



Tree Mortality: Facts and Figures

Tree Mortality Task Force

April 2017

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Background

The Tree Mortality Task Force (TMTF) is comprised of state and federal agencies, local governments, utilities, and various stakeholders that coordinate emergency protective actions, and monitor conditions to address large areas of tree mortality resulting from five years of drought and associated bark beetle activity in California.

Numbers summarized below were generated by the TMTF Mapping and Monitoring work group to provide current estimates of mortality and high hazard zones to support taskforce leadership and address a variety of information requests from public and private entities. The mortality data is based on the U.S. Forest Service Aerial Detection Survey flown on all forested areas of the State each year. This version of the Facts and Figures document includes information from 2010-2016 and is current as of March 2017. Values from 2010 through 2016 depict broad mortality trends and those from 2012 through 2016 are specific to the time period described in the Governor's Proclamation of a State of Emergency on October 30, 2015 (CA 2015). This document will be revised as new information is made available.

The primary focus of this document is on the 10 high priority counties identified by the TMTF as suffering severe mortality. Analogous to the high priority counties, the U.S. Forest Service has identified 6 National Forests that are high priorities due to their elevated mortality (see Figure 1). Summaries for other counties are provided in the Appendices, or upon request. Data sources used to generate values for this report are cited in Appendix A.

Tree Mortality Task Force Baseline Numbers

Description	Estimate
Estimated Number of Dead Trees in California: 2010 –2016	102 million trees
Estimated Number of Dead Trees in *High Priority Counties of California (Amador, Calaveras, Eldorado, Fresno, Kern, Madera, Mariposa, Placer, Tulare, Tuolumne): 2010 -2016	76 million trees
Estimated Number of Dead Trees on National Forests of the Sierra (Eldorado, Sequoia, Sierra, Stanislaus, Tahoe National Forests and LTBMU): 2010 –2016	51 million trees
Estimated Number of Dead Trees in Tier 1 **High Hazard Zones by Ownership <i>Statewide</i> : 2012-2016	USFS: 5.5 million Other Federal: 1.1 million Private, State, Local: 8.0 million Total: 14.6 million
Estimated Number of Dead Trees in Tier 1 High Hazard Zones by Ownership <i>High Priority Counties</i> : 2012-2016	USFS: 4.8 million Other Federal: 1.1 million Private, State, Local: 6.6 million Total: 12.5 million
Acres of Tree Mortality in High Priority Counties: 2010 – 2016	3.4 million acres
Acres of Tree Morality detected in 6 Southern Sierra Ntl. Forests: 2010 - 2016	2.1 million acres
Estimated Acres of Tree Mortality in California by Ownership	USFS: 4,593,000 Other Federal: 734,000 Private, State, Local: 2,348,000 Total: 7,676,000
Statewide Acres of Tier1 High Hazard Zones for Tree Mortality by Ownership	USFS: 306,025 Other Federal: 58,347 Private, State, Local: 592,840 Total: 957,212
Statewide Total Acres of Tier 1 and Tier 2 High Hazard Zones	Tier 1 Total: 957,213 Tier 2 Total: 20,161,005
High Priority Counties Total Acres of Tier 1 and Tier 2 HHZ	Tier 1 Total: 522,704 Tier 2 Total: 6,007,614
Estimated Acres of Forest Land in California based on U.S. Forest Service ***Forest Inventory and Analysis (FIA) Data	32 million acres
Estimated Number of Live Trees over 5-Inch Diameter Breast Height (DBH) on Forest Lands in California	4.1 billion trees
Estimated Number of Trees in Urban Areas of California	173.2 million trees
<p>*High Priority Counties were identified by the Tree Mortality Taskforce as most in need of assistance in addressing tree mortality issues and include Amador, Calaveras, El Dorado, Fresno, Kern, Madera, Mariposa, Placer, Tulare, Tuolumne. **High Hazard Zones are areas designated by California State government as being in greatest need of dead tree removal due to severe tree mortality levels caused by 5 years of Drought and subsequent bark beetle infestations. These areas are represented in two tiers, representing both potential direct threat to people, buildings and infrastructure from falling trees (Tier One), as well as broader fire risk and forest health considerations (Tier Two). *** Forest Inventory and Analysis (FIA) data are a statically based forest inventory maintained by the USDA Forest Service on a 10-year cycle.</p>	

