

Characteristics of decay and insect attack in California homes

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California's structural pest control industry is one of the most tightly regulated in the United States. One requirement is that a copy of each standard inspection report be filed with the state. In 1986, more than 1.5 million structural pest inspection reports were filed with the California Structural Pest Control Board (SPCB). The reports contain a wealth of information on the frequency with which wood-destroying organisms occur, their most likely areas of occurrence, the current treatments recommended to control and prevent structural pest damage, and the inspection fees and repair costs associated with controlling these pests.

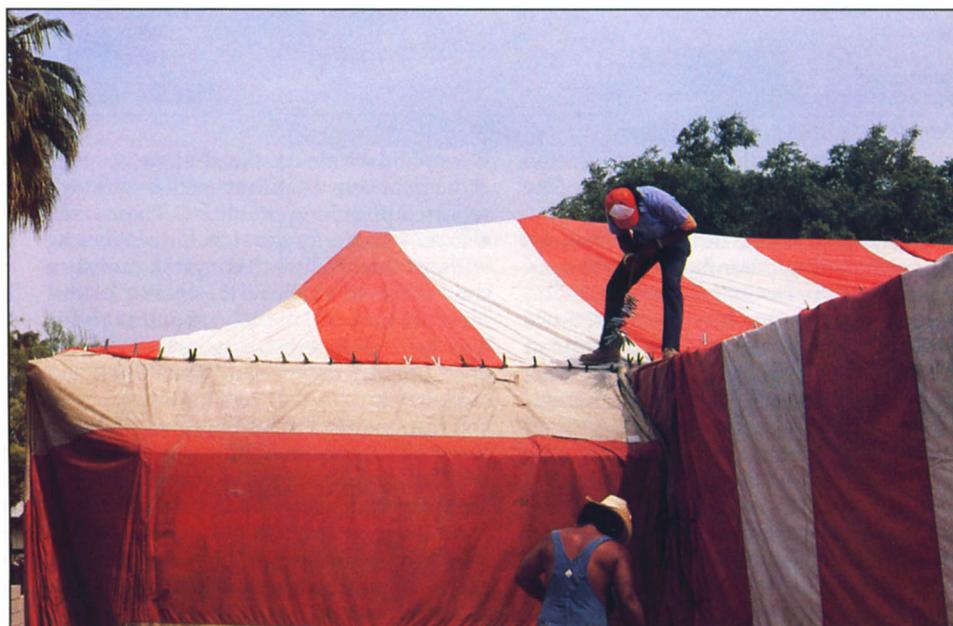
We studied a sample of inspection reports to quantify the types of organisms responsible for structural damage in homes and to identify the California locations most frequently affected by structural pests. A total of 573 reports were studied, randomly taken from the 2.6 million filed with the state in 1985 and 1986. The seven counties included generated 70 percent of all reports filed. We also reviewed information in the reports on treatment recommendations and costs associated with inspection and repair to assess the economic effects of structural pests on California homes.

Causes and location

Our findings on locations affected, occurrence of pests or problems, and treatment recommendations are all based on the number of reports sampled. For example, a 27 percent occurrence of subterranean termites in subareas (crawl spaces) in the three San Francisco Bay Area counties studied (Alameda, Contra Costa, and Santa Clara) means that 27 percent of the sampled reports in that region listed at least one subarea occurrence of subterranean termites. Regional percentages are the unweighted means of the sampled counties within that region.

Western subterranean termites were evenly distributed in the sampled regions, reflecting their broad range throughout California (table 1). Their structural damage was primarily confined to locations near the ground; most infestations were found in subarea, garage, and porch locations.

The following treatments, alone or in combination, were recommended for subterranean termite control: "treat the



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Full structure fumigation with a toxic gas is the most frequently recommended treatment for drywood termites; treatment of the soil with insecticides or replacement of affected wood is most commonly recommended for subterranean termite or fungus damage.

TABLE 1. Pests/problems linked to locations — percent of sample

Location	Pest/problem							
	Termites			Earth/ wood contact	Plumb- ing problem	Faulty seal	Exces- sive mois- ture	Water damage
	Subter- ranean	Dry- wood	Fungus					
	----- % -----							
Subarea								
Bay Area*	27	14	22	8	4	0	24	3
So. Coast†	18	15	3	3	1	0	2	2
Valley‡	18	0	14	0	3	0	6	4
Siding								
Bay Area	1	1	12	1	0	0	0	6
So. Coast	<1	13	13	1	0	0	0	<1
Valley	0	0	25	4	0	0	0	1
Attic								
Bay Area	<1	4	13	0	1	<1	1	6
So. Coast	2	44	10	0	<1	<1	<1	1
Valley	0	0	29	0	1	0	1	6
Window/door								
Bay Area	1	3	22	<1	0	0	2	4
So. Coast	2	6	5	0	0	0	0	0
Valley	1	0	15	1	1	0	0	3
Bath								
Bay Area	1	<1	18	<1	28	36	6	33
So. Coast	3	1	5	0	7	2	3	3
Valley	0	0	13	0	15	27	6	23
Porch/patio								
Bay Area	6	<1	18	12	<1	1	<1	2
So. Coast	4	9	10	4	<1	0	<1	1
Valley	8	0	17	8	0	0	0	1
Deck								
Bay Area	0	1	6	2	0	<1	0	0
So. Coast	<1	<1	1	0	0	0	0	4
Valley	0	0	0	0	0	0	0	0
Garage								
Bay Area	5	6	5	7	2	<1	0	5
So. Coast	6	32	4	1	0	0	<1	0
Valley	10	0	13	0	1	1	1	0

* San Francisco Bay Area counties of Alameda, Contra Costa, and Santa Clara.

