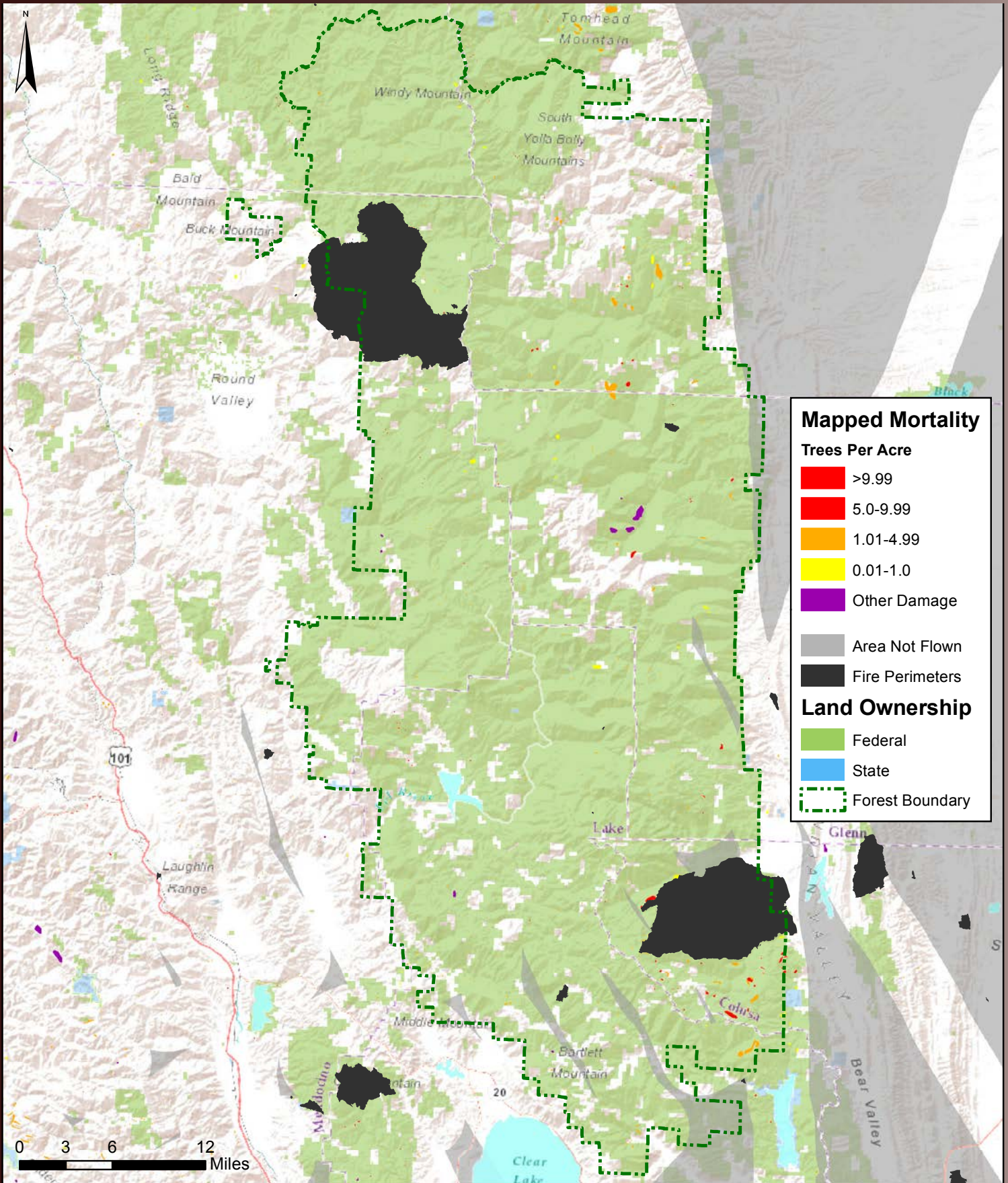
- A total of 43,926 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, a dramatic increase from the 10,002 acres mapped in 2013.
- The bulk of the mortality occurred within the eastern extent of the Mt. Pinos Ranger District where all pine species especially pinyon and Jeffrey as well as coast live oak were heavily impacted by exceptional drought (see drought page 6).
- Tanoak and coast live oak mortality attributable to sudden oak death was recorded across the entire western extent of the Monterey Ranger District. This increase occurred despite the dry conditions which typically inhibit the spread and expression of this disease, probably because the previously infected and dying trees provide a tremendous inoculum source. This also is the only area of the forest in extreme rather than exceptional drought conditions.
- Gray pine also experienced substantial mortality, topkill and flagging both within the Forest and the surrounding area.

Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
Jeffrey pine	15,389	3,920	998
singleleaf pinyon	14,241	1,547	631
Coast live oak	5,746	168	274
Coulter pine	2,922	909	3,226
tanoak	1,532	3,737	2,801
grey pine	1,323	9	4
Monterey pine	195	0	3
bigcone Douglas-fir	143	1,071	32
California black oak	128	479	1
Santa Lucia fir	127	146	1,324
Forest Disturbance other than Tree Mortality			
Coast live oak ^{3 8}	1,071	0	17
hardwoods ^{1 3 4 8}	121	50	1
redwood ³	561	37	0
gray pine ^{5 8}	458	0	0

¹Defoliation, ²Discoloration, ³Dieback, ⁴Topkill, ⁵Flagging

The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types. Therefore it is inappropriate to sum the acreages in this table for overall damage area extent.

Mendocino National Forest



Mendocino National Forest



Scattered pockets of ongoing ponderosa pine mortality south of Ball Mountain on the Corning Ranger District.

Overview

- Only 6,197 acres of activity were recorded in 2014 about half the 12,665 acres reported in 2013 and continuing a three year decline in forest disturbance activity in this area.
- Mortality decreased across the board in all conifer species especially white fir and gray pine despite the ongoing extreme drought situation (see drought page 6).
- Overstory ponderosa and sugar pine mortality occurred in small and scattered pockets throughout the Forest as well as small pockets of Douglas-fir mortality primarily along the western extent.

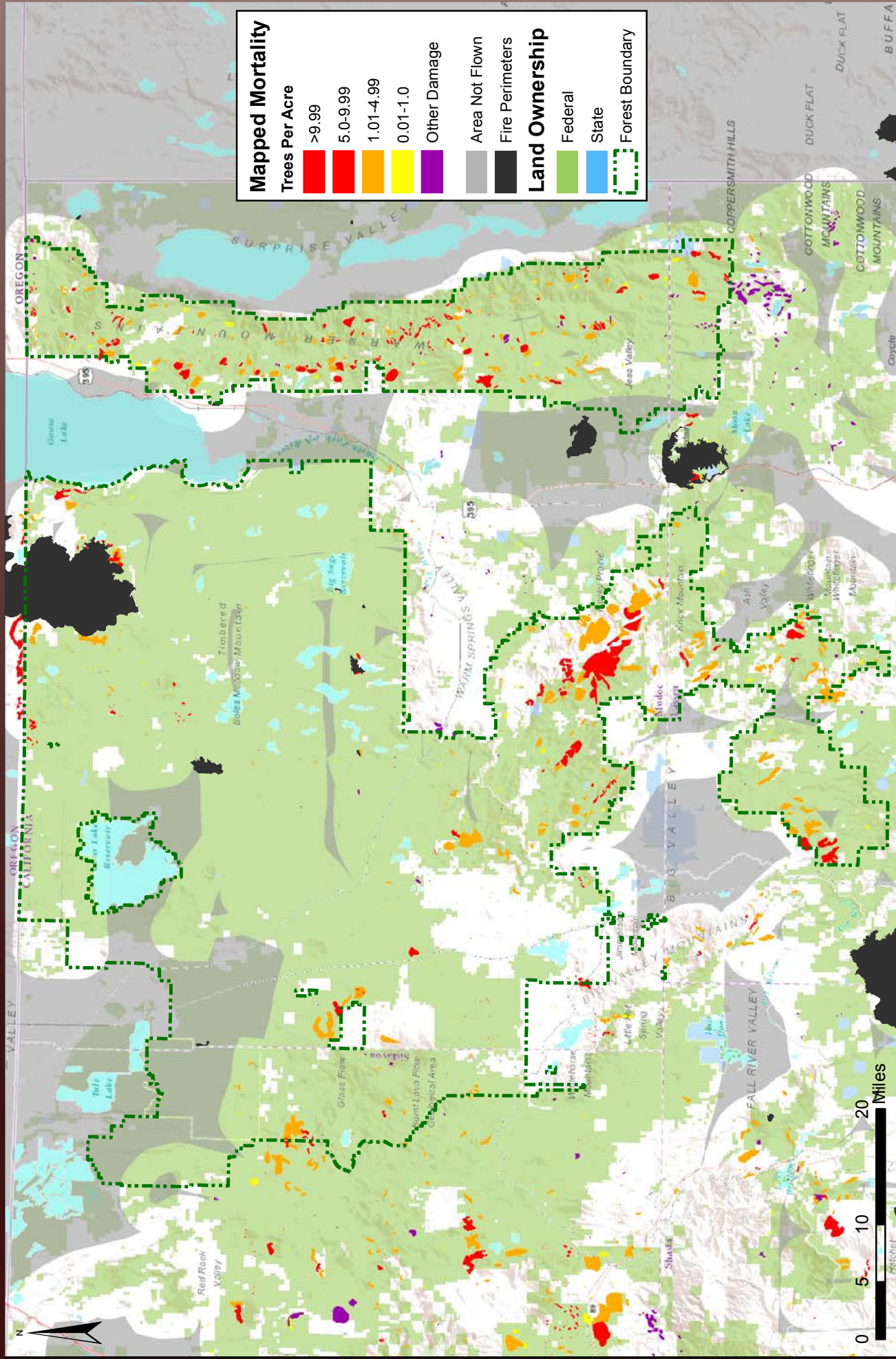
Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
ponderosa pine	3,511	4,754	12,845
knobcone pine	855	1,138	1,200
white fir	642	3,441	3,476
mixed conifer	456	4	0
Douglas-fir	353	1,497	32
California red fir	130	489	189
gray pine	90	606	157
sugar pine	23	79	8,113
fir	20	31	1,424
Jeffrey pine	0	298	0
Forest Disturbance other than Tree Mortality			
knobcone pine ³	346	0	190
California red fir ⁸	60	234	678
California black oak ¹	9	0	0
ponderosa pine ³	823	1	7

¹Discoloration, ³Topkill, ⁸Flagging

The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types.

Therefore it is inappropriate to sum the acreages in this table for overall damage area extent.

Modoc National Forest



Modoc National Forest



Ongoing outbreak of mixed but primarily Jeffrey pine mortality south of Buck Mountain on the Warner Mountain Ranger District.

Overview

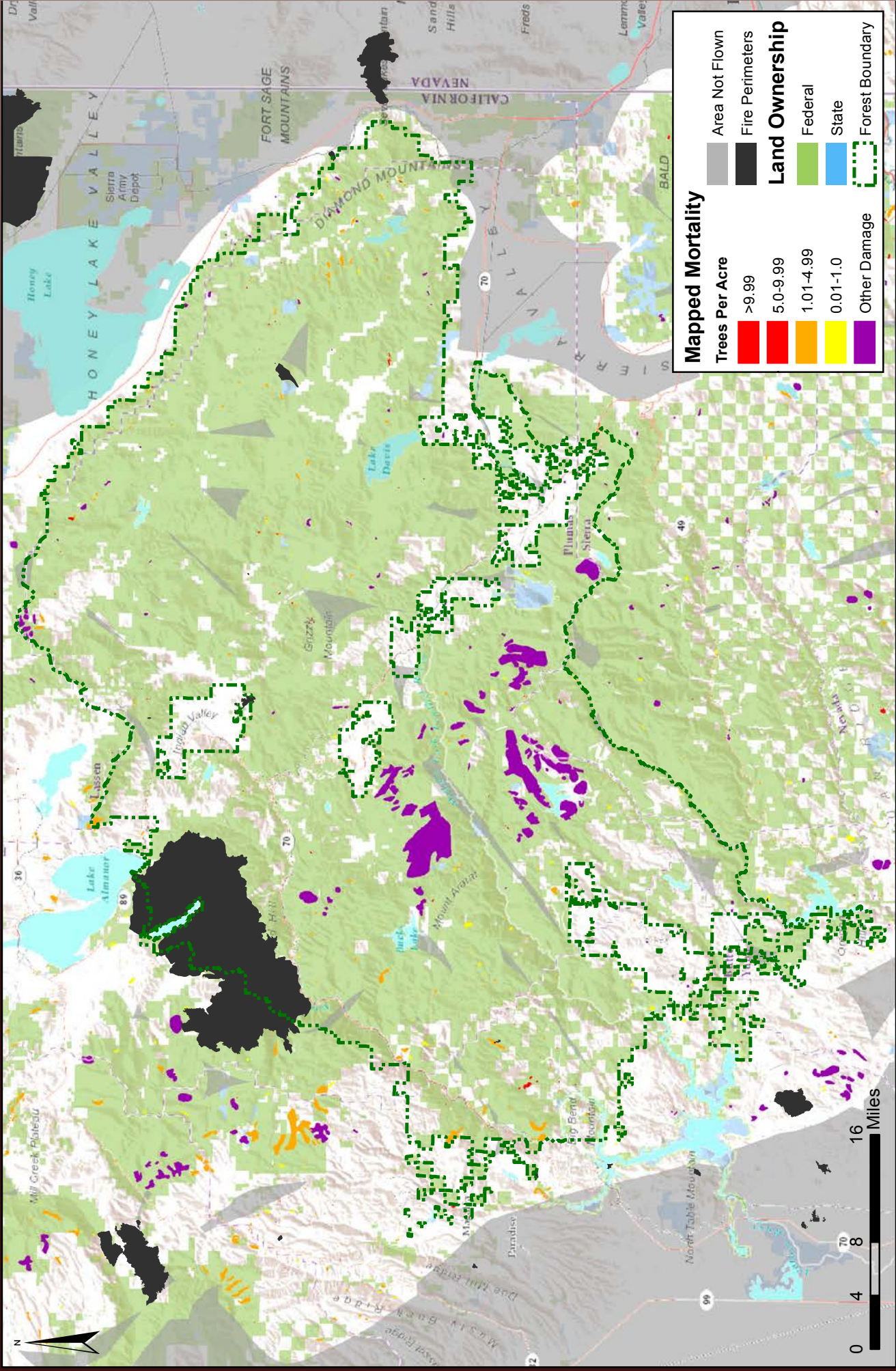
- A total of 72,913 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, a modest increase from the 54,709 acres mapped in 2013 reflecting the ongoing extreme drought conditions in the area (see drought page 6).
- In particular, white fir mortality more than doubled in extent and greatly increased in overall intensity throughout the Forest.
- A combination of white fir and ponderosa pine mortality in particular increased in the northeast portion of the Big Valley Ranger District.
- Two exceptions to this upward trend are lodgepole and to a lesser extent whitebark pine mortality which greatly decreased especially in the Warner Mountains as this host type has already been depleted by a mountain pine beetle outbreak spanning the last several years.

Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
white fir	44,924	21,826	18,851
ponderosa pine	35,792	25,860	27,158
Jeffrey pine	11,574	3,342	10
lodgepole pine	1,916	11,202	9,452
California red fir	1,212	64	3
whitebark pine	787	2,682	7,081
fir	99	0	0
juniper	95	4	3
mixed conifer	4	9	0
western white pine	0	1,931	3,720
Forest Disturbance other than Tree Mortality			
white fir ⁵	1,831	0	0
quaking aspen ^{1 4}	305	105	256
ponderosa pine ^{4 5 8}	142	38	281
hardwood ^{1 3}	70	31	0

¹Defoliation, ³Discoloration, ⁴Dieback/Decline, ⁵Topkill, ⁸Branch Flagging

The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types. Therefor it is inappropriate to sum the acreages in this table for overall damage area extent.

Plumas National Forest



Plumas National Forest



Greatly expanded and severe defoliation of white fir south of Meadow Valley on the Quincy Ranger District

Overview

- A total of 40,176 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, more than triple the 12,747 acres mapped in 2013, but down substantially from 2012 mortality levels.
- Mortality in most major host types increased especially ponderosa pine along the western extent of the Forest and as well as white fir more centrally located between the Mt. Hough and Feather River Ranger Districts.
- Douglas-fir tussock moth defoliation of white fir rebounded after an outbreak that started in 2012 and has likely killed vast numbers of trees often not well detected by aerial survey since the trees are denuded of foliage.

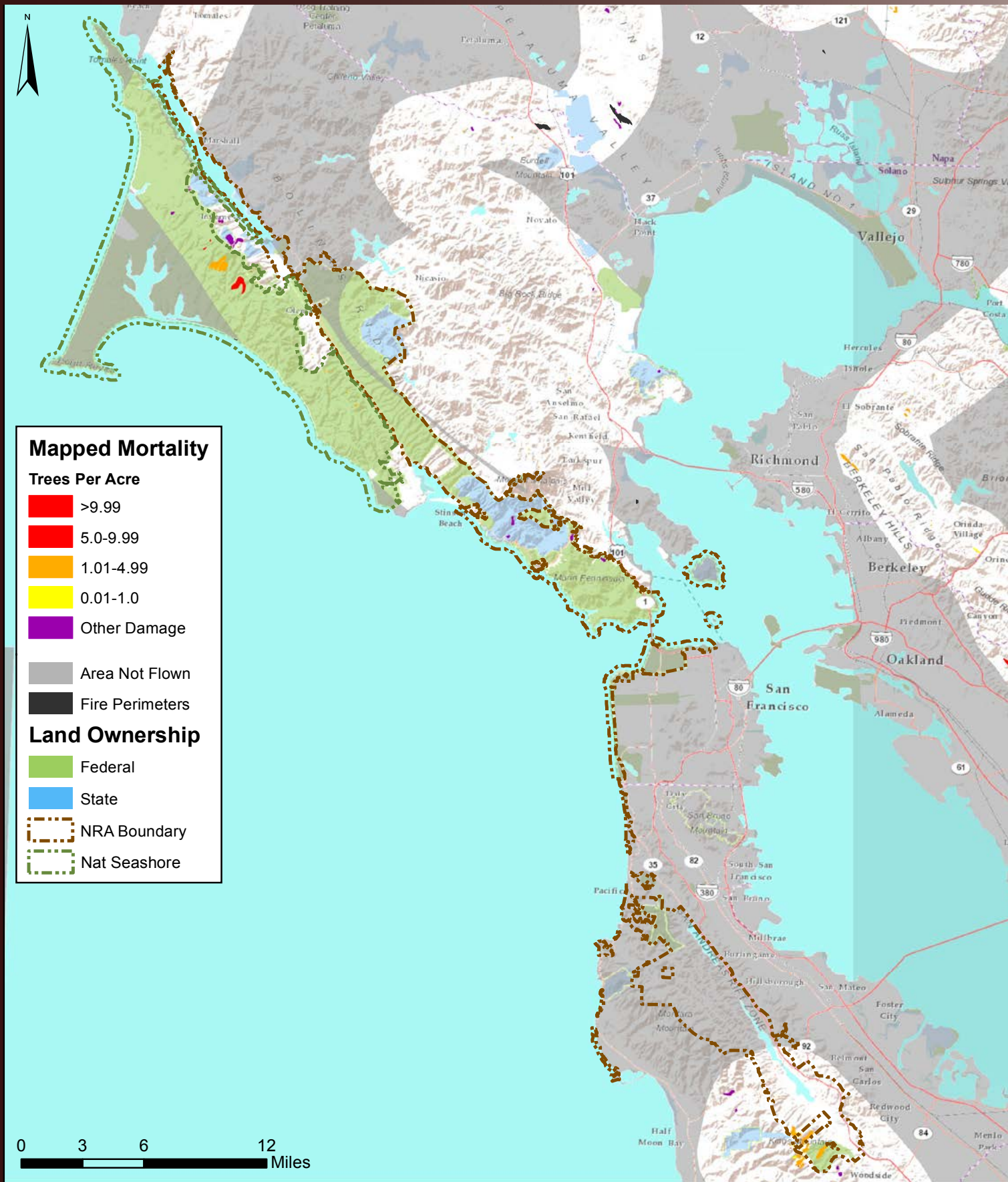
Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
ponderosa pine	9,891	1,659	23,957
white fir	6,609	1,572	9,096
sugar pine	3,588	771	20,153
Jeffrey pine	931	255	637
Douglas-fir	902	1,510	136
lodgepole pine	112	122	1,601
fir	88	48	0
California red fir	71	677	260
mixed conifer	21	40	0
pine	0	240	0
Forest Disturbance other than Tree Mortality			
white fir ⁵	22,172	6,247	15,243
lodgepole pine	1,192	0	0
California red fir ^{5 8}	162	120	2,982
quaking aspen ^{1 3 4}	151	71	0

¹Defoliation, ²Dieback/Decline, ³Topkill, ⁴Flagging

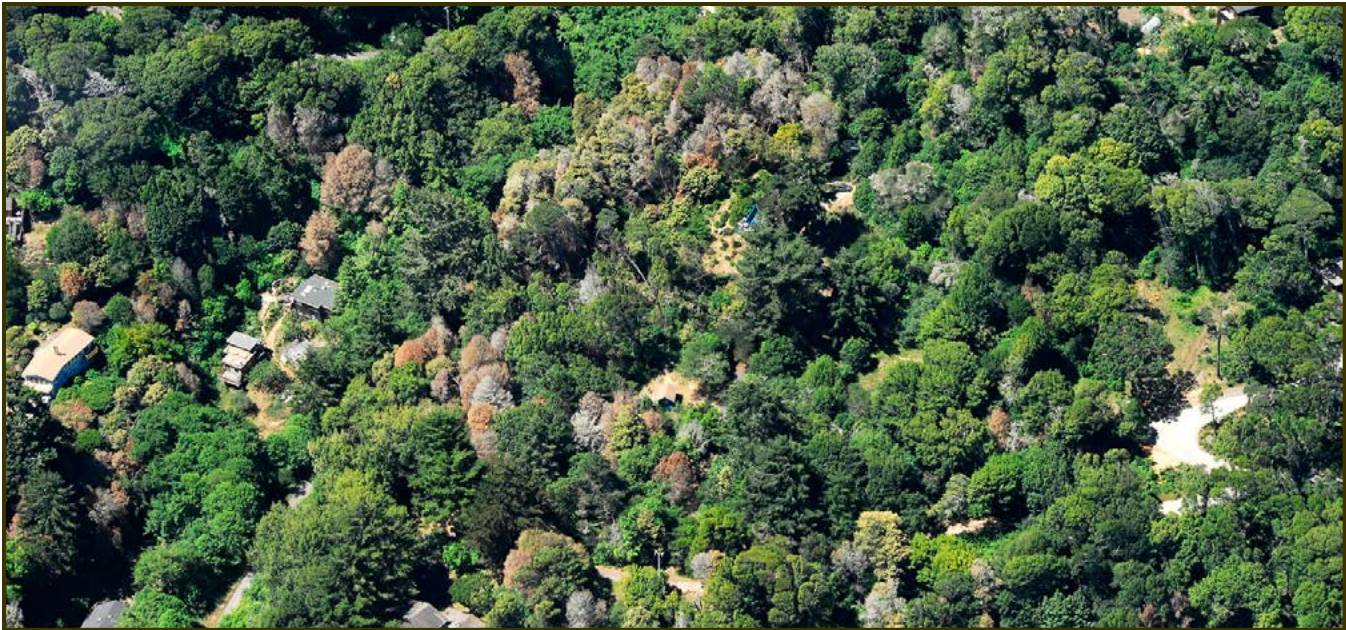
The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types.

