

Firewood and Forest Pests Entering California, 2011-2013

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This report summarizes data gathered by the 16 border protection stations of the California Department of Food and Agriculture (CDFA; Map 1) on firewood and associated intercepted forest pests entering the state between 2011 and 2013. Due to reduced budgets starting in late 2011, 7 of the 16 stations moved to reduced hours through steady attrition. Since effort was not uniform between years, all data summaries are presented for the entire three-year period. Furthermore, individual records were excluded from analysis if they were missing the origin, destination, or estimated weight of the load.

Table 1 shows the total and average mass (in pounds) and the number of individual loads that were recorded by each station. Tables 2 and 3 break these numbers down by vehicle type (private and commercial, respectively). Table 1 also shows the proportion of wood in commercial vehicles recorded by each station. All three tables are sorted in descending order by total mass. Some key results:

- Firewood in commercial vehicles accounts for 69% of the total weight while firewood in private vehicles accounts for 88% of the individual loads that were recorded.
- Almost a third (29%) of all firewood entering the state by weight is in commercial loads moving south down I-5 and recorded at the Hornbrook station. Adding in the wood in commercial loads recorded at Yermo (I-15) and Redwood Highway (US199) brings the total proportion to over half (58%).
- Top entry points for firewood in private vehicles by weight are Redwood Highway, Hornbrook, Alturas (US395), and Winterhaven (I-8).
- Average weight of a load of firewood was very different between commercial and private vehicles: over 17,000 lbs for commercial loads versus less than 1,100 pounds for wood in private vehicles.
- By station the average weight of a private load varied from over 4,000 pounds at Redwood Highway to 78 pounds at Vidal (US95).

Tables 4-6 show the top (defined as summing to 99% of the total) origin states/countries of firewood entering California. Overall, firewood was brought to (or back to) California from 47 other states, Canada, and Mexico; but wood in commercial vehicles only arrived from 21 other states. Oregon is clearly the largest origin of wood with 42% by weight. The top five origins (adding in Utah, British Columbia, California, and Arizona) accounted for 92% of all firewood by weight.

The top species (defined as 95% of the sum by weight) of recorded wood in private and commercial vehicles are shown in Tables 7 and 8. These are further broken down to show the top origins of the various species. Over a third (41%) of all firewood brought into the state is some species of pine, with madrone (14%), true fir species (12%), and oaks (9%) being next most common.

Table 9 shows the average distance that loads of firewood were expected to travel (based on straight-line distances to the stated destinations) from each of the stations, broken down by vehicle type. The key finding is that commercial firewood on average travels over twice as far (188 versus 76 miles) from the border station than wood in private vehicles. Redwood Highway

and Smith River (US101) offer an interesting contrast to this trend – wood in private vehicles entering at those two stations travels much further on average (74 and 124 miles) than commercial loads (34 and 41 miles). It appears there is a major commercial firewood distribution hub in nearby Crescent City. Wood in private vehicles entering at Winterhaven (10 miles) and Alturas (29 miles) tends to stay local, while wood entering at Needles (I-40; 258 miles), Vidal (173 miles), and Dorris (CA97; 170 miles) travels the furthest.

California was the final destination for 91% of the recorded firewood. Over half of the remaining wood was going to Nevada (mostly Reno), and Oregon and Utah were the only other states where relatively large quantities were bound. There were over 800 destinations named for firewood within California (Maps 2-4) and Tables 10 and 11 show the top (defined as over 100,000 pounds) destinations for wood in private and commercial vehicles, respectively. Firewood destinations were spread throughout the state and included everything from the largest urban centers and popular tourist destinations, down to specific landmarks such as lakes and mountain passes.

Pest interceptions in firewood

In 2011-2013 the CDFA border stations intercepted 610 potential forest pests in firewood (Table 12). Table 13 shows the number of forest pest interceptions by station and vehicle type. Just under half of the pests were intercepted at the Needles (37.5%) and Meyers (11.6%) stations and pests were overwhelmingly more likely to be intercepted in private vehicles (97%).

Forest pests traveled to California in firewood from 38 other states, Canada, and Mexico (Map 5). Top origins for forest pests were Texas (71), Arizona (57), Oregon (54), Colorado (48) and Nevada (47). However, over a fifth of the intercepted pests were in vehicles with California license plates (Map 6), returning from 21 other states and Canada. In fact Californians brought over twice as many pests back to the state in firewood as vehicles with the next most frequent license state Colorado. Map 5 shows that most pests came from western and southwestern states, which might explain why over a third of them are intercepted at Needles.

Intercepted forest pests were traveling to over 170 different destinations, with roughly 97% of them in California (Map 7). Top destinations included Yosemite National Park and 7 of the 10 largest (by population) urban areas in the state.

