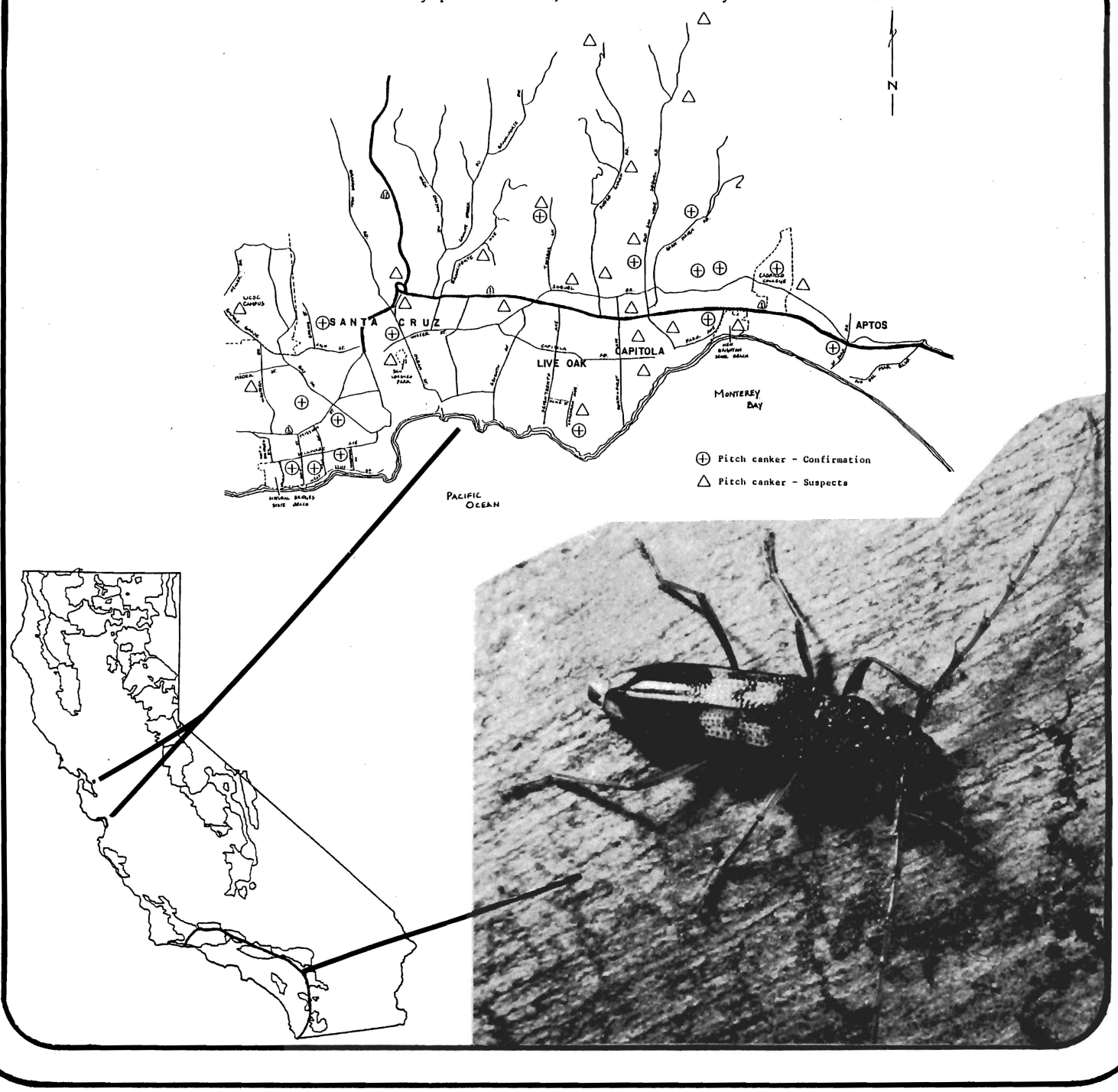
Area affected by pitch canker, Santa Cruz County (Nov-Dec. 1986)



FOREST PEST CONDITIONS IN CALIFORNIA-1986

A PUBLICATION OF
THE CALIFORNIA FOREST PEST COUNCIL

THE CALIFORNIA FOREST PEST COUNCIL (formerly the California Forest Pest Control Action Council) was founded in 1951. Its membership is open to public and private forest managers, foresters, silviculturists, entomologists, pathologists, zoologists, and others interested in the protection of forests from damage caused by animals, insects, diseases, and weeds. Its objective is to establish, maintain and improve communication among individuals -- managers, administrators and researchers -- who are concerned with these issues. This objective is accomplished by four actions:

1. Coordination of detection, reporting, and compilation of pest damage information.

2. Evaluation of pest conditions.

3. Pest control recommendations made to forest managing agencies and landowners.

4. Review of policy, legal, and research aspects of forest pest control, and submission of recommendations thereon to appropriate authorities.

The California Board of Forestry recognizes the Council as an advisory body in forest pest protection. The Council is a participating member in the Western Forest Pest Committee of the Western Forestry and Conservation Association.

This report, **FOREST PEST CONDITIONS IN CALIFORNIA - 1986**, is compiled for public and private forest land mangers to keep them informed of pest conditions on forested land in California, and as an historical record of pest trends and occurrences. The report is based largely on information provided by the State-wide Cooperative Forest Pest Detection Survey, and from information generated by Forest Pest Management, Pacific Southwest Region, USDA Forest Service, while making formal detection surveys and biological evaluations.

The report was prepared by the Forest Service in cooperation with other member organizations of the Council. It was duplicated and distributed by the California Department of Forestry and Fire Protection.

COVER PHOTO: Approximate distribution of two new pest problems in California: pitch canker on Monterey pine in Santa Cruz and Alameda Counties, and the Eucalyptus borer on the eucaplyptus species in six southern California counties. (Map courtesy of DED Project CDF&FP, Palo Alto; photo courtesy of Prof. R. F. Luck, UC-Riverside)

Sacramento **February, 1987**

HIGHLIGHTS OF PEST CONDITIONS - 1986

STATUS OF INSECTS. Major bark beetle activity in 1986 was generally very low. The two notable exceptions were carryovers from 1985 conditions. Mountain pine beetle continued to kill lodgepole pine around Tuolumne Meadows, Yosemite National Park, which had been repeatedly defoliated by the lodgepole pine needleminer. White fir mortality caused by 1985 fir engraver attacks was very common around South Lake Tahoe.

Activity of most native defoliators remained stable or declined. Douglas-fir tussock moth levels were as high or higher than last year, but feeding damage is still not visible from the air. The area of bitterbrush rangeland in Inyo and Mono Counties defoliated by the Great Basin tent caterpillar expanded in 1986.

Gypsy moth trap catches in California remained at about the same low level as the previous two years. The situation in Oregon improved dramatically in areas which had been treated.

STATUS OF DISEASES. Occurrences of the major tree diseases remained about the same as in recent years, with root diseases, dwarf mistletoe, and white pine blister rust receiving the most attention from land managers. Port-Orford-cedar root disease had not spread outside of the Smith River watershed. Reports of white pine blister rust have increased. The disease is intensifying in areas throughout the State, and is causing significant losses in some Sierra Nevada plantations containing sugar pine.

Reports of foliage and abiotic diseases decreased compared to 1985. An unidentified foliage and twig dieback problem of incense-cedar occurred in the Mt. Shasta and Lake Tahoe areas. The widespread foliage injury reported on lodgepole pines in 1985 has abated this year. Ozone injury to many pines in the southern Sierra Nevada appeared to have stablilized.

Two canker diseases were of concern in local situations. A canker fungus was associated with dieback of Ceanothus crassifolius in southern California. Pitch canker was reported for the first time in California in portions of Santa Cruz and Alameda Counties.

Nursery diseases were at low levels. Fusarium hypocotyl rot, charcoal root disease, Phoma blight and Sirococcus tip blight remained the major problems confronting nurseries in the State.

STATUS OF ANIMAL PESTS. Deer browsing damage was widespread (33,792 ac.) with most injury in conifer plantations up to five years old. Pocket gopher damage occurred on 18,512 acres of conifer plantations. Porcupines damaged pines on 17,445 acres across northern California and southward through the Sierra Nevada, with increasing damage in Humboldt County. Rabbit damage to plantations of Douglas-fir and pines occurred in localized areas of 10 to 300 acres. Black bear damage continues to increase in Del Norte and Humboldt Counties.

