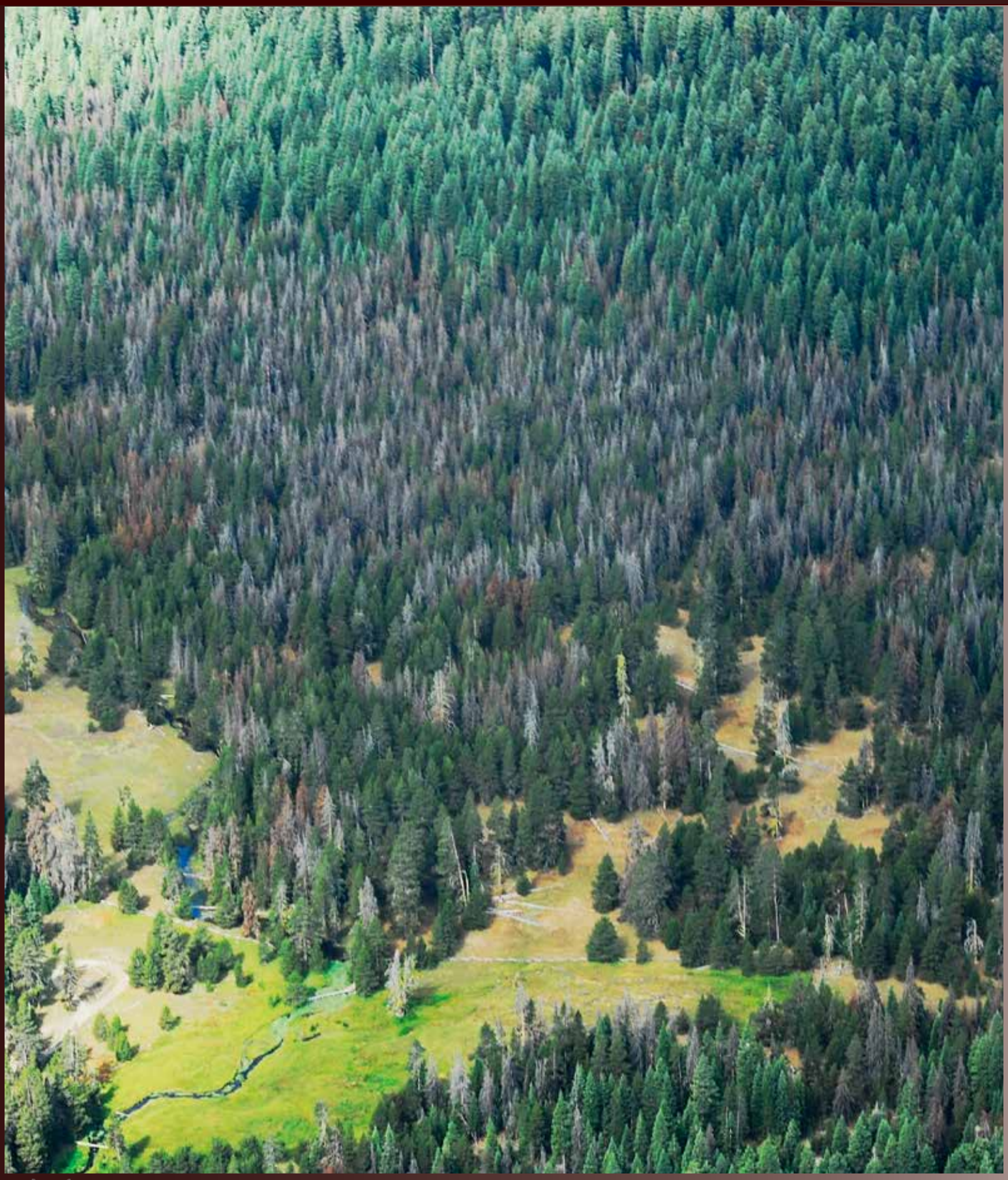
2012 Aerial Survey Results: California



USDA Forest Service
Pacific Southwest Region
Forest Health Protection

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

2012 Aerial Survey Results: California

Prepared by Zachary Heath[1], Jeff Moore[1], Brent Oblinger[1], & Meghan Woods[2]

Cover Photo: Lodgepole mortality caused by mountain pine beetle at Shovel Creek Meadow, Goosenest Ranger District, Klamath National Forest.
Photo by: Zack Heath, US Forest Service

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Overview

Aerial surveys are conducted annually by R5 Forest Health Protection in order to record and map recent tree mortality and current injury using a digital aerial sketch mapping system. The 2012 surveys covered 47 million acres of California, covering all National Forests and forested National Parks, along with other federal, State and private lands. The 2012 aerial detection surveys took place from June 13th through September 27th, 2012. Mapped mortality remained similar to last year's levels; about 513,000 acres with elevated mortality and an estimated 1.75 million trees killed. Key results include:

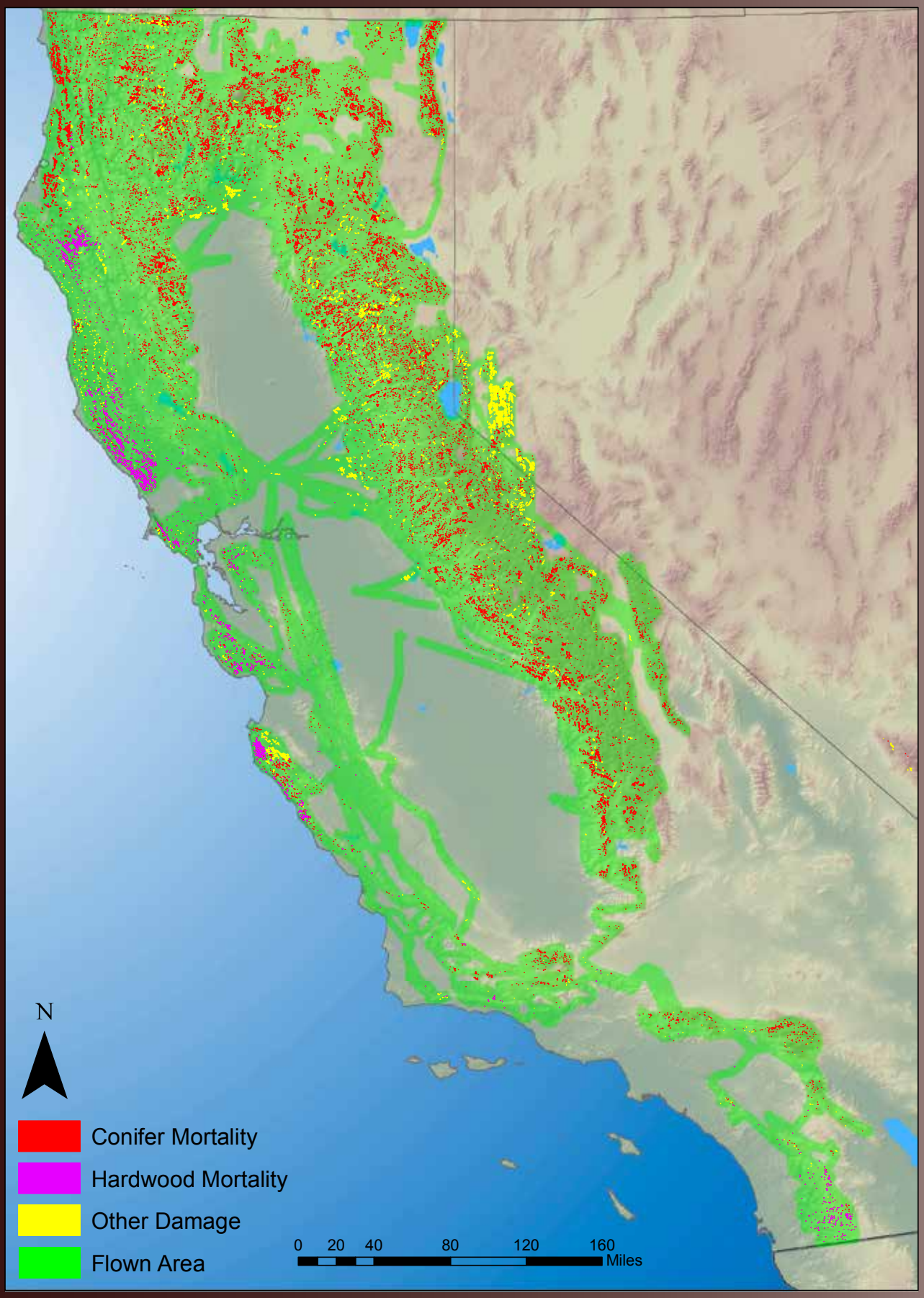
- Overall, acres affected by bark beetles were reduced from 2011 and 2010 levels, mainly due to a continued decrease of fir mortality.
- Fir mortality attributed to fir engraver beetle decreased to 131,000 acres of elevated activity in 2012, about half the acreage mapped in 2011. This is the second consecutive year of decreasing fir mortality.
- Pine mortality from western and mountain pine beetles increased in 2012, affecting 175,000 and 185,000 acres respectively. Mountain pine beetle-affected acreage doubled from 2011.
- Areas affected by Jeffrey pine beetle increased slightly to about 12,000 acres, from the 8,000 acres mapped in 2011.
- Several pockets of Douglas-fir beetle activity were mapped for the first time in recent years on the Plumas National Forest.
- Oak mortality from gold-spotted oak borer in San Diego County remained similar to previous years at just over 1,130 acres.
- Oak and tanoak mortality from sudden oak death increased dramatically from last year, affecting 54,400 acres compared to 8,000 acres mapped in 2011.
- Other observed diseases included Port-Orford Cedar root disease, pitch canker and Cytospora canker on fir.
- Feeding from white fir sawfly affected over 15,000 acres in the Sierra Nevada.
- Other defoliator activity included California oak worm, fall webworm, black oak leafminer, satin moth, lodgepole needle miner, pinyon sawfly, fruittree leafroller, and flea beetle.

Methodology

Aerial observers survey for current/recent tree damage and mortality as they fly in small, fixed-wing aircraft at approximately 1,000 feet above ground level. Observers look for any kind of forest disturbance and typically color is the primary indicator. Forested areas are systematically flown in a grid pattern for more complete coverage. Typically two observers fly simultaneously surveying out opposite sides of the aircraft. When damage is detected the observer locates the area affected on a computer touch screen typically depicting enhanced satellite imagery and georeferrenced by an onboard global positioning system. The observer draws a polygon on the screen where the damage would be located on the ground and then labels it with the tree species being affected, severity of damage or number of trees killed, and type of damage (defoliation, mortality, decline, etc). Multiple host and/or damage types may be attributed to the same polygon.

Three FHP staff conducted surveys in Region 5 in 2012: Zachary Heath, Brent Oblinger and Jeff Moore.

Flown Area and Damage Mapped in 2012



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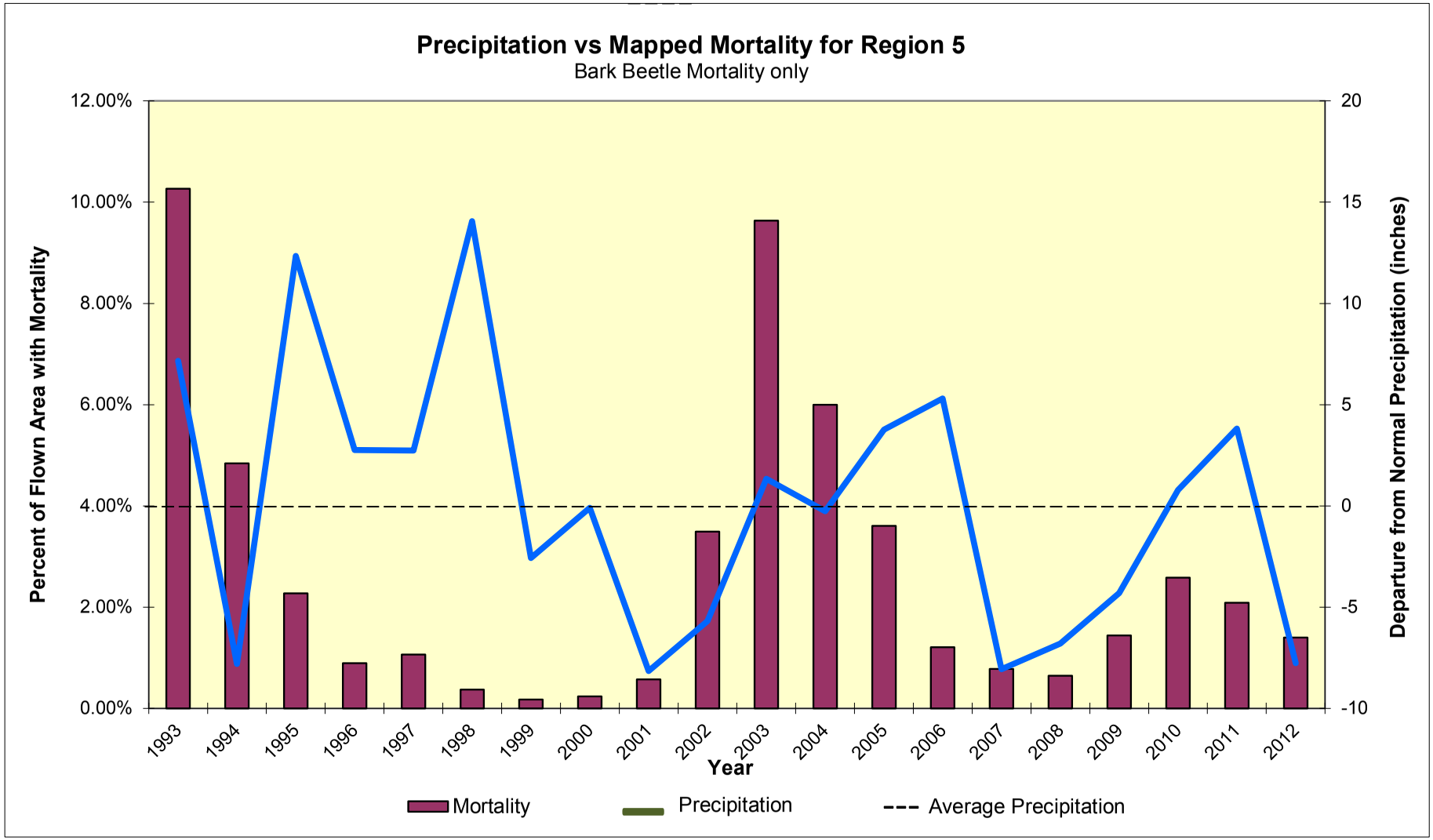

Acres of biotic-caused mortality, as a percentage of the area surveyed and deviation from normal rainfall. The precipitation data is based on average precipitation for the State of California from 1949-2005 (Precipitation data source: Western Regional Climate Center-California Climate Tracker).

Acres with Mortality by National Forest/Park

Unit	Bark Beetle				Other Agents					Unit
	Pine	Fir	Mix	Total	Pine	Fir	Mix	Hardwood	Total	Total
Angeles	534	0	88	622	477	0	11	24	512	1,134
Cleveland	22	1	0	23	7	0	1	1,009	1,017	1,040
Eldorado*	2,205	71	1	2,277	4	0	24	2	30	2,307
Inyo	10,330	135	301	10,766	0	0	0	48	48	10,814
Klamath**	11,579	17,319	9,797	38,695	367	0	1,830	1	2,198	40,893
Lassen	22,570	5,308	7,634	35,512	3	0	1	0	4	35,516
Los Padres	3,734	161	881	4,776	56	727	76	3,360	4,219	8,995
Mendocino	11,195	2,019	3,073	16,287	1,081	0	32	17	1,130	17,417
Modoc**	33,560	10,928	7,926	52,414	0	0	3	0	3	52,417
Plumas	25,321	3,917	5,491	34,729	0	0	167	5	172	34,901
San Bernardino	516	107	8	631	291	0	1	1	293	924
Sequoia	14,024	2,230	4,132	20,386	0	0	0	0	0	20,386
Shasta-Trinity	43,858	7,495	10,774	62,127	1,029	0	206	68	1,303	63,430
Sierra	21,213	1,952	5,642	28,807	0	0	0	0	0	28,807
Six Rivers**	355	1,171	99	1,625	381	0	3,876	13	4,270	5,895
Stanislaus	9,967	2,872	1,075	13,914	6	0	0	34	40	13,954
Tahoe*	8,777	1,052	1,253	11,082	0	0	9	3	12	11,094
Tahoe Basin*	585	44	0	629	0	0	0	0	0	629
Total Forest Service	220,345	56,782	58,175	335,302	3,702	727	6,237	4,585	15,251	350,553
Golden Gate	0	0	0	0	0	0	1	516	516	516
Lassen Volcanic	1,953	678	83	2,714	0	0	0	0	0	2,714
Point Reyes	0	0	0	0	86	0	92	422	600	600
Redwood	0	0	0	0	0	0	4,616	0	4,616	4,616
Sequoia-Kings	3,646	1,776	3,301	8,723	0	0	0	0	0	8,723
Whiskeytown	1,268	0	0	1,268	1	0	0	0	1	1,269
Yosemite	2,519	433	1,213	4,165	0	0	0	0	0	4,165
Total Park Service	9,386	2,887	4,597	16,870	87	0	4,709	938	5,733	22,603

*Includes mortality mapped by Region 4

**Includes mortality mapped by Region 6

Unit	Other Mortality-Causing Events/Agents:
Angeles	Flatheaded borer, oak & hardwood mortality
Cleveland	Flatheaded borer, gold-spotted oak borer, hardwood & oak mortality
Eldorado	Hardwood & madrone mortality, flatheaded borer
Inyo	Wind, hardwood mortality
Klamath	Hardwood mortality, flatheaded borer, bear
Lassen	Flatheaded borer, flooding
Los Padres	Flatheaded borer, sudden oak death, hardwood, madrone & oak mortality
Mendocino	Oak mortality, flatheaded borer
Modoc	Juniper mortality
Plumas	Juniper, madrone & hardwood mortality, flatheaded borer
San Bernardino	Oak & hardwood mortality, flatheaded borer
Sequoia	N/A
Shasta-Trinity	Tanoak mortality, herbicide, flatheaded borer, bear
Sierra	N/A
Six Rivers	Oak, tanoak, madrone & hardwood mortality, flatheaded borer, POC root disease, bear
Stanislaus	Oak mortality, flatheaded borer
Tahoe	Madrone & maple mortality, flatheaded borer
Lake Tahoe Basin	N/A
Golden Gate	Sudden oak death, redwood mortality
Lassen Volcanic	N/A
Point Reyes	Sudden oak death, flatheaded borer, pitch canker
Redwood	Bear
Sequoia-Kings	N/A
Whiskeytown	Flatheaded borer
Yosemite	N/A

Number of Dead Trees by National Forest/Park

Unit	Bark Beetle				Other Agents					Unit
	Pine	Fir	Mix	Total	Pine	Fir	Mix	Hardwood	Total	Total*
Angeles	2,937	0	151	3,088	662	0	7	35	42	3,130
Cleveland	31	1	0	32	10	0	3	1,405	1,408	1,440
Eldorado*	3,898	118	3	4,019	4	0	588	4	592	4,611
Inyo	41,244	132	160	41,536	0	0	0	228	228	41,764
Klamath**	41,150	39,235	19,772	100,157	1,105	0	2,837	1	2,838	102,995
Lassen	37,152	12,491	15,846	65,489	28	0	2	0	2	65,491
Los Padres	9,202	320	2,182	11,704	138	845	56	23,060	23,961	35,665
Mendocino	30,280	3,326	3,336	36,942	2,424	0	27	4	31	36,973
Modoc**	181,333	47,490	27,082	255,905	0	0	6	0	6	255,911
Plumas	92,036	10,053	16,247	118,336	0	0	803	7	810	119,146
San Bernardino	1,075	118	12	1,205	296	0	2	3	5	1,210
Sequoia	35,934	4,673	22,917	63,524	0	0	0	0	0	63,524
Shasta-Trinity	131,270	17,893	19,272	168,435	3,170	0	428	1,304	1,732	170,167
Sierra	58,916	4,119	9,025	72,060	0	0	0	0	0	72,060
Six Rivers**	701	1,700	125	2,526	803	0	13,244	54	13,298	15,824
Stanislaus	49,131	3,637	1,183	53,951	29	0	0	853	853	54,804
Tahoe	16,073	1,780	3,472	21,325	0	0	15	7	22	21,347
Lake Tahoe Basin*	920	76	0	996	0	0	0	0	0	996
Total Forest Service	733,283	147,162	140,785	1,021,230	8,669	845	18,018	26,965	45,828	1,067,058
Golden Gate	0	0	0	0	0	0	2	4,945	4,947	4,947
Lassen Volcanic	2,899	941	83	3,923	0	0	0	0	0	3,923
Point Reyes	0	0	0	0	339	0	422	2,188	2,949	2,949
Redwood	0	0	0	0	0	0	12,457	0	12,457	12,457
Sequoia-Kings	9,804	3,230	7,750	20,784	0	0	0	0	0	20,784
Whiskeytown	1,935	0	0	1,935	2	0	0	0	2	1,937
Yosemite	3,873	851	2,463	7,187	0	0	0	0	0	7,187
Total Park Service	18,511	5,022	10,296	33,829	341	0	12,881	7,133	20,355	54,184

*Includes mortality mapped by Region 4

**Includes mortality mapped by Region 6

Unit	Other Mortality-Causing Events/Agents:
Angeles	Flatheaded borer, oak & hardwood mortality
Cleveland	Flatheaded borer, gold-spotted oak borer, hardwood & oak mortality
Eldorado	Hardwood & madrone mortality, flatheaded borer
Inyo	Wind, hardwood mortality
Klamath	Hardwood mortality, flatheaded borer, bear
Lassen	Flatheaded borer, flooding
Los Padres	Flatheaded borer, sudden oak death, hardwood, madrone & oak mortality
Mendocino	Oak mortality, flatheaded borer
Modoc	Juniper mortality
Plumas	Juniper, madrone & hardwood mortality, flatheaded borer
San Bernardino	Oak & hardwood mortality, flatheaded borer
Sequoia	N/A
Shasta-Trinity	Tanoak mortality, herbicide, flatheaded borer, bear
Sierra	N/A
Six Rivers	Oak, tanoak, madrone & hardwood mortality, flatheaded borer, POC root disease, bear
Stanislaus	Oak mortality, flatheaded borer
Tahoe	Madrone & maple mortality, flatheaded borer
Lake Tahoe Basin	N/A
Golden Gate	Sudden oak death, redwood mortality
Lassen Volcanic	N/A
Point Reyes	Sudden oak death, flatheaded borer, pitch canker
Redwood	Bear
Sequoia-Kings	N/A
Whiskeytown	Flatheaded borer
Yosemite	N/A

Other Damage by National Forest/Park

Unit	Defoliation	Discoloration	Dieback	Topkill	Flagging	Breakage	Total
Angeles	21	4	0	27	0	0	52
Cleveland	0	5	0	11	0	22	38
Eldorado	0	985	0	8	295	0	1,288
Inyo	905	63	1,695	216	51	1,572	4,502
Klamath	0	1,543	0	88	9,329	0	10,960
Lassen	3,440	1,036	0	371	3,832	0	8,679
Los Padres	28	5,988	150	3	0	0	6,169
Mendocino	0	121	0	0	829	0	950
Modoc	118	0	138	337	0	0	593
Plumas	16,962	2,155	4	408	2,941	0	22,470
San Bernardino	169	19	0	10	2	0	200
Sequoia	0	361	0	1	1,009	0	1,371
Shasta-Trinity	139	1,490	0	1,878	5,784	0	9,291
Sierra	18	2,576	0	346	1,277	0	4,217
Six Rivers**	0	318	14	3	113	0	448
Stanislaus	0	277	4	5	812	58	1,156
Tahoe	5,239	804	10	8	2,290	0	8,351
Tahoe Basin	98	0	0	0	982	0	1,080
Total Forest Service	27,137	17,745	2,015	3,720	29,546	1,652	81,815
Golden Gate	0	0	0	1	0	0	1
Lassen Volcanic	0	0	0	119	120	0	239
Point Reyes	0	102	0	0	174	0	276
Redwood	316	0	0	17	0	0	0
Sequoia-Kings	64	628	0	427	994	0	2,113
Whiskeytown	0	0	0	0	0	0	0
Yosemite	345	359	0	1	613	169	1,487
Total Park Service	725	1,089	0	565	1,901	169	4,116

Unit	Other Damage-Causing Events/Agents:
Angeles	Alder flea beetle, unknown defoliator, drought, Ips
Cleveland	Unknown discoloration, Ips, wind, snow
Eldorado	Drought, frost, unknown discoloration, engraver beetles, Cytospora, blister rust
Inyo	Frost, wind, unknown defoliators, decline, pinyon sawfly, Ips
Klamath	Unknown discoloration, drought, Ips, Cytospora, twig beetles,
Lassen	Unknown defoliators, white fir sawfly, frost, engraver beetles, Cytospora
Los Padres	Alder flea beetle, unknown discoloration, decline, engraver beetles
Mendocino	Dwar mistletoe, drought, unknown discoloration, Cytospora, Diplodia
Modoc	Unknown defoliator, decline, engraver beetles
Plumas	Unknown defoliators, decline, white fir sawfly, frost, drought, engraver beetles, Cytospora
San Bernardino	Fruit tree leafroller, alder flea beetle, unknown discoloration, engraver beetles, unknown flagging
Sequoia	Unknown discoloration, drought, Ips, Cytospora
Shasta-Trinity	Unknown defoliators, discoloration, sawfly, dwarf mistletoe, drought, engraver beetles, Cytospora
Sierra	Unknown defoliator, discoloration, frost, engraver beetles, Cytospora
Six Rivers	Unknown discoloration, decline, Ips
Stanislaus	Unknown discoloration, decline, frost, drought, wind, Ips, Cytospora
Tahoe	Sawfly, leafminer, webworm, drought, engraver beetles, Cytospora, multiple unknown damage agents
Lake Tahoe Basin	Frost, satin moth, Cytospora,
Golden Gate	Animal damage
Lassen Volcanic	Fir engraver, Cytospora
Point Reyes	Unknown discoloration, pitch canker
Redwood	Unknown defoliator, bear
Sequoia-Kings	Unknown defoliator, winter injury, fir engraver, Cytospora
Whiskeytown	N/A
Yosemite	Lodgepole needleminer, unknown defoliator, frost, Ips, Cytospora, wind

Acres with Mortality by County

County	Bark Beetle				Other Agents					County
	Pine	Fir	Mix	Total	Pine	Fir	Mix	Hardwood	Total	Total
Alameda	6	0	0	6	0	0	1	143	145	150
Alpine*	4,610	384	1,231	6,225	0	0	0	0	0	6,225
Amador	300	5	0	305	0	0	0	0	0	305
Butte	4,947	44	108	5,099	0	0	0	1	1	5,101
Calaveras	1,155	31	228	1,414	0	0	0	0	0	1,415
Colusa	9	1	0	10	60	0	0	0	60	70
Contra Costa	13	0	0	13	0	0	1	149	149	162
Del Norte**	295	505	95	895	379	2	12,530	6	12,917	13,812
El Dorado*	2,129	55	1	2,185	4	0	26	0	30	2,215
Fresno	17,901	2,370	5,571	25,842	0	0	0	0	0	25,842
Glenn	3,440	1	39	3,480	281	0	0	0	281	3,760
Humboldt	118	780	39	937	2	0	38,568	10,159	48,729	49,666
Inyo	2,428	0	0	2,428	0	0	0	4	4	2,433
Kern	3,512	77	800	4,388	51	0	31	0	82	4,470
Lake	492	8	1	500	967	0	9	24	1,000	1,500
Lassen	19,274	8,293	7,159	34,726	0	0	99	0	99	34,824
Los Angeles	534	0	88	623	471	0	11	24	506	1,128
Madera	2,176	275	1,260	3,711	0	0	0	1	1	3,712
Marin	1	0	0	1	86	0	99	1,885	2,071	2,072
Mariposa	7,866	309	1,222	9,397	6	0	0	35	41	9,437
Mendocino	360	86	962	1,407	82	0	714	3,594	4,390	5,798
Merced	1		0	0	0	0	0	0	0	0
Modoc**	24,568	11,745	6,767	43,080	0	0	2	0	2	43,082
Mono*	9,021	5	311	9,338	0	0	0	44	44	9,381
Monterey	749	0	597	1,345	1	729	46	10,859	11,636	12,981
Napa	81	0	0	81	30	0	3	17	49	131
Nevada	3,245	34	316	3,595	0	0	4	18	21	3,616
Orange	1	0	0	1	0	0	0	1	1	2
Placer	3,256	243	207	3,706	1	0	0	3	3	3,709
Plumas	20,557	4,287	5,213	30,057	3	0	88	0	91	30,148
Riverside	31	2	0	33	15	0	1	5	21	54
Sacramento	0	0	0	0	0	0	0	14	14	14
San Benito	8	0	0	8	0	0	0	2	2	10
San Bernardino	501	105	8	614	282	0	1	1	284	898
San Diego	19	1	0	20	7	0	0	1,152	1,159	1,179
San Luis Obispo	190	0	0	190	0	3	1	49	54	243
San Mateo	0	0	0	0	1	0	10	701	712	712
Santa Barbara	1,758	0	0	1,758	0	0	1	32	32	1,790
Santa Clara	16	0	0	16	5	0	7	1,450	1,461	1,478
Santa Cruz	76	0	0	76	173	0	27	3,682	3,883	3,959
Shasta	18,099	3,381	3,855	25,335	296	0	69	1	365	25,700
Sierra*	4,551	1,098	1,638	7,287	0	0	6	8	13	7,300
Siskiyou**	45,566	22,778	18,071	86,415	1,924	0	2,059	1	3,984	90,399
Solano	1	0	0	1	0	0	0	6	6	7
Sonoma	3	0	0	3	7	0	73	22,690	22,770	22,773
Stanislaus	39	0	0	0	0	0	0	0	0	0
Tehama	14,451	2,030	7,183	23,665	0	0	2	19	21	23,686
Trinity	9,059	4,278	4,962	18,299	290	0	171	123	583	18,883
Tulare	12,847	3,480	5,672	22,000	0	0	0	1	1	22,000
Tuolumne	6,700	2,597	849	10,147	0	0	0	0	0	10,147
Ventura	724	119	44	887	10	0	1	2	13	901
Yolo	97	0	0	97	0	0	0	1	1	97
Yuba	3,529	0	0	3,529	0	0	1	8	10	3,539
Total	251,311	69,403	74,499	395,173	5,434	734	54,660	56,917	117,744	512,917

* Includes acreage mapped by Region 4

** Includes acreage mapped by Region 6

Estimated Number of Dead Trees by County

County	Bark Beetle				Other Agents					County
	Pine	Fir	Mix	Total	Pine	Fir	Mix	Hardwood	Total	Total
Alameda	13	0	0	13	0	0	2	179	181	194
Alpine*	10,934	675	7,817	19,426	0	0	0	0	0	19,426
Amador	619	8	0	627	0	0	0	1	1	628
Butte	20,726	66	141	20,933	0	0	0	2	2	20,935
Calaveras	1,683	23	228	1,934	0	0	1	0	1	1,935
Colusa	14	2	0	16	260	0	0	0	260	276
Contra Costa	31	0	0	31	0	0	1	186	187	218
Del Norte**	469	917	95	1,481	804	5	36,555	10	37,374	38,855
El Dorado*	4,013	98	2	4,113	4	0	590	0	594	4,707
Fresno	65,747	5,065	10,907	81,719	0	0	0	0	0	81,719
Glenn	7,009	1	39	7,049	1,071	0	0	0	1,071	8,120
Humboldt	312	876	39	1,227	7	0	127,268	65,778	193,053	194,280
Inyo	5,805	0	0	5,805	0	0	0	10	10	5,815
Kern	5,249	240	2,170	7,659	133	0	31	0	164	7,823
Lake	921	12	1	934	1,666	0	15	11	1,692	2,626
Lassen	53,626	21,175	16,599	91,400	0	0	770	0	770	92,170
Los Angeles	2,938	0	151	3,089	651	0	7	35	693	3,782
Madera	2,772	342	2,492	5,606	0	0	0	1	1	5,607
Marin	2	0	0	2	339	0	450	12,265	13,054	13,056
Mariposa	16,692	673	2,551	19,916	29	0	0	855	884	20,800
Mendocino	1,813	89	1,099	3,001	626	0	3,362	18,307	22,295	25,296
Merced	3	0	0	0	0	0	0	0	0	0
Modoc**	138,003	51,060	25,003	214,066	0	0	3	0	3	214,069
Mono*	38,746	12	180	38,938	0	0	0	218	218	39,156
Monterey	1,409	0	1,193	2,602	2	848	28	130,766	131,644	134,246
Napa	74	0	0	74	8	0	6	26	40	114
Nevada	5,939	61	884	6,884	0	0	7	22	29	6,913
Orange	1	0	0	1	0	0	0	2	2	3
Placer	4,484	375	328	5,187	4	0	0	4	8	5,195
Plumas	56,835	9,836	15,299	81,970	28	0	168	0	196	82,166
Riverside	43	4	0	47	28	0	2	204	234	281
Sacramento	0	0	0	0	0	0	0	600	600	600
San Benito	13	0	0	13	0	0	0	3	3	16
San Bernardino	1,053	114	12	1,179	279	0	2	6	287	1,466
San Diego	25	1	0	26	10	0	1	1,572	1,583	1,609
San Luis Obispo	1,449	0	0	1,449	0	7	2	95	104	1,553
San Mateo	0	0	0	0	1	0	124	4,821	4,946	4,946
Santa Barbara	5,011	0	0	5,011	0	0	1	56	57	5,068
Santa Clara	32	0	0	32	7	0	8	1,833	1,848	1,880
Santa Cruz	144	0	0	144	346	0	258	7,611	8,215	8,359
Shasta	48,442	7,323	5,295	61,060	1,147	0	73	1	1,221	62,281
Sierra*	9,445	2,321	5,226	16,992	0	0	8	20	28	17,020
Siskiyou**	147,579	53,113	41,192	241,884	7,313	0	2,967	1	10,281	252,165
Solano	1	0	0	1	0	0	0	8	8	9
Sonoma	5	0	0	5	27	0	76	136,959	137,062	137,067
Stanislaus	16	0	0	16	0	0	0	0	0	16
Tehama	33,749	3,419	11,946	49,114	0	0	7	96	103	49,217
Trinity	22,429	8,367	9,550	40,346	769	0	389	2,307	3,465	43,811
Tulare	25,081	6,819	24,833	56,733	0	0	0	1	1	56,734
Tuolumne	41,488	3,208	879	45,575	0	0	0	0	0	45,575
Ventura	903	119	267	1,289	19	0	1	5	25	1,314
Yolo	193	0	0	193	0	0	0	1	1	194
Yuba	30,666	0	0	30,666	0	0	3	11	14	30,680
Total	814,649	176,414	186,418	1,177,478	15,578	860	173,186	384,889	574,513	1,751,991

* Includes acreage mapped by Region 4

** Includes acreage mapped by Region 6

Other Mortality-Causing Events by County

County	Agents
Alameda	Flatheaded borer, sudden oak death, hardwood, madrone & oak mortality
Alpine	N/A
Amador	Black oak mortality
Butte	Hardwood mortality
Calaveras	Flatheaded borer
Colusa	Flatheaded borer
Contra Costa	Flatheaded borer, sudden oak death, madrone & oak mortality
Del Norte	Flatheaded borers, POC root disease, bear
El Dorado	Flatheaded borers, hardwood, madrone & oak mortality
Fresno	N/A
Glenn	Flatheaded borer
Humboldt	Flatheaded borers, POC root disease, bear, sudden oak death, hardwood, madrone & oak mortality
Inyo	Hardwood mortality
Kern	Flatheaded borer
Lake	Flatheaded borers, madrone, oak & tanoak mortality
Lassen	Juniper mortality
Los Angeles	Flatheaded borers, hardwood & oak mortality
Madera	Oak mortality
Marin	Flatheaded borer, sudden oak death, pitch canker, madrone mortality
Mariposa	Flatheaded borer, oak mortality
Mendocino	Flatheaded borers, sudden oak death, bear, hardwood, tanoak, madrone mortality
Merced	N/A
Modoc	Juniper mortality
Mono	Wind
Monterey	Flatheaded borers, sudden oak death, hardwood, tanoak, oak & madrone mortality
Napa	Flatheaded borers, sudden oak death, hardwood, oak & madrone mortality
Nevada	Flatheaded borer, madrone mortality
Orange	Hardwood & oak mortality
Placer	Flatheaded borer, oak & madrone mortality
Plumas	Flatheaded borer, flooding
Riverside	Flatheaded borers, hardwood & oak mortality
Sacramento	Eucalyptus mortality
San Benito	Hardwood & oak mortality
San Bernardino	Flatheaded borers, hardwood & oak mortality
San Diego	Flatheaded borers, gold-spotted oak borer, hardwood & oak mortality
San Luis Obispo	Flatheaded borer, hardwood, oak & madrone mortality
San Mateo	Flatheaded borers, sudden oak death, madrone mortality
Santa Barbara	Flatheaded borer, hardwood, oak & madrone mortality
Santa Clara	Flatheaded borers, sudden oak death, hardwood & oak mortality
Santa Cruz	Flatheaded borers, sudden oak death, hardwood & madrone mortality
Shasta	Flatheaded borers, oak mortality
Sierra	Flatheaded borer, aspen mortality
Siskiyou	Flatheaded borers, bear, hardwood mortality
Solano	Sudden oak death, oak mortality
Sonoma	Flatheaded borers, sudden oak death, hardwood, oak & madrone mortality
Stanislaus	N/A
Tehama	Flatheaded borer, hardwood mortality
Trinity	Flatheaded borers, bear, herbicide, tanoak, oak & madrone mortality
Tulare	Oak mortality
Tuolumne	N/A
Ventura	Flatheaded fir borers, hardwood mortality
Yolo	Oak mortality
Yuba	Flatheaded borer, madrone mortality

Other Damage by County

County	Defoliation	Discoloration	Dieback	Topkill	Breakage***	Flagging	Total
Alameda	0	56	0	0	0	0	56
Alpine*	1483	35	410	1	67	188	2,184
Amador	573	3342	0	0	0	3	3,918
Butte	906	973	0	0	0	1378	3,257
Calaveras	0	220	0	3	0	486	709
Colusa	0	45	0	0	0	0	45
Contra Costa	0	18	0	0	0	0	18
Del Norte**	0	18	0	159	0	407	584
El Dorado*	278	5525	0	8	0	294	6,105
Fresno	17	1180	0	478	0	926	2,601
Glenn	0	0	0	0	0	145	145
Humboldt	647	3367	14	211	0	164	4,403
Inyo	191	63	35	1	0	460	750
Kern	183	52	0	0	0	47	282
Lake	0	721	0	1	0	75	797
Lassen	2374	49	334	1044	0	267	4,068
Los Angeles	21	4	0	26	0	1	52
Madera	0	1,468	0	8	1,410	350	3,236
Marin	0	192	0	40	0	174	406
Mariposa	320	246	0	0	0	509	1,075
Mendocino	334	178	71	1,932	0	53	2,568
Merced	0	0	0	0	0	0	0
Modoc**	118	0	17	377	0	0	512
Mono*	8,608	0	2,614	216	267	0	11,705
Monterey	1,635	12,968	150	1	0	0	14,754
Napa	0	0	0	0	1	80	81
Nevada	1,787	593	37	1	0	845	3,263
Orange	0	5	0	0	0	0	5
Placer	3,595	4,782	0	4	0	1,254	9,635
Plumas	15,672	2,367	4	453	0	3,608	22,104
Riverside	50	9	0	12	0	0	71
Sacramento	2,264	1,374	0	0	0	0	3,638
San Benito	0	17	0	0	0	0	17
San Bernardino	119	17	0	5	0	2	143
San Diego	0	14	0	10	22	1	47
San Luis Obispo	269	65	0	0	0	0	334
San Mateo	0	16	0	1	0	130	147
Santa Barbara	0	328	0	1	0	0	329
Santa Clara	0	272	0	1	0	0	273
Santa Cruz	0	106	0	2	0	0	108
Shasta	159	16,445	0	500	0	2,309	19,413
Sierra*	4,994	548	10	2	0	1,342	6,896
Siskiyou**	116	1,719	0	1,543	0	13,232	16,610
Solano	26	83	0	0	0	0	109
Sonoma	0	36	0	51	0	0	87
Stanislaus	4	0	0	0	0	0	4
Tehama	5	58	0	296	0	508	867
Trinity	1,200	1,869	0	4	0	3,616	6,689
Tulare	64	960	0	288	0	1,957	3,269
Tuolumne	2,932	404	4	3	113	271	3,727
Ventura	28	0	3	1	0	0	32
Yolo	3	1,127	1	0	0	29	1,160
Yuba	648	63	0	0	0	0	711
Total	51,623	63,997	3,704	7,684	1,880	35,111	163,999

* Includes acreage mapped by Region 4

** Includes acreage mapped by Region 6

*** Includes broken limbs, broken main stems and uprooting

Other Damage-Causing Events by County

County	Agents
Alameda	Oak, hardwood discoloration
Alpine	Pinyon scale, frost, aspen decline, Ips, wind, Cytospora
Amador	Fall webworm, drought, oak defoliation, drought, Cytospora
Butte	White fir sawfly, hardwood & oak defoliation, frost, drought, Cytospora
Calaveras	Drought, frost, Ips, Cytospora
Colusa	Dwarf mistletoe
Contra Costa	Hardwood & oak discoloration
Del Norte	Pine discoloration, bear, Cytospora
El Dorado	Sawfly, drought, frost, hardwood discoloration, engraver beetles, Cytospora, blister rust, Diplodia
Fresno	Aspen defoliation, drought, frost, hardwood discoloration, engraver beetles, Cytospora
Glenn	Ips
Humboldt	Pine needlecast, hardwood damage, drought, madrone dieback, animal damage, Cytospora
Inyo	Pinyon sawfly, hardwood & aspen decline, Ips, hardwood flagging
Kern	Drought, Cytospora
Lake	Drought, hardwood discoloration, Ips, Diplodia
Lassen	White fir sawfly, aspen defoliation, juniper discoloration & topkill, aspen decline, fir engraver, Cytospora
Los Angeles	Alder flea beetle, oak defoliation, drought, Ips
Madera	Frost, Ips, wind, Cytospora
Marin	Oak & hardwood discoloration, animal damage, pitch canker
Mariposa	Lodgepole needleminer, frost, Cytospora
Mendocino	Pine needlecast, hardwood, pine & Doug-fir damage, drought, Phytophthora nemarosa, animal damage
Merced	N/A
Modoc	Aspen defoliation & decline, fir engraver
Mono	Pinyon scale, pine scale, frost, drought, hardwood defoliation, aspen decline, wind
Monterey	California oakworm, hardwood, oak, tanoak, madrone discoloration & decline, Ips
Napa	Wind, Ips
Nevada	Black oak leafminer, frost, hardwood damage, drought, pine discoloration, Ips, Cytospora, pine flagging
Orange	Hardwood discoloration
Placer	Black oak leafminer, fir sawfly, drought, hardwood & pine discoloration, engraver beetles, Cytospora
Plumas	White fir sawfly, oak, aspen & pine damage, frost, drought, engraver beetles, Cytospora
Riverside	Alder flea beetle, hardwood discoloration, Ips
Sacramento	Drought
San Benito	Hardwood discoloration
San Bernardino	Fruit tree leafroller, hardwood discoloration, engraver beetles, Elytroderma, pine & fir flagging
San Diego	Oak discoloration, engraver beetles, wind, snow, oak flagging
San Joaquin	Hardwood discoloration (54 acres)
San Luis Obispo	Drought, pine discoloration
San Mateo	Hardwood discoloration, Douglas-fir engraver, pitch canker
Santa Barbara	Hardwood & oak discoloration, Douglas-fir engraver
Santa Clara	Hardwood & oak discoloration, Douglas-fir engraver, animal damage
Santa Cruz	Hardwood discoloration, Douglas-fir engraver, animal damage
Shasta	Oak & alder defoliation, drought, hardwood & pine discoloration, engraver beetles, Cytospora
Sierra	Black oak leafminer, sawfly, pine scale & discoloration, frost, aspen damage, drought, Ips, Cytospora
Siskiyou	White fir sawfly, dwarf mistletoe, drought, hardwood, pine & fir damage, engraver beetles, Cytospora
Solano	Drought, oak defoliation, boxelder discoloration
Sonoma	Hardwood & oak discoloration, Douglas-fir engraver, animal damage
Stanislaus	Drought
Tehama	White fir sawfly, drought, Ips, Cytospora
Trinity	Alder & oak defoliation, drought, hardwood, pine & fir discoloration, Ips, Cytospora, animal damage
Tulare	Fir defoliation, frost, drought, engraver beetles, Cytospora
Tuolumne	Lodgepole needleminer, drought, aspen damage, frost, pine discoloration, Ips, wind, Cytospora
Ventura	Alder flea beetle, hardwood decline, engraver beetles
Yolo	Drought, hardwood decline & flagging
Yuba	Fall webworm, oak defoliation, drought

Aerial Survey Results by National Forests and Parks

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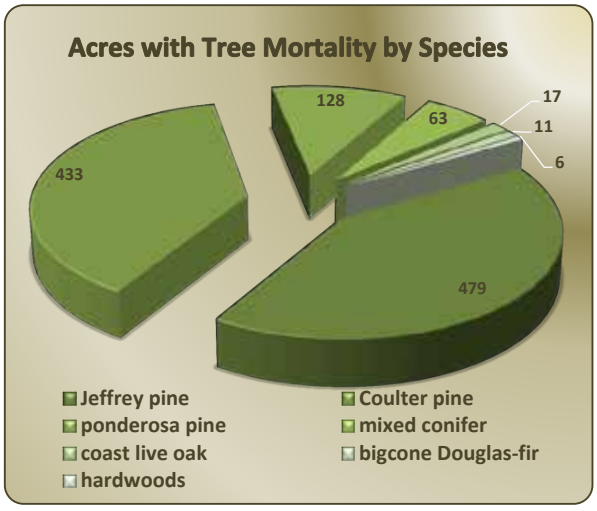
Angeles National Forest

Pine Mortality in the Station Fire.

