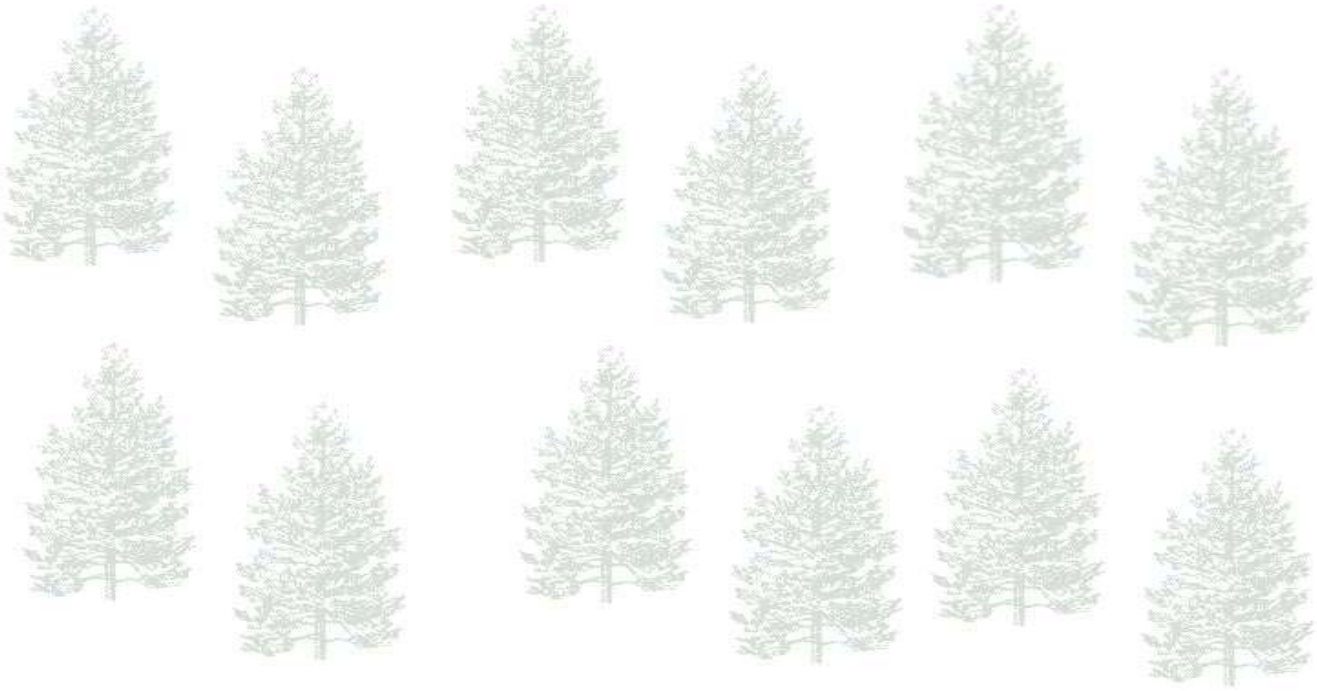
FOREST PEST CONDITIONS IN CALIFORNIA - 2000



A PUBLICATION OF THE CALIFORNIA FOREST PEST COUNCIL

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ABSTRACT

The important forest insect and disease conditions in California in 2000 are given. Included are bark beetles, defoliators, abiotic injury, root, foliage, rust and canker diseases, dwarf mistletoes, and declines. The section on surveys and evaluations includes summaries of the western pine blister rust screening program, the Southern California dwarf mistletoe suppression program, new work in ozone injury, detecting vegetation changes in California using satellite imagery and the cumulative surveys of Douglas-fir tussock moth, lodgepole needleminer and 21 years of tree mortality in eastside pine thinning plots.

Keywords: California, forest diseases, forest insects, surveys, tree mortality

THE CALIFORNIA FOREST PEST COUNCIL

The California Forest Pest Council, a 501(3)c non-profit organization, was founded in 1951 as the California Forest Pest Control Action Council. Membership is open to public and private forest managers, foresters, silviculturists, entomologists, pathologists, biologists, and others interested in the protection of forests from damage caused by biotic and abiotic agents. The Council's objective is to establish, maintain, and improve communication among individuals who are concerned with these issues. This objective is accomplished by five actions:

1. Coordinate the detection, reporting and compilation of pest damage, primarily forest insects, diseases and animal damage,

2. Evaluate pest conditions, primarily those of forest insects, diseases and animal damage,

3. Make recommendations on pest control to forest management, protection agencies and forest landowners.

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

5. Foster educational work on forest pests and forest health.

The California Board of Forestry recognizes the Council as an advisory body in forest health protection, maintenance, and enhancement issues. 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 - 2000***, is compiled for public and private forest land managers and other interested parties to keep them informed of conditions on forested land in California, and as a historical record of forest insect and disease trends and occurrences. The report is based largely on information provided by three sources: (1) information generated by Forest Pest Management, Pacific Southwest Region, USDA Forest Service, while making formal detection surveys and biological evaluations, (2) reports and surveys of conditions on private lands provided by personnel of the California Department of Forestry and Fire Protection, and (3) the statewide Cooperative Forest Insect and Disease Survey, in which federal, state, and private foresters and land managers participate.

This report was prepared by the USDA Forest Service, Pacific Southwest Region, State and Private Forestry, in cooperation with other member organizations of the Council, published by the California Department of Forestry and Fire Protection and distributed by the two agencies.

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SUMMARY

Insects

In general, activity by forest insects was low in 2000.

Bark and Engraver Beetles and Wood Borers. Activity of the Douglas-fir beetle and the fir flatheaded borer was light in northern California. Mortality caused by the pine reproduction weevil declined sharply on the Groveland and Mariposa Districts in the southern Sierras. Jeffrey pine beetle activity continued to decline or was at low rates in northern California and increased somewhat in southern California. Activity of the red turpentine beetle was generally low or unreported for much of California. Reported activity was often associated with management activity, such as thinning and prescribed burning, or injury from wildfire. Western pine beetle was most active in ecosections M261A and D. Elsewhere, it appeared to be restricted to scattered individual and small groups of ponderosa pine in northern California, and scattered Coulter pines in southern California. Mortality from pine engravers was light in northern California and high in southern California, where mortality was associated with overstocked, off-site or exotic plantations.

The mountain pine beetle was still present in areas reported over the past few years -- near Truckee, in parts of the Lake Tahoe Basin, in the Thousand Lakes Wilderness. In Lassen Volcanic National Park, mortality was reduced to a small area. Activity was somewhat higher in southern California than in 1999; sugar pine and ponderosa pine were the hosts. Sugar pine was also the host in far northern California where fire injury or competition from understory brush and trees was associated with the mortality.

Defoliators. Several defoliating species were reported in 2000. The most obvious of these were fall webworm, fruittree leafroller, lodgepole pine needleminer, Modoc budworm, pine needle sheatminer and white fir sawfly.

Defoliation and web-making by the fall webworm was visible by aerial survey from Clear Lake to the Oregon border. Madrones were frequently defoliated and alder, black walnut, Oregon ash and apple were affected. The fruittree leafroller was found in the central Sierra Nevada foothills, but the most important infestation occurred in the San Bernardino Mountains in southern California. This may be the largest outbreak since 1951-1953. Some black oaks defoliated for two consecutive years are now in a state of decline. Populations of the lodgepole pine needleminer have been expanding in Yosemite National Park since the season of 1993-1994. Large population increases were noted at almost all sample plots and visible defoliation is expected in some areas, along with tree mortality in areas that have been defoliated over the past several years.

Of lesser importance, the Modoc budworm caused defoliation of new foliage near the western boundary of the South Warner Wilderness and on the Big Valley District in Modoc County. There have also been increases in pine needle sheathminer at several locations in northern California. Several areas of defoliation were caused by the white fir sawfly in northeastern California; suppressed and intermediate trees are the most affected.

Other. Fifteen other insects were reported from forest or urban tree hosts or can be considered insects that will influence forest management practices in the future. A new eucalyptus lerp psyllid has been found in

southern California. The find is so recent that information on rate of spread and favored hosts is unknown. The range of the Africanized honey bee continues to expand and a recent stinging incident at Joshua Tree National Park illustrates the type of impact the bee may have on recreational activity in wildland settings. Of the other species, only the pitch moths and the redgum lerp psyllid had more than a localized distribution.

Diseases

Abiotic. Five abiotic injury categories were reported – winter burn of regeneration, salt damage, tip dieback and leaf scorch from very high day-time temperatures, and scorch from hot winds. Reports of the latter two may, or may not, be for the same time period.

Root Diseases. As usual, new locations for the various root diseases come in every year. However, only one report of a new Port-Orford-cedar root disease infestation was submitted. Port-Orford-cedar root disease is continuing to spread and intensify *within known* infested areas along the Little Bald Hills Trail in Redwood National Park and along the Sacramento River south of Dunsmuir.

Foliage and Rust Diseases. There were no remarkable reports of foliage or rust diseases with one exception. The new virulent race of white pine blister rust has expanded on the Mountain Home Demonstration State Forest.

Canker Diseases. Several canker diseases were reported in 2000. The status of these varies from widespread and severe to decreasing. The causal agents for cankers on chinkapin and California laurel are yet to be identified. In general, incidence of branch flagging caused by pitch canker appears to be less in 2000 than in the several years following initial detection within California. Pitch canker incidence has been declining for about 10 years in the Santa Cruz long-term monitoring plots and some previously heavily infected trees appear to be recovering in the absence of new infections. Screening for genetically resistant native and ornamental Monterey pine continued.

Dwarf mistletoes. Five species of dwarf mistletoes were reported in 2000. Four of these are the usual suspects, but gray pine dwarf mistletoe is not usually reported. This species has caused high rates of mortality of all sizes of gray pine on the Greenhorn District of the Sequoia National Forest. Many of the pines had multiple infections on most branches. Low activity of pine engravers and woodborers on some pines demonstrated the primacy of dwarf mistletoes in decline and death.

Declines. Declines continue to play an important role in forest health. Six are reported. Causal agents are infrequently associated with these reports; however, sudden oak death has now been associated with a new species of Phytophthora. Increasing numbers of tanoak, coast live oak and black oak are dying in various areas of Monterey County north through Sonoma County. However, not all dead oaks and tanoaks are the result of sudden oak death. The death of many oaks remain associated with other causes.

FOREST INSECT CONDITIONS - 2000

BARK and ENGRAVER BEETLES, and BORERS

AMBROSIA BEETLES, *Monarthrum scutellare* and ***M. dentiger.*** Ambrosia beetle attacks have been associated with dying tanoak, coast live oak, and black oak exhibiting symptoms of sudden oak death in Monterey (Big Sur), Santa Cruz, Marin, Napa, and Sonoma Counties

CALIFORNIA FIVESPINED IPS, ***Ips paraconfusus***. California fivespined ips caused mortality of pole-size ponderosa pine in three plantations in Butte and Tehama Counties north of Forest Ranch in late 1999 (M261D). At one plantation, roughly 100 trees were killed. Contributing factors were slash from a recent thinning and shallow, droughty soil. Two successive generations of beetles appear to have killed trees, but the infestation did not cause additional tree mortality in the spring of 2000. Only a few trees were killed at the other plantations, which were higher site quality.

DOUGLAS-FIR BEETLE, ***Dendroctonus pseudotsugae***. Douglas-fir beetle, sometimes in conjunction with the flatheaded fir borer, killed several pockets of large diameter Douglas-fir in the Railroad Gulch area of Mendocino County. Infestation likely started with population build-up in windthrown Douglas-firs.

Douglas-fir beetle continued to kill single, mistletoe-infested trees near Camp Creek west of Mount Shasta City (M261A). Several spots of mortality caused by Douglas-fir beetle were detected in a timber sale near Boulder Creek on the northern edge of the Marble Mountain Wilderness (M261A). These spots were apparently the result of beetles breeding in storm damage. Scattered Douglas-firs were killed by the Douglas-fir beetle south of the Van Duzen River near Dinsmores (263A).