STATUS AND CONTROL OF INSECTS

WESTERN PINE BEETLE, Dendroctonus brevicomis. Western pine beetle activity was at a very low level this year. The few reports of its presence indicated it generally occurred only in combination with other bark and engraver beetles in trees which had been previously stressed or injured.

MOUNTAIN PINE BEETLE, Dendroctonus ponderosae. The mountain pine beetle infestation in lodgepole pine is continuing in the Tuolumne Meadows areas of Yosemite National Park (Tuolumne County). Mortality occurred over 15,000 to 20,000 acres in stands previously defoliated by the lodgepole needleminer. The beetle also caused mortality in 90 to 110 year old lodgepole pine stands near Skunk Cabbage Creek in the South Warner Mountains (Lassen County). Resource managers became concerned over lodgepole pine mortality on the Truckee Ranger District, Tahoe National Forest (Nevada County). Mountain pine beetle has been killing trees for several years in an area of 86 acres located between the residential development of Prosser Lakeview Estates and Prosser Creek Reservoir.

FIR ENGRAVER, Scolytus ventralis. White fir mortality caused by 1985 attacks of the fir engraver was abundant in the Camp Richardson-Estates area near South Lake Tahoe (El Dorado County). Heavy stand stocking and low precipitation in 1985 may have contributed to the mortality. Several group kills of white fir were also evident in Yosemite National Park, (Mariposa County).

PINE ENGRAVER BEETLES, Ips spp. Top-killing and mortality caused by pine engravers was heavy enough in a few localities to concern resource managers. Residual ponderosa pine along ridgetops in the Howard Mill vicinity (Lake County), which were injured in the Round Burn of 1966, were being top-killed by pine engravers. Ponderosa pine in the Middle Creek drainage (Siskiyou County) also were being killed or top-killed by engraver beetles. Stress caused by a rise in the water table following an upslope burn is suspected as a major contributor to current mortality in that area. A nearby area on Johnny O'Neil Ridge, which had been logged the previous year, also had some residual ponderosa and sugar pine poles and small sawtimber killed by pine engravers. An apparent district-wide increase in top-killing of dominant pines was noted on the Nevada City Ranger District of the Tahoe National Forest (Nevada County), and the Placerville Ranger District of the Eldorado National Forest (El Dorado County). Pine engravers also killed 10 to 20 percent of the 25 year old ponderosa pine in a 100 acre plantation on the Nevada City Ranger District.

JEFFREY PINE BEETLE, Dendroctonus jeffreyi. Mortality related to the Jeffrey pine beetle continued to decline in the Fallen Leaf-Kiva-Estates suppression project area near South Lake Tahoe (El Dorado County). The project was initiated in 1982/1983 when 330 infested trees were treated.

Subsequent yearly tree mortality in the project area has been as follows: 1983/84, 145 trees; 1984/85, 43 trees; 1985/86, 31 trees; so far in 1986, 14 infested trees have been identified. Some scattered individual and small groups of trees infested with Jeffrey pine beetle have been observed in the South Lake Tahoe area.

A WESTERN SPRUCE BUDWORM, Choristoneura carnana californica. The recent infestation (1982-1985) in Trinity and Shasta Counties was terminated in 1985 by a combination of climatic conditions and application of Bacillus thuringiensis. This was confirmed by larval sampling in late April (Fig. 1) and egg mass sampling in August 1986. Light damage was found in the lower crowns of Douglas-firs in two, small unsprayed areas - Jennings Gulch and the North Fork of Swift Creek. Larvae and pupae were few and often parasitized in Jennings Gulch. Only one new egg mass was found from a sample of 64 plots (384 18-inch branch tips).

Figure 1. Recovery of a Douglas-fir from severe defoliation (1982-1985) by a western spruce budworm (Choristoneura carnana californica), early spring 1986, Shasta-Trinity National Forests. (USDA Forest Service)

TENT CATERPILLAR, Malacosoma sp. The tent caterpillar infestation in Inyo and Mono Counties, first observed in 1983, continued in 1986. Areas with heavy defoliation increased to approximately 18,000 acres on the Mono Lake and Mammoth Ranger Districts (Mono County). Heavily defoliated areas include Convict, Hot Creek, Tobacco Flat, Mammoth Junction and Little Antelope Valley (Mammoth Ranger District) and Owens River (just south of East Portal), Aeolian Buttes/West Portal and the south shore of Mono Lake (east of Mono Mills) on the Mono Lake Ranger District. Results of larval rearings at the Forestry Sciences Laboratory in Corvallis, Oregon, indicate that a naturally occurring virus is beginning to show up in some areas, specifically, Little Antelope Valley and Convict.

DOUGLAS-FIR TUSSOCK MOTH, Orgyia pseudotsugata. Douglas-fir tussock moth activity increased slightly relative to 1985 in localized areas in Placer, El Dorado, Calaveas and Tuolumne Counties. Early instar larval surveys were variable, ranging from about 3 larvae per 1,000 square inches of white fir foliage to 12 larvae per 1,000 square inches. High areas included Iron Mountain Ridge, Baltic Ridge, Plummer Ridge and Armstrong Lookout (El Dorado County), Summit Level Ridge (Calaveras County) and Dodge Ridge and Twomile (Tuolumne County). Subsequent later-instar mid-crown sampling in El Dorado County averaged 2-3 larvae per 1,000 square inches. Light feeding damage, not visible from the air, was observed in virtually all areas surveyed; heaviest feeding was found on Iron Mountain, Baltic, Plummer and Dodge Ridges. To date, 1986 pheromone detection survey results from most of the above-mentioned areas indicate that trap catch levels are about the same as in 1985 (high). Fall cocoon/egg mass observations suggest localized populations to be somewhat higher than 1985.

In July 1986, Forest Pest Management, in cooperation with the Eldorado National Forest and the Project for Biological Methods for Managing Western Forest Insects , Forestry Sciences laboratory, Corvallis, OR, conducted a field test with the pheromone of the Douglas-fir tussock moth. The purpose of the test was to evaluate the efficacy of treating low, but apparently increasing, populations with the pheromone to disrupt mating and reduce reproduction. Eight, 40-acre plots (four treated, four untreated) were randomly selected on the Eldorado National Forest (one plot was on American Forest Products land). The plots were treated on July 30-31 using a fixed-wing aircraft with a dosage of 10 grams/acre of pheromone formulated in hollow celcon fibers coated with a polybutene sticker (Figs. 2-5). Results should be available in late 1987 and will be used to support registration of the pheromone with the EPA for use as a mating disruptant on an operational basis.

JEFFREY PINE NEEDLEMINER, Coleotechnites sp. No defoliation of consequence was observed in areas of past Jeffrey pine needleminer activity in Snow Valley, Big Bear City and Lake Irwin (San Bernardino County). In Plumas County the needleminer populations near Ross Meadows and Portola apparently declined also.

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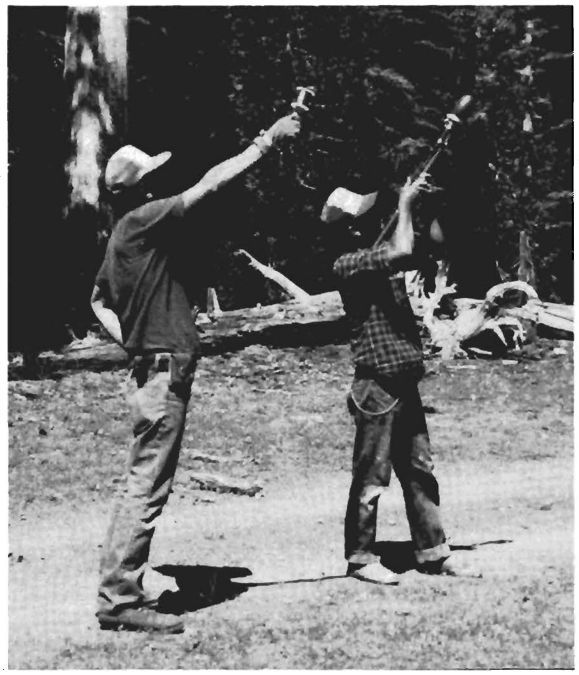

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Figures 2-5. Application of the pheromone of the Douglas-fir tussock moth, Eldorado National Forest: 2. Hollow celcon fibers filled with the pheromone. 3. Wing-pod equipment designed for aerial application of pheromone-filled hollow fibers. 4. Applying plot-boundary flags to tree tops with a line-gun. 5. Aerial application of fibers. (US Forest Serv.)