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Point Reyes National Seashore & Golden Gate National Recreation Area



Point Reyes National Seashore & Golden Gate National Recreation Area



Tanoak mortality near Tomales Bay.

Overview

- A total of 1,450 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, a significant decrease from the 3,239 acres mapped in 2013 and equivalent to 2012 levels.
- Unlike most of the rest of the Region, drought conditions in western portions of the Bay Area have improved somewhat going from mostly extreme in 2013 to mostly severe in 2014 and with a corresponding decrease in both SOD induced mortality and pitch canker infection levels. The exception is the southern part of the Golden Gate NRA which is still in extreme drought conditions and where moderate levels of mostly SOD-caused tanoak mortality were recorded (see drought page 6).
- Mortality of bishop pine was also somewhat subdued since pitch canker infection rates were likely inhibited by drought conditions.

Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
bishop pine	954	1,615	86
tanoak	394	1,330	904
coast live oak	45	241	34
Douglas-fir	1	22	92
knobcone pine	0	23	0
California black oak	0	2	0
Forest Disturbance other than Tree Mortality			
Eucalyptus ^{1,4}	46	73	0
Douglas-fir ⁵	0	73	0
bishop pine ⁶	0	1,635	169
coast live oak ³	10	0	102

¹Defoliation, ²Discoloration, ³Topkill, ⁴Flagging

The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types.

Therefore it is inappropriate to sum the acreages in this table for overall damage area extent.

San Bernardino National Forest



Significant Jeffrey pine mortality south of Crafts peak on the Arrowhead Ranger District

Overview

- A total of 1,796 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, more than double the 872 acres mapped in 2013.
- Mortality overall was up quite dramatically in all major host types except oak and is likely attributable to ongoing drought conditions (see drought page 6).
- A substantial decrease in drought induced defoliation in California black oak was not as apparent or recorded. This was probably due trees producing smaller and fewer leaves as a response to prior drought conditions.
- The most active area was of Jeffrey, pinon and Coulter pine mortality along the western edge of the Forest in the San Gabriel Mtns. within the Cajon Ranger District directly correlating with the most severe drought conditions on the Forest.

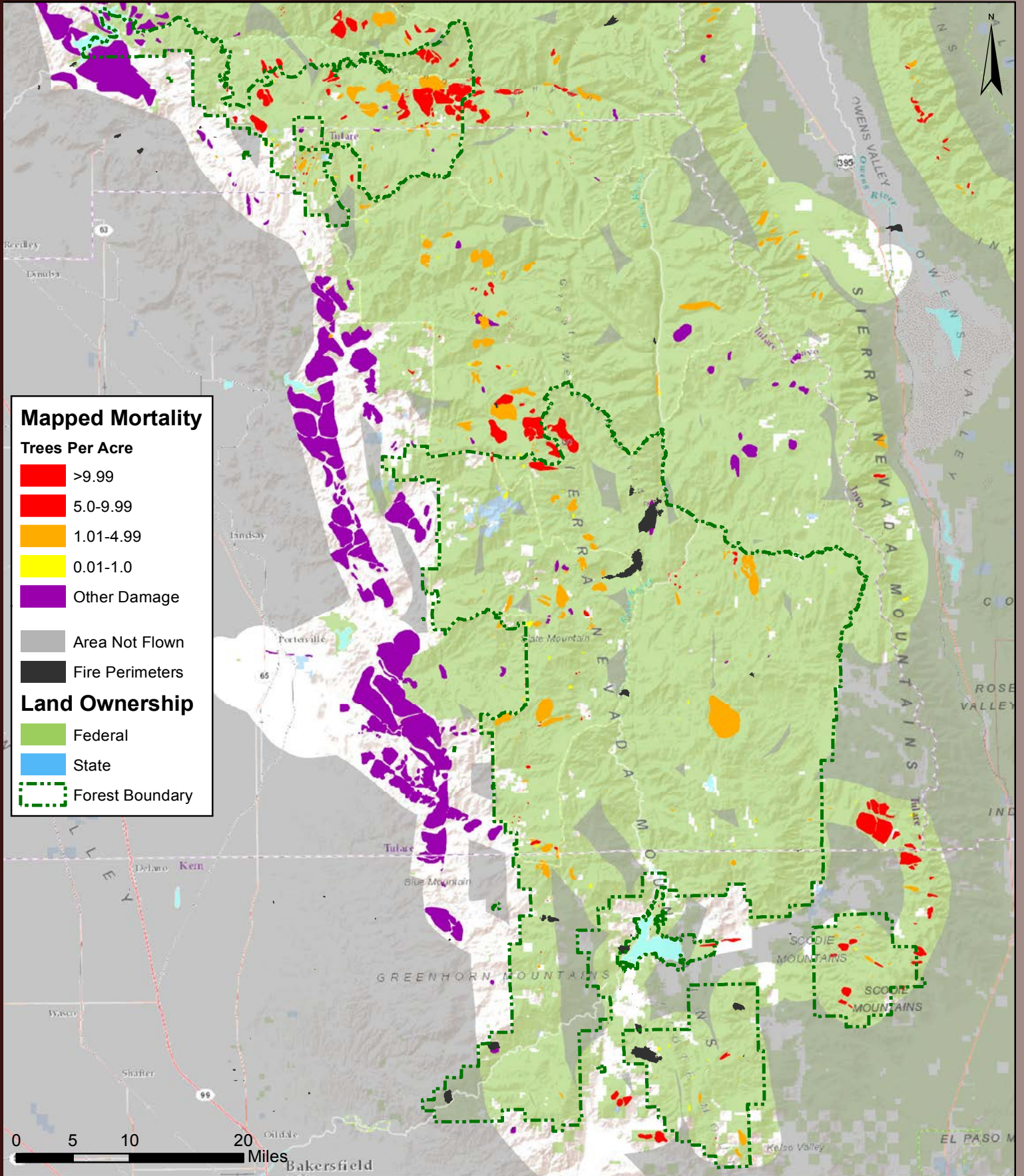
Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
Jeffrey pine	723	220	474
Coulter pine	558	21	14
white fir	170	6	192
single leaf pinyon	135	14	555
incense-cedar	85	0	0
ponderosa pine	14	1	0
coast live oak	6	2	1
sugar pine	4	9	11
California black oak	3	0	0
big cone Douglas-fir	1	1	1
Forest Disturbance other than Tree Mortality			
California black oak ¹	44	382	119
Jeffrey pine ^{3 5 7 8}	47	154	1
hardwoods ³	16	45	50
Coulter pine ⁵	7	7	6

¹Defoliation, ²Topkill, ³Flagging

The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types.

Therefore it is inappropriate to sum the acreages in this table for overall damage area extent.

Sequoia National Forest



Sequoia National Forest



Fairly intense pine and fir mortality northwest of Mount Maddox on the Hume Lake Ranger District.

Overview

- A total of 93,873 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, more than double the 39,180 acres mapped in 2013 which was in turn almost double what was mapped in 2012 correlating with the onset of exceptional drought conditions throughout this area of the state (see drought page 6).
- Mortality was up consistently across all major conifer host types but was most dramatic in fir which increased over five fold.
- Drought induced defoliation and discoloration in blue oak was also quite pronounced and expanded in both extent and severity. However, this type of mortality is quite difficult to detect and not well reported by the survey.

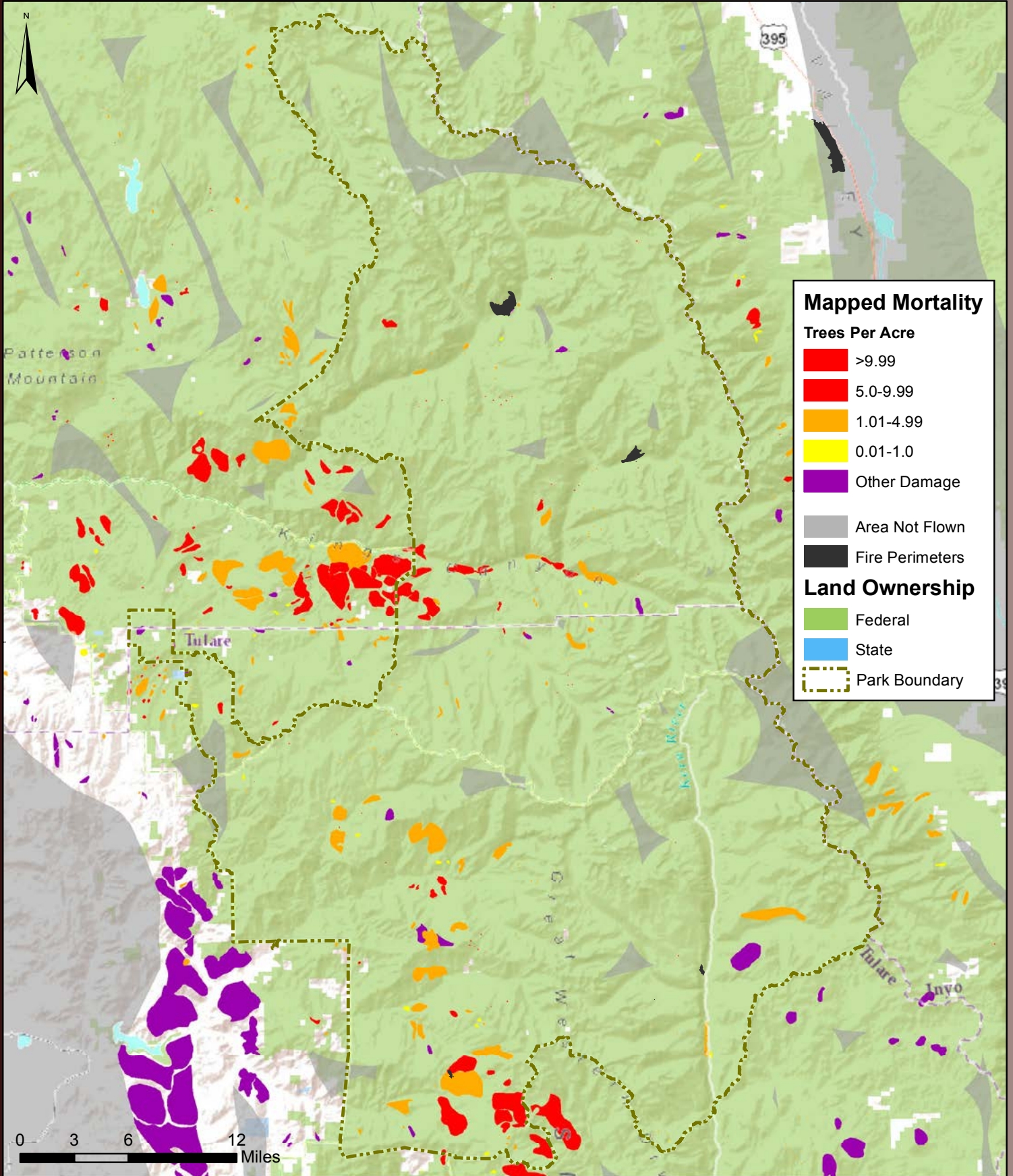
Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
ponderosa pine	39,874	10,408	3,960
sugar pine	36,526	10,973	6,082
white fir	22,753	3,529	5,831
Jeffrey pine	22,579	11,094	1,908
California red fir	12,083	2,786	485
lodgepole pine	8,898	2,036	8,955
single leaf pinyon	2,259	806	2
mixed conifer	1,707	5,136	195
hardwoods	182	1	0
western white pine	178	2,478	10
Forest Disturbance other than Tree Mortality			
blue oak ¹	988	4,712	1
California red fir ^{5 8}	2,094	1,542	1,009
Jeffrey pine ^{5 8}	7	699	1
hardwoods ³	59	298	29

¹Defoliation, ²Discoloration, ³Topkill, ⁴Flagging

The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types.

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Sequoia-Kings Canyon National Park



Sequoia - Kings Canyon National Park



Mixed pine and fir mortality east of Kenawyrs near Mist Falls.

Overview

- A total of 41,202 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, about a 250% increase from the 14,093 acres mapped in 2013.
- Damage was again most pronounced in the southwestern portion of the park and greatly expanded from 2013.
- Substantial increases in mortality and other types of damage were observed for all major conifer species with Jeffrey, sugar and ponderosa pine being the most dramatic and consisting mostly of scattered large overstory trees.

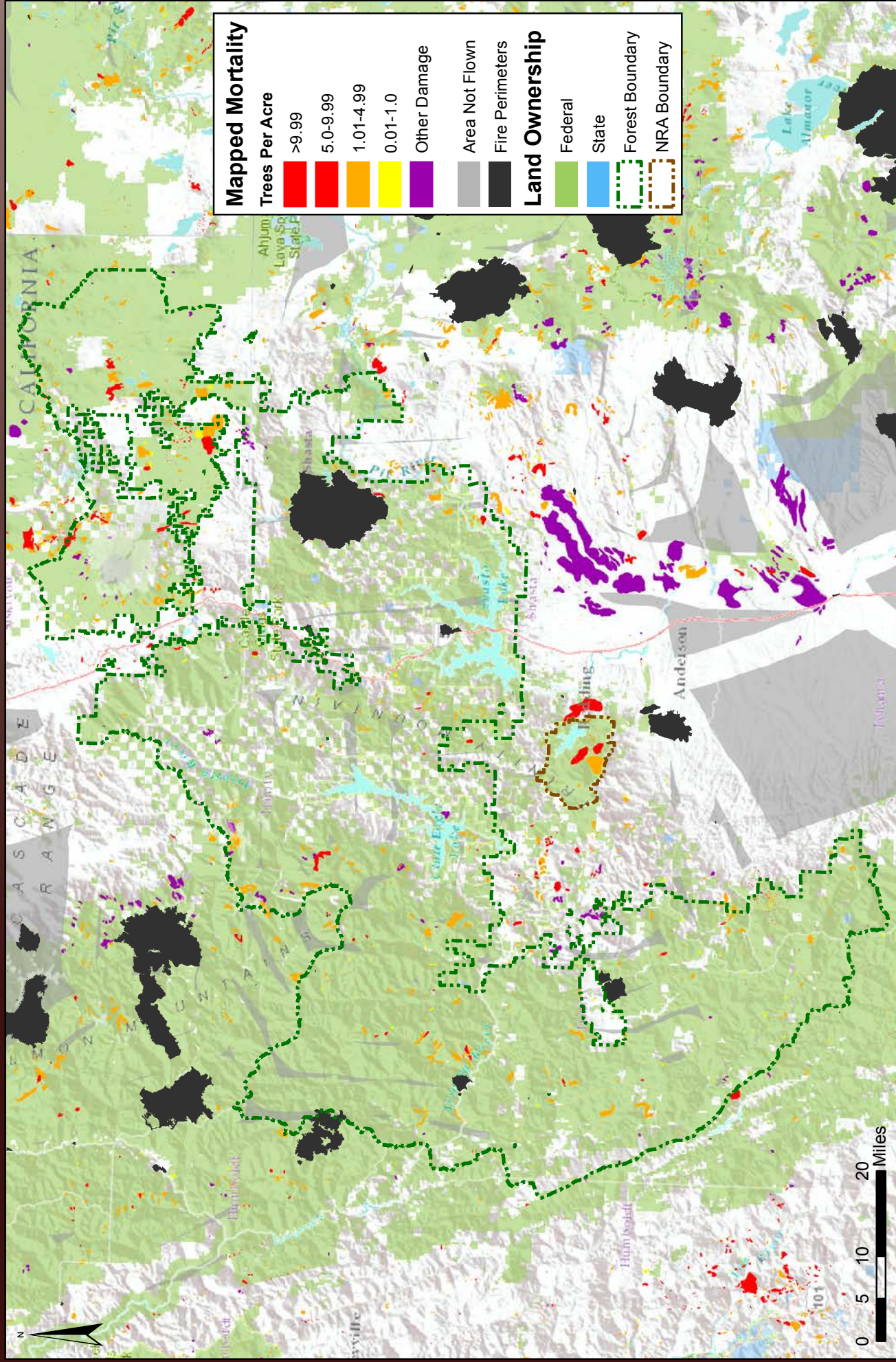
Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
lodgepole pine	11,910	7,107	3,280
Jeffrey pine	11,533	713	35
sugar pine	10,279	204	2,261
ponderosa pine	8,704	100	499
California red fir	5,517	4,427	2,313
whitebark pine	1,842	603	1,139
white fir	1,558	808	2,665
fir	1,287	131	95
western white pine	1,149	714	629
giant sequoia	21	0	0
Forest Disturbance other than Tree Mortality			
lodgepole pine ¹	1,033	0	0
California red fir ^{5 a}	619	376	1,331
whitebark pine ^{3 6}	389	0	0
Jeffrey pine ²	16	0	0

¹Defoliation, ²Flagging

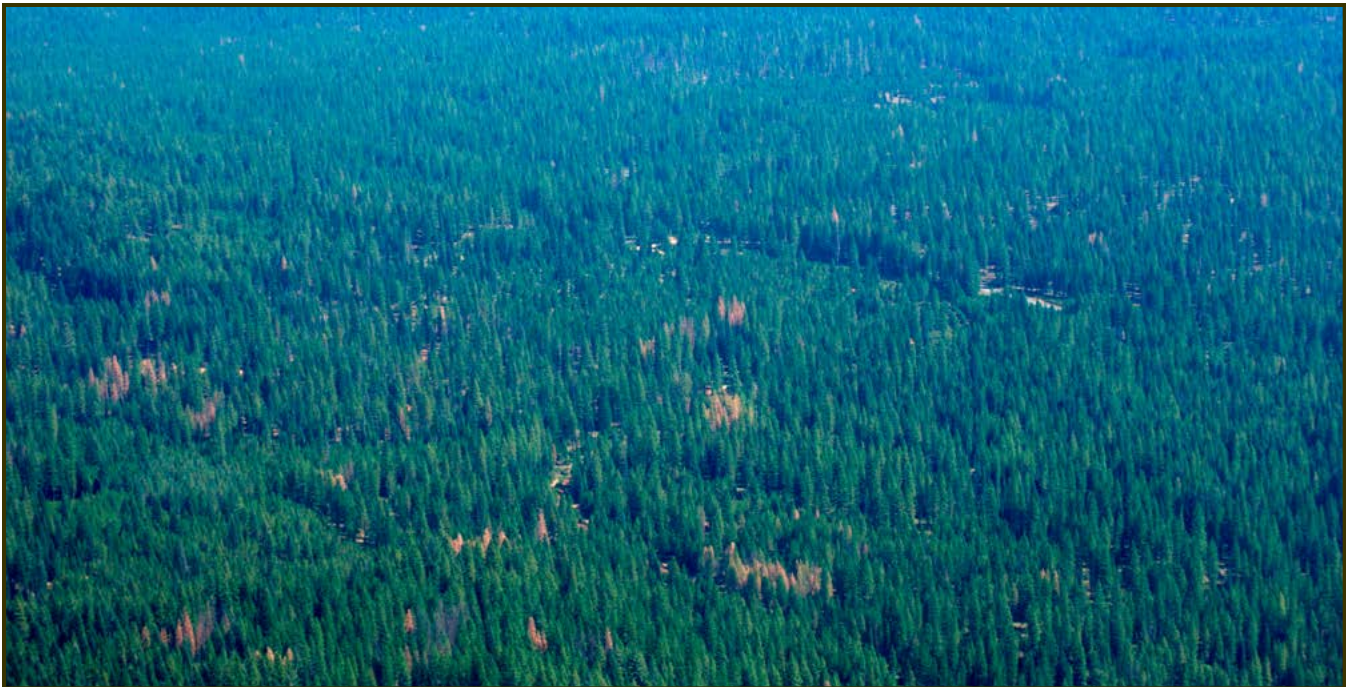
The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types.

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Shasta-Trinity National Forest & Whiskeytown National Recreation Area



Shasta-Trinity National Forest



Scattered pockets of mostly ponderosa pine mortality north of Four Mile Flat on the McCloud Ranger District.