FIR ENGRAVER, ***Scolytus ventralis***. True fir mortality related to fir engraver attacks continued to decline throughout northeastern California. A few isolated pockets of mortality were detected during aerial surveys this year. Three pockets of white fir mortality were detected on the Hat Creek Ranger District, Lassen National Forest (M261D). Two areas are in the vicinity of the Beaver Creek wetlands at the junction of County Road 111 and Forest Service Road 34N88. Additional white fir mortality was observed just east of West Propect Peak located north of Lassen Volcanic National Park. On the Almanor Ranger District a small pocket of white fir mortality was detected just south of Duck Lake along Forest Service Road 29N18 (M261D). One area of continued mortality was detected over 80 acres in the Babbit Peak Natural Area on the east side of the Sierraville Ranger District, Tahoe National Forest (M261E).

Incidental damage from the fir engraver beetle was noted on private land near D.L. Bliss State Park, on the west shore of Lake Tahoe. The fir engraver beetle heavily damaged this area during recent drought years. Many white firs have shown poor recovery and fir engraver activity persists at a low intensity, causing scattered branch mortality and top kill.

True fir mortality and top-kill associated with the fir engraver remained at background rates throughout much of the southern part of M261E. White fir mortality and top-kill were observed northwest of Boneyard Meadow, on the southwest edge of the Teakettle Experimental Area, and in several locations between Courtright and Wishon Reservoirs on the Sierra National Forest.

FLATHEADED FIR BORER, ***Melanophila drummondi***. Understory, suppressed, and stressed western hemlock have died in Jedediah Smith State Park and Redwood National Park. The galleries, larvae and adult exit holes all appear to be from the flatheaded fir borer. A high percentage of the dead hemlock originated on "nurse logs," and most showed Armillaria fans under the bark at the root collar (263A).

Douglas-fir on a site near Weaverville, Trinity County continues to suffer chronic attack by fir flatheaded borer. Low site quality appears to be the principal factor predisposing the trees to attack. This is a common occurrence on the drier, eastern portions of the Klamath Mountains.

JEFFREY PINE BEETLE, ***Dendroctonus jeffreyi***. Jeffrey pine beetle activity continues to decline throughout northeastern California. Two isolated group kills were detected during 2000. Mortality was mostly individual trees and small 3-5 tree groups. Continued activity was noted around Manzanita Lake within Lassen Volcanic National Park and along the Butte Lake Road (32N21) between Highway (Hwy) 44 and the park boundary (M216D). Two other areas of Jeffrey pine mortality were near the northeastern corner of Snag Lake and on the southern end of Butte Lake.

Low rates of Jeffrey pine mortality continued in the southern part of ecosections M261E and F. Pockets of Jeffrey pine mortality were observed on the north shore of lake Tahoe (M261E) near Sunnyside and William Kent campground.

In southern California, Jeffrey pine mortality associated with this beetle appeared to be higher in 2000 than in 1999, presumably because of the intensification of drought effects on the trees. Large diameter trees were killed in the vicinity of Big Bear Lake in the San Bernardino Mountains, for example. Dead and dying Jeffrey pines felled by conservation camp crews in the community of Wrightwood (on the north side of the San Gabriel Mountains, M262B) were not infested with Jeffrey pine beetles, but rather had been killed by other agents, including pine engravers.

MOUNTAIN PINE BEETLE, ***Dendroctonus ponderosae***. Large, individual sugar pines continue to die in northern California (M261A, M261B, M261D). The pines become susceptible to attack with the encroachment of understory trees and brush. Mountain pine beetles contributed to additional sugar pine mortality associated with fire-related injuries on the Foresthill District, Tahoe National Forest (M261E). Following a prescribed fire in the area between Antoine and Screwauger Canyons, mountain pine beetles were found attacking very large sugar pine trees that had sustained cambium injuries.

Scattered lodgepole pine mortality attributed to mountain pine beetle and host age and size was detected in the Thousand Lakes Wilderness, Lassen National Forest (M261D). The area covers about four sections between Lake Eiler, Upper and Lower Twin Lakes and Hufford Lake. Another wilderness area with mortality was detected near Tumble Buttes. Within Lassen Volcanic National Park, mountain pine beetle-related lodgepole mortality was scattered over about 300 acres north of Hat Mountain near Little Bear Lake (M261D).

Chronic areas of lodgepole pine mortality remained on the Truckee and Sierraville Ranger Districts, Tahoe National Forest (M261E). Additional mortality has occurred north of Truckee along Hwy 89, near the Upper Little and Lower Little Truckee Campgrounds and on adjoining private lands. Additional areas along Hwy 89 were found between Hobart Mills and Prosser Reservoir and along Alder Creek. Scattered lodgepole mortality is also apparent in the southwest corner of the junction of Hwy 89 south and Interstate 80 and along

Interstate 80 between Donner Lake and Cisco Grove. One additional area of mortality of note was found on 80 acres just south of the Silver Creek Campground along Hwy 89 between Truckee and Tahoe City.

Mortality associated with the mountain pine beetle remained low throughout most of the southern M261E and F ecosections. Mountain pine beetle activity in lodgepole pine continued in the Lake Tahoe Basin (M261E) with mortality pockets occurring on the south shore near Trout Creek east of Meyers and on the north shore near Burton Creek State Park. Mountain pine beetle was also reported killing lodgepole pine on the Summit District, Stanislaus National Forest, in the vicinity of Eagle Meadow, Long Valley, Niagara Creek and Herring Creek Reservoir. In addition, mountain pine beetle activity in sugar pine was reported on private lands near Miwuk in Tuolumne County.

As with the Jeffrey pine beetle in southern California, ponderosa and sugar pine mortality associated with the mountain pine beetle was higher in some areas in 2000 vs. 1999. In particular, mortality was observed in the vicinity of Lake Arrowhead/Crestline and Big Bear Lake (M262B).

OAK BARK BEETLES, ***Pseudopityophthorus*** spp. Mortality of coast live oak was reported in the Pine Valley region of eastern San Diego County and was observed along Eagle Peak Road on the Cleveland National Forest (M262B). Limited sampling produced bark beetle galleries and larvae and several flatheaded borer larvae. Reports of mortality in Engelmann oak in San Diego County were actually of trees displaying drought-deciduous behavior.

PINE ENGRAVER BEETLES, ***Ips*** spp. *Ips mexicanus* was commonly recovered from about 80 dead and dying shore pine along the coastal bluffs north of the mouth of the Albion River in Mendocino County and a minor amount of Bishop pines were also killed. Scattered Monterey pine were killed by engraver beetles in Potter Valley, Mendocino County. Engraver beetles continue to be associated with the mortality of pitch canker-infected Monterey pines throughout thet Coastal Pitch Canker Zone of Infestation.

Mortality associated with Ips species was high in southern California in 2000, especially in overstocked, off-site, and/or exotic plantations.

- The die off in the plantation (which met all of the above criteria) above City Creek Fire Station, San Bernardino National Forest, was especially dramatic. Mortality was also observed in native knobcone pine trees in that area.
- Less severe mortality was observed in the Valley of the Moon Plantation in the San Gabriel River Canyon of the Angeles National Forest, where poor sanitation (piling of slash without further timely treatment) has provided additional resources for the beetles. In this latter plantation, mortality was particularly severe in an overstocked portion of the stand, suggesting that the thinning program has reduced drought stress and thus susceptibility of the trees to attack.
- *Ips confusus* was observed attacking and killing single-leaf pinyon at the Horse Spring Campground on the north slope of the San Bernardino Mountains. The trees in this area were damaged by the Devil Fire (1994) and nearby areas burned in the large Willow Fire in 1999. Because of these fires and drought, a large food base is available to Ips in this area.
- *Ips confusus* were also found in singleleaf pinyon in the Tehachapis along the ridge above (and southeast of) Blackburn Canyon. The pinyons in that area are suffering from an as-yet unexplained dieback. Engraver beetles were found in some of the dead or dying trees, but appeared to be secondary to the cause of death.

- *Ips confusus* populations, as always, were high in singleleaf pinyon in the vicinity of Baldwin Lake, Nelson Ridge, and Onyx Summit in the San Bernardino Mountains. Pinyons in this area are infected with blackstain root disease.
- Drought and Ips caused mortality of Coulter and knobcone saplings in an overstocked Penny Pines plantation on the north slope of the San Bernardino Mountains. Interestingly, the slash created by a newly instituted thinning project in the plantation was not infested. The overstory in this area is Jeffrey pine, thus the plantation trees are off-site.

PINE REPRODUCTION WEEVIL, ***Cylindrocopturus eatoni***. Mortality caused by the pine reproduction weevil declined significantly in pine plantations on the Groveland District, Stanislaus National Forest and the Mariposa District, Sierra National Forest (M261E). Suppression (removal of infested trees) was conducted over 235 acres on the Mariposa District. Only about 5% of the 4,530 total acres surveyed on both districts had pine mortality related to the weevil.

RED TURPENTINE BEETLE, ***Dendroctonus valens***. The red turpentine beetle caused mortality of pole-size ponderosa pine in the Pondosa burn plantation, Siskiyou County (M261D). At each of four areas, trees were killed in or adjacent to research plots where deep soil tilling/ripping had been conducted prior to the mortality. Inspection of the trees revealed a common pattern: red turpentine beetles were solely responsible for the mortality, but there was copious resin and little evidence of successful brood production associated with the tree-killing attacks. Thinning in the plantation over the past four years provided good breeding sites for red turpentine beetles; fresh stumps and presumably soil ripping in the research plots is what attracted beetles to the living trees.

This bark beetle was common in wildfire and prescribed burn areas in northeastern California over the past four years. The area with the highest amount of current activity is within the Divide Prescribed Fire, located along the Foresthill Divide Road, Tahoe National Forest (M261E). However, most mortality is associated with fire-related injuries. No reports or observations of red turpentine beetle activity were received from the southern part of ecosections M261E and F.

This insect was found attacking trees in the off-site, low elevation Valley of the Moon plantation in the San Gabriel Canyon, Angeles National Forest. Attacks were sometimes on the same trees that were infested with *Ips paraconfusus*. The red turpentine beetle was also common in pines charred by wildfire, including the Mixing Fire (Aug.-Sept. 1999), in the San Jacinto Mountains (M262B).

TWIG BEETLES, *Pityophthorus* spp., and others. What appeared to be twig beetle damage was seen in the upper crowns of mature drought-stressed sugar and ponderosa pines on more moist sites in the San Bernardino Mountains, e.g., in the vicinity of the Arrowhead Ranger Station.

WESTERN OAK BARK BEETLE, *Pseudopityophthorus pubipennis*. This bark beetle was found killing diseased and declining tanoak, coast live oak, and black oak in coastal counties from Monterey County north to the Oregon border. Predominantly, this beetle was associated with mortality of trees with symptoms of sudden oak death (see diseases: cankers) on tanoak, coast live oak, and black oak in Monterey (Big Sur), Santa Cruz, San Mateo, Marin, Napa, and Sonoma Counties. In Mendocino and Del Norte Counties, this beetle was associated with the mortality of tanoak infected with *Armillaria mellea*.

WESTERN PINE BEETLE, ***Dendroctonus brevicomis.*** The western pine beetle killed a group of about a dozen older plantation trees in the McBride plantation near the Everett Memorial Highway at Mount Shasta

(M261D). The spot seemed to originate from a lightning-struck tree. Some larger and older ponderosa pines have been killed on the McCloud District in the Mud Flow Research Natural Area, and in nearby stands that have black stain root disease (M261D). Numerous small spots of ponderosa pine mortality were detected by the aerial survey between Schell Mountain and Slate Mountain on the Shasta and Trinity County line. There are also many ponderosa pine mortality spots in the Coffee Creek drainage (M261A). A pocket of 22 ponderosa pine was killed by the western pine beetle at Boggs Mountain Demonstration State Forest. Pine engravers were suspected higher in the trees; a few felled pine stems were left in the woods adjacent to the attacked trees.