Forest pests were over 11 times more likely to be intercepted in firewood that came from a non-adjacent state than an adjacent one, although the CDFA policies concerning which vehicles are stopped and inspected likely inflates this figure. The average weight of a load of firewood in a private vehicle that was bearing a potential forest pest was 153 lbs., while the average weight of a private pest-free load was 1,063 lbs. There was no correlation between the number of pests intercepted at a given station and either the amount of firewood recorded there, or the annual average daily traffic through the station according to CalTrans (2009 data). Taken in sum these findings suggest that it is mostly recreationists either coming or returning from other states that are bringing pests in firewood to California.

Station	Count	Total Pounds	Avg Weight	Proportion Commercial
Hornbrook	3,493	23,539,083	2,285	83.9%
Yermo	609	12,845,731	2,065	99.1%
Redwood Highway	1,744	11,742,792	1,828	55.1%
Needles	620	4,253,605	4,149	85.8%
Alturas	1,387	3,169,180	6,739	3.5%
Blythe	1,255	2,293,854	505	67.5%
Winterhaven	4,851	2,040,833	176	2.5%
Dorris	441	1,829,744	6,861	40.5%
Smith River	2,049	1,561,025	6,733	10.6%
Topaz	1,264	1,043,879	762	20.7%
Long Valley	1,762	889,074	826	3.0%
Truckee	1,758	839,725	478	6.3%
Benton	375	774,479	762	69.1%
Tulelake	909	692,693	281	17.7%
Vidal	412	115,770	421	72.7%
Meyers	244	42,932	21,093	1.1%
Totals	23,173	67,674,399	2,920	68.4%

Table 1. Number of loads, total and average weight in pounds, and proportion in commercial vehicles of firewood recorded by CDFA border stations.

Private Vehicles			
Station	Count	Pounds	Avg Weight
Redwood Highway	1,314	5,275,042	4,014
Hornbrook	2,042	3,781,714	1,852
Alturas	1,373	3,057,800	2,227
Winterhaven	4,847	1,989,533	410
Smith River	1,996	1,395,955	699
Dorris	420	1,089,363	2,594
Long Valley	1,749	862,555	493
Topaz	1,247	828,138	664
Truckee	1,741	786,532	452
Blythe	1,206	746,495	619
Needles	513	603,483	1,176
Tulelake	879	570,048	649
Benton	354	239,375	676
Yermo	155	115,054	742
Meyers	234	42,457	181
Vidal	407	31,662	78
Totals	20,477	21,415,206	1,046

Table 2. Number of loads, total and average weight of firewood recorded in private vehicles by CDFA border stations.

Commercial Vehicles			
Station	Count	Pounds	Avg Weight
Hornbrook	1,451	19,757,369	13,616
Yermo	454	12,730,677	28,041
Redwood Highway	430	6,467,750	15,041
Needles	107	3,650,122	34,113
Blythe	49	1,547,359	31,579
Dorris	21	740,381	35,256
Benton	21	535,104	25,481
Topaz	17	215,741	12,691
Smith River	53	165,070	3,115
Tulelake	30	122,645	4,088
Alturas	14	111,380	7,956
Vidal	5	84,108	16,822
Truckee	17	53,193	3,129
Winterhaven	4	51,300	12,825
Long Valley	13	26,519	2,040
Meyers	10	475	48
Totals	2,696	46,259,193	17,158

Table 3. Number of loads, total and average weight of firewood recorded in commercial vehicles by CDFA border stations.

Origin	Pounds	Count
Oregon	28,418,182	6,672
Utah	10,107,082	618
British Columbia	7,949,425	403
California	7,775,711	4,443
Arizona	7,752,397	6,500
Montana	1,789,303	291
Nevada	1,352,078	2,528
Mexico	654,374	22
Texas	510,012	136
Washington	472,693	490
New Mexico	171,365	114
Idaho	164,676	179
Colorado	145,554	194
Louisiana	122,627	21
36 other states and the rest of Canada	288,921	562
Totals	67,674,399	23,173

Table 4. Number of loads and total weight by top origins (99% by sum of total) of firewood recorded by CDFA border stations.

Private Vehicles		
Origin	Pounds	Count
Oregon	10,154,958	5,180
California	5,875,117	4,297
Arizona	3,184,498	6,361
Nevada	1,172,081	2,496
Washington	225,323	474
British Columbia	218,834	45
Utah	90,234	274
Louisiana	79,307	20
Idaho	72,514	174
Colorado	62,509	188
Mexico	45,175	4
Oklahoma	42,632	56
South Dakota	40,889	19
Missouri	33,676	35
Texas	30,607	123
Montana	28,695	216
New Mexico	18,288	78
33 other states/ rest of Canada	39,870	437
Totals	21,415,206	20,477

Table 5. Number of loads and total weight by top origins (99% by sum of total) of firewood in private vehicles recorded by CDFA border stations.