FRUITTREE LEAFROLLER, Archips argyrospilus. Damage from the fruittree leafroller dropped to the lowest level in recent years in the vicinity of Lake Gregory-Lake Arrowhead (San Bernardino County). Nevertheless, the crowns of many black oaks appeared thin; perhaps because of moderate to heavy defoliation experienced the previous 10 years.

GYPSY MOTH, Lymantria dispar. The gypsy moth situation in California has been relatively stable over the past few years (Table I). The only site proposed for eradication in 1987 is at Encino (Los Angeles County). The Encino area accounted for half of the male moths trapped statewide and was also the location of a property with egg masses and pupal cases.

TABLE I . CALIFORNIA GYPSY MOTH SITUATION

Years	Traps Placed	Adults Trapped	Counties	Properties with Eggs/Pupal Cases	Sites Treated
			Number		
1984	30,000	25	9	2	5
1985	28,000	28	10	3	2
1986	27,000	20	9	1	0

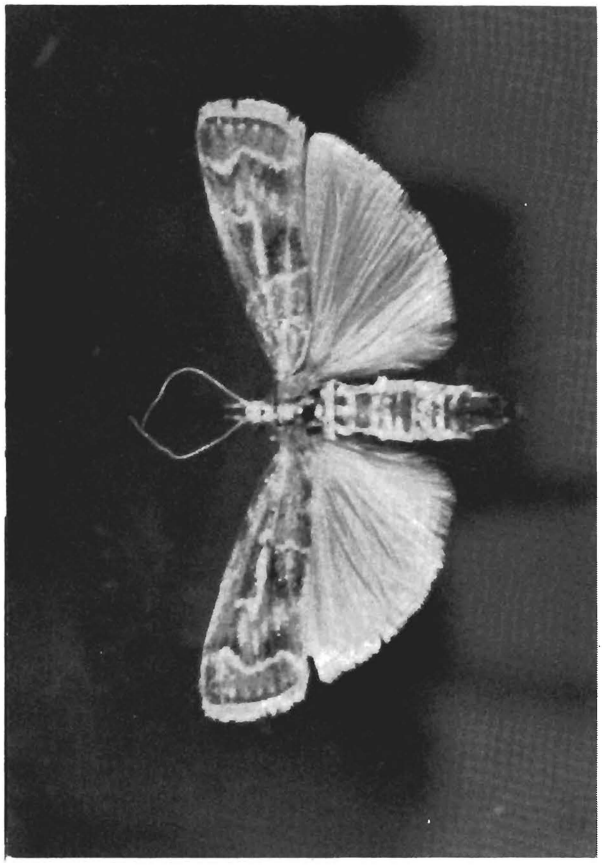
The situation in Oregon has generally improved over 1985. Following the second year of an eradication effort in Lane County using Bacillus thuringiensis, the trap catch of male moths dropped from over 1,100 moths in 1985 to 46 moths in 1986. Trap catches in a separate infestation near Glide (Douglas County) declined from 140 in 1985 to 7 in 1986 following treatment. The number of males caught in Southeast Portland declined in the vicinity of a sterile egg release site. Trap catches increased in the historically high area of Lake Oswego (Clackamas County).

MODOC BUDWORM, Choristoneura retiniana. The Modoc budworm caused moderate defoliation of white fir on 50,000 acres in the Warner Mountains and the Manzanita Mountain area of Modoc County. The level of defoliation was significantly reduced as compared to the last three years. Defoliation occurred at Lily Lake, Mill Creek, Davis Creek, from Buck Mountain to Halls Meadow, Stowe Reservoir, south from Deep Creek to Soup Springs, Mahogany Ridge, and Manzanita Mountain. In these same areas, defoliation caused by the white fir needle miner, Epinotia meritana, and the sawfly, Neodiprion sp., was also significantly reduced this year, being very light. Lodgepole pine throughout the Warner Mountains was defoliated by the sugar pine tortrix, Choristoneura lambertiana. This defoliation ranged from light to heavy. No attempt was made in 1986 to monitor the populations of the sugar pine tortrix. Modoc budworm larvae were found in Lassen County on Roop's Mountain and Diamond Mountain. Because defoliation in these areas was light, the budworm populations were not sampled.

NANTUCKET PINE TIP MOTH, Rhyacionia frustrana. This tip moth has been detected for the first time in Northern California. The previous range was limited to Kern, Orange, San Bernardino and San Diego Counties. A total of five moths were trapped in two different commercial nurseries near Sunol (Alameda County). A survey of hosts in and around the nurseries discovered several live and dead pupae as well as pupal skins.

GOUTY PITCH MIDGE, Cecidomyia piniinopis. Heavy flagging caused by gouty pitch midge attacks were reported from a number of 15 to 25 year old ponderosa pine plantations in the northern Sierras and Coast Range. Damage seemed to be concentrated in plantations with heavy competition.

LODGEPOLE PINE NEEDLEMINER, Coleotechnites milleri. Larval surveys this year in the chronic Tuolumne Meadows outbreak area of Yosemite National Park confirmed last year's findings -- populations are at the lowest levels in over two decades.



Figures 6-7. The pine coneworm, Dioryctria auranticella: 6. Adult moth, 7. Ponderosa pine conelet (left) killed by the feeding of a larva. (Courtesy of J. W. Dale)

TABLE II. INSECTS OF LESSER IMPORTANCE IN CALIFORNIA FORESTS - 1986

INSECTS			WHERE EXAMINED OR REPORTED	
Scientific Name	Common Name	HOSTS	County	Remarks
Adelges picea	Balsam woolly aphid	GF Fir	Santa Clara Sacramento	 Capitol Prk
Asterolecanium minus		LO	Monterey	
Contarinia pseudotsugae		DF	El Dorado	
Dioryctria sp.		RF	Siskiyou	Callus tissue
Elatobium abietinum	Spruce aphid	SS	Humboldt	Ornamental
Eurytoma tumoris		MP MP	Santa Cruz Monterey	
	Grasshoppers	WF	El Dorado	
Hemicoelus gibbicollis	Pacific power-post beetle	RW	Marin	
Matsucoccus bisetosus	Ponderosa pine twig scale	PP	Plumas	
Neophasia menapia	Pine Butterfly	PP	Modoc	Abundant
Nymphalis californica	California Tortoiseshell	SB SB, MZ	Humboldt Modoc	
Orgyia antiqua	Rusty tussock moth	SP	Plumas	Plantation
Parthenolecanium corni	European fruit lecanium	MD	Trinity	Causing dieback
Platynota stultana	Omnivorus leafroller	SP	El Dorado	Nursery stock

TABLE II. (Cont.)

INSECTS Scientific Name	Common Name	HOSTS	WHERE EXAMINED OR REPORTED County	Remarks
Scythropus sp.		PP	Yuba	
Tetraleurodes mori	Mulberry whitefly	MD	Trinity	
Vespamima sequoiae	Sequoia pitch moth	PP	Siskiyou	Plantation
	Leaf miner	BO	Mariposa	Yosemite N.P.
	Margarodid scale	SP	Mariposa	Yosemite N.P.
	Whitefly	CL	Los Angeles	School camp
Xyococculus macrocarpae		IC	Calaveras	

HOST ABBREVIATIONS

BO = Black oak	CL = California laurel
DF = Douglas-fir	GF = Grecian fir
IC = Incense-cedar	LO = Live oak
MD = Madrone	MP = Monterey pine
MZ = Manzanita	PP = Ponderosa pine
RF = Red fir	RW = Redwood
SB = Snowbrush	SP = Sugar pine
SS = Sitka spruce	WF = White fir

STATUS AND CONTROL OF DISEASES

ABIOTIC DISEASES. Lodgepole pines in the Sierra Nevada that suffered heavy foliage loss in 1985 appear to have recovered in 1986 and most now support at least a 3 years complement of needles. The exact cause of the damage was never determined.

A foliage problem and twig dieback of incense-cedar was reported in 1986 from Mt. Shasta City (Siskiyou County), Lake Wildwood (Nevada County), and the west and north shores of Lake Tahoe (El Dorado and Placer Counties). Incense-cedars in the Lake Tahoe area had been exhibiting decline symptoms for several years, but the damage appeared to worsen in 1986. The cause has not been determined, although several secondary pests were occasionally identified on affected trees.