Mortality of ponderosa pine caused by the western pine beetle was very uncommon in northeastern California during 2000. Two pockets of mortality were noted on the Feather River District, Plumas National Forest (M261E). One encompassed about 100 acres of scattered mortality along Peavine Creek south of Rogers Cow Camp; the other was about 97 acres of scattered mortality two miles south of the Brush Creek Work Center along FS Road 44605A.

No specific western pine beetle group kills were reported from the southern part of ecosections M261E and F. Mortality associated with the western pine beetle was restricted to scattered individual pines and small groups of ponderosa pine.

The western pine beetle is a primary killer of Coulter pine in the Peninsular Ranges of southern California. In particular, this insect was observed in dying Coulter pines in the San Jacinto Mountains (San Bernardino National Forest, M262B). Other stressors on the affected trees were western dwarf mistletoe, brush competition, and possibly root disease.

DEFOLIATORS

CALIFORNIA OAKWORM, ***Phryganidia californica***. The California oakworm defoliated canyon live oak and giant chinkapin along the Smith River and on the Hoopa Indian Reservation (M261A) and along Highway 101 near Redway (263A). The California oakworm also caused minor defoliation of coast live oak in Lompoc (Santa Barbara County, 261B) and near Nacimiento Lake (San Luis Obispo County, 261A).

CALIFORNIA BUDWORM, ***Choristoneura carnana californica***. Light defoliation of Douglas-fir occurred on Trinity Mountain, Trinity and Shasta Counties and along Bowerman Ridge, Trinity County (M261A) for the fifth consecutive year. The defoliation, however, was somewhat less than has been observed in previous years and numbers of larvae and pupae were lower than anticipated.

DOUGLAS-FIR TUSSOCK MOTH, ***Orgyia pseudotsugata***. The outbreak of 1999 on the Big Valley District, and adjoining private lands (Modoc County, M261G), declinded due to natural controls. Follow-up egg mass surveys late in the fall of 1999 and larval surveys in the spring of 2000 indicated that the population had collapsed. No defoliation was detected or reported for northeastern California or elsewhere in the state. Trap counts of male moths are given for 1979 through 2000 in Surveys and Evaluations.

ELM LEAF BEETLE, *Xanthogaleruca luteola.* As usual, a healthy population of elm leaf beetle munched on elms around Lassen and Modoc County (M261E, M261D, M261G). This is about the third consecutive year of rather significant defoliation, but little elm mortality has been detected to date.

Figure 1. Defoliation and webbing caused by the fall webworm.

FALL WEBWORM, ***Hyphantria cunea***. The fall webworm defoliated madrones of all sizes in the Coast Range from Clear Lake to the Oregon border (M261A, M261B). Defoliation and web-making was intensive enough in the Trinity and Klamath River drainages to be picked up by aerial survey. In Trinity County, alder was defoliated as well as the madrone. Defoliation was reported along the Rush Creek Road to Hwy 3 and along Hwy 3 to Coffee Creek and beyond.

Mature madrones in interior Mendocino County were heavily defoliated; less damage was found on alder in Hendy Woods State Park (Mendocino County). This is the second, consecutive year for such reports on mature madrones near Covelo. Other hosts frequently defoliated in the area were Oregon ash, apple and black walnut. Both federal and private lands were involved.

FRUITTREE LEAFROLLER, ***Archyps argyrospila***. Defoliation caused by larvae of the fruittree leafroller varied from light to heavy on scattered, individual California black oak on the Shingle Springs Rancheria west of Placerville in El Dorado County. Similar defoliation of California black oak has been evident in the Sierra Nevada Foothills ecosection from El Dorado County to Tuolumne County for the past two years.

The fruittree leafroller was extremely numerous in the San Bernardino Mountains in 2000. California black oaks were partially to totally defoliated. In some areas larvae were so numerous that after completely consuming the leaves of their host trees, they dropped to the ground on strands of silk to seek other hosts on which to complete development. The silk thus produced covered understory plants and other objects such as fence posts. Mountain residents complained about the large amount of silk encountered around residences and businesses, and to a lesser extent, about the frass raining from the trees. During the peak of larval activity, silk extended across Highway 18 in the vicinity of the Heaps Peak Arboretum, where the prevailing winds from the south blew the larvae to the north side of the highway. Although most trees produced new leaves after the defoliation of 1999, some trees did not produce new leaves in the summer of 2000, while others produced a few leaves and sometimes very heavy acorn crops. It is anticipated that oak mortality will occur as a result of the defoliation, drought, and to a much lesser extent, high levels of mistletoe (*Phoradendron villosum*) infection on certain trees. Although larval mortality from starvation and predation was high, high numbers of insects survived to adulthood, and numerous new egg masses were observed. Insect numbers were so high, and defoliation so severe, that naked pupae were observed in the duff at the base of one tree as well as in rolled leaves on less severely defoliated trees (the normal, better protected location). Defoliation was observed for the first time at Barton Flats, at an elevation of approximately 6500 ft. in the Santa Ana River drainage. Bud break was early in the spring of 2000. It is speculated that an absence of foliage early in the spring at cooler locations normally limits survival of first instar larvae at these sites. The fruittree leafroller population in the San Bernardino Mountains may have equaled or exceeded the large outbreak of 1951-1953 reported by Brown and Eads (Brown, L.R. and C.O. Eads. 1965. A Technical Study of Insects Affecting the Oak Tree in Southern California. Calif. Agric. Exp. Stn. Bull. 810. 105 p.). Unlike the 1951-53 outbreak, there were no reports of defoliation in Pasadena (R. Garrison, Dept. of Agric.

Figure 2. **Defoliation by the fruittree leafroller in the San Bernardino Mountains**

Figure 3. **Larva of the fruittree leafroller**

Commissioner, Weights & Measures, County of Los Angeles, pers. comm.) The San Bernardino Mountains and the eastern end of the San Gabriel Mountains were thoroughly surveyed in 2000 for defoliation. The Mendenhall Valley on Mt. Palomar, where defoliation has been observed in the past (L. Merrill, personal observation), was not surveyed in 2000.

GYPSY MOTH, ***Lymantria dispar***. Thirty-five male gypsy moths were trapped by Pest Detection, California Department of Food and Agriculture this year. The detection trap catches by county were: Los Angeles 1, Marin 19 (quarantine traps), Orange 1, Sacramento 1, San Diego 7, San Mateo 2, Shasta 1, Ventura 2 and Yolo 1. This is four counties more than 1999. Trap densities around these finds were increased from three traps per square mile to 25 traps per square mile. A treatment project is planned for the Ignacio neighborhood of Novato, Marin County in 2001. No properties with egg masses or pupal cases were found.

LODGEPOLE PINE NEEDLEMINER, ***Coleotechnites milleri***. Populations of lodgepole needleminer started to increase in several areas of Yosemite National Park in 1993-1994 and this expansion continued in 2000. Larval survival over winter has been high for the past several years and large population increases were recorded at 26 of 28 sample plots (see Surveys and Evaluations). High populations were present in areas extending from Tenaya Lake through Tenaya Gap, the Cathedral Lake Basin, Delaney Creek, Dingley Creek, upper Budd Creek, Olmstead and May Lake. Population densities remained low around the high use areas of Tuolumne Meadows. However, the abundance of needleminers suggest there will be visible defoliation along Hwy 120 and along all the major trails leading south, west and north from Tuolumne Meadows. Increasing tree mortality is expected in areas that have been defoliated over the past several years.

MODOC BUDWORM, ***Choristoneura retiniana***. In the last few years, patches of activity by this defoliator were noted during aerial surveys of the Warner Mountains (M261G). There were no indications of budworm activity detected during a flight conducted mid-June. However, defoliation and larvae were seen in mid-July along the Pine Creek Trail from near the boundary of the South Warner Wilderness to near the wilderness trail head and in scattered nearby areas of the Warner Mountains State Game Refuge. Incidental

feeding on white fir by the Modoc budworm was evident in the CalPines subdivision, Modoc County (M261G).

Budworm activity was noted this year on the Big Valley District on nearly the same acres as the 1999 outbreak of the Douglas-fir tussock moth. In general, areas were near Manzanita Mountain, Calpines, Deer Springs and the Rush Creek drainage (M261G). The budworm defoliation was primarily in the current years growth and was heaviest in the upper two-thirds of the white fir crowns. Mortality is not expected, but there may be some growth loss associated with the combined effects of Douglas-fir tussock moth, budworm and sawflys over the past two years.

OAK RIBBEDCASE MAKER, *Bucculatrix albertiella*. The oak ribbedcase maker skeletonized black oak leaves over several hundreds of acres in Lassen and Plumas Counties (M261E). Larvae consume the lower leaf surface, giving leaves a brownish, skeletonized appearance. In some areas heavy infestations resulted in almost total defoliation as the skeletonized leaves dropped from the oaks.

PACIFIC TENT CATERPILLAR, ***Malacosoma contrictum***. Some blue oaks along ridge tops in the Cottonwood area, Shasta County, were completely defoliated by the pacific tent caterpillar, but overall defoliation was light.

PINE NEEDLE SHEATHMINER, ***Zelleria haimbachi***. Since 1997 there has been a steady increase in the sheathminer population on ponderosa pine east of Pondosa, Siskiyou County (old Pondosa burn). A survey conducted in the spring of 1999 found an average of 3.8 larval mines per shoot. This population level produced defoliation that land managers considered to be on the threshold of tolerable damage. This year's sample estimated the population to be higher - 5 to 8 larvae per shoot. The decision was made to conduct a trial spray treatment over three-quarters of the infested area using the pesticide Asana (Esfenvalerate) on June 2. The effectiveness of the treatment will be determined by estimating the subsequent generation's population level in the spring of 2001. Some defoliation had already occurred by the June 2 spray date (M261D).

Elsewhere in northern California, the pine needle sheath miner caused visible defoliation of the tops of plantation trees in the War Memorial Plantation near the intersection of Hwy 97 and the Military Pass Road (M261A).

In northeastern California, several 20-year-old ponderosa pine plantations were affected near Fender Flat in the northern Warner Mountains east of Goose Lake (M261G). Farther south, damage was seen west of Bordertown, NV on the Humbolt-Toiyabe and Tahoe National Forests (M261E).

PONDEROSA PINE RESIN MIDGE, ***Cecidomyia piniinopis***. Ponderosa pine plantations on the west slope of Mt. Shasta exhibit chronic damage by the gouty pitch midge. Low site and brush competition are contributing factors.

PONDEROSA PINE TIP MOTH, ***Rhyacionia zozana***. Dead leaders and laterals caused by this tip moth were detected in two ponderosa pine plantations on the Groveland District, Stanislaus National Forest (M261E). Evidence of past feeding, lateral dominance and multiple leaders, suggests that tip moths have been active in the platations for the past two years. It is estimated that less than 20% of the trees in the plantation have been affected and no mortality attributed to tip moth feeding was observed.

SATIN MOTH, ***Stilpnotia salicis***. The satin moth infestation near the Little Shasta Meadow Botanical Area

(M261D) on the Goosenest Ranger District collapsed after the third year of defoliation. Some of the overstory aspens are showing signs of severe decline and aspen root suckers are abundant.

SHORTHORNED GRASSHOPPERS, Acrididae. Grasshopper damage to ponderosa pine plantations decreased in 2000. Mortality caused by shorthorned grasshopper feeding occurred in two ponderosa pine plantations in the Bull Meadow area of the Groveland District, Stanislaus National Forest in 1999. The two most heavily affected plantations covered a total of 195 acres and 50% to 85% of the pines planted in the units were killed. Another pine plantation of 171 acres also had damage with mortality estimated at less than 20% of total stocking. All three plantations had been deep tilled in late summer of 1998 and planted in the spring of 1999.