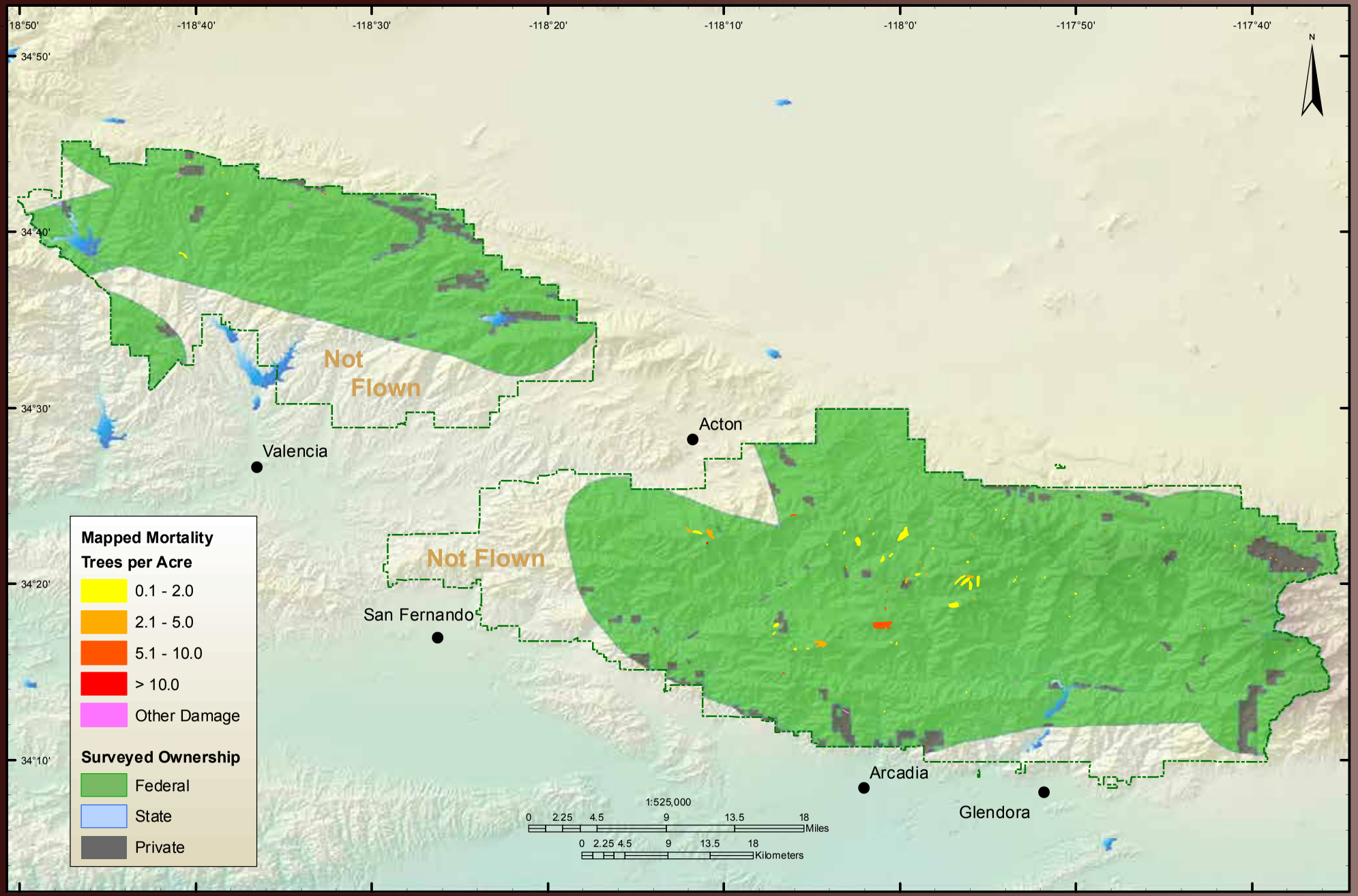
Overview

- 1,186 acres were mapped as having current disturbance activity within the forest boundaries in 2012, an increase from the 442 acres mapped in 2011.
- Approximately 96% (1,134 acres) contained recent tree mortality. 89% of mortality was attributed to pine.
- 831 acres (approximately 70%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 286 acres (approximately 24%) of damage polygons occurred within designated wilderness areas of the forest.
- Areas within the forest boundary that are not forested or that have had recent stand replacing fires were not generally flown.
- Disturbance activity was most pronounced along the perimeter of the Station fire of 2009.
- The areas of the Forest mapped most often in recent years are Sawmill Mtn. and Mt. Gleason on the Santa Clara/Mojave Rivers Ranger District and the Crystal Lake area on the San Gabriel River Ranger District all with six years of recorded disturbance activity.

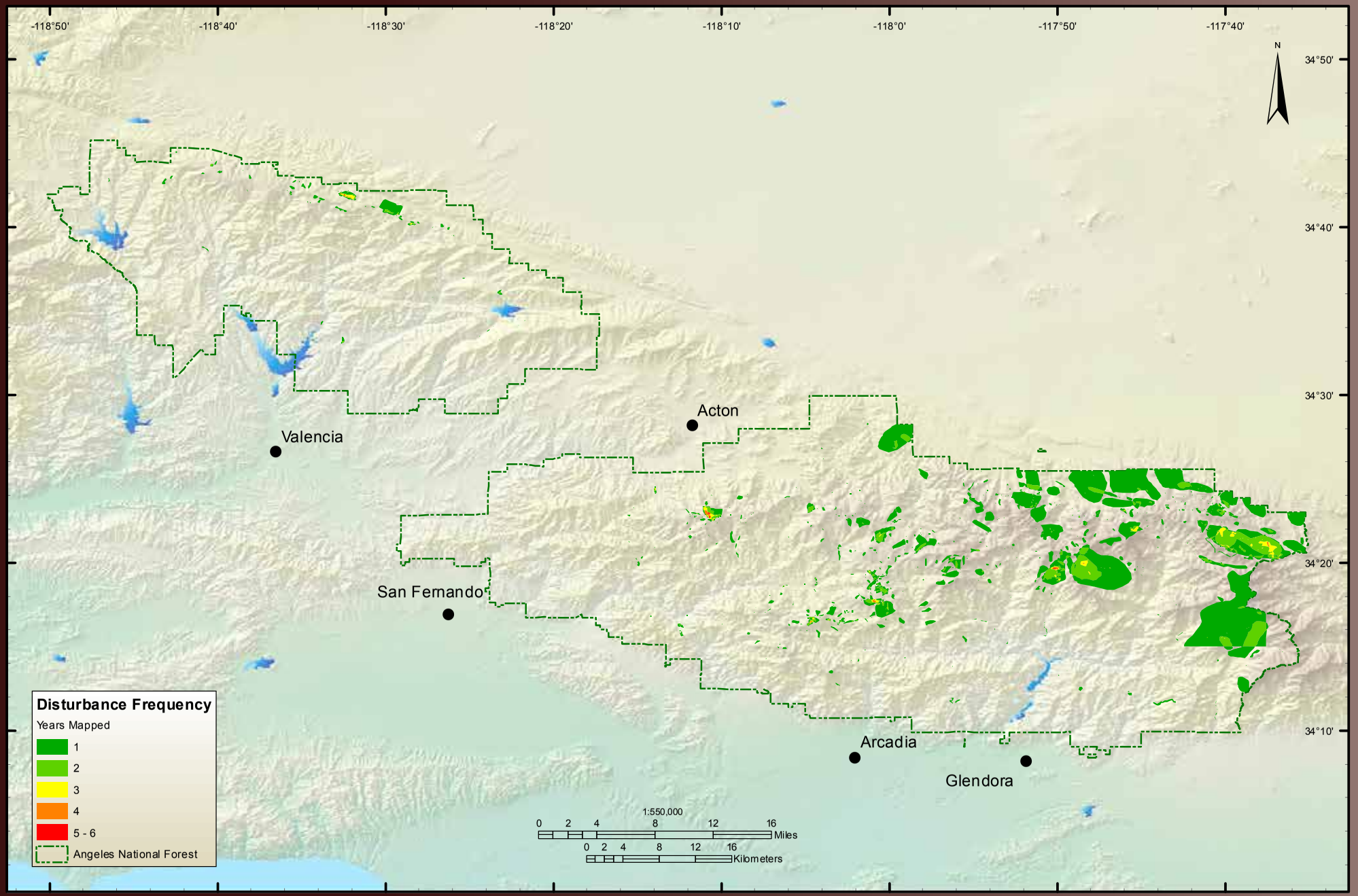
Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
Jeffrey pine	479	58	214
Coulter pine	433	7	37
ponderosa pine	128	0	0
mixed conifer	63	328	0
coast live oak	17	4	0
bigcone Douglas-fir	11	5	0
hardwoods	6	0	0
Forest Disturbance other than Tree Mortality			
sugar pine[1]	163	0	0
bigcone Douglas-fir[1]	25	1	0
[1]topkill			



Angeles National Forest, 2012



Angeles National Forest, Cumulative Mortality & Damage 1995 - 2012



Forest not flown 1996, 1998-1999.

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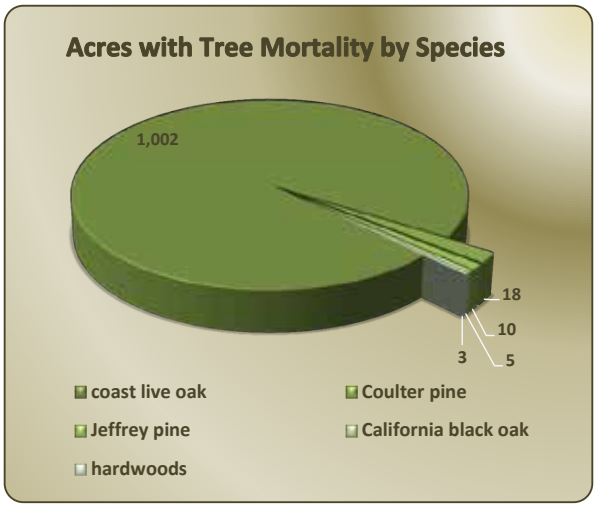
Cleveland National Forest

Live oak mortality from gold-spotted oak borer.

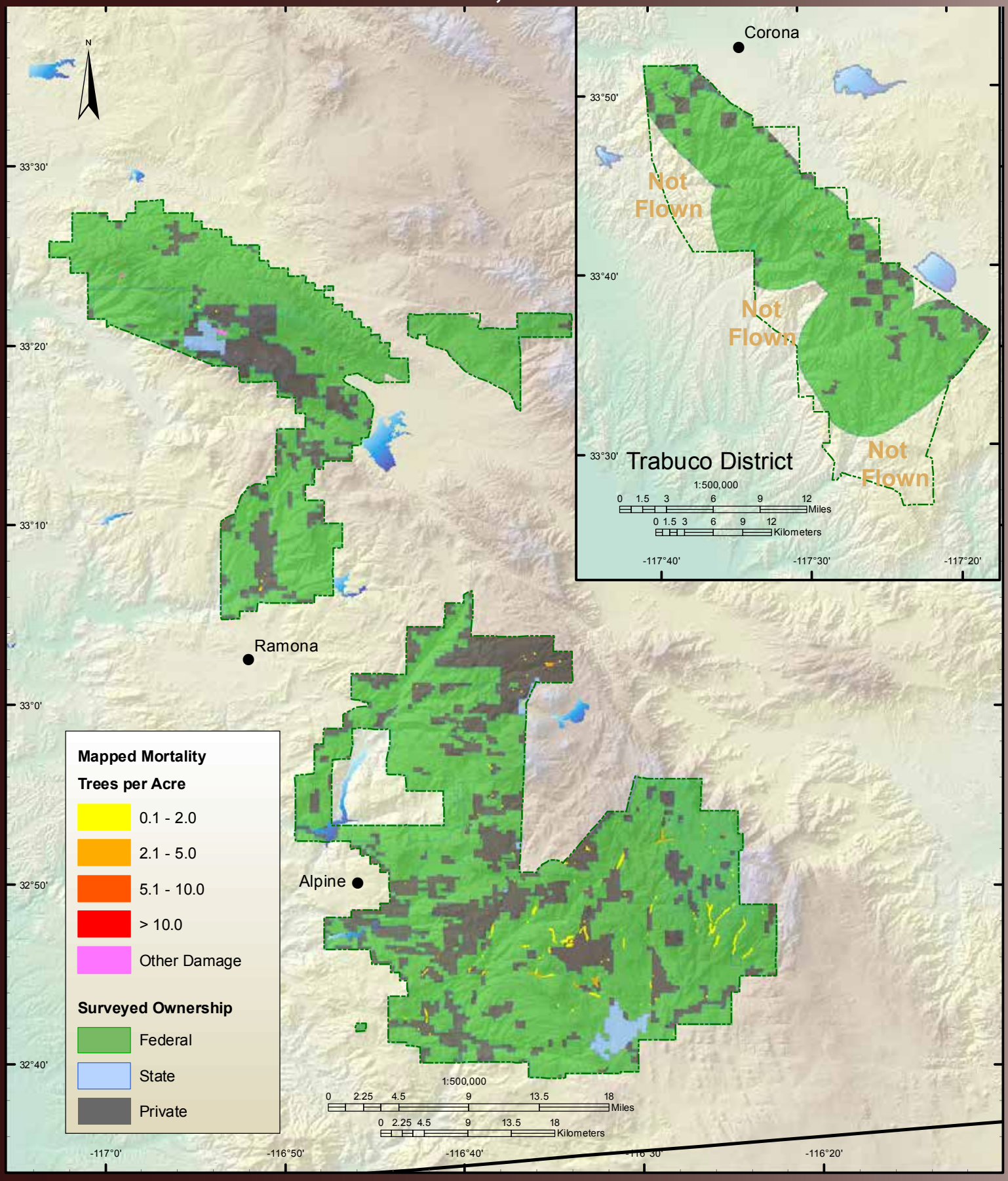
Overview

- 1,078 acres were mapped as having current disturbance activity within the forest boundaries in 2012, a slight decrease from the 1,383 acres mapped in 2011.
- Approximately 96% (1,040 acres) contained recent tree mortality. 97% of mapped mortality was of coast live oak and to a much lesser extent California black oak attributable to golden spotted oak borer (GSOB).
- 689 acres (approximately 64%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 193 acres (approximately 18%) of damage polygons occurred within designated wilderness areas.
- The area of the Forest mapped most often in recent years is located in Long Canyon on the Descanso Ranger District with seven years of recorded disturbance activity.

Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
coast live oak	1,002	1,272	758
Coulter pine	18	14	73
Jeffrey pine	10	1	2
California black oak	5	2	4
hardwoods	3	34	3
Forest Disturbance other than Tree Mortality			
coast live oak[1]	40	0	0
Coulter pine[2]	10	0	11
[1]branch dieback/breakage [2]topkill			



Cleveland National Forest, 2012



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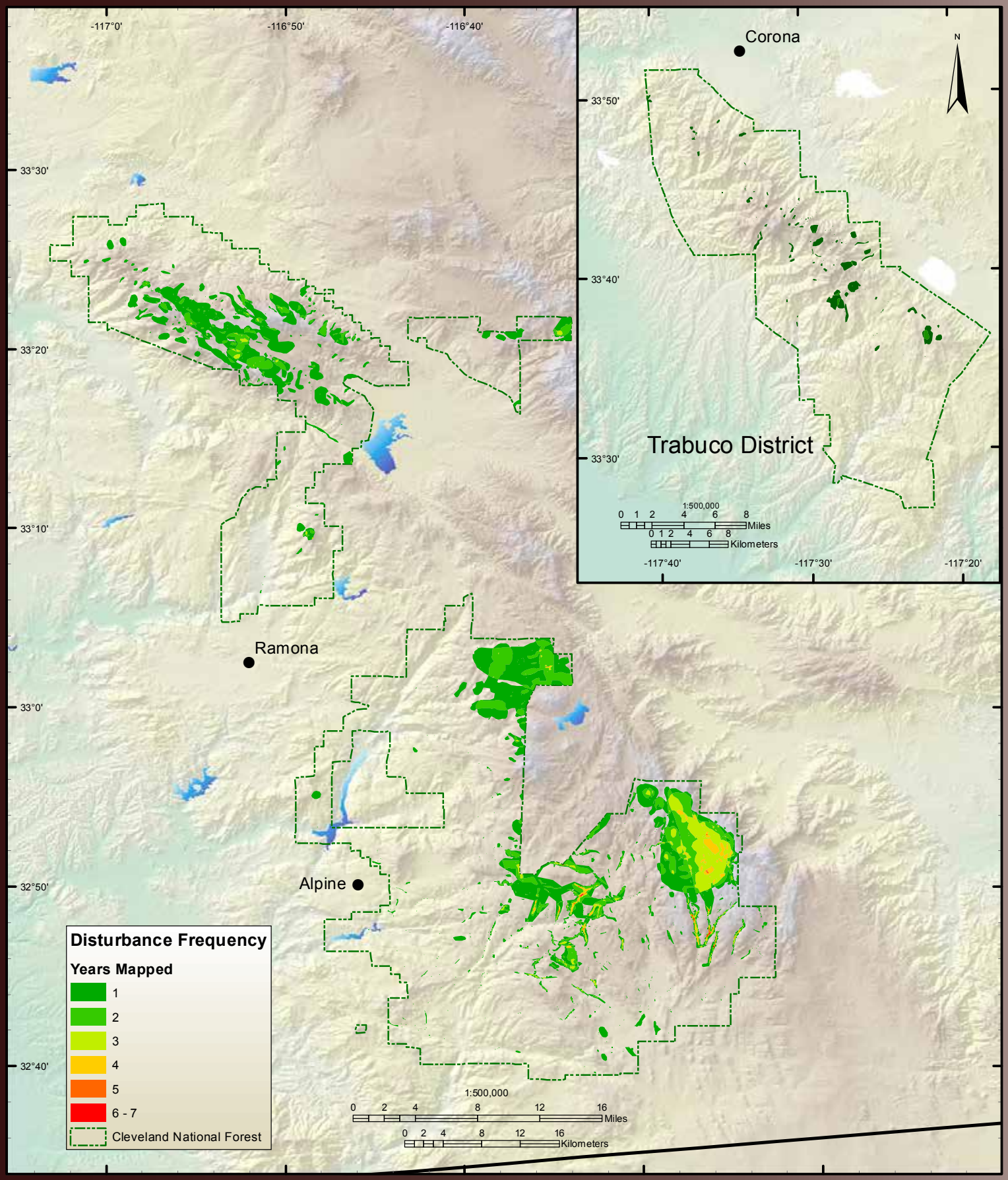
Cleveland National Forest, Cumulative Mortality & Damage 1995 - 2012



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Forest not flown 1997-1999.

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Eldorado National Forest

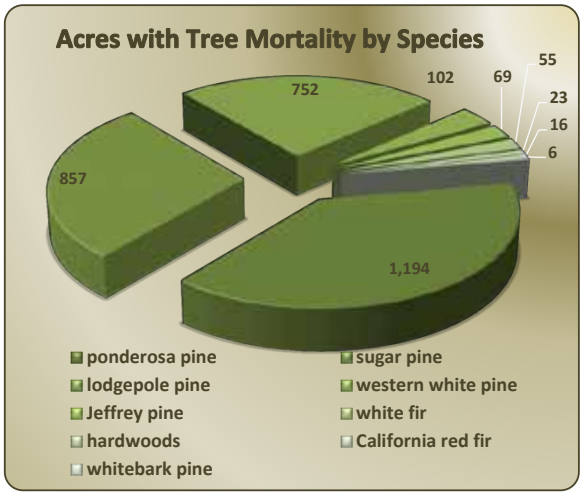
Dead lodgepole near Caples Lake.

Overview

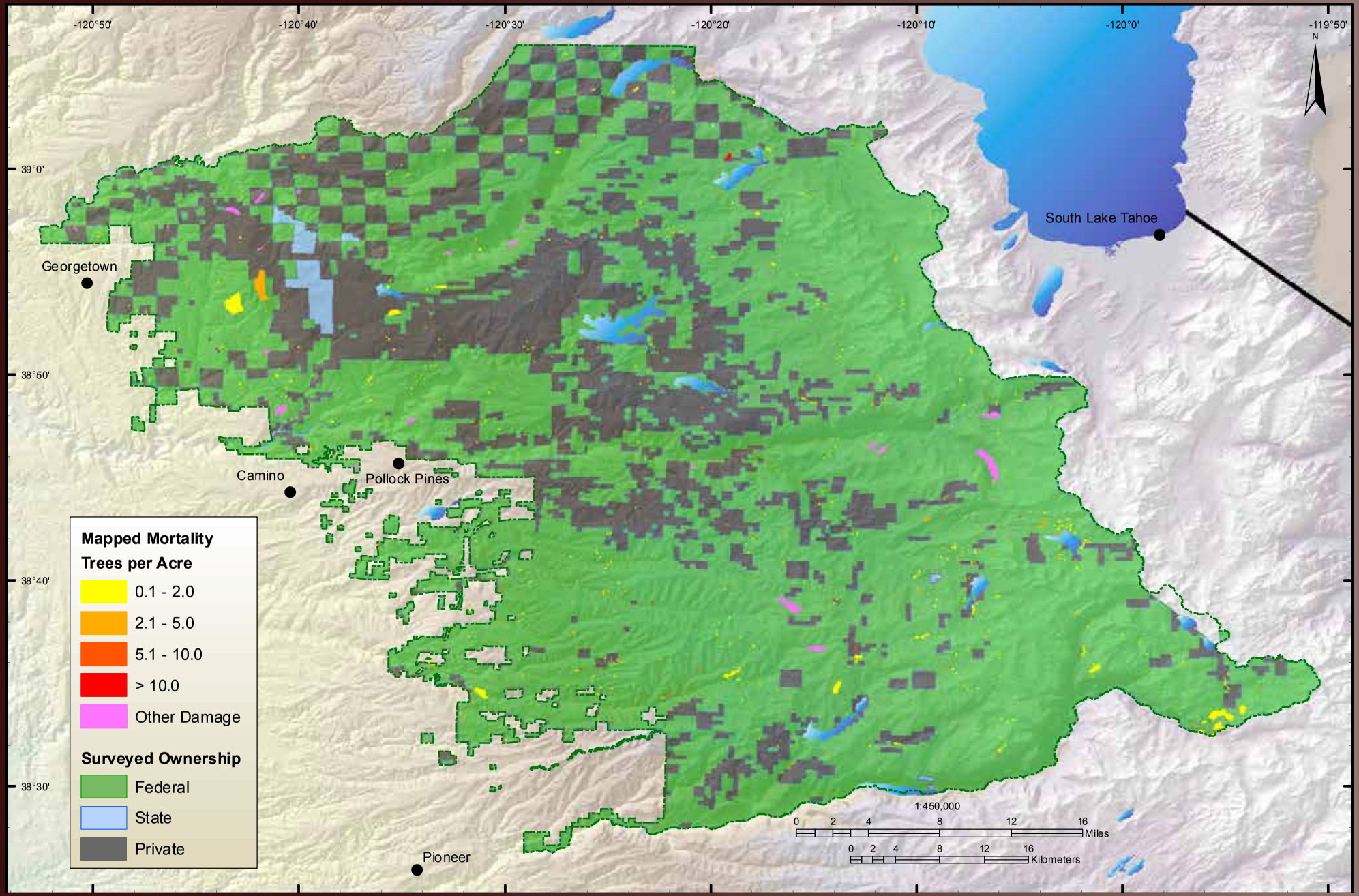
- 3,595 acres were mapped as having current disturbance activity within the forest boundaries in 2012, a sizable decrease from the 12,106 acres mapped in 2011.
- Approximately 64% (2,307 acres) contained recent tree mortality. Pine mortality comprised about 96% of the mortality mapped.
- 2,138 acres (approximately 59%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 639 acres (18%) of damage polygons occurred within designated wilderness areas.
- The area of the Forest mapped most often in recent years is located east of Icehouse Reservoir on the Pacific Ranger District with eight years of recorded disturbance activity.

Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
ponderosa pine	1,194	218	902
sugar pine	857	18	5
lodgepole pine	752	2,679	738
western white pine	102	21	3
Jeffrey pine	69	39	70
white fir	55	3,824	24,614
hardwoods	23		
California red fir	16	1,487	211
whitebark pine	6		
Forest Disturbance other than Tree Mortality			
California red fir[1]	294	688	0
bigleaf maple[2]	256	0	0

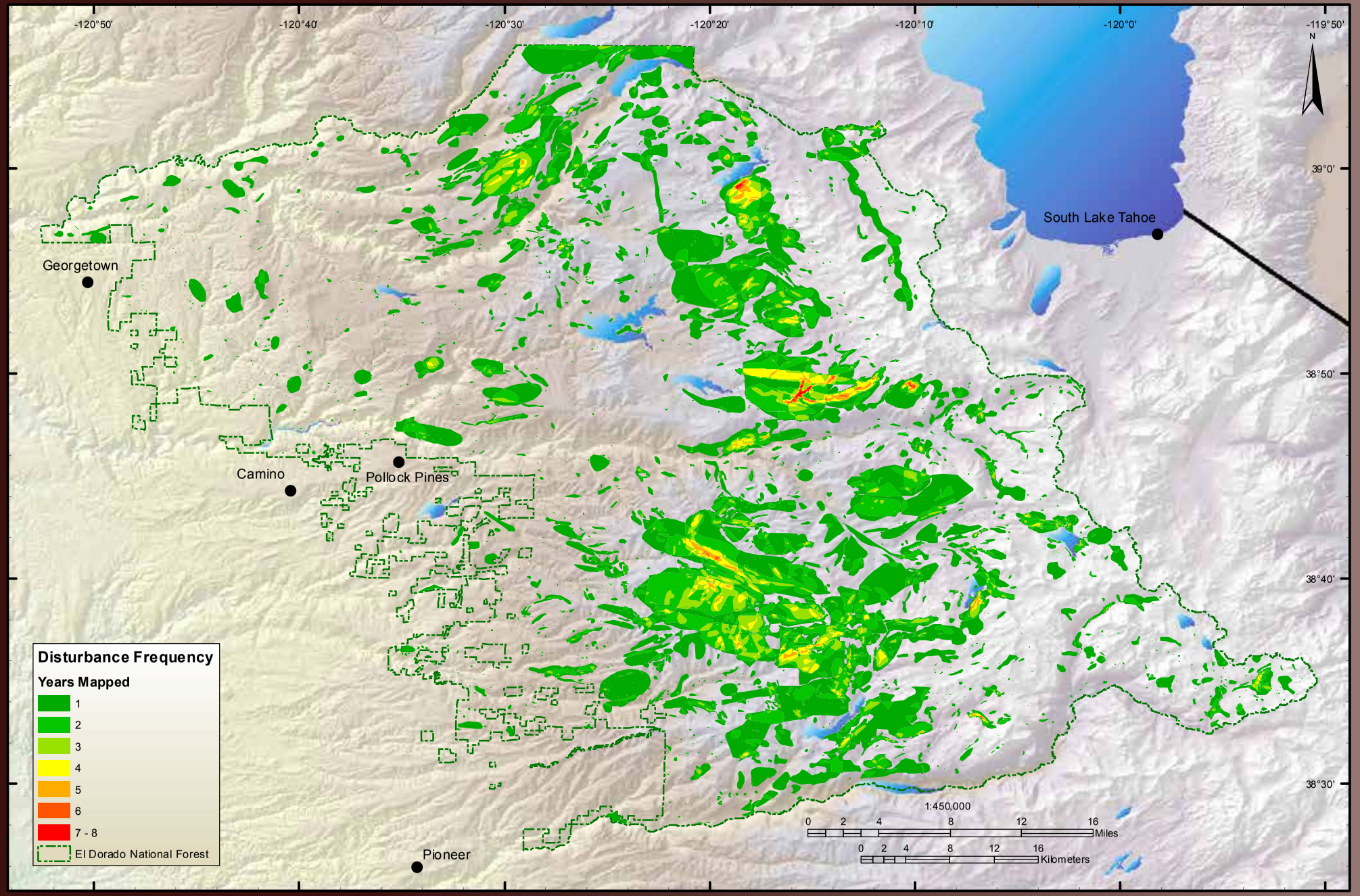
[1]branch flagging (cytospora) [2]discoloration



Eldorado National Forest, 2012



Eldorado National Forest, Cumulative Mortality & Damage 1994 - 2012



Inyo National Forest

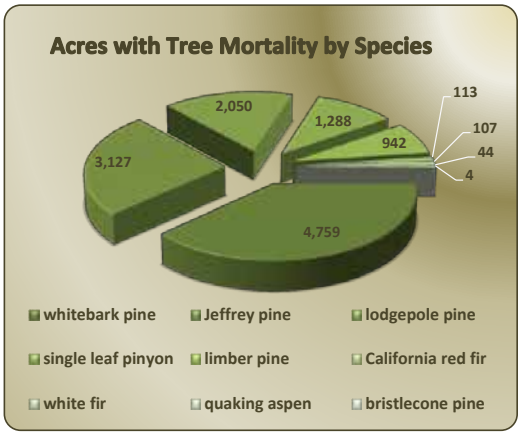
Dead lodgepole and whitebark pine at June Mountain.

Overview

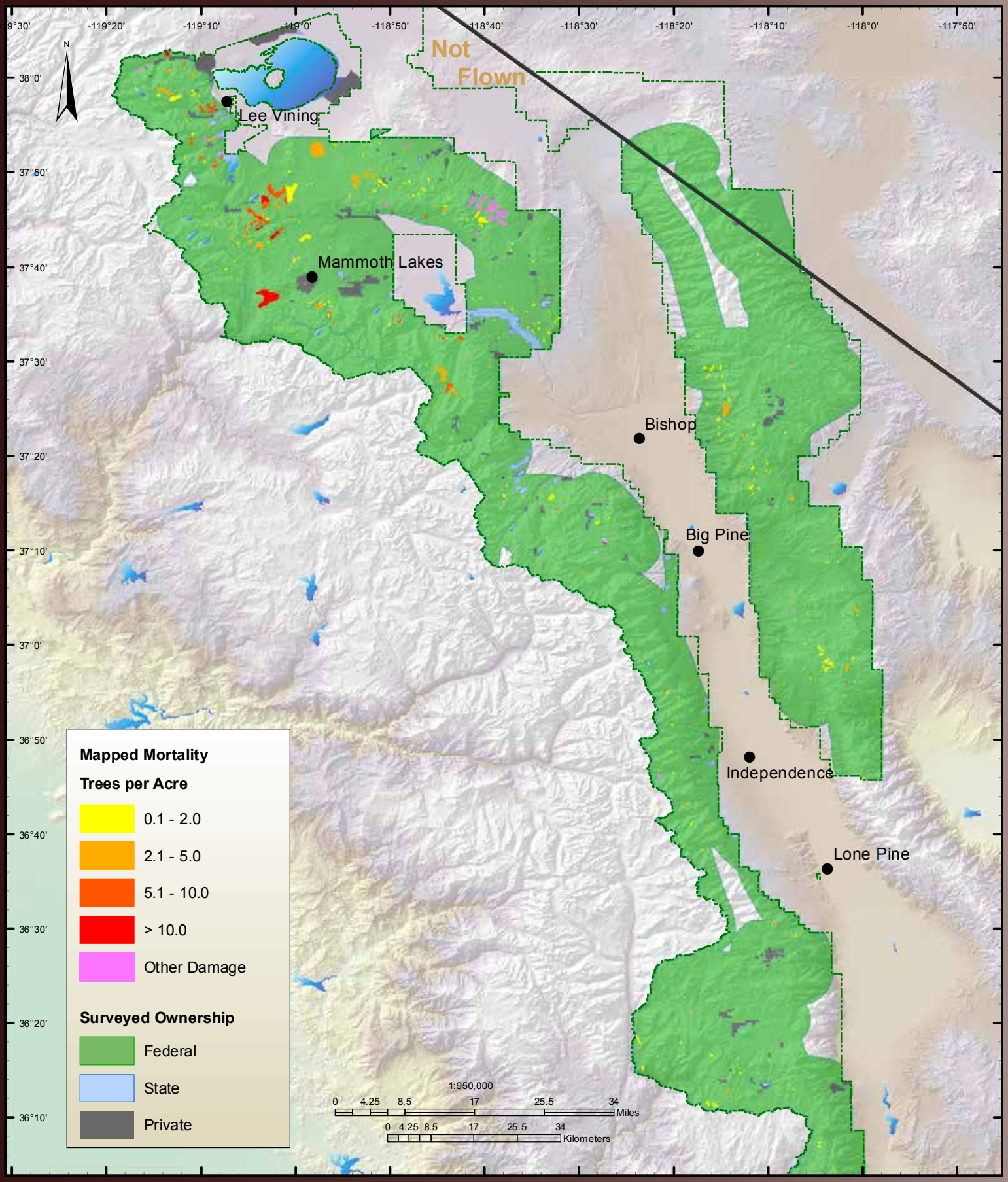
- 15,316 acres were mapped as having current disturbance activity within the forest boundaries in 2012, almost double from the 8,630 acres mapped in 2011.
- Approximately 71% (10,814 acres) contained recent tree mortality. The vast majority of mortality was attributed to pine.
- 6,534 acres (approximately 43%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 6,230 acres (approximately 41%) of damage polygons occurred within designated wilderness areas.
- Significant loci of pine (mostly high elevation whitebark) mortality were again mapped in the June mountain area stretching south to Mammoth Mountain.
- 1,927 acres of defoliation, wind damage and general decline were recorded mostly in quaking aspen.
- An additional 1,376 acre of wind damage was recorded in mixed conifer in and near the Devil's Post Pile area. This is a huge underestimate of an unprecedented wind storm that blew over thousands of trees over a large area in November 2011. This type of damage is difficult to detect via aerial survey since remaining overstory trees mask the event.
- The area of the Forest mapped most often in recent years is located around June Mountain on the Mono Ranger District with eight years of recorded disturbance activity.

Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
whitebark pine	4,759	4,097	4,689
Jeffrey pine	3,127	902	912
lodgepole pine	2,050	2,542	2,841
single leaf pinyon	1,288	11	296
limber pine	942	9	0
California red fir	113	366	1,126
white fir	107	286	3,882
quaking aspen	44	3	0
bristlecone pine	4	0	0
Forest Disturbance other than Tree Mortality			
quaking aspen[1]	2,575	678	2
hardwoods[2]	245	30	2

[1]dieback, defoliation and general decline [2]mortality, general decline, topkill and defoliation



Inyo National Forest, 2012



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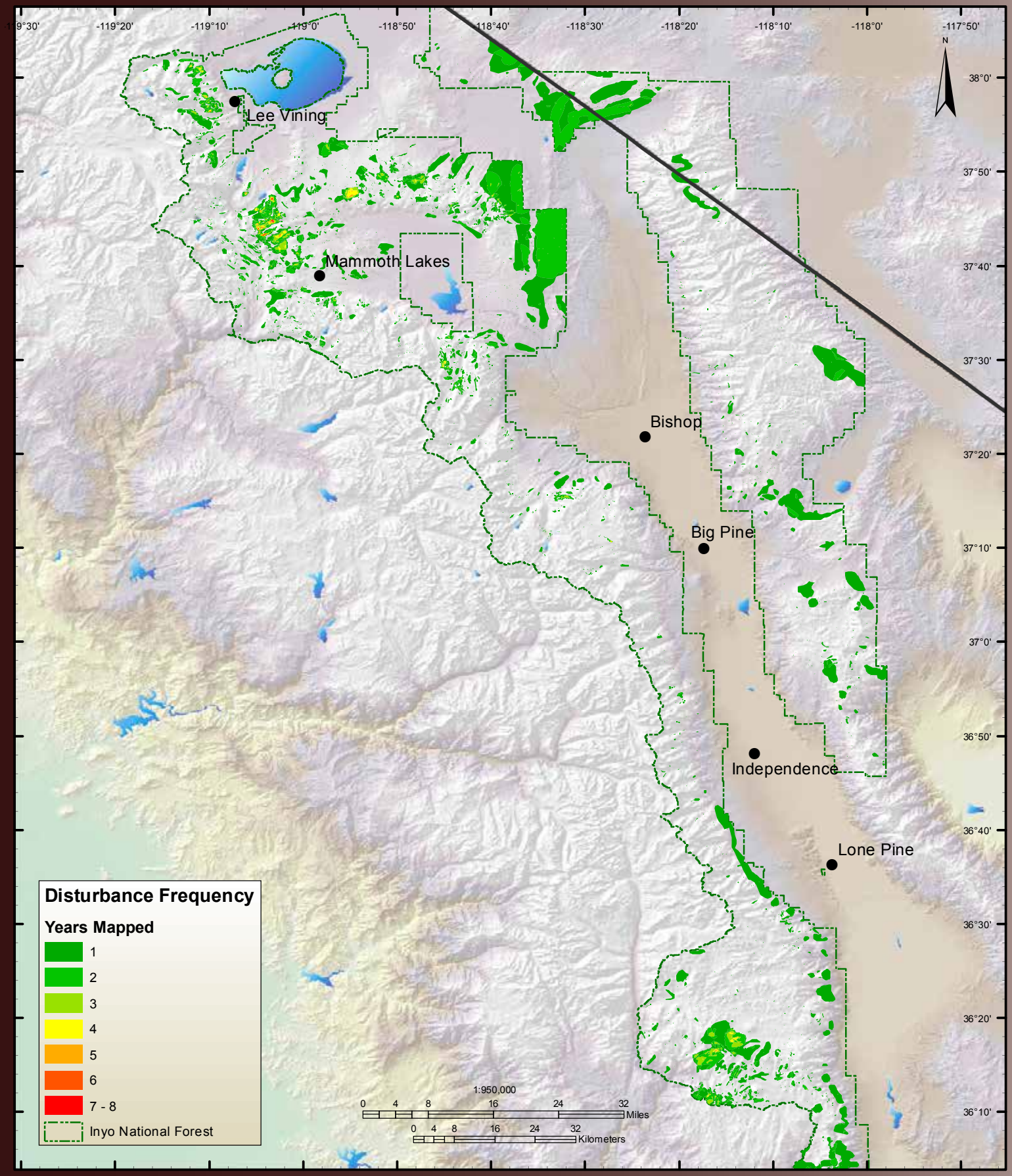
Inyo National Forest, Cumulative Mortality & Damage 1994 - 2012



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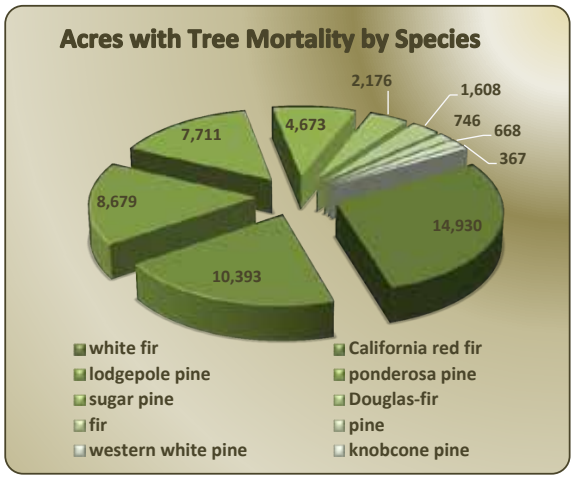
Klamath National Forest

Lodgepole mortality at Shovel Creek.

