FOREST PEST CONDITIONS IN CALIFORNIA - 2001

A PUBLICATION OF THE CALIFORNIA FOREST PEST COUNCIL

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 2001***, 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. The report is available at the following website:
http://www.r5.fs.fed.us/fpm/fhp_doc.htm.

ABSTRACT

The important forest insects and diseases in California in 2001 are reviewed. 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 screening program for white pine blister rust, the southern California dwarf mistletoe suppression program, assessing ozone injury to pines in the Sierra Nevada, detecting vegetation changes in California using satellite imagery, aerial survey for Sudden Oak Death and the cumulative surveys of Douglas-fir tussock moth, lodgepole pine needleminer and 22 years of tree mortality in eastside pine thinning plots.

Key words; California, forest diseases, forest insects, surveys, tree mortality.

CFPC field meeting, Laguna Mountains Recreation Area, San Diego County.

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SUMMARY

Insects

Bark and Engraver Beetles, Wood Borers. Reports indicated that pine and fir mortality increased in 2001. The increase is primarily attributed to drought conditions returning during 2000 and 2001 and excessive stocking densities on many sites. Reports of all the major bark beetles increased with the exception of the Jeffrey pine beetle. Regions of the state most affected are the northern Sierras and northeastern and southern California. Least affected regions are the southern Sierras and the area now commercially referred to as Upper California.

In northern California, mountain pine beetle activity in lodgepole pine continued in known chronic areas during 2001. Activity in ponderosa and sugar pine increased compared to the past few years as drought conditions returned. Mountain pine beetle also killed several dozen whitebark pines on Goosenest Mountain, Klamath National Forest. A large increase in pine engraver activity was noted throughout northeastern California during 2001, particularly of the pine engraver, *Ips pini*, on the east side of the Sierra Nevada and southern Cascade Range. More mortality caused by *Ips pini* and drought was detected during 2001 than throughout the whole of the protracted drought period of the late 1980s and early 1990s.

Defoliators. Fifteen defoliators were reported in 2001. Three years of defoliation of California black oak by the fruittree leafroller produced some mortality and more frequent twig and branch dieback in parts of the San Bernardino Mountains. Populations of lodgepole pine needleminer continue to increase in Yosemite National Park. Aerial survey delineated 25,000 acres of severe defoliation and tree mortality is beginning after four alternating years of defoliation. The number of reports of gypsy moth fell sharply.

Other. Twelve other insects were reported. The most important of these was the pinyon needle scale that killed sapling pinyon pines in the Los Padres National Forest.

Diseases

Abiotic. The most important influence was the return of moisture deficit to the forests of California in all regions of the state. Blue oak experienced browning and premature loss of foliage in many areas of northern California. California black oak was less noticeably affected.

Canker Diseases. Six canker diseases were reported in 2001. Pacific madrones and manzanita seemed to be hosts that were the most affected compared to 2000. The increase in madrone canker may be connected in some way to the heavy defoliation by fall webworm that occurred in 2000 in northwestern California.

Declines. The count of California counties with at least one confirmed instance of Sudden Oak Death is now 10; it was seven in November 2000. The pathogen is also confirmed in Curry County, Oregon. Surveys began

in 2001in the intervening area between Curry County and southern Mendocino County, the previous northern occurrence of the disease. These surveys will continue in 2002. The latest updates on the pathogen and its occurrence can be found at www.suddenoakdeath.org.

Dwarf mistletoes. Reports of dwarf mistletoes were down in 2001. However, the range and occurrence of these parasitic plants do not change rapidly and with the onset of drought in California, their relevance to forest health and tree mortality increases.

Foliage Diseases. The pathogen causing Sudden Oak Death has been found to cause leaf spots and/or twig dieback on California bay, rhododendron, big leaf maple, Pacific madrone, huckleberry, California buckeye, manzanita, toyon, California honeysuckle and California coffeeberry. Other foliage diseases were not reported as important problems in 2001.

Root Diseases. Root diseases continue to be a problem that is apparently increasing in scope. The presence of Armillaria root disease in areas with oaks and tanoaks continues to create difficulty in surveying some areas for Sudden Oak Death. New pockets of black stain root disease were found and new sites with Port-Orford-cedar root disease were recorded within the range of the disease.

Other. Rust diseases and true mistletoes were not reported as significantly damaging in 2001.

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BARK and ENGRAVER BEETLES, and BORERS

AMBROSIA BEETLES, ***Monarthrum scutellare*** and ***M. dentiger.*** Ambrosia beetle attacks on tanoak, coast live oak and California black oaks along the northern California coast were associated with dying trees that exhibited symptoms similar to those manifest for Sudden Oak Death. However, Sudden Oak Death has not been confirmed north of southern Mendocino County (263A) in California.