WHITE FIR SAWFLY, ***Neodiprion abietis***. There was scattered defoliation of understory white fir trees in the vicinity of Martins Dairy (M261D) and feeding by the white fir sawfly was noted in the vicinity of Latour State Forest headquarters, Shasta County.

Several areas of defoliation caused by white fir sawfly were detected in northeastern California during 2000. The outbreak on the Sierraville Ranger District, Tahoe National Forest, was the largest one reported (M261E). The area of defoliation is located north on Moscow Meadow and encompasses about 900 acres (T.18N. R13E. S. 3, 4 and T.19N. R13E. S. 33, 34). The stand is composed of Jeffrey pine, ponderosa pine, and white fir. Level of defoliation ranges from light to almost 90% of the 1-year and older needles. All size classes are affected, however, the smaller trees (<16 in. dbh) are more severely defoliated than the larger trees. Defoliation is evenly distributed throughout the crown on the smaller trees, but only about the lower two-thirds of the crowns of the larger size classes or dominant trees are affected. The area of defoliation will become less apparent as the brown needles drop from the trees in the fall. On the Downieville Ranger District, about 50 acres of defoliation was detected in the Haskell Peak area.

Two areas of defolation were detected on the Plumas National Forest. On the Feather River Ranger District, several hundreds of acres were defoliated east of Gibsonville in the vicinity of Mt. Etna, Mt. Fillmore and Stafford Mountain (M261E). On the Mt. Hough Ranger District approximately 160 acres of defoliation were detected near the Lucky S Mine (about 1.5 miles SW of Eisenheimer Peak, M261E).

Three areas of defolation were detected on the Big Valley Ranger District, Modoc National Forest and on surrounding private lands. The heavy sawfly-related defoliation was detected in the same areas of the 1999 Douglas-fir tussock moth outbreak. The areas in general are located on Manzanita Mountain, on Deer Spring Ridge, the Rush Creek drainage and on private land at Calpines (M261G).

Information from previous outbreaks indicates that mortality is typically less than 1 percent and most commonly is observed in the intermediate and suppressed trees. In addition, there has not been any evidence of bark beetles or borers coming into the defoliated trees. Following an outbreak in the early 1950s on the Plumas National Forest, Struble concluded that growth reductions occurred immediately after the onset of the outbreak and there was little evidence of recovery two years after the outbreak ended. He indicated that foliage recovery may require five to seven years (Struble, G.R. 1957. Biology and control of the white-fir sawfly. For. Sci. 3(4):306-313).

XYELID SAWFLIES, *Xyela* sp. or spp. Residents of communities in the western end of the San Bernardino Mountains (areas near Crestline and Lake Arrowhead) complained of numerous larvae on decks and other impermeable surfaces. Larvae of *Xyela* sawflies, which feed in staminate cones of pines, had dropped to the ground in large numbers. Normally the larvae quickly crawl off into the duff, but when they

fall onto man-made surfaces they may be trapped and readily observed. Their abundance and their resemblance to maggots are disturbing to some residents.

OTHERS

A NEW LERP PSYLLID, ***Eucalyptolyma maideni***. This new lerp psyllid was found in the Anaheim and Santa Monica areas. The "lerps" created by this psyllid look nothing like those formed by the redgum lerp psyllid. A search for biological control agents from Australia is underway.

AFRICANIZED HONEY BEE, ***Apis mellifera scutellata***. The Africanized honey bee (AHB) continued to expand its range in California in 2000. A California Department of Food and Agriculture (CDFA) detection entomologist found AHB foraging on roadside plants outside the known colonized area, thus the colonized area has been expended to include all of Kern County and a portion of San Luis Obispo County. AHB now occupies approximately 51,060 square miles of southern California, including all of Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura Counties, and a portion of San Luis Obispo County.

Africanized honey bees were **not** responsible for two recent multiple stinging incidents in southern California. In September a tractor operator in Banning (Riverside County) died of an apparent anaphylactic response to more than 100 stings from Egyptian (not Africanized) honey bees. In another dramatic multiple stinging incident, an elderly woman in Lake Forest (Orange County) survived more than 500 stings from European bees nesting in a commercial bee trap in a residential complex. However, in June, four hikers were attacked – and survived – a frightening encounter in Joshua Tree National Park. One hiker fell and broke his leg while fleeing the bees and received 100 stings, a second hiker received more than 50 stings, and the other two received about 25 stings each. All survived. Eventually such an attack will occur on a national forest.

BALSAM FIR GALL MIDGE, ***Paradiplosis tumifex***. The balsam fir gall midge was intercepted by a number of county agricultural offices on Christmas wreaths imported from the northeastern states. This is a "B-rated" pest, which gives individual county agricultural commissioners the option of rejecting or accepting infested material. The midge is not known to occur in California. Potential hosts are *Abies* species.

MAPLE LEAFHOPPER SCORCH, A leafhopper. Many locations in Shasta and Siskiyou Counties (M261A) had widespread symptoms of maple scorch. Studies have shown a high correlation between leafhopper populations and scorch symptoms.

OAK PIT SCALE, *Asterolecanium* sp. Oak pit scales and an unidentified canker pathogen were associated with mortality of several tanoak saplings in one area of Jack London State Park in Sonoma County.

PONDEROSA PINE TWIG SCALE, ***Matsucoccus bisetosus***. This scale and twig beetles (*Pityophthorus* spp.) were present on dying twigs of Jeffrey pine in the Tahoe Keys, South Lake Tahoe. Matsucoccus scale is capable of causing this type of damage, but low scale numbers create uncertainty about this being the primary cause of the dieback. Twig beetles are typically secondary invaders and can be found on most dying branches

PITCH MOTHS, ***Synanthedon sequoiae*** (Sesiidae) and ***Dioryctria*** spp. (Pyralidae). Moths in this group feed in the phloem of the bole and main branches of trees, causing the exudation of large masses of pitch and frass. These insects are nuisance pests in landscape trees and occasionally girdle the branch or stem in which

they are feeding. Attacks tend to reoccur year after year at the same site. Damage was observed on Monterey X knobcone saplings in a Penny Pines plantation on the north slope of the San Bernardino Mountains (vicinity Rock Camp). Damage caused by *Synanthedon sequoiae* was observed on mature pines in May Valley, San Jacinto Mountains. *Dioryctria* sp. was observed infesting single-leaf pinyon in Pinyon Flat in the Santa Rosa Mountains. The latter trees are growing in and around a mountain community and suffer heavy recreational impact. Similar infestations have not been observed in more remote areas in the adjacent Santa Rosa Wilderness.

A heavy infestation of what appears to be Sequoia pitch moth was widespread on hundreds of trees over 10 acres of an isolated stand of low elevation ponderosa pine along Paynes Creek, Tehama County (M261F). Approximately 10% of the trees show severe decline with poor needle retention and thin crowns.

REDGUM LERP PSYLLID, ***Glycaspis brimblecombei***. This exotic pest has been found in several new locations – Middletown, Lake County; Anderson, Shasta County; and Red Bluff, Tehama County and Shingle Springs, El Dorado County. This psyllid now occurs in practically all California counties with redgum eucalyptus (California Plant Pest and Disease Report 19, 1-2).

A detailed discussion of this eucalyptus pest may be found in Volume 18, No. 1-2 of the California Plant Pest and Disease Report (California Department of Food and Agriculture). Information on current biocontrol research at the University of California at Berkeley may be found by an internet search of redgum lerp psyllid. Information on *E. maideni* should eventually appear there also.

ROOT WEEVILS, unknown. When 2-0 Douglas-fir seedlings were lifted at the Magalia Nursery (California Department of Forestry), some were found to have roots damaged by insect feeding. Inspection of 1-0 seedling beds during the winter revealed root feeding on some of these seedlings also, but no insects. Damage was highly variable. The suspected causal agent is root weevils, which likely originated from adjacent forest.

SPRUCE APHID, *Elatobium abietinum*. A row of about 20 Sitka spruce was moderately damaged from spruce aphid feeding near the town of Smith River in Del Norte County. Long standing infestations are static on Sitka spruce lining portions of Highway 101 between Fortuna and Eureka in Humboldt County (263A).

Table 1. Miscellaneous Reports of Forest Insects in California, 2000

Insects			Where Examined or Reported	
Common Name	**Scientific Name**	**Host**	**County**	**Remarks**
Black pineleaf scale	Nuculaspis californica	Knobcone X Monterey	San Bernardino	Plantation, 2 roadside saplings
Fall webworm	*Hyphantria cunea*	Madrone	Trinity	Private lands
Ermine moth	Unknown	Oregon ash	Del Norte	Extensive skeletonizing of leaves within

				and near Jedediah Smith State Park.
Red imported fire Ant	*Solenopsis invicta*	——	Madera	New location
Silverspotted tiger Moth	*Halisidota argentata*	Live oak, Monterey pine	Santa Cruz	Defoliated ornamental trees in the city of Santa Cruz

FOREST DISEASE CONDITIONS - 2000

ABIOTIC DAMAGE

Winter desiccation. About 15,000 acres of natural regeneration within the 1994 Cottonwood wildfire suffered winter injury (M261E). Regeneration in the area is dominated by pine species with a minor component of white fir and incense cedar. Seedlings range in age up to six years and in height up to 3.5 feet. Foliage was dead on about 30% of the seedlings and a very small percentage were killed. All species were affected. The symptoms observed were typical of winter desiccation resulting from a combination of warm temperatures and/or winds and sunny days occurring when the soil is frozen or at low temperatures. By late August most of the injured seedlings had active shoot growth. Minimal mortality is expected.

Chloride damage. Many roadside lodgepole pine trees are showing extreme symptoms of chloride (salt) damage along Interstate 80 between Donner Lake and Blue Canyon (M261E). Needle tip dieback is very apparent on trees within about 50 feet of the roadsides.

Heat. Branch tip dieback occurred on southern and western exposures of ornamental redwood, Douglas-fir, and Monterey pine in Mendocino and Sonoma Counties after exposure to extremely high temperatures. For two consecutive days in mid-June the temperature reached about 116°F. Leaves on dozens of mature blue oaks near Ukiah, Mendocino County, were also scorched.

Ozone. Twenty-seven ozone injury trend plots on the Sequoia National Forest (M261E) were assessed for foliar injury using the Forest Pest Management rating system. These plots were first established in 1977 and have been re-evaluated biennially. In the two years since the plots were last rated, the following changes occurred: nine plots showed increased injury, seven showed less injury and 11 experienced no change. Most changes were slight and do not represent any major shifts in injury patterns. Low elevation plots remain the most severely impacted and high elevation plots generally have very little chlorotic mottle.

Wind desiccation. Maple leaf scorch occurred in late spring and early summer along Indian Creek, North Fork Feather River and North Yuba River drainages in Plumas and Sierra Counties (M261E). Similar damage occurred in 1998 when hot windy weather followed a cold wet spring. Maple leaf scorch was also reported to be heavy in the Magalia/Paradise area, Butte County.

BIOTIC DAMAGE

ANIMAL DAMAGE

BEAR DAMAGE, caused by ***Ursus Americanus***. Many thousands of trees have been killed, top-killed, or damaged by black bear activity in northern Humboldt and Del Norte Counties. Side drainages of the Smith and Klamath Rivers are hard hit. The damage has been on the rise the past few years, as have the bear populations. Trees mostly affected are redwood, Douglas-fir, and Port-Orford-cedar. Damage is noted on saplings and larger trees, and damage frequently occurs in second growth redwood stands 30 to 50 years of age. In affected areas, foresters estimate an average of 25 to 40 percent of the trees are damaged. Widespread damage to mature Port-Orford-cedar occurred in a 20-acre area near the headwaters of the east fork of Pecwan Creek, Orleans District, Six Rivers National Forest (M261B).