Commercial Vehicles		
Origin	Pounds	Count
Oregon	18,263,224	1,492
Utah	10,016,848	344
British Columbia	7,730,591	358
Arizona	4,567,899	139
California	1,900,594	146
Montana	1,760,608	75
Mexico	609,199	18
Texas	479,405	13
Washington	247,370	16
Nevada	179,997	32
New Mexico	153,077	36
13 other states/ rest of Canada	350,431	28
Totals	46,259,193	2,696

Table 6. Number of loads and total weight by top origins (99% by sum of total) of firewood in commercial vehicles recorded by CDFA border stations.

pine	5,506,098	cedar	345,814
California	2,075,333	Oregon	109,403
Oregon	1,681,497	Arizona	102,977
Arizona	802,697	California	90,870
Nevada	638,399	17 other states and Canada	42,564
35 other states, Canada and Mexico	308,173	alder	244,491
madrone	3,560,713	Oregon	231,555
Oregon	3,170,577	7 other states and Canada	12,936
7 other states	390,137	almond	149,713
juniper	2,190,983	California	122,951
California	1,302,008	7 other states	26,762
Oregon	594,664	eucalyptus	139,402
12 other states	294,312	Arizona	104,608
fir	2,126,917	3 other states	34,793
Oregon	1,560,436	myrtle	138,650
California	428,432	Oregon	137,150
16 other states and Canada	138,049	Washington	1,500
oak	2,051,110	spruce	109,817
Oregon	1,379,756	Oregon	75,525
California	541,463	Utah	13,154
42 other states and Canada	129,891	10 other states and Canada	21,138
mesquite	1,147,768	unknown	1,875,952
Arizona	1,082,910	Arizona	774,739
5 other states and Mexico	64,858	Oregon	505,706
lodgepole pine	893,474	California	208,132
California	469,335	37 other states, Canada and Mexico	387,375
Oregon	403,030		
9 other states	21,109		

Table 7. Top species (95% by sum of total weight) of firewood recorded in private vehicles, broken down by origin.

pine	20,963,534	oak	3,819,207
Utah	5,548,532	Oregon	3,575,927
British Columbia	4,945,314	8 other states and Mexico	243,280
Oregon	3,814,669	spruce	2,442,965
Arizona	3,312,639	Utah	2,053,910
Montana	1,693,108	4 other states and BC	389,055
California	842,974	mesquite	1,085,659
12 other states and rest of Canada	806,299	Arizona	634,460
fir	6,142,714	Mexico	435,199
Oregon	2,214,633	2 other states	16,000
Utah	2,064,847	unknown species	3,686,797
British Columbia	1,348,499	Oregon	1,873,677
California	473,745	British Columbia	958,395
2 other states	40,990	7 other states, rest of Canada, Mexico	854,725
madrone	5,930,063		
Oregon	5,739,563		
CA / BC	190,500		

Table 8. Top species (95% by sum of total weight) of firewood recorded in commercial vehicles, broken down by origin.

	Commercial	Private	All Vehicles
Alturas	123	29	29
Benton	197	70	77
Blythe	205	68	73
Dorris	284	170	175
Hornbrook	282	136	196
Long Valley	47	55	55
Meyers	102	96	96
Needles	181	258	244
Redwood Highway	34	74	63
Smith River	41	124	121
Topaz	64	119	119
Truckee	120	81	81
Tulelake	78	125	123
Vidal	350	173	176
Winterhaven	41	10	10
Yermo	94	128	103
All Stations	188	76	89

Table 9. Average straight-line distance (in miles) traveled by firewood in California, by station and vehicle type.

Destination	Pounds	Destination	Pounds
Crescent City	3,688,132	Tracy	213,791
Alturas	2,637,649	Hiouchi	206,565
Dunes	1,773,728	City of Industry	200,050
Yreka	699,375	Walker	196,273
Eureka	575,745	Los Angeles	189,696
Woodland	440,000	Truckee	187,118
Glamis	437,474	Bishop	181,173
Smith River	398,730	Benton	149,014
Susanville	325,387	Fort Dick	136,500
Gasquet	320,015	Red Bluff	135,290
Sacramento	275,888	Imperial Dunes	133,445
Hornbrook	245,885	Patterson	132,240
Redding	233,954	Montague	127,470
Perris	230,684	San Jose	119,999
Macdoel	216,335	Chilcoot	106,417
San Bernardino	215,256	752 other destinations	4,092,015

Table 10. Top destinations (defined as over 100,000 lbs) in California of firewood recorded in private vehicles.

Destination	Pounds	Destination	Pounds
Crescent City	5,264,170	Eureka	367,100
Santa Fe Springs	2,688,030	Hayward	312,098
Commerce	2,657,922	Antioch	273,359
San Bernardino	1,921,891	San Francisco	219,647
Perris	1,849,232	Gasquet	213,000
City of Industry	1,824,170	Big Sur	204,380
Mira Loma	1,774,807	Cotati	204,280
Sacramento	1,702,548	Macdoel	177,700
Apple Valley	1,591,434	Chico	164,905
El Monte	1,590,474	Concord	163,440
Patterson	1,564,971	Citrus Heights	155,034
La Habra	1,476,620	Elk Grove	154,530
Modesto	1,271,637	Mount Shasta	141,055
Red Bluff	1,179,410	Brisbane	138,950
Tracy	1,013,210	Jurupa Valley	131,150
Ontario	950,697	Chino	126,485
Los Angeles	861,112	Moreno Valley	124,720
Porterville	631,786	San Bruno	122,820
Woodland	562,650	Fairfield	115,666
Riverside	536,124	French Camp	115,501
Corona	524,960	Hiouchi	109,000
Mammoth	507,461	Sunnyvale	107,734
San Jose	484,990	142 other destinations	3,352,622
Bakersfield	454,395		

Table 11. Top destinations (defined as over 100,000 lbs) in California of firewood recorded in commercial vehicles.