Overview

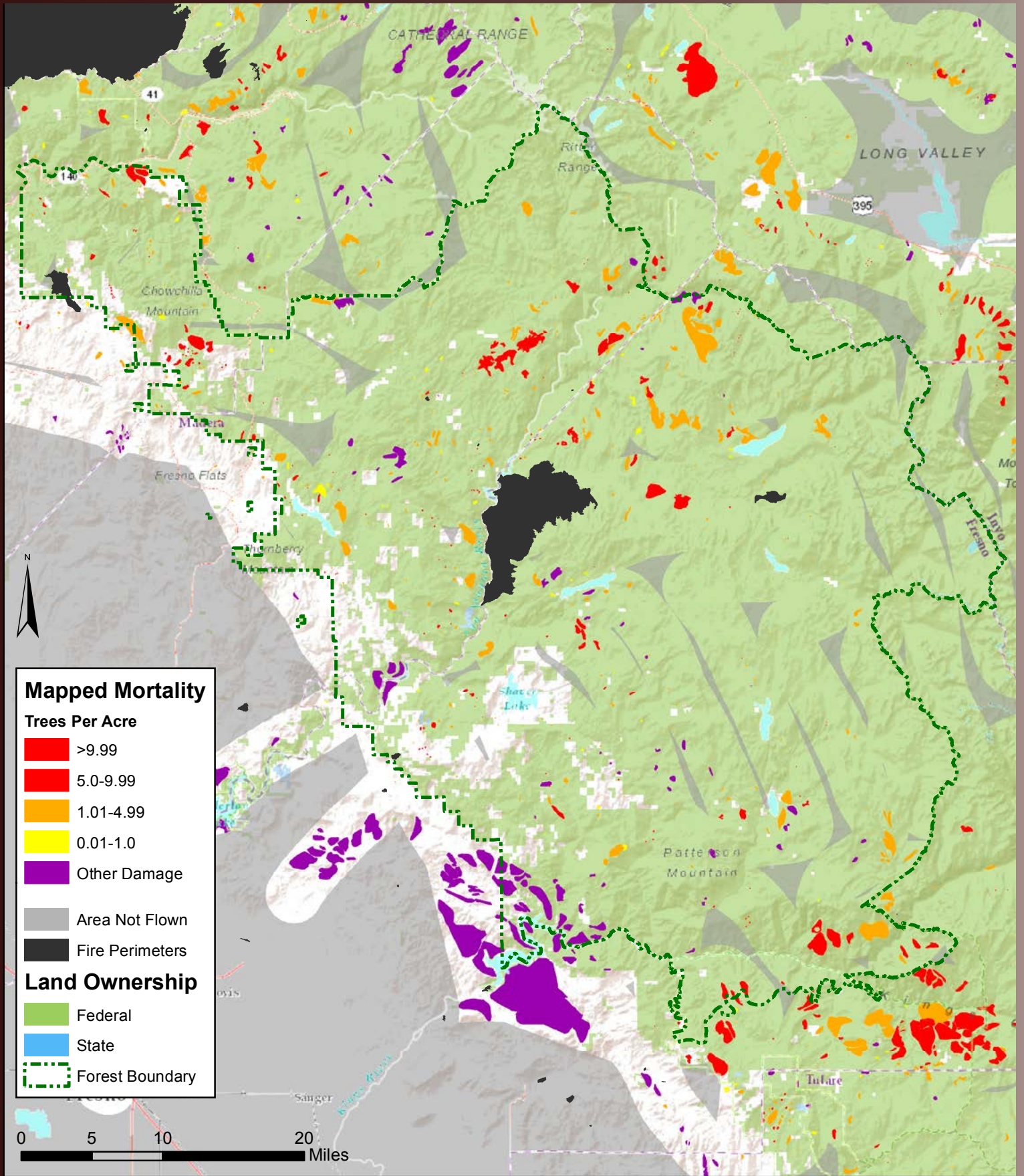
- A total of 77,094 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, more than double the 33,237 acres mapped in 2013 but equivalent to 2012 levels.
- Increases in mortality were seen in all major conifer species but was most dramatic in fir which saw a six fold increase from the previous year.
- The most active areas of mortality were of primarily ponderosa pine and to a lesser degree white fir in the several areas of the McCloud Ranger District.
- Exceptional drought conditions had developed across northern portions of the Forest in the summer of 2014, but have ameliorated somewhat becoming extreme (see drought page 6) Even so, mortality overall will likely continue to increase.

Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)*	Acres 2014	Acres 2013	Acres 2012
white fir	33,163	3,459	12,636
ponderosa pine	30,317	19,391	49,676
California red fir	15,022	4,403	2,531
lodgepole pine	5,098	1,993	3,810
sugar pine	2,309	2,162	13,865
Douglas-fir	2,018	3,578	1,645
fir	1,852	636	1,730
knobcone pine	1,393	1,123	1,411
gray pine	246	40	1
Jeffrey pine	202	75	0
Forest Disturbance other than Tree Mortality			
California red fir ⁸	12,716	3,041	5,760
white fir ^{3 5}	605	278	1,036
hardwoods ⁵	52	77	429
knobcone pine ³	0	50	320

³Discoloration, ⁵Topkill, ⁸Flagging
*does not include the Whiskeytown NRA

The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types. Therefor it is inappropriate to sum the acreages in this table for overall damage area extent.

Sierra National Forest



Sierra National Forest



Pockets of ponderosa pine mortality south of Devil Peak on the Mariposa Ranger District.

Overview

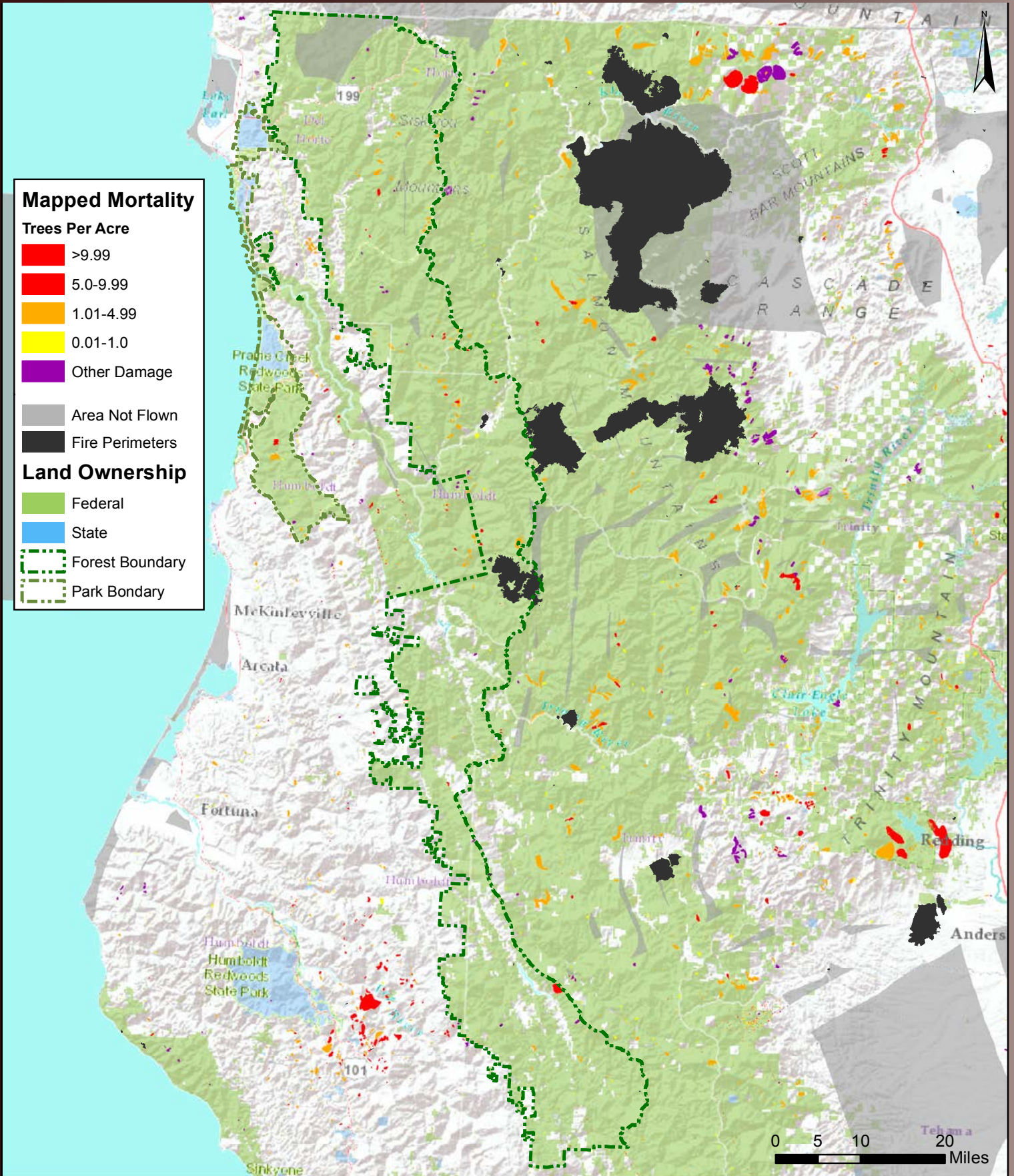
- A total of 54,651 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, a modest increase from the 43,487 acres mapped in 2013.
- The largest increase in mortality was in Jeffrey and ponderosa pine which when combined was about a 240% increase over 2013 levels and triggered by the ongoing exceptional drought conditions throughout the forest (see drought page 6). However, most other pine mortality either remained relatively unchanged or in a few instances dropped dramatically.
- Defoliation/discoloration of blue oak due to drought response was quite elevated and some mortality likely occurred but was not captured by aerial survey as this would be quite difficult to detect. This is the second consecutive year of this occurrence and was quite pronounced.
- The most active mortality areas were of mixed pine and fir in the Chowchilla Mountains and around Jackass Butte both on the Bass Lake Ranger District and around Eagle Peaks on the High Sierra Ranger District.

Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
Jeffrey pine	16,408	1,478	1,467
lodgepole pine	14,747	16,378	15,178
ponderosa pine	12,433	10,313	11,852
California red fir	4,433	2,930	1,947
whitebark pine	3,531	283	70
white fir	2,237	7,763	5,569
sugar pine	1,288	5,216	5,844
western white pine	174	184	287
knobcone pine	115	77	0
gray pine	5	545	0
Forest Disturbance other than Tree Mortality			
blue oak ¹	5,323	3,724	0
California red fir ^{5 8}	2,214	1,100	6,808
white fir ⁵	1,199	39	338
lodgepole pine ^{3 8}	27	40	2,576

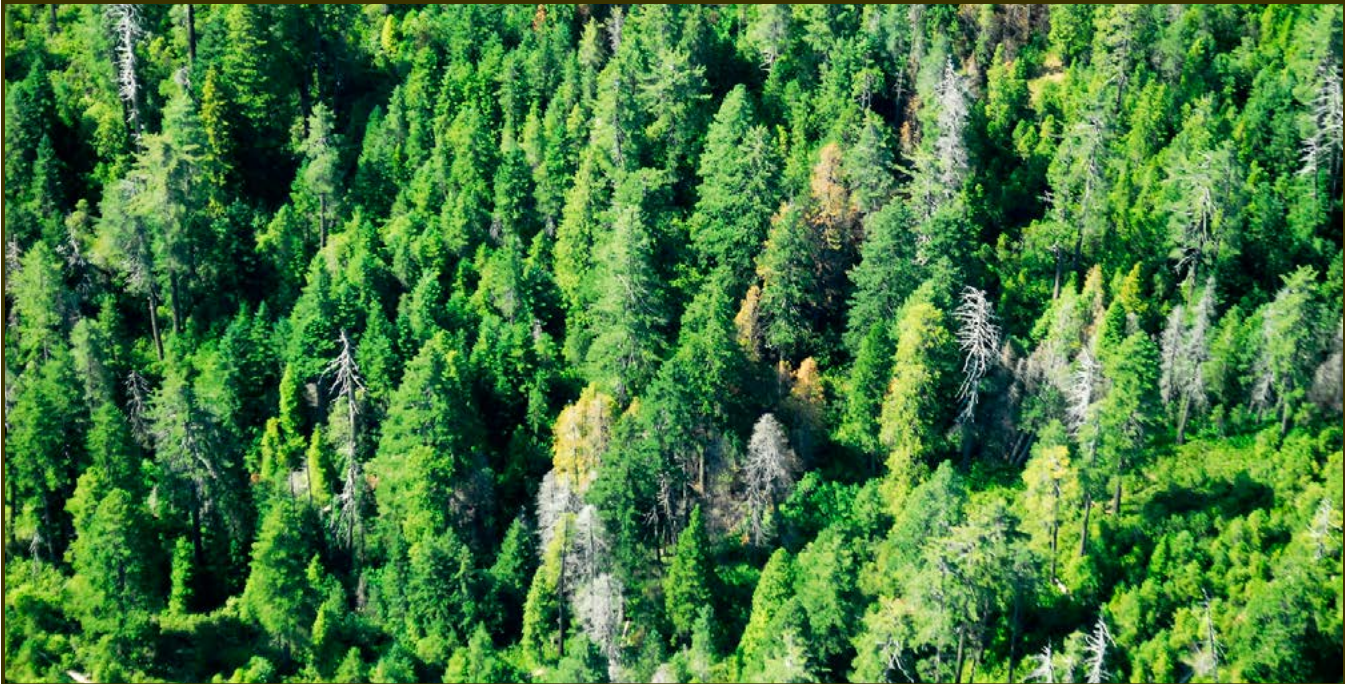
¹Defoliation, ²Discoloration, ³Topkill, ⁴Windthrow/Wind damage, ⁵Flagging

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Six Rivers National Forest & Redwood State and National Parks



Six Rivers National Forest



Port-Orford-cedar mortality on the Smith River National Recreation Area

Overview

- A total of 17,982 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, almost triple the 6,125 acres mapped in 2013.
- Though Douglas-fir mortality remained virtually unchanged, most other conifer species showed significant increases in mortality rates, reflecting the severe drought conditions.
- It should be noted that California red fir which showed a dramatic increase in mortality from drought and as well as increased Cytospora induced branch flagging.
- Although the Port-Orford-cedar populations are small and ever dwindling due to *Phytophthora lateralis*, the increase in the 2014 mortality rate is noteworthy.
- An additional 1,026 acres with mortality were also recorded within the Redwood National and State Parks, a sizeable decrease from the 2,950 acres recorded in 2013. However, this included small but increasing levels of tanoak mortality caused by sudden oak death.

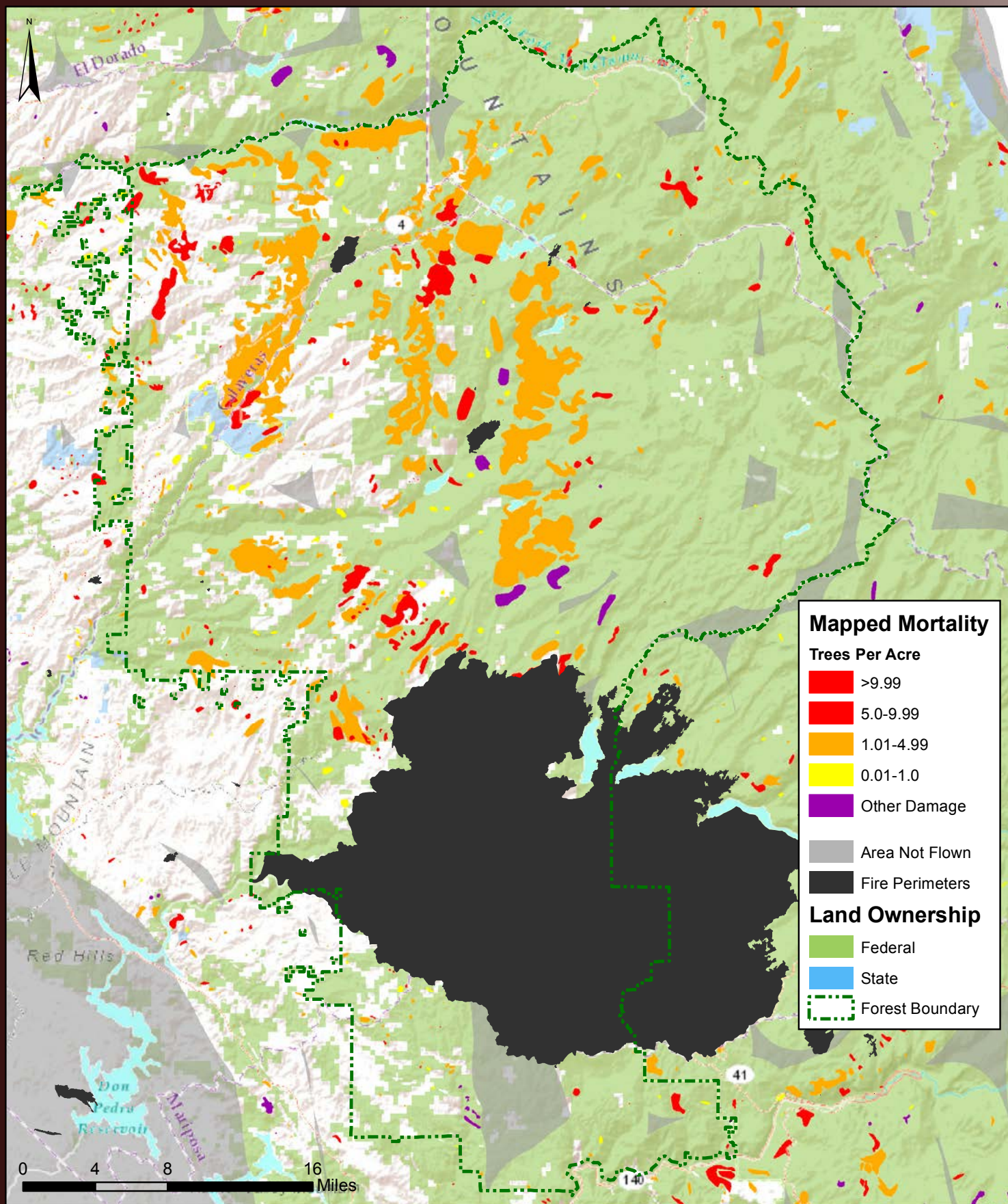
Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
California red fir	7,515	100	623
Douglas-fir	4,188	4,025	3,871
white fir	3,912	693	519
ponderosa pine	1,867	578	144
Jeffrey pine	726	12	153
fir	345	75	59
Port-Orford-cedar	204	14	59
sugar pine	81	44	428
knobcone pine	49	217	272
redwood	5	16	407
Forest Disturbance other than Tree Mortality			
California red fir ⁵	4,131	150	113
white fir ³	106	49	0
pacific madrone ^{1, 2}	117	179	14
hardwoods ³	39	16	0

¹Defoliation, ²Discoloration, ³Dieback/decline, ⁴Topkill, ⁵Flagging

The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types.

Therefore it is inappropriate to sum the acreages in this table for overall damage area extent.

Stanislaus National Forest



Stanislaus National Forest



Areas of clumped ponderosa and sugar pine along with scattered white fir mortality around Thompson Peak on the Mi-Wok Ranger District.

Overview

- The most dramatic increase in forest disturbance within California was on the Stanislaus where 111,573 acres were mapped which was an increase of almost 450% from 2013 levels and reflective of the severe to extreme and now exceptional drought conditions (see drought page 6).
- Impressive increases in mortality were recorded in all major conifer species and in most areas of the Forest except the far eastern high elevation areas as well as within the Groveland Ranger District due primarily to the Rim Fire.
- Most pine mortality was of extensive areas of widely scattered overstory trees, but several fairly extensive areas of very concentrated pine mortality were also recorded at many different locations.
- The most dramatic increase of all was in white fir which included trees of all sizes and varying amounts of intensity.

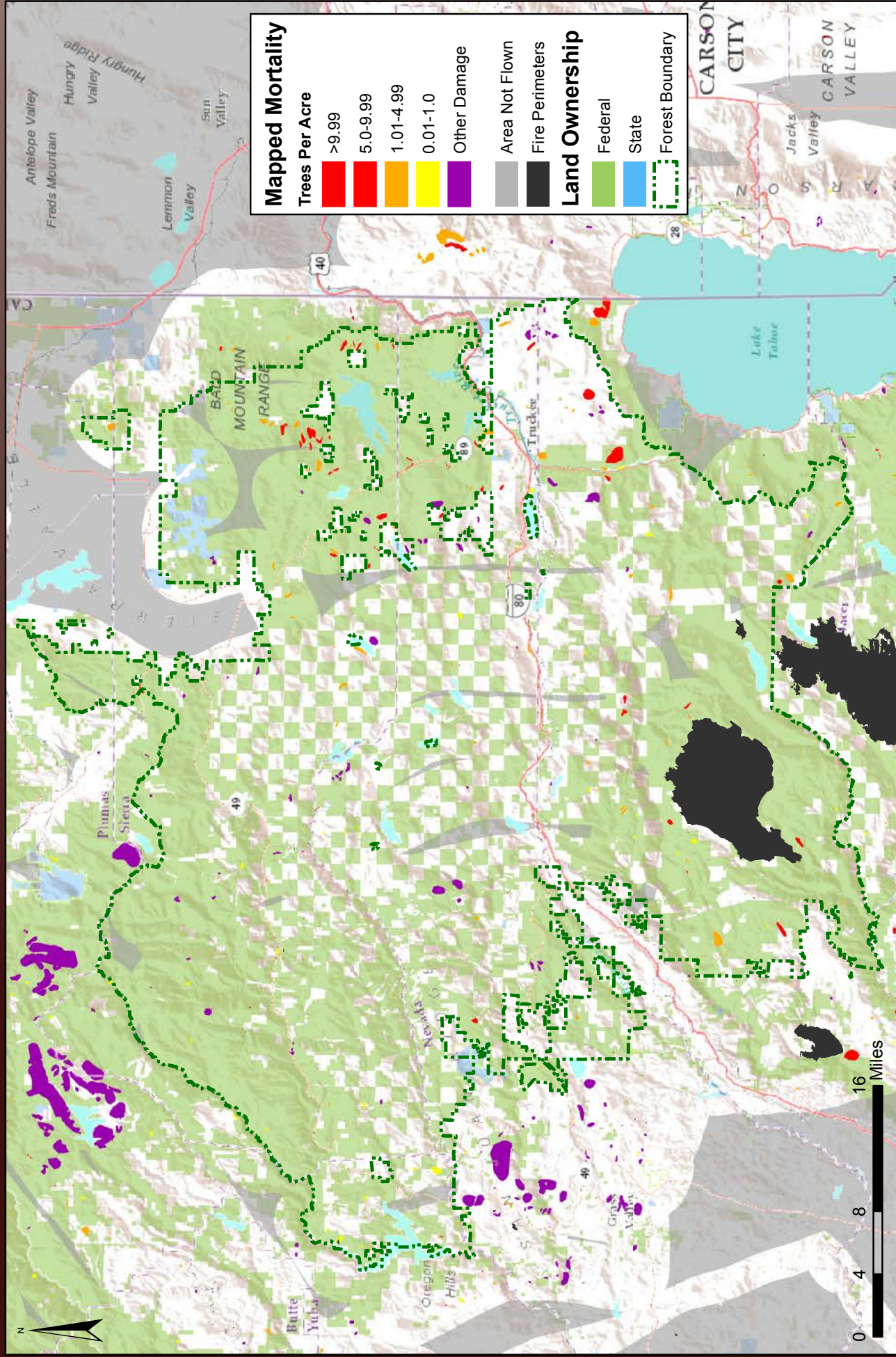
Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
white fir	48,095	559	3,788
sugar pine	44,581	9,635	2,765
lodgepole pine	36,578	4,843	5,031
ponderosa pine	32,577	13,434	5,326
fir	31,949	185	2
Jeffrey pine	30,198	1,331	43
California red fir	8,064	2,507	74
knobcone pine	1,963	410	6
western white pine	1,120	46	152
whitebark pine	459	81	67
Forest Disturbance other than Tree Mortality			
white fir ⁵	5,054	0	0
Jeffrey pine ⁵	11,148	8	0
California red fir ⁸	1,431	828	847
California black oak ³	140	0	0

³Discoloration, ⁵Topkill, ⁸Flagging

The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types.