CANKER DISEASES

A CHINKAPIN CANKER, cause unknown. Branch dieback and mortality of chinkapin was observed along 15 miles of the Bluff Creek Road between Blue Lake and Onion Mountain (Orleans District, Six Rivers National Forest, M261A), along 2 miles of the Bear Basin Road near Bear Basin Butte (M261A), along a 2-mile segment at the summit of the Bald Hills Road (between Orick and Weitchpec, near Schoolhouse Peak (263A), and along a 1-mile section of Hwy 36 at South Fork Summit (M261B). Distribution of the disease in these areas was patchy, and the disease affected all ages of chinkapin. An oomycete was isolated from a chinkapin along the Bear Basin Road and identification is pending.

CYTOSPORA CANKER, caused by ***Cytospora abietis***. Cytospora blight is typically found in association with infections of true fir dwarf mistletoe *(Arceuthobium abietinum)* in red and white fir, where it causes moderate to severe branch flagging. In 2000, the disease was widespread and severe near South Fork Mountain on the Shasta-Trinity and Six Rivers National Forests (M261B), and at Dry Lake Mountain, north of the old Oak Knoll Ranger Station on the Klamath National Forest (M261A).

DIPLODIA BLIGHT OF PINES, caused by ***Sphaeropsis sapinea (Diplodia pinea)***. Shoot dieback caused by *Sphaeropsis sapinea* was observed again this year on ponderosa pines in the upper Sacramento River Canyon, Shasta County (M261A and M261C). Damage was similar to that seen in 1999, but was noticeably less than seen in years prior. Incidental reports from other parts of the north state suggest that the disease is persisting at low levels over a larger area.

Diplodia blight is actively killing branches in old growth ponderosa pines in the Goodyears Bar area on the North Yuba River in Sierra County (M261E). The disease was also reported on ponderosa pine in the West Point and Wilseyville areas of Calaveras County (M261E).

PITCH CANKER, caused by ***Fusarium circinatum***. Three long-term monitoring plots in Santa Cruz County (261A) provide a view of past and current impacts of pitch canker in an area were the disease was first found in California. Current pitch canker activity in these plots has dropped to near zero although many trees show evidence of past damage. Pitch canker incidence has been steadily declining for about 10 years and some previously heavily infected trees appear to be recovering in the absence of new infections. In the Soquel plot, where no live trees have been cut, 32% of Monterey pines were killed by pitch canker between 1987 and 2000. This is in sharp contrast to a 78% loss of the trees from the other two plots where trees were often removed before they died.

The California Board of Forestry's Coastal Pitch Canker Zone of Infestation is still in effect, and the disease is still a management concern within the zone. Incidence of branch flagging appears to be less than in the several years following initial detection within California in 1986. Populations of several of the insect vectors could be at lower levels. Recent detection surveys have not found the disease north of Mendocino County, or in the central valley counties. Screening for genetically resistant native and ornamental Monterey pine continues. Updates on pitch canker within California can be found at the following internet address: http://frap.cdf.ca.gov/pitch_canker.

A LAUREL CANKER, cause unknown. California-laurel (bay) along coastal Marin and Sonoma Counties had branch flagging from cankers caused by unidentified pathogens.

DECLINES

ASPEN DECLINE, cause unknown. False tinder fungus is present in mature quaking aspen growing between Butte Lake and Snag Lake in the Lassen Volcanic National Park (M261D). The disease is a heart rot that is wide spread on hardwoods in the United States and may be playing a role in the decline.

CHAPARRAL DECLINE, cause unknown. Chaparral dieback is still occurring in extensive areas on the Mountaintop District, San Bernardino National Forest and on private lands in the San Jacinto Mountains, Riverside County (M262B).

INCENSE-CEDAR DIEBACK, cause unknown. Mortality of incense-cedar in southern California has been increasing over the past few years, and is at a level that is generating concern from state and federal forestry employees and the public. On pole-size trees the top usually dies first, sometimes with a few branches along one side of the tree (i.e., the branches presumably supported by the same root or roots) and then the whole tree dies. Saplings may be killed entirely, or have the tops die first, then the entire crown. Bark beetles (presumably *Phloeosinus* spp.) are sometimes found excavating galleries in the dead portion of the stem. These beetles appear to be secondary. No pathogens have as yet been found to be associated with this mortality. Mortality has been observed over the range of the species in the San Bernardino and San Jacinto Mountains.

OAK DIEBACK, cause unknown. Oak dieback was observed on coast live oak and tanoak in and around Pfeiffer Big Sur State Park. About 90% of the dieback was either on state or private land, with the other 10% on the Monterey District, Los Padres National Forest (M262A).

SUDDEN OAK DEATH, associated with a previously unknown ***Phytophthora*** sp. A tanoak with bleeding cankers similar to those found in trees with sudden oak death was found one-quarter mile west of the intersection of Hwy 96 and the Bluff Creek Road (FS Road 13) (Humbolt County, M261A). Samples sent to University of California, Davis for isolation and identification proved negative. This illustrates that signs and symptoms (host response) similar to sudden oak death can arise from causes other than the new pathogen.

Increasing numbers of tanoak, coast live oak, and black oak are dying in various areas of Monterey County north through Sonoma County. To date, lab isolations have confirmed the new Phytophthora species in the following six counties: Monterey, Santa Cruz, San Mateo, Marin, Napa, and Sonoma. Many dead oaks and tanoaks have been reported and evaluated within these and other counties, but mortality is often associated with other causes such as *Armillaria mellea*, other *Phytophthora* species (especially overwatered ornamental trees) or intentional herbicidal treatments in commercial timberlands. The number of dead trees precludes sampling all mortality for the new pathogen.

This summer saw the formation of the California Oak Mortality Task Force, an assemblage of public agencies, non-profit organizations, and private interests to address the issue of elevated levels of oak and tanoak mortality in California. The Task Force will implement a comprehensive and unified approach for research, management, education, and public policy. For specifics on the disease and its occurrence, and composition and research updates from the California Oak Mortality Task Force, visit the following internet address: http://www.suddenoakdeath.org.

TANOAK DECLINE, cause unknown. Hundreds of **s**mall to mature tanoaks are declining and dying from Annapolis in Sonoma County to north of Gualala, Mendocino County. The trees do not have the canker symptoms associated with sudden oak death elsewhere in the state. Crowns are sparse and leaves smaller than normal. Most affected sites are on ridges, where no other tree or shrub species in the vicinities are overtly affected.

DWARF MISTLETOES

DOUGLAS-FIR DWARF MISTLETOE, caused by ***Arceuthobium douglasii***. Moderate-to-high rates of infection by Douglas-fir dwarf mistletoe were identified in scattered pockets of Douglas-fir along the two-mile segment of the Deer Mountain Road, west of Deer Mountain Snowpark (Goosenest District, Klamath National Forest, M261D).

GRAY PINE DWARF MISTLETOE, caused by ***Arceuthobium occidentale***. Unusually high and conspicuous mortality of gray pine on the Greenhorn District, Sequoia National Forest (M261E) prompted district personnel to request a site evaluation from Forest Pest Management. Scattered gray pine mortality was obvious throughout areas adjacent to Lake Isabella. Along the Shirley Creek drainage from Greenhorn Summit to Lake Isabella, mortality began at about 4800 feet and extended down to the lake (2600 feet). Mortality extends south of Lake Isabella for several miles along Havilah Canyon, and north along the Kern River to South Fork Falls at an elevation of 4200 feet. Trees of all sizes were dead or dying, but most were the largest trees in the stands.

Three pines were felled and examined along the Kern River north of Kernville near Headquarters Campground . Trees selected for examination were all dying but still had some green foliage. They varied from 11 to 19 inches diameter and 34 to 58 feet tall. According to local foresters, once trees began showing symptoms of dieback, they usually faded fairly rapidly and sometimes were dead within a period of a few weeks. The most common and consistent factor found on the felled trees was severe dwarf mistletoe infection. Subsequent observations of dead and dying gray pines throughout the area showed that most had Hawksworth ratings of 5 or 6. Many pines had multiple infections on almost every one of their branches. Relatively low levels of pine engravers (*Ips* spp.) and woodborers were found associated with some of the dying pines.

Additional reports of gray pine mortality were confirmed in the western foothills of the Sierra Nevada from just south of Sonora (Tuolumne County) to Pine Flat Reservoir in Fresno County. Localized areas of moderate to severe decline were observed near Mariposa (Mariposa County), south of Oakhurst (Madera County), west of Prather and on the north side of Pine Flat Reservoir east of Trimmer (Fresno County). In general, gray pine mortality was greatest in the southern Sierra near Kernville and lessened with travel northward.

HEMLOCK DWARF MISTLETOE, caused by ***Arceuthobium tsugense*** subsp. ***tsugense.*** Infected western hemlocks were found scattered throughout Jedediah Smith State Park in Del Norte County.

PINYON PINE DWARF MISTLETOE, caused by ***Arceuthobium divaricatum***. Over 200 acres of pinyon pine affected by severe dwarf mistletoe infection were observed. The infested area is on the Inyo National Forest, east of Bishop and adjacent to the road to the Ancient Bristlecone Pine Forest (322A). Long-term dwarf mistletoe infections have lead to tree mortality, branch dieback and deformed crowns.

RED FIR DWARF MISTLETOE, caused by ***Arceuthobium abietinum***, f.sp. ***magnificae***. Incidence and impact of red fir dwarf mistletoe continues to be heavy at South Fork Mountain (Shasta-Trinity and Six Rivers National Forests, M261B) and at Dry Lake Mountain (Scott River District, Klamath National Forest, M261A). The disease has also been identified in low-to-moderate levels in several stands near Croney Ridge (Grindstone District, Mendocino National Forest, M261B). Damage levels are increased by branch mortality caused by *Cytospora abietis*, which is associated with the dwarf mistletoe infections, as well as by topkill and mortality caused by the fir engraver beetle.

WHITE FIR DWARF MISTLETOE, caused by ***Arceuthobium abietinum***, f.sp. ***concoloris***. A few acres of grand fir in west central Humboldt County had brooms and stem swellings from dwarf mistletoe infections. Many of the brooms have been killed by other agents or crown shading. Incidence and impact of white fir

dwarf mistletoe continues to be heavy at South Fork Mountain (Shasta-Trinity and Six Rivers National Forests, M261B). Infections were identified as a management concern along the two-mile segment of the Deer Mountain Road west of Deer Mountain Snowpark (Goosenest District, Klamath National Forest, M261D). Damage consists of branch mortality caused by the mistletoe and associated *Cytospora abietis*, as well as topkill and mortality caused by the fir engraver beetle.

FOLIAGE DISEASES

ELYTRODEREMA DISEASE, caused by ***Elytroderma deformans***. Elytroderma disease continues to be widespread on Jeffrey pines in the Laguna Mountain area, Descanso District, Cleveland National Forest (M262B).

SUGAR PINE NEEDLE CAST, caused by ***Lophodermella arcuata***. Needle cast of sugar pine was seen at two locations in the central and southern Sierra Nevada (M261E). The first was on a few 23-year old planted sugar pines within the area burned in the Granite Fire of 1973. The second was on scattered pole-size trees in Mountain Home Demonstration State Forest. In both instances the disease was confined to 1999 foliage, and although highly visible, was not causing obvious damage to the host.

SYCAMORE ANTHRACNOSE, caused by ***Gnomonia* (*Gloeosporium*) *platani*.** There has been a noticeable decline in incidence of sycamore anthracnose in portions of San Luis Obispo County.

TRUE FIR NEEDLE CAST, caused by ***Lirula abietis-concoloris***. True-fir needle cast was present on white fir along Hwy 38 on both the Front Country and Mountaintop Districts, San Bernardino National Forest (M262B).