Taxa	Number
Coleoptera (Beetles)	573
Cerambycidae (Long-horned borers)	352
Buprestidae (Flatheaded borers)	140
Scolytidae (Bark beetles)	81
Isoptera (Termites)	26
Lepidoptera (Moths)	9
Tortricidae (Leafrollers)	4
Lasiocampidae (Tentworms)	3
Lymantriidae (Gypsy moths)	2
Hymenoptera (Ants, Bees, Wasps)	2
Siricidae (Wood wasps)	2
Total	610

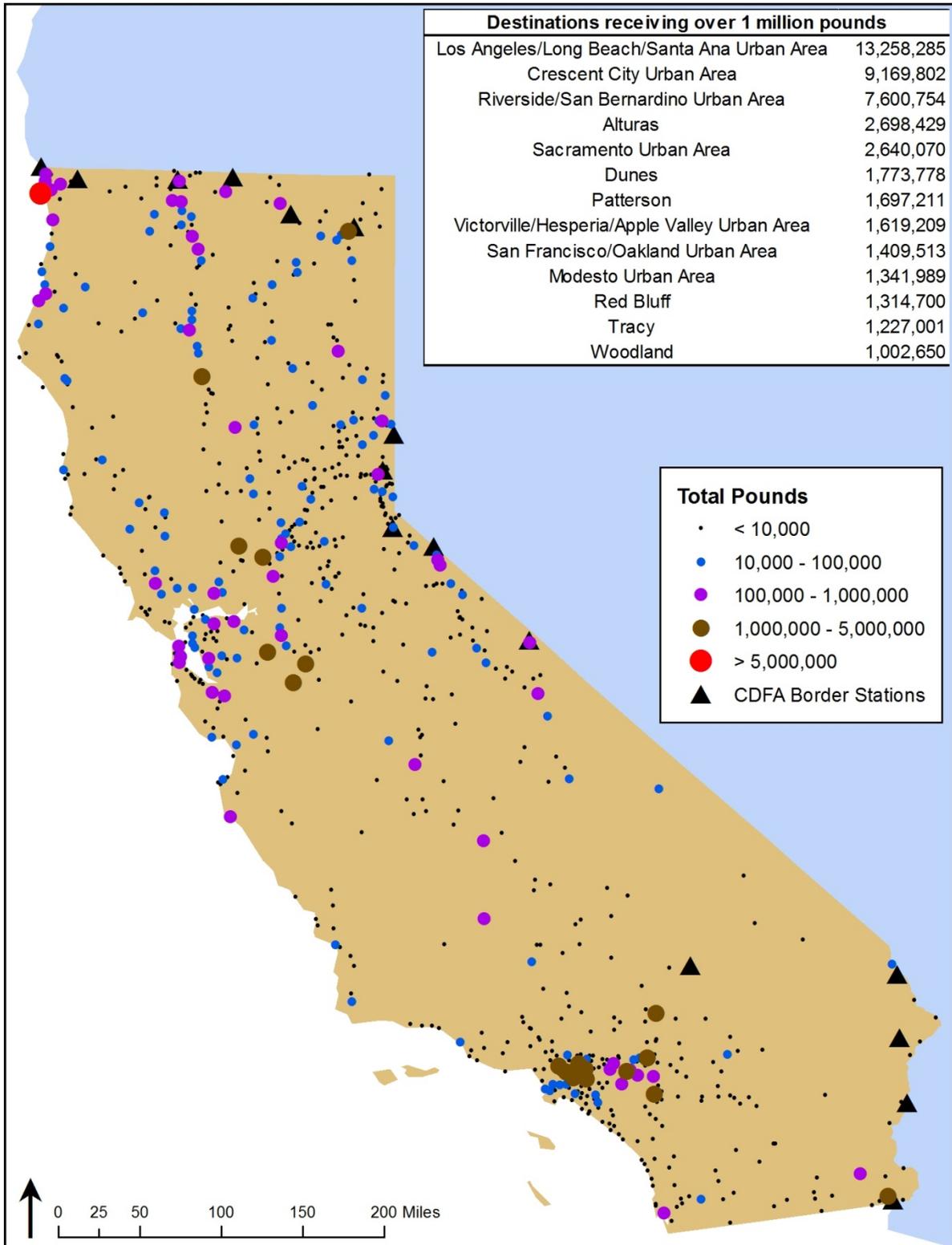
Table 12. Forest pests by taxon intercepted in firewood.