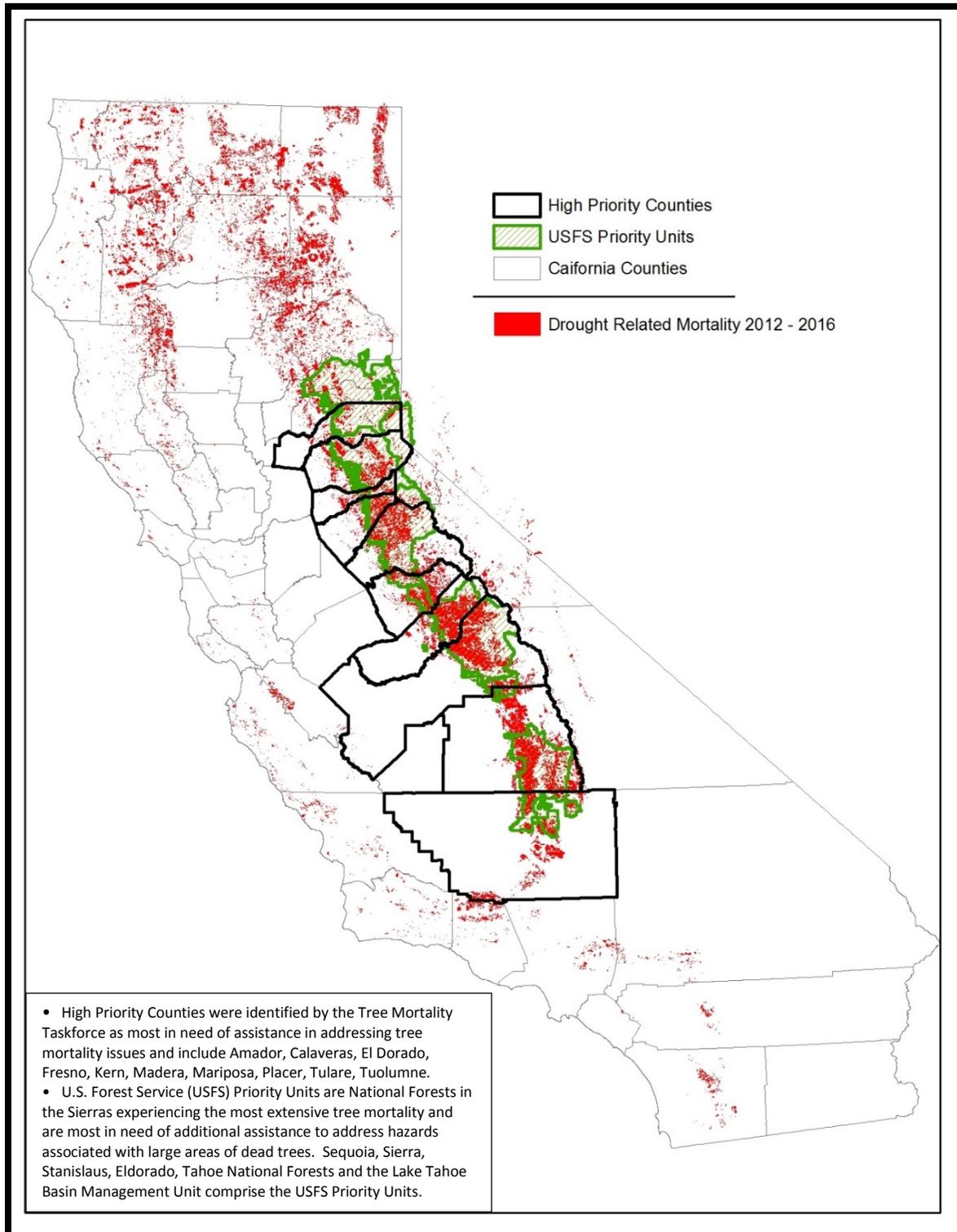


Figure 1: Aerial Detection Survey Coverage and Reporting Units

Section 1: Estimates of Dead Trees in California

Number of Dead Trees in California

Description: Between 2010 and late 2015, U.S. Forest Service Aerial Detection Surveys (U.S. Forest Service ADS) found that 40 million trees had died across California – with nearly three quarters of that total succumbing to drought and insect mortality from September 2014 to October 2015 alone. Surveys completed during the 2016 flight season resulted in detection of approximately 62 million additional dead trees. *These estimates reflect dead trees killed by a variety of agents and are not limited to drought or drought related insect activity.*

Data Date Range: 2010 through 2016

Assumptions: U.S. Forest Service Aerial Detection Survey results provide estimates of new dead trees over the time period of interest. Survey results provide a reasonable estimate of dead trees that aid in the understanding of this mortality event.