ROOT DISEASES

ANNOSUS ROOT DISEASE, caused by ***Heterobasidion annosum***. Annosus root disease was confirmed in scattered pockets of dead and dying red and white fir in several stands near Croney Ridge (Grindstone District, Mendocino National Forest, M261B), and in scattered pockets of dead and dying white fir along the two-mile segment of the Deer Mountain Road, west of Deer Mountain Snowpark (Goosenest District, Klamath National Forest, M261D). Confirmation of the disease was made by locating fruiting bodies of the fungus inside of stumps.

ARMILLARIA ROOT DISEASE, caused by ***Armillaria*** sp. Understory suppressed, stressed western hemlocks have died in Jedediah Smith and Prairie Creek State Parks, and Redwood National Park. A high percentage of the dead hemlocks originated on "nurse logs" and had *Armillaria* fans under the bark, together with galleries, larvae and adult exit holes from the flatheaded fir borer (263A).

Dozens of tanoak in southern Mendocino County were killed by Armillaria infections and attacks by the western oak bark beetle. Scattered tanoak with similar pest combinations were noted in Del Norte County. Minor incidence of Armillaria and this bark beetle were found in association with dying tanoak, coast live oak, and black oak in areas of sudden oak death.

BLACK STAIN ROOT DISEASE, caused by ***Leptographium wageneri***. Pockets of black stain root disease were found in stressed Douglas-fir south of the Van Duzen River near Dinsmores (263A), and in Tannery Campground at Trinity Lake (M261A). Approximately 30 Douglas-fir were marked for removal in the campground. In surveys conducted during the summer and fall of 2000, incidence of black stain root disease

was found to have increased dramatically in 30 second-growth Douglas-fir stands on the Happy Camp District, Klamath National Forest. (M261A).

Black stain root disease has been actively killing ponderosa and Jeffrey pine in a 500 acre area about a mile southwest of Prattville in Plumas County (M261D). About thirty small (one to ten trees) and ten larger (0.1 to 1.0 acre) disease centers have been located and are being monitored. This root disease continues to kill pine trees in Lassen and Modoc Counties as well. About twenty new centers have been located about three miles east of Willow Creek Campground on the Modoc National Forest in Lassen County (M261G).

BROWN CUBICAL BUTT ROT, caused by ***Phaeolus schweinitzii***. Scattered windthrow, stem breakage and mortality was found in overstocked, declining 200 to 300-year-old Douglas-fir at the "Dollar Bend" area along the middle fork of the Smith River and California State Hwy 199 (M261A). The disease is commonly associated with old fire scars and is particularly damaging in stressed trees. The disease was also identified as a factor affecting management in the late successional reserves south of the Van Duzen River near Dinsmores (263A).

PORT-ORFORD-CEDAR ROOT DISEASE, caused by ***Phytophthora lateralis***. A new Port-Orford-cedar root disease infestation was identified near the intersection of Aikens Creek and the old Bluff Creek Road (FS Road 13, M261A), about 2.5 miles from previous known locations. Introduction of the disease may have been by Port-Orford-cedar bough collectors. Port-Orford-cedar root disease is continuing to spread and intensify within known infested areas along the Little Bald Hills Trail in Redwood National Park (263A). Port-Orford-cedars within the developed camping area of Jedediah Smith State Park appeared healthy, although one dead snag was noted along a small creek.

Baiting for *P. lateralis* was attempted at the initial infestation site at the headwaters of Potato Patch Creek (Smith River National Recreation Area, Six Rivers National Forest, M261B), where removal of infected trees was performed in 1996. The fungus was not recovered from the site. However, the disease was found in two mature Port-Orford-cedars in land under private ownership 1.5 miles below the headwaters.

Port Orford cedar root disease continues to cause tree mortality in the upper Sacramento River Canyon (M261A), but no new areas of infestation have been found. The two known infested areas are isolated from other stands of Port Orford cedar, although the Dunsmuir infestation is upstream of many individual and groups of uninfected trees scattered south along the river. Branch tips were collected from living trees within infested areas and are being tested for disease resistance.

RUST DISEASES

INCENSE-CEDAR RUST, caused by ***Gymnosporangium libocedri***. A number of reports were received of incense cedar rust in the Mount Shasta area, Siskiyou County.

WESTERN GALL RUST, caused by ***Endocronartium harknessii*.** This rust fungus continues to cause management concerns in ornamental Monterey pine and native Bishop pine in coastal Sonoma County recreation sites.

WHITE PINE BLISTER RUST, caused by ***Cronartium ribicola*.** Within the Mountain Home Demonstration State Forest, an area affected by the new virulent race of white pine blister rust has expanded west of the Forest headquarters and northeast of the headquarters into the general Balch Park area. This virulent race was first detected at Mountain Home in 1996.

TRUE MISTLETOES

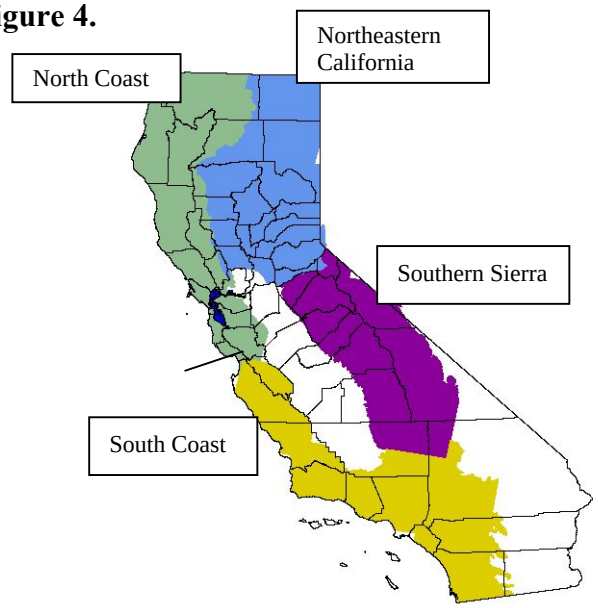
True or leafy mistletoes (*Phoradendron* spp.) continue to cause dieback and decline in both hardwood and conifer species in developed recreation areas on all National Forests in Southern California. Management and suppression projects for leafy mistletoes on hardwoods were conducted on the Campo and La Jolla Reservations in San Diego County (M262B).

SURVEYS AND EVALUATIONS – 2000

DETECTING VEGETATION CHANGES IN CALIFORNIA USING SATELLITE IMAGERY

The USDA-Forest Service and California Department of Forestry and Fire Protection have been cooperating on a statewide change detection program since 1995. This program covers the state over a five-year time period, by project area. The goal of the program is to implement a long-term, low-cost monitoring program to identify trends in forest health and assess changes in vegetation extent and composition. Satellite imagery, aerial photography, ground surveys and other ancillary data are used to achieve the programs objectives.

Figure 4.



Project Area	Monitoring Dates (nominal)	Change Data Complete
Southern Sierra	1990 to 1995	1996
Northeastern	1991 to 1996	1997
South Coast	1993 to 1997	1999
North Coast	1994 to 1998	2000

Location and extent of project areas.

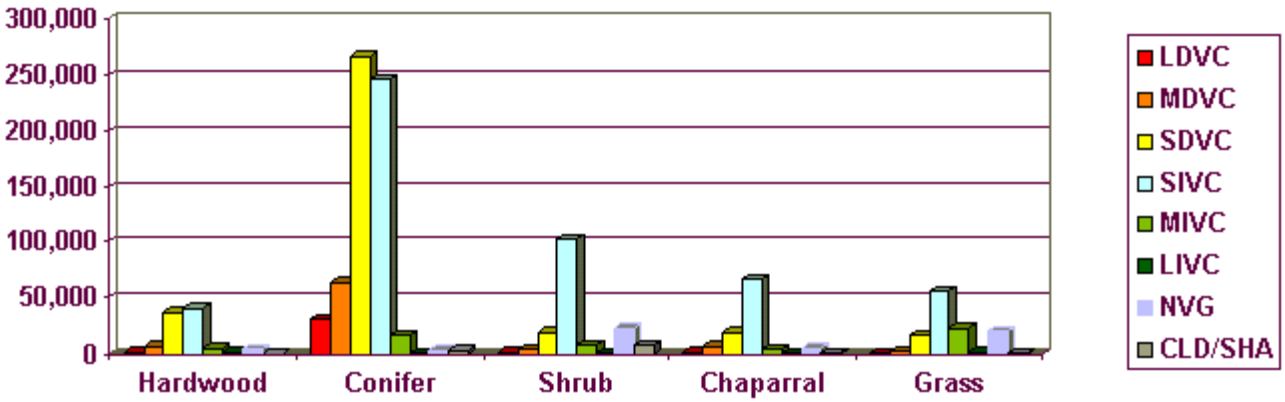
In FY 2000 the Northeastern project area was evaluated. Changes detected within the project area consist of vegetation cover differences represented by levels of increasing, decreasing and no change classes. These classes represent a measure of change from 1991 to 1996. Change classes are further described by lifeform including conifer, hardwood, shrub, etc., which provides reference to the types of vegetation exhibiting change. Changes in woody vegetation classes such as conifer and hardwood classes reveal differences in canopy cover while shrub, chaparral and grass classes portray changes in ground cover. The little to no change class indicates change within existing vegetation is either nonexistent or so subtle that changes could not be detected. Detected increases in vegetation are not necessarily indicative of a net increase in cover but rather understory regrowth, seasonal variations, or succession following disturbance. In the Northeastern project area changes are reported on approximately 14.8 million acres within conifer, hardwood, shrub, chaparral and grass lifeform vegetation types. While the total project area spans 18.7 million acres of land, 3.9 million fall within a "non-forested/other" category including urban, agriculture and water classes. Those classes are not evaluated for landcover changes in this project area.

About 475,000 acres within the project area show increases in vegetation cover or approximately 3% of the area, and 570,000 acres show decreases in vegetation cover or approximately 3.8% of the area. Table 2 shows the distribution of change classes by lifeform in acres. Most of the changes fall within the small decrease and small increase change classes. The conifer type shows the most change in both small decreasing and small increasing classes, 360,265 and 263,000 respectively. Additionally, 63,500 acres are detected in moderate

decrease and 30,300 detected in large decrease change classes. All lifeform classes include small increase in vegetation. Shrub, chapparal and grass lifeforms exceed the acreage of the increasing vegetation in the hardwoods. Four percent of the conifers and 2% of the hardwoods fall within the decreasing change class category.

Some of the reasons for vegetation cover increases include regrowth after fire or other disturbance, moisture differences between the two Landsat image dates, and slowed growth of existing vegetation canopy. Decreases in vegetation cover may be attributed to fire and the removal of overstory and understory vegetation, any type of mechanical manipulation including timber harvesting, and/or development from wildland to urban or other landuse conversion. Overall, changes are occurring in small degrees throughout the project area relative to total acres per lifeform class.

Table 2. Acreage Calculations for the Northeastern California Project Area.



L= large; D= decease; M= moderate; S= small; I= increase; V= vegetation; C= change; NVG= non-vegetation; CLD/SHA= cloud and shadow class.

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 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 reached when fully stocked with trees, which in the demonstration areas, ranges from 185 to 215 sq ft/ac, depending on site quality.) Twenty-one years after thinning, the treatments had reduced mortality from 95 to 100 percent of the level in unthinned stands (Table 3).