Station	Private	Commercial	Total
Needles	220	9	229
Meyers	71		71
Truckee	49		49
Redwood Highway	48		48
Benton	43		43
Vidal	29		29
Yermo	23	2	25
Topaz	22		22
Alturas	14	3	17
Hornbrook	14	1	15
Long Valley	15		15
Tulelake	13		13
Smith River	13		13
Blythe	10	2	12
Dorris	9		9
Winterhaven			0
Totals	593	17	610

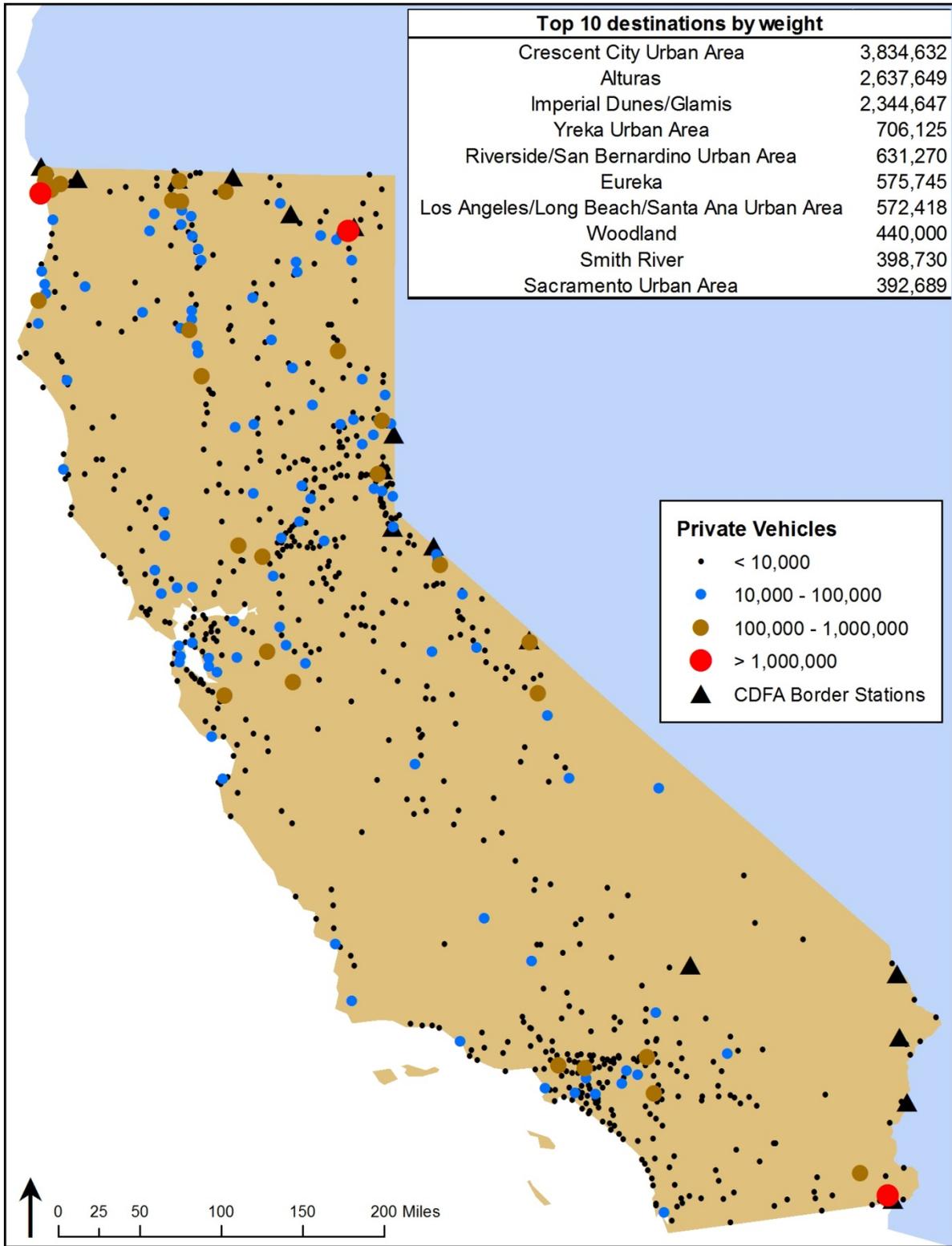
Table 13. Forest pests by station and vehicle type intercepted in firewood.