AIR POLLUTION. Twenty-eight ozone injury trend plots on the Sequoia National Forest (Fresno, Tulare, and Kern Counties) were evaluated in 1986. Most of the changes in injury ratings since the plots were last evaluated two years ago were minor. Since 1984, the majority of plots at elevations of 4,000 and 5,000 feet with moderate or severe ratings showed small increases in injury, while most plots at 7,000 and 8,000 feet with moderate or slight ratings showed small decreases in injury. Plots at 6,000 feet showed no clear trend.

CANKER DISEASES. A dieback of Ceanothus crassifolius on low elevation sites within the Angeles National Forest (Los Angeles County) was reported last year under "Abiotic Diseases". Since then the canker fungus Botryosphaeria ribis was recovered from dying twigs collected from two widely separated locations (May Canyon and San Dimas Experimental Forest). Typical cankers were not visible on affected branches, but the fungus appears to have caused some of the dieback, most likely in combination with low winter precipitation and high air pollution doses.

The pitch canker fungus, Fusarium moniliforme var. subglutinans was reported for the first time in California on Monterey, Bishop, and Aleppo pines in Santa Cruz County and on Monterey pine in Alameda County. One isolate tested was very pathogenic to Monterey pine.

A twig dieback of canyon live oak was reported along the Trinity River from east of Big Bar to at least Helena (Trinity County). Cryptocline cinerescens was isolated from the twigs; symptoms resemble the twig dieback of coast live oak.

DWARF MISTLETOES, Arceuthobium spp. The status of dwarf mistletoes has not substantially changed from previous years. Several suppression projects and presuppression surveys were conducted on Forest Service and Park Service managed lands. Kings Canyon National Park continued its pruning and tree removal work of ponderosa pine in the Cedar Grove area (Fresno

County). Moraine and Canyon View Campgrounds were treated in 1986, completing the treatment of campgrounds in the area. Phase 2 of a three phase project of pruning and tree removal of Jeffrey pines was completed in 16 acres of the Nevada Beach Campground in the Lake Tahoe Basin Management Unit (Douglas County, Nevada). Jeffrey pines were pruned in Fallen Leaf Campground, Lake Tahoe Basin Management Unit (El Dorado County) to suppress western dwarf mistletoe as part of a vegetation management plan that will be completed through a planned timber sale. Two recreation areas on the Angeles National Forest had dwarf mistletoe management projects completed. A presuppression survey of 495 acres was performed in the Prairie Fork Recreation Area (Los Angeles County). A project involving tree removal and pruning of witches' brooms of ponderosa pine was completed in Table Mountain Campground (Los Angeles County). A presuppression survey of 2600 acres was completed for the Dixie Compartment, Plumas National Forest (Plumas County). The information gathered from this survey will be used in a stand growth and yield model to prioritize stands for treatment. A suppression project in a Jeffrey pine plantation on the Cannell Meadow Ranger District, Sequoia National Forest (Tulare County) was completed.

FOLIAGE DISEASES. Leaf and needle diseases were relatively uncommon due to the rather dry, short spring. Dothistroma needle blight, caused by Scirrhia pini, occurred on ponderosa and Jeffrey pine saplings and poles in Moraine Campground, Cedar Grove, Kings Canyon National Park (Fresno County).

A leaf scorch of bigleaf maple was reported from Ahwahnee Meadows, Yosemite National Park (Mariposa County), Paradise (Butte County), and Muir Woods National Monument (Marin County). This damage was also observed on the west shore of Clair Engle Lake (Trinity County) and along the North Fork of the Feather River (Plumas County). This is a recurrent situation that has been reported to be more severe in certain years, but its cause has not been determined.

NURSERY DISEASES. Diseases were at a relatively low incidence at all California nurseries in 1986. Humboldt Hursery (Humboldt County) sustained some losses of 1-1 Douglas-fir from stem cankers caused by Phoma eupyrena, Fusarium oxysporum, and F. roseum; and of 2-0 Jeffrey pine from Sirococcus tip blight (Sirococcus strobilinus). Sirococcus tip blight was also reported on 2-0 Afghanistan pine at Placerville Nursery (El Dorado County).

Diseases causing minor damage included damping off, caused by Pythium spp., of 1-0 Jeffrey and ponderosa pine at Humboldt Nursery; Fusarium (F. oxysporum, F. roseum) stem cankers on 1-0 Douglas-fir at Humboldt Nursery; tip dieback of 2-1 white fir, caused by P. eupyrena, at Humboldt Nursery; Botrytis blight, caused by Botrytis cinerea, on 2-0 red fir at Humboldt Nursery; Phomopsis canker, caused by Phomopsis occulta, on 2-0 Douglas-fir, 3-0 white fir, and 1-0 western hemlock at Humboldt Nursery; hypocotyl rot, caused by F. oxysporum, of 1-0 sugar pine at Placerville Nursery; and charcoal root disease, caused by Macrophomina phaseolina, on true fir at the Placerville nursery.

Soils and seedling root tips from two locations at Humboldt Nursery were baited or placed on selective medium to determine the presence of Phytophthora spp. Phytophthora was not recovered.

ROOT DISEASES. Root diseases were of continued concern to forest resource managers. In terms of volume loss, the three principal root diseases in California remained annosus root disease, caused by Fomes annosus; Armillaria root disease, caused by Armillaria sp.; and black stain root disease, caused by Ceratocystis wageneri.

Annosus root disease continues to cause conifer mortality at Yosemite National Park (Mariposa County). Suppression efforts were continued to reduced the impacts of annosus root disease in the lodge area of Yosemite Valley. Large ponderosa pines on the periphery of root disease centers were removed to reduce potential hazards.

Annosus root disease was also reported killing white fir at Sierra Campground on the Tahoe National Forest (Sierra County), and was associated with decay of structural roots of windthrown red fir near recreation residences at Soda Springs (Placer County).

A survey of eastside pine stands on the Modoc National Forest (Modoc and Siskiyou Counties) was conducted to determine levels of annosus root disease in 10 to 15-year-old timber sales where borax was not applied to stumps. Percentages of infested stumps ranged from 20 to 80% (average of 50%) on nine sales. About 20% of each acre surveyed was out of production due to the disease.

Black stain root disease was reported on dying ponderosa pines at Rush Creek, Stanislaus National Forest (Toulumne County). Tree failure of a valley oak, due to Armillaria sp. decaying structural roots, was reported from Yosemite National Park.

Areas of Port-Orford-cedar on state, private, and federal lands in northern California were surveyed to determine the distribution of Port-Orford-cedar root disease, caused by Phytophthora lateralis. The disease was found only within the Smith River watershed (Del Norte County).

RUSTS. Incense-cedar rust, caused by Gymnosporangium libocedri, was heavy on incense-cedar in the Mt. Shasta area (Siskiyou County).

White pine blister rust, caused by Cronartium ribicola, was reported on sugar pine in the following areas: (1) saplings near Thomes Pocket Administrative Site, Corning Ranger District, Mendocino National Forest (Tehama County); (2) poles in Mariposa Grove of Big Trees, Yosemite National Park (Mariposa County); (3) seedlings, saplings, and poles in the Brown Cone Area, Pineridge Ranger District, Sierra National Forest (Fresno County); and (4) seedlings, saplings, and poles from Shaver Lake to Brushy Meadow beyond Dinkey Creek, Pineridge and Kings River Ranger Districts, Sierra National Forest (Fresno County). White pine blister rust was also found infecting western white pine seedlings, saplings, and poles in Silver Lake Campground, Amador Ranger District, Eldorado National Forest (Amador

County). Blister rust was identified in the Lake Tahoe Basin Management Unit on western white pine at Blackwood Creek (Placer County). The incidence of blister rust has significantly increased throughout the Sierra Nevada during the past several years with many reports of its occurrence.

Figure 8. Trunk and limb cankers caused by white pine blister rust on a 12-year-old western white pine.

TABLE III. FOREST DISEASES REPORTED - 1986[a]

AGENT	HOST	COUNTY
ABIOTIC INJURIES		
Frost	WH	Humboldt
	RW	Santa Cruz
Heat canker	DF	Siskiyou
Herbicide	Sy	Butte
Physical damage (hail)	PP	Siskiyou
Salt	LP, WF	Mono
Unknown	LP	Sierra
	DF	Humboldt
	BM	Marin
	SP	Plumas
	IC	Nevada
	IC	Siskiyou
	IC	Placer
CANKER DISEASES		
Botryosphaeria ribis	SR	Santa Clara
		Sacramento
Cryptocline cinerescens	LO	San Luis Obispo,
		Trinity
Dothiorella gregaria	SR	Mendocino
Endothia parasitica	AC	San Joaquin,
		Yuba
Fusarium moniliforme var. *subglutinans*	MP, BP, AlP	Santa Cruz
	MP	Alameda
Fusicocum sp.	PM	Humboldt
	PM	Marin
	Mz	Lake

TABLE III. (Cont.)