Therefore it is inappropriate to sum the acreages in this table for overall damage area extent.

Tahoe National Forest



Tahoe National Forest



Ongoing chronic lodgepole pine mortality around Webber Lake on the Sierraville Ranger District.

Overview

- A total of 9,175 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, almost double from the 5,234 acres mapped in 2013 and indicative of the moderate to severe drought conditions in 2013. However, drought conditions have more recently become increasingly exceptional (see drought page 6).
- Pine mortality overall decreased from 2013 levels which were already quite modest with lodgepole pine the only major species with a sizeable increase in mortality.
- Fir mortality however more than doubled with non-mortality symptoms also increasing both in extent and severity.
- A special survey was conducted in late April to assess the extent and severity of a known blowdown event the previous winter. A handful of small, discrete but fairly devastated areas were recorded near Goodyear Bar and Bear Valley on the Yuba River Ranger District.

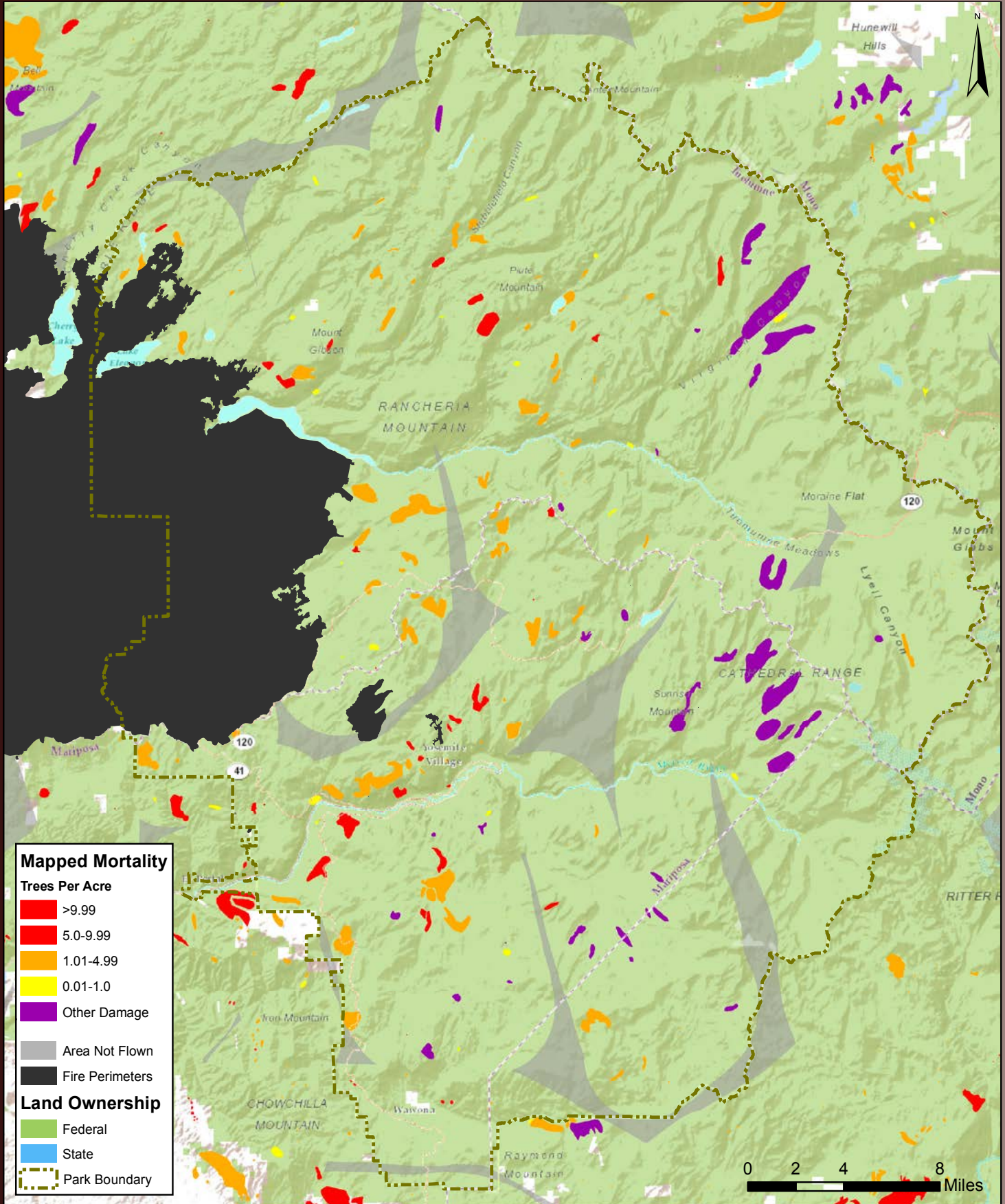
Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
white fir	2,877	1,572	1,897
fir	1,346	0	11
lodgepole pine	1,299	488	5,137
Jeffrey pine	1,147	640	1,310
ponderosa pine	748	2,523	4,027
California red fir	157	53	372
Douglas-fir	81	553	20
gray pine	19	0	0
sugar pine	10	1,023	2,149
knobcone pine	10	13	0
Forest Disturbance other than Tree Mortality			
California red fir ⁸	1,262	46	2,237
white fir ^{4 5}	324	61	477
quaking aspen ⁴	87	51	115
mixed conifer ⁷	54	0	0

⁴Dieback, ⁵Topkill, ⁷Main Stem Broken/Uprooted, ⁸Flagging

The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types.

Therefore it is inappropriate to sum the acreages in this table for overall damage area extent.

Yosemite National Park



Yosemite National Park



Scattered pine and fir mortality west of El Capitan on the north rim of Yosemite Valley.

Overview

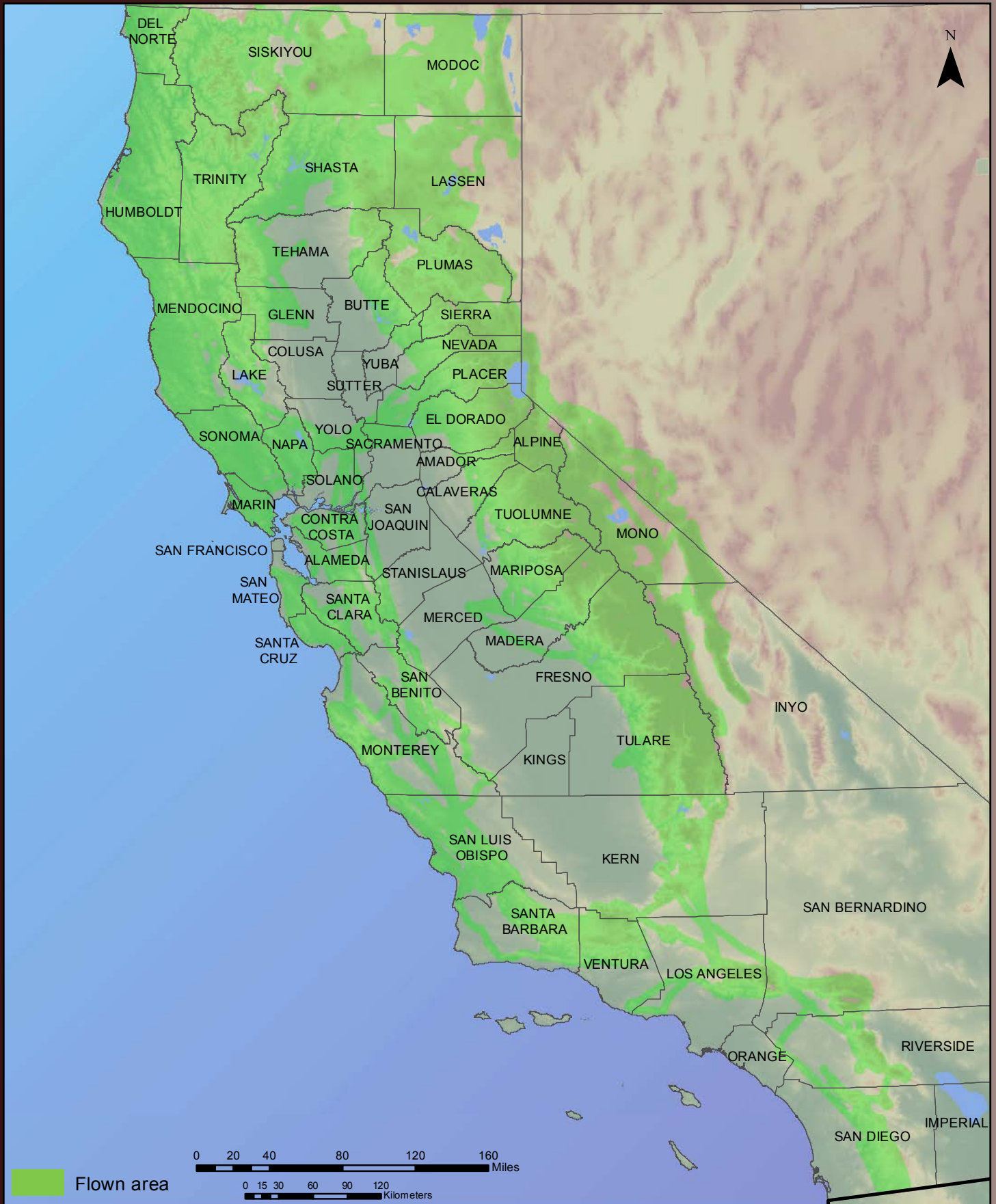
- A total of 29,156 acres with recent tree mortality or other damage were mapped within the forest boundaries in 2014, a significant decrease from the 40,517 acres mapped in 2013. This despite the severe drought conditions of 2013 which since have become exceptional (see drought page 6)
- Pine mortality generally decreased and sugar pine in particular saw a dramatic decrease in mortality rates.
- In contrast, fir host types increased both in mortality and non-mortality issues.
- In addition, lodgepole pine needleminer activity seemed more widespread and severe than in previous years.

Forest Disturbance Activity and Trends			
Acres Containing Affected Hosts (Mortality)	Acres 2014	Acres 2013	Acres 2012
lodgepole pine	8,027	9,013	1,001
California red fir	6,253	3,021	417
fir	3,593	721	6
ponderosa pine	3,074	9,258	233
white fir	2,001	1,867	321
sugar pine	1,664	17,050	1,450
Jeffrey pine	1,540	5,313	283
whitebark pine	587	127	100
pine	0	821	0
western white pine	0	411	18
Forest Disturbance other than Tree Mortality			
lodgepole pine ^{1 4}	9,059	5,879	613
California red fir ^{4 5 8}	464	2,045	822
fir ⁵	240	1,193	0
mixed conifer ⁷	120	441	242

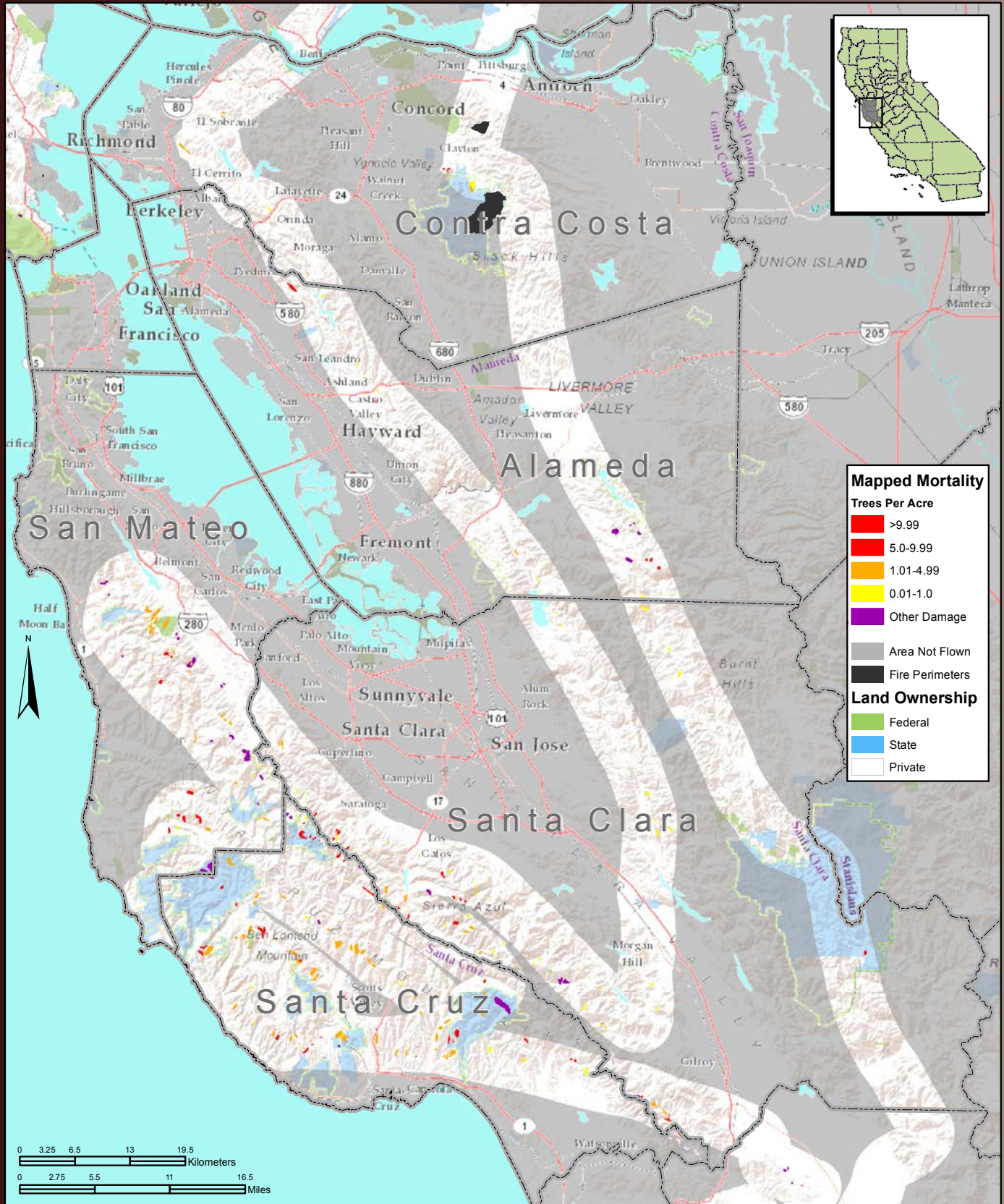
¹Defoliation, ⁴Dieback/Decline, ⁵Topkill, ⁷Wind damage/throw, ⁸Flagging

The table above is a breakdown of forest disturbance by tree host species in order to gain additional insight on which tree species are currently the most adversely affected as well how this activity is changing over time. Often multiple tree host species or multiple damage types are recorded for the same location so that acreages can be counted multiple times for multiple hosts and/or multiple damage types. Therefore it is inappropriate to sum the acreages in this table for overall damage area extent.

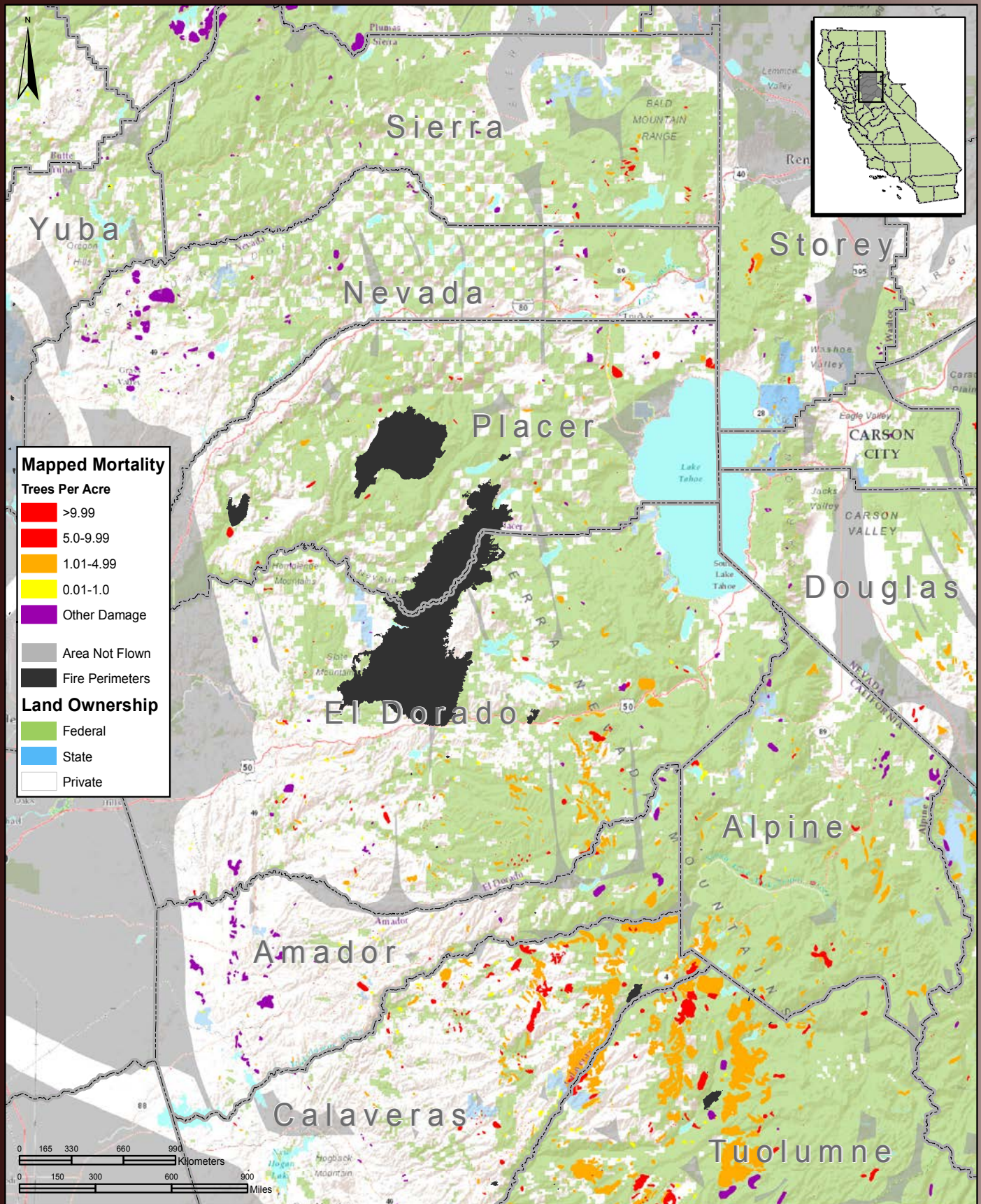
Aerial Survey Results by County



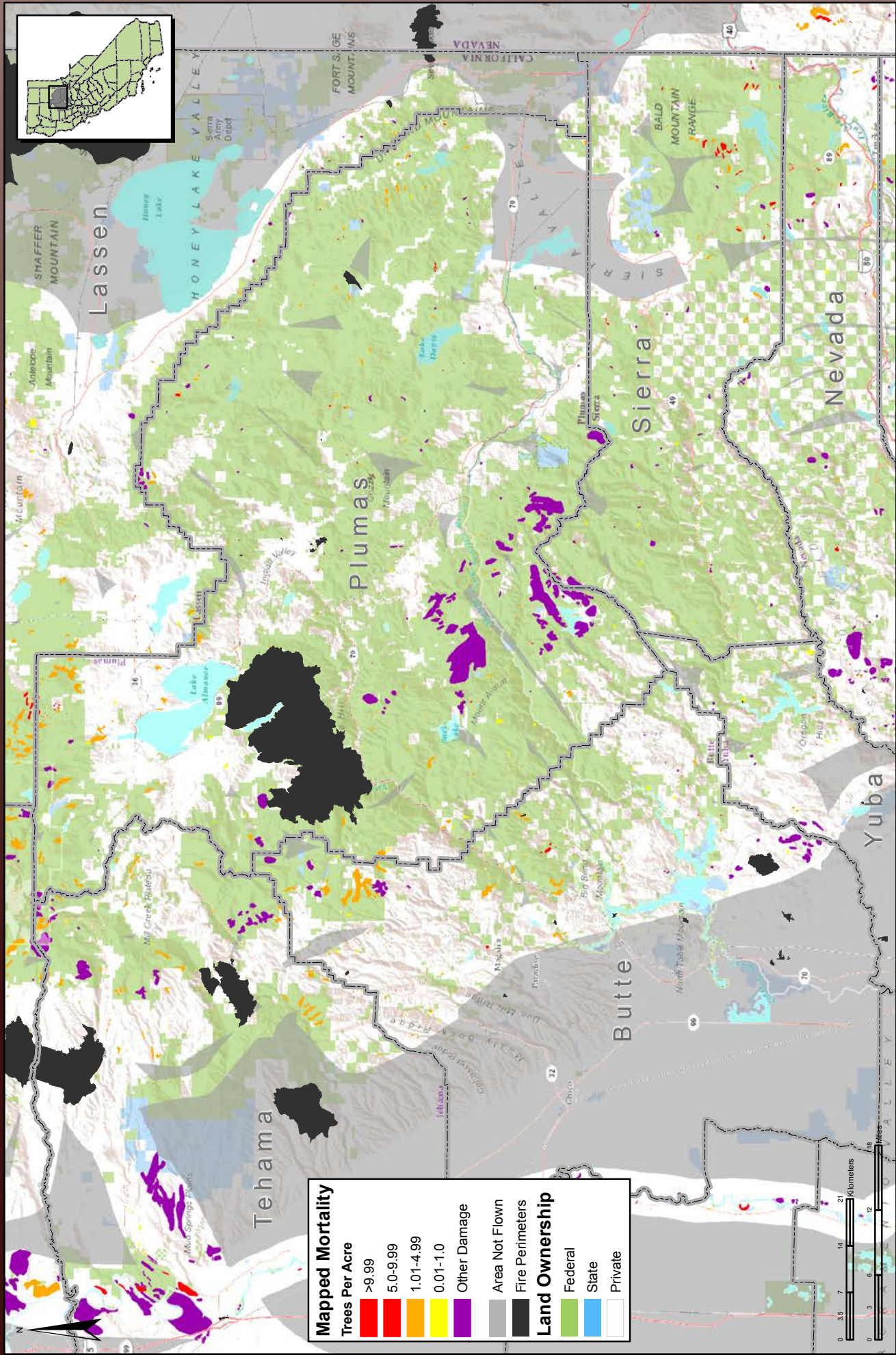
Alameda, Contra Costa, San Joaquin, San Mateo, Santa Clara, Santa Cruz, and Stanislaus Counties