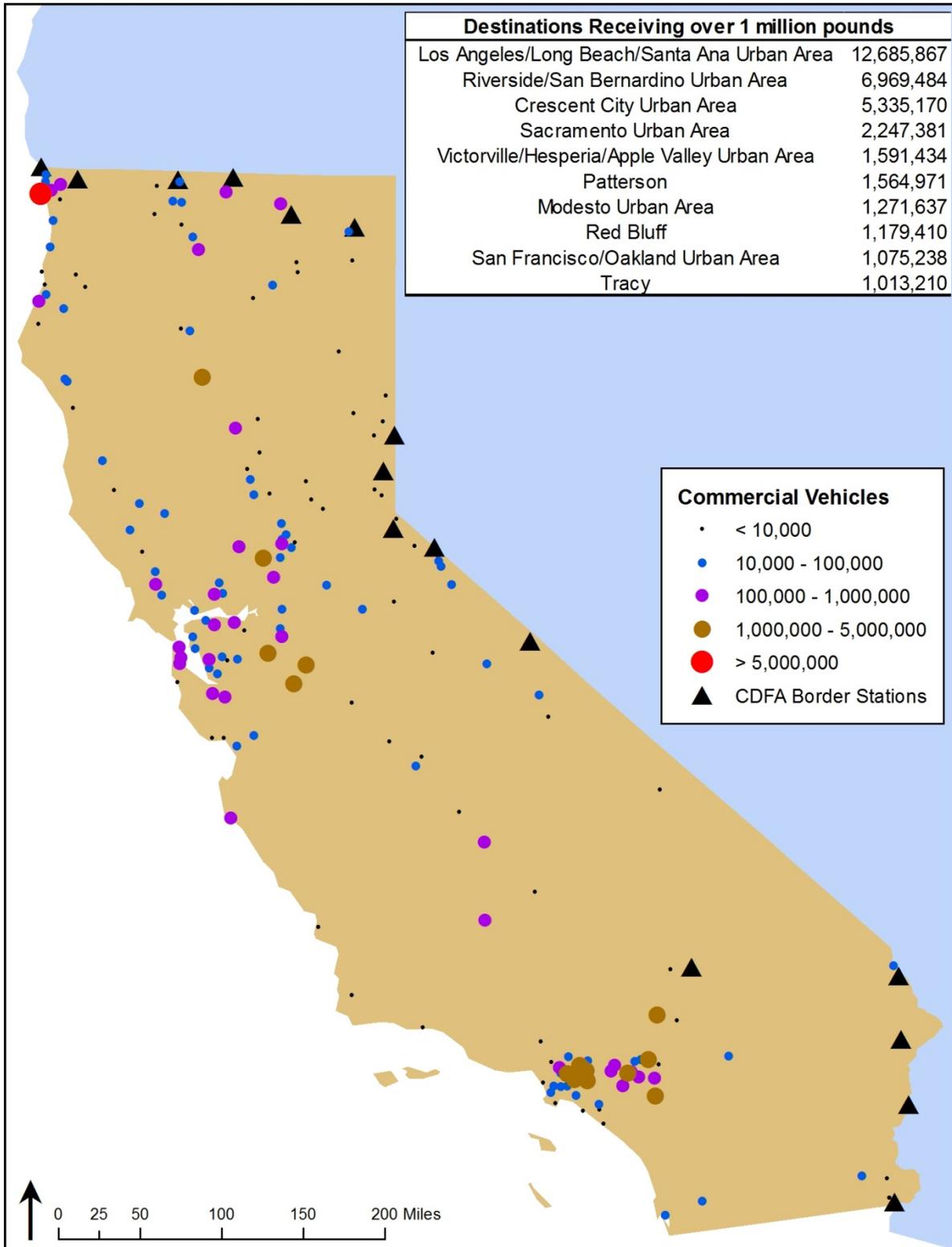
Map 1. Locations of the sixteen CDFA border stations.