TABLE 3. Commercial Tree Mortality by Stocking Level, 21 years after thinning

Year	Residual Stocking After Thinning 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
1987	0.0	0.0	0.0	1.4
1988	0.0	0.0	0.0	0.0
1989 -------- -------- -------- -------- --------	0.0	0.4	0.0	2.6
1990	0.0	0.0	0.0	2.6
1991	0.0	0.0	0.0	1.8
1992	0.0	0.2	0.0	3.0
1993	0.0	0.2	0.3	5.2
1994 -------- -------- -------- -------- --------	0.0	0.0	0.0	4.8
1995	0.0	0.0	0.3	0.4
1996	0.0	0.2	0.0	1.3
1997	0.0	0.2	0.0	1.3
1998	0.0	0.0	0.0	0.0
1999 -------- -------- -------- -------- --------	0.0	0.0	0.0	0.9
2000	0.0	0.2	0.3	0.0
Mean	0.0	0.1	0.1	1.9
Range	0	0-0.5	0-0.8	0-5.2
Percent Mortality Reduction Compared with normal Basal Area	100	95.0	95.0	----

a. Commercial trees are 8 inches dbh and larger, with straight boles, yielding at least one 10-foot log with a 6-inch top. Trees were killed by the mountain pine beetle.
b. Percent of normal basal area.

GROWTH PATTERNS OF PINE WITH OZONE INJURY

This fall increment cores were taken from 183 pines on Forest Health Protection (FHP) ozone injury trend plots on the Sierra and Sequoia National Forests. Growth patterns will be analyzed relative to the 23 years of ozone injury data available for these trees. Data analysis will be done by Dr. Michael Arbaugh from the Pacific Southwest Experiment Station in Riverside, CA.

LODGEPOLE NEEDLEMINER IN YOSEMITE NATIONAL PARK

There have been large increases in needleminer population density throughout the survey area. There will be visible defoliation along Highway 120 and along the major trails leading north, south and west from Tuolumne Meadows. Extensive areas of tree mortality should be expected south and west of Tuolumne Meadows where the lodgepole forest has been heavily defoliated for the last eight years.

TABLE 4a. NEEDLEMINER POPULATION DENSITY*

Live Needleminers Per 100 Tips - July					
Plot	**1994**	**1996**	**1998**	**2000**	**% Change 1998-2000**
Upper Tenaya	90	382	380	3426	802
Cathedral Creek West	18	36	80	322	302
Cathedral Creek South	52	274	658	3006	357
Cathedral Creek East	22	14	48	648	1250
May Lake	2204	1708	962	2464	156
Dog Lake	8	44	32	184	475
West Lyell	2	6	20	20	0
Kuna	20	36	28	44	57
Average	320.5	312.5	275.2	1264.2	359
Budd Creek	80	216	896	2398	168
Cathedral Creek	92	248	704	4320	513
Dingley Creek	14	32	74	396	435
Delaney Creek	150	140	128	834	551
Dana Meadow	ND	ND	2	8	300
Average	67.2	134.4	360.8	1591.2	341
Olmstead #1	3010	1236	542	2472	262
Olmstead #2	42	94	42	40	-5
Murphy Creek Weather Sta.	12	46	48	142	224
Lower Tenaya	4	44	72	270	275
Mt. Hoffman	14	24	24	40	67
Bear Pits	20	52	28	66	126
Average	517.0	249.3	245.3	505.0	106
Lembert Dome	14	6	16	344	2050
Campground	ND	14	4	16	300
Plot G	2	24	78	242	210
Plot H	ND	10	10	40	300
Base Camp	26	18	24	138	475
Plot A	4	12	2	82	4000
Plot 0	26	20	12	88	633
Tenaya Beach	32	34	228	640	181
Tenaya PA.	34	160	202	556	175
Average	15.6	33.1	64.0	238.4	273

* Data provided by Dr. T.W. Koerber, Entomological Service Company, Box 992, Berkeley, CA 94701. The Council thanks Dr. Koerber and Yosemite National Park for making this information available.
ND= no data

TABLE 4b. NEEDLEMINER POPULATION DENSITY*

Live Needleminers Per 100 Tips - October					
Plot	**1993**	**1995**	**1997**	**1999**	**%Change 1997-1999**
Upper Tenaya	134	446	524	3862	637
Cathedral Creek West	26	38	112	338	201
Cathedral Creek South	80	334	872	3356	285
Cathedral Creek East	26	26	86	746	767
May Lake	2542	2254	1422	2858	101
Dog Lake	20	58	46	232	404
West Lye	16	18	34	28	- 17
Kuna	52	50	38	70	84
Average	362.0	403.0	391.8	1436.3	267
Budd Creek	144	270	1042	2842	173
Cathedral Creek	174	326	852	5070	495
Dingley Creek	28	62	92	474	415
Delaney Creek	204	168	160	912	470
Dana Meadow	0	4	10	22	120
Average	110.0	166.0	431.2	1864.0	332
Olmstead #1	3216	1462	852	3088	262
Olmstead #2	58	114	62	60	-3
Murphy Creek Weather Sta.	22	48	64	174	172
Lower Tenaya	8	56	126	322	155
Mt. Hoffman	20	38	38	64	68
Bear Pits	30	64	36	76	111
Average	559.0	297.0	196.0	630.7	222
Lembert Dome	36	20	38	392	931
Campground	10	16	12	26	117
Plot G	4	36	100	316	216
Plot H	6	14	20	58	190
Base Camp	42	32	40	180	350
Plot A	10	24	14	989	600
Plot C	44	24	28	146	421
Tenaya Beach	46	46	294	842	186
Tenaya P.A.	44	180	256	740	189
Average	26.9	43.5	89.1	310.9	249

SOUTHERN CALIFORNIA FIVE-YEAR DWARF MISTLETOE SUPPRESSION PROGRAM

Dwarf mistletoes continue to be a serious problem in developed recreation areas throughout Southern California. The updated Five-Year Dwarf Mistletoe Suppression Program is continuing on the Cleveland, Los Padres, and San Bernardino National Forests (M262 and M262B). The results are as follows:

1 Cleveland National Forest (Descanso District) -376 trees pruned (100 broom pruned), and 28 trees removed on 59 acres treated;

2. Los Padres National Forest (Mt. Pinos and Ojai Districts) - 503 trees climbed and pruned, 600 trees either removed or ground pruned and eight climbers certified on 265 acres treated;

3. San Bernardino National Forest (forest-wide) -132 trees were broom pruned, 334 trees were branch pruned, and 14 trees were removed on the 20 acres treated.

WHITE PINE BLISTER RUST RESISTANCE SCREENING PROGRAM - FY-2000

Progeny of 809 sugar pine trees were grown, inoculated, and evaluated for major gene resistance (MGR) to white pine blister rust at the greenhouses located at the Placerville Nursery. Thirty nine new resistant families were identified from this evaluation bringing the total number of MGR trees in the program to 1,332. In addition, screening of 101 families of western white pine for its rare variant of the MGR gene identified 3 resistant trees and 4 trees that had a few seedlings with resistance resulting from pollination. No resistant seedlings were found among 2 bulk seed lots of white bark pine.

This fall, a total of 1,244 proven MGR sugar pine seedlings were planted at the Happy Camp site for long-term evaluation of slow-rusting resistance. Of this number, 744 were from the 39 MGR families, and 500 were from 228 pollen receptor families. Initial slow rust resistance assessments were made for 4,442 sugar pine seedlings in the 1993, 1994, and 1995 field plantings; 147 trees were selected for cloning into seed orchards from the 1986, 1987, 1988, and 1991 plantings.

For the next cycle of screening, we have sown progeny of 931 sugar pine candidates, which are in the process of being inoculated.

RESULTS OF 2000 AERIAL SURVEY IN CALIFORNIA

TABLE 5. Aerial Observation of Acres with Mortality, Defolation and Blowdown in California, 2000*

Damage	Pines	Douglas-fir/true fir	Hardwoods	Total
Mortality	56,350	14,390	1,960	72,700
Defoliation	0	3,780	205,800 #	209,580
Main stem broken or uprooted	0	0	0	0

* Forest acres flown and observed: 22,300,557

\# Includes 28,000 acres from ground survey

THE 2000 DOUGLAS-FIR TUSSOCK MOTH PHEROMONE DETECTION COOPERATIVE SURVEY.

Twenty-six additional pheromone detection plots were established in 2000. The number of plots with an average trap catch of 25 or more male moths increased slightly in 2000. However, as noted in the insect section of this report, defoliation was not reported. Federal and state forest health protection personnel will continue to monitor all life stages at established monitoring sites and in areas were moth activity exceeded an average of 25 males per trap.

TABLE 6. Number of Douglas-fir Tussock Moth Pheromone Detection Survey Plots by Trap Catch (1979 to 2000).

Year	Total	NUMBER OF PLOTS WITH AN AVERAGE MOTH CATCH PER TRAP OF:													
	No. of plots														
		0<10	10<20	20<25	25<30	30<35	35<40	40<45	45<50	50<55	55<60	60<65	65<70	70<75	75+
1979	102	97	2	1	1	0	1	0	0	0	0	0	0	0	0
	100%	95%	2%	1%	1%		1%								
1980	99	99	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	100%													
1981	93	78	10	4	1	0	0	0	0	0	0	0	0	0	0
	100%	84%	10%	4%	2%										
1982	95	93	1	0	1	0	0	0	0	0	0	0	0	0	0
	100%	98%	1%		1%										
1983	98	87	6	1	1	3	0	0	0	0	0	0	0	0	0
	100%	89%	6%	1%	1%	3%									
1984	111	51	18	11	5	7	8	4	3	4	0	0	0	0	0
	100%	46%	16%	10%	4%	6%	7%	4%	3%	4%					
1985	105	58	14	4	7	6	5	1	2	4	1	2	0	1	0
	100%	55%	13%	4%	6%	6%	5%	1%	2%	4%	1%	2%		1%	
1986	107	64	16	4	8	6	1	3	0	1	0	1	1	1	1
	100%	60%	15%	3%	7%	6%	1%	3%		1%		1%	1%	1%	1%
1987	108	80	15	4	2	1	1	3	0	1	0	0	1	0	0
	100%	74%	14%	4%	2%	1%	1%	2%		1%			1%		
1988	124	106	9	3	3	0	2	1	0	0	0	0	0	0	0
	100%	86%	7%	2%	2%		2%	1%							
1989	130	129	1	0	0	0	0	0	0	0	0	0	0	0	0
	100%	99%	1%												
1990	138	135	1	0	1	1	0	0	0	0	0	0	0	0	0
	100%	97%	1%		1%	1%									
1991	143	135	4	1	0	0	2	1	0	0	0	0	0	0	0
	100%	94%	3%	1%			1%	1%							
1992	164	156	3	0	2	1	0	0	0	0	1	0	1	0	0
	100%	95%	1%		1%	1%					1%		1%		
1993	143	135	8	0	0	0	0	0	0	0	0	0	0	0	0
	100%	94%	6%												
1994	151	139	11	1	0	0	0	0	0	0	0	0	0	0	0
	100%	92%	7%	1%											
1995	158	77	35	13	16	7	7	3	0	0	0	0	0	0	0
	100%	49%	22%	8%	10%	4.5%	4.5%	2%							
1996	149	33	26	16	^8	7	12	9	5	8	6	8	5	1	5
	100%	22%	17%	11%	6%	4%	8%	6%	3%	6%	4%	6%	3%	1%	3%
1997	142	88	27	10	9	4	3			1					
	100%	62%	19%	7%	6%	3%	2%			<1%					
1998	159	81	22	11	9	6	3	10	7	5	2	1	1	1	0
	100%	51%	14%	7%	6%	3%	2%	6%	4%	3%	1%	<1%	<1%	<1%	-
1999	159	126	20	5	3	2	2	0	0	0	1	0	0	0	0
	100%	79%	13%	3%	2%	1%	1%	-	-	-	1%	-	-	-	-
2000	185	154	15	4	4	0	1	2	2	2	0	0	1	0	0
	100%	83%	8%	2%	2%		<1%	2%	1%	1%			<1%		