Source: [USDA Press Release](#) (USDA 2016c); USFS ADS GIS data (USDA 2010, 2015, 2016a).

Table 1a: Estimated Cumulative Number of Dead Trees in California: 2010 –2016

Time Period	Estimated Number of Dead Trees
2010	3.1 million
2011	1.6 million
2012	1.8 million
2013	1.3 million
2014	3.2 million
2015	29 million
2016	62 million
Total	102 million

Table 1b: Estimated Cumulative Number of Dead Trees in High Priority Counties of California: 2010 –2016

County	Estimated Cumulative Number of Dead Trees High Priority Counties							
	2010	2011	2012	2013	2014	2015	2016	All Years
Amador	7,000	2,000	600	2,000	17,000	79,000	682,000	789,600
Calaveras	8,000	2,000	2,000	4,000	144,000	237,000	1,875,000	2,272,000
El Dorado	53,000	19,000	5,000	11,000	47,000	200,000	1,359,000	1,694,000
Fresno	82,000	59,000	82,000	65,000	269,000	4,300,000	11,912,000	16,769,000
Kern	79,000	18,000	8,000	23,000	176,000	3,300,000	2,994,000	6,598,000
Madera	15,000	8,000	6,000	31,000	55,000	1,900,000	8,972,000	10,987,000
Mariposa	18,000	10,000	21,000	72,000	68,000	1,200,000	6,562,000	7,951,000
Placer	90,000	16,000	5,000	5,000	21,000	80,000	557,000	774,000
Tulare	234,000	46,000	57,000	67,000	272,000	6,800,000	12,957,000	20,433,000
Tuolumne	39,000	15,000	45,000	83,000	287,000	997,000	6,213,000	7,679,000
Total	625,000	195,000	231,600	363,000	1,356,000	19,093,000	54,083,000	75,946,600

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Table 1c: Estimated Cumulative Number of Dead Trees on Select National Forests of the Sierra: 2010 –2016

National Forest	Estimated Cumulative Number of Dead Trees on Select National Forests Rounded to the nearest 1000							
	2010	2011	2012	2013	2014	2015	2016	All Years
El Dorado	78,000	21,000	5,000	7,000	62,000	210,000	1,028,000	1,411,000
LTBMU	15,000	6,000	1,000	1,000	6,000	35,000	72,000	136,000
Sequoia	191,000	33,000	63,000	89,000	323,000	6,130,000	10,147,000	16,976,000
Sierra	82,000	66,000	72,000	103,000	190,000	5,900,000	18,563,000	24,976,000
Stanislaus	49,000	15,000	55,000	81,000	414,000	1,251,000	4,896,000	6,761,000
Tahoe	165,000	42,000	21,000	9,000	30,000	93,000	358,000	718,000
Total	580,000	183,000	217,000	290,000	1,025,000	13,619,000	35,064,000	50,978,000

Number of Dead Trees in Tier 1 High Hazard Zones

Description: Tier 1 High Hazard Zones (HHZ) represent areas where critical infrastructure and mortality directly coincide. The number of dead trees reported below were generated based on U.S. Forest Service ADS results from 2012 through 2016. *These estimates reflect trees killed by drought and drought related insect activity.* For more detailed estimates by owner and county, refer to Appendix B. Information on Local Tier 1 High Hazard Zone designations are provided upon request.

Data Date Range: 2012 through 2016

Assumptions: The primary assumption for this metric is that dead trees are evenly distributed across mapped areas. U.S. Forest Service ADS data for 2012-2016 are statewide. U.S. Forest Service ADS results are estimates of trees that died over the time period of interest. Survey results are a reasonable estimate of dead trees that aid in the understanding of this mortality event. High Hazard Zones are generated from drought related mortality data and cover the drought years of 2012 to the present. Ownership GIS data used is a reasonable representation of each entity's land holdings.

Source: Tier 1 HHZ GIS data (CA 2017), U.S. Forest Service ADS (USDA 2010, 2015, 2016a) and CPAD (2016) GIS data.