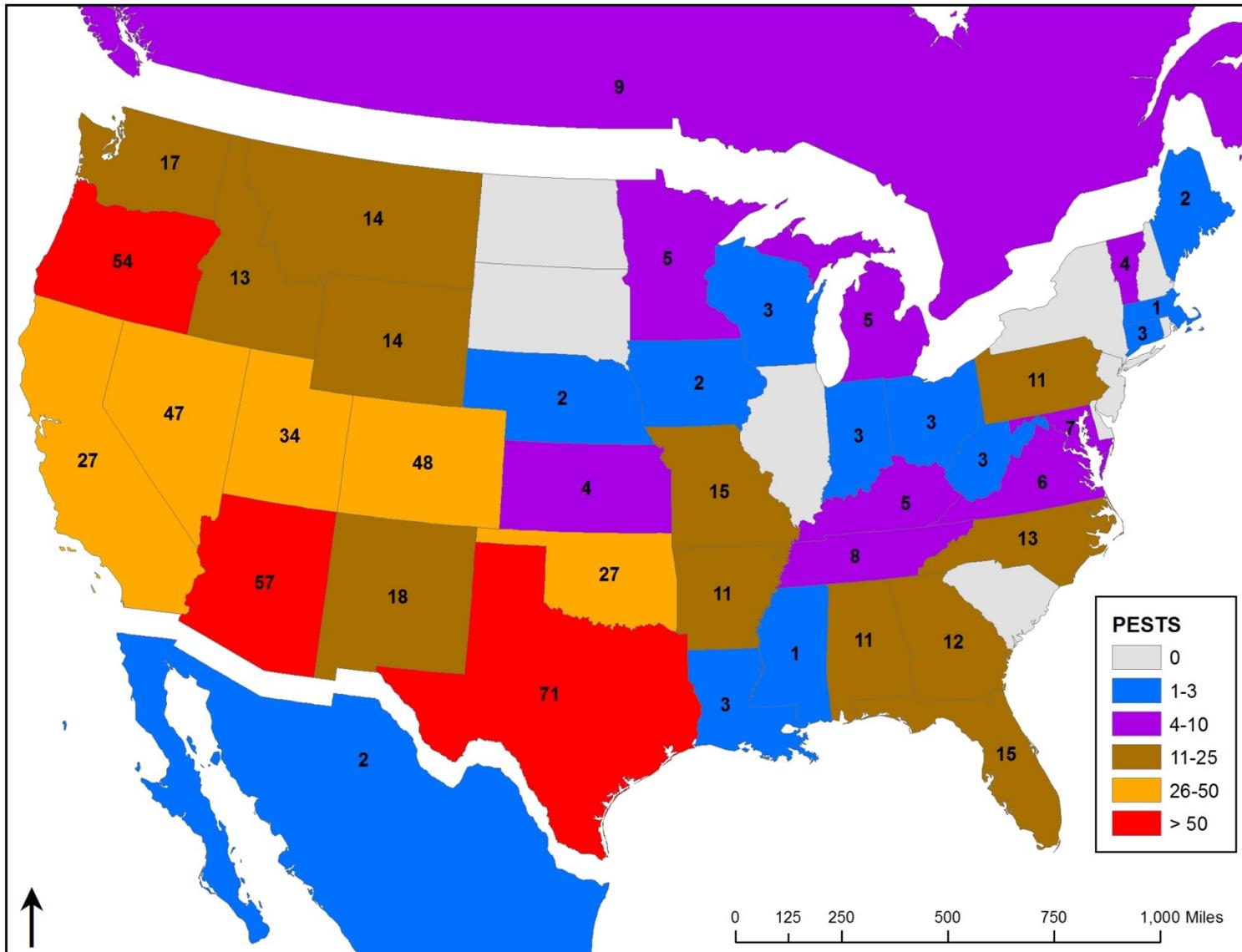
Map 2. Destinations in CA of all firewood recorded at CDFA border stations.



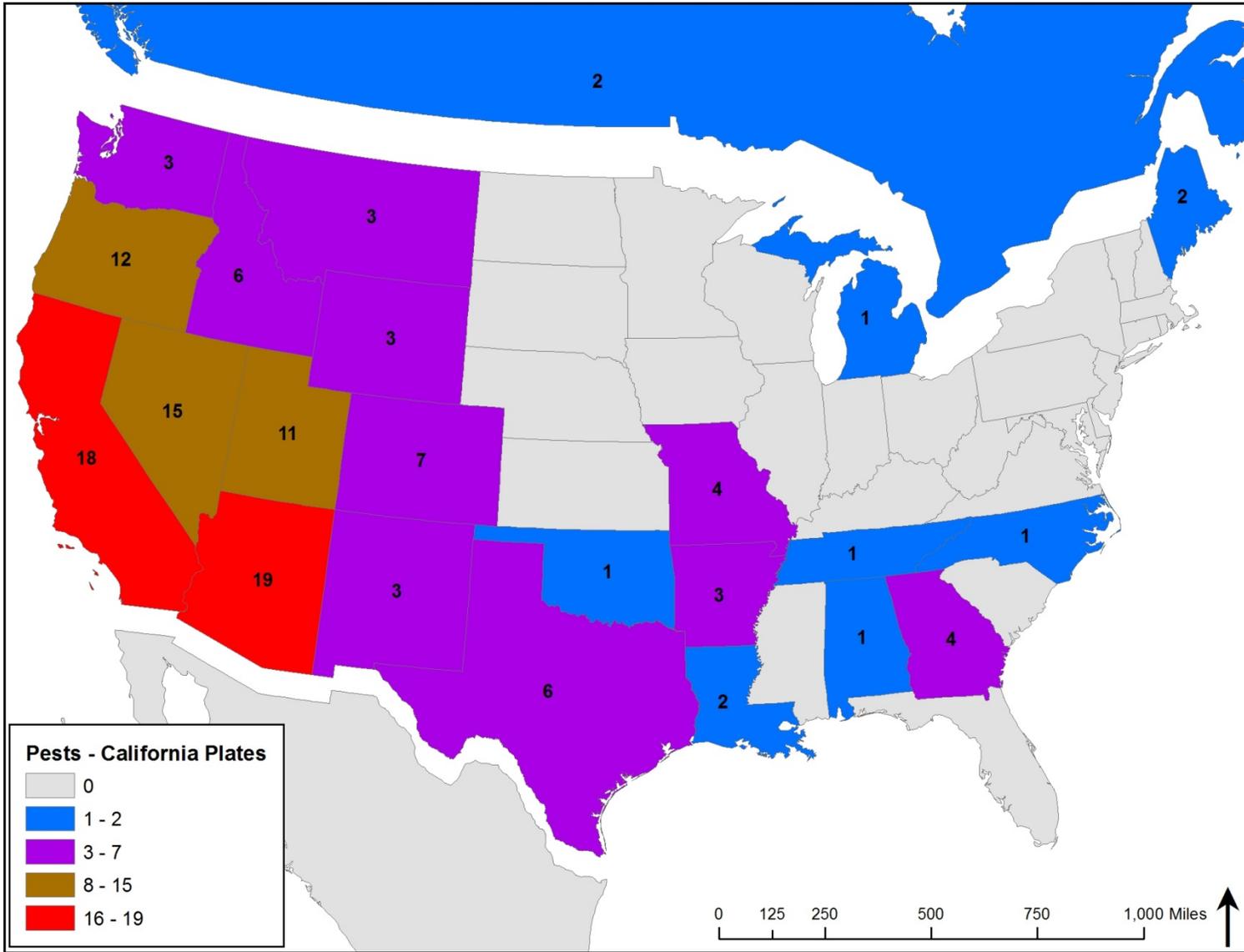
Map 3. Destinations in CA of firewood in private vehicles recorded at CDFA border stations.