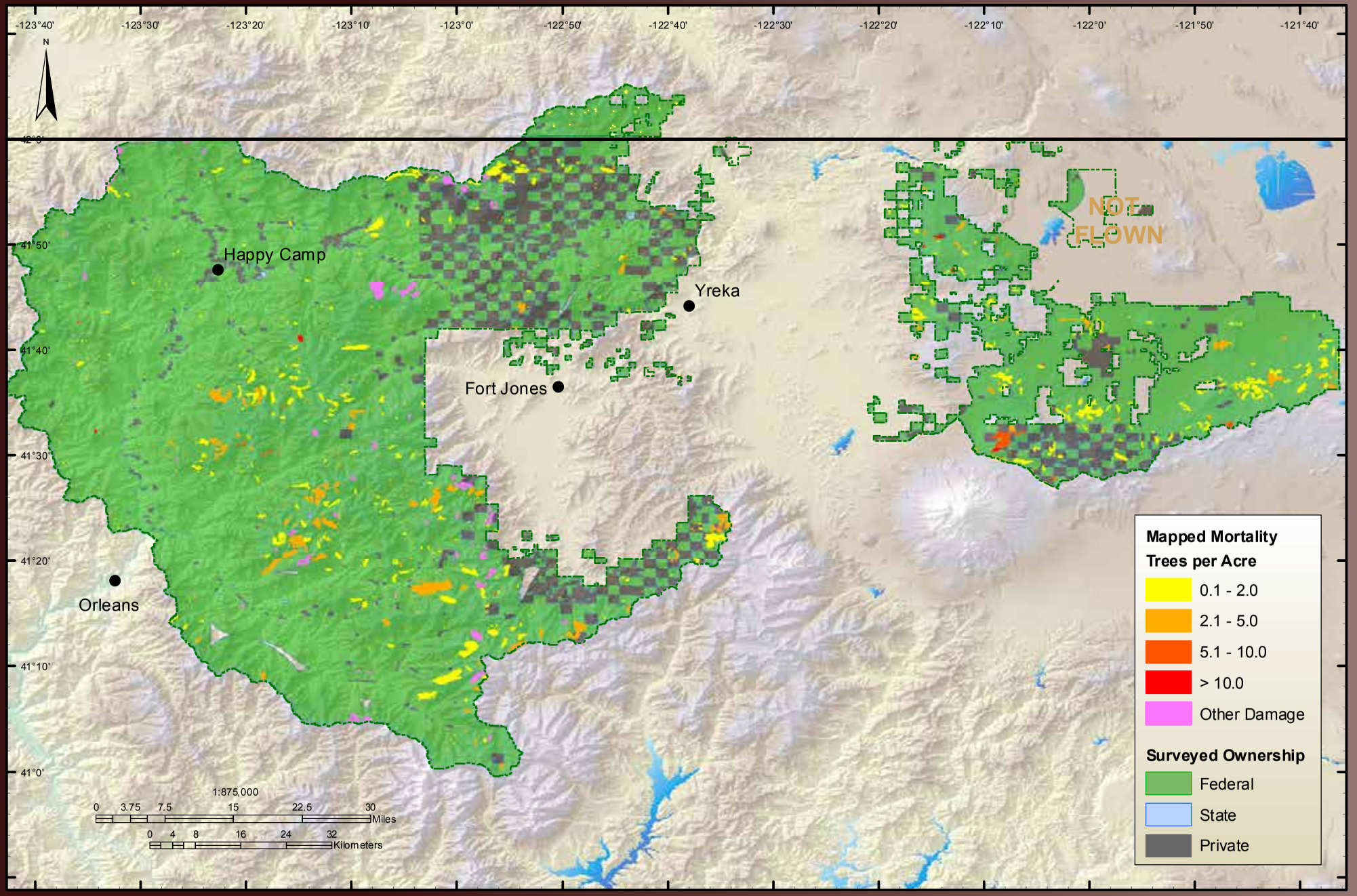
Overview

- 51,853 acres were mapped as having current disturbance activity within the forest boundaries in 2012, a decrease from the 82,917 acres mapped in 2011.
- Approximately 79% (40,893 acres) contained recent tree mortality. Unlike the majority of Region 5 Forests, true fir comprised the bulk of the mortality.
- 8,827 acres (approximately 17%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 19,081 acres (approximately 37%) of damage polygons occurred within designated wilderness areas.
- Generally, damage was both more widespread and severe in southern portions of the forest.
- Many red fir stands on ridgetops were observed to be in declining conditions from Cytospora canker and fir engraver activity.
- The areas of the Forest mapped most often in recent years are located around Hole-in-the-Ground Geologic Area and Ball Mountain on the Goosenest Ranger District with fourteen years of recorded disturbance activity.

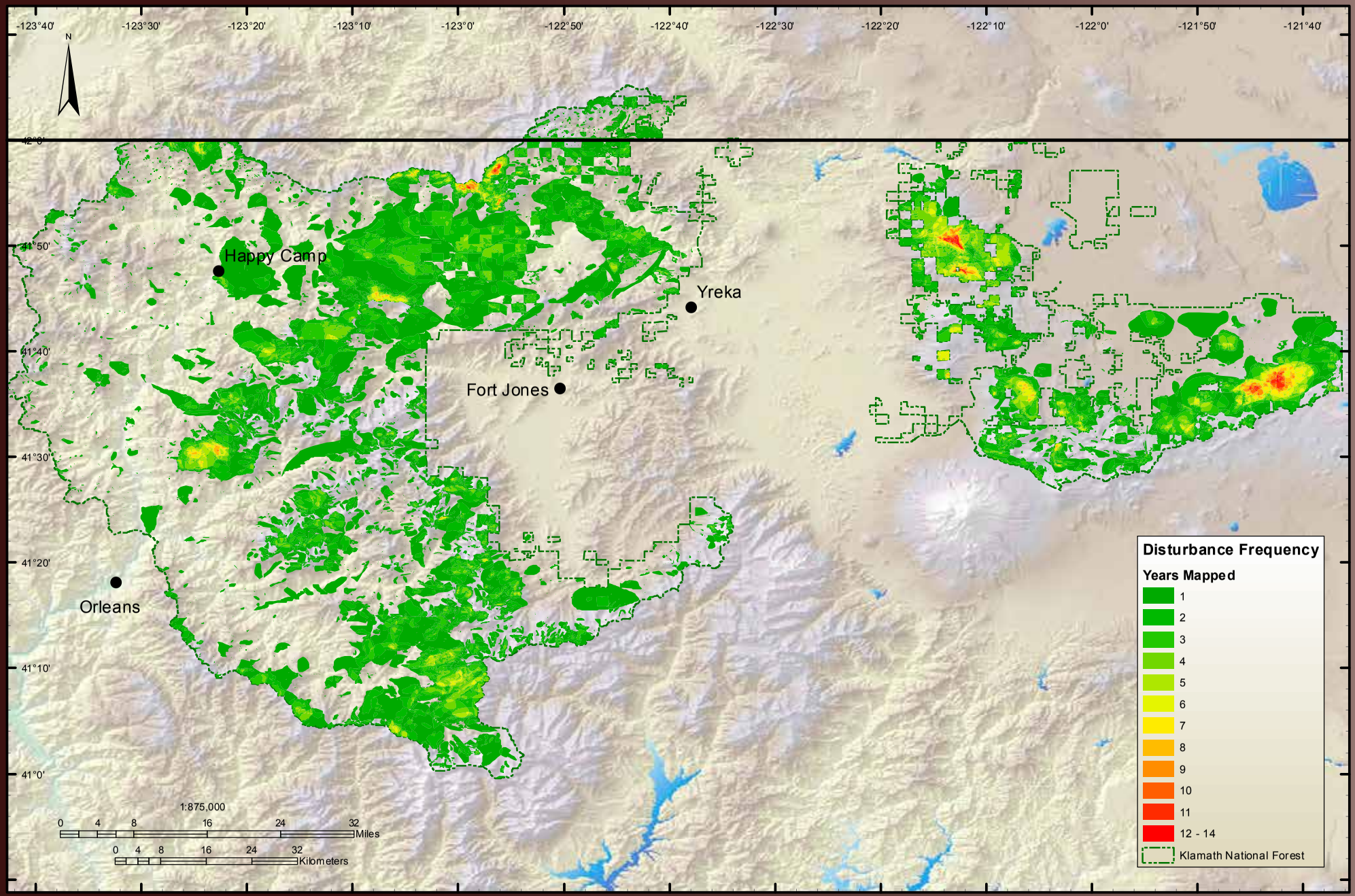
Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
white fir	14,930	10,617	7,237
California red fir	10,393	18,239	9,333
lodgepole pine	8,679	4,903	4,525
ponderosa pine	7,711	4,602	3,852
sugar pine	4,673	1,068	541
Douglas-fir	2,176	1,287	1,083
fir	1,608	3,444	3,624
pine	746	0	0
western white pine	668	12	0
knobcone pine	367	435	0
Forest Disturbance other than Tree Mortality			
California red fir[1]	9,313	17,453	4,703
[1]Branch flagging (cytospora)			



Klamath National Forest, 2012



Klamath National Forest, Cumulative Mortality & Damage 1993 - 2012



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Forest not flown 1999.

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Lake Tahoe Basin Management Unit

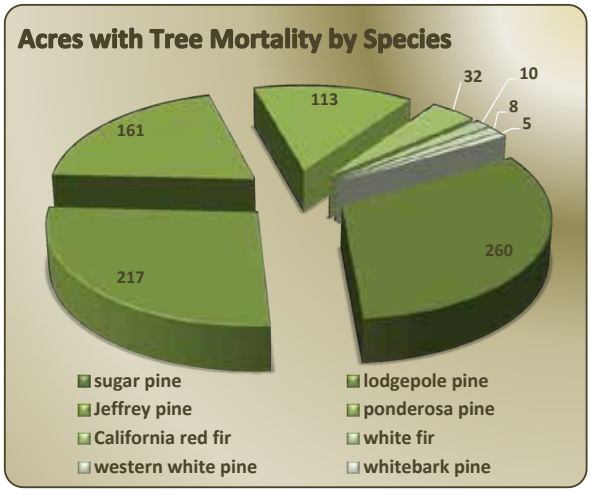
Lodgepole pine mortality at High Meadows.

Overview

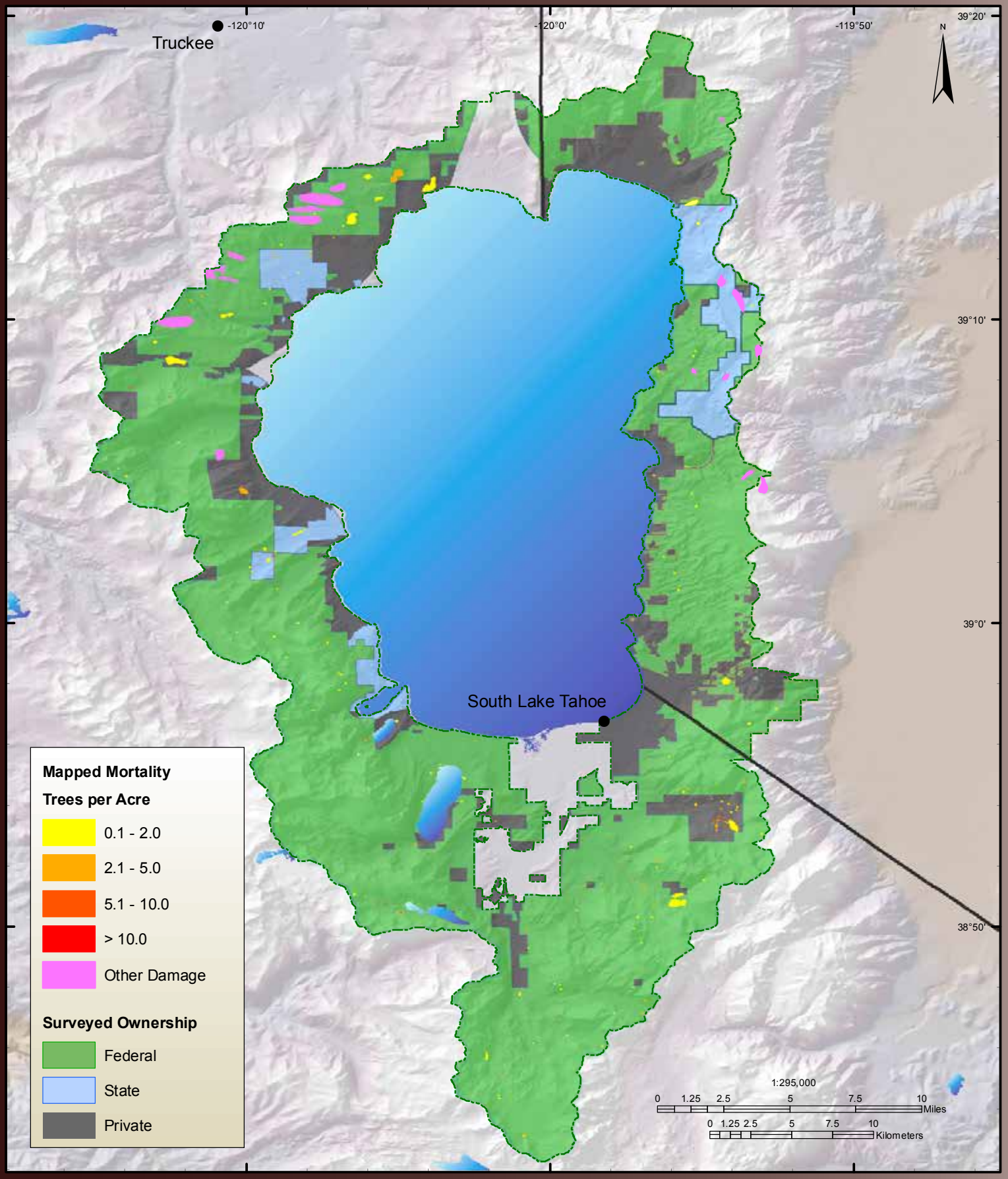
- 1,709 acres were mapped as having current disturbance activity within the forest boundaries in 2012, less than half of the 3,683 acres mapped in 2011.
- Approximately 37% (629 acres) contained recent tree mortality. Pine comprised 93% of the total mortality.
- 1,647 acres (approximately 96%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 11 acres (approximately 0.6%) of damage polygons occurred within designated wilderness areas.
- Larger areas of scattered overstory pine mortality were detected around the northwestern portion of the management unit.
- The area of the Basin mapped most often in recent years is located next to Page Meadows east of Tahoe City, having ten years of recorded disturbance activity.

Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
sugar pine	260	25	1
lodgepole pine	217	834	668
Jeffrey pine	161	181	185
ponderosa pine	113	0	0
California red fir	32	398	6
white fir	10	1,243	4,123
western white pine	8	1	16
whitebark pine	5	6	17
Forest Disturbance other than Tree Mortality			
California red fir[1]	982	0	0
quaking aspen[2]	211	39	0

[1]branch flagging (cytospora) [2]defoliation and general decline



Lake Tahoe Basin Management Unit, 2012



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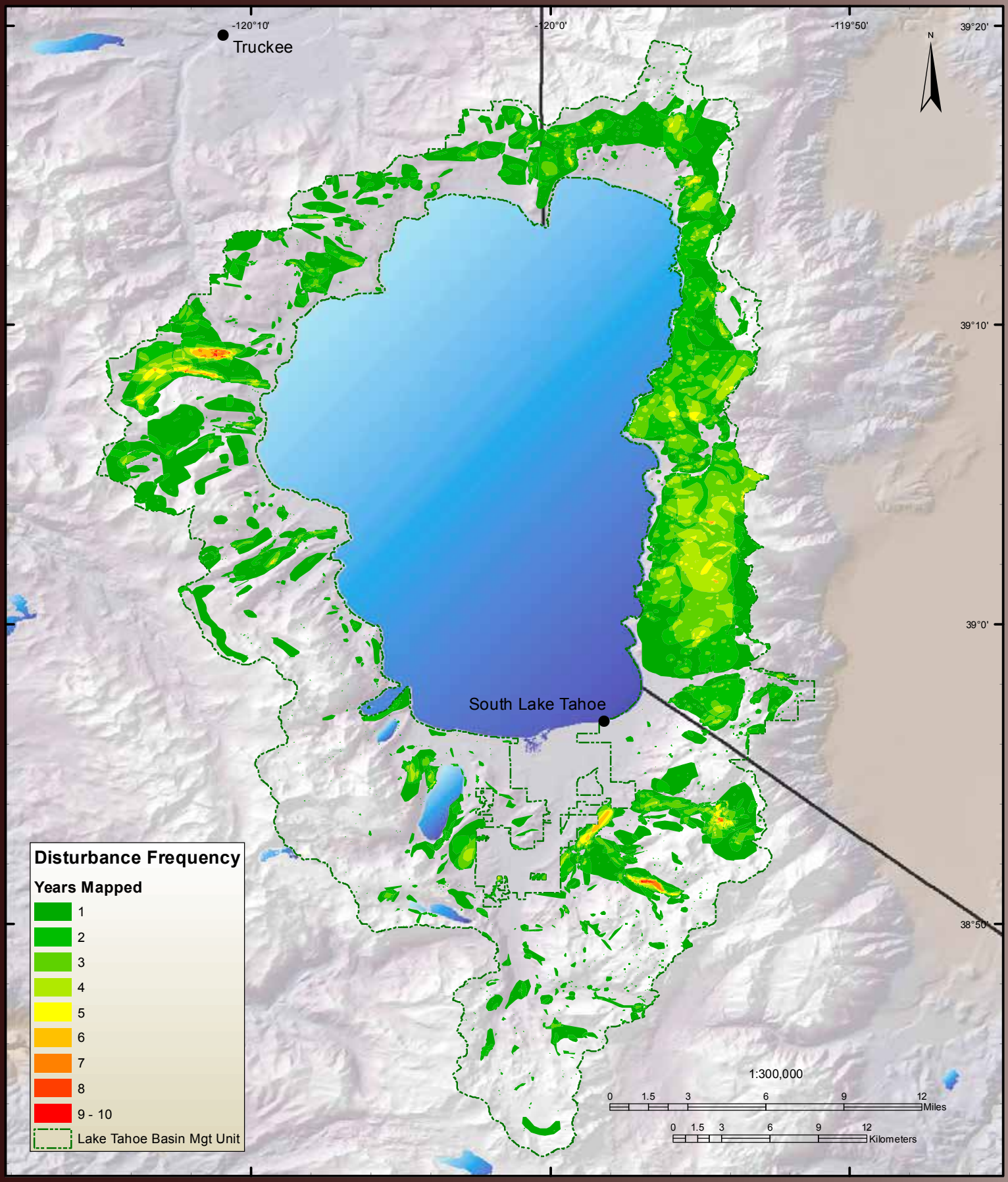
Lake Tahoe Basin Management Unit, Cumulative Mortality & Damage 1993 - 2012



USDA Forest Service
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Forest Health Monitoring Program
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Lassen National Forest

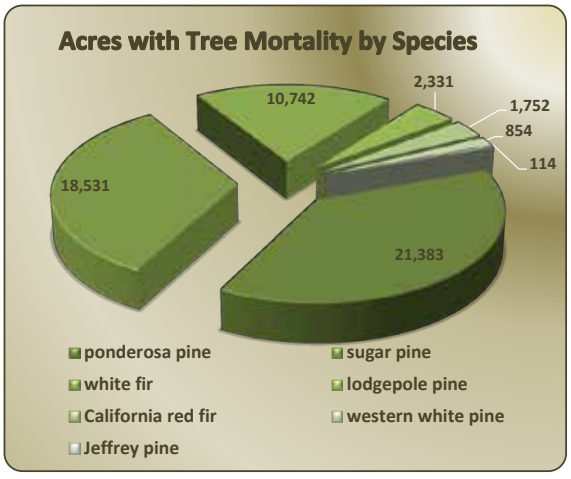
Pockets of ponderosa pine mortality near Deer Creek.

Overview

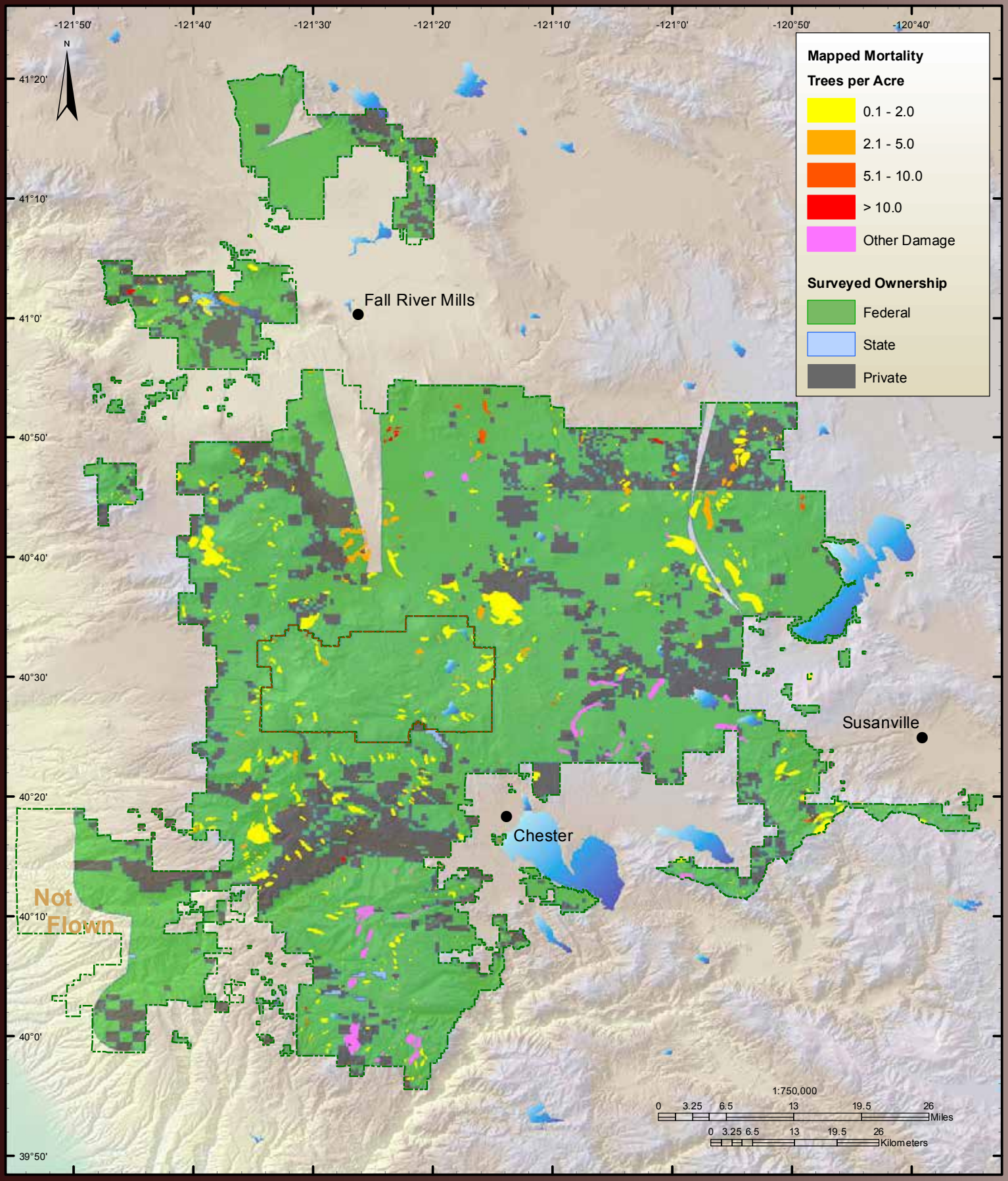
- 44,195 acres were mapped as having current disturbance activity within the forest boundaries in 2012 about 67% of the 66,449 acres mapped in 2011.
- Approximately 80% (35,516 acres) contained recent tree mortality. About 64% of mortality was attributed to pine.
- 12,272 acres (approximately 28%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 2,827 acres (approximately 6%) of damage polygons occurred within designated wilderness areas.
- Additionally, 2,953 acres of disturbance were mapped on the Lassen Volcanic National Park. Much of that disturbance was attributed to mountain pine beetle in lodgepole pine.
- In general pine mortality increased across the board while fir mortality decreased.
- The area of the Forest mapped most often in recent years is located south of Eiler Peak within the Thousand Lakes Wilderness, having sixteen years of recorded disturbance activity.

Forest Disturbance Activity and Trends			
*Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
ponderosa pine	21,383	9,833	33,973
sugar pine	18,531	5,894	385
white fir	10,742	37,164	91,999
lodgepole pine	2,331	9,393	15,755
California red fir	1,752	3,698	27,516
western white pine	854	232	78
Jeffrey pine	114	584	2,304
Forest Disturbance other than Tree Mortality			
California red fir[1]	3,833	2,313	26,662
white fir[2]	6,323	1,377	884
lodgepole pine[3]	1,036	0	225
sugar pine[4]	204	0	0

[1]Branch flagging (cytospora) [2]defoliation/top kill [3]discoloration (frost, needleminer) [4]topkill *numbers do not include Lassen Volcanic National Park



Lassen National Forest & Lassen National Park, 2012



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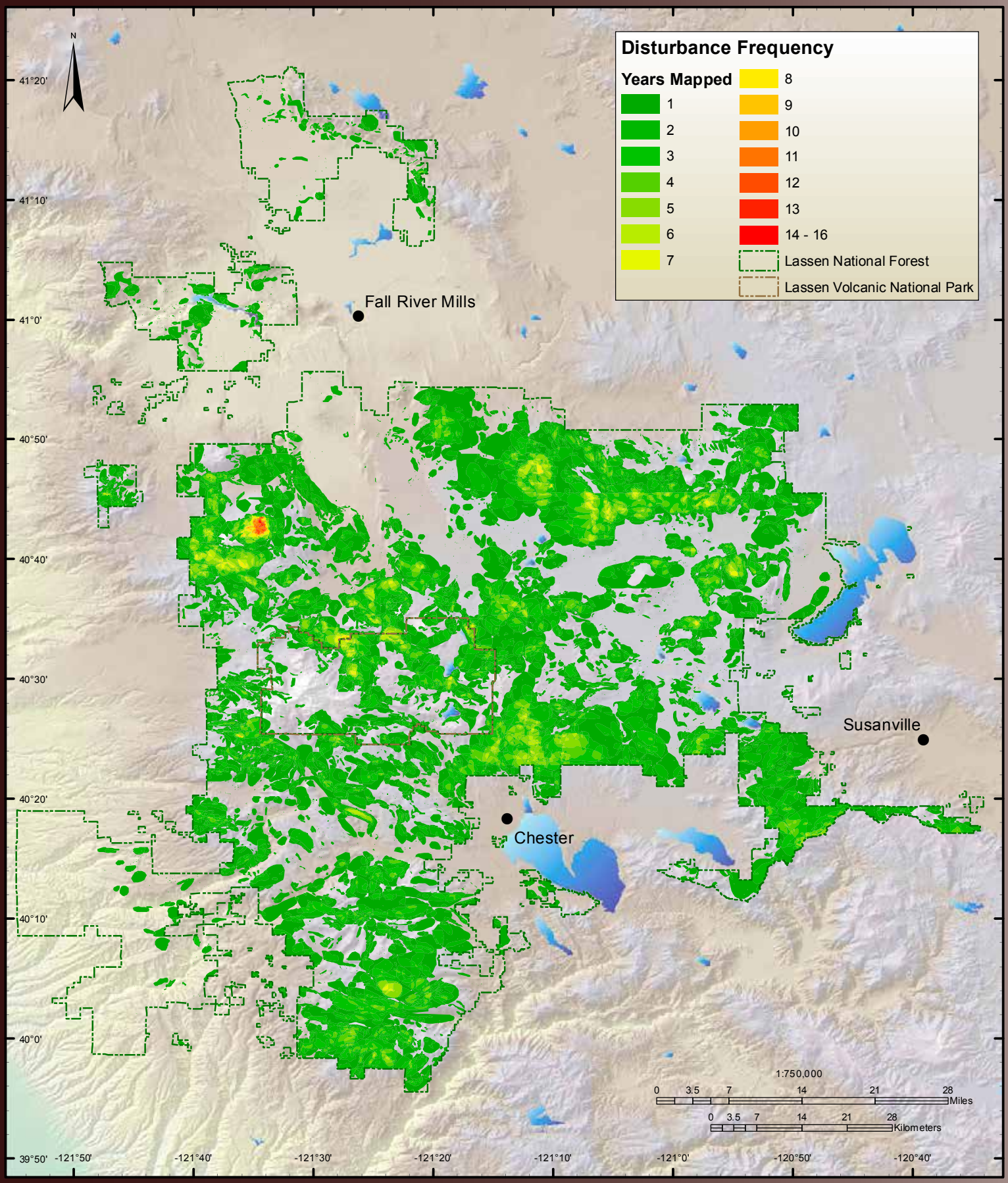
Lassen National Forest & Lassen National Park, Cumulative Mortality & Damage 1994 - 2012



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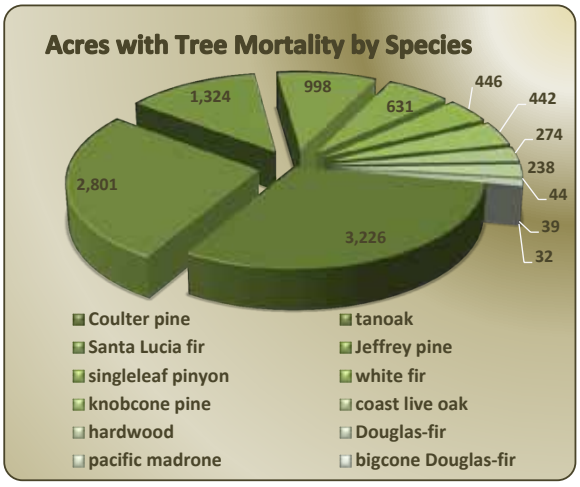
Los Padres National Forest

Tanoak mortality from sudden oak death on the Monterey Ranger District.

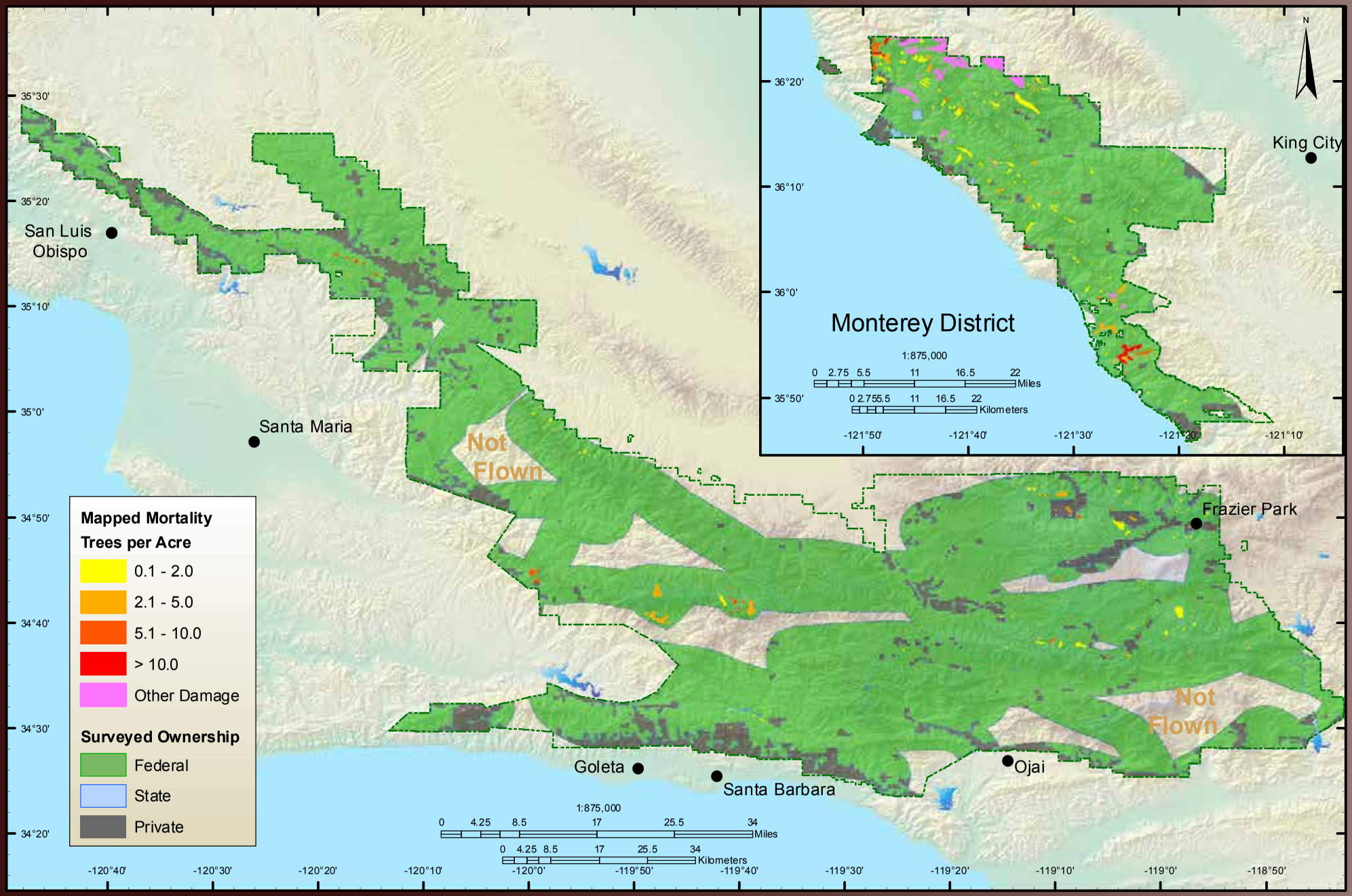
Overview

- 15,164 acres were mapped as having current disturbance activity within the forest boundaries in 2012, a huge jump from the 4,302 acres mapped in 2011.
- Approximately 59% (8,995 acres) contained recent tree mortality. Mortality was a mix of pine (42%) and oaks (37%).
- 7,889 acres (approximately 52%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 12,501 acres (approximately 82%) of damage polygons occurred within designated wilderness areas.
- A dramatic increase in the amount of oak (primarily tanoak) mortality increased this year as in other areas along the coast attributable to sudden oak death.
- The other major forest disturbance recorded on the Las Padres was 6,138 acres of discolored and declining oak, madrone, and other hardwoods.
- The area of the Forest mapped most often in recent years is located west of Devil's Peak on the Monterey Ranger District having seven years of recorded disturbance activity.

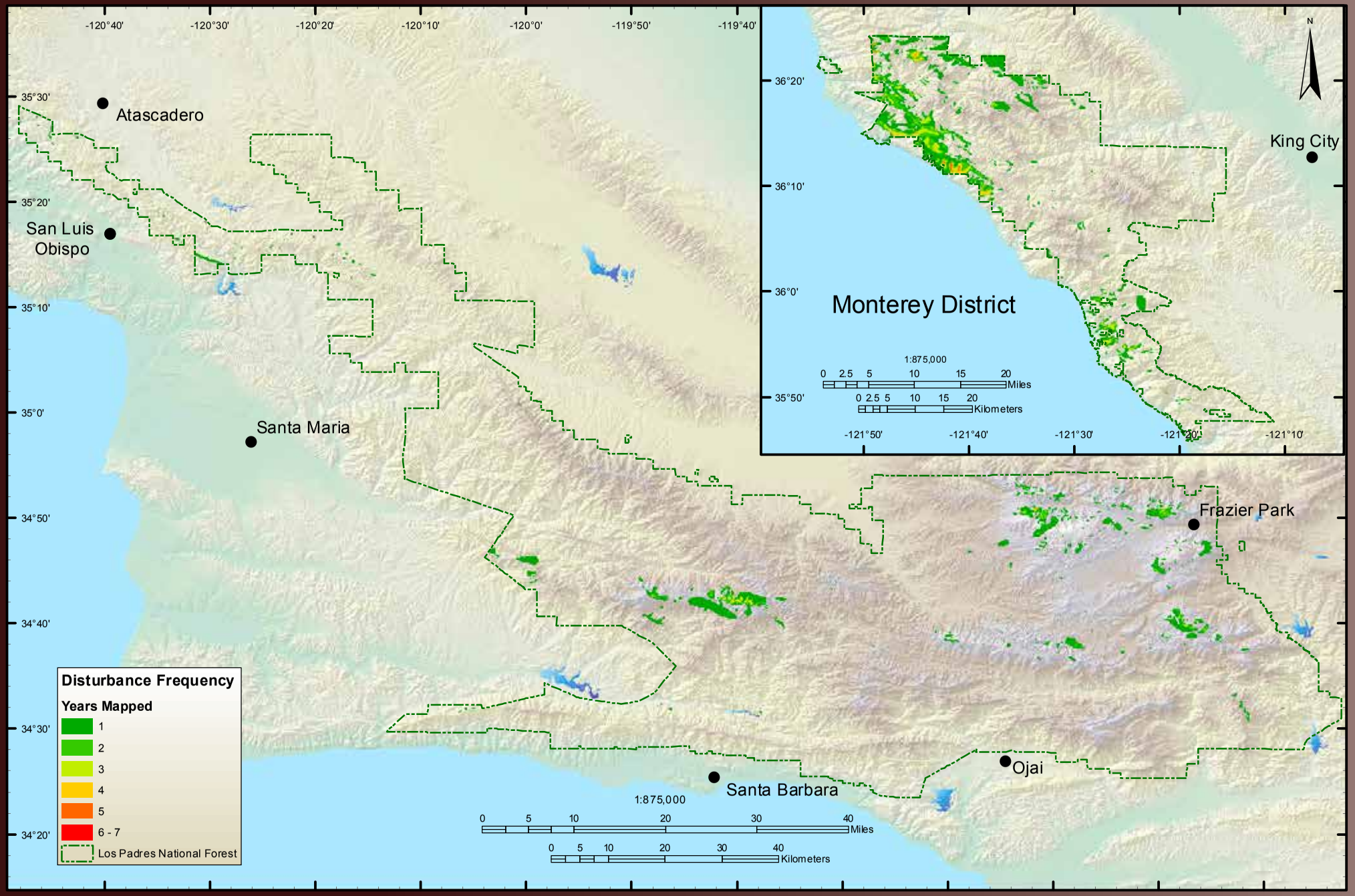
Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
Coulter pine	3,226	686	114
tanoak	2,801	11	18
Santa Lucia fir	1,324	92	3
Jeffrey pine	998	1,270	2,660
singleleaf pinyon	631	4	0
white fir	446	27	235
knobcone pine	442	0	0
coast live oak	274	122	69
hardwood	238	652	59
Douglas-fir	44	6	1
pacific madrone	39	0	0
bigcone Douglas-fir	32	149	3,965



Los Padres National Forest, 2012



Los Padres National Forest, Cumulative Mortality & Damage 1994 - 2012



Forest not flown 1997-1999.

Mendocino National Forest

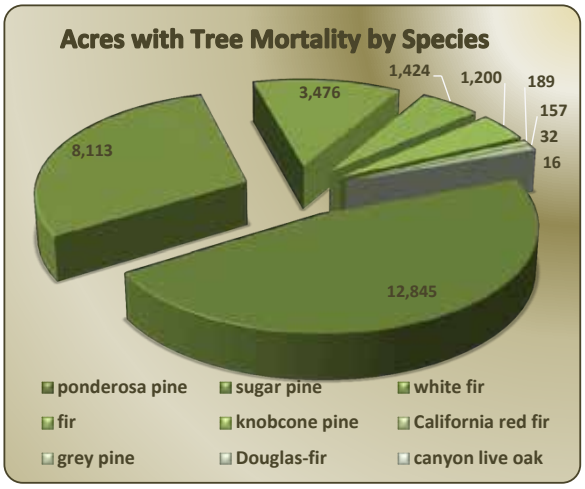
Pockets of ponderosa pine mortality near Thomes Creek.