Table 1d: Statewide Estimated Number of Dead Trees in Tier 1 High Hazard Zones by Ownership: 2012 – 2016

Ownership					
USFS	Other Federal	Private	State	Local	Total
5,540,000	1,160,000	7,680,000	130,000	20,000	14,530,000

* Numbers rounded to nearest 1,000

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Table 1e: Priority Counties Estimated Number of Dead Trees in Tier 1 High Hazard Zones by Ownership: 2012 – 2016

High Priority Counties	Ownership			
	USFS	Other Federal	Private, State, and Local	All
Amador	26,000	28,000	248,000	275,000
Calaveras	167,000	56,000	836,000	1,059,000
El Dorado	94,000	6,000	207,000	307,000
Fresno	1,856,000	15,000	1,279,000	3,150,000
Kern	246,000	37,000	533,000	816,000
Madera	610,000	6,000	603,000	1,219,000
Mariposa	508,000	392,000	1,098,000	1,998,000
Placer	41,000	7,000	141,000	188,000
Tulare	802,000	411,000	552,000	1,765,000
Tuolumne	491,000	97,000	1,117,000	1,705,000
Total	4,841,000	1,054,000	6,613,000	12,508,000

* Numbers rounded to nearest 1,000

Section 2: Estimated Area of Tree Mortality

Area of Dead Trees in California

Description: Acres reported in this section represent the total area of observed tree mortality statewide, and in the 10 high priority counties and 6 National Forests of the Sierra based on U. S. Forest Service Aerial Detection Survey methods. *These estimates reflect areas of dead trees killed by a variety of agents and are not limited to drought or drought related insect activity.*

Data Date Range: 2010 - 2016

Assumptions: Lands where mortality was mapped repeatedly through time are only counted once. Ownership GIS data used is a reasonable representation of each entities land holdings.

Source: U.S. Forest Service ADS (USDA 2010, 2015, 2016a) and CAPD (2016) GIS data

Table 2a: Acres of Tree Mortality Detected in California High Priority Counties: 2010 –2016

County	Rounded Acres* <i>Rounded to the nearest 1000</i>
Amador	79,000
Calaveras	160,000
El Dorado	312,000
Fresno	552,000
Kern	353,000
Madera	355,000
Mariposa	290,000
Placer	154,000
Tulare	769,000
Tuolumne	437,000
Total	3,461,000

*All overlap between surveys was removed from data prior to analysis.

Table 2b: Acres of Tree Mortality Detected in California by Ownership: 2010- 2016

Ownership	Acres*	Rounded Acres*
U.S. Forest Service	4,592,552	4,593,000
Other Federal	734,431	734,000
Private, State and Local	2,348,292	2,348,000
Total**	7,675,274	7,675,000

*All overlap between surveys was removed from data prior to analysis.

** Totals may not match due to rounding

Table 2c: Acres of tree mortality detected in National Forests of the south Sierra from 2010 –2016.

National Forest	Rounded Acres* <i>Rounded to the nearest 1000</i>
Eldorado	220,000
LTBMU	21,000
Sequoia	595,000
Sierra	696,000
Stanislaus	377,000
Tahoe	178,000
Total	2,087,000

*All overlap between surveys was removed from data prior to analysis.

Section 3: High Hazard Zones

Acres of High Hazard Zones

Description: Acres reported below represent areas mapped for Tier 1 and Tier 2 High Hazard Zones classifications. Tier 1 HHZ pose a direct threat to critical infrastructure, while Tier 2 HHZ are mapped at the watershed scale (Hydrologic Unit Code 12; WBD 2016) and represent areas of landscape ecological change. Tier 1 HHZ are areas where critical infrastructure intersects drought and drought related insect activity as mapped by ADS from 2012 – 2016. *These estimates reflect areas of trees killed by drought and drought related insect activity.* For acreages of all counties, see Appendix B. Information on Local Tier 1 High Hazard Zone designations are provided upon request. Ownership information is based on California Protected Areas Database (CPAD) updated in 2016. CPAD contains data on lands owned in fee by governments, non-profits and some private entities that are protected for open space purposes and was updated with information to identify private lands.

Data Date Range: 2012 - 2016

Assumptions: Locations where Tier 1 and Tier 2 HHZ overlap are included in this summary. Ownership GIS data used is a reasonable representation of each entity’s land holdings.

Source: Tier 1 HHZ (CA 2017), Tier 2 HHZ (CA 2017), CPAD (2016) and WBD (2016) GIS data.