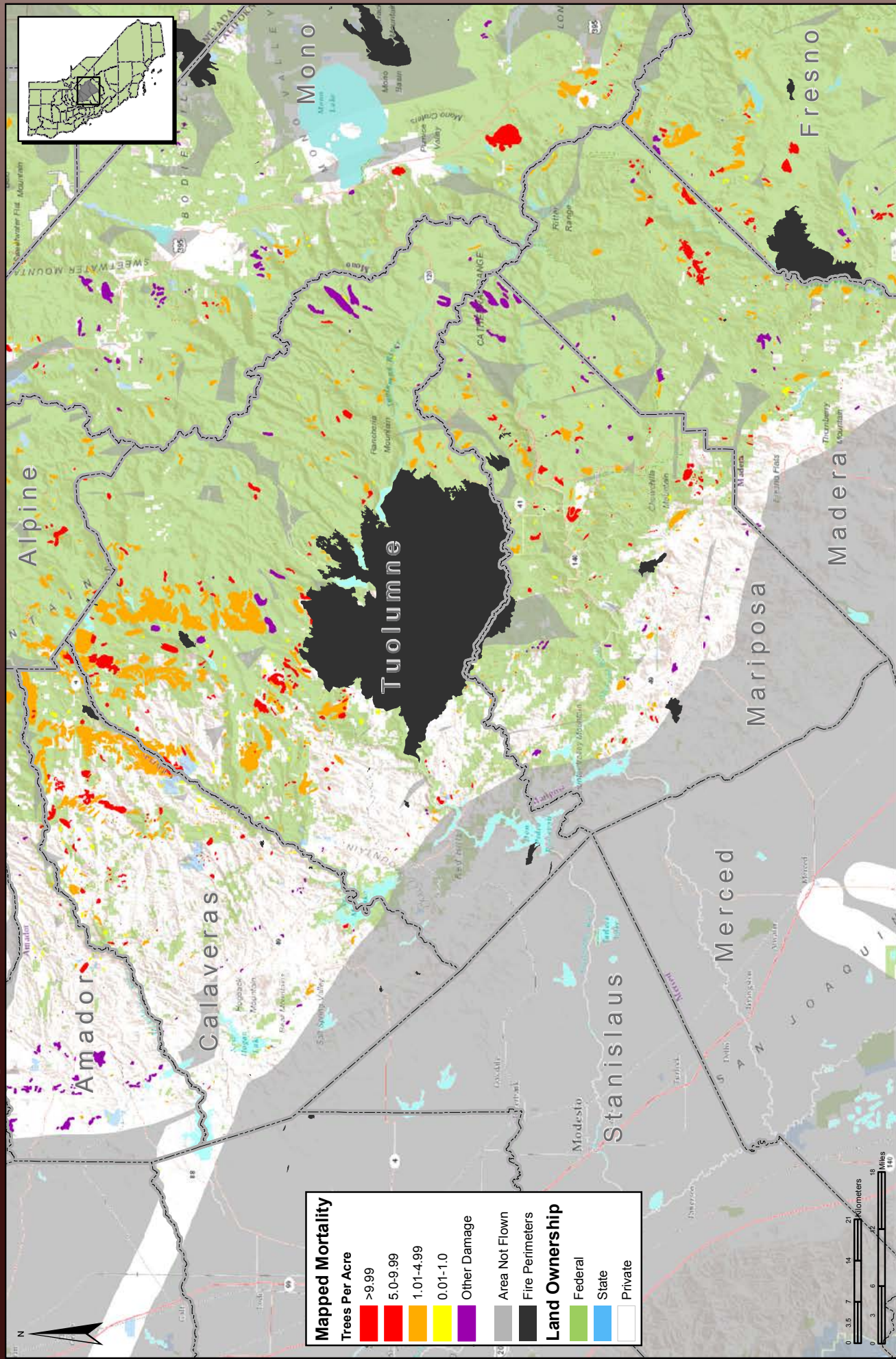
Alpine, Amador, El Dorado, Nevada, and Placer Counties



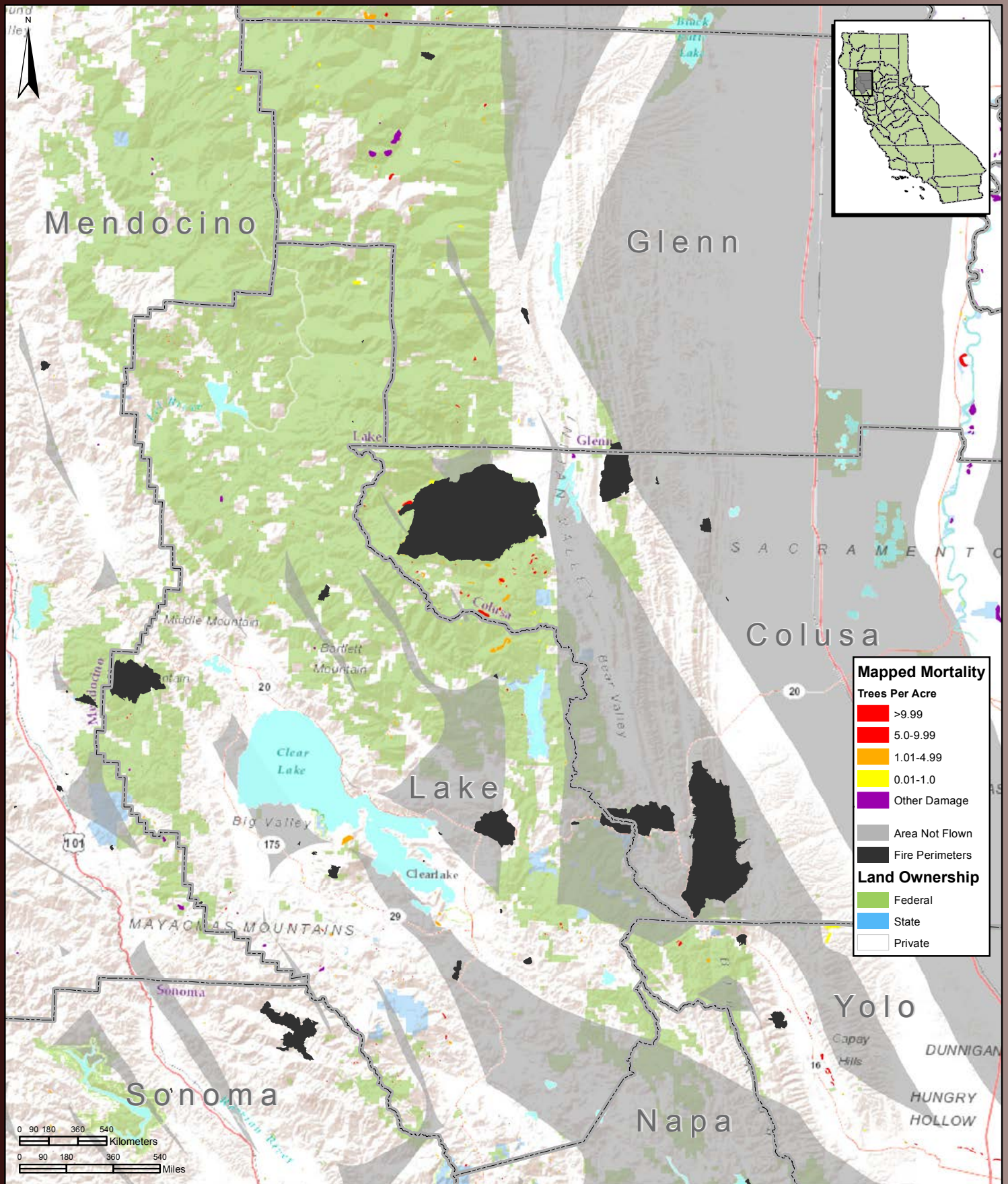
Butte, Plumas, Sierra, Yuba, and Tehama (east) Counties



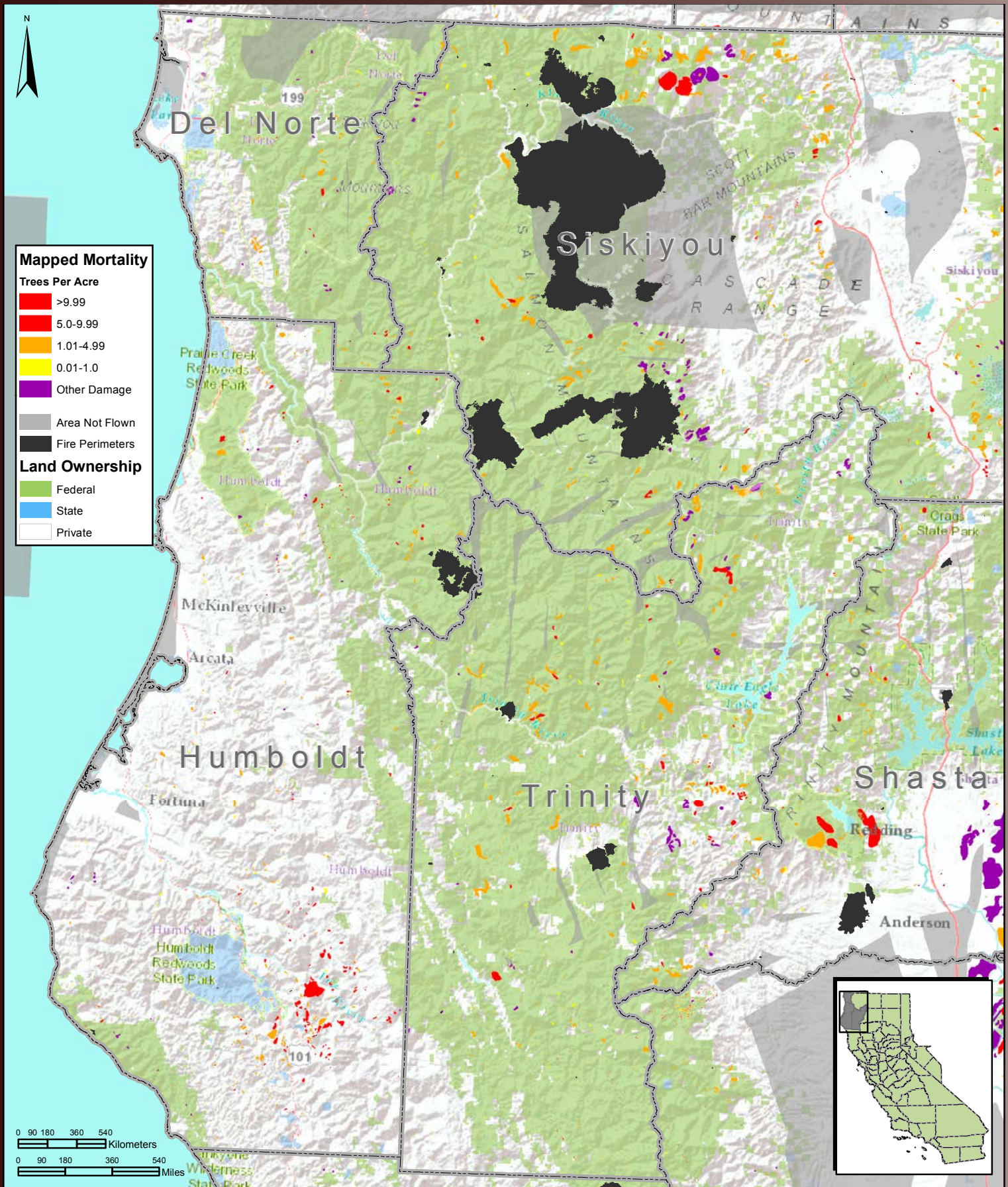
Calaveras, Mariposa, and Tuolumne Counties



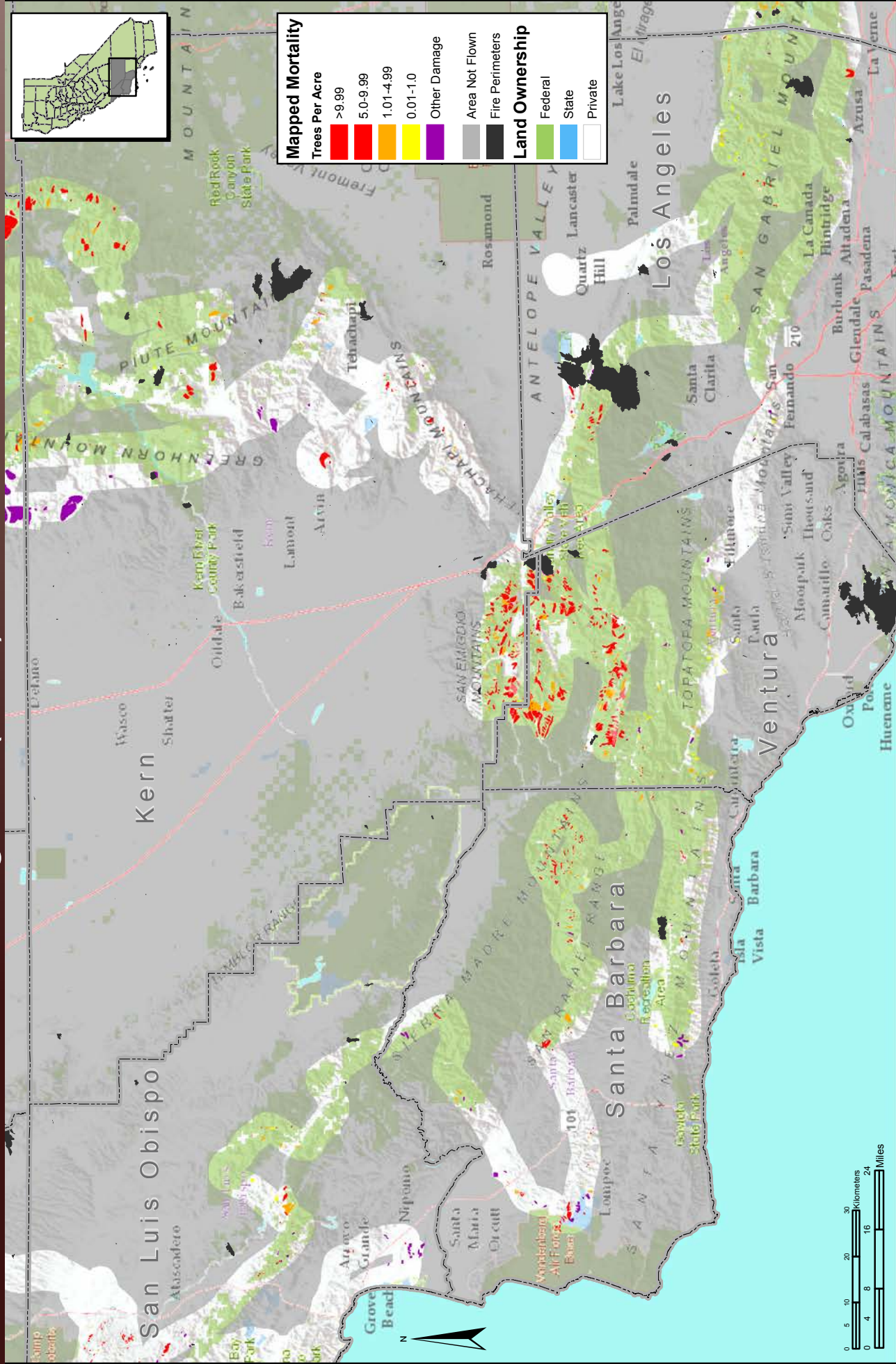
Colusa, Glenn, and Lake Counties



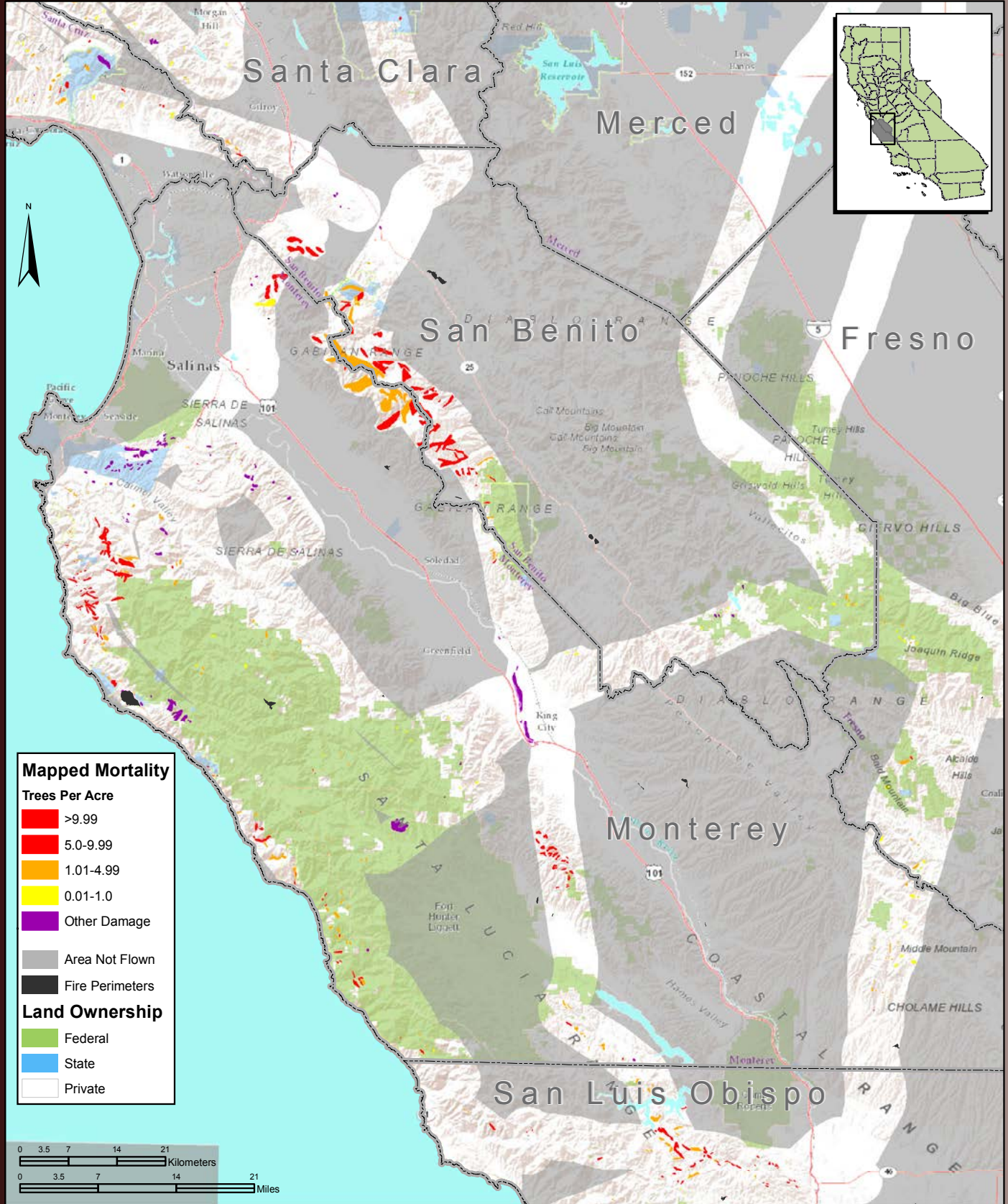
Del Norte and Humboldt Counties



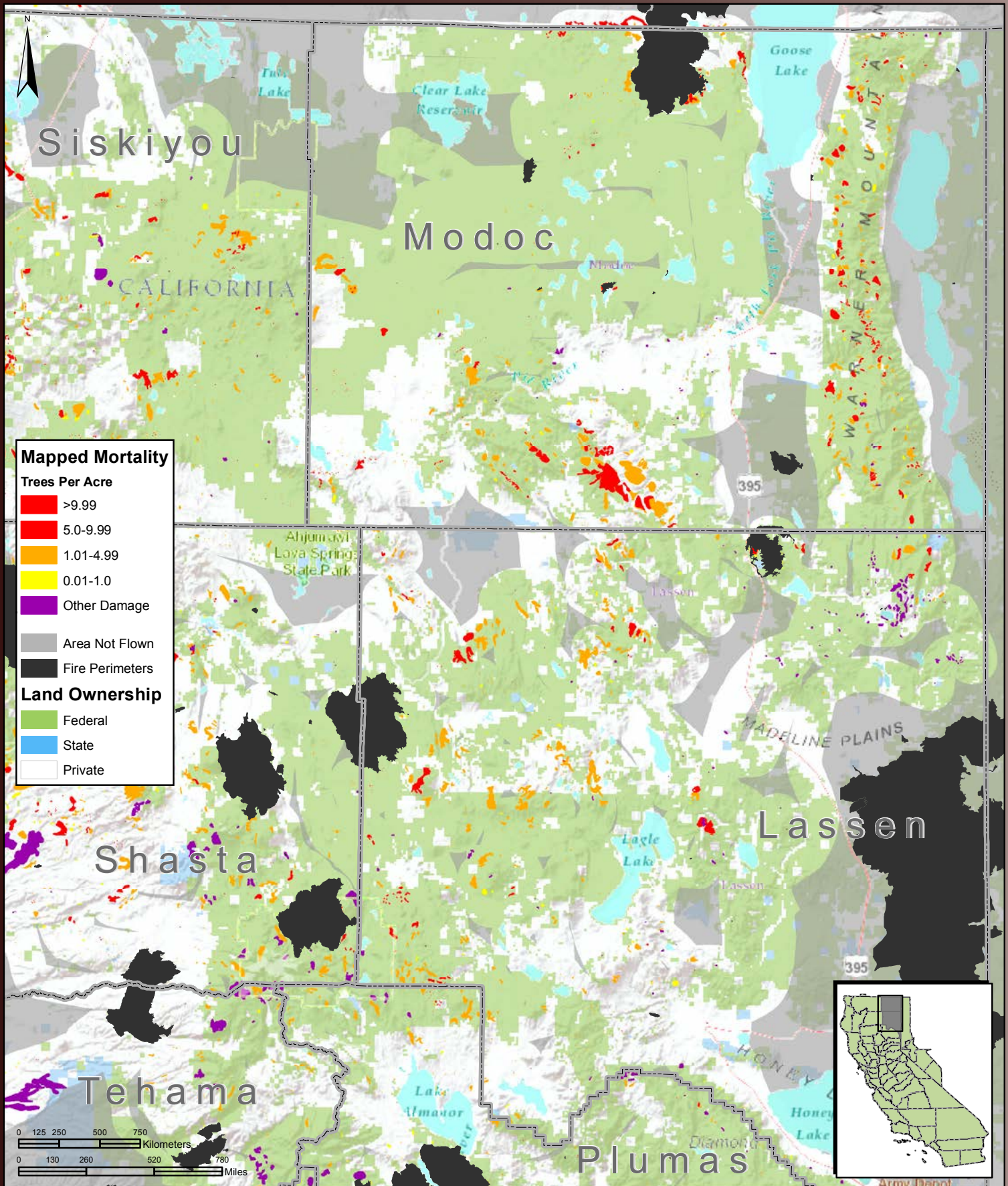
Kern, Ventura, and Los Angeles (west) Counties