Overview

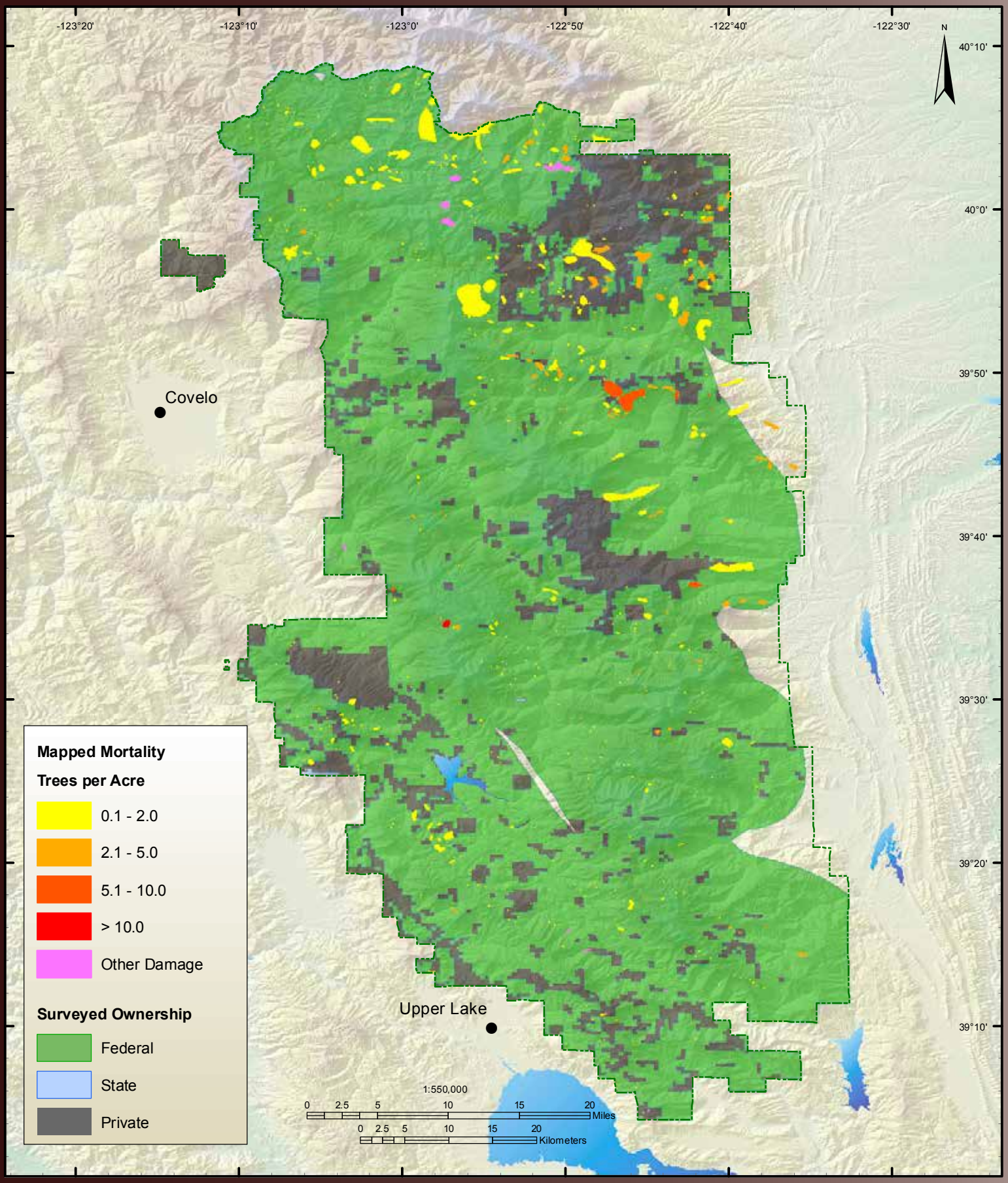
- 18,367 acres were mapped as having current disturbance activity within the forest boundaries in 2012, about half of the 36,678 acres mapped in 2011.
- Approximately 95% (17,417 acres) contained recent tree mortality. Pines comprised 70% of the mortality.
- 564 acres (approximately 3%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 7,082 acres (approximately 39%) of damage polygons occurred within designated wilderness areas.
- In general pine mortality increased across the board while fir mortality decreased.
- The area of the Forest mapped most often in recent years is located along Doll Ridge on the Grindstone Ranger District having eight years of recorded disturbance activity.

Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
ponderosa pine	12,845	10,921	5,112
sugar pine	8,113	4,270	22
white fir	3,476	2,026	14,385
fir	1,424	4,002	823
knobcone pine	1,200	233	1,010
California red fir	189	3,178	2,611
grey pine	157	13	85
Douglas-fir	32	0	0
canyon live oak	16	0	0
Forest Disturbance other than Tree Mortality			
California red fir[1]	678	122	992
knobcone pine[2]	190	346	10

[1]Branch flagging (cytospora) [2]Branch flagging (pitch canker) and discoloration (foliar disease)



Mendocino National Forest, 2012



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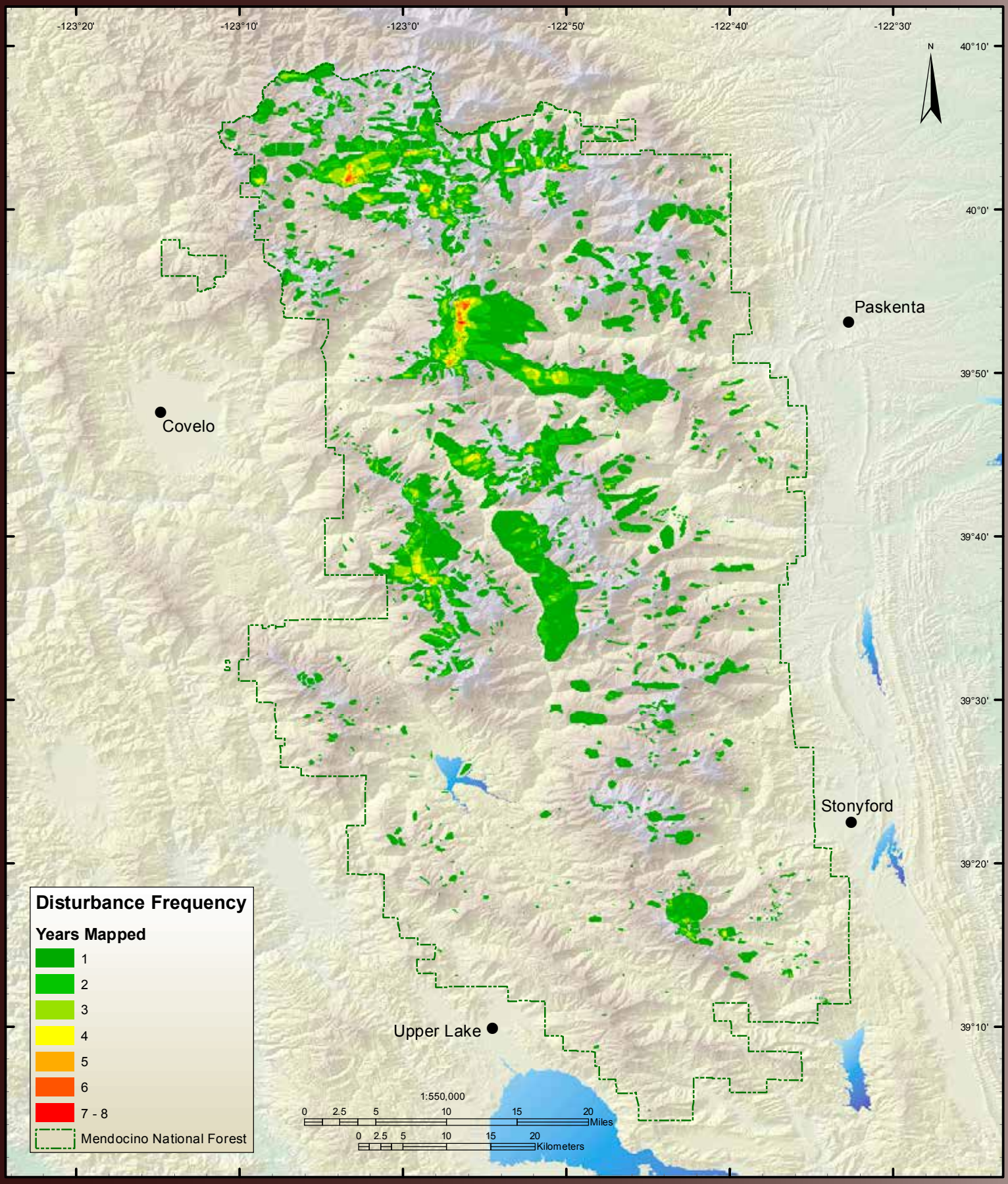
Mendocino National Forest, Cumulative Mortality & Damage 1995 - 2012



Forest not flown 2000-2001.

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Forest Health Protection

Forest Health Monitoring Program
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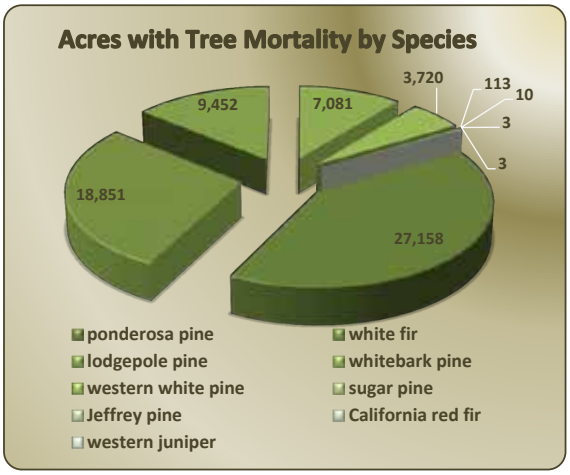
Modoc National Forest

Dead whitebark and lodgepole in the Warner Mountains.

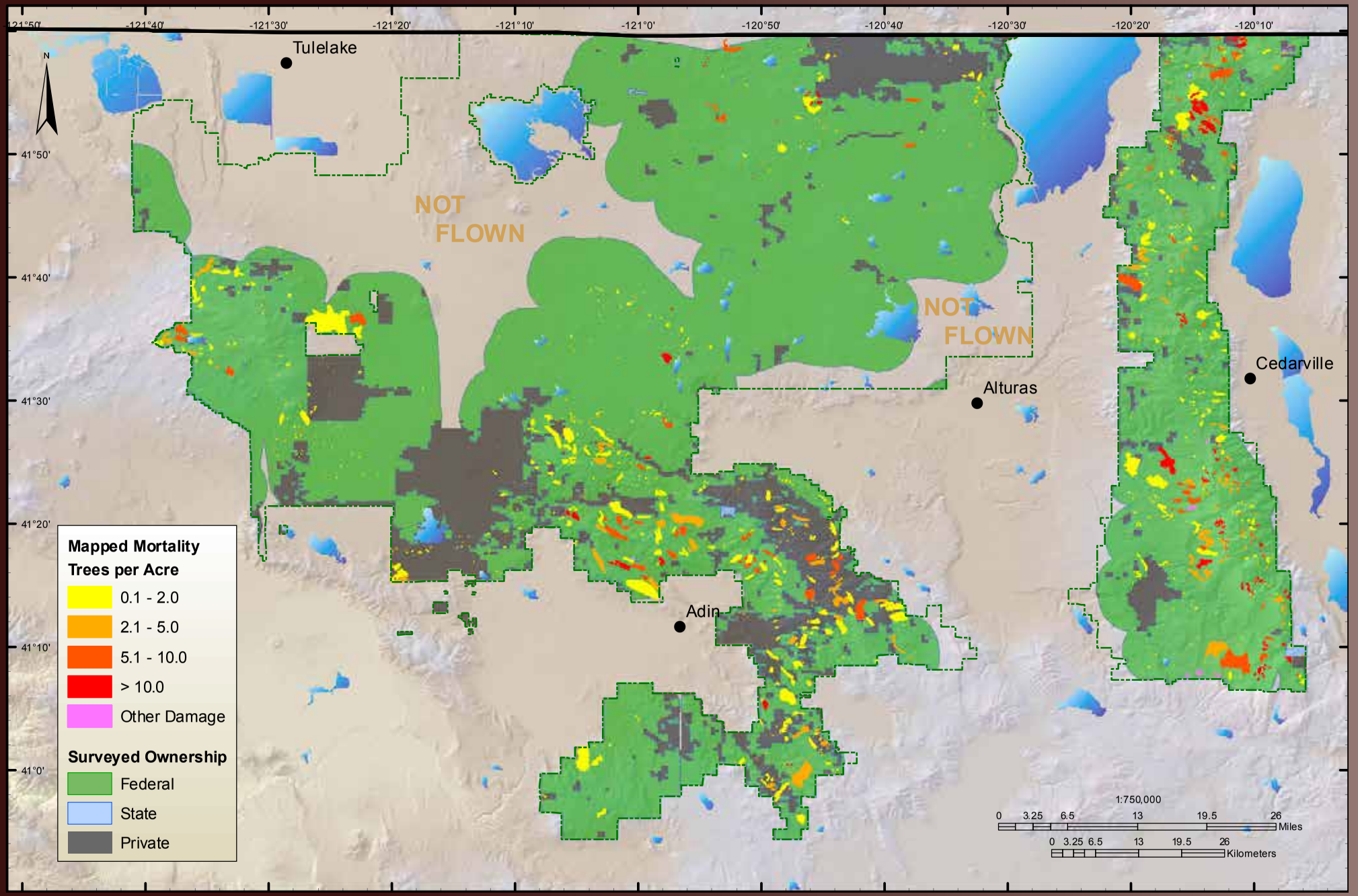
Overview

- 53,010 acres were mapped as having current disturbance activity within the forest boundaries in 2012, a 20% decrease from the 67,414 acres mapped in 2011.
- Approximately 99% (52,417 acres) contained recent tree mortality. About 64% of the mortality was mapped to pine.
- 18,436 acres (approximately 35%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 5,575 acres (11%) of damage polygons occurred within designated wilderness areas.
- In general both pine and, to a greater degree, fir mortality decreased from 2011.
- The Modoc NF consistently exhibits some of the most widespread and severe mortality events in the Region especially the Warner Mtn and eastern Big Valley Ranger Districts. However this is becoming less the issue since most of the suitable host has already been killed.
- The areas of the Forest mapped most often in recent years are Fandango Peak and east of Emerson Peak on the Warner Mountain Ranger District and north of Boyd Hill on the Big Valley Ranger District all with eleven years of recorded disturbance activity.

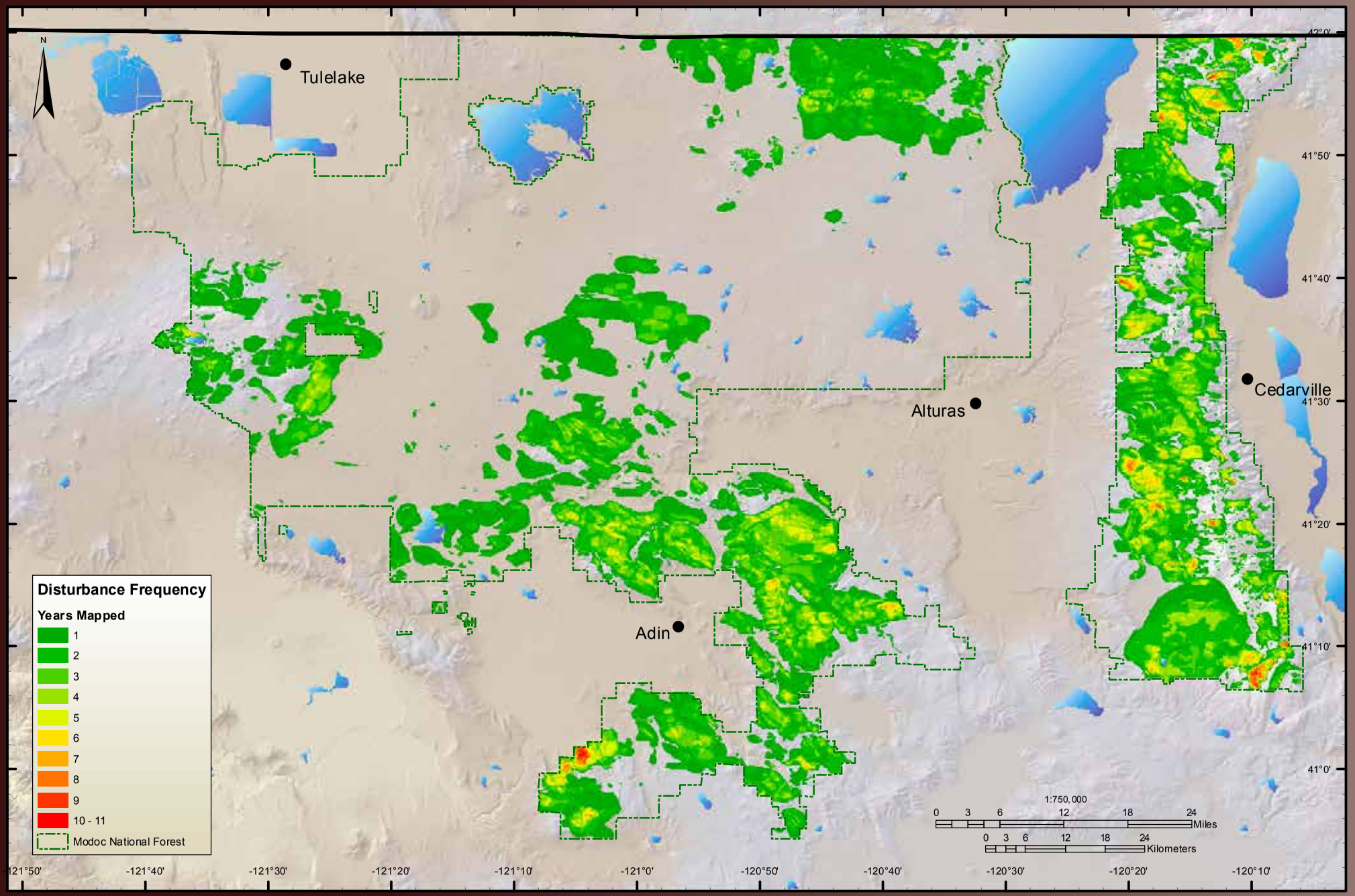
Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
ponderosa pine	27,158	29,923	24,346
white fir	18,851	32,637	29,610
lodgepole pine	9,452	11,616	9,116
whitebark pine	7,081	4,963	6,521
western white pine	3,720	4,987	1,401
sugar pine	113	1,247	1
Jeffrey pine	10	6,815	97
California red fir	3	2	0
western juniper	3	6	56
Forest Disturbance other than Tree Mortality			
quaking aspen[1]	256	35	0
ponderosa pine[2]	281	4	0
[1]defoliation and general decline/dieback [2]topkill			



Modoc National Forest, 2012



Modoc National Forest, Cumulative Mortality & Damage 1994 - 2012



USDA Forest Service
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Forest not flown 1997.

Forest Health Monitoring Program
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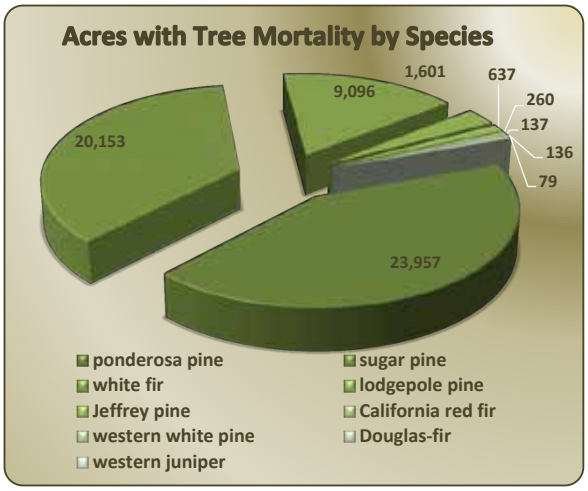
Plumas National Forest

Discoloration of fir due to white fir sawfly.

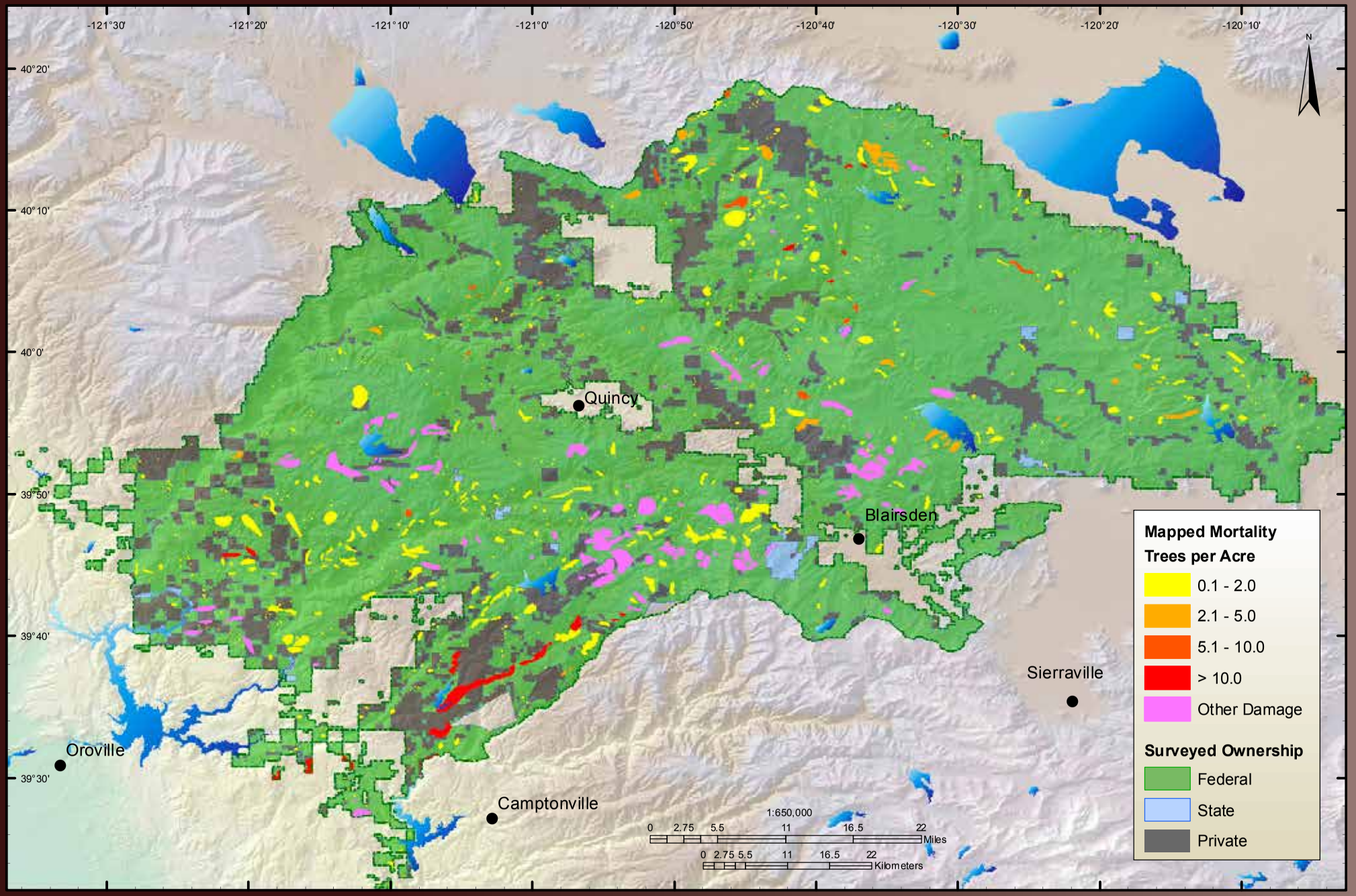
Overview

- 55,371 acres were mapped as having current disturbance activity within the forest boundaries in 2012, a slight increase from the 51,850 acres mapped in 2011.
- Approximately 61% (34,901 acres) contained recent tree mortality, with 73% of the mortality attributed to pines.
- 24,488 acres (approximately 43%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 1,983 acres (3%) of damage polygons occurred within designated wilderness areas.
- In general pine mortality increased across the board while fir mortality decreased.
- The area of the Forest mapped most often in recent years is located around Smith Peak on the Beckworth Ranger District having eight years of recorded disturbance activity.

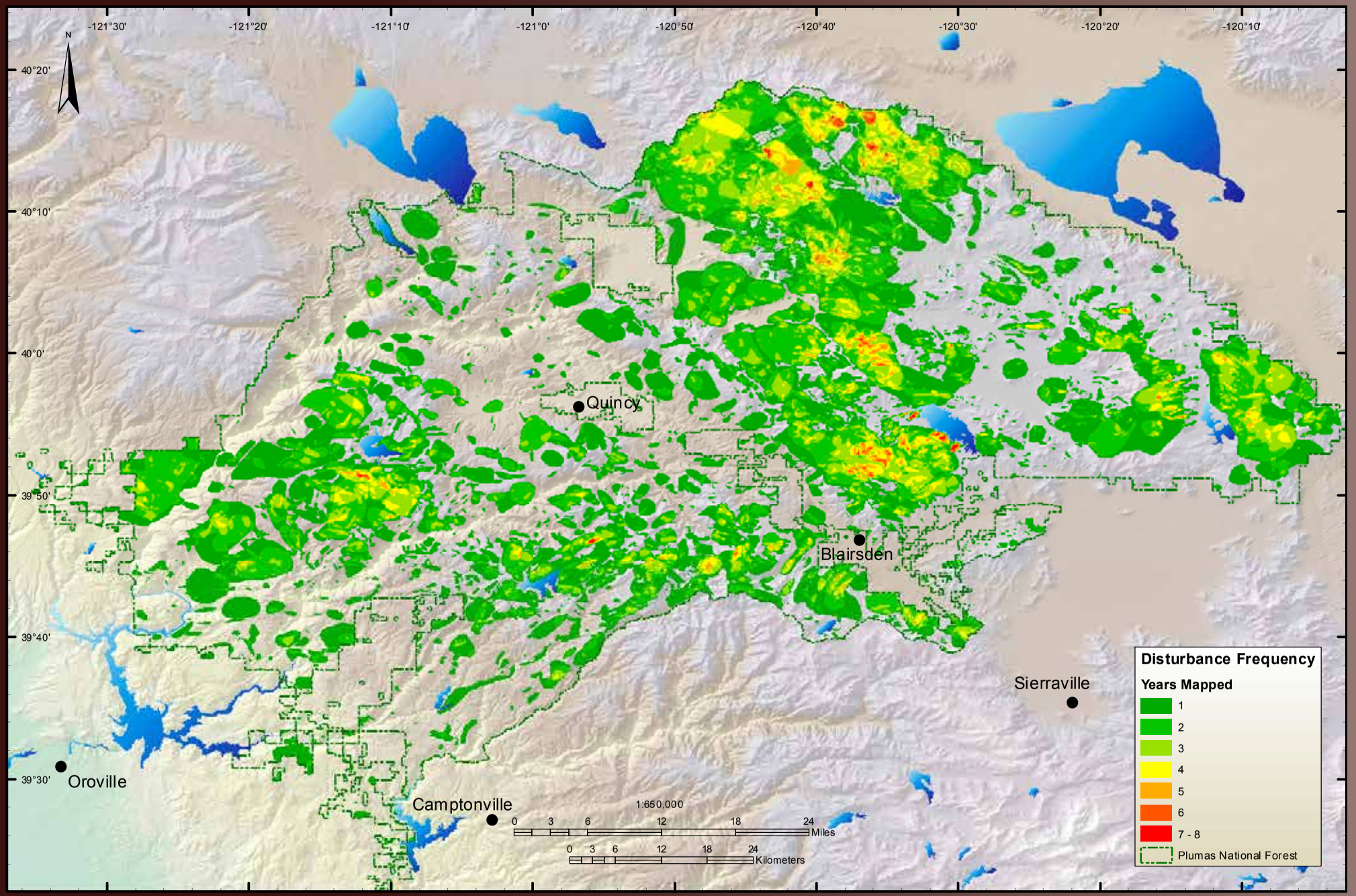
Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
ponderosa pine	23,957	3,205	11,092
sugar pine	20,153	2,881	432
white fir	9,096	12,094	10,346
lodgepole pine	1,601	255	0
Jeffrey pine	637	3,787	1,050
California red fir	260	3,058	12,640
western white pine	137	13	10
Douglas-fir	136	1	0
western juniper	79	0	
Forest Disturbance other than Tree Mortality			
white fir[1]	15,243	54	10,067
California red fir[1]	2,982	8,176	9,794
[1]defoliation, branch flagging and topkill			



Plumas National Forest, 2012



Plumas National Forest, Cumulative Mortality & Damage 1995 - 2012



USDA Forest Service
Pacific Southwest Region
Forest Health Protection

Forest not flown 1999.

Forest Health Monitoring Program
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Point Reyes National Seashore & Golden Gate National Recreation Area

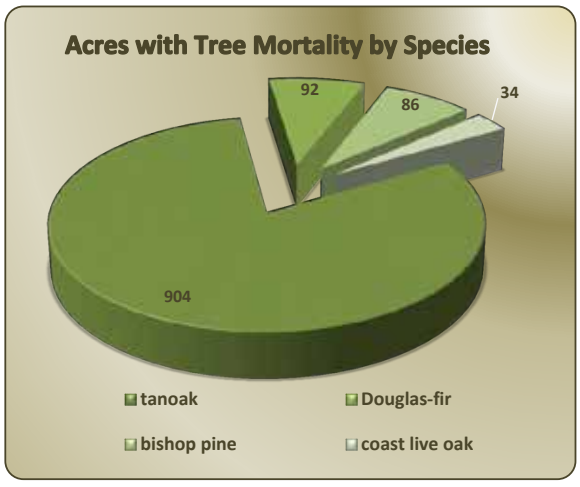
Tanoak mortality on Point Reyes.

Overview

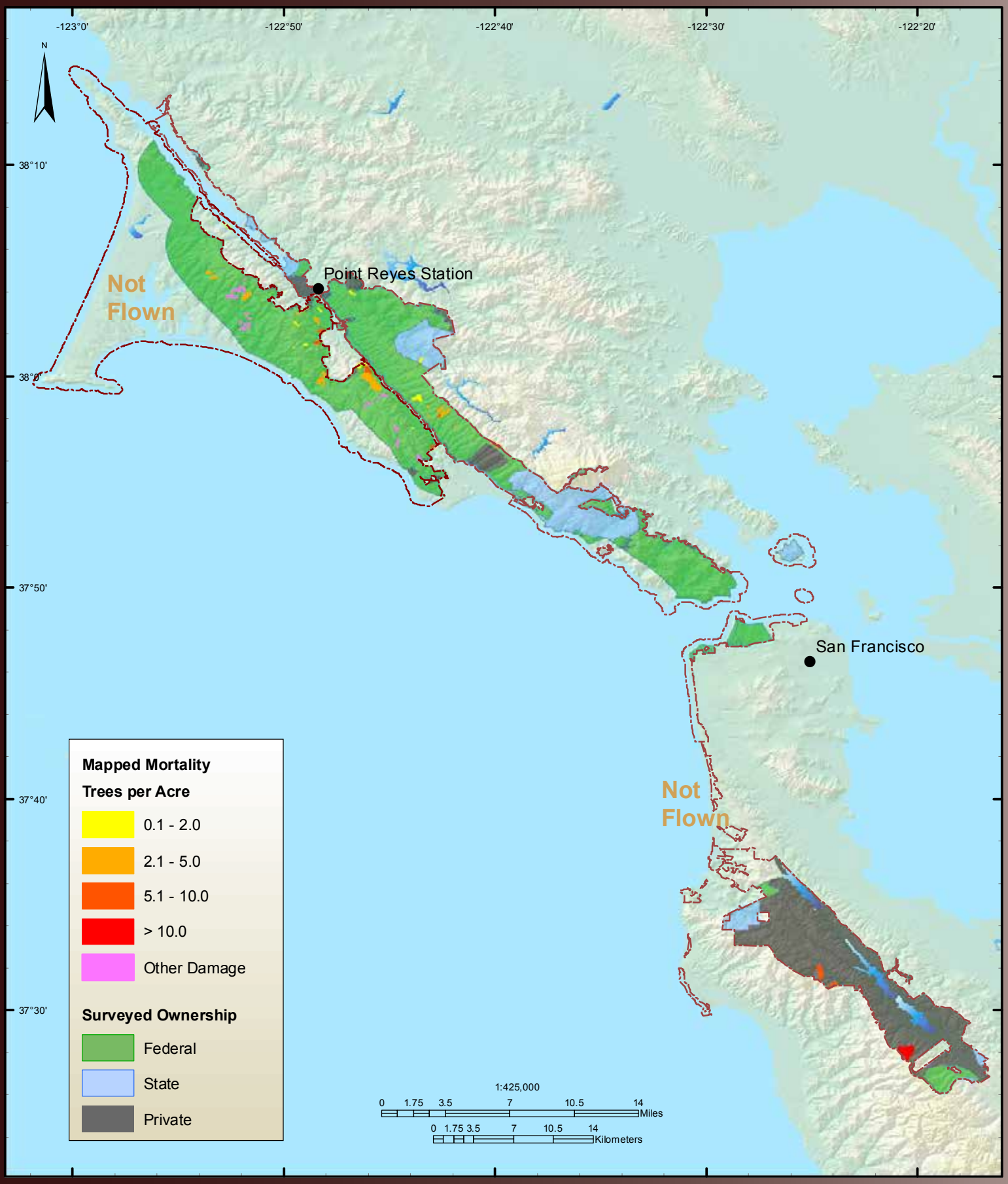
- 1,393 acres were mapped as having current disturbance activity within the forest boundaries in 2012, an increase from the 931 acres mapped in 2011.
- Approximately 80% (1,116 acres) contained recent tree mortality.
- The majority of this mortality was attributed to sudden oak death killing tanoak, and to a lesser extent coast live oak.
- The remaining acreage was primarily mapped as having branch flagging in bishop pine attributable to pitch canker.
- 1,064 acres (approximately 76%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 793 acres (approximately 57%) of damage polygons occurred within designated wilderness areas.
- Much of the Point Reyes peninsula was not flown due to a lack of forest type. Additionally, much of the Golden Gate NRA is not typically flown due to airspace issues around San Francisco International Airport.
- The area of these parks mapped most often in recent years is located on Mount Wittenberg southwest of Point Reyes Station having seven years of recorded disturbance activity.

Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
tanoak	904	73	32
Douglas-fir	92	53	32
bishop pine	86	4	649
coast live oak	34	11	34
Forest Disturbance other than Tree Mortality			
bishop pine[1]	169	750	699
coast live oak[2]	102	0	0
Monterey pine[1]	6	0	0
redwood[3]	2	0	0

[1]branch flagging/shoot dieback (pitch canker) [2]discoloration (drought/California oakworm) [3]mortality and topkill



Point Reyes National Seashore & Golden Gate National Recreation Area, 2012



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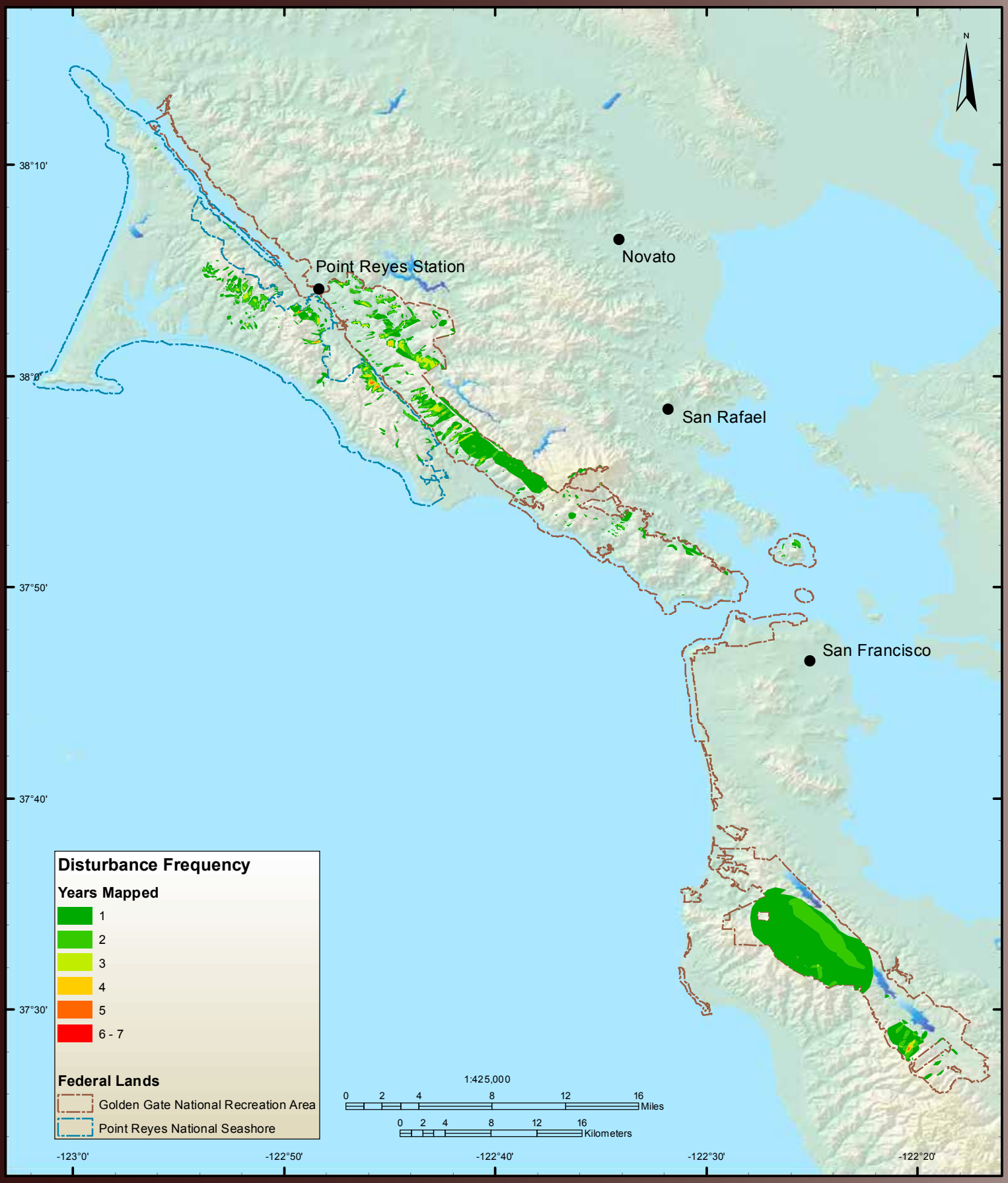
Point Reyes National Seashore & Golden Gate National Recreation Area, Cumulative Mortality & Damage 2001 - 2012



Parks not flown 2003-2004.

USDA Forest Service
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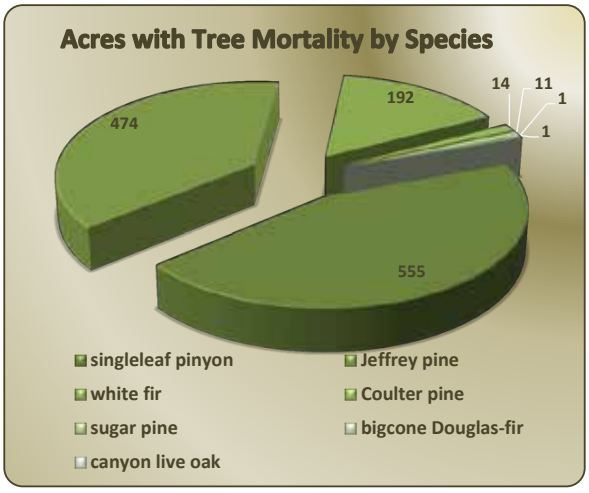
San Bernardino National Forest

Dead pine on the San Jacinto Ranger District.