CALIFORNIA FLATHEADED BORER, ***Melanophila californica***. The California flatheaded borer was found in recently killed Jeffrey pines in the Laguna and San Bernardino Mountains (M262B), sometimes in conjunction with pine engravers and the Jeffrey pine beetle.

DOUGLAS-FIR BEETLE, ***Dendroctonus pseudotsugae***. Douglas-fir beetle killed scattered, mistletoe-infested Douglas-firs along the upper Sacramento River, west of Mount Shasta (M261A). The area has been under severe drought stress.

FIR ENGRAVER, ***Scolytus ventralis***. True fir mortality associated with the fir engraver is on the rise again in northeastern California. The increase was most noticeable on the Lassen National Forest, particularly on the Eagle Lake Ranger District (M261D). Scattered white fir mortality (5 to 10 trees per acre) was found throughout all dense stands on the west side of Harvey Mountain and was most common in small, suppressed understory trees. Mortality of one to two white firs per acre was observed in open-grown stands of 10 to 16 inch dbh trees that were thinned about 10 years ago. Scattered mortality occurred between Bogard and Cone Lake, also on the Eagle Lake District. The resurgence in mortality is very likely associated with drought conditions and there may be some annosus root disease in these firs as well.

The fir engraver beetle is present in fire injured true firs (typically <12" dbh) in both the 1999 Bucks Fire on the Feather River District, Plumas National Forest, and throughout the Storrie Fire that burned in 2000 on both the Almanor District, Lassen National Forest and the Mt. Hough District, Plumas National Forest. Scattered white fir mortality is also visible along Highway (Hwy) 70 through the Feather River Canyon between the towns of Halston and Poe (M261E). True fir mortality and top-kill associated with the fir engraver remained at background levels throughout the southern half of M261E.

FLATHEADED FIR BORER, ***Melanophila drummondi***. Mature and pole-size Douglas-firs near French Creek north of Callahan, Siskiyou County (M261A) suffered top-kill, branch dieback and tree mortality due to attack by the flatheaded fir borer. Dissections of trees revealed a history of repeated attacks during previous years. Low site quality appears to be a factor contributing to chronic borer activity, while this year's dry spring likely contributed to greater tree stress and higher levels of damage. No pest damage was noted on ponderosa pine growing on the site.

JEFFREY PINE BEETLE, ***Dendroctonus jeffreyi***. Jeffrey pine beetle activity is increasing throughout the Jeffrey pine type in northern California. More activity was detected this year compared to previous years.

Large single Jeffrey pine trees continue to be killed by Jeffrey pine beetle around Manzanita Lake and the Park administrative sites on the north end of Lassen Volcanic National Park and also along the trail from Tamarack Swale to Eiler Lake in the Thousand Lakes Wilderness (M261D).

On the Lassen National Forest, a few small group-kills caused by Jeffrey pine beetle were noted. Two were within and near the Harvey Mountain goshawk management area on the west side of Harvey Mountain. One pocket has two to three old growth trees (>30" dbh) and the other has two to three small trees (10-15"). In addition, a few large trees were killed along Hwy 36 on the eastside of Fredonyer Summit along the west fork of Willard Creek. This mortality consisted of two or three small pockets of 2-3 trees each. Additional Jeffrey pine mortality on the Eagle Lake Ranger District was detected along Forest Service (FS) Road 32N21 just south of the FS Road 32N61 and several large individual trees were also killed along the FS 32N09 and FS 32N09E just east of Pole Springs (M261D). On the Big Valley District, Modoc National Forest isolated individual Jeffrey pine tree mortality was noted off Forest Service Road 38N45 northwest of Moll Reservoir (M261D).

Jeffrey pine mortality continued at low levels in the southern part of the M261E ecosection. Pockets of morality were observed on the east shore of Lake Tahoe near Incline Village and Logan Shoals. Jeffrey pine beetle activity was detected in Sherwin Creek Campground, Mammoth District, Inyo National Forest (M261E); about 60 Jeffrey pines were killed in 2000 and 2001. Jeffrey pine beetles continued to kill Jeffrey pines in the San Bernardino Mountains of southern California at moderate rates, as in 2000.

MOUNTAIN PINE BEETLE, ***Dendroctonus ponderosae***. In northern California, mountain pine beetle activity in lodgepole pine continued in known chronic areas during 2001. Activity in ponderosa and sugar pine increased this year compared to the past few years as drought conditions returned. Mountain pine beetle on Goosenest Mountain (M261D) killed several dozen whitebark pines.

Lodgepole pine. On the Tahoe National Forest, lodgepole pine mortality continued north of Truckee along Hwy 89 from Sagehen Creek to the Upper Little Truckee Cross country Ski Area. Mortality is on both public and adjoining private lands. Additional areas along Hwy 89 include Hobart Mills to Prosser Reservoir and a large increase in mortality was detected along Alder Creek. Scattered individual lodgepole pine mortality