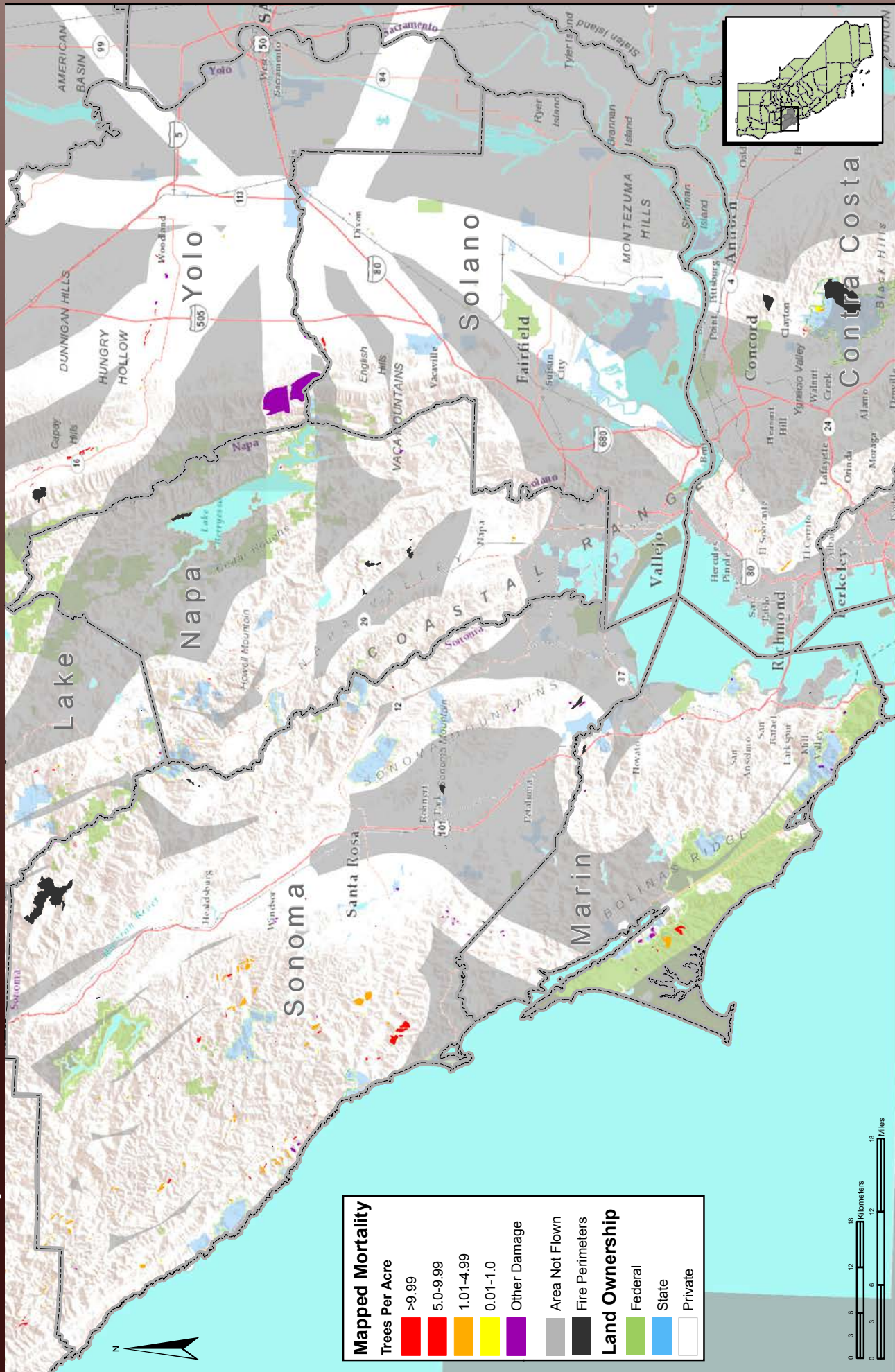
Kings, Merced, Monterey, San Benito, and Fresno (west) Counties



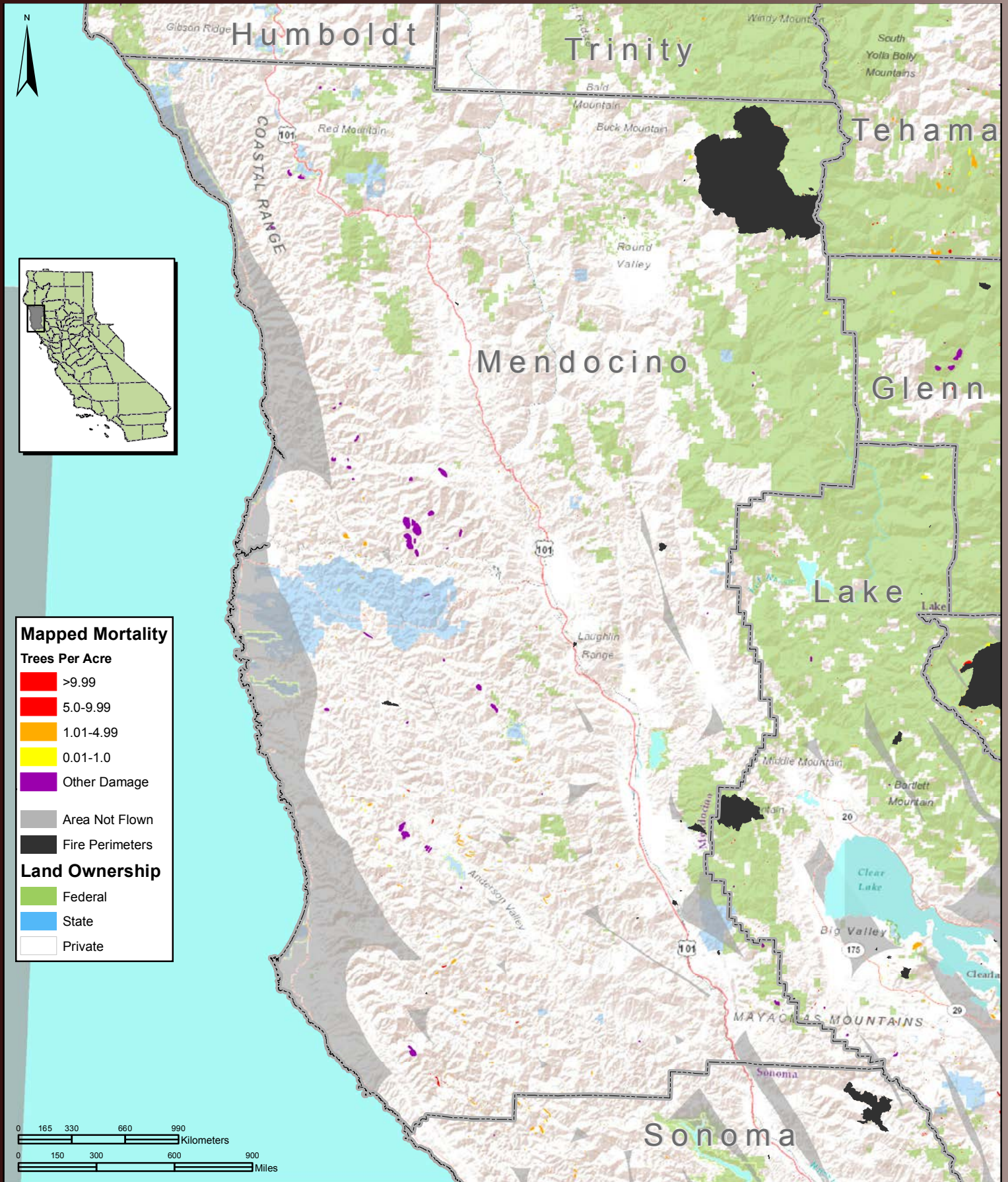
Lassen and Modoc Counties



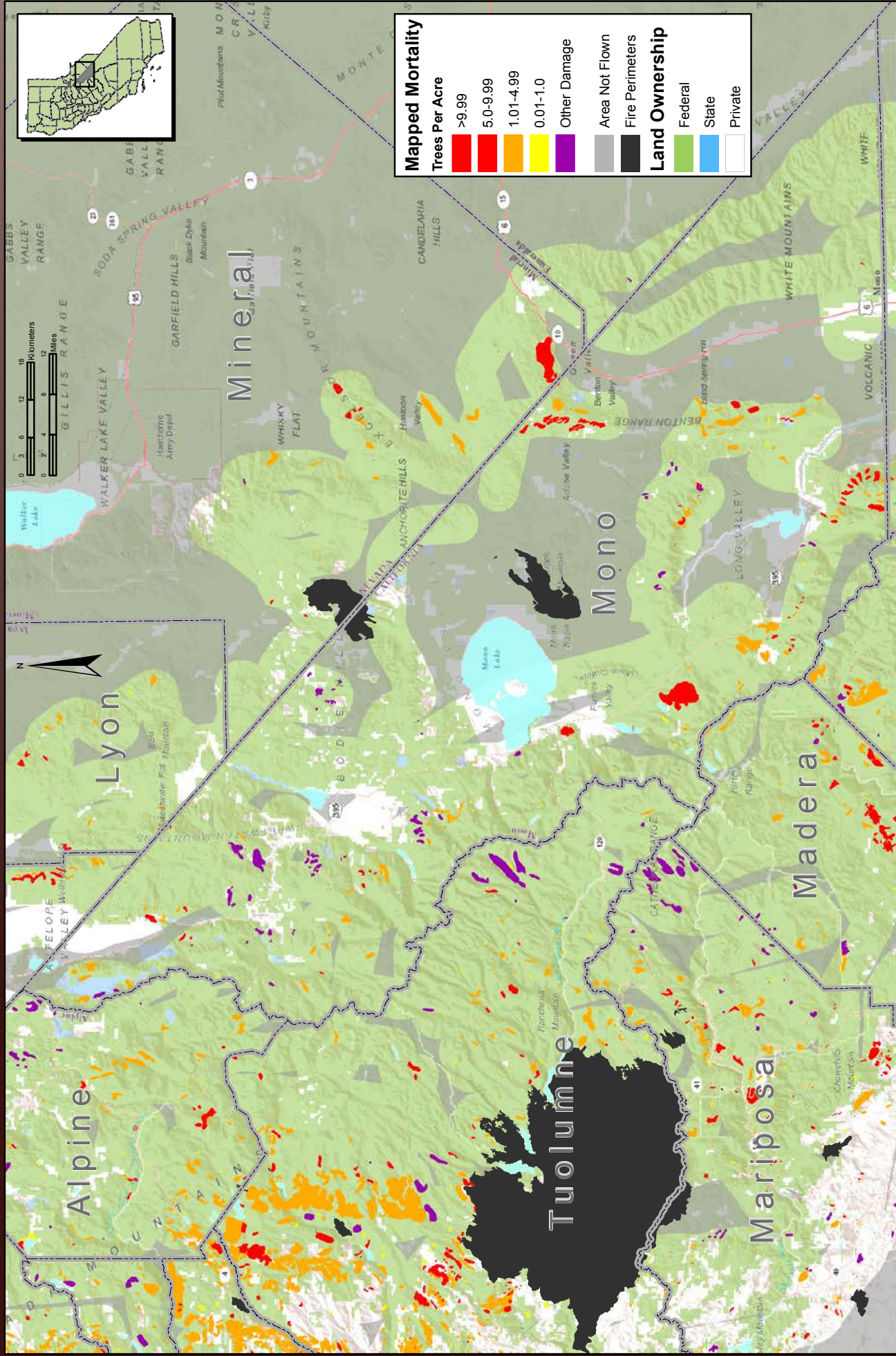
Marin, Napa, Solano, Sonoma, and Yolo Counties



Mendocino County



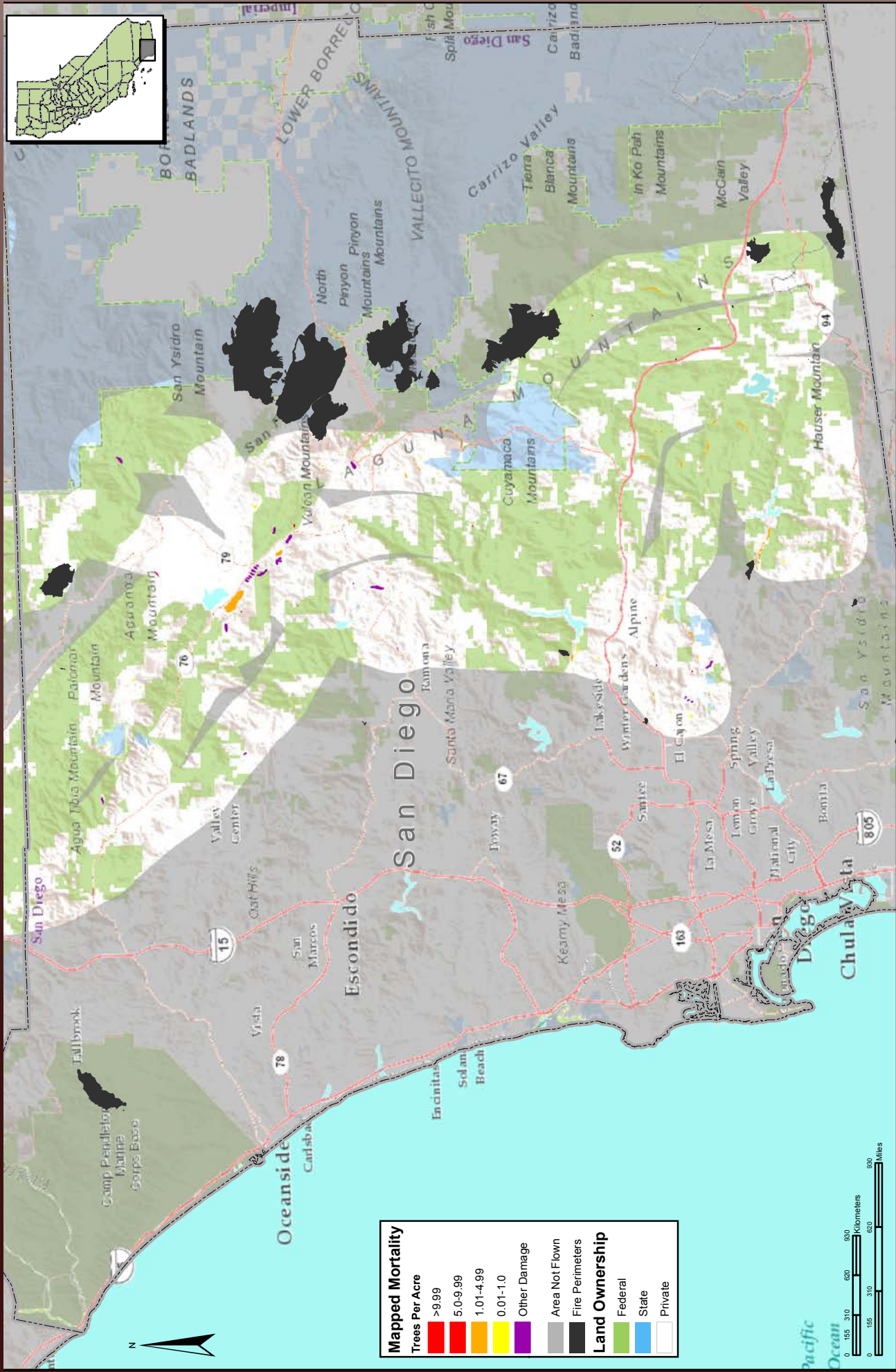
Mono County



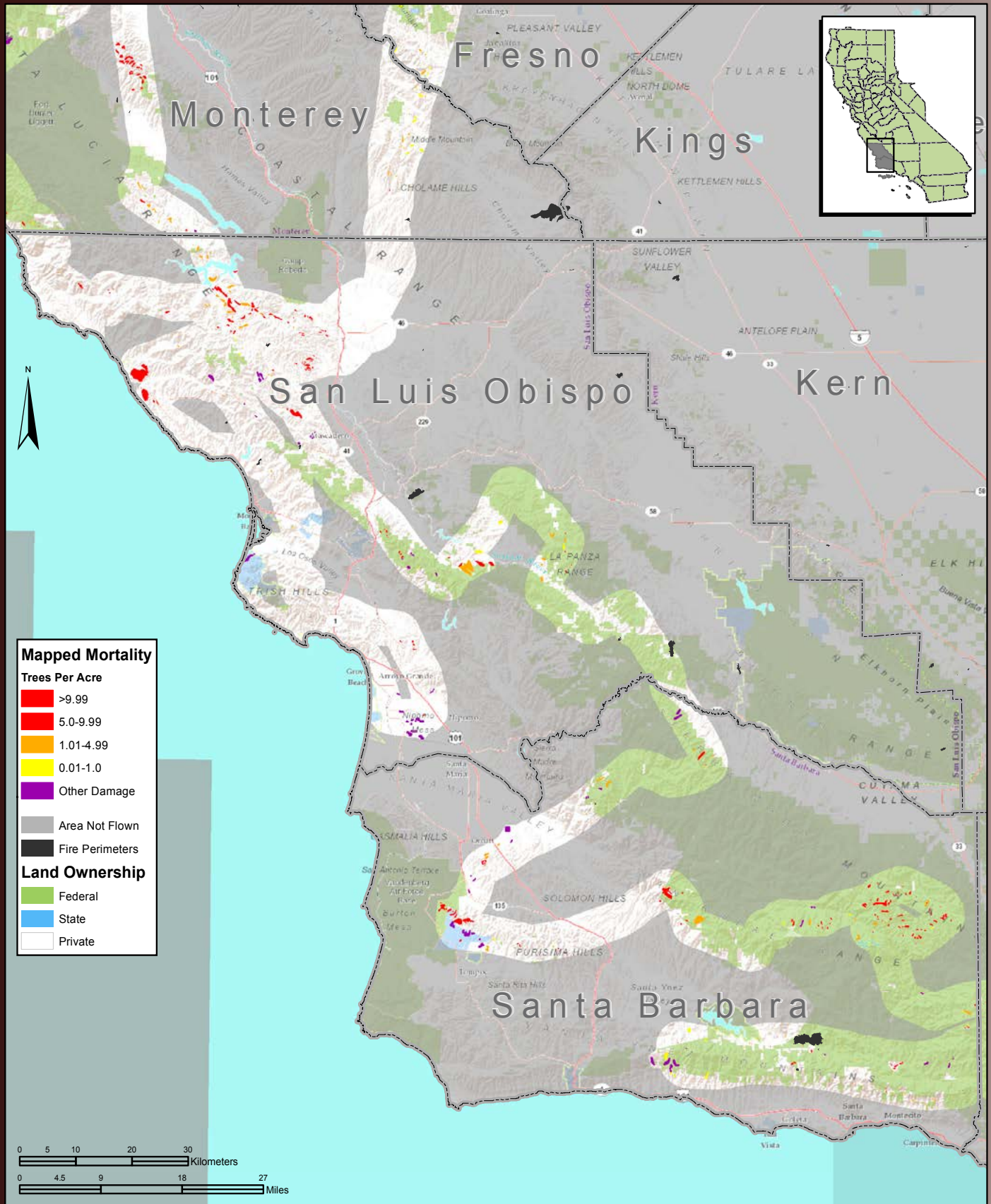
Orange, Riverside, San Bernardino, and Los Angeles (east) Counties