AGENT	HOST	COUNTY
CANKER DISEASES (Cont.)		
Seridium cardinale	LC	Sonoma
Unknown	Mz	Humboldt
	Oa	Humboldt
DECAYS		
Fomitopsis pinicola	DF	Humboldt
Hericium erinaceus	LO	San Benito
Unknown	VO	San Benito
FOLIAGE DISEASES		
Lirula abietis-concoloris	WF	El Dorado
Lophodermium sp.	LP	Humboldt
Oidium sp.	LO	San Luis Obispo
Phaeocryptopus gaumanni	DF	Butte
Pseudomonas lauracearum	CL	Humboldt
Rabdocline pseudotsugae	DF	Santa Clara
Scirrhia pini	MP	Humboldt (3)[b]
	PP, JP	Fresno
NURSERY DISEASES		
Botrytis alternaria	BC	El Dorado
Botrytis cinerea	DF	Humboldt
Fusarium sp.	DF	Humboldt

TABLE III. (Cont.)

AGENT	HOST	COUNTY
NURSERY DISEASES (Cont.)		
Fusarium oxysporum	DF	Humboldt
	WF	Butte
Fusarium roseum	DF	Humboldt
Phoma eupyrena	DF, RF, WF	Humboldt
Phomopsis occulta	WH	Humboldt
Phomopsis sp.	WF	Humboldt
Pythium sp.	PP, JP	Humboldt
Sirococcus strobilinus	AP	El Dorado
	JP	Humboldt
Unknown	DF	Humboldt
Verticillium sp.	BC	El Dorado
PARASITIC PLANTS		
Arceuthobium abietinum f. sp. *concoloris*	WF	Sierra
	WF	Nevada
Arceuthobium abietinum f. sp. *magnificae*	RF	Sierra
	RF	Nevada
Arceuthobium campylopodum	PP	Sierra
	PP	Nevada
Phoradendron bolleanum ssp. *densum*	Ju	Santa Barbara
ROOT DISEASES		
Armillaria sp.	LO, DF	Marin
	Oa	Mariposa
	RW	Humboldt

TABLE III. (Cont.)

AGENT	HOST	COUNTY
ROOT DISEASES		
Ceratocystis wageneri	DF	Humboldt (4)
	DF	Siskiyou
	DF	Tuolumne
	DF	Mendocino
	PP	Stanislaus
Fomes annosus	WF	Sierra
	RF	Placer
	PP	Mariposa
	Md	Lake
	Md	Nevada
Pholiota adiposa	WF	Tulare
Phytophthora lateralis	POC	Del Norte
Phytophthora sp.	CL	Marin
	DF	Santa Clara
Pythium sp.	DF	El Dorado
Unknown	AL	Humboldt
RUST DISEASES		
Cronartium ribicola	SP	Tehama
	SP	Fresno (2)
	SP	Mariposa
	SP	Glenn
	WWP	Placer
	WWP	Amado
Gymnosporangium sp.	Ju	Shasta
Gymnosporangium libocedri	IC	Siskiyou

a. Not a complete listing for all locations reported, nor for reports of common diseases.
b. Number in parentheses is number of reports.

HOST ABBREBIATIONS

AC	= American chestnut	AL	= Alder
AlP	= Aleppo pine	AP	= Afghanistan pine
BC	= Black currant	BM	= Bigleaf maple
BP	= Bishop pine	CL	= California laurel
DF	= Douglas-fir	IC	= Incense-cedar
JP	= Jeffrey pine	Ju	= Juniper
LC	= Leyland cypress	LO	= Live oak
LP	= Lodgepole pine	Mz	= Manzanita
MP	= Monterey pine	Oa	= Oaks
PM	= Pacific madrone	POC	= Port-Orford-cedar
PP	= Ponderosa pine	RF	= Red fir
RW	= Redwood	SP	= Sugar pine
SR	= Sierra redwood	Sy	= Sycamore
VO	= Valley oak	WF	= White fir
WH	= Western hemlock	WWP	= Western white pine

Figure 9. Bole damage on ponderosa pine caused by sapsuckers, Crusher Progeny Test Plantation, Stanislaus National Forest. (US Forest Service)

STATUS AND CONTROL OF ANIMAL PESTS

DEER. Deer browsing damage to pines, true firs, Douglas-fir and redwood was widespread. Most damage occurred in plantations up to five years old with some damage in plantations up to fifteen years of age. The major damage to natural regeneration occurred on Douglas-fir and redwood in the north coast counties. The extent of damage was most frequently less than 200 trees per acre, but there were numerous reports of injury to 300 to 600 trees per acre. The overall damage trend was static with localized increases outnumbering decreases by five to four. Seedling protectors and repellents were used as control measures.

POCKET GOPHER. Pocket gopher damage was reported on 18,512 acres of conifer plantations. Most of the damage was in one to ten-year-old plantations of pines and true firs in the northern interior forests and the Sierra Nevada. Plantations of Douglas-fir and redwood were damaged in Humboldt County. Damage magnitude was commonly 10 to 50 trees per acre and often 100 to 400 trees per acre. Reports of increased damage outnumbered those of decreased damage by five to one. Most of the increased damage reports were at locations along the entire length of the Sierra Nevada. Baiting with strychnine-treated grain was the major control method employed. Vegetation control with herbicides was used on a few areas in the Sierra Nevada.

PORCUPINE. Porcupines damaged pines in plantations and natural stands across northern California and southward through the Sierra Nevada for a reported total of 17,445 acres. Douglas-fir, redwood, and pines were injured in the north coast counties. The largest acreages affected were in Siskiyou, Shasta, Lassen, and Modoc Counties, as in past years, and in Humboldt County. The overall damage trend was static. Several reports of increased damage in Humboldt County may indicate a spreading problem. Injury rates were mainly 5 to 150 trees per acre, ranging up to 200 to 800 trees per acre in some areas. Limited control with trapping, hunting, and strychnine-salt blocks was undertaken.

RABBITS. Rabbit damage, primarily in plantations of Douglas-fir and pines, occurred from north to south in localized areas of 4 to 400 acres, over a total of 1,351 acres. The injury rate on seedlings up to five years of age was often severe, ranging from 200 to 400 trees per acre. The overall damage trend was static. Seedling protectors and repellents were used for control in a few plantations.

BLACK BEAR. Black bear damage to redwood and Douglas-fir continued in Del Norte and Humboldt Counties. Bark stripping and sapwood consumption occurred in second growth timber 20 to 60 years old. The injury rate ranged from one to 40 trees per acre. Three private timber companies reported $650,591 in bear damage in Humboldt and Del Norte Counties and 24 bears were removed by USDA Animal Damage Control specialists through the use of foot snares, dogs and shooting. Bears also damaged a few pines in the northern Sierra Nevada and injured a few true firs in the southern Sierra Nevada. The total reported acreage in bear damage was 11,115 acres.

Other animals also caused damage (Table IV). Damage was serious on some sites, but generally not widespread.

TABLE IV. OTHER ANIMALS CAUSING DAMAGE IN CALIFORNIA - 1986

SPECIES	COUNTY OR REGION
Antelope	Modoc, Lassen
Beaver	Humboldt, San Bernardino, Riverside, San Diego; Sierra Nevada Mountains
Birds	Tuolumne (sapsuckers), El Dorado
Domestic stock	All major timber areas
Dusky-footed woodrat	Del Norte, Humboldt, Mendocino, Siskiyou
Elk	Del Norte, Humboldt
Ground squirrel	San Bernardino, Los Angeles
Meadow mouse	Modoc, Lassen
Mountain beaver	Del Norte, Humboldt
Small seed-eating mammals	Siskiyou, El Dorado
Tree squirrels	Tulare, Kings, San Bernardino
Feral hogs	Mendocino

STATUS AND CONTROL OF WEEDS

Competition from weeds remains a major problem to the survival and growth of forest plantations in the state. It is estimated that the continuance of the current suspension of herbicide use on the National Forests in California will result in a 20-30% reduction in future timber volume. Based on the 1985 timber harvest, the future reduction would amount to 340-510 million board feet of timber per year. This translates into loss of approximately 11,400 jobs in the timber and wood products industry, or about $250 million a year in direct timber and wood products related payroll. This also means a loss of about $1.05 million in annual timber yield tax revenue to the counties.