LIST OF COMMON AND SCIENTIFIC NAMES

INSECTS

Common Name	Scientific Name
Bark Beetles	
California fivespined engraver	*Ips paraconfusus*
Cedar bark beetles	*Phloesinus* spp.
Douglas-fir beetle	*Dendroctonus pseudotsugae*
Fir engraver	*Scolytus ventralis*
Flatheaded fir borer	*Melanophila drummondi*
Jeffrey pine beetle	*Dendroctonus jeffreyi*
Mountain pine beetle	*Dendroctonus* ponderosae
Pine engraver	*Ips pini*
Pine engravers	*Ips* spp.
Pinyon ips	*Ips confusus*
Red turpentine beetle	*Dendroctonus valens*
Twig beetles	*Pityophthorus* spp.
Western pine beetle	*Dendroctonus brevicomis*
Defoliators	
California budworm	*Choristoneura carnana californica*
California oakworm	*Phryganidia californica*
Douglas-fir tussock moth	*Orgyia pseudotsugata*
Elm leaf beetle	*Xanthogaleruca luteola*
Fall webworm	*Hyphantria cunea*
Fruittree leafroller	*Archips argyrospilus*
Gypsy moth	*Lymantria dispar*
Lodgepole pine needleminer	*Coleotechnites milleri*
Modoc budworm	*Choristoneura retiniana*
Oak ribbedcase maker	*Bucculatrix albertiella*
Pacific tent caterpillar	*Malacosoma contrictum*
Satin moth	*Stilanotia* salicis
White fir sawfly	*Neodiprion* spp.
Tree Regeneration Insects	
Balsam fir gall midge	*Paradiplosis tumifex*
Pine needlesheath miner	*Zelleria haimbachi*
Pine reproduction weevil	*Cylindrocopturus eatoni*
Ponderosa pine resin midge	*Cecdomyia piniinopis*
Ponderosa pine tip moth	*Rhyacionia zozana*
Redgum lerp psyllid	*Glycaspis brimblecombei*
Shorthorned grasshoppers	Acrididae
Other	
A new lerp psyllid	*Eucalyptolyma maideni*
Africanized honey bee	*Apis mellifera scutellata*

Maple leafhopper scorch	A leafhopper
Ponderosa pine twig scale	*Matsucoccus bisetosus*
Red imported fire ant	*Solanopsis invicta*
Sequoia pitch moth	*Synanthodon sequoiae*
Root weevils	unknown

DISEASES AND THEIR CAUSAL PATHOGENS

Common Name of the Disease	Scientific Name of the Pathogen
Cankers	
Chinkapine canker	unknown
Cytospora canker	*Cytospora abietis*
Diplodia blight of pines	*Sphaeropsis sapinea* (*Diplodia pinea*)
Pitch canker	*Fusarium circinatum*
Declines	
Aspen decline	unknown
Sudden oak death	*Phytophthora* sp.
Dwarf Mistletoes	
Douglas-fir dwarf mistletoe	*Arceuthobium douglasii*
Gray pine dwarf mistletoe	*Arceuthobium occidentale*
Red fir dwarf mistletoe	*Arceuthobium abietinum* f.sp. *magnificae*
True fir dwarf mistletoe	*Arceuthobium abietinum*
Western dwarf mistletoe	*Arceuthobium campylopodum*
White fir dwarf mistletoe	*Arceuthobium abietinum* f.sp. *concoloris*
Foliage Diseases	
Sugar pine needle cast	*Lophodermella arcuata*
Root Diseases	
Annosus root disease	*Heterobasidion annosum*
Armillaria root disease	*Armillaria* sp.
Black stain root disease	*Leptographium wageneri*
Brown cubical butt rot	*Phaeolus schweinitzii*
Phytophothora root disease	*Phytophthora* sp.
Port-Orford-cedar root disease	*Phytophthora lateralis*
Rusts	
Incense-cedar rust	*Gymnosporangium libocedri*
Western gall rust	*Endocronartium harknessii*
White pine blister rust	*Cronartium ribicola*
True Mistletoes	
Hairy mistletoe	*Phoradendron villosum*

Trunk Rot

False tinder fungus	*Phellinus igniarius*

TREES

Common Name	Scientific Name
Conifers	
Pines	
Bishop pine	*Pinus muricata*
Gray pine	*Pinus sabiniana*
Jeffrey pine	*Pinus jeffreyi*
Knobcone pine	*Pinus attenuata*
Lodgepole pine	*Pinus contorta* var. m*urrayana*
Monterey pine	*Pinus radiata*
Ponderosa pine	*Pinus ponderosa*
Shore pine	*Pinus contorta* var. *contorta*
Singleleaf pinyon	*Pinus monophylla*
Sugar pine	*Pinus lambertiana*
Western white pine	*Pinus monticola*
Whitebark pine	*Pinus albicaulis*
True firs	
Red fir	*Abies magnifica*
White fir	*Abies concolor*
Others	
Douglas-fir	*Pseudotsuga menziesii*
Incense-cedar	*Libocedrus decurrens*
Port-Orford-cedar	*Chamaecyparis lawsoniana*
Sitka spruce	*Picea sitchensis*
Hardwoods	
Eucalyptus	
Blue gum	*Eucalyptus globulus*
Red gum	*Eucalyptus camaldulensis*
Sugar gum	*Eucalyptus cladocalyx*
Oaks	
Blue oak	*Quercus douglasi*
Canyon live oak	*Quercus chrysolepis*
California black oak	*Quercus kelloggii*
Coast live oak	*Quercus agrifolia*
Engelmann oak	*Quercus engelmannii*
Oaks	*Quercus* spp.

Other

Apple	*Malus* sp.
Aspen	*Populus tremuloides*
Black walnut	*Juglans nigra*
California laurel	*Umbellularia californica*
Elm	*Ulmus* sp.
Hackberry	*Celtis occidentalis*
Oregon ash	*Fraxinux latifolia*
Tanoak	*Lithocarpus densiflorus*
Willow	*Salix* sp.

AGENTS REPORTED IN 1999, BUT NOT IN 2000

CALIFORNIA FLATHEADED BORER, *Melanophila californica*
CEDAR BARK BEETLES, *Phloeosinus* spp.
ROUND FIR HEADED BORER, *Tetropium abietis*
BALSAM TWIG APHID, *Mindarus abietinus*
BRANCH CANKER OF PONDEROSA PINE, cause unknow
ELYTRODERMA DISEASE, caused by *Elytroderma deformans*
TARSPOT OF MADRONE, caused by *Rhytisma punctatum*
YELLOW WITCHES BROOM, cause by *Melampsorella caryophyllacearum*
INCENSE-CEDAR TRUE MISTLETOE, caused by *Phorodendron juniperinum* f.sp. *juniperinum*
WESTERN DWARF MISTLETOE, caused by *Arceuthobium campylopodum*
HACKBERRY DECLINE, cause unknown
LODGEPOLE PINE DECLINE, cause unknown

PUBLICATIONS

McPherson, B.A., D.L. Wood, A.J. Storer, P. Svihra, D.M. Rizzo, N. Maggi Kelly and R.B. Standiford. 2000. Oak mortality syndrome: Sudden death of oaks and tanoaks. Sacramento, CA, California Department of Forestry and Fire Protection. Tree Note No. 26. 6 p.

Owen, D. 2000. Black stain root disease of ponderosa pine in California. Sacramento, CA, California Department of Forestry and Fire Protection. Tree Note No. 25. 4 p.

(See the webpage of the California Department of Forestry to locate each of these and other publications.)

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. _____

Section (s) _____

5. Date:

6. Location:

UTM:

7. Landownership:
National Forest [ ]
Other Federal [ ]
State [ ]
Private [ ]

8. Suspected Cause of Injury:
1. Insect [ ] 5. Chemical [ ]
2. Disease [ ] 6. Mechanical [ ]
3. Animal [ ] 7. Weed [ ]
4. Weather [ ] 8. Unknown [ ]

9. Size of Trees Affected:
1. Seedling [ ] 4. Sawtimber [ ]
2. Sapling [ ] 5. Overmature [ ]
3. Pole [ ]

10. Part(s) of Tree Affected:
1. Root [ ] 5. Twig [ ]
2. Branch [ ] 6. Foliage [ ]
3. Leader [ ] 7. Bud [ ]
4. Bole [ ] 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. Elevation:

17. Plantation?
1. Yes [ ] 2. No [ ]

18. Stand Composistion (species):

19. Stand Age and Site Class:

20. Stand Density:

21. Site Quality:

22. Pest Names (if known) and Remarks (symptoms and contributing factors):

23. Sample Forwarded:
1. Yes [ ] 2. No [ ]

24. Action Requested:
1. Information only [ ]
2. Lab Identification [ ]
3. Field Evaluation [ ]

25. Reporter's Name:

26. Reporter's Agency:

27. Reporter's Address and Phone Number:

II. Reply (Pest Management Use)

28. Response:

29. Report Number:

30. Date:

31. Examiner's Signature:

R5-3400-1 (Rev. 12/99)

The Cooperative Forest Pest Detection Survey is sponsored by the California Forest Pest Council. The Council encourages federal, state, and private land managers and individuals to contribute to the Survey by submitting pest injury reports and samples in the following manner:

Federal Personnel: Send all detection reports through channels. Mail injury samples with a copy of this report to one of the following appropriate offices:

USDA Forest Service
State and Private Forestry
1323 Club Drive
Vallejo, CA 94592

Forest Pest Management
Shasta-Trinity National Forests
2400 Washington Avenue
Redding, CA 96001

Forest Pest Management
Stanislaus National Forest
19777 Greenley Road
Sonora, CA 95370

Forest Pest Management
Lassen National Forest
2550 Riverside Drive
Susanville, CA 96130

Forest Pest Management
San Bernadino National Forest
1824 Commercenter Circle
San Bernadino, CA 92408-3430

State Personnel: Send all detection reports through channels. Mail injury samples with a copy of this report to one of the following appropriate offices:

Forest Pest Management
CA Dept. of Forestry & Fire Protection
P.O. Box 944246
Sacramento, CA 94244-2460

Forest Pest Management
CA Dept. of Forestry & Fire Protection
6105 Airport Road
Redding, CA 96002

Forest Pest Management
CA Dept. of Forestry & Fire Protection
1475 South State Street
Ukiah, CA 95482

Private Land Managers and Individuals: Send all detection reports and samples to the closest California Department of Forestry and Fire Protection office listed above.

Completing the Detection Report Form

Heading (Blocks 1-7): Enter all information requested. In Block 6, **LOCATION**, provide sufficient information for the injury center to be relocated. If possible, attach a location map to this form.

Injury Description (Blocks 8-15): Check as many boxes as are applicable, and fill in the requested information as completely as possible.

Stand Description (Blocks 16-21): This information will aid the examiner in determining how the stand conditions contributed to the pest situation. In Block 18 indicate the major tree species in the overstory and understory. In Block 19, indicate the stand age in years and/or the size class (seedling-sapling; pole; young sawtimber; mature sawtimber; overmature or decadent).

Pest Names (Block 22): Write a detailed description of the pest or pests, the injury symptoms, and any contributing factors.

Action Requested (Block 24): Mark "Field Evaluation" only if you consider the injury serious enough to warrant a professional evaluation. Mark "Information Only" if you a reporting a condition that does not require further attention. All reports will be acknowledged and questions answered on the lower part of this form.

Reply (Section II): Make no entries in this block; for examining personnel only. A copy of this report will be returned to you with the information requested.

Handling Samples: Please submit injury samples with each detection report. If possible, send several specimens illustrating the stages of injury and decline. Keep samples cool and ship them immediately after collection. Send them in a sturdy container, and enclose a completed copy of the detection report.

Your participation in the Cooperative Forest Pest Detection Survey is greatly appreciated. Additional copies of this form are available from the Forest Service, Forest Pest Management, and from the California Department of Forestry and Fire Protection.