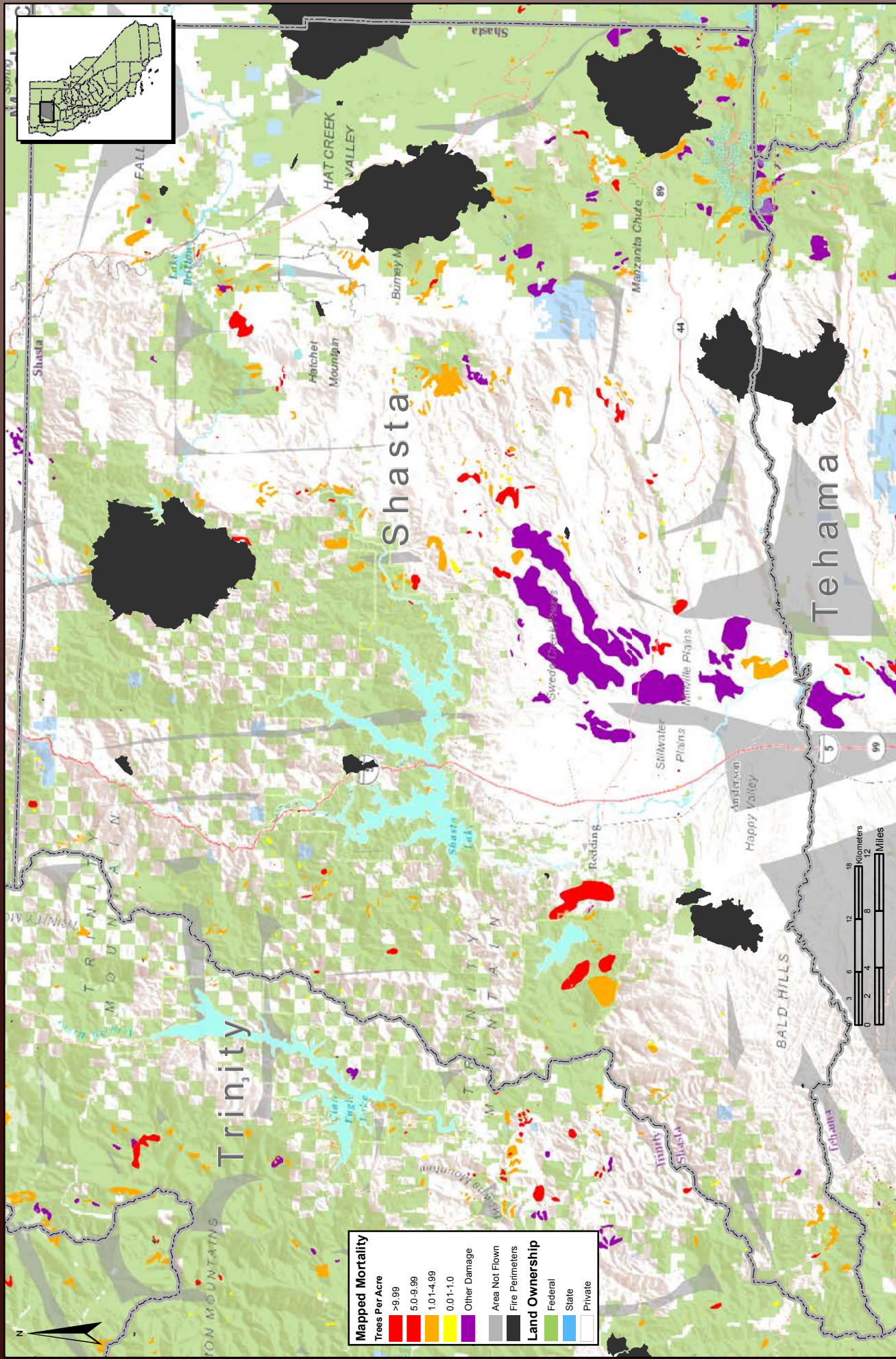
San Diego County



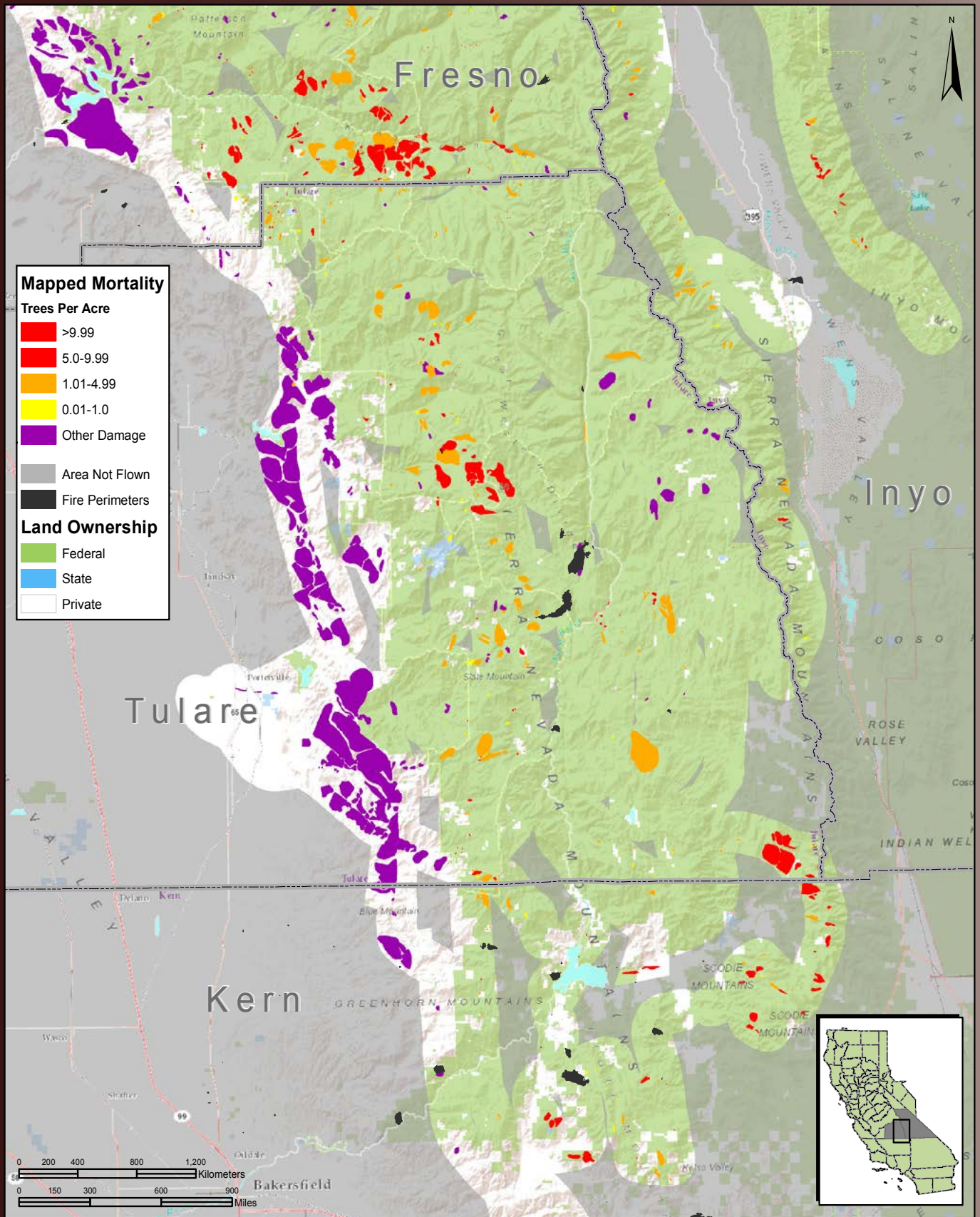
San Luis Obispo and Santa Barbara Counties



Shasta County



Tulare and Inyo (south) Counties



Acres with Mortality by National Forest/Park

Unit	Bark Beetle				Other Agents†					Unit Total
	Pine	Fir	Mix*‡	Total	Pine	Fir	Mix‡	Hardwood	Total	
Angeles	1,994	73	71	2,138	209	3	0	1,343	1,555	3,693
Cleveland	141	0	0	141	0	0	2	965	967	1,108
Eldorado*	5,301	10,009	8,103	23,413	0	0	324	1	325	23,738
Inyo	26,251	1,767	1,495	29,513	1	0	3,611	562	4,174	33,687
Klamath**	12,207	40,759	18,714	71,680	2	0	3,009	0	3,011	74,691
Lassen	10,333	38,117	23,671	72,121	5	0	2,588	0	2,593	74,714
Los Padres	30,664	123	322	31,109	969	131	1,896	6,610	9,606	40,715
Mendocino	4,560	642	150	5,352	90	0	271	5	366	5,718
Modoc**	24,202	21,244	18,188	63,634	672	0	8,114	0	8,786	72,420
Plumas	8,376	4,664	2,196	15,236	557	0	437	99	1,093	16,329
San Bernardino	1,309	127	42	1,478	0	0	89	10	99	1,577
Sequoia	28,856	4,873	25,547	59,276	13,611	0	18,431	182	32,224	91,500
Shasta-Trinity	22,853	33,908	14,954	71,715	246	0	1,981	1	2,228	73,943
Sierra	30,919	3,956	9,626	44,501	4,655	0	248	0	4,903	49,404
Six Rivers**	1,821	10,846	832	13,499	3	0	4,145	41	4,189	17,688
Stanislaus	21,174	9,558	78,550	109,282	135	0	44	0	179	109,461
Tahoe*	2,566	4,052	268	6,886	243	0	141	0	384	7,270
Tahoe Basin*	496	1,199	144	1,839	0	0	0	0	0	1,839
Total Forest Service	234,023	185,917	202,873	622,813	21,398	134	45,331	9,819	76,682	699,495
Golden Gate	0	0	0	0	0	0	1	361	362	362
Lassen Volcanic	538	5,969	1,237	7,744	0	0	0	0	0	7,744
Point Reyes	0	0	0	0	954	0	0	78	1,032	1,032
Redwood	0	0	0	0	0	0	995	3	998	998
Sequoia-Kings	21,496	2,249	4,776	28,521	4,107	0	6,481	0	10,588	39,109
Whiskeytown	4,068	73	208	4,349	1	0	82	0	83	4,432
Yosemite	10,168	7,318	4,409	21,895	0	0	0	1	1	21,896
Total Park Service	36,270	15,609	10,630	62,509	5,062	0	7,559	443	13,064	75,573

*Includes mortality mapped by Region 4

‡Includes Douglas-fir beetle

†includes other conifers

**Includes Mortality mapped by Region 6

‡Includes abiotic, wild animals, wood borers, etc.

‡Insect/disease complex affecting gray pine

Unit	Other Mortality-Causing Events/Agents†
Angeles	flatheaded fir borer, drought, oak and hardwood mortality, complex‡
Cleveland	drought, flatheaded fir borer, gold-spotted oak borer, oak mortality
Eldorado*	flatheaded fir borer, drought
Inyo	California flathead borer, drought induced juniper, redcedar and hardwood mortality
Klamath**	bear, flat headed fir borer, California flathead borer, drought
Lassen	flat headed fir borer, fire, unknown mortality
Los Padres	California flathead borer, flat headed fir borer, sudden oak death, unknown oak and hardwood mortality, ‡
Mendocino	California flathead borer, flat headed fir borer, ‡
Modoc**	California flathead borer, drought induced juniper, redcedar and hardwood mortality
Plumas	flatheaded fir borer, California flathead borer, unknown mortality of madrone
San Bernardino	flatheaded fir borer, California flathead borer, drought
Sequoia	California flat head borer, drought and unknown mortality of hardwoods and liveoak
Shasta-Trinity	California flathead borer, flatheaded fir bore, drought, black stain root disease, ‡
Sierra	California flathead borer, flat headed fir borer, ‡
Six Rivers**	flatheaded fir borer, California flathead borer, Phytophthora, bear, unknown mortality of tanoak and hardwoods
Stanislaus	California flathead borer, flatheaded fir borer ‡
Tahoe*	water/flooding, flatheaded fir borer, California flathead borer, aspen decline
Tahoe Basin*	
Golden Gate	flatheaded fir borer, sudden oak death
Lassen Volcanic	
Point Reyes	sudden oak death, pitch canker
Redwood	flatheaded fir borer, bear, sudden oak death
Sequoia-Kings	California flathead borer
Whiskeytown	flatheaded fir borer, ‡
Yosemite	drought

Number of Dead Trees by National Forest/Park

Unit	Bark Beetle				Other Agents†					Unit Total
	Pine	Fir	Mix‡	Total	Pine	Fir	Mix‡	Hardwood	Total	
Angeles	5,401	60	103	5,564	318	3	0	7,818	8,139	13,703
Cleveland	141	0	0	141	0	0	5	1,535	1,540	1,681
Eldorado*	25,159	19,090	17,081	61,330	0	0	574	1	575	61,905
Inyo	142,291	3,963	4,270	150,524	1	0	18,935	11,236	30,172	180,696
Klamath**	38,840	85,802	61,004	185,646	3	0	6,735	0	6,738	192,384
Lassen	32,136	61,736	46,065	139,937	9	0	5,986	0	5,995	145,932
Los Padres	226,076	977	3,545	230,598	2,883	199	7,795	42,672	53,549	284,147
Mendocino	16,457	1,167	141	17,765	284	0	349	32	665	18,430
Modoc**	73,888	75,102	93,935	242,925	1,888	0	38,289	0	40,177	283,102
Plumas	65,710	6,552	3,892	76,154	1,110	0	644	96	1,850	78,004
San Bernardino	2,070	147	42	2,259	0	0	427	21	448	2,707
Sequoia	118,800	13,127	36,228	168,155	68,749	0	84,316	1,753	154,818	322,973
Shasta-Trinity	75,656	57,028	28,981	161,665	531	0	4,508	3	5,042	166,707
Sierra	109,781	10,276	29,875	149,932	34,308	0	6,118	0	40,426	190,358
Six Rivers**	2,497	15,076	3,335	20,908	4	0	8,934	44	8,982	29,890
Stanislaus	103,047	31,931	278,435	413,413	181	0	88	0	269	413,682
Tahoe*	12,288	16,497	873	29,658	402	0	310	0	712	30,370
Tahoe Basin*	1,796	4,023	287	6,106	0	0	0	0	0	6,106
Total Forest Service	1,052,034	402,554	608,092	2,062,680	110,671	202	184,013	65,211	360,097	2,422,777
Golden Gate	0	0	0	0	0	0	1	819	820	820
Lassen Volcanic	913	10,751	2,169	13,833	0	0	0	0	0	13,833
Point Reyes	0	0	0	0	2,949	0	0	92	3,041	3,041
Redwood	0	0	0	0	0	0	2,201	9	2,210	2,210
Sequoia-Kings	59,697	5,729	15,289	80,715	23,051	0	16,656	0	39,707	120,422
Whiskeytown	20,940	73	563	21,576	3	0	86	0	89	21,665
Yosemite	28,093	15,283	12,408	55,784	0	0	0	1	1	55,785
Total Park Service	109,643	31,836	30,429	171,908	26,003	0	18,944	921	45,868	217,776

*Includes mortality mapped by Region 4

‡Includes Douglas-fir beetle

†includes other conifers

**Includes Mortality mapped by Region 6

‡Includes abiotic, wild animals, wood borers, etc.

‡Insect/disease complex affecting gray pine

Unit	Other Mortality-Causing Events/Agents†
Angeles	flatheaded fir borer, drought, oak and hardwood mortality, complex‡
Cleveland	drought, flatheaded fir borer, gold-spotted oak borer, oak mortality
Eldorado*	flatheaded fir borer, drought
Inyo	California flathead borer, drought induced juniper, redcedar and hardwood mortality
Klamath**	bear, flat headed fir borer, California flathead borer, drought
Lassen	flat headed fir borer, fire, unknown mortality
Los Padres	California flathead borer, flat headed fir borer, sudden oak death, unknown oak and hardwood mortality, ‡
Mendocino	California flathead borer, flat headed fir borer, ‡
Modoc**	California flathead borer, drought induced juniper, redcedar and hardwood mortality
Plumas	flatheaded fir borer, California flathead borer, unknown mortality of madrone
San Bernardino	flatheaded fir borer, California flathead borer, drought
Sequoia	California flat head borer, drought and unknown mortality of hardwoods and liveoak
Shasta-Trinity	California flathead borer, flatheaded fir bore, drought, black stain root disease, ‡
Sierra	California flathead borer, flat headed fir borer, ‡
Six Rivers**	flatheaded fir borer, California flathead borer, Phytophthora, bear, unknown mortality of tanoak and hardwoods
Stanislaus	California flathead borer, flatheaded fir borer ‡
Tahoe*	water/flooding, flatheaded fir borer, California flathead borer, aspen decline
Tahoe Basin*	
Golden Gate	flatheaded fir borer, sudden oak death
Lassen Volcanic	
Point Reyes	sudden oak death, pitch canker
Redwood	flatheaded fir borer, bear, sudden oak death
Sequoia-Kings	California flathead borer
Whiskeytown	flatheaded fir borer, ‡
Yosemite	drought

Other Damage by National Forest/Park

Unit	Defoliation	Discoloration	Dieback	Topkill	Main Stem Broken/Uprooted	Branch Flagging	Other Damage*	Total
Angeles	2	0	0	35	1	1	410	449
Cleveland	20	134	0	0	0	0	0	154
Eldorado*	0	15	17	425	0	1,056	27	1,540
Inyo	3,501	22	299	220	0	1	118	4,160
Klamath**	0	518	0	3	0	5,635	1,356	7,512
Lassen	3,735	143	200	3	0	5,554	160	9,795
Los Padres	69	1,319	4	31	0	70	1,718	3,211
Mendocino	9	346	0	0	0	0	124	479
Modoc**	41	59	275	24	0	40	53	493
Plumas	22,268	1,275	107	1	0	162	35	23,847
San Bernardino	8	117	5	1	1	8	77	219
Sequoia	988	27	0	161	0	358	838	2,373
Shasta-Trinity	0	52	6	1	0	2,565	527	3,151
Sierra	5,325	79	0	1,477	0	975	119	7,976
Six Rivers**	0	156	10	0	0	23	106	294
Stanislaus	0	140	10	1,652	0	309	0	2,112
Tahoe*	0	55	246	179	30	1,249	146	1,905
Tahoe Basin*	56	74	33	12	0	26	79	279
Total Forest Service	36,022	4,532	1,212	4,226	32	18,032	5,893	69,949
Golden Gate	40	0	0	0	0	0	0	40
Lassen Volcanic	0	170	240	155	0	7,151	21	7,737
Point Reyes	10	0	0	0	0	0	0	10
Redwood	0	0	0	45	0	0	0	45
Sequoia-Kings	1,033	85	0	1	0	766	209	2,093
Whiskeytown	0	0	0	0	0	0	61	61
Yosemite	6,710	0	0	22	161	367	0	7,260
Total Park Service	7,792	255	240	223	161	8,284	291	17,246

*Includes mortality mapped by Region 4

‡herbicide, fire

**Includes Mortality mapped by Region 6

‡Insect/disease complex affecting gray pine

Unit	Other Damage-Causing Events/Agents
Angeles	drought, Ips, fir engraver, wind breakage, fire
Cleveland	drought
Eldorado*	Ips, fir engraver, Cytospora, fire, abiotic (frost), unknown dieback in whitebark pine
Inyo	dieback and satin moth defoliation in aspen, unknown defoliator in lodgepole pine, fir engraver, Cytospora, unknown branch flagging in whitebark pine
Klamath**	Cytospora, fir engraver, unknown or drought induced discoloration in bigleaf maple, ponderosa pine and Douglas-fir
Lassen	Douglas-fir tussock moth, satin moth, Cytospora, Ips, aspen dieback, unknown discoloration of lodgepole pine and white fir, topkill from bark beetles
Los Padres	fir engraver, Ips, drought, pitch canker in Coulter pine, fire, alder flea beetle, unknown discoloration of madrone, hardwoods and oak
Mendocino	drought, fir engraver, flatheaded fir borer, Cytospora, fire
Modoc**	Ips, satin moth defoliation and unknown dieback and branch flagging in aspen, drought, frost, fire, decline and branch flagging in ponderosa pine
Plumas	Douglas-fir tussock moth, Satin moth, drought, Ips, Cytospora, maple, black oak and pine discoloration, squirrels, fire
San Bernardino	Ips, drought, black pineleaf scale, alder flea beetle, wind, fire
Sequoia	Ips, Cytospora, drought, fire
Shasta-Trinity	Ips, fir engraver, Cytospora, herbicides, drought, unknown discoloration of fir, pine and hardwoods, topkill of gray pine‡
Sierra	Ips, Cytospora, drought, defoliation and flagging in blue oak, discoloration of lodgepole and ponderosa pine
Six Rivers**	Cytospora, bear, drought, unknown discoloration of madrone, fir, oak, hardwoods and Douglas-fir
Stanislaus	drought, Ips, fir engraver, Cytospora, die back of aspen, western gall rust, ‡
Tahoe*	Ips, fir engraver, Cytospora, wind (tornado), aspen dieback, discoloration of pine and white fir
Tahoe Basin*	Cytospora, satin moth defoliation and dieback in aspen, Ips, needleminer in Jeffrey pine, fir engraver
Golden Gate	flatheaded fir borer, drought and frost damage in eucalyptus
Lassen Volcanic	Cytospora, fir engraver, unknown discoloration and dieback in lodgepole pine
Point Reyes	pitch canker, Douglas-fir engraver
Redwood	bear
Sequoia-Kings	fir engraver, Cytospora, Ips, fire, unknown defoliation in lodgepole pine and unknown branch flagging and discoloration in whitebark pine
Whiskeytown	fire
Yosemite	fir engraver, Ips, lodgepole needleminer, Cytospora, windthrow, avalanche