Table 3a: Statewide Summary of Tier 1 and Tier 2 High Hazard Zones

Acres of Tier 1 HHZ	Acres of Tier 2 HHZ	Number of Tier 2 Watersheds*
957,213	20,161,005	782

* HUC 12 watersheds (WBD 2016).

Table 3b: Statewide Acres of Tier 1 and Tier 2 High Hazard Zones by Ownership 2012 – 2016

HHZ	USFS	Other Federal	Private	State	Local	Total*
Tier 1	306,025	58,347	11,090	577,566	4,184	957,213
Tier 2	10,013,034	1,734,472	7,953,101	271,913	238,941	20,161,005

*Totals may not match due to rounding.

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Table 3c: Priority Counties Acres of Tier 1 High Hazard Zones by Ownership 2012 – 2016

High Priority Counties	Acres of Tier 1 High Hazard Zones					
	USFS	Other Federal	Private	State	Local	Total*
Amador	2,889	1,392	28	20,424	7	24,739
Calaveras	8,683	2,727	956	52,160	13	64,539
El Dorado	15,425	1,397	372	42,564	139	59,898
Fresno	35,812	1,030	82	27,338	29	64,291
Kern	15,521	2,087	8	27,774	312	45,701
Madera	16,471	430	109	29,323	0	46,333
Mariposa	11,999	13,500	84	35,132	49	60,765
Placer	6,413	1,127	863	21,219	64	29,686
Tulare	22,141	11,996	897	20,633	29	55,696
Tuolumne	22,848	3,420	748	43,745	294	71,055
Total*	158,202	39,107	4,146	320,312	937	522,703

*Totals may not match due to rounding

Table 3d: Priority Counties Acres of Tier 2 High Hazard Zones by Ownership 2012 – 2016

High Priority Counties	Acres of Tier 2 High Hazard Zones					
	USFS	Other Federal	Private	State	Local	Total*
Amador	50,252	3,967	94,552	396	111	149,277
Calaveras	77,148	24,430	182,814	3,504	3	287,898
El Dorado	367,506	18,668	341,237	5,519	664	733,595
Fresno	724,206	77,266	143,854	1,249	0	946,576
Kern	173,596	98,911	455,588	5,786	1,145	735,026
Madera	354,838	51,539	231,631	500	0	638,508
Mariposa	110,570	110,398	158,857	204	404	380,433
Placer	277,007	36,153	237,492	2,546	1,273	554,471
Tulare	413,775	245,224	153,805	5,874	169	818,847
Tuolumne	456,091	108,941	192,524	4,425	1,003	762,983
Total*	3,004,989	775,497	2,192,354	30,004	4,770	6,007,614

*Totals may not match due to rounding.

Section 4: Estimates of Live Trees in California

Acres of Forest Land in California

Description: Average area of forest land (lands dominated by hardwoods and conifer tree species) in California; excludes urban trees, orchards and windbreaks.

Data Date Range: 2005 - 2014

Assumptions: Lands dominated by hardwood and conifer tree species are considered forest lands in California. U.S. Forest Service Forest Inventory Analysis (FIA) data provides a reasonable approximation of forest land extent when data is averaged over a 10-year sampling period.

Source: FIA 2005 - 2014 Area Report for all California counties (USDA 2016b).

Table 4a: Estimated Acres of Forest Land in California based on FIA Data: 2005 - 2014

Vicinity	Estimated Forest Land Acres
California	32 million

Number of Live Trees on California Forest Land

Description: Average number of live trees in California forest land estimated from U.S. Forest Service Forest Inventory Analysis (FIA) data. Numbers reported below include all live trees (hardwoods and conifers) on public and private forest land over five-inch diameter at breast height (DBH). Lands characterized as urban, orchards and windbreaks are not included. For a more detailed summary of live trees by diameter class and species group see Appendix B.

Data Date Range: 2005 - 2014

Assumptions: By averaging annual plot data collected over the 10-year time period, U.S. Forest Service FIA data provides a reasonable estimate of live trees in the state. This timeframe was used because U.S. Forest Service FIA plots are re-read on a 10-year rotation. This date range provides the most recent baseline conditions for comparison prior to the onset of the large-scale tree mortality event being experienced in the State.

Source: U.S. Forest Service Forest Inventory and Analysis Program 2005-2014 Tree Count Reports for all California counties (USDA 2016b).