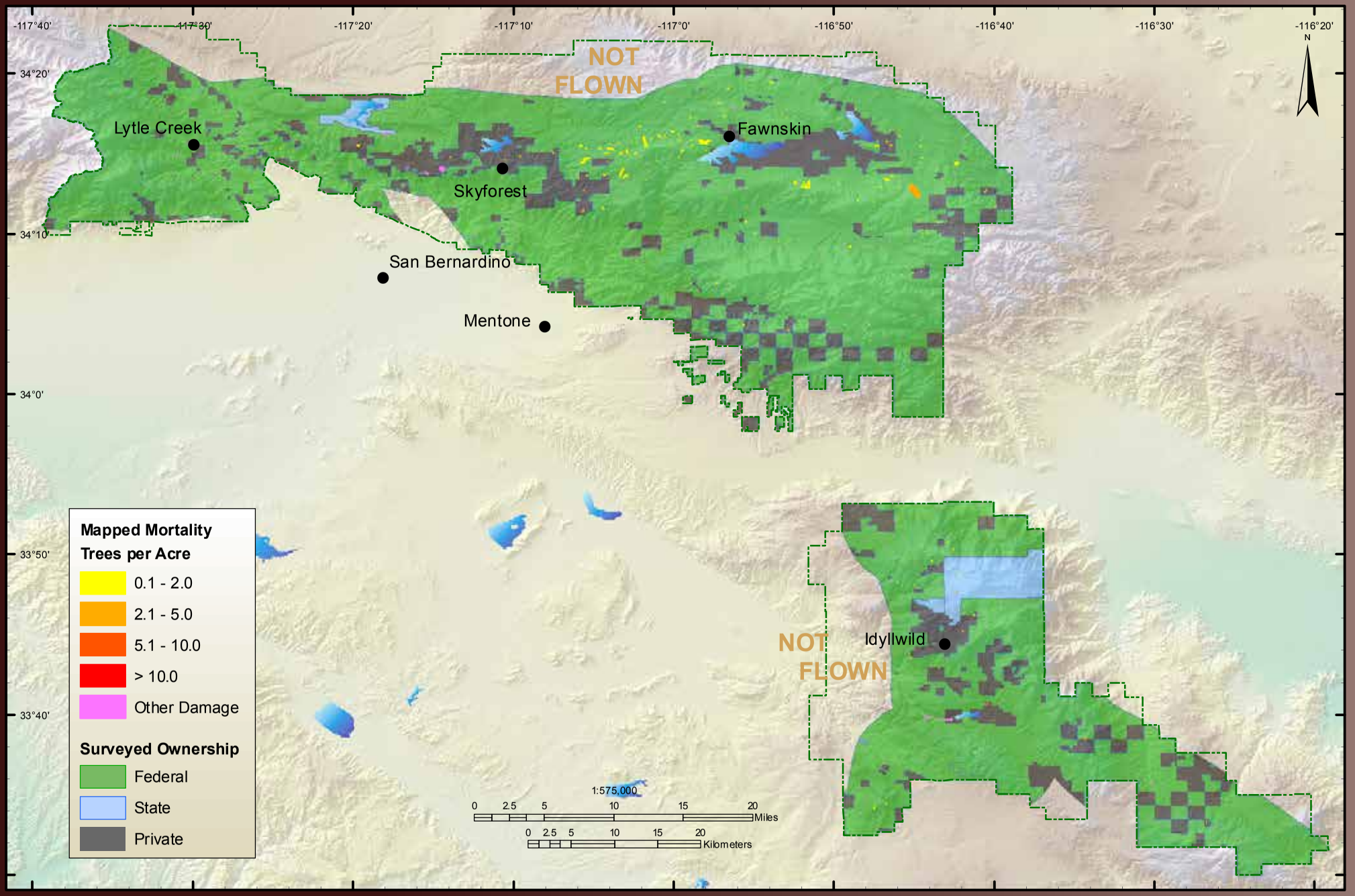
Overview

- 1,124 acres were mapped as having current disturbance activity within the forest boundaries in 2012, a large decrease from the 7,888 acres mapped in 2011.
- Approximately 82% (924 acres) contained recent tree mortality. Pines comprised 87% of the observed mortality.
- 988 acres (approximately 88%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 85 acres (approximately 8%) of damage polygons occurred within designated wilderness areas.
- In general pine (especially singleleaf pinyon) mortality increased across the board while fir and oak mortality decreased.
- The area of the Forest mapped most often in recent years is located near San Jacinto Peak on the San Jacinto Ranger District with seven years of recorded disturbance activity.

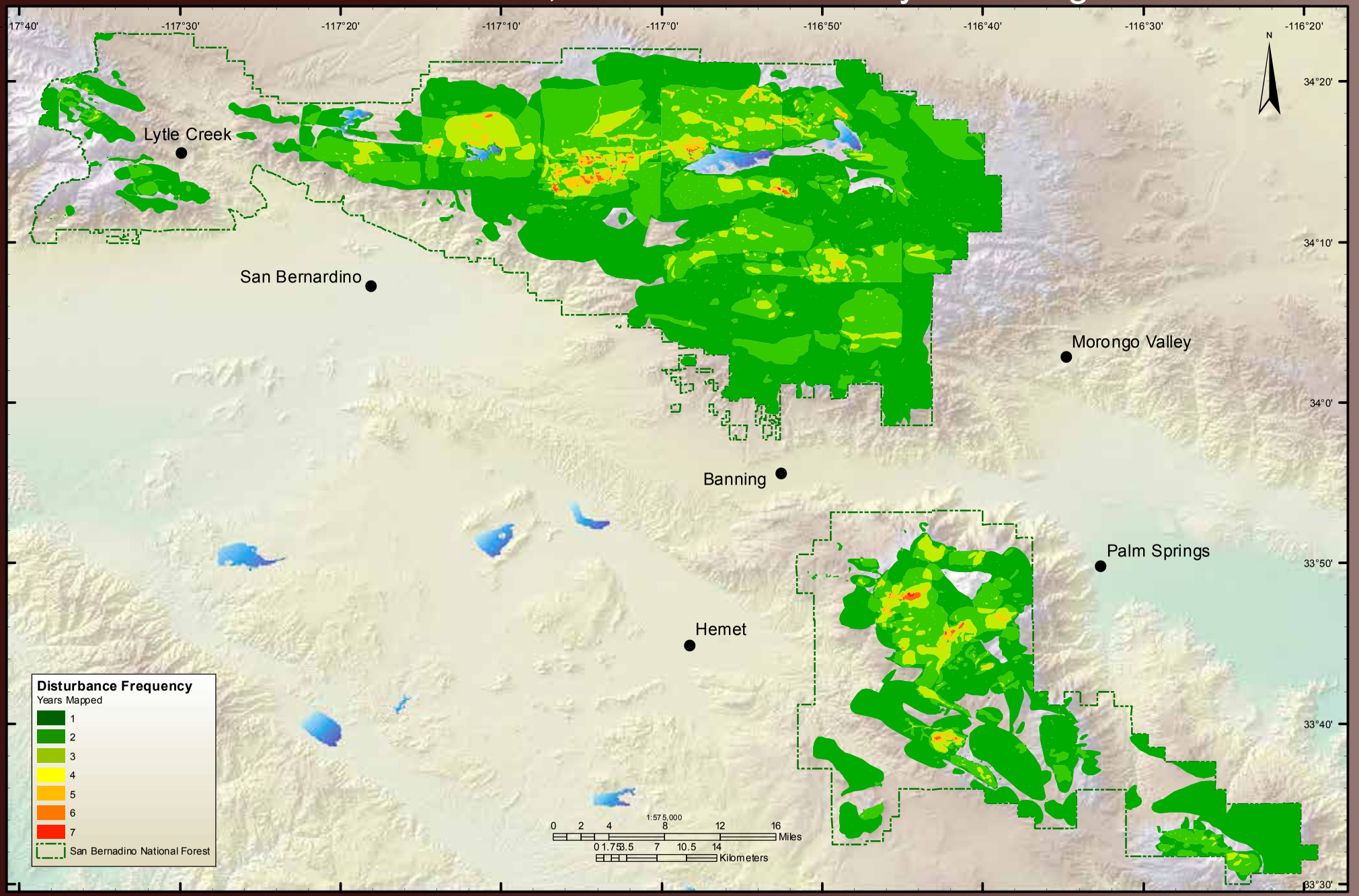
Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
singleleaf pinyon	555	86	18
Jeffrey pine	474	337	2,219
white fir	192	409	63
Coulter pine	14	21	161
sugar pine	11	5	5
bigcone Douglas-fir	1	21	1
canyon live oak	1	107	7
Forest Disturbance other than Tree Mortality			
California black oak[1]	119	8	0
white alder[1]	50	0	0
sugar pine[2]	31	0	0
Coulter pine[2]	6	0	0
[1]defoliation [2]topkill			



San Bernardino National Forest, 2012



San Bernardino National Forest, Cumulative Mortality & Damage 1994 - 2012



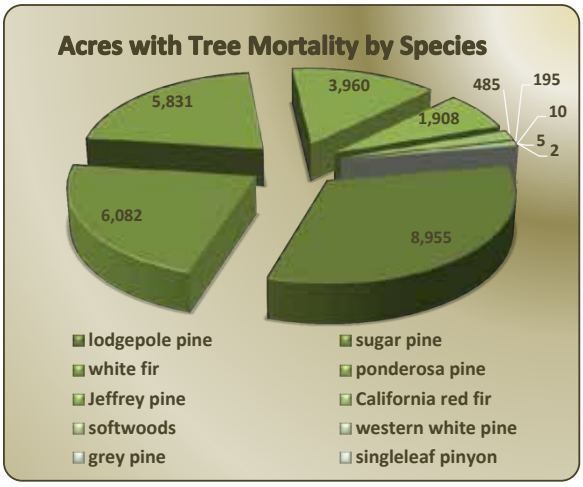
Sequoia National Forest

Cytospora canker of fir severe enough to be seen from the air on the Sequoia National Forest.

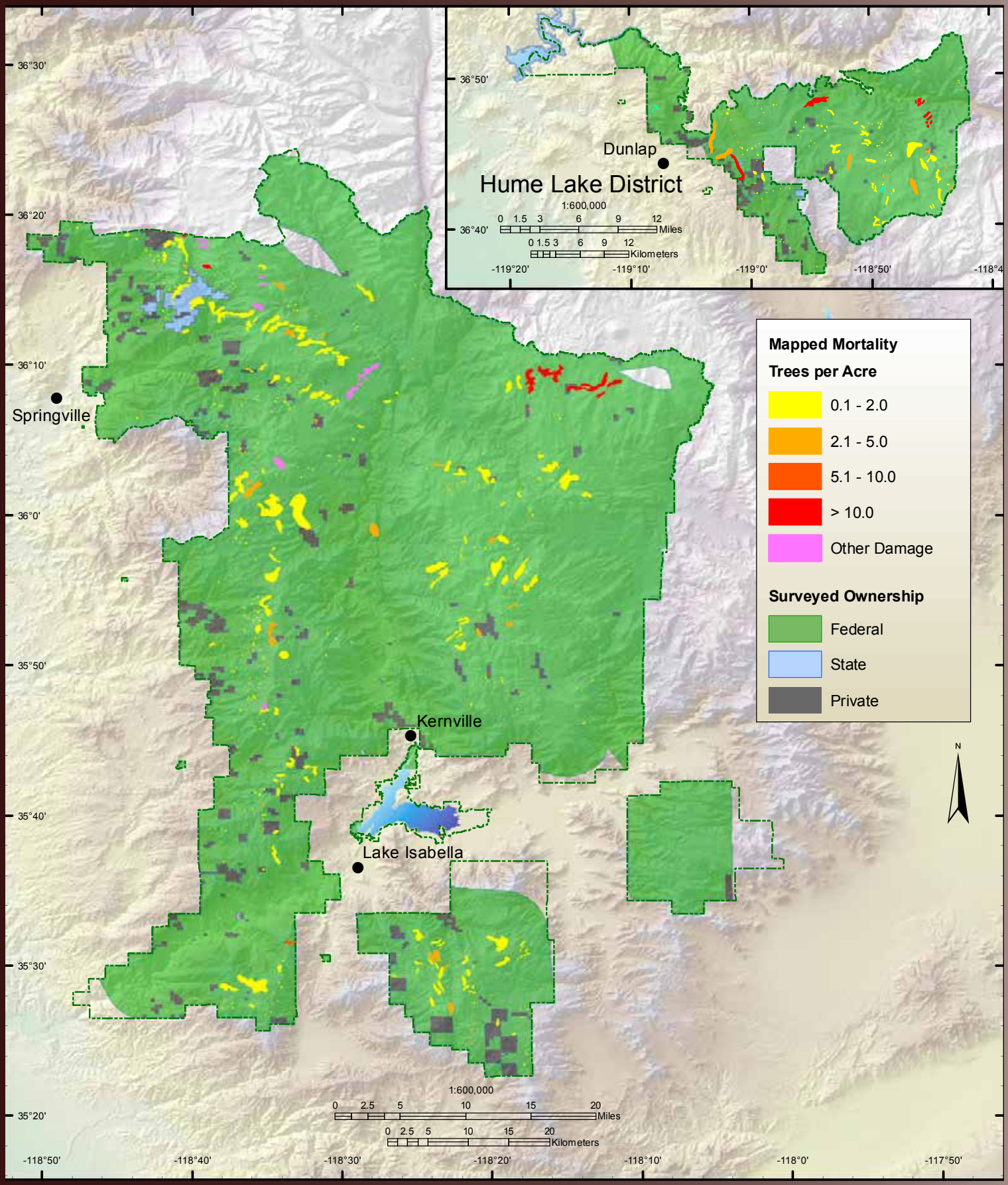
Overview

- 21,757 acres were mapped as having current disturbance activity within the forest boundaries in 2012, roughly unchanged from the 21,581 acres mapped in 2011.
- Approximately 94% (20,386 acres) contained recent tree mortality. Pines comprised 71% of the mortality.
- 11,124 acres (approximately 51%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 3,977 acres (approximately 18%) of damage polygons occurred within designated wilderness areas.
- Lodgepole pine mortality showed the most pronounced increase in mortality but may have been mapped as general softwood mortality in 2011.
- The area of the Forest mapped most often in recent years is located near Serretta Peak on the Kern River Ranger District having eleven years of recorded disturbance activity.

Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
lodgepole pine	8,955	80	6,300
sugar pine	6,082	433	25
white fir	5,831	542	36,474
ponderosa pine	3,960	1,159	6,245
Jeffrey pine	1,908	1,343	5,335
California red fir	485	673	11,903
softwoods	195	12,978	15,820
western white pine	10	0	0
grey pine	5	0	0
singleleaf pinyon	2	10	540
Forest Disturbance other than Tree Mortality			
California red fir[1]	1,009	4,695	8,596
[1]branch flagging (cytospora)			



Sequoia National Forest, 2012



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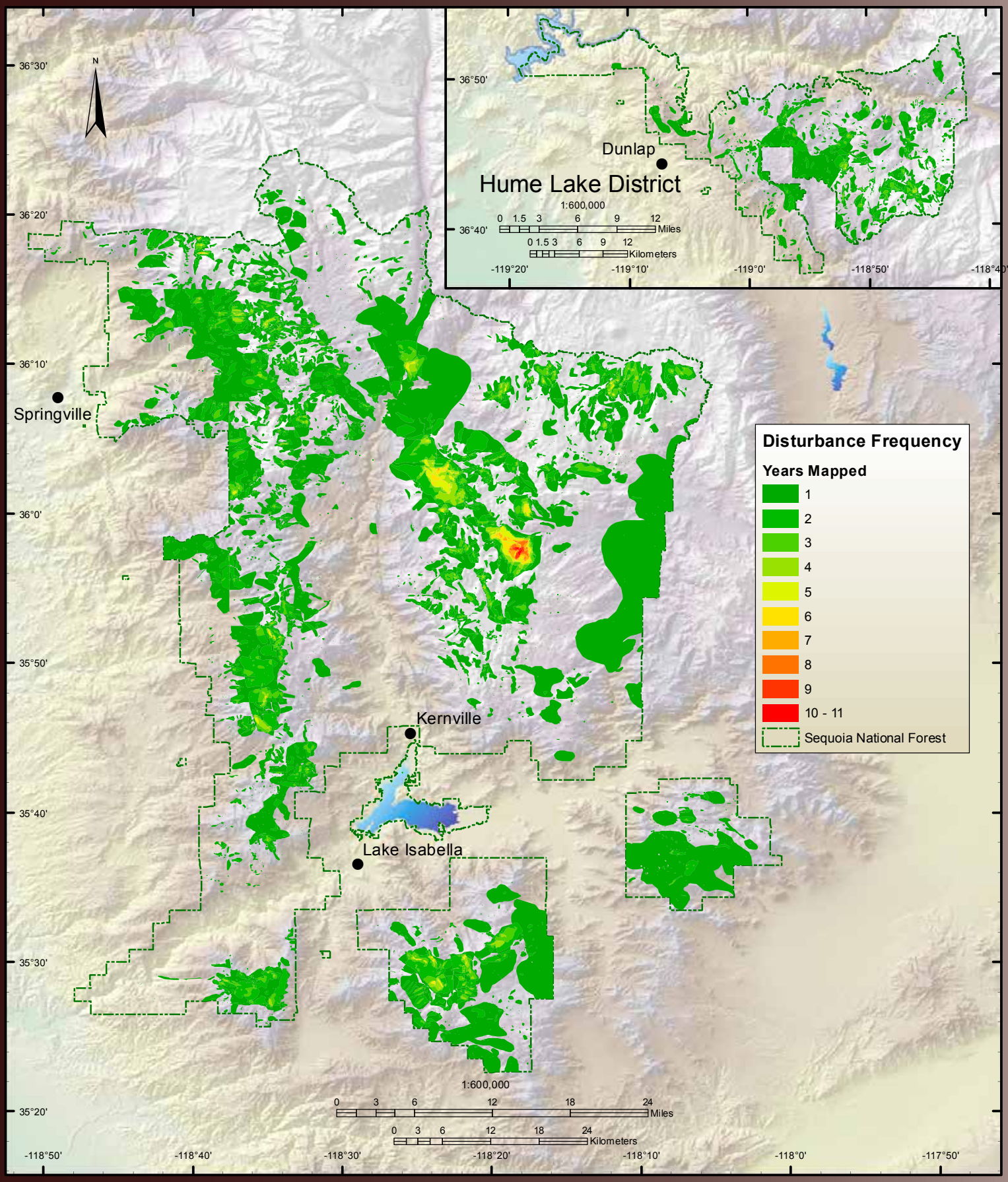
Sequoia National Forest, Cumulative Mortality & Damage 1993 - 2012



Forest not flown 1994, 1997, 2001.

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Forest Health Monitoring Program
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Sequoia - Kings Canyon National Park

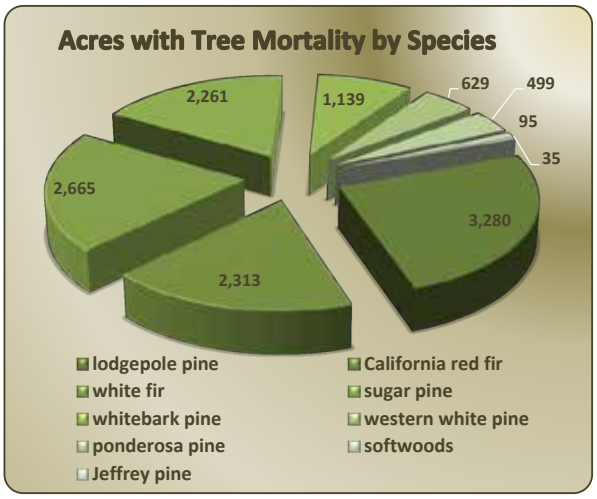
Whitebark pine mortality near Barton Peak.

Overview

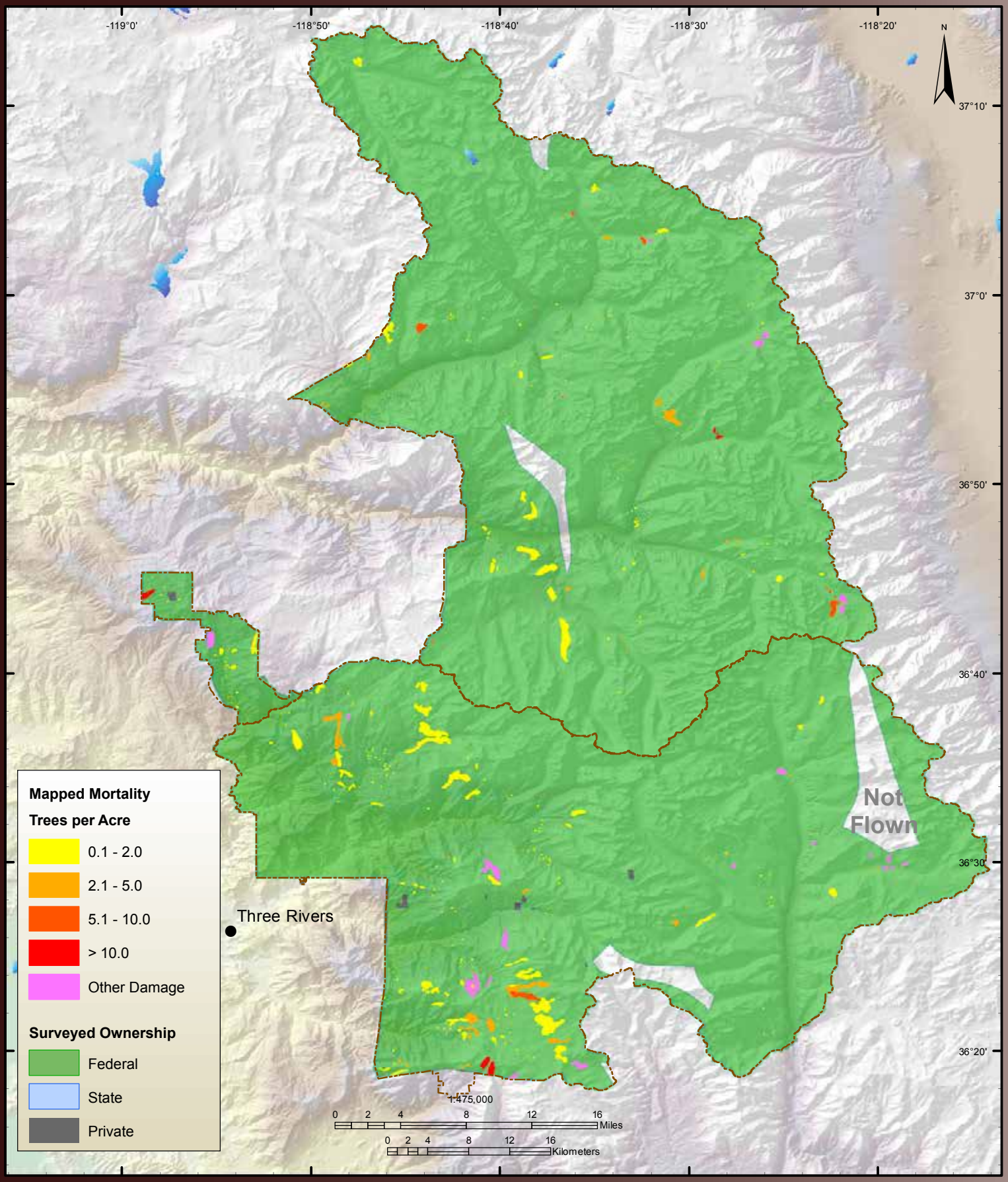
- 10,836 acres were mapped as having current disturbance activity within the forest boundaries in 2012, a slight decrease from the 12,858 acres mapped in 2011.
- Approximately 81% (8,723 acres) contained recent tree mortality. About 80% of the mortality was attributed to pine and mixed conifer.
- 423 acres (approximately 4%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 5,564 acres (approximately 53%) of damage polygons occurred within designated wilderness areas.
- In general pine mortality increased across the board while fir mortality decreased.
- The area of the Forest mapped most often in recent years is located between Hockett Meadows and White Chief Peak with eight years of recorded disturbance activity.

Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
lodgepole pine	3,280	961	3,694
California red fir	2,313	2,961	6,173
white fir	2,665	3,897	6,265
sugar pine	2,261	33	10
whitebark pine	1,139	106	991
western white pine	629	10	99
ponderosa pine	499	21	88
softwoods	95	104	1
Jeffrey pine	35	28	39
Forest Disturbance other than Tree Mortality			
California red fir[1]	1,331	1,849	7,294

[1]branch flagging (cytospora) , defoliation, topkill and general decline



Sequoia-Kings Canyon National Park, 2012



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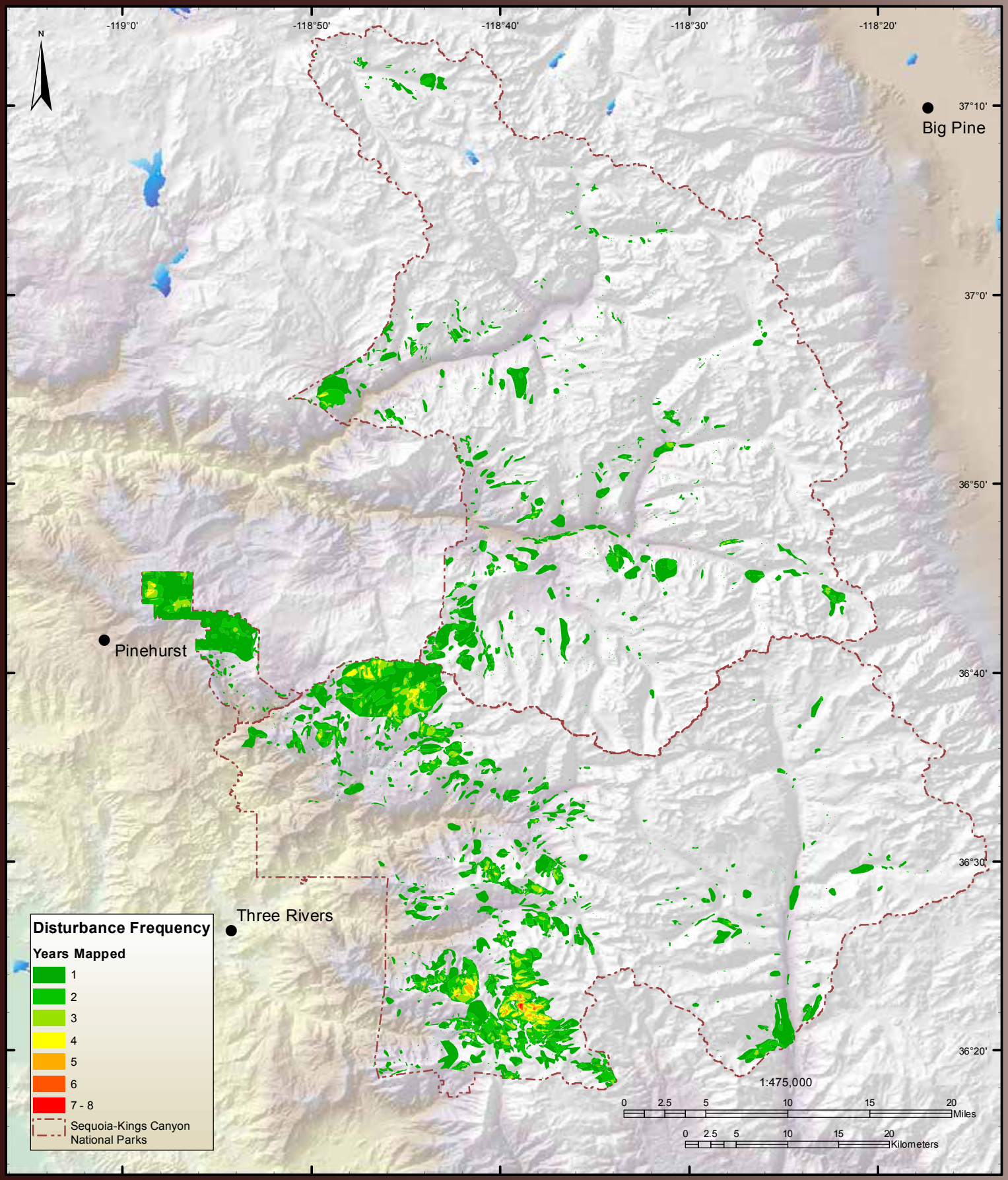
Sequoia-Kings Canyon National Park, Cumulative Mortality & Damage 1995 - 2012



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Park not flown 1996.

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Shasta-Trinity National Forest

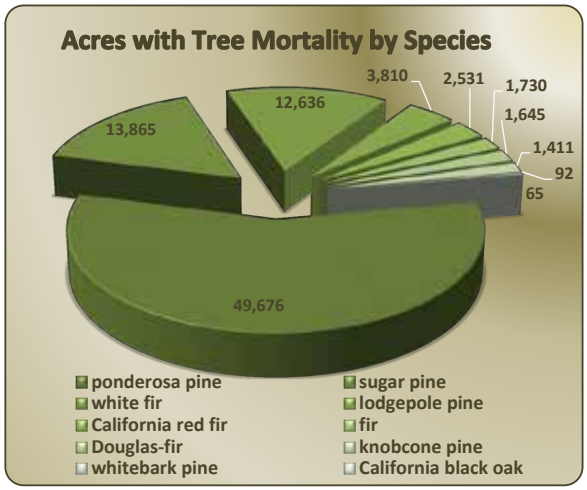
Ponderosa pine mortality east of Trininty Lake.

Overview

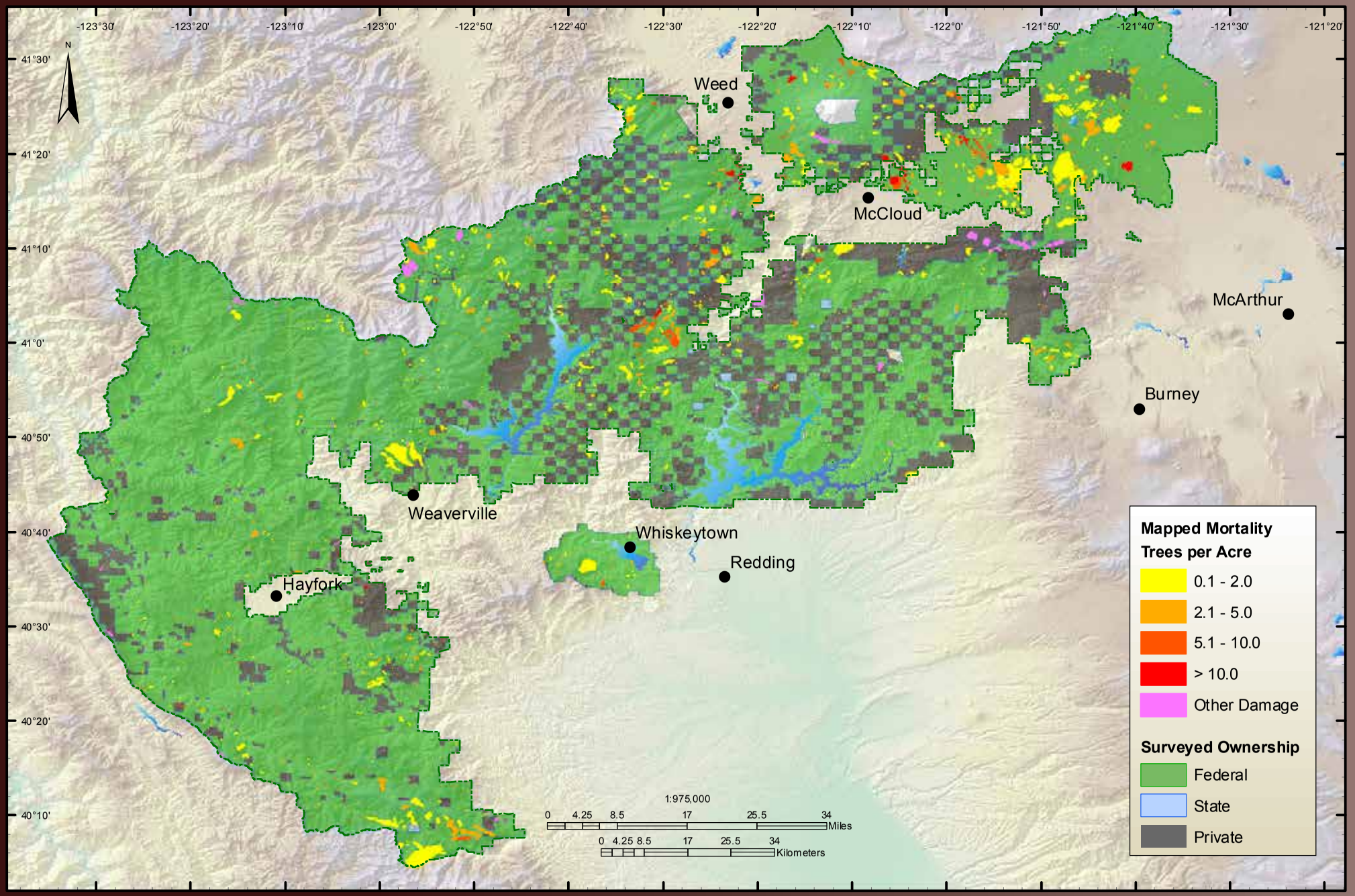
- 72,721 acres were mapped as having current disturbance activity within the forest boundaries in 2012, about 65% of the 112,326 acres mapped in 2011.
- An additional 1,269 acres with pine mortality were mapped in the Whiskeytown National Recreation Area, a large increase from the 221 acres mapped in 2011.
- Approximately 87% (63,430 acres) contained recent tree mortality. 71% of the mortality was attributed to pine.
- 16,156 acres (approximately 22%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 21,088 acres (approximately 29%) of damage polygons occurred within designated wilderness areas.
- Large areas of pine mortality were mapped in and near McCloud Flats and east of Trinity Lake.
- The area of the Forest mapped most often in recent years is located northwest of Red Hill on the McCloud Ranger District with sixteen years of recorded disturbance activity.

Forest Disturbance Activity and Trends			
*Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
ponderosa pine	49,676	32,574	8,166
sugar pine	13,865	2,989	130
white fir	12,636	2,527	10,750
lodgepole pine	3,810	4,602	4,927
California red fir	2,531	6,433	8,505
fir	1,730	3,683	3,152
Douglas-fir	1,645	95	0
knobcone pine	1,411	1,171	539
whitebark pine	92	223	44
California black oak	65	0	0
Forest Disturbance other than Tree Mortality			
California red fir[1]	5,760	7,468	2,659

[1]branch flagging (cytospora) , defoliation, topkill and general decline
*does not include the Whiskeytown NRA



Shasta-Trinity National Forest & Whiskeytown National Recreation Area, 2012



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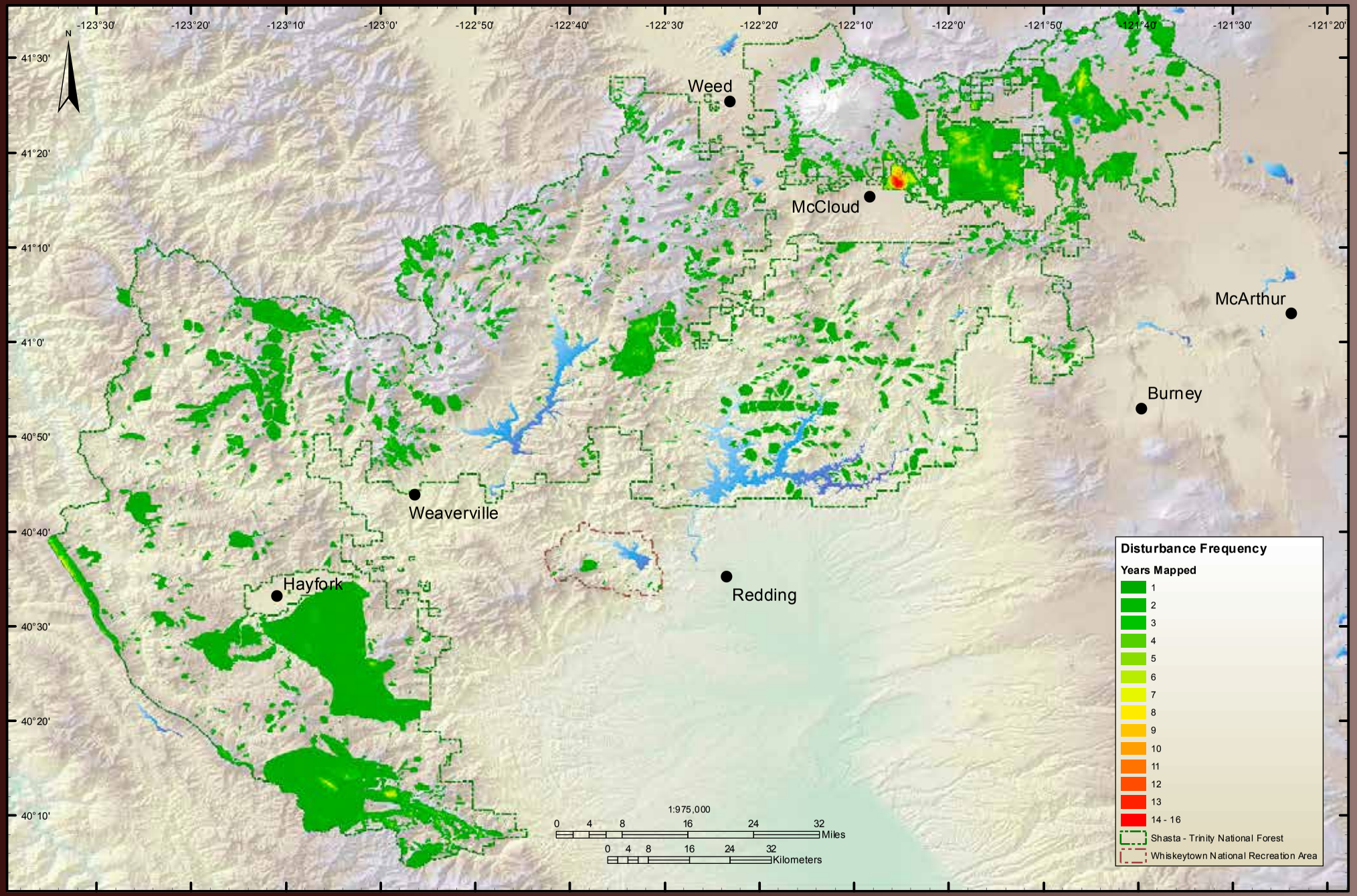
Shasta-Trinity National Forest & Whiskeytown National Recreation Area, Cumulative Mortality & Damage 1994 - 2012



Forest not flown 1999. Park not flown until 2004.

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Sierra National Forest

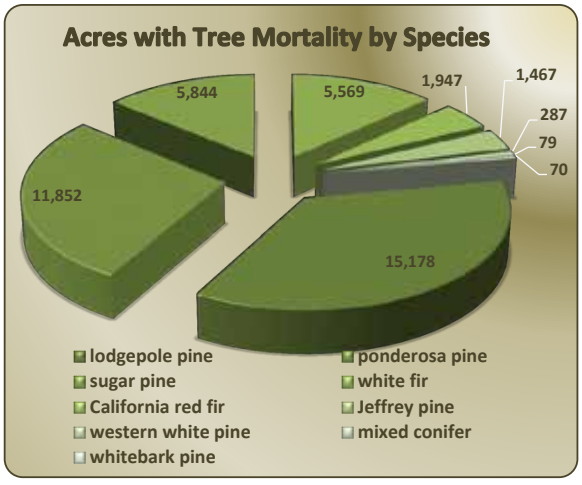
Lodgepole pine with cold damage, near Little Shuteye Peak.

Overview

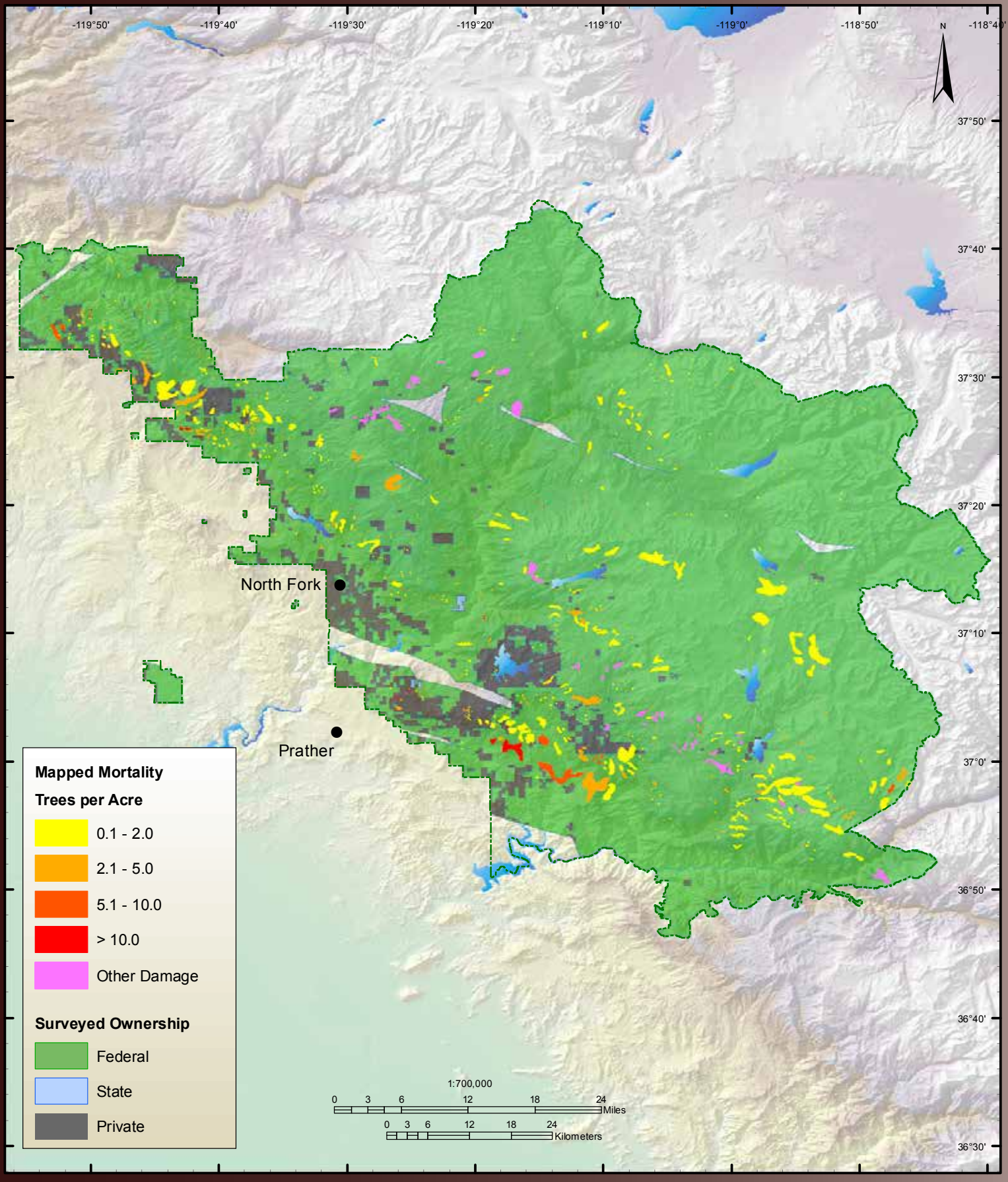
- 33,024 acres were mapped as having current disturbance activity within the forest boundaries in 2012, 76% of the 43,305 acres mapped in 2011.
- Approximately 87% (28,807 acres) contained recent tree mortality. About 74% of the mortality was attributed to pine.
- 15,714 acres (approximately 48%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 10,757 acres (approximately 33%) of damage polygons occurred within designated wilderness areas.
- In general pine mortality increased across the board while California red fir mortality decreased.
- Areas along the western edge of the forest continue to experience elevated levels of overstory pine mortality.
- The area of the Forest mapped most often in recent years is located along Crown Ridge on the High Sierra Ranger District having eight years of recorded disturbance activity.

Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
lodgepole pine	15,178	4,934	1,634
ponderosa pine	11,852	14,572	4,338
sugar pine	5,844	443	150
white fir	5,569	448	5,432
California red fir	1,947	12,268	6,755
Jeffrey pine	1,467	42	1
western white pine	287	43	25
mixed conifer	79	4,289	1,293
whitebark pine	70	48	115
Forest Disturbance other than Tree Mortality			
lodgepole pine[1]	2,576	1	0
California red fir[2]	1,277	6,808	3,095

[1]discoloration (sheath miner and foliar diseases) [2]branch flagging (cytospora)



Sierra National Forest, 2012



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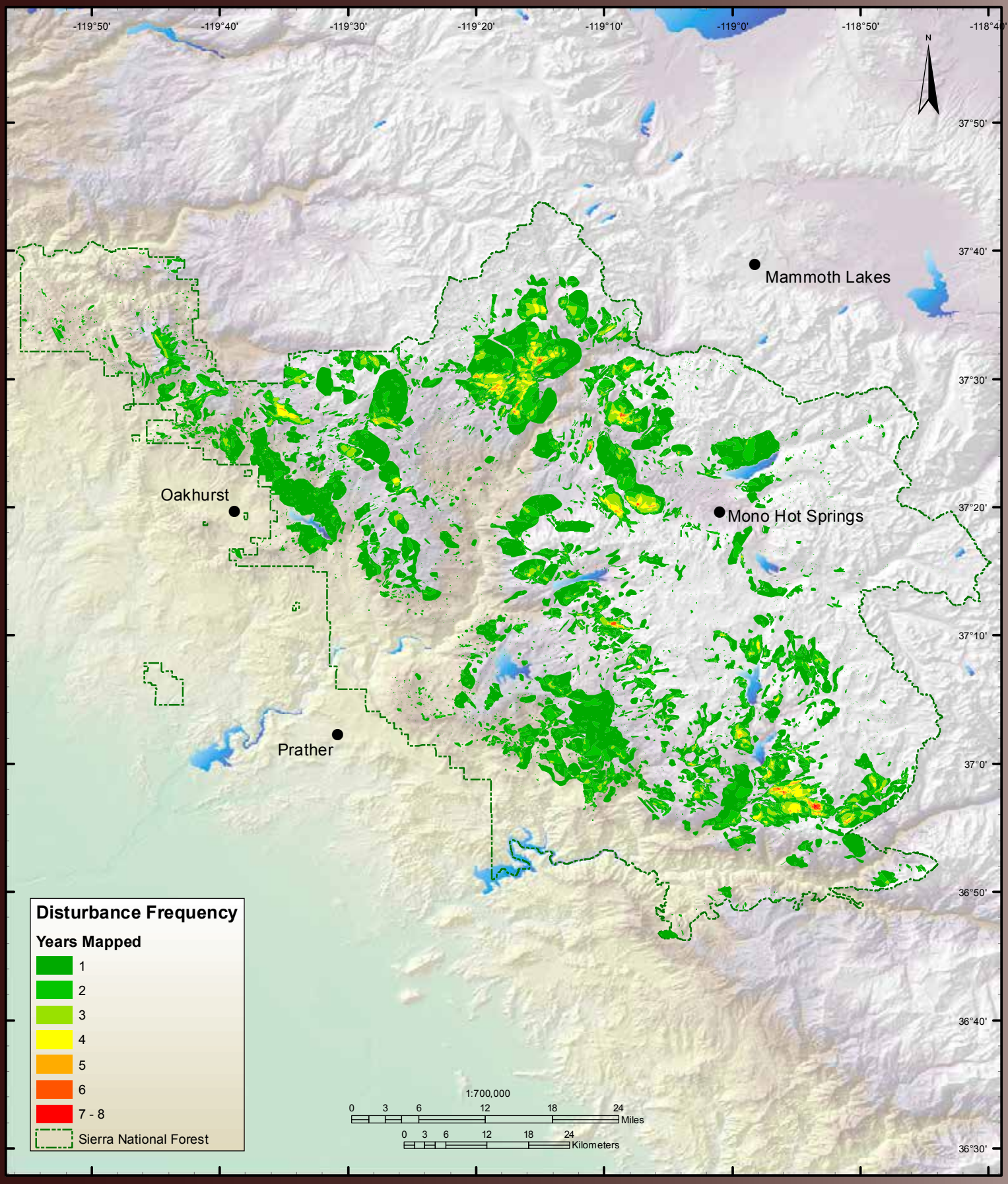
Sierra National Forest, Cumulative Mortality & Damage 1994 - 2012



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Forest not flown 1999, 2001.

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Six Rivers National Forest

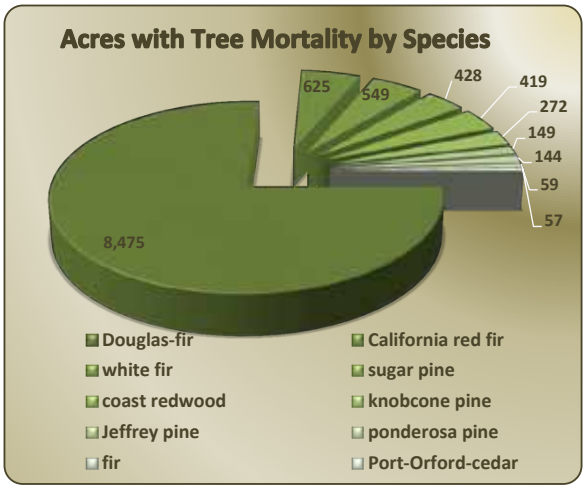
Bear damage near the Smith River.

Overview

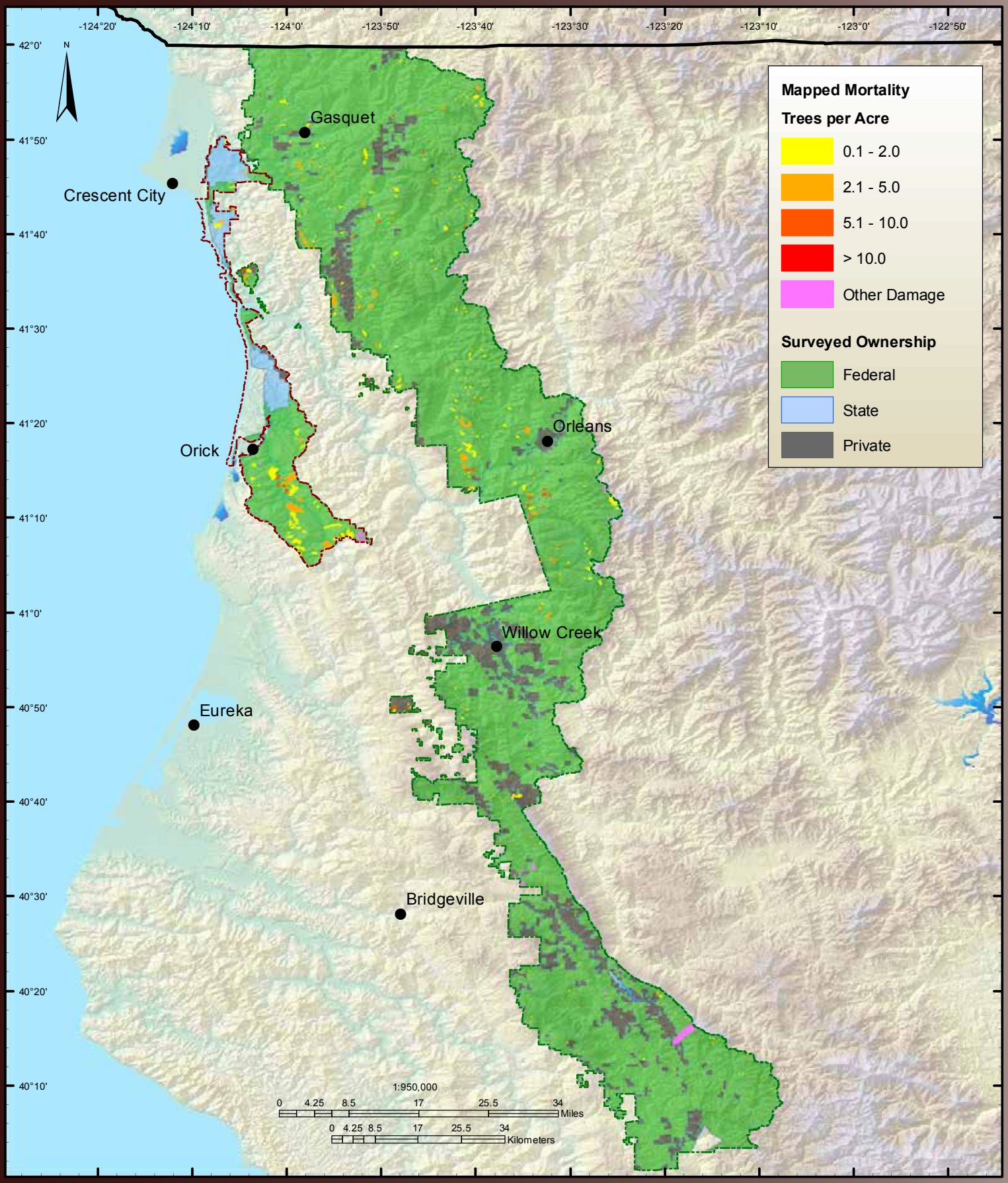
- 6,343 acres were mapped as having current disturbance activity within the forest boundaries in 2012, an increase of 23% from the 5,156 acres mapped in 2011.
- An additional 4,616 acres of disturbance were recorded on the Redwood National and State Parks, more than twice as many acres mapped in 2011.
- Approximately 93% (5,895 acres) contained recent tree mortality. Much of this mortality was attributed to bear damage to Douglas-fir.
- 3,625 acres (approximately 57%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 2,062 acres (approximately 33%) of damage polygons occurred within designated wilderness areas.
- In general softwood (fir and pine) mortality increased across the board while hardwood mortality decreased.
- The area of the Forest mapped most often in recent years is located north of Blake Mountain on the Mad River Ranger District having nine years of recorded disturbance activity.

Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
Douglas-fir	8,475	1,028	2,755
California red fir	625	307	691
white fir	549	55	2,504
sugar pine	428	31	0
coast redwood	419	106	598
knobcone pine	272	22	0
Jeffrey pine	149	0	0
ponderosa pine	144	61	149
fir	59	92	49
Port-Orford-cedar	57	85	36
Forest Disturbance other than Tree Mortality			
hardwoods[1]	629	54	1

[1]oak species and Pacific madrone discoloration and dieback (drought/foliar diseases/foliar insects)



Six Rivers National Forest & Redwood State and National Parks, 2012



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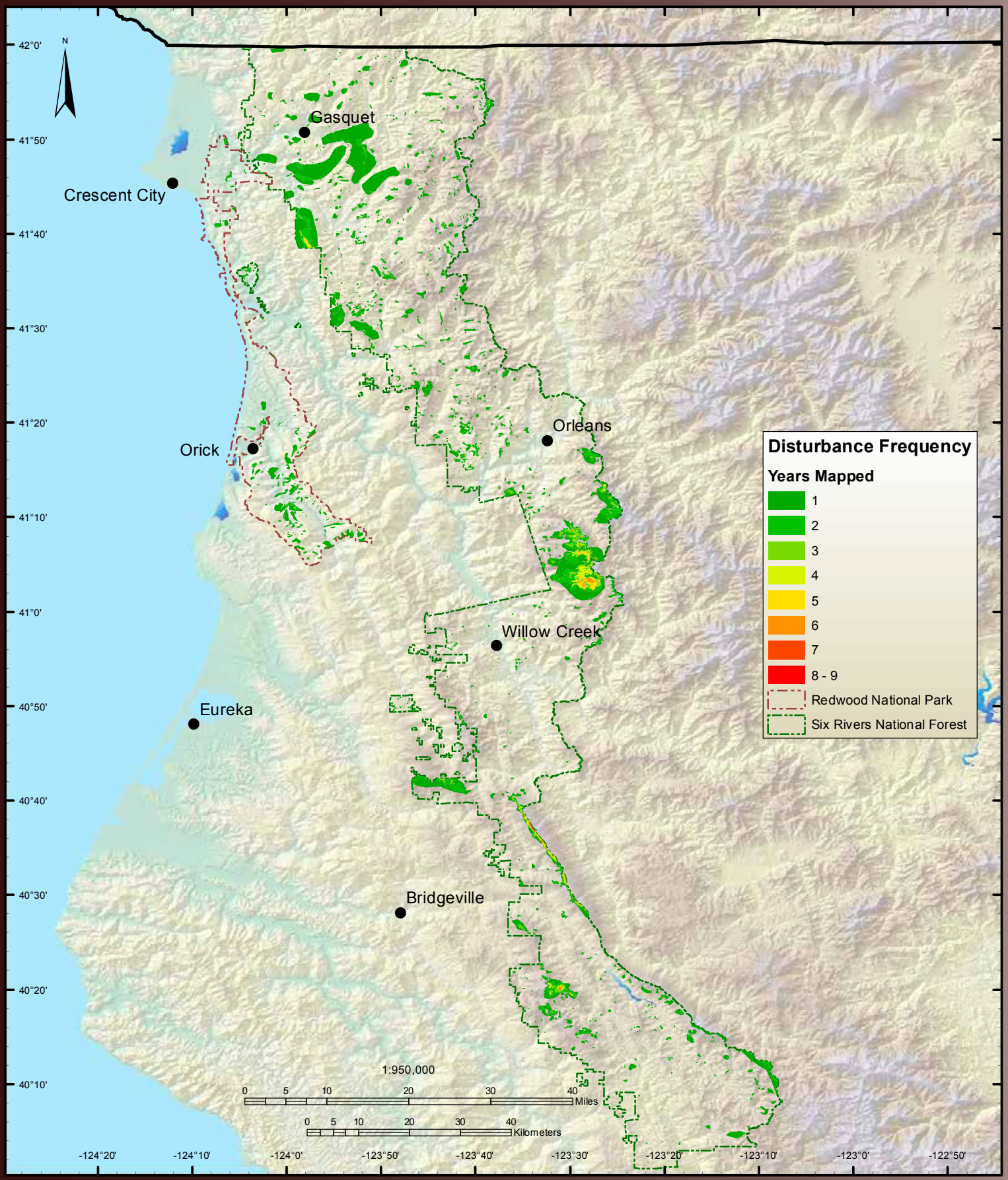
Six Rivers National Forest & Redwood State and National Parks, Cumulative Mortality & Damage 1994 - 2012



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Forest not flown 1995, 1999-2001
Park not flown until 2004.

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Stanislaus National Forest

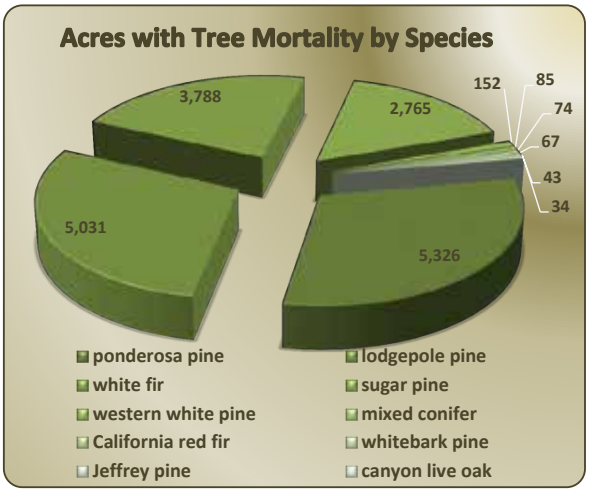
Ponderosa pine mortality along Dodge Ridge on the Mi-Wok Ranger District.

Overview

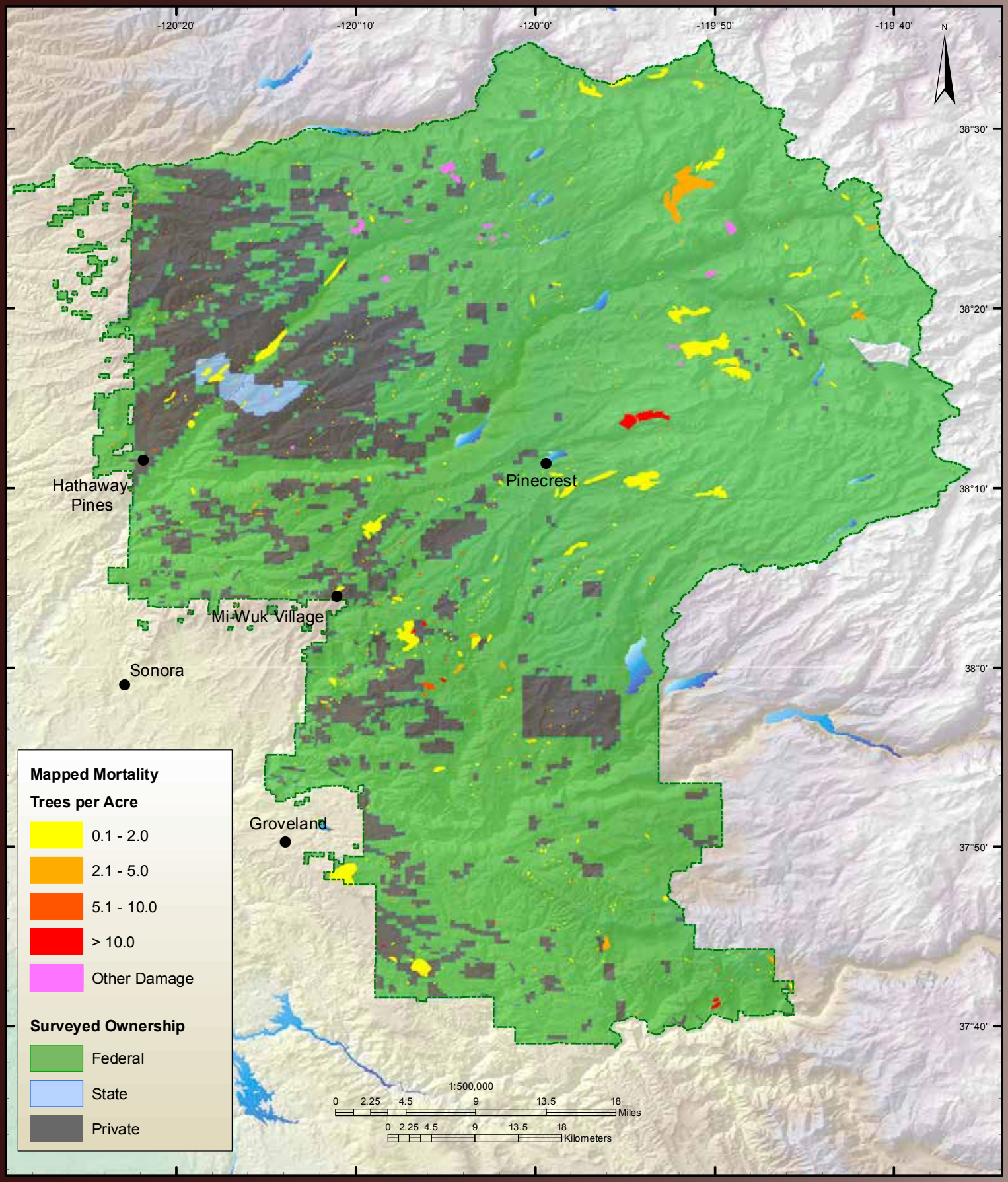
- 15,110 acres were mapped as having current disturbance activity within the forest boundaries in 2012, a 34% increase from the 11,267 acres mapped in 2011.
- Approximately 92% (13,954 acres) contained recent tree mortality. Pine comprised 71% of the mortality.
- 7,126 acres (approximately 47%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 3,821 acres (approximately 25%) of damage polygons occurred within designated wilderness areas.
- In general pine mortality increased across the board while California red fir mortality decreased.
- Areas along the border between the Groveland and Mi-Wok Ranger Districts in the Thompson Peak area continue to experience high levels of overstory pine mortality.
- The areas of the Forest mapped most often in recent years are located in Hiram Canyon on the Calavaras Ranger District and west of Bourland Mountain on the Mi-

Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
ponderosa pine	5,326	1,351	924
lodgepole pine	5,031	710	688
white fir	3,788	4,024	3,431
sugar pine	2,765	93	8
western white pine	152	3	0
mixed conifer	85	269	2,537
California red fir	74	1,460	238
whitebark pine	67	12	7
Jeffrey pine	43	12	102
canyon live oak	34	1	0
Forest Disturbance other than Tree Mortality			
California red fir[1]	847	1,255	337

[1]branch flagging (cytospora) , discoloration and general decline



Stanislaus National Forest, 2012



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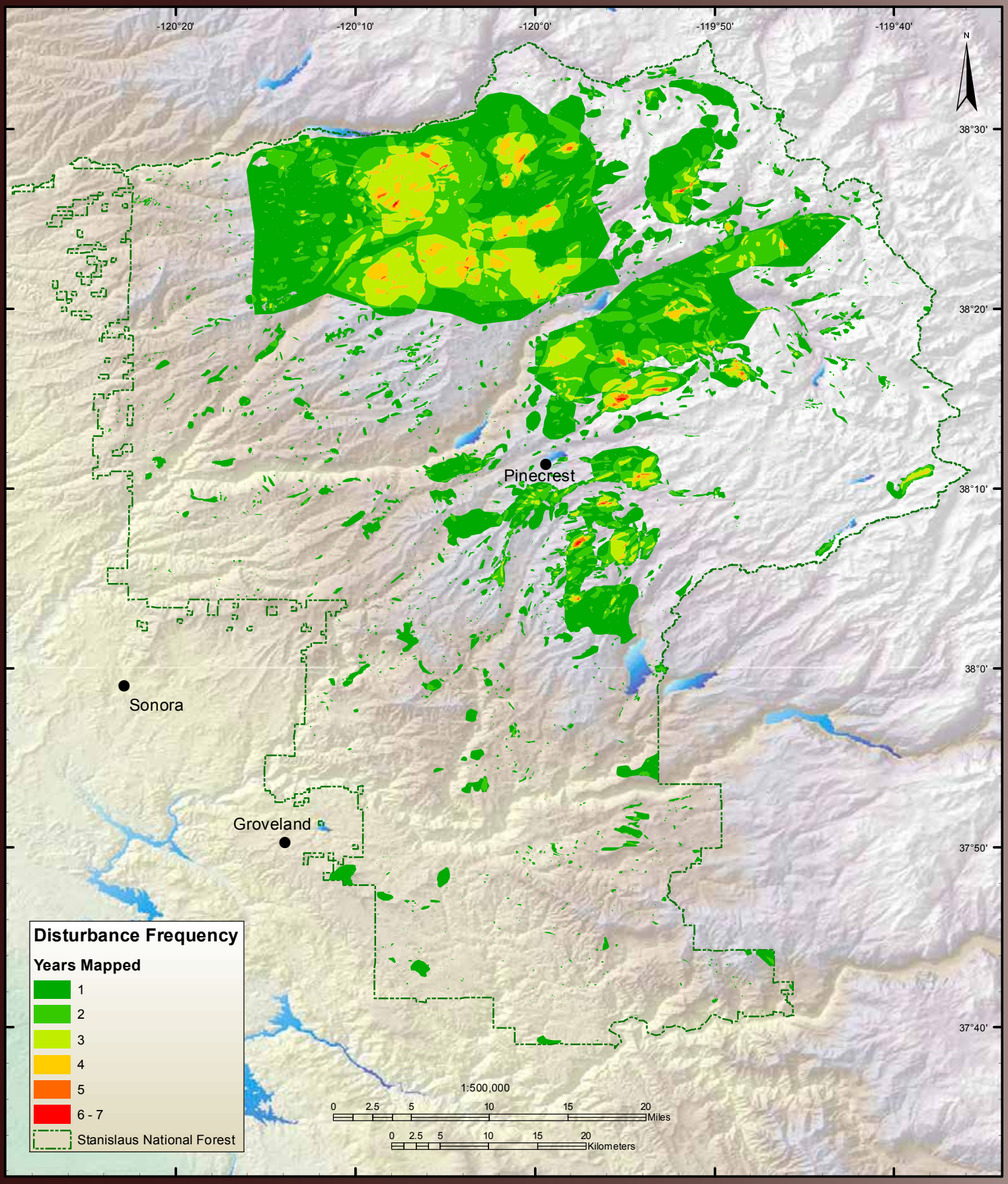
Stanislaus National Forest, Cumulative Mortality & Damage 1993 - 2012



Forest not flown 1996.

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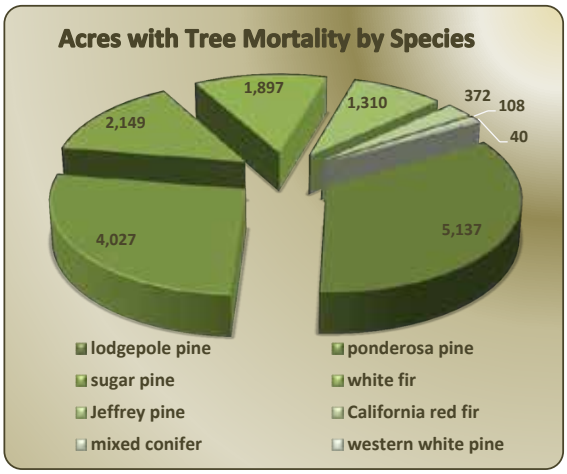
Tahoe National Forest

Black oak leafminer activity in black oak near Blue Canyon.

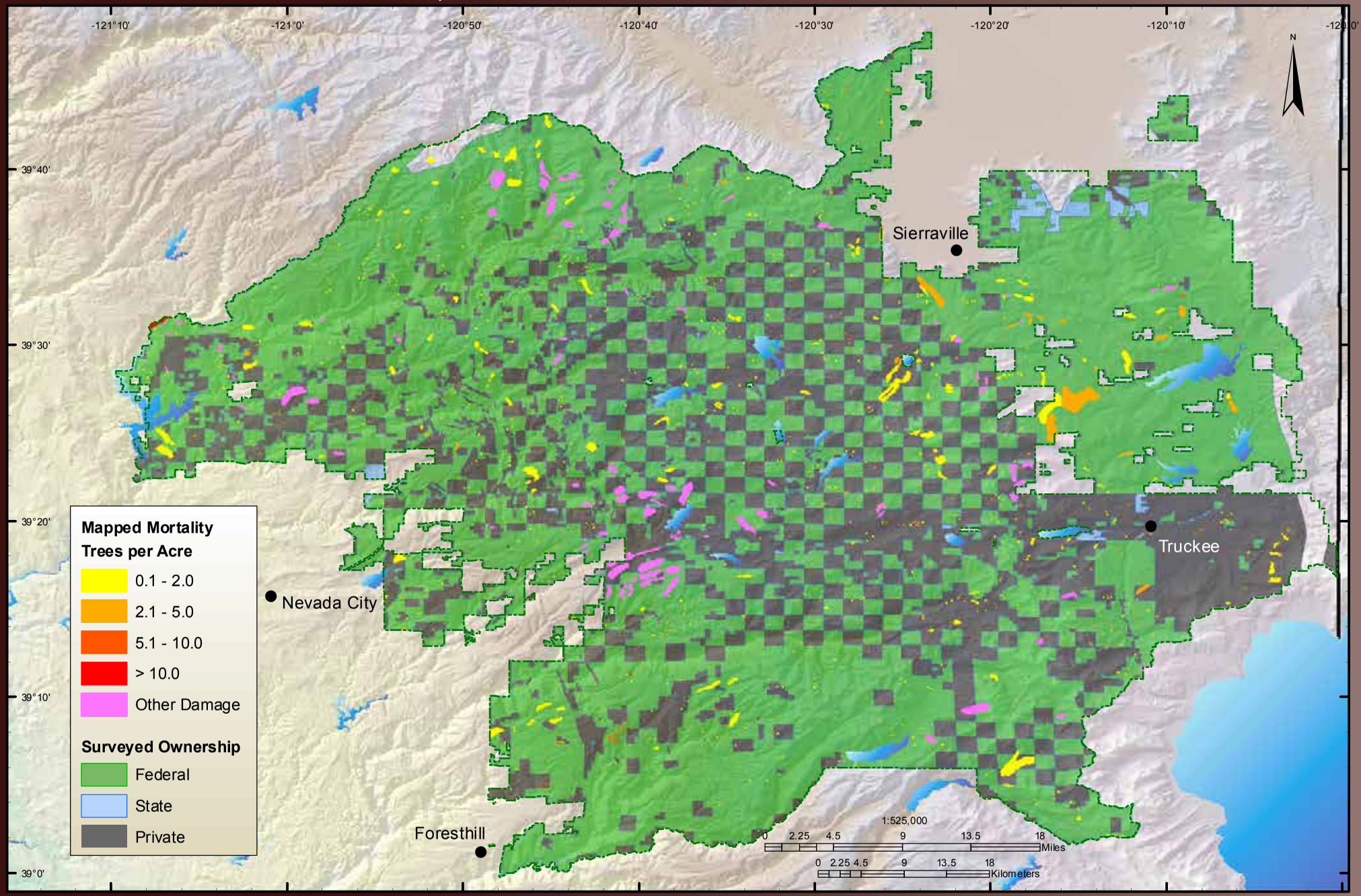
Overview

- 19,445 acres were mapped as having current disturbance activity within the forest boundaries in 2012, about half of the 41,044 acres mapped in 2011.
- Approximately 57% (11,095 acres) contained recent tree mortality. Pines comprised about 79% of the observed mortality.
- 12,644 acres (approximately 65%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 870 acres (approximately 4%) of damage polygons occurred within designated wilderness areas.
- In general pine mortality increased across the board while fir mortality decreased.
- The area of the Forest mapped most often in recent years is located next to the Sagehen Creek Campground on the Truckee Ranger District with nine years of recorded disturbance activity.

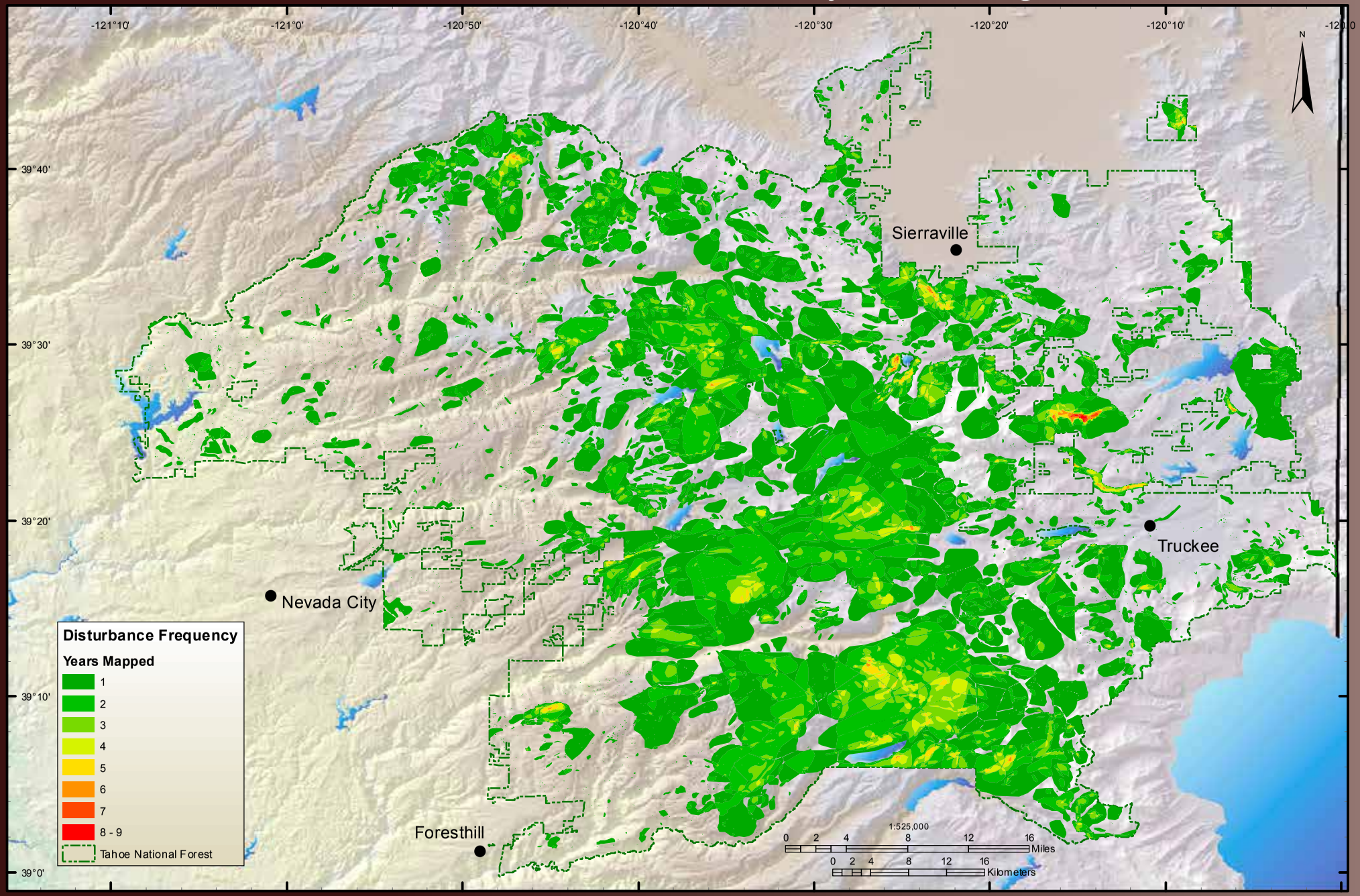
Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
lodgepole pine	5,137	3,679	3,026
ponderosa pine	4,027	399	2,197
sugar pine	2,149	551	23
white fir	1,897	9,995	42,384
Jeffrey pine	1,310	506	1,008
California red fir	372	5,082	470
mixed conifer	108	1,157	350
western white pine	40	283	9
Forest Disturbance other than Tree Mortality			
California black oak[1]	4,383	9,376	0
California red fir[2]	2,237	2,302	9,367
quaking aspen[3]	115	38	0
[1]drought/discoloration/defoliation (cytospora) , defoliation and general decline		[2]branch flagging [3]dieback, defoliation and general decline	



Tahoe National Forest, 2012



Tahoe National Forest, Cumulative Mortality & Damage 1995 - 2012



Yosemite National Park

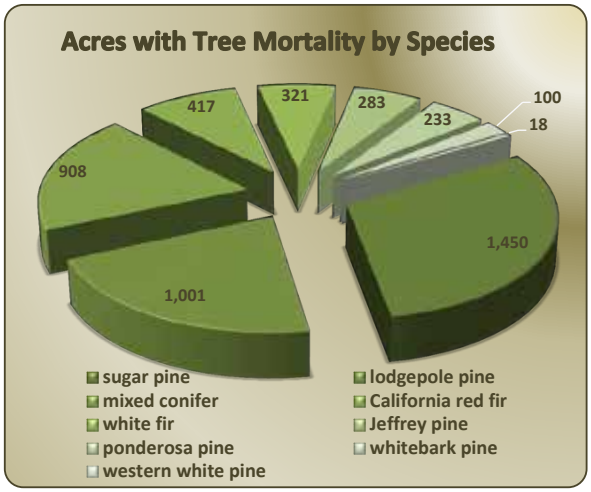
Ponderosa pine mortality in western Yosemite.

Overview

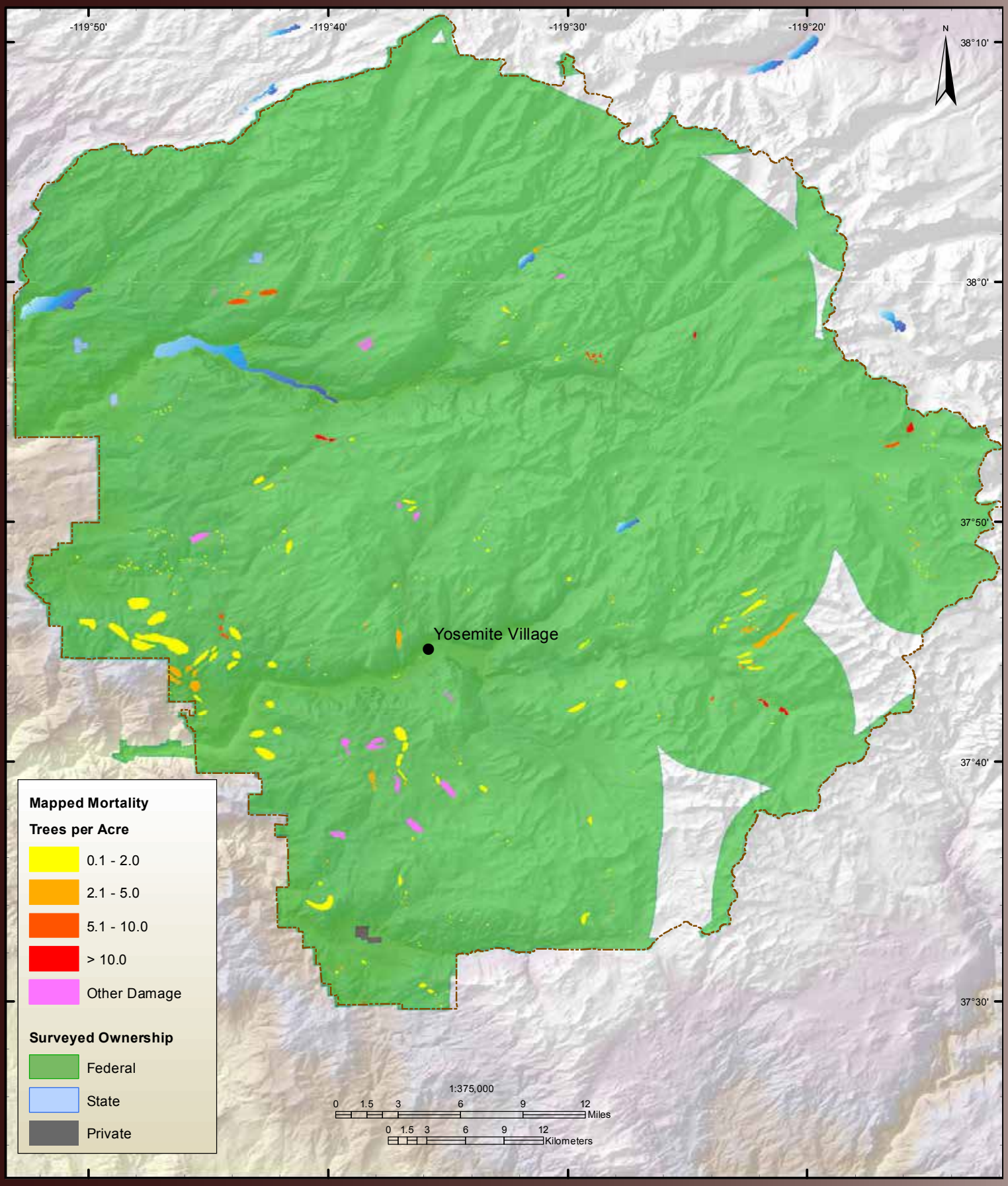
- 5,652 acres were mapped as having current disturbance activity within the forest boundaries in 2012, about half of the 10,940 acres mapped in 2011.
- Approximately 74% (4,165 acres) contained recent tree mortality. About 60% of that acreage was pine.
- 1,698 acres (approximately 30%) of damage polygons occurred within the wildland urban interface (WUI) portions of the forest.
- 4,512 acres (approximately 80%) of damage polygons occurred within designated wilderness areas.
- In general pine mortality increased (with the exception of lodgepole pine) while fir and mixed conifer mortality decreased.
- The area of the Park mapped most often in recent years is located between Cathedral Pass and Echo Lake with fourteen years of recorded disturbance activity.