Acres with Mortality by County

Unit	Bark Beetle				Other Agents†					Unit Total
	Pine	Fir	Mix*	Total	Pine	Fir	Mix‡	Hardwood	Total	
Alameda	84	0	0	84	0	0	0	276	276	360
Alpine	4,802	4,236	5,857	14,895	0	0	0	0	0	14,895
Amador	1,844	2,124	1,796	5,764	55	0	102	168	325	6,089
Butte	674	5,353	2,882	8,909	5	0	781	113	899	9,808
Calaveras	8,600	1,536	23,914	34,050	783	0	2	355	1,140	35,190
Colusa	622	5	0	627	136	0	0	43	179	806
Contra Costa	164	0	0	164	0	0	0	637	637	801
Del Norte**	819	1,101	2	1,922	0	0	4,950	8	4,958	6,880
El Dorado*	5,989	7,832	6,442	20,263	84	0	529	67	680	20,943
Fresno	27,150	3,827	8,396	39,373	15,313	0	2,978	1,532	19,823	59,196
Glenn	1,390	180	24	1,594	18	0	0	191	209	1,803
Humboldt	197	3,559	100	3,856	17	0	6,595	10,422	17,034	20,890
Inyo	4,965	3	745	5,713	0	0	0	230	230	5,943
Kern	15,964	851	314	17,129	3,134	0	342	905	4,381	21,510
Lake	870	74	0	944	350	0	162	10	522	1,466
Lassen	10,723	13,480	20,940	45,143	157	0	906	29	1,092	46,235
Los Angeles	1,947	70	71	2,088	537	0	39	1,456	2,032	4,120
Madera	14,691	1,740	2,917	19,348	51	0	0	1	52	19,400
Marin	1	0	0	1	954	0	1	203	1,158	1,159
Mariposa	9,636	5,172	2,167	16,975	1,811	0	16	875	2,702	19,677
Mendocino	1,207	113	601	1,921	2	0	1,663	1,169	2,834	4,755
Merced	0	0	0	0	0	0	0	1	1	1
Modoc**	14,951	19,591	11,597	46,139	7,364	0	329	0	7,693	53,832
Mono*	24,320	2,504	0	26,824	0	0	282	562	844	27,668
Monterey	1,357	0	0	1,357	4,951	129	3,387	7,013	15,480	16,837
Napa	100	0	0	100	42	0	45	6	93	193
Nevada	1,154	554	55	1,763	23	0	54	2	79	1,842
Orange	44	0	0	44	0	0	0	138	138	182
Placer	1,180	2,932	205	4,317	141	0	21	10	172	4,489
Plumas	8,479	11,984	3,867	24,330	513	0	621	0	1,134	25,464
Riverside	262	0	0	262	0	2	3	53	58	320
San Benito	4,113	0	0	4,113	3,874	0	2,259	2,402	8,535	12,648
San Bernardino	1,116	130	127	1,373	0	1	0	13	14	1,387
San Diego	56	0	0	56	0	0	1	2,380	2,381	2,437
San Joaquin	0	0	0	0	16	0	0	0	16	16
San Luis Obispo	2,149	0	0	2,149	1,501	1	3	3,426	4,931	7,080
San Mateo	53	0	0	53	0	0	36	1,311	1,347	1,400
Santa Barbara	2,028	64	0	2,092	84	0	228	2,371	2,683	4,775
Santa Clara	169	0	0	169	205	0	47	1,078	1,330	1,499
Santa Cruz	972	0	31	1,003	0	0	879	3,523	4,402	5,405
Shasta	26,061	20,620	14,567	61,248	1,419	0	3,287	2,268	6,974	68,222
Sierra*	649	1,364	10	2,023	103	0	443	0	546	2,569
Siskiyou**	30,404	44,075	23,086	97,565	174	0	5,924	208	6,306	103,871
Solano	0	0	0	0	1	0	3	94	98	98
Sonoma	100	0	1	101	2	0	272	4,329	4,603	4,704
Tehama	2,752	11,273	1,799	15,824	78	0	812	1,484	2,374	18,198
Trinity	5,979	26,712	7,551	40,242	72	0	1,084	490	1,646	41,888
Tulare	40,116	5,150	29,464	74,730	3,531	0	10,266	129	13,926	88,656
Tuolumne	2,052	10,015	52,918	64,985	779	0	8	13	800	65,785
Ventura	19,420	0	0	19,420	703	0	452	2,063	3,218	22,638
Yolo	28	0	0	28	516	0	0	198	714	742
Yuba	528	158	0	686	16	0	6	0	22	708
Total	302,931	208,382	222,446	733,759	49,515	133	49,818	54,255	153,721	887,480

*Includes mortality mapped by Region 4
 **Includes Mortality mapped by Region 6

‡Includes Douglas-fir beetle
 †Includes abiotic, wild animals, wood borers, etc.

‡includes other conifers
 †Insect/disease complex affecting gray pine

Number of Dead Trees by County

Unit	Bark Beetle				Other Agents†					Unit Total
	Pine	Fir	Mix‡	Total	Pine	Fir	Mix‡	Hardwood	Total	
Alameda	431	0	0	431	0	0	0	851	851	1,282
Alpine	22,696	10,596	17,530	50,822	0	0	0	0	0	50,822
Amador	10,187	2,750	3,134	16,071	108	0	104	344	556	16,627
Butte	1,460	8,252	4,155	13,867	12	0	1,681	112	1,805	15,672
Calaveras	57,645	6,686	76,780	141,111	2,550	0	3	584	3,137	144,248
Colusa	7,323	4	0	7,327	377	0	0	27	404	7,731
Contra Costa	298	0	0	298	0	0	0	808	808	1,106
Del Norte**	1,299	1,946	8	3,253	0	0	8,369	7	8,376	11,629
El Dorado*	15,102	16,180	14,032	45,314	146	0	1,418	338	1,902	47,216
Fresno	94,789	14,161	33,481	142,431	104,839	0	19,274	2,263	126,376	268,807
Glenn	3,113	172	9	3,294	23	0	0	3,124	3,147	6,441
Humboldt	602	4,173	327	5,102	100	0	14,806	60,844	75,750	80,852
Inyo	22,276	5	2,979	25,260	0	0	0	1,206	1,206	26,466
Kern	145,819	2,712	2,230	150,761	13,316	0	1,474	10,580	25,370	176,131
Lake	2,724	52	0	2,776	521	0	235	84	840	3,616
Lassen	32,260	33,872	52,596	118,728	384	0	3,220	33	3,637	122,365
Los Angeles	5,319	56	103	5,478	1,834	0	48	7,864	9,746	15,224
Madera	43,748	2,687	8,705	55,140	52	0	0	2	54	55,194
Marin	5	0	0	5	2,949	0	1	245	3,195	3,200
Mariposa	45,402	10,887	6,332	62,621	4,919	0	53	890	5,862	68,483
Mendocino	2,604	664	2,592	5,860	4	0	4,329	2,609	6,942	12,802
Merced	0	0	0	0	0	0	0	2	2	2
Modoc**	47,340	68,434	69,058	184,832	35,714	0	525	0	36,239	221,071
Mono*	124,012	4,966	0	128,978	0	0	1,272	11,236	12,508	141,486
Monterey	16,904	0	0	16,904	20,532	199	8,945	42,538	72,214	89,118
Napa	328	0	0	328	67	0	100	9	176	504
Nevada	2,482	1,767	95	4,344	27	0	85	3	115	4,459
Orange	22	0	0	22	0	0	0	142	142	164
Placer	16,272	3,640	755	20,667	276	0	49	21	346	21,013
Plumas	67,091	17,502	6,019	90,612	1,059	0	914	0	1,973	92,585
Riverside	286	0	0	286	0	5	10	661	676	962
San Benito	23,845	0	0	23,845	15,129	0	5,335	18,881	39,345	63,190
San Bernardino	1,870	151	457	2,478	0	1	0	22	23	2,501
San Diego	135	0	0	135	0	0	1	4,349	4,350	4,485
San Joaquin	0	0	0	0	16	0	0	0	16	16
San Luis Obispo	24,396	0	0	24,396	3,346	1	6	15,970	19,323	43,719
San Mateo	167	0	0	167	0	0	19	3,723	3,742	3,909
Santa Barbara	23,341	744	0	24,085	505	0	559	20,462	21,526	45,611
Santa Clara	194	0	0	194	258	0	27	3,705	3,990	4,184
Santa Cruz	2,036	0	90	2,126	0	0	1,515	9,202	10,717	12,843
Shasta	122,368	35,646	30,492	188,506	3,202	0	7,474	7,235	17,911	206,417
Sierra*	2,836	5,433	25	8,294	122	0	551	0	673	8,967
Siskiyou**	92,122	93,212	78,555	263,889	865	0	11,606	5,189	17,660	281,549
Solano	0	0	0	0	4	0	11	470	485	485
Sonoma	345	0	2	347	3	0	481	11,362	11,846	12,193
Tehama	4,450	14,503	2,174	21,127	184	0	1,135	8,368	9,687	30,814
Trinity	13,193	45,261	17,470	75,924	217	0	3,059	4,448	7,724	83,648
Tulare	185,270	10,521	48,314	244,105	6,446	0	21,428	305	28,179	272,284
Tuolumne	60,561	29,644	194,493	284,698	2,729	0	3	13	2,745	287,443
Ventura	146,388	0	0	146,388	2,812	0	2,539	7,567	12,918	159,306
Yolo	139	0	0	139	463	0	0	2,162	2,625	2,764
Yuba	543	83	0	626	23	0	10	0	33	659
Total	1,494,038	447,362	672,992	2,614,392	226,133	206	122,674	270,860	619,873	3,234,265

*Includes mortality mapped by Region 4
 **Includes Mortality mapped by Region 6

‡Includes Douglas-fir beetle
 †Includes abiotic, wild animals, wood borers, etc.

‡includes other conifers
 †Insect/disease complex affecting gray pine

Other Mortality-Causing Events by County

County	Other Mortality-Causing Events/Agents†
Alameda	sudden oak death, drought
Alpine	
Amador	flat headed fir borer drought, ‡
Butte	drought, unknown mortality in madrone, tanoak and live oak, flatheaded fir borer, ‡
Calaveras	drought, flatheaded fir borer, ‡
Colusa	drought, ‡
Contra Costa	sudden oak death, drought
Del Norte**	flatheaded fir borer, POC root disease, bear, unknown mortality in madrone and tanoak
El Dorado*	flatheaded fir borer, drought, unknown mortality of blue oak and madrone, ‡
Fresno	California flathead borer, drought, ‡
Glenn	drought, ‡
Humboldt	flatheaded fir borer, bear, sudden oak death, POC, drought, unknown mortality in spruce, oak, madrone and hardwoods
Inyo	drought/unknown mortality in hardwoods
Kern	California flathead borer, drought, unknown mortality of hardwoods and live oak, ‡
Lake	flatheaded fir borer, drought, ‡
Lassen	California flathead borer, flatheaded fir borer, drought/unknown mortality in juniper, aspen and hardwoods, ‡
Los Angeles	flatheaded fir borer, California flat head borer, drought/unknown mortality in hardwoods and oak, ‡
Madera	drought, ‡
Marin	pitch canker, flatheaded fir borer, sudden oak death, drought
Mariposa	western cedar bark beetle, flatheaded fir borer, drought, ‡
Mendocino	flatheaded fir borer, sudden oak death, bear, drought, unknown mortality in tanoak, madrone and hardwoods, ‡
Merced	unknown mortality in hardwoods,
Modoc**	California flathead borer, drought
Mono*	drought, unknown mortality of hardwoods
Monterey	flatheaded fir borer, sudden oak death, drought, unknown mortality of oak and hardwoods, ‡
Napa	flatheaded fir borer, sudden oak death, ‡
Nevada	flatheaded fir borer, drought, ‡
Orange	drought
Placer	California flathead borer, flatheaded fir borer, drought, ‡
Plumas	flatheaded fir borer
Riverside	flatheaded fir borer, drought
Sacramento	unknown mortality of white oak
San Benito	drought, ‡
San Bernardino	flatheaded fir borer, drought
San Diego	flatheaded fir borer, gold spotted oak borer, drought
San Joaquin	‡
San Luis Obispo	flatheaded fir borer, drought, unknown mortality in cypress, ‡
San Mateo	flatheaded fir borer, sudden oak death, drought
Santa Barbara	flatheaded fir borer, drought, ‡
Santa Clara	flatheaded fir borer, sudden oak death, drought, ‡
Santa Cruz	flatheaded fir borer, sudden oak death, drought
Shasta	flatheaded fir borer, drought, unknown hardwood mortality, ‡
Sierra*	California flathead borer, flatheaded fir borer
Siskiyou**	California flathead borer, flatheaded fir borer, bear, drought, black stain root disease, unknown hardwood mortality
Solano	drought, ‡
Sonoma	flatheaded fir borer, sudden oak death, drought, hardwood mortality, ‡
Stanislaus	‡
Tehama	flatheaded fir borer, drought, ‡
Trinity	flatheaded fir borer, sudden oak death, drought, bear, unknown oak and hardwood mortality, ‡
Tulare	California flathead borer, drought, ‡
Tuolumne	drought, ‡
Ventura	California flathead borer, flatheaded fir borer, hardwood and black and live oak mortality
Yolo	drought, ‡
Yuba	flatheaded fir borer, ‡

Other Damage by County

County	Defoliation	Discoloration	Dieback	Topkill	Main Stem Broken/Uprooted	Branch Flagging	Other Damage‡	Total
Alameda	0	153	3	0	0	1	0	157
Alpine	408	0	481	2,078	0	269	0	3,236
Amador	3,441	112	111	859	0	956	3	5,482
Butte	3,504	270	23	1	0	459	0	4,257
Calaveras	214	107	37	3,779	0	87	0	4,224
Colusa	29	262	0	0	0	0	198	489
Contra Costa	0	0	0	0	0	0	0	0
Del Norte**	92	208	10	0	0	1,029	8	1,347
El Dorado*	687	826	598	676	0	354	62	3,203
Fresno	33,346	317	0	963	0	1,759	328	36,713
Glenn	16	594	0	0	0	0	0	610
Humboldt	18	212	18	92	10	3,435	139	3,924
Inyo	601	0	112	0	0	275	118	1,106
Kern	4,141	15	0	0	0	322	665	5,143
Lake	8	86	0	0	0	163	61	318
Lassen	1,457	617	1,642	434	0	1,468	107	5,725
Los Angeles	72	9	0	41	1	777	342	1,242
Madera	3,363	41	0	1,985	0	785	0	6,174
Marin	73	6	53	0	0	0	176	308
Mariposa	4,895	227	0	207	0	497	0	5,826
Mendocino	10	5	138	39	0	9	3,165	3,366
Merced	0	0	0	0	0	0	0	0
Modoc**	27	133	173	1,746	0	124	245	2,448
Mono*	2,939	1,993	865	1,219	0	0	897	7,913
Monterey	654	826	169	32	0	2,248	311	4,240
Napa	22	10	0	0	0	25	4	61
Nevada	0	994	213	142	12	3,678	112	5,151
Orange	0	33	0	0	0	0	0	33
Placer	0	5	69	93	0	358	16	541
Plumas	22,187	1,235	256	143	0	608	6,588	31,017
Riverside	44	201	0	0	1	0	0	246
San Benito	2	14	17	0	0	2,532	20	2,585
San Bernardino	2	40	5	9	1	8	145	210
San Diego	110	373	10	0	0	7	0	500
San Joaquin	0	0	0	0	0	0	0	0
San Luis Obispo	644	350	0	0	0	1,094	0	2,088
San Mateo	33	373	5	18	0	0	430	859
Santa Barbara	7	768	4	92	0	985	0	1,856
Santa Clara	0	148	0	0	0	1	0	149
Santa Cruz	0	366	8	1	0	78	1	454
Shasta	32,398	2,904	43	5	0	11,785	1,740	48,875
Sierra*	669	55	165	1	22	292	80	1,284
Siskiyou**	0	6,626	24	2,476	0	15,978	1,586	26,690
Solano	90	22	0	0	0	0	0	112
Sonoma	65	163	60	3	0	100	50	441
Tehama	19,816	884	8	6	0	5,965	5	26,684
Trinity	0	972	0	452	0	10,684	955	13,063
Tulare	86,068	191	0	162	0	2,853	939	90,213
Tuolumne	5,023	42	10	8,721	161	511	0	14,468
Ventura	62	117	0	0	0	373	1,407	1,959
Yolo	0	51	0	0	0	31	4,000	4,082
Yuba	105	122	0	0	0	0	45	272
Total	227,342	24,078	5,330	256,750	208	72,963	24,948	611,619

*Includes mortality mapped by Region 4

**Includes Mortality mapped by Region 6

‡Insect/disease complex affecting gray pine

‡ suspected herbicide damage, lightning

Other Damage-Causing Events by County

County	Other Mortality-Causing Events/Agents†
Alameda	drought, wild animals, Ips, ‡
Alpine	fir engraver, Ips, satin moth, Cytospora, unknown dieback in aspen
Amador	fir engraver, Ips, Cytospora, drought, western gall rust, fir engraver, unknown dieback ponderosa pine and unknown discoloration in Douglas-fir, ‡
Butte	Ips, Cytospora, Douglas-fir tussock moth, unknown foliage diseases in madrone and maple, discoloration/dieback of hardwoods and black and live oak
Calaveras	Ips, drought, fir engraver, ‡
Colusa	drought, fire
Contra Costa	None
Del Norte**	Cytospora, needlecast in Monterey pine, frost, fire, unknown dieback in ponderosa and discoloration in madrone, Douglas-fir and hardwoods
El Dorado*	Ips, drought, , fir engraver, satin moth, needleminer, Cytospora, fire, unknown decline and discoloration of ponderosa pine and madrone, ‡
Fresno	fir engraver, Ips, lodgepole needleminer and unknown discoloration and branch flagging, Cytospora, drought, fire, ‡
Glenn	drought, unknown discoloration in knobcone and gray pine, ‡
Humboldt	needlecast, drought, bear, land slide, herbicides, fire, Cytospora, foliar diseases in Monterey pine and madrone, discolor and dieback of hardwoods
Inyo	satin moth, Cytospora, fire, unknown defoliation in lodgepole pine, unknown flagging in whitebark pine, unknown decline in aspen
Kern	unknown/drought induced defoliation/discoloration of oak and hardwoods, fire
Lake	Ips, fire, unknown discoloration in knobcone pine and madrone, ‡
Lassen	Douglas-fir tussock moth, satin moth, needlecast, Ips, fir engraver, Cytospora, Marssonina, fire, drought/unknown decline in aspen and pine
Los Angeles	Ips, drought, windthrow, fir engraver, fire, unknown branch flagging in Jeffrey pine and black oak, unknown defoliation of oak and hardwoods, ‡
Madera	Cytospora, lodgepole needleminer, fir engraver, drought induced defoliation of sycamore and blue oak, unknown discoloration of ponderosa pine, ‡
Marin	flatheaded fir borer, pitch canker, sudden oak death defoliation, drought, unknown dieback and foliar disease in eucalypts and madrone
Mariposa	Cytospora, Ips, fir engraver, lodgepole needleminer, drought, western gall rust, ‡
Mendocino	Ips, Douglas-fir engraver, western gall rust, bear/wild animal, drought, herbicides, fire, unknown foliar disease of madrone and discolored pine
Merced	None
Modoc**	Ips, fir engraver, drought, frost, fire, satin moth and unknown dieback in aspen, discoloration in hardwoods, unknown flagging and discolor in ponderosa pine
Mono*	satin moth and unknown dieback in aspen, fir engraver, drought, unknown discoloration in pinon and hardwoods, fire
Monterey	Ips, mistletoe in blue oak, foliar disease in madrone, drought induced defoliation/discoloration/flagging in oak, hardwoods and redwood, fire
Napa	Ips, flatheaded fir borer, drought, fire
Nevada	Ips, fir engraver, Cytospora, western gall rust, drought, wind, foliar disease of maple, discoloration and dieback of pine, fir and hardwoods, ‡
Orange	drought
Placer	Ips, fir engraver, Cytospora, drought, fire, unknown aspen decline
Plumas	Ips, fir engraver, Douglas-fir tussock moth, satin moth, Cytospora, drought, fire, frost, unknown defoliator in aspen and pine, unknown discoloration of pine
Riverside	black pineleaf scale, alder flea beetle, drought, wind-tornado
Sacramento	None
San Benito	Ips, drought, fire, ‡
San Bernardino	Ips, alder flea beetle, drought, wind-tornado, fire, unknown flagging of Jeffrey pine and decline of incense-cedar
San Diego	drought, polyphagous shot hole borer
San Luis Obispo	Ips, drought, unknown foliar disease on madrone
San Mateo	Douglas-fir engraver, drought, fire, unknown discoloration of redwood and oak
Santa Barbara	Ips, fir engraver, drought, alder flea beetle, unknown madrone decline
Santa Clara	drought, unknown madrone foliar disease, unknown redwood discoloration and flagging
Santa Cruz	Ips, drought, wild animals, unknown redwood discoloration and flagging
Shasta	Cytospora, Ips, fir engraver, drought, fire, unknown pine, fir and Douglas-fir discoloration, aspen decline, ‡
Sierra*	fir engraver, Cytospora, Douglas-fir tussock moth, wind-tornado, fire, unknown pine aspen and white fir discoloration, branch flagging and decline
Siskiyou**	fir engraver, Ips, Cytospora, drought, fire, unknown aspen decline, pine flagging, Douglas-fir, fir and ponderosa pine discoloration
Solano	drought
Sonoma	Douglas-fir engraver, flatheaded fir borer, sudden oak death, pitch canker, hardwood dieback and defoliation, redwood discoloration, Ips, ‡
Stanislaus	None
Tehama	Ips, fir engraver, Cytospora, Douglas-fir tussock moth, drought, unknown pine discoloration, ‡
Trinity	Ips, flatheaded fir borer, Cytospora, drought, fire, herbicides, madrone foliar disease, discoloration of pine and fir
Tulare	Ips, Cytospora, fir engraver, drought, fire, unknown defoliation of lodgepole pine, unknown branch flagging in whitebark pine
Tuolumne	Ips, fir engraver, lodgepole needleminer, Cytospora, drought, wind-tornado, dieback in aspen
Ventura	Ips, drought, fire, unknown pinyon discoloration
Yolo	drought, fire, ‡
Yuba	drought, herbicides, fire, unknown ponderosa pine discoloration