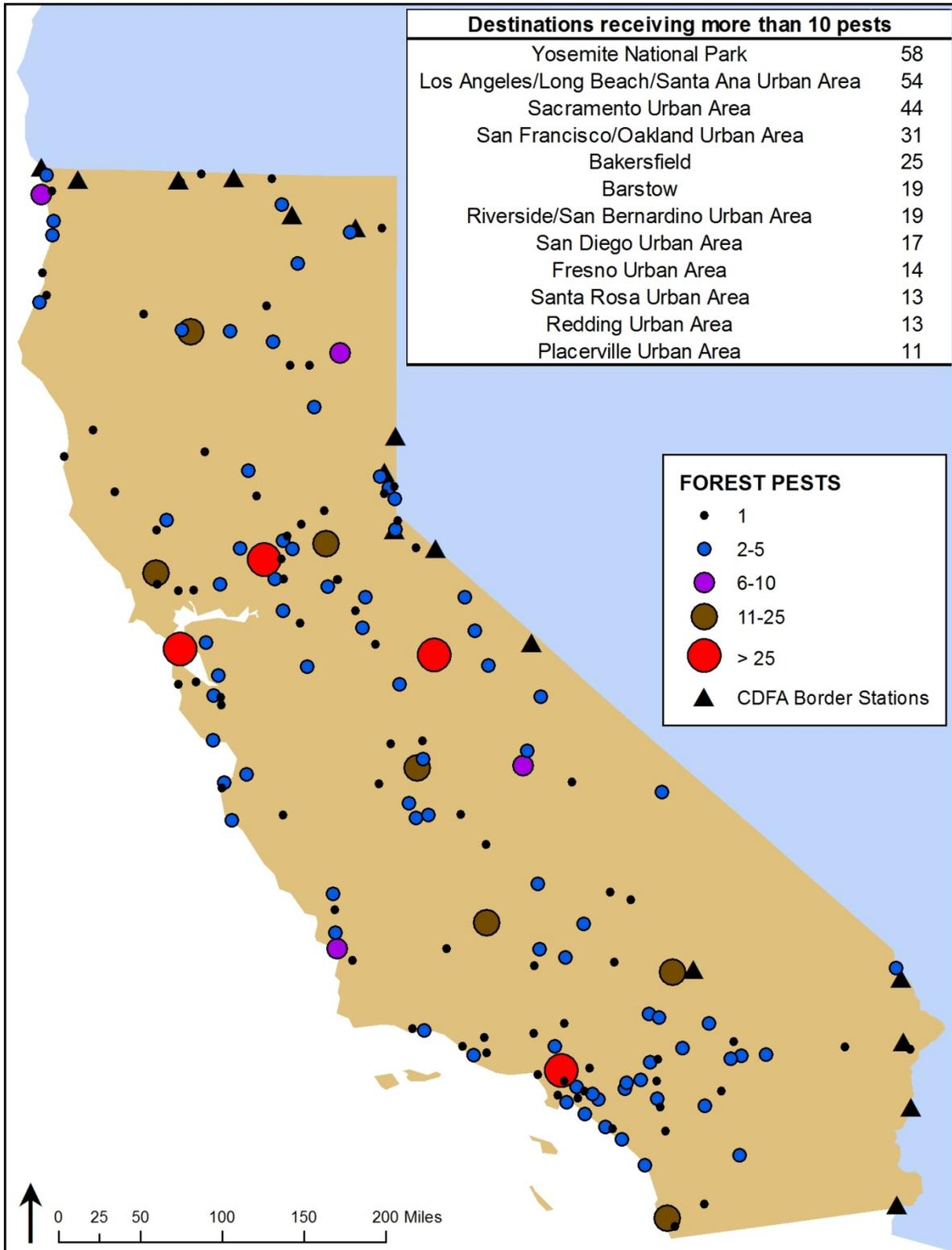
Map 4. Destinations in CA of firewood in commercial vehicles recorded at CDFA border stations.



Map 5. Origins of forest pests intercepted at CA border stations in firewood.



Map 6. Origins of forest pests intercepted in firewood in private vehicles with CA license plates.



Map 7. Destinations in California of forest pests intercepted in firewood.