The following tables show herbicide usage through August of 1985 by chemical, and for all of 1984 by county. These figures are compiled from pesticide use permits that are submitted to county agricultural commissioners for application of herbicides.

FOREST/TIMBERLAND HERBICIDE USE 1985

MONTH	2,4-D	DICHLORP	PICLORAM	ASULAM	ATRAZ/DWP	HEXAZ	GLYPHOS	TRICLOPYR
Jan	70	6	-	-	-	-	-	-
Feb	-	-	-	-	213	120	-	-
Mar	-	-	-	5	100	231	35	595
Apr	3,780	-	50	-	780	-	65	7,674
May	612	7	-	-	-	-	294	111
Jun	476	50	-	-	118	-	119	329
Jul	305	12	39	-	-	-	52	14
Aug	359	21	78	-	-	-	260	230
TOTAL	5,602	96	167	5	1,211	351	825	8,953

TOTAL through August 1985 ..... 17,210 acres

1984 HERBICIDE USE BY CALIFORNIA COUNTY

COUNTY	ACRES	COUNTY	ACRES
Amador	-	Nevada	175
Calaveras	1,584	Placer	136
Del Norte	10,266	Plumas	1,022
El Dorado	1,460	Shasta	1,216
Humboldt	5,367	Sierra	-
Lassen	206	Siskiyou	7,689
Madera	695	Trinity	-
Mariposa	-	Tuolomne	993
Mendocino	287	Yuba	-
Modoc	1,038		
		TOTAL	32,134

Know Your Forest Pests

THE EUCALYPTUS BORER

Robert F. Luck and Glenn T. Scriven
Division of Biological Control
University of California
Riverside, CA 92521

The eucalyptus borer, Phoracantha semipunctata (Fab.) (Cerambycidae), is native to Australia although it has been accidently introduced almost everywhere Eucalyptus species are grown. California is the last of these areas to get it. The borer was first discovered in October 1984 infesting eucalyptus trees near El Toro (Orange Co.), California. It now occurs in all six southern California counties, having spread in firewood cut from infested eucalyptus trees. Eventually it is expected to spread throughout California wherever eucalyptus is grown. In Australia, the borer occurs throughout the eucalyptus forests, but it is usually restricted to dead or dying trees, to large, broken branches or to large pieces of logging residue. During droughts it will attack standing trees that are under severe moisture stress but it seldom kills them. Numerous natural enemies are associated with the beetle in Australia but they are absent from most of the beetle populations outside of its area of origin. In Californiia, South Africa and the Mediterranean region, the beetle will kill living trees.

The beetle is a strong flyer and has been known to attack isolated trees nine miles from the nearest infested tree. The female usually lays eggs on diseased or moisture-stressed trees or on freshly cut logs. Eggs may be laid on the bark of well-watered healthy trees, but most of the newly emerged larvae die when they attempt to penetrate the bark. Healthy trees respond to larval boring by producing copious quantities of gum that smother the larvae.

In unirrigated woodlots, some trees are under more moisture stress than others. Stress symptoms include sprouting of inactive buds on the tree bole and changes in leaf color. The leaves of such trees viewed through a No. 8 yellow photographic filter appear much lighter than those on healthy trees. The beetles repeatedly lay eggs on such trees and avoid neighboring healthy trees.

Larvae that survive the tree's initial gum defenses and reach the cambium confine their feeding to a limited area, forming a lesion. The beetles continue to lay eggs on these trees, and surviving larvae form additional lesions. Finally gum production ceases and the tree succumbs to a massive attack; the larvae riddle the inner bark and cambium with frass-packed galleries. Larvae can mine the trunk and branches as small as 3/4 inch in diameter.

Our preliminary observations suggest that eucalyptus species vary in susceptibility to attack under comparable drought conditions. Massive beetle attacks quickly kill Eucalyptus globulus and E. viminalis when their gum defenses decline. In contrast, the gum defenses of E. blakelyi continue to cause high mortality of larvae entering the bark, but some larvae survive, producing long narrow lesions. Occasionally, a single larva will girdle the trunk and kill the tree. Eucalyptus cladocalyx has substantial gum defenses, even during severe drought, but some larvae penetrate the bark of certain trees and produce large oval-shaped lesions exposing bare wood.

The beetle is about 1 inch long; the body is shiny black; and a yellow band extends across the upper half of the forewings. Within the yellow band is an irregular black line. The female's antennae are about the same length as the body; those of the male are somewhat longer and heavier with prominent spines at each segment.

Upon emergence, the adult male is ready to mate; the female, however, must wait 48 hours. After mating, which takes 8 to 28 minutes, the female wait an additional period of 2 to 4 days before she can begin laying eggs. The sex ratio is one to one, and unmated females lay no eggs. We have observed females feeding on the flowers of eucalyptus and other plants, apparently to gain additional nutrition for egg production (Fig. 10). Adult females may live 40 days in summer and 180 days in winter and lay up to 300 eggs. However, they tend to live only 3 to 14 days in the laboratory.

Egg laying occurs at night. The eggs are laid under loose bark in loose groups of 3 to 30 eggs, which incubate in 10 to 14 days. When the eggs hatch, the larvae may feed along the bark surface for a short distance (1/4 to 1 inch) forming a conspicuous dark trail. Then they turn into the bark and proceed toward the cambium - the living tissue beneath the bark. They feed in the cambium region until they are nearly mature.

The larvae grow as they feed, and gallery size increases correspondingly. The gallery is oval in cross-section and about twice as wide as the young larva's head. As the larva matures, the gallery widens, increasing to more than three times the head width. A single larval gallery can extend several feet and can girdle a tree. When the larva nears maturity, it first forms a short tunnel to the bark surface then bores several inches into the wood to form a pupal chamber. The tunnel near the bark surface will provide the exit for the emerging adult beetle.

Larvae develop in about 70 days in fresh logs and up to 180 days in dry logs. The pupal stage lasts about 20 days. During the spring and summer, the beetle requires three to four months to complete its life cycle, but in the fall and winter, it may require up to nine months. Two to three generations per year occur in Mediterranean climates similar to that of California.