† Includes Los Angeles, Orange, and San Diego counties.

‡ Sacramento County.

TABLE 2. Repair costs and inspection fees by region, 1986

Region	Number of notices	Average inspection fee	Average repair cost	Total cost*
Bay Area	65,216	93	1,252	100,827,057
South Coast	202,311	36	640	146,516,562
Valley	7,912	56	669	7,798,204
Three-region total cost				255,141,823

* Total inspection fee and repair cost, 1986.

TABLE 3. Most frequent treatment recommendations by region

	Bay South Area Coast Valley		
	%	%	%
Full structure fumigation	18	49	0
Apply insecticide	12	39	5
Apply fungicide	43	17	34
Soil treatment with insecticide	25	19	19
Remove, and replace wood member	55	40	60
Redo shower	55	2	27

soil with insecticide," "replace the affected wood member," and "treat the surface of the wood member with insecticide."

Reports of drywood termite infestations in the sampled regions indicated high populations in southern California counties, tapering off into the northern counties. Since drywood termites can survive in wood at low moisture contents and are not dependent on water or earth-wood contacts, their damage can be found in a wide variety of locations throughout structures. They enter through cracks and crevices, which makes detection difficult, but infestations are confirmed by the presence of fecal pellets ejected from the galleries.

The most frequently recommended treatment for drywood termites was a full structure fumigation with a toxic gas registered for such use. Another treatment often given as a secondary recommendation (because it is considered less effective) was to inject insecticidal dusts or liquid fumigants locally into the galleries, on a colony-by-colony basis. Local treatment of drywood termites is practical only if all colonies are found and treated effectively.

Wood-destroying fungi require wood moisture contents of at least the fiber saturation point (25 to 30 percent) to remain active. Sources of moisture within homes include plumbing leaks, leaks from outside (such as irrigation and rainfall), earth-wood contacts, and condensation. Bay Area fungus infection rates reflect the wide variety of moisture sources within homes. Although the areas affected in South Coast homes were similar, infestations occurred at much lower rates in the subarea, window/door, and bath locations.

"Remove and replace wood member" was the treatment recommended most often for fungus damage. Another recommendation was to "scrape, and treat affected members with fungicides." This surface treatment, although widely used, fails to provide the durability and protection of pressure-treated wood and does not eliminate an existing fungal infection.

There were marked differences between the South Coast (Los Angeles, Orange and San Diego counties) and the Bay Area in the rate of plumbing and moisture-related problems, especially in the bath and subareas. Typical South Coast construction uses slab-on-grade foundations. Since plumbing

is installed within the slab, leak detection is difficult at best, resulting in a lower rate of reported plumbing problems. These leaks also may wet only the slab and soil below without materially affecting the moisture content of wood above the treated or durable heartwood sill plate. Another factor may be differences in structural pest control operator performance and attention to detail.

Recommended treatments were "redo the shower enclosure" (including regROUT and tile), "replace the floor/subfloor," and "consult other trades," such as a plumbing or drainage contractor.

Fungus, plumbing problems, faulty seal, excessive moisture, and water damage are all water-related. Indeed, many of these problems occur at similar rates and locations within homes. For example, water and fungus damage in the attic generally indicates leaks in the roof and a need for maintenance. When excessive moisture or water damage and fungus problems occur in the subarea, probable causes are inadequate venting, construction deficiencies, or both.

Repair and inspection costs

Average repair costs by county and region were calculated from the number of notices of work completed or not completed that were filed with the SPCB (table 2). These costs were approximately twice as high in the Bay Area as on the South Coast, and the Valley was intermediate. Regional differences in the number of pests or problems affecting homes must contribute significantly to this disparity between repair costs. Bay Area reports average seven pests/problems each, while South Coast reports listed an average of only four. The Valley average was five items.

Variations among regions in the occurrence of wood-destroying organisms and related deficiencies could be due to differences in thoroughness of the standard inspection, in the ecology and distribution of structural pests, and in design and age of the housing stock. Industry competition, and thus labor cost, must also play a significant role in determining the inspection fees and repair costs.

Assuming that the cost picture found in the counties studied is valid for the other 30 percent of the reports filed with the SPCB, the statewide value of the industry's serv-

ices is approximately \$364 million annually, comprising about \$55.7 million in inspection fees and \$308.6 million for repairs. The \$364 million annual figure is a conservative estimate of the effect of structural pests, because it does not include repairs done by homeowners themselves or by firms outside the structural pest control system, nor does it include Branch 2 (household pantry pests) operations.

Conclusions

Our study of structural pest inspection reports revealed several important differences between the three sampled regions. The South Coast had higher rates of drywood termites, fewer water-related pests/problems, and a prevalence of slab-on-grade foundations. As a result, the reports showed greater use of fumigation, lower rates of plumbing problems, and lower average repair costs than in the other regions (table 3). The Bay Area had a greater occurrence of problems in general (especially water-related), a wider range of locations within homes that were significantly affected by structural pests/problems, and fewer slab-on-grade foundations. These characteristics resulted in more recommendations to "redo the shower enclosure/check plumbing seals" and "owner to maintain," as well as higher average repair costs. The Central Valley was similar to the Bay Area in types of pests/problems, locations affected and repair costs, but they occurred at somewhat lower rates.

The differences between the regions can be attributed to the natural ecologic distribution of the structural pests, variations in foundation construction, rainfall and other variations in climate, labor cost differences, the structural pest control operator's perception of what constitutes acceptable practice, and variations in home size and age. Because of these differences, changes in pest treatment practices would be most effective if done on a regional, as opposed to statewide, level.

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