Table 4b: Estimated Number of Live Trees over 5-Inch DBH on California Forest Land: 2005 - 2014

Vicinity	Estimated Live Tree Count
California	4.1 billion

Estimated Number of Trees in Urban Areas

Description: The approximate number of trees in urban forests was estimated by the U.S. Forest Service Urban Ecosystems and Social Dynamics Program (McPherson et al., 2016). Urban areas are defined by the U.S. Census Bureau as densely developed areas that contain 50,000 or more inhabitants with a density level of 1,295 persons or greater per square kilometer. This study used tree data from field plots in urban areas to describe forest structure (e.g., tree numbers, density, basal area, species composition) for six land use categories in six California climate zones. Urban tree canopy was mapped at one-meter resolution. Tree numbers and standard errors were estimated as the product of tree densities and land areas for each land use type and climate zone. For a more detailed summary of the methods please refer to McPherson et al. (2016).

Data Date Range: 2012

Assumptions: Model assumptions and inputs are a reasonable way to approximate the number of trees in urban areas. The U.S. Census Bureau definition of urban areas is an adequate categorization of this land use type.

Source: McPherson, et al. 2016. Urban tree canopy cover map was classified by EarthDefine based on 2012 National Agricultural Imagery Program data for California.

Table 4c: Estimated Number of Trees in Urban Areas of California: 2012

Vicinity	Estimated Urban Tree Count
California	173.2 million trees

Appendix A: Reference Data Sources

Data sources used to generate values for this report are cited here in Appendix A. This document will be revised as new information is made available.

California Protected Areas Database (CPAD). 2016. Ownership GIS Data. GreenInfo Network, Ca. June 1, 2016. Available online: <http://www.calands.org/data>. Accessed June 15, 2016.

McPherson, G.E.; N. Doorn; J. Goede. 2016. Structure, function and value of street trees in California, USA. *Urban Forestry & Urban Greening*. 17: 104-115.

State of California (CA). 2015. Proclamation of a State of Emergency Executive Order October 30, 2015. Available on line: https://www.gov.ca.gov/docs/10.30.15_Tree_Mortality_State_of_Emergency.pdf.

State of California (CA). 2017. High Hazard Zones GIS Database, Tier 2 Feature Class. State of California, California Department of Forestry and Fire Protection, Fire and Resource Assessment Program. Available on line: <http://www.fire.ca.gov/treetaskforce/downloads/HighHazardZones.gdb.zip>

State of California (CA). 2017. High Hazard Zones (Tier 1) GIS Database, Tier 1 Feature Class. State of California, California Department of Forestry and Fire Protection, Fire and Resource Assessment Program. Available on line: <http://www.fire.ca.gov/treetaskforce/downloads/HighHazardZones.gdb.zip>

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USDA. 2016a. Aerial Detection Survey: 2016 Results. USDA, Forest Service, Pacific Southwest Region, Vallejo, California. Available online: <http://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fseprd506712>

USDA. 2016b. Forest Inventory and Analysis Program (FIA). USDA, Forest Service, National Office, Washington, D.C. Available online: <http://apps.fs.fed.us/fido/standardrpt.html>. Tree Count Reports accessed 7/29/2016 and Area Reports accessed 8/05/2016

USDA. 2016c. Forest Service Finds Record 66 Million Dead Trees in Southern Sierra Nevada: Underscores Need for Congress to Take Action on Fire Budget Fix. USDA, Office of Communications, Washington, D.C. Press Release No. 0150.16, June 22, 2016. Available online: <http://www.usda.gov/wps/portal/usda/usdahome?contentid=2016/06/0150.xml>

Watershed Boundary Dataset (WBD). 2016. Coordinated effort between the USDA-NRCS, USGS and EPA. WBD was created from a variety of sources from each state and aggregated into a standard national layer for use in strategic planning and accountability. Watershed Boundary Dataset for California. October 25, 2016. Available online: <http://datagateway.nrcs.usda.gov>

Appendix B: Live Trees in California

U.S. Forest Inventory and Analysis Live Tree Report

Number of Live Trees on California Forest Land

Description: Average number of live trees in California forest land estimated from U.S. Forest Inventory Analysis (FIA) data. Numbers reported below include all live trees (hardwoods and conifers) on public and private forest land over five-inch diameter at breast height (DBH). Lands characterized as urban, orchards and windbreaks are not included. For a more detailed summary of live trees by diameter class and species group see Table B1.