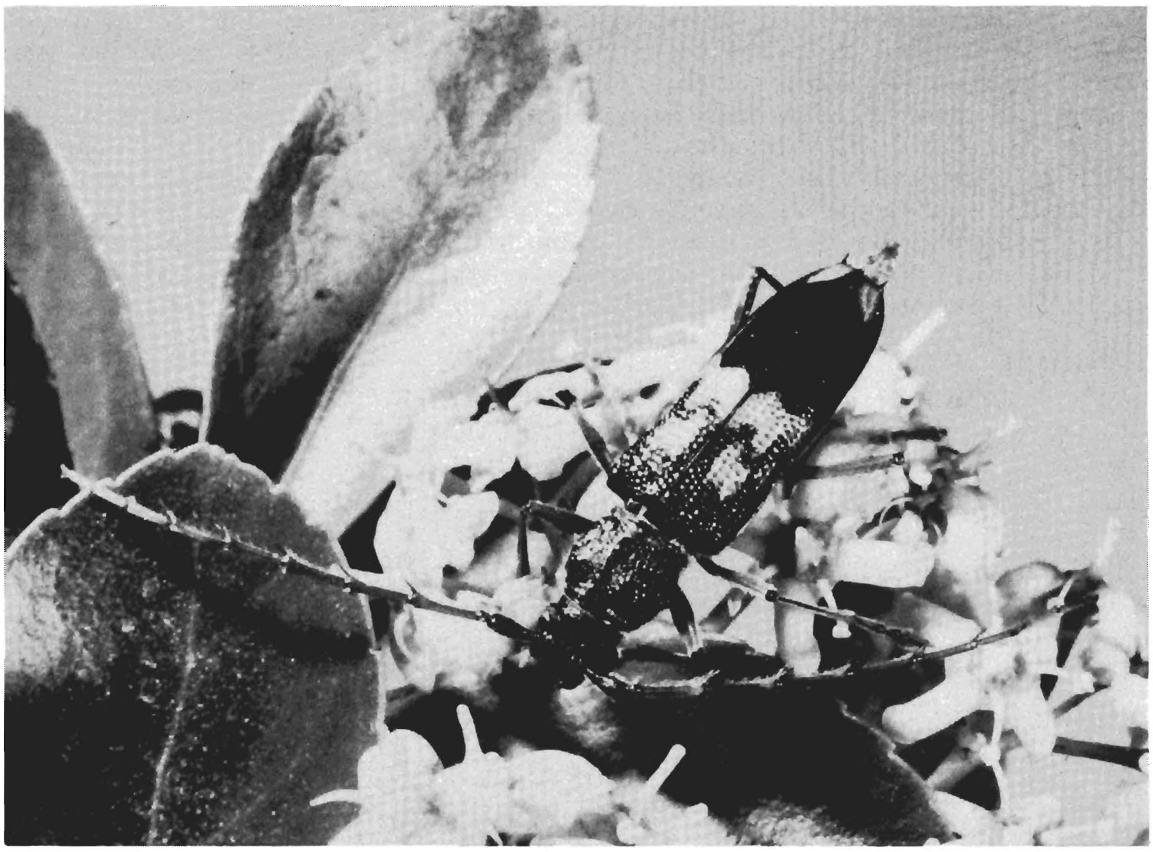


Figure 10. Eucalyptus borer, Phoracantha semipunctata, feeding on flowers.

SURVEYS AND EVALUATIONS

DEMONSTRATION THINNING PLOTS IN THE EASTSIDE PINE TYPE ON THE LASSEN NATIONAL FOREST. In 1978-1979 the Forest Service established plots in the eastside pine type to show the effects of thinning on pest-caused tree losses in areas of high tree mortality. The stands chosen were mostly pole-size ponderosa pine mixed with some white fir and incense-cedar, growing on medium to low sites, and ranging in age from 70 to 90 years. Within the demonstration plots, four levels of stocking density -- 40, 55, 70, and 100 percent of normal basal area -- were established to demonstrate the biological and economic alternatives available for management planning. (Normal basal area is the basal area that a stand should have when fully stocked with trees, which, in the demonstration areas, ranges from 185 to 215 sq ft/ac depending on site quality.) Seven years after thinning, the treatments had reduced mortality from 86 to 100 percent of the level in unthinned stands (Table IV).

TABLE IV. COMMERCIAL TREE MORTALITY BY STOCKING LEVEL, SEVEN YEARS AFTER THINNING[a]

Year	Residual Stocking After Thinning[b] 40%	55%	70%	100%
		Trees per Acre		
1980	0.0	0.2	0.2	2.4
1981	0.0	0.0	0.7	2.4
1982	0.0	0.5	0.3	3.6
1983	0.0	0.1	0.8	4.1
1984	0.0	0.0	0.0	1.0
1985	0.0	0.2	0.0	0.6
1986	0.0	0.0	0.0	1.3
Mean	0.0	0.1	0.3	2.2
Range	0	0-0.5	0-0.8	0.6-4.1
Percent Mortality Reduction Compared with Normal Basal Area	100	95.5	86.4	---

a. Commercial trees are 8 inches dbh and larger, with straight boles, yeilding a 10-foot log with a 6-inch top. Mountain pine beetle killed trees.
b. Percent of normal basal area.

PITCH CANKER SURVEY, SANTA CRUZ COUNTY. Pines were surveyed (Fig. 11) by the California Department of Forestry in Santa Cruz and southern San Mateo Counties for symptoms of pitch canker infection. The area surveyed included Ano Nuevo State Reserve, south along the Santa Cruz County coast to Sunset State Beach, inland to Watsonville, then north to Aptos, Scotts Valley, Mt. Hermon, and Felton. Samples were collected from trees suspected of being infected and attempts were made to isolate the pitch canker fungus.

Only Monterey pines had symptoms of pitch canker. Pitch canker was found from the city of Santa Cruz to Aptos. Area with concentrations of symptomatic pines included: San Lorenzo Park north to Highway 1 and De Laveaga Park and Golf Course in Santa Cruz; the Corcoran Lagoon area in Live Oak; the Santa Cruz Gardens Park area, Soquel Drive, and nearby areas in Soquel; the eastern two-thirds of the city of Capitola; the Cabrillo College area; New Brighton State Beach;; Highway 1 from High Street in Santa Cruz to State Park Drive in Aptos; and the Highway 17-Highway 1 interchange area. Sixteen sampled trees were confirmed for pitch canker in the following cities: Santa Cruz (7), Live Oak (1), Capitola (1), Soquel (5), and Aptos (2).

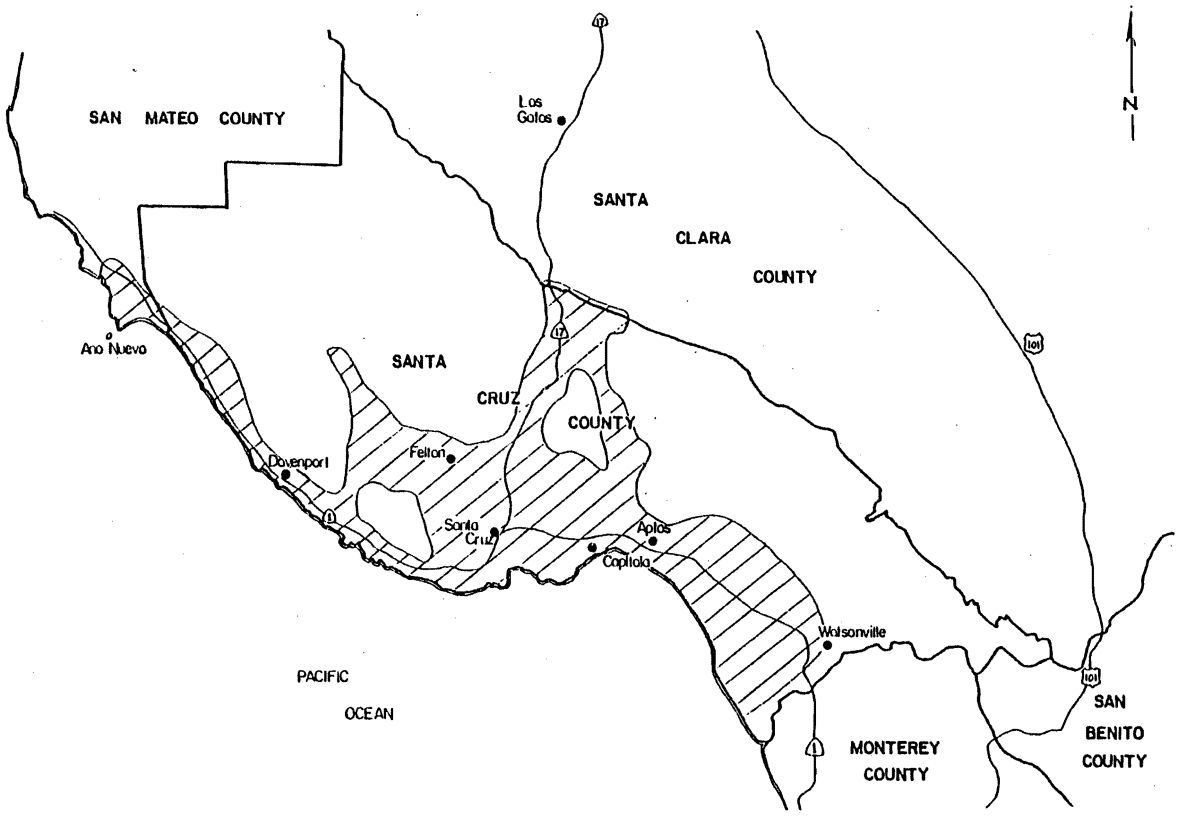


Figure 11. Survey-sampling area (in cross hatch) for pitch canker fungus, November-December 1986. (Courtesy of DED Project, CDF&FP, Palo Alto, Ca)

BLISTER RUST SURVEY IN NORTHERN AND CENTRAL SIERRA NEVADA PLANTATIONS. Forest Pest Management surveyed 4- to 26-year-old plantations with sugar pine on four National Forests in the northern and central Sierra Nevada. The purpose was to determine the incidence of white pine blister rust and its effect on stocking levels, and to examine our ability to accurately determine rust hazard based on site characteristics.