Forest Disturbance Activity and Trends			
Acres containing Affected Hosts (Mortality)	Acres 2012	Acres 2011	Acres 2010
sugar pine	1,450	676	36
lodgepole pine	1,001	1,601	601
mixed conifer	908	2,076	782
California red fir	417	787	2,704
white fir	321	515	360
Jeffrey pine	283	216	1
ponderosa pine	233	55	698
whitebark pine	100	31	0
western white pine	18	90	5
Forest Disturbance other than Tree Mortality			
lodgepole pine[1]	613	2,283	2,567
California red fir[2]	822	788	3,274

[1]discoloration, wind damage and defoliation [2]branch flagging (cytospora) , defoliation and general decline



Yosemite National Park, 2012



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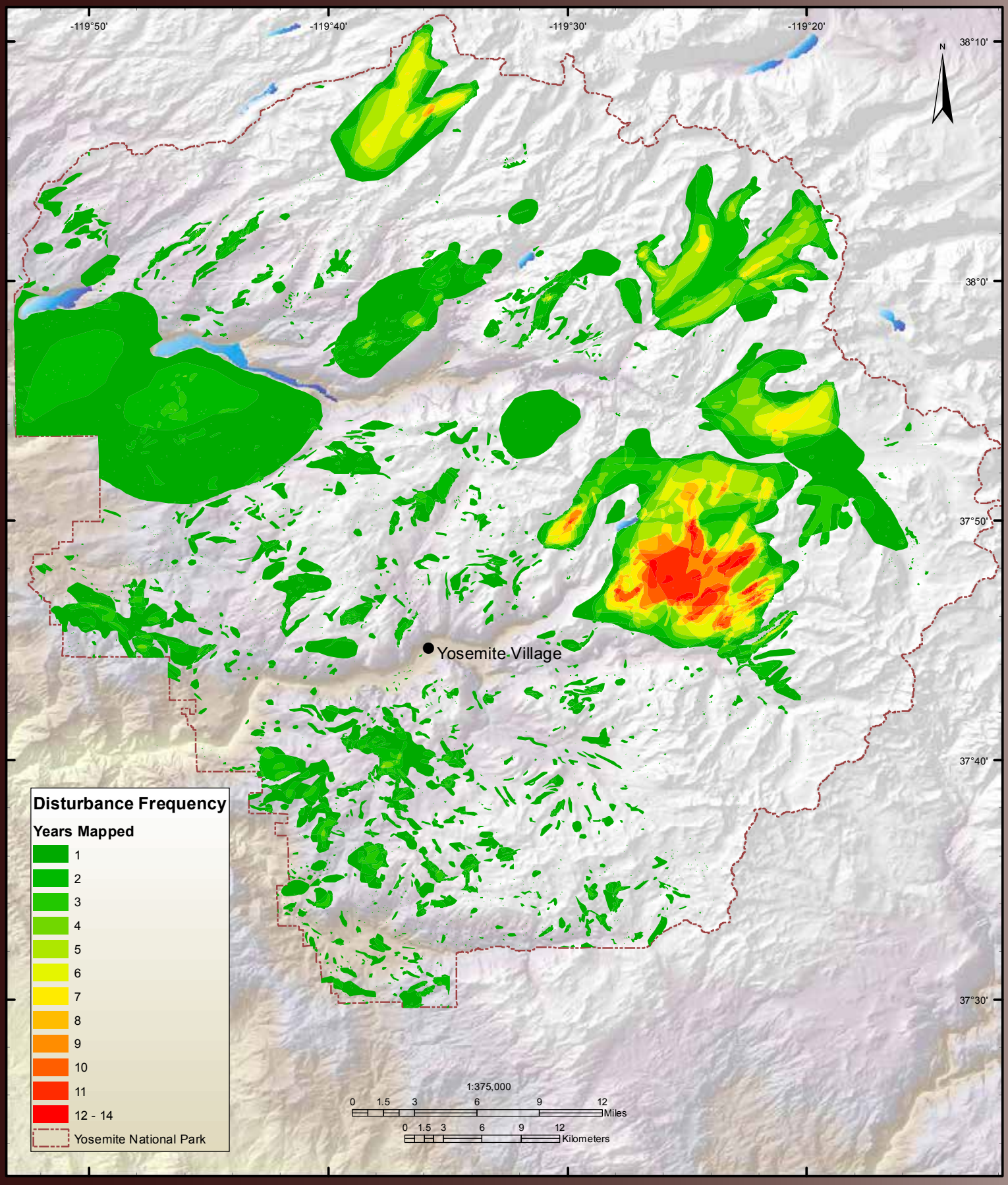
Yosemite National Park,
Cumulative Mortality & Damage 1996 - 2012



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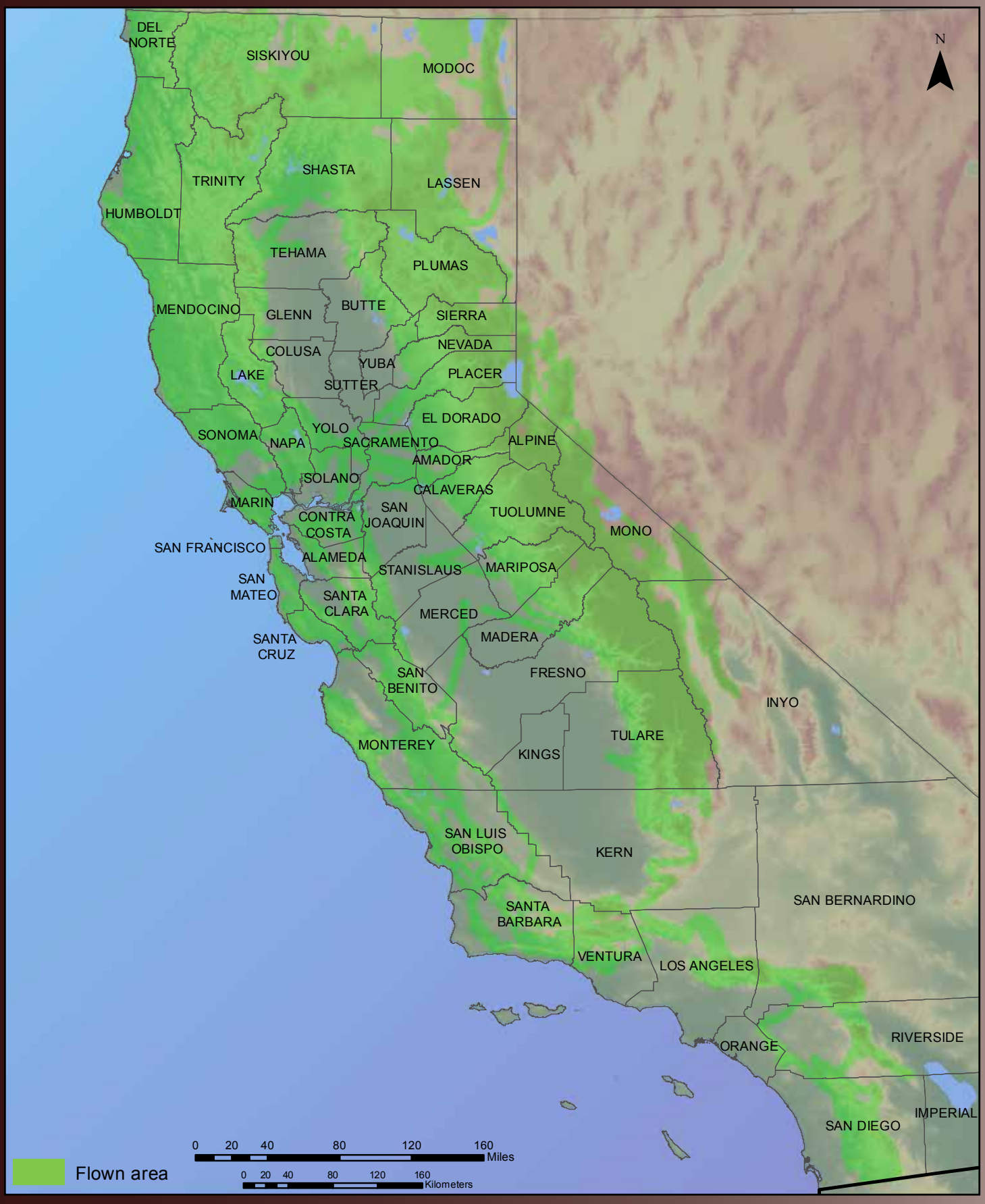
Aerial Survey Results by County



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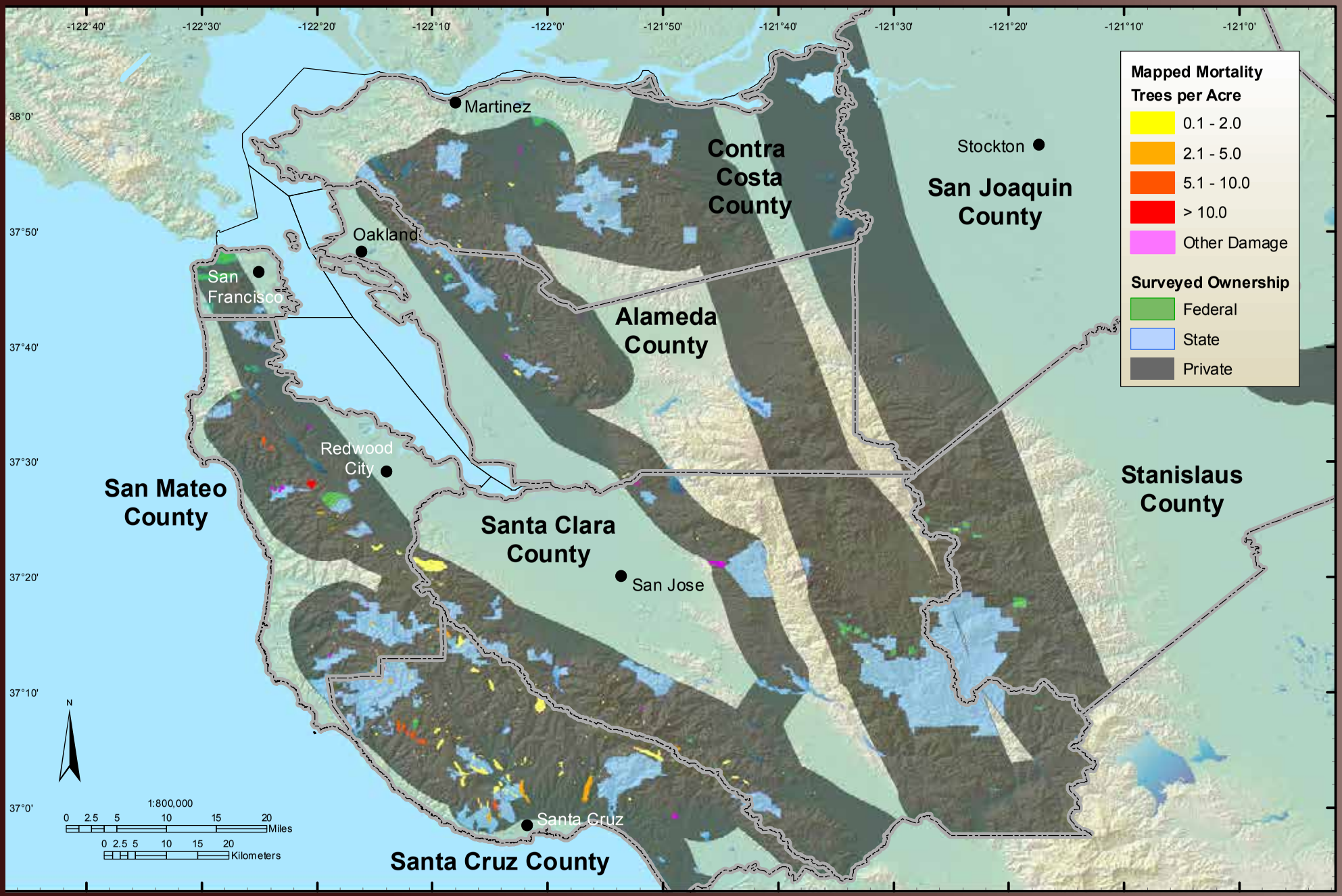
Alameda, Contra Costa, San Joaquin, San Mateo, Santa Clara, Santa Cruz, and Stanislaus Counties, 2012



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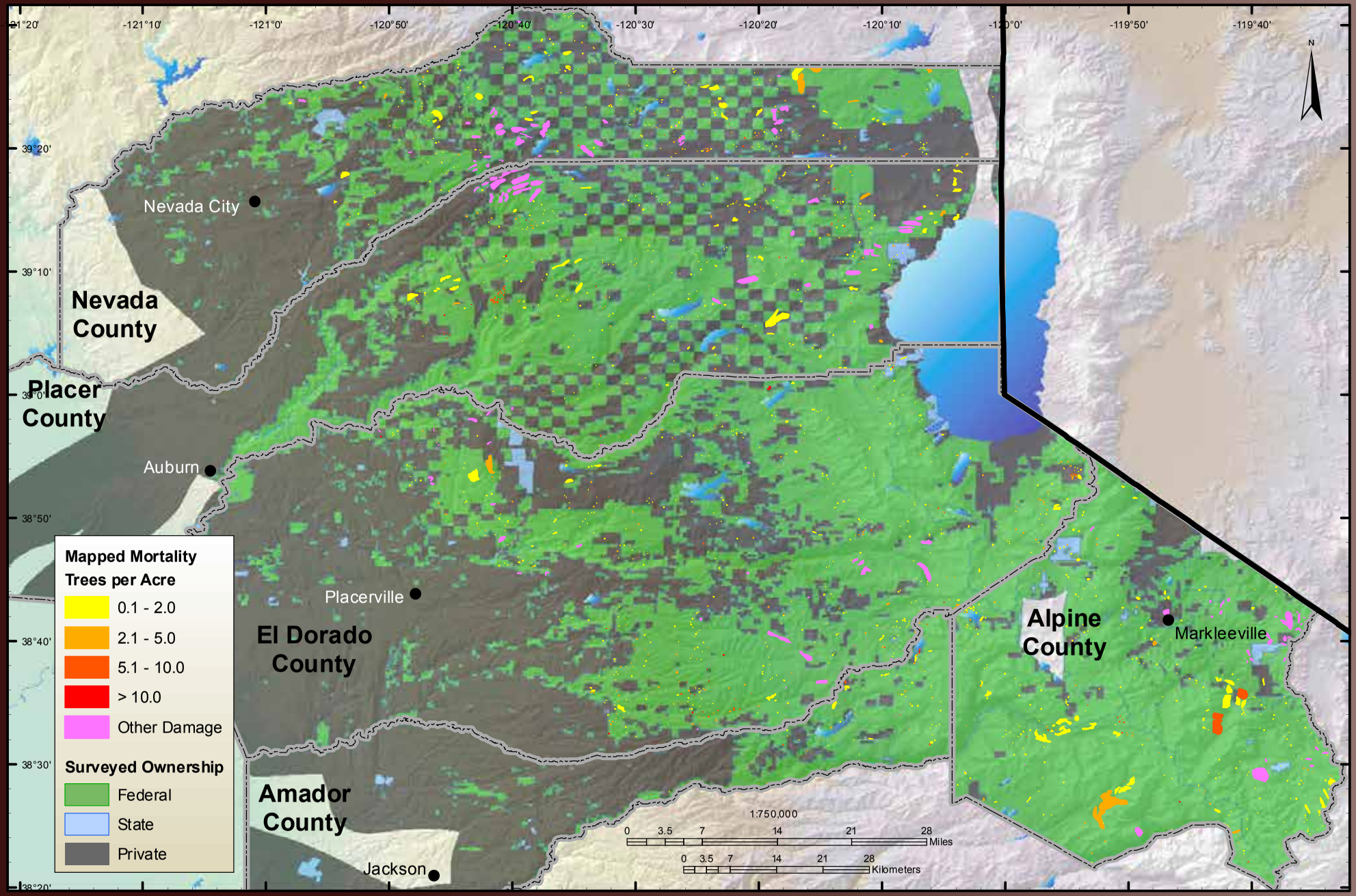
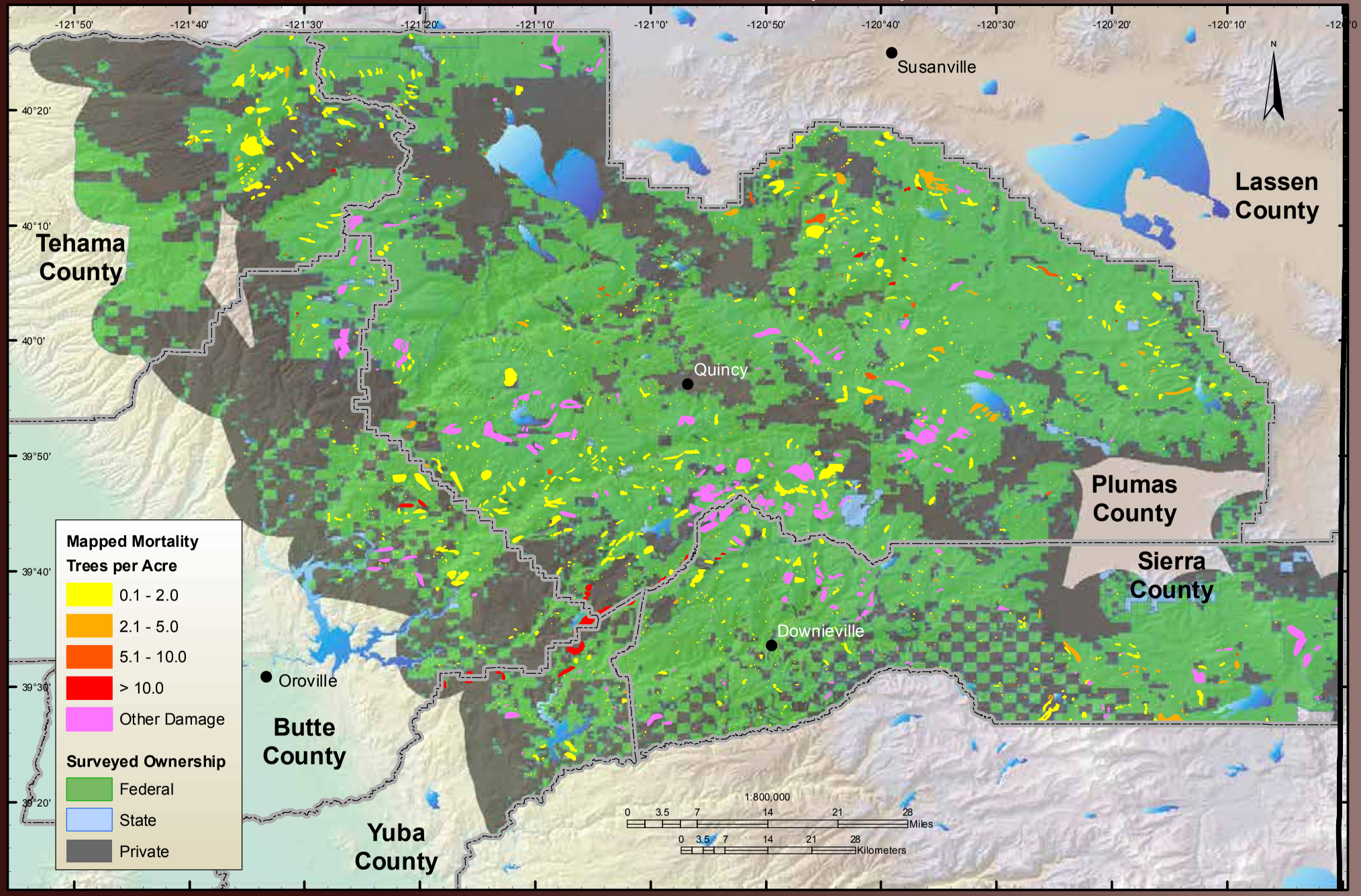
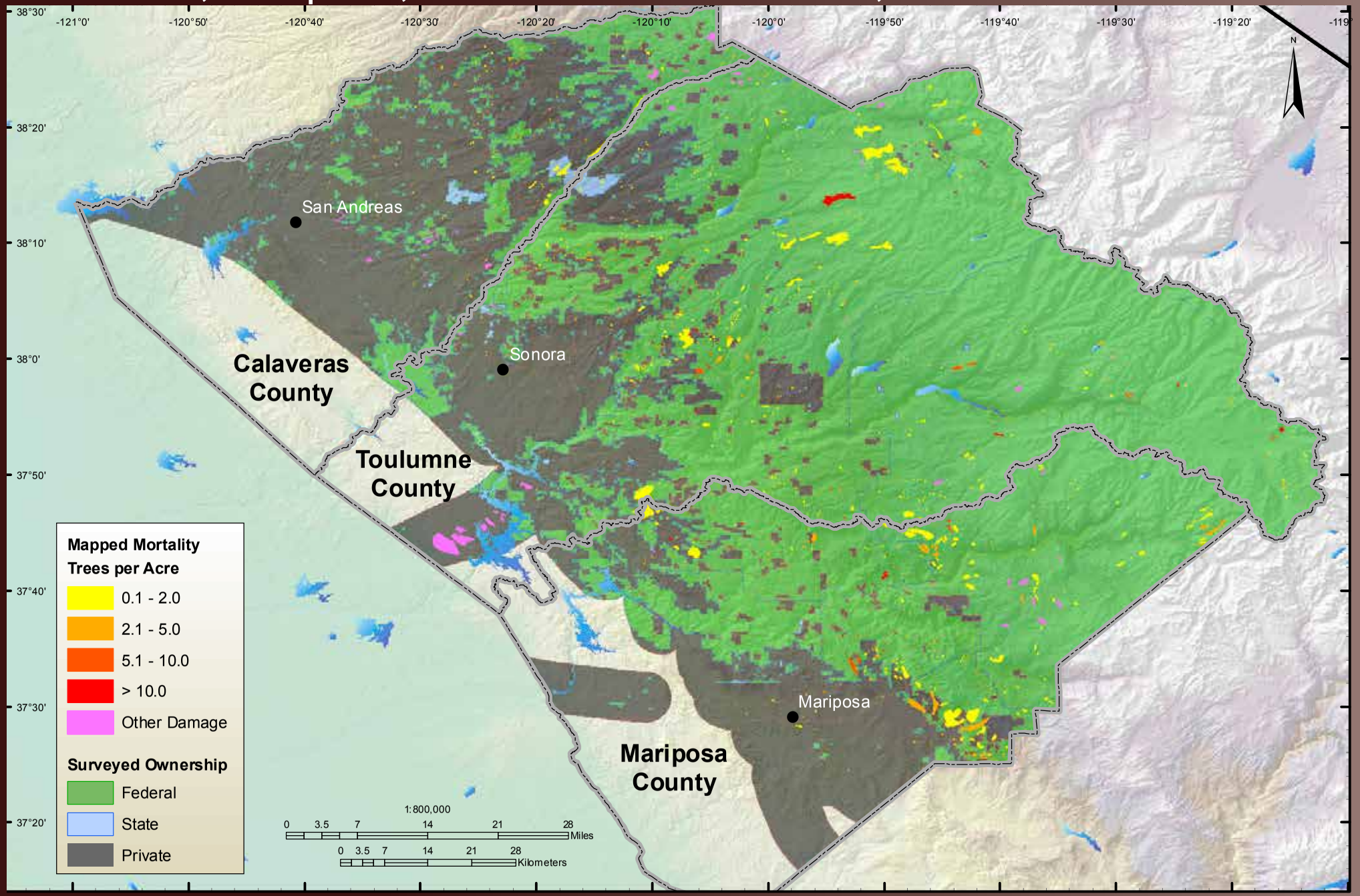
Alpine, Amador, El Dorado, Nevada, and Placer Counties, 2012



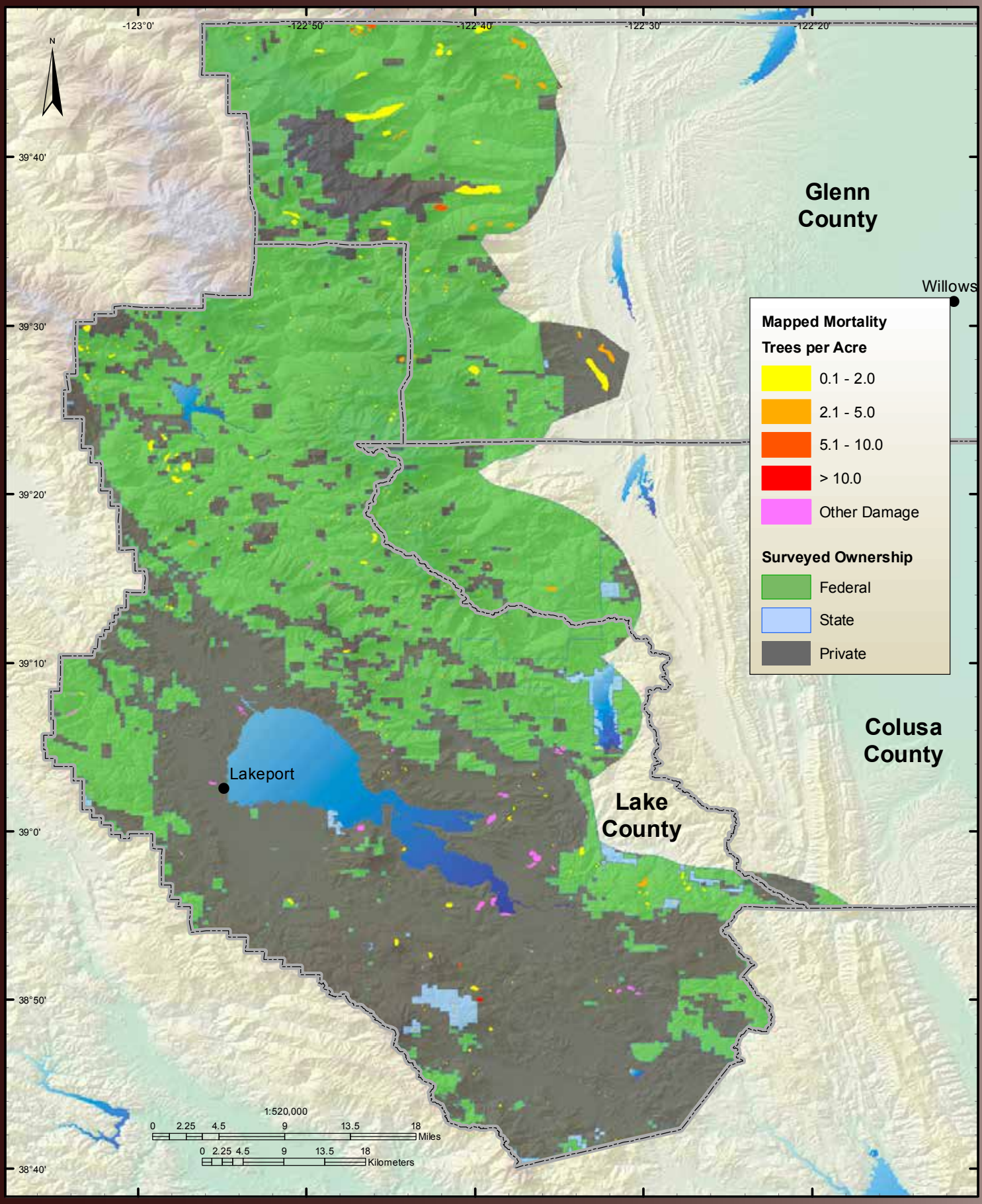
Butte, Plumas, Sierra, Yuba, and Tehama (east) Counties, 2012



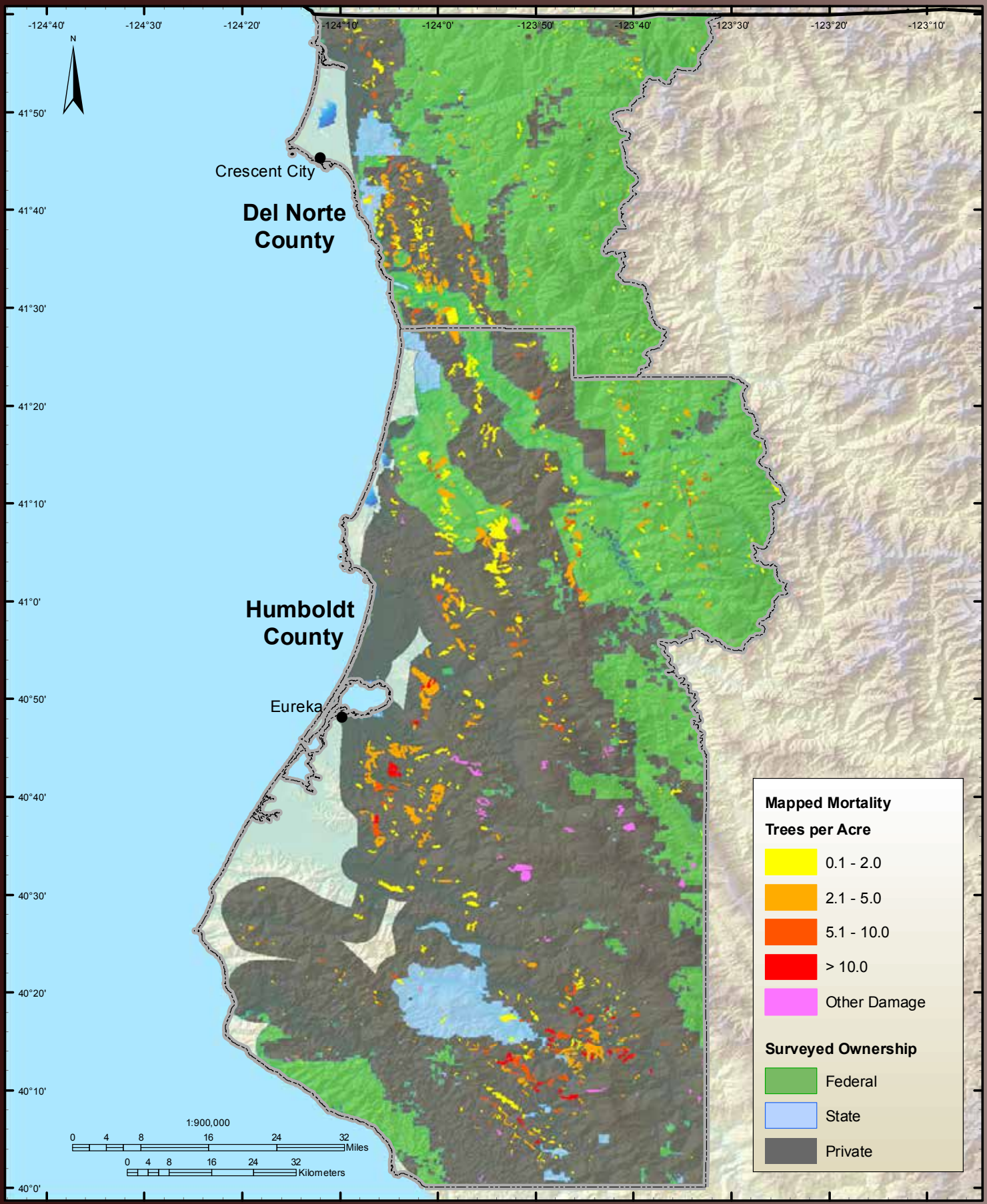
Calaveras, Mariposa, and Tuolumne Counties, 2012



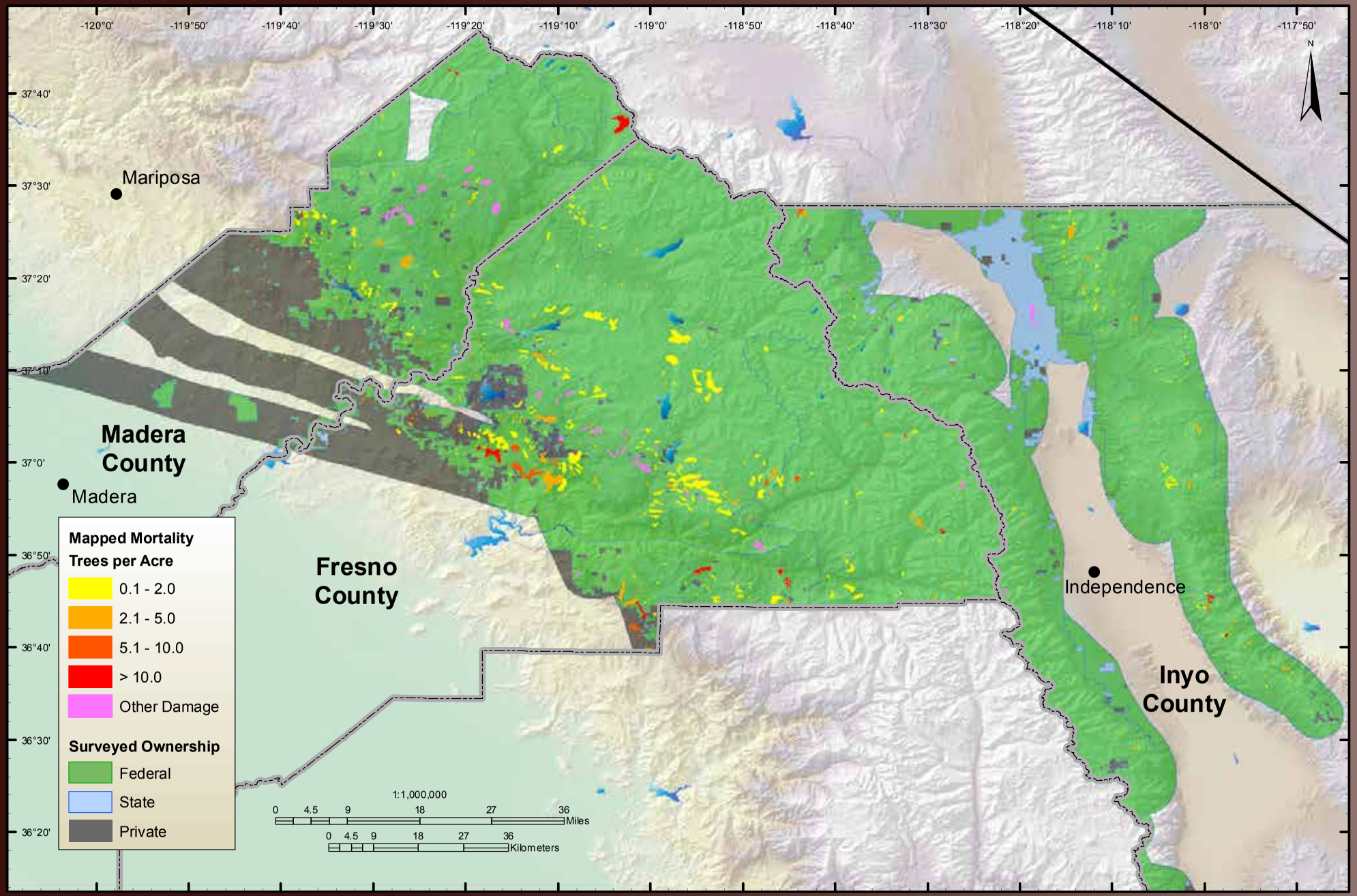
Colusa, Glenn, and Lake Counties, 2012



Del Norte and Humboldt Counties, 2012



Fresno (east), Madera, and Inyo (north) Counties, 2012



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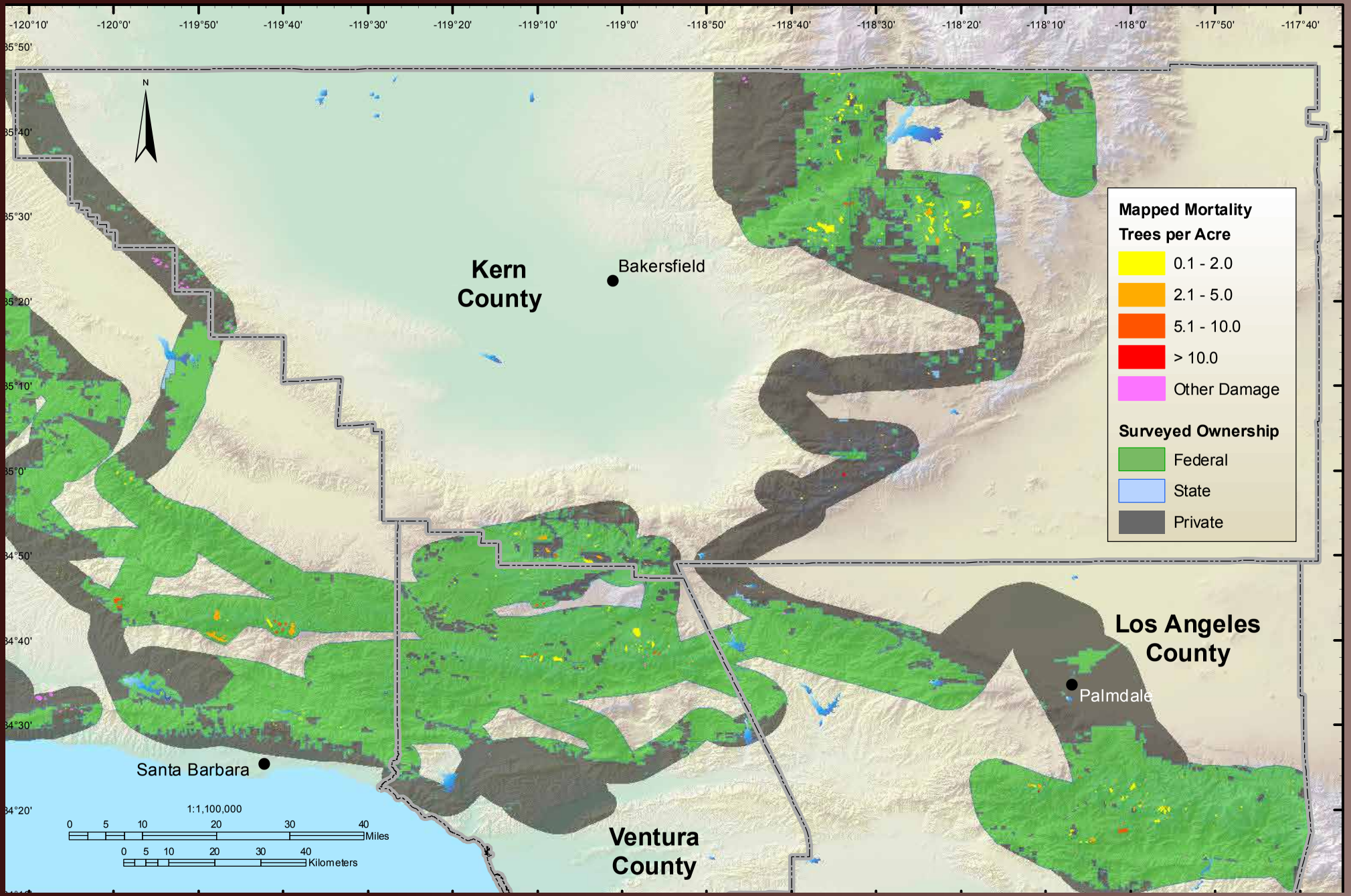
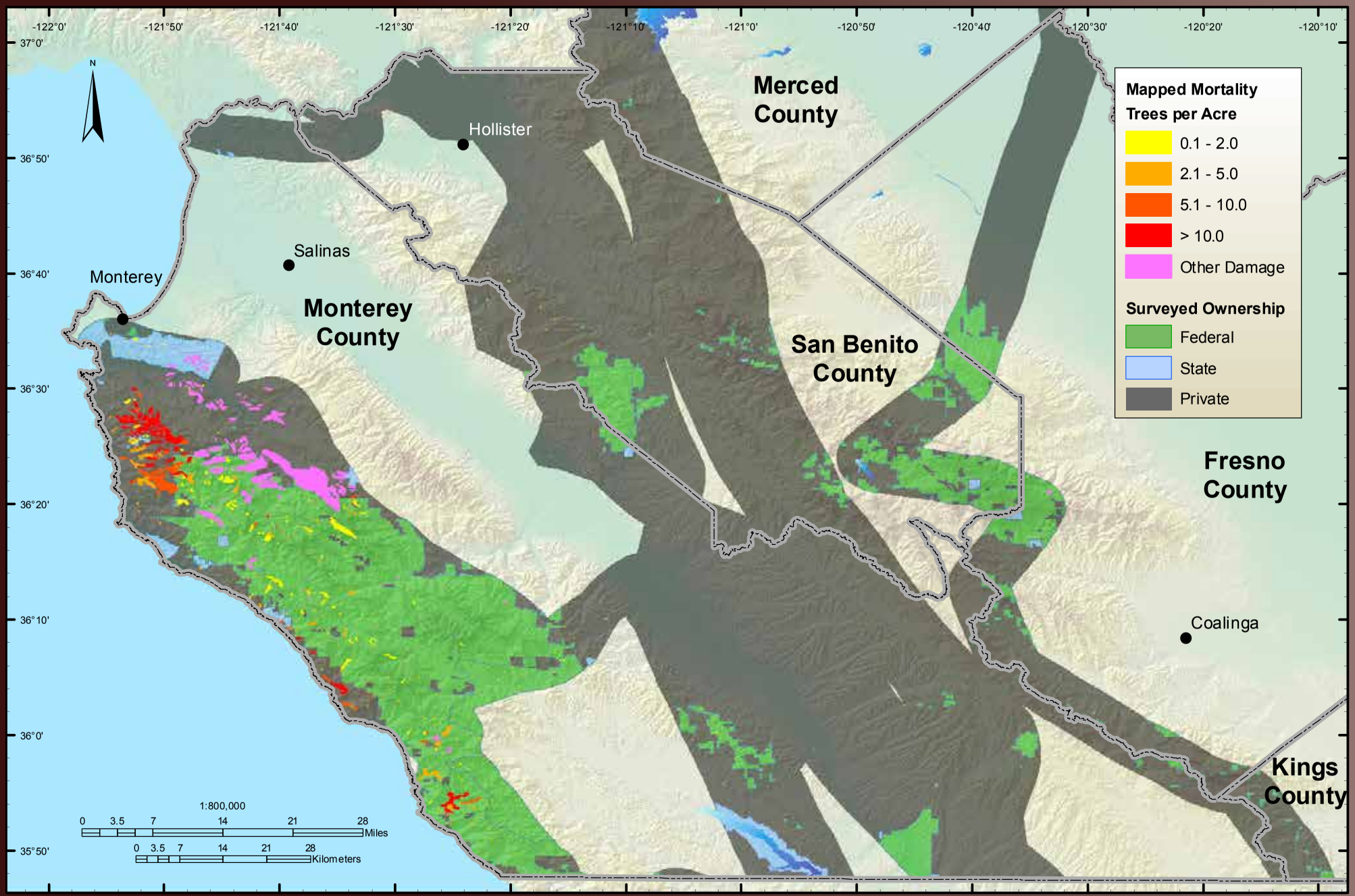
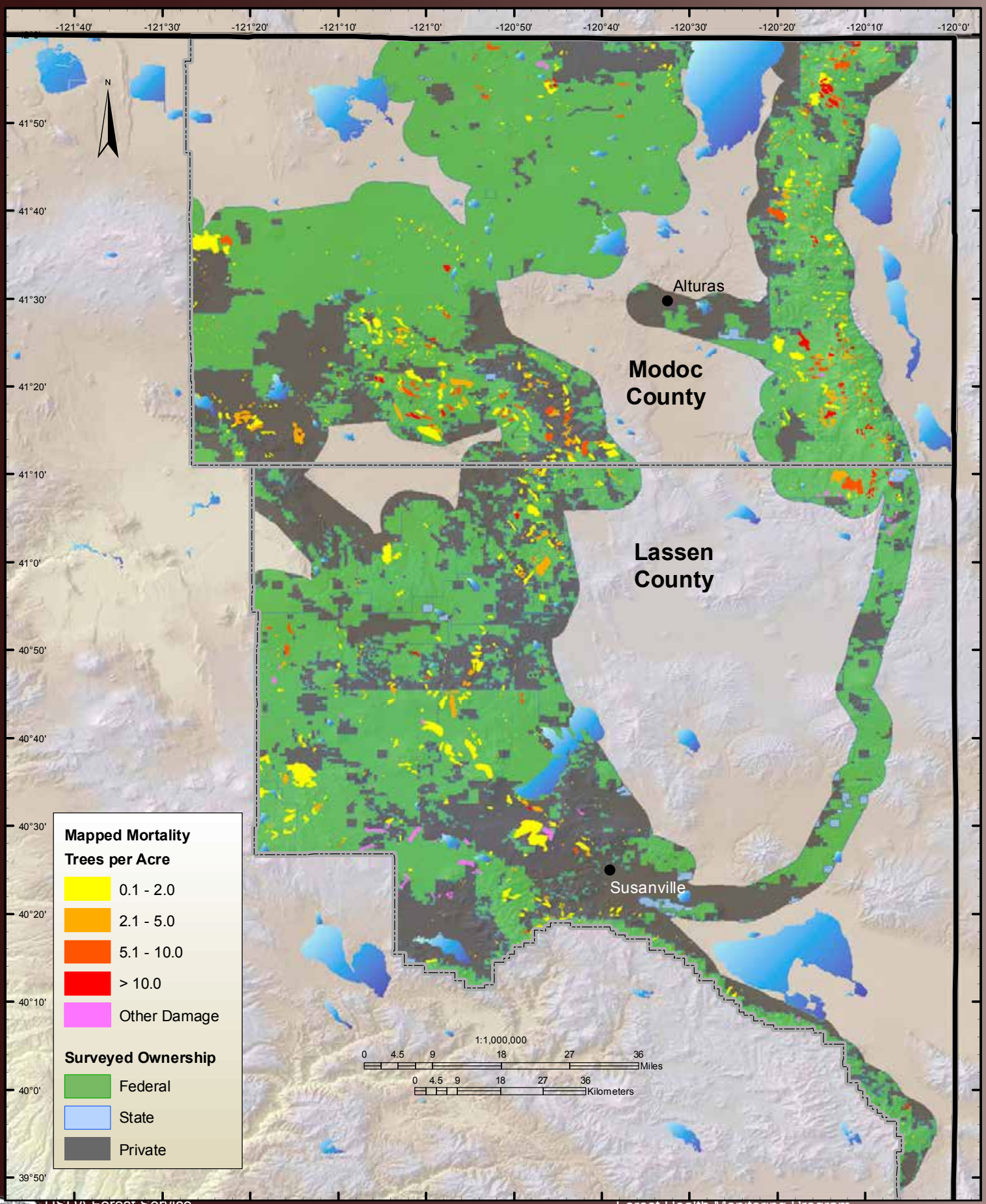
Kern, Ventura, and Los Angeles (west) Counties, 2012