Data Date Range: 2005-2014

Assumptions: By averaging annual plot data collected over the 10-year time period, U.S. Forest Service FIA data provides a reasonable estimate live trees in the state. This timeframe was used because FIA plots are re-read 10 year rotation.

Source: U.S. Forest Service Forest Inventory and Analysis (FIA) Program 2005-2014 Tree Count Reports for all California counties (USDA 2016b).

See Table B1 on the following page.

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Table B1: Number of Live Trees over 5 inch DBH on Forest Land in California by Species Group and Diameter Class (inches)*

Tree species groups	Diameter at Breast Height (DBH) Class										Total
	5.0-6.9 in	7.0-8.9 in	9-10.9 in	11-12.9 in	13-14.9 in	15-16.9 in	17-18.9 in	19-20.9 in	21-28.9 in	29+ in	
<i>Acres</i>											
Douglas-Fir	133,715,036	95,250,899	71,360,435	51,892,844	39,683,595	28,700,530	23,443,706	16,266,186	34,034,068	28,058,485	522,405,784
Ponderosa and Jeffrey Pines	108,741,764	84,727,064	65,175,551	52,090,359	38,092,989	27,276,343	22,105,983	15,538,690	31,401,360	16,058,338	461,208,441
True Fir	157,304,814	114,193,068	87,638,433	61,544,948	49,245,723	39,780,564	29,141,791	23,347,399	46,912,475	28,929,115	638,038,330
Western Hemlock	1,283,403	942,526	584,121	418,649	469,155	216,977	278,290	245,605	296,376	95,923	4,831,025
Sugar Pine	12,015,608	9,629,683	7,315,441	5,680,511	3,990,220	3,315,936	2,840,799	2,555,636	7,582,836	6,733,231	61,659,902
Western White Pine	6,449,162	4,513,647	3,120,960	2,023,068	1,596,541	1,142,835	1,380,395	841,191	1,944,249	2,484,715	25,496,763
Redwood	33,093,550	23,559,720	18,891,359	16,370,539	11,997,381	10,090,008	7,421,994	6,358,401	16,727,222	12,023,581	156,533,755
Sitka Spruce	710,232	697,559	408,496	391,746	394,852	286,809	331,588	149,715	265,563	283,877	3,920,436
Engelmann and other spruces	230,259	148,896	70,260	33,302	35,130	0	70,260	0	59,380	23,136	670,622
Western Larch	0	0	35,526	0	0	0	0	0	0	0	35,526
Incense-Cedar	68,848,792	42,160,922	30,972,025	20,424,303	12,805,699	10,980,757	7,699,316	6,377,557	12,077,530	7,639,945	219,986,847
Lodgepole Pine	36,596,081	23,440,024	20,630,938	14,277,775	12,938,263	8,564,824	7,655,829	6,446,161	12,408,540	4,148,548	147,106,983
Western Red Cedar	0	0	35,130	0	0	0	0	0	18,251	11,665	65,047
Woodland softwoods	19,753,538	16,953,442	14,071,728	10,824,313	9,618,341	7,401,377	5,701,586	3,396,408	5,001,803	1,095,440	93,817,976
Other western softwoods	56,240,311	40,290,723	28,744,368	19,265,639	14,255,087	10,763,225	9,361,130	6,946,707	11,997,053	5,467,216	203,331,459
Cottonwood and Aspen	3,705,257	1,609,230	944,466	760,431	653,548	479,964	292,019	274,276	595,784	117,619	9,432,594
Red Alder	6,606,537	5,890,754	4,881,614	4,287,263	1,877,401	1,387,308	750,948	322,063	255,653	42,242	26,301,783
Oak	373,326,791	241,193,650	144,658,129	82,117,659	50,217,947	31,986,924	21,455,151	13,143,326	19,490,149	4,638,106	982,227,831
Other western hardwoods	212,729,456	129,905,385	81,180,217	49,115,207	30,961,730	17,234,616	12,824,563	8,344,783	12,419,297	2,475,787	557,191,042
Woodland hardwoods	15,120,534	9,649,830	7,128,349	3,982,004	2,451,955	1,900,469	1,053,160	787,906	759,107	73,320	42,906,634
Total	1,246,471,125	844,757,022	587,847,546	395,500,560	281,285,557	201,509,466	153,808,508	111,342,010	214,246,696	120,400,289	4,157,168,780

*Numbers reported are limited to 5 inch DBH and larger trees to allow for comparison to ADS estimates. Values represent a 10-year average estimate from 2005 – 2014 plot data.