Twenty-nine plantations were examined on the Plumas, Tahoe, Eldorado, and Stanislaus National Forests. Infection levels for plantations ranged from 0 to 93% of the trees. Forest-wide infection levels were: Plumas - 61%; Tahoe - 72%; Eldorado - 71%; and Stanislaus - 72%. Mortality levels (includes trees killed by blister rust and those lethally infected) were: Plumas - 56%; Tahoe - 65%; Eldorado - 66%; and Stanislaus - 79%. Only one plantation had no infected trees. It was at the southern end of the Groveland RD, Stanislaus NF on a southwest-facing, upper slope at a low elevation.

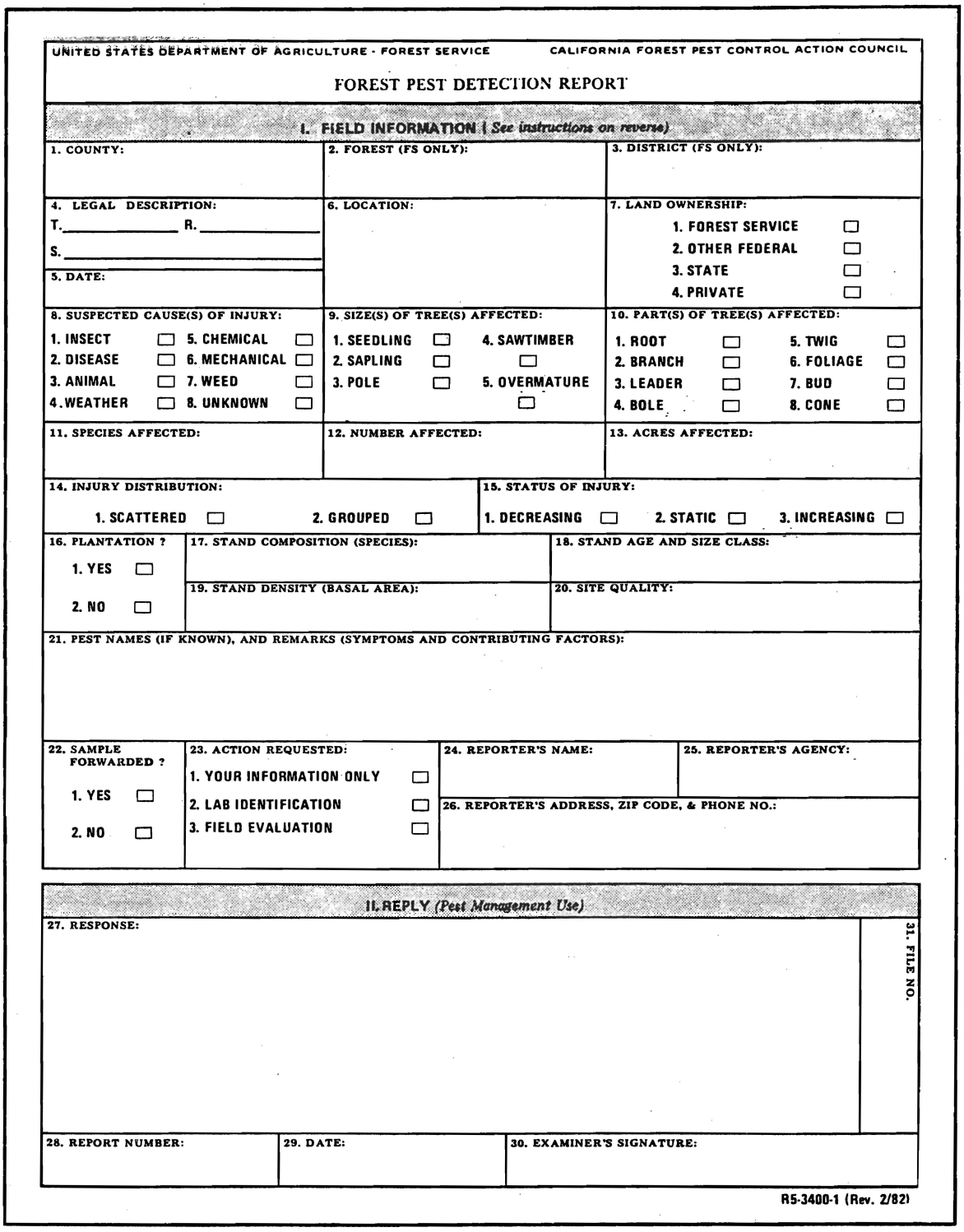
Rating site hazard did not accurately predict infection levels. Sites classified on-site as low hazard had infection levels as high as moderate and high hazard sites. Topography and aspect did not influence the amount of infection. The effect of the disease on stocking levels in these plantations is being analyzed.

DUTCH ELM DISEASE. Dutch elm disease (DED) incidence decreased some this year from 1985 levels and remained confined to the Bay Area. San Francisco has been free of the disease since 1982. However, within the Bay Area the disease is spreading geographically, with 1986 extensions of the range to Vacaville (Solano County), San Pablo (Contra Costa County), Oakland (Alameda County), Los Gatos (Santa Clara County), and Belvedere (Marin County).

While the number of confirmed elms decreased in Marin County this year, the number of locations increased. Marin and Santa Clara Counties are likely to be most troublesome in the future.

	NUMBER OF CONFIRMED DED ELM TREES		
COUNTY	1984	1985	1986
Alameda	1	0	11
Contra Costa	29	21	30
Marin	71	154	125
Napa	3	2	3
San Francisco	0	0	0
San Mateo	54	63	45
Santa Clara	17	34	41
Solano	0	0	1
Sonoma	13	28	14
TOTAL	188	302	270[a]

a. Through December 16, 1986.



UNITED STATES DEPARTMENT OF AGRICULTURE - FOREST SERVICE — CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL

FOREST PEST DETECTION REPORT

I. FIELD INFORMATION (See instructions on reverse)

1. COUNTY:
2. FOREST (FS ONLY):
3. DISTRICT (FS ONLY):
4. LEGAL DESCRIPTION: T._____ R._____ S._____
5. DATE:
6. LOCATION:
7. LAND OWNERSHIP: 1. FOREST SERVICE ☐ 2. OTHER FEDERAL ☐ 3. STATE ☐ 4. PRIVATE ☐
8. SUSPECTED CAUSE(S) OF INJURY: 1. INSECT ☐ 2. DISEASE ☐ 3. ANIMAL ☐ 4. WEATHER ☐ 5. CHEMICAL ☐ 6. MECHANICAL ☐ 7. WEED ☐ 8. UNKNOWN ☐
9. SIZE(S) OF TREE(S) AFFECTED: 1. SEEDLING ☐ 2. SAPLING ☐ 3. POLE ☐ 4. SAWTIMBER ☐ 5. OVERMATURE ☐
10. PART(S) OF TREE(S) AFFECTED: 1. ROOT ☐ 2. BRANCH ☐ 3. LEADER ☐ 4. BOLE ☐ 5. TWIG ☐ 6. FOLIAGE ☐ 7. BUD ☐ 8. CONE ☐
11. SPECIES AFFECTED:
12. NUMBER AFFECTED:
13. ACRES AFFECTED:
14. INJURY DISTRIBUTION: 1. SCATTERED ☐ 2. GROUPED ☐
15. STATUS OF INJURY: 1. DECREASING ☐ 2. STATIC ☐ 3. INCREASING ☐
16. PLANTATION ? 1. YES ☐ 2. NO ☐
17. STAND COMPOSITION (SPECIES):
18. STAND AGE AND SIZE CLASS:
19. STAND DENSITY (BASAL AREA):
20. SITE QUALITY:
21. PEST NAMES (IF KNOWN), AND REMARKS (SYMPTOMS AND CONTRIBUTING FACTORS):
22. SAMPLE FORWARDED ? 1. YES ☐ 2. NO ☐
23. ACTION REQUESTED: 1. YOUR INFORMATION ONLY ☐ 2. LAB IDENTIFICATION ☐ 3. FIELD EVALUATION ☐
24. REPORTER'S NAME:
25. REPORTER'S AGENCY:
26. REPORTER'S ADDRESS, ZIP CODE, & PHONE NO.:

II. REPLY (Pest Management Use)

27. RESPONSE:
31. FILE NO.
28. REPORT NUMBER:
29. DATE:
30. EXAMINER'S SIGNATURE:

R5-3400-1 (Rev. 2/82)

FOREST PEST DETECTION REPORT FORM. The Conditions Report was compiled from information provided by Federal, State, and private forest land managers and individuals. Copies of this form are available at local offices of the Forest Service or the California Department of Forestry.

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