Kings, Merced, Monterey, San Benito, and Fresno (west) Counties , 2012



Lassen and Modoc Counties, 2012



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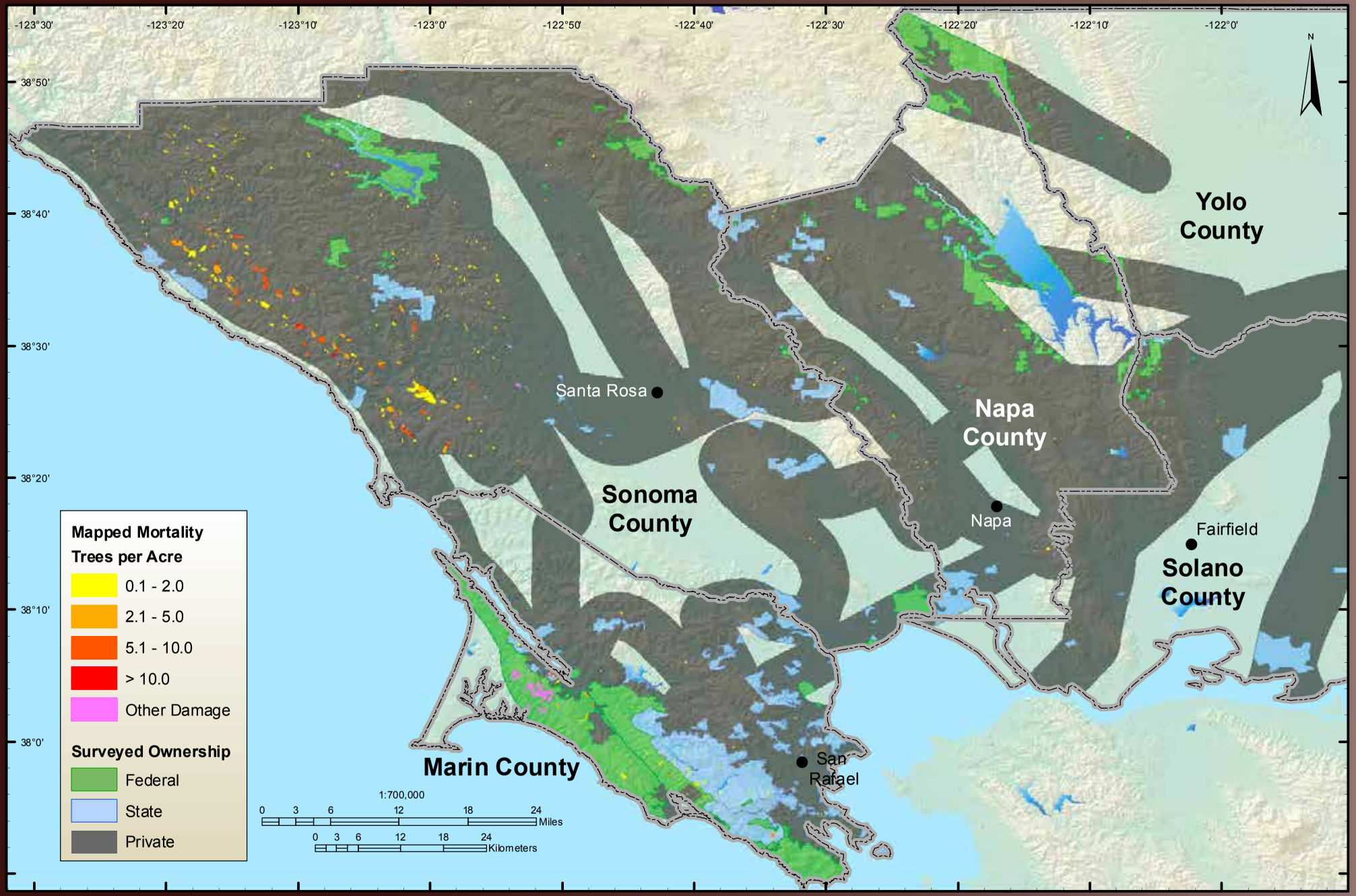
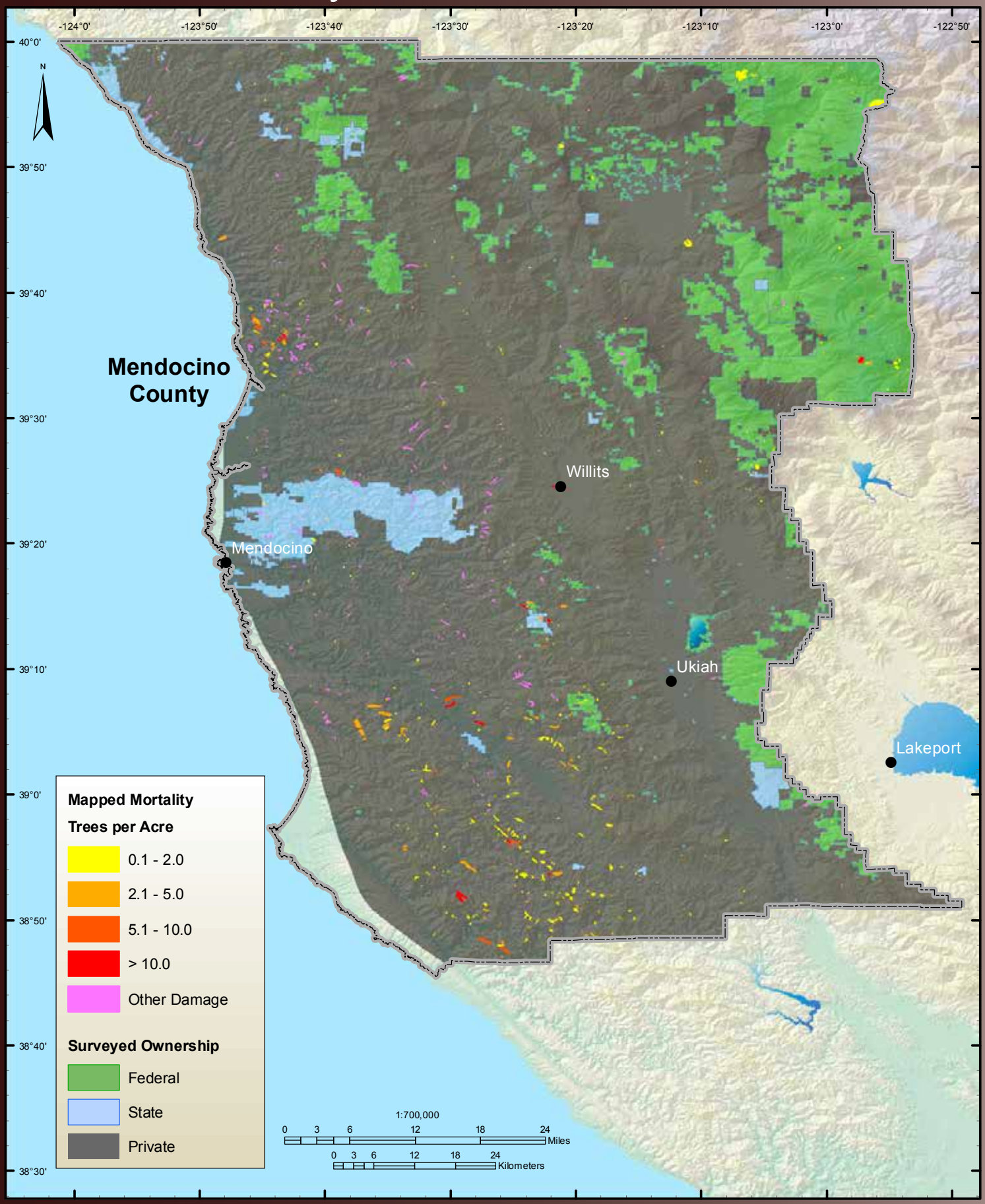
Marin, Napa, Solano, Sonoma, and Yolo Counties



Mendocino County, 2012



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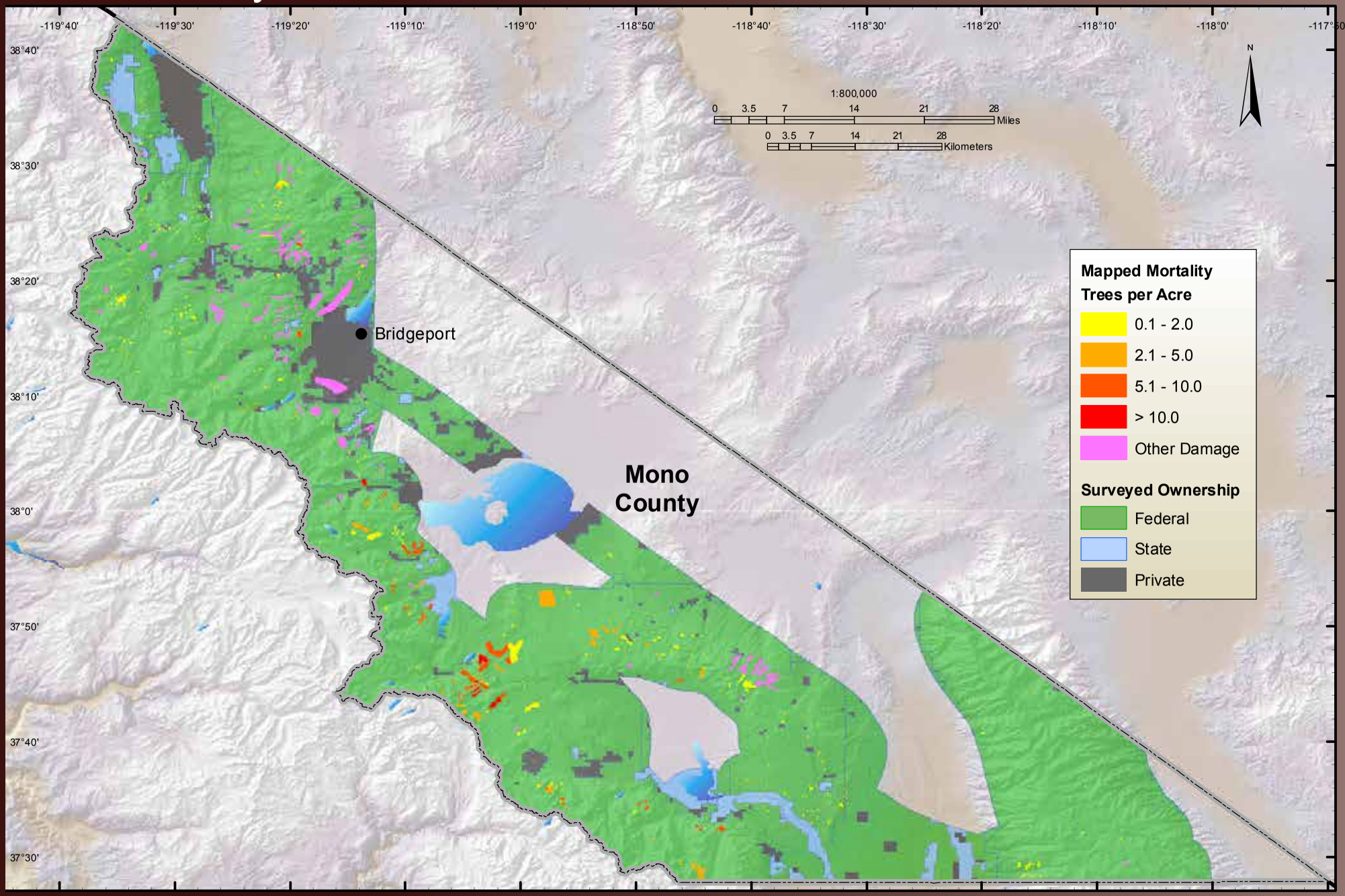
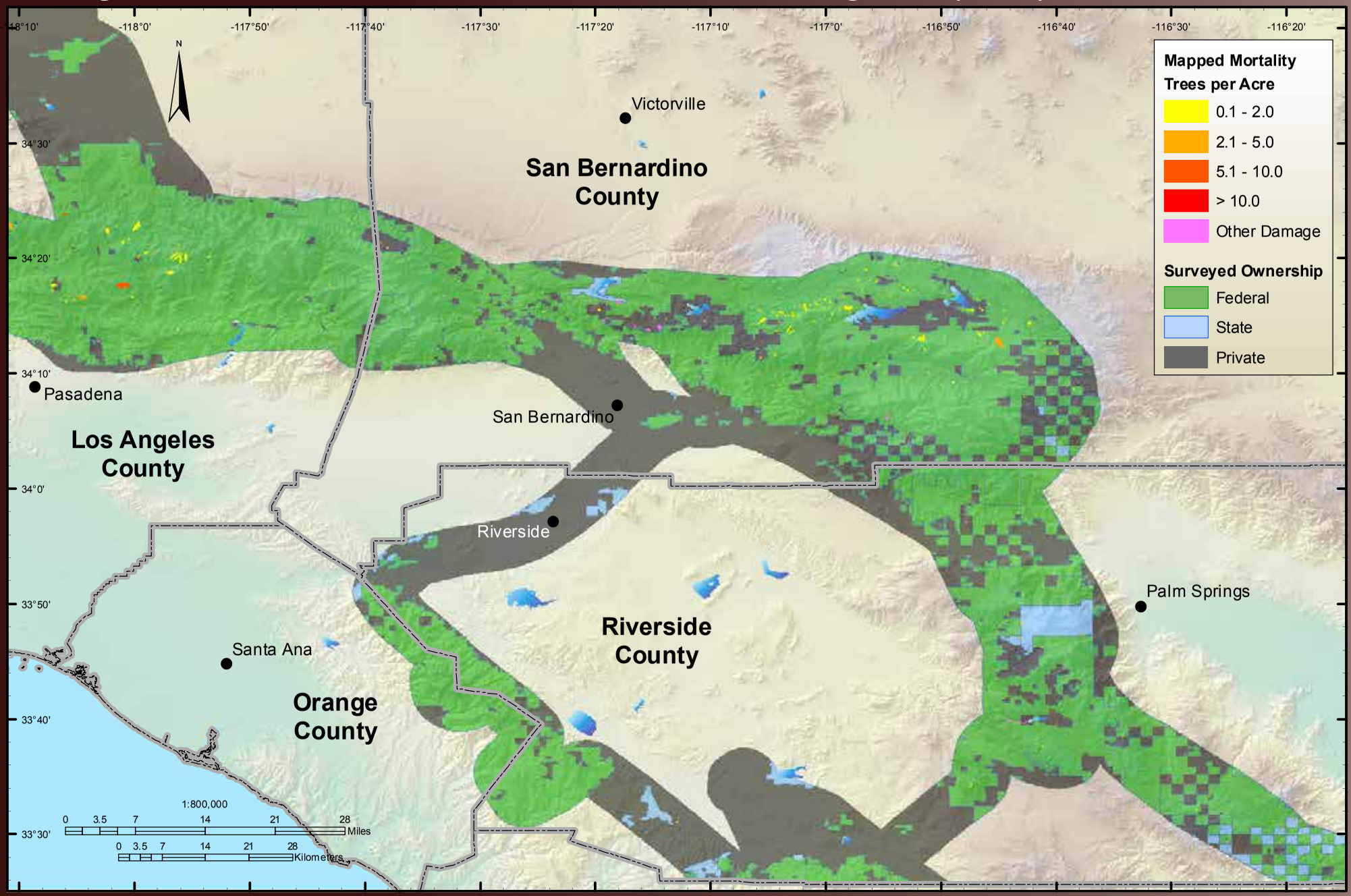
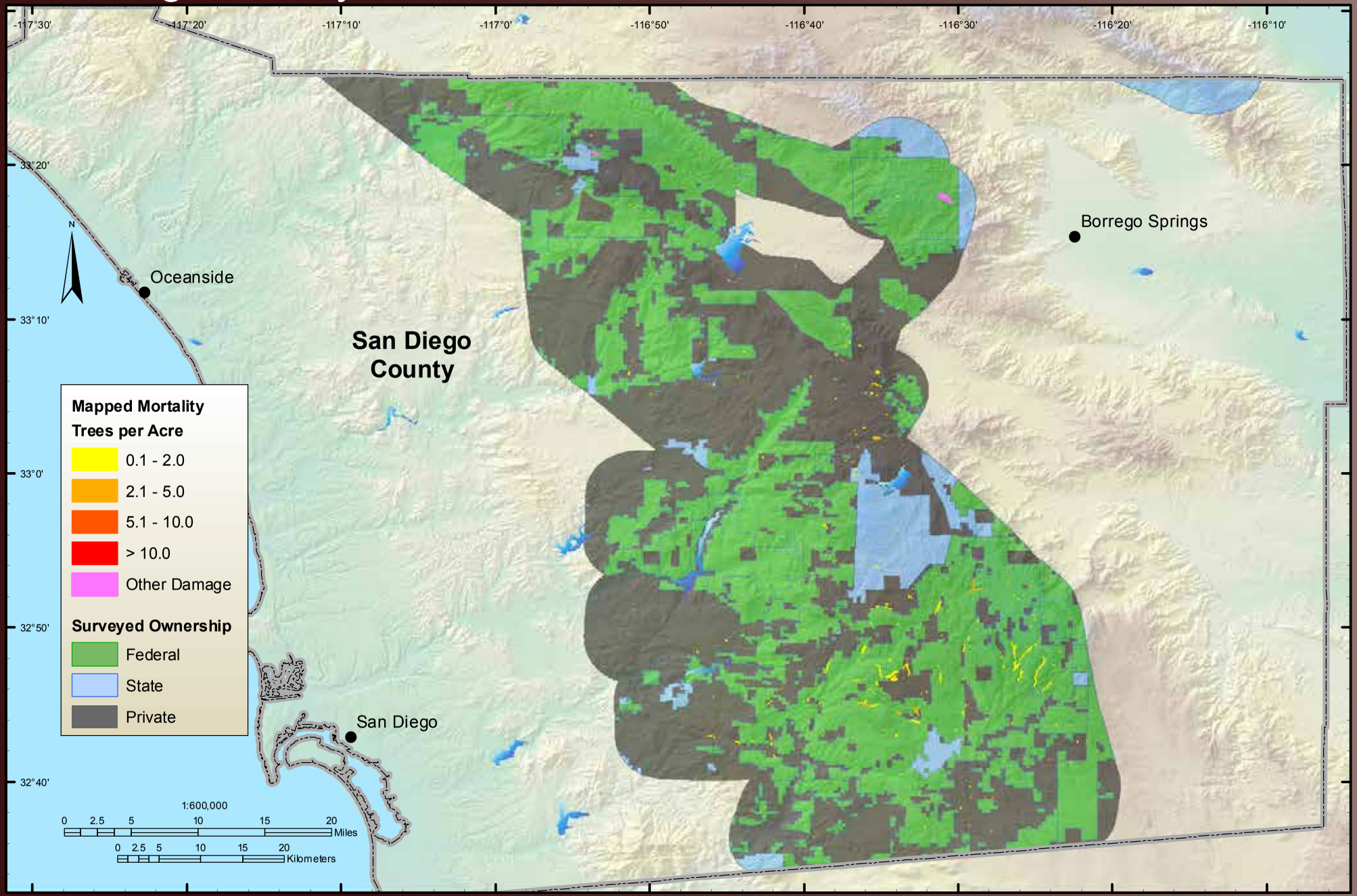
Mono County, 2012



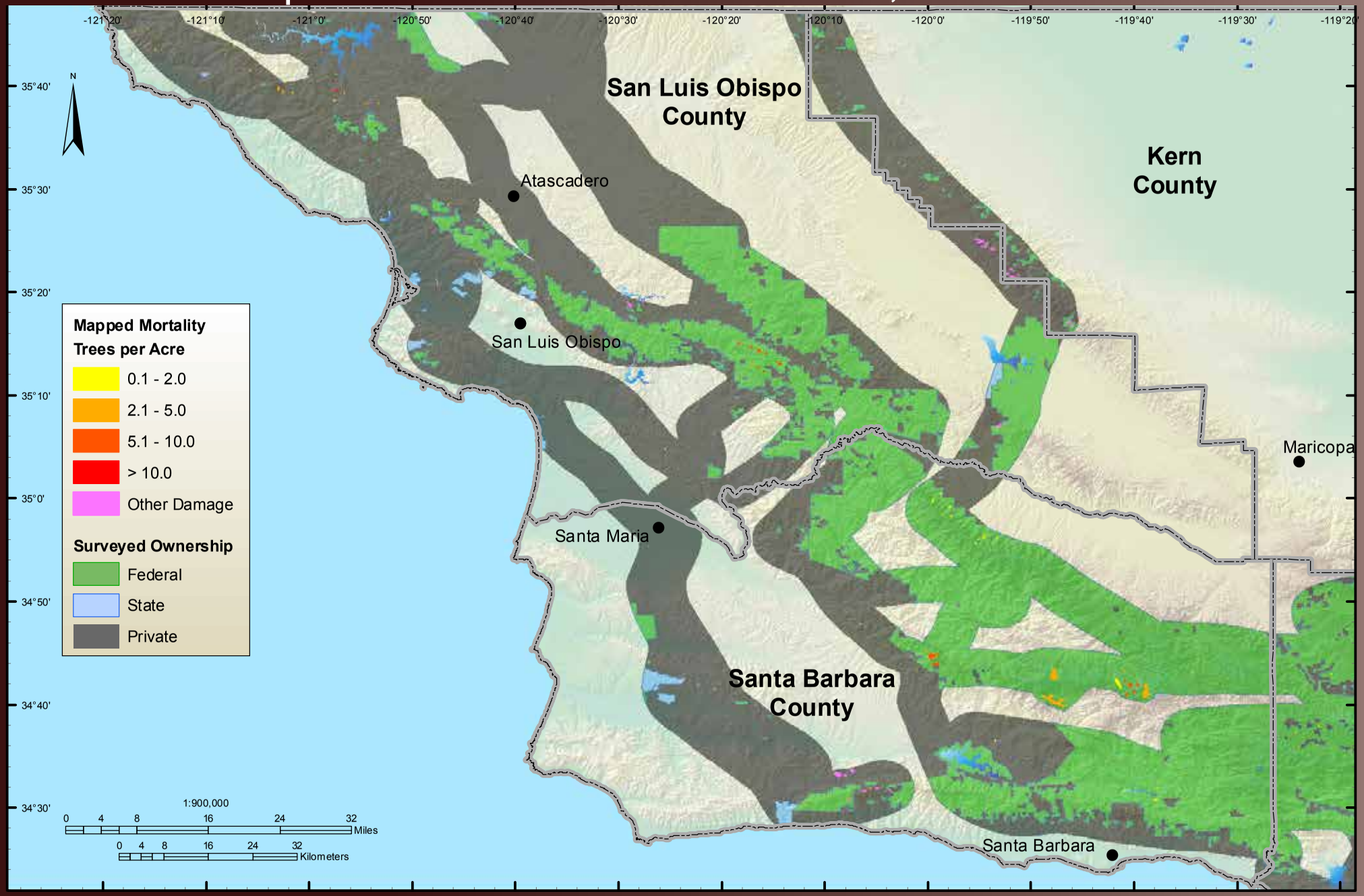
Orange, Riverside, San Bernardino, and Los Angeles (east) Counties, 2012



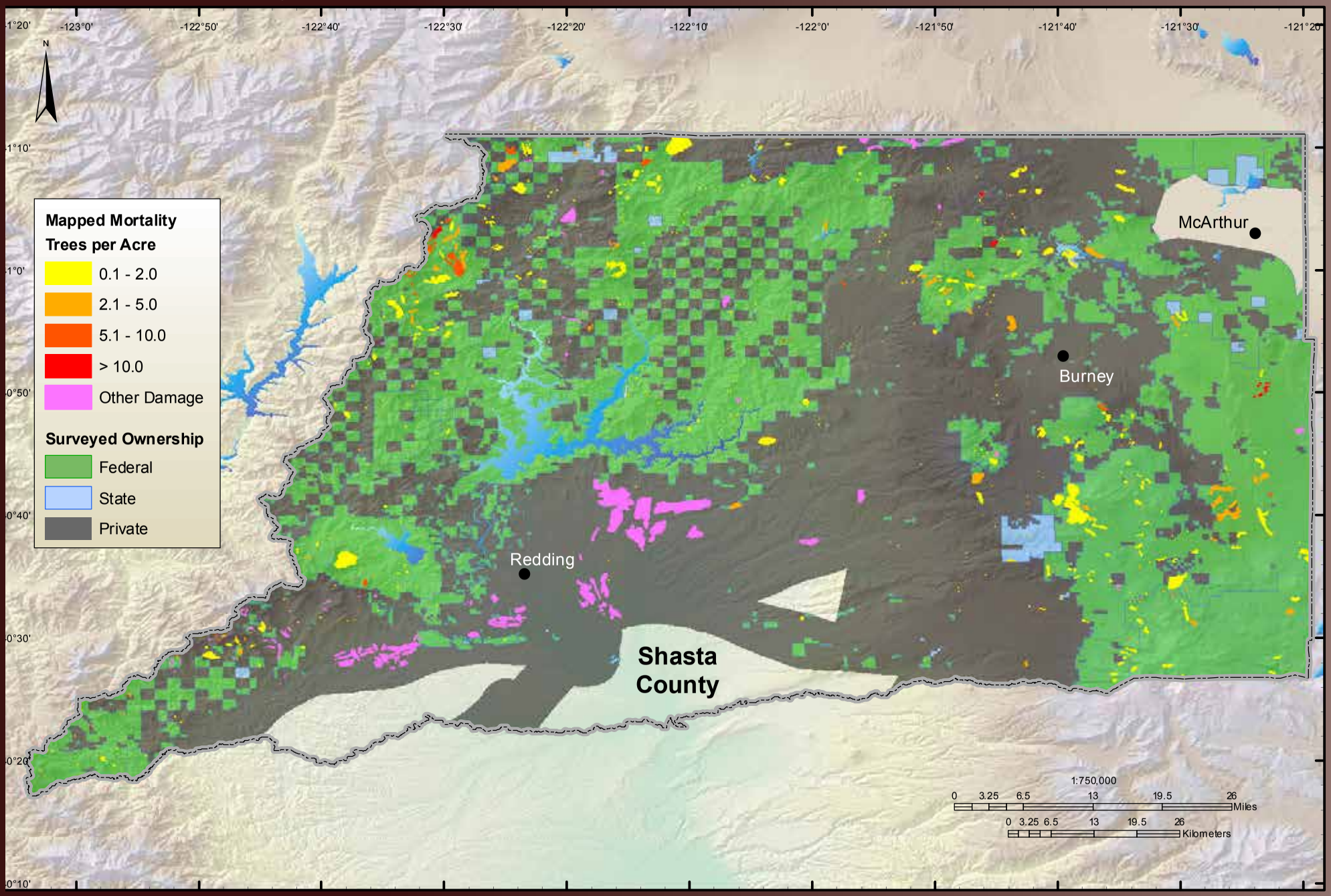
San Diego County, 2012



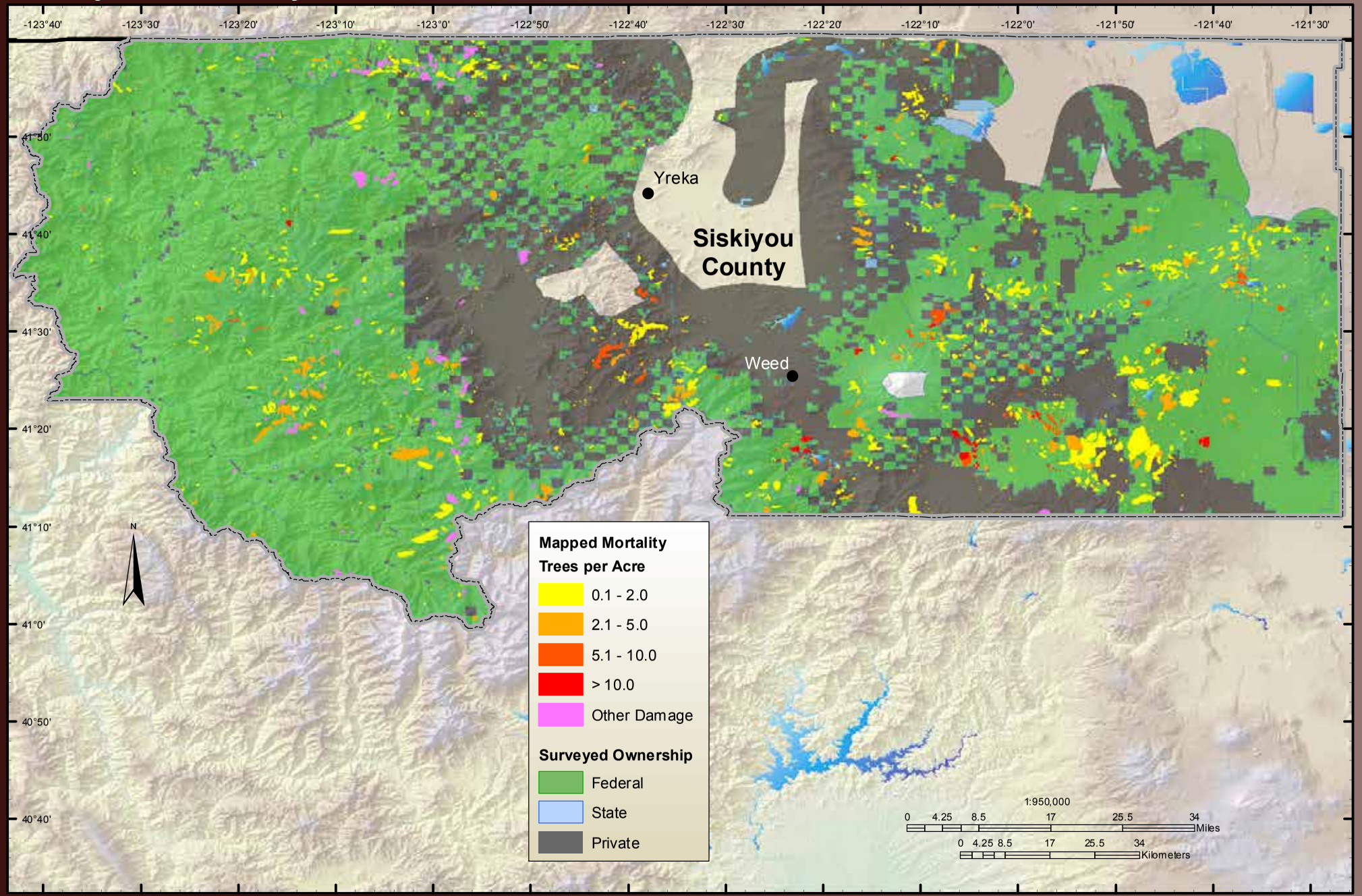
San Luis Obispo and Santa Barbara Counties, 2012



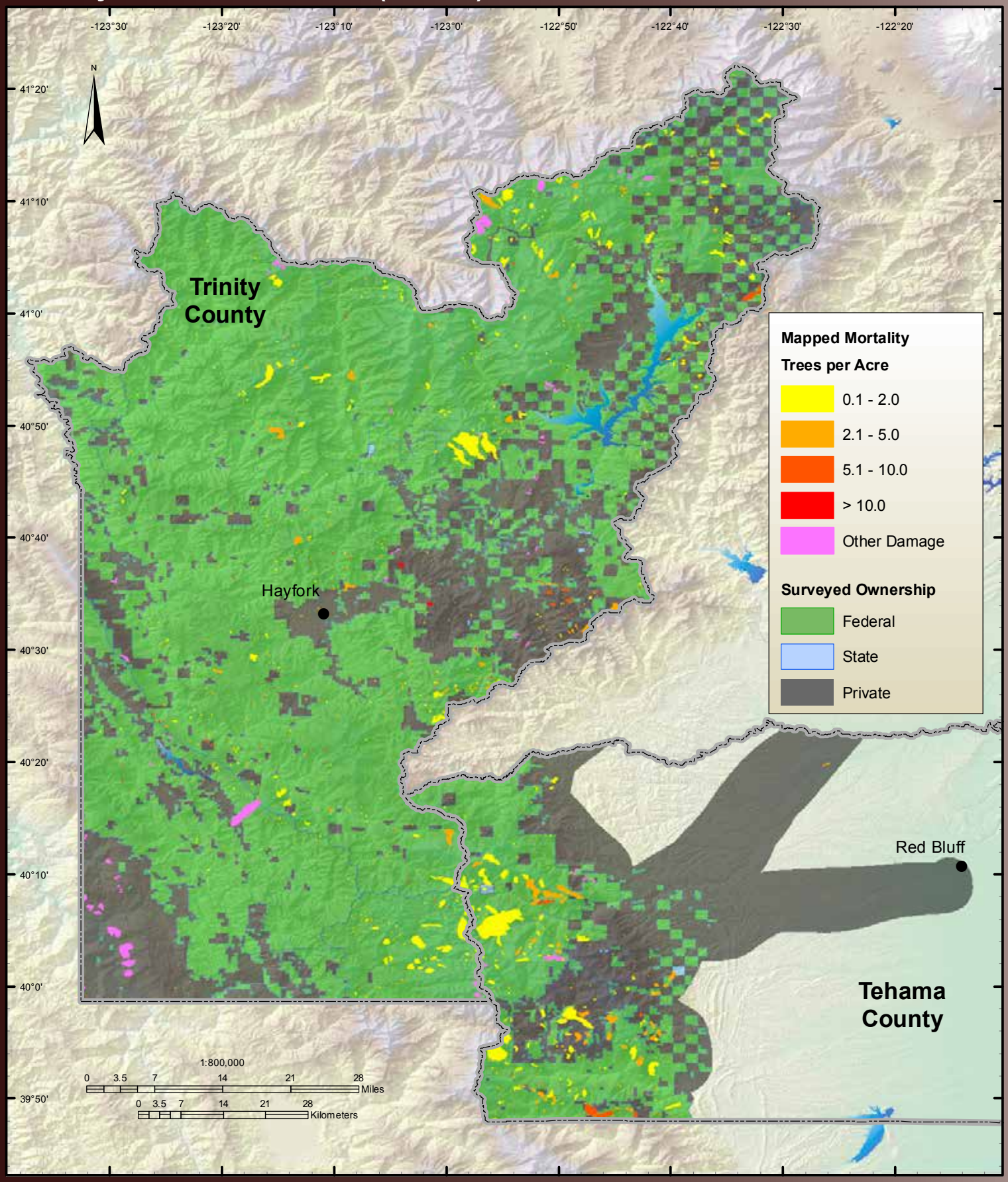
Shasta County, 2012



Siskiyou County, 2012



Trinity and Tehama (west) Counties, 2012



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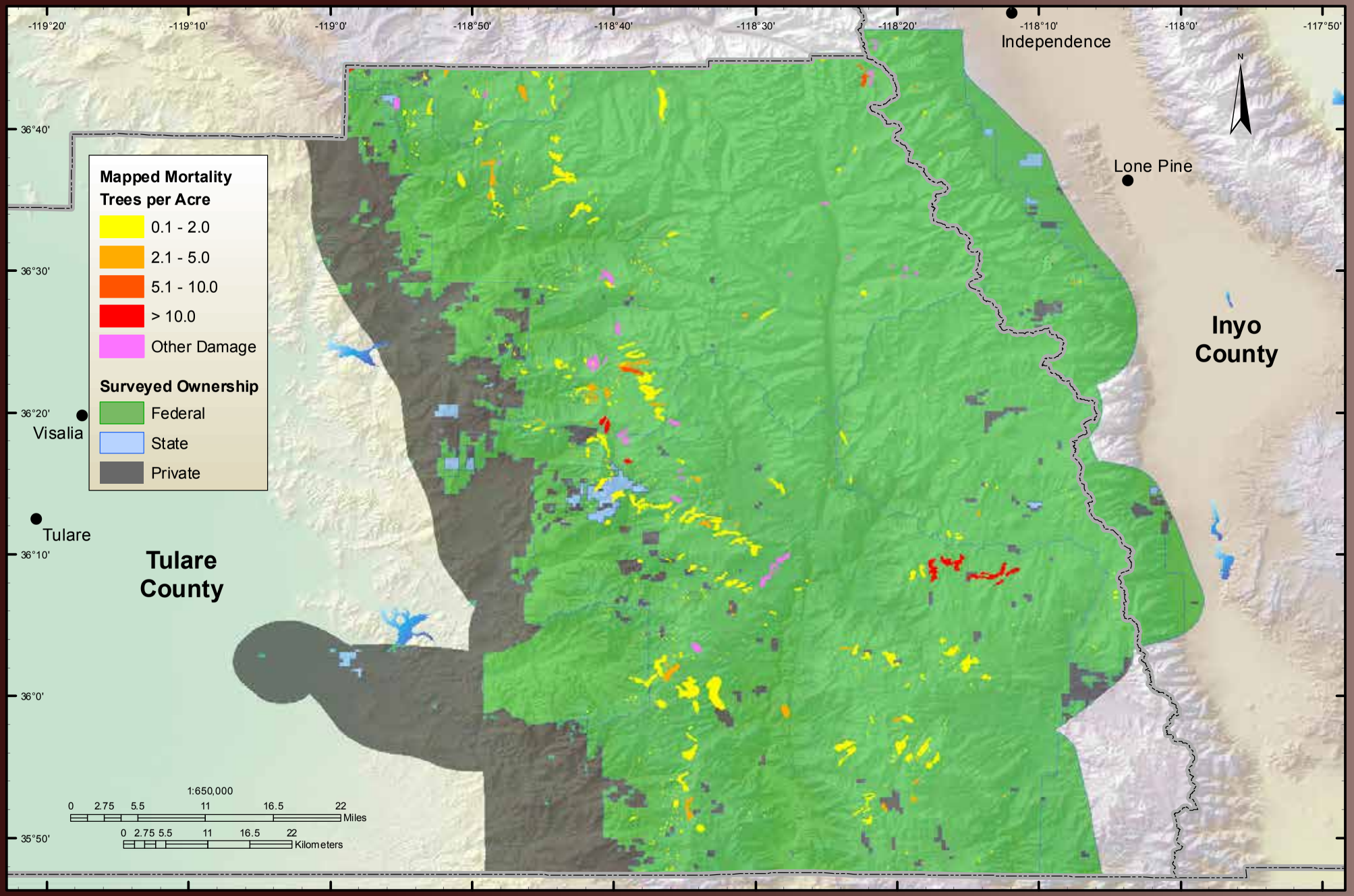
Tulare and Inyo (south) Counties, 2012



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