Appendix C: Forest Land in California

U.S. Forest Inventory and Analysis Area Report (Core Table 4)

Acres of Forest Land in California

Description: Average area of forest land (lands dominated by hardwoods and conifer tree species) in California; excludes urban trees, orchards and windbreaks.

Data Date Range: 2005-2014

Assumptions: Lands dominated by hardwood and conifer tree species are considered forestlands in California. U.S. Forest Service FIA data provides a reasonable approximation of forestland extent when data is averaged over a 10-year sampling period.

Source: U.S. Forest Service FIA 2005-2014 Area Report for all California counties (USDA 2016b).

Note: Totals may be off due to rounding.

¹Forest land that is capable of producing in excess of 20 cubic feet per acre per year of wood at culmination of mean annual increment.

²Forest land that is not capable of producing in excess of 20 cubic feet per acre per year of wood at culmination of mean annual increment.

Table C1: Area of Hardwood Forest Land by Forest Type Group, Ownership Group, and Forest Land Status^{1,2}, California 2005 – 2014 (USDA 2016b)

Hardwood Forest Type Group	Ownership										
	U.S. Forest Service		Other federal		State & local government		Private corporate		Private non-corporate		All owners
	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Total
<i>Thousand Acres</i>											
Alder / Maple	21	16	12	28	0	7	80	1	47	15	226
Aspen / Birch	19	38	0	9	0	1	4	0	10	0	80
Elm / Ash / Cottonwood	0	5	0	1	0	8	1	2	0	15	31
Tanoak / Laurel	218	215	37	38	10	152	518	12	561	109	1,870
Western Oak	977	1,578	102	549	17	437	380	562	662	3,792	9,055
Woodland hardwoods	48	141	0	70	0	21	5	0	7	44	336
<i>Thousand Acres</i>											
Exotic hardwoods	0	0	2	0	0	0	0	0	0	0	2
Other hardwoods	118	98	6	32	4	46	58	3	95	88	548
Total	1,401	2,091	159	725	32	672	1,046	579	1,383	4,062	12,149

Tree Mortality: Facts and Figures

Table C2: Area of Softwood Forest Land by Forest Type Group, Ownership Group, and Forest Land Status^{1,2}, California 2005 – 2014 (USDA 2016b)

Softwood Forest Type Group	Ownership										
	U.S. Forest Service		Other federal		State & local government		Private corporate		Private non-corporate		All owners
	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Total
<i>Thousand Acres</i>											
California mixed conifer	4,201	1,043	67	437	34	55	1,555	0	582	3	7,976
Douglas-Fir	159	167	18	49	20	30	323	0	330	0	1,096
Fir / Spruce / Mountain Hemlock	1,093	449	6	190	10	11	214	0	62	0	2,034
Western Hemlock / Sitka Spruce	0	0	0	1	0	1	28	0	8	0	38
Lodgepole Pine	230	480	0	219	9	6	26	0	43	0	1,013
Pinyon / Juniper	11	743	0	578	0	65	0	44	1	126	1,569
Ponderosa Pine	1,243	220	37	37	6	23	439	3	357	8	2,373
Redwood	3	16	0	30	31	58	369	0	233	0	741
Western Larch	0	0	0	0	0	0	0	0	0	0	0
Western White Pine	24	141	0	13	0	0	0	0	0	0	177
Other western softwoods	160	937	24	477	0	30	13	49	68	289	2,046
Total	7,123	4,197	152	2,030	109	278	2,967	96	1,685	427	19,063

Table C3: Area of Forest Land by Forest Type Group, Ownership Group, and Forest Land Status^{1,2}, California 2005 – 2014 (USDA 2016b)

Forest type group	Ownership										
	U.S. Forest Service		Other federal		State & local government		Private corporate		Private non-corporate		All owners
	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Timberland	Other forest land	Total
<i>Thousand Acres</i>											
Non-stocked*	370	216	12	80	0	8	154	7	24	19	890
Softwoods	7,123	4,197	152	2,030	109	278	2,967	96	1,685	427	19,063
Hardwoods	1,401	2,091	159	725	32	672	1,046	579	1,383	4,062	12,149
All Types	8,894	6,503	323	2,835	141	958	4,167	682	3,091	4,508	32,102

*Formerly stocked forest land that currently has less than 10% stocking, but has the potential to again become 10% stocked. For example, recently harvested, burned or windthrow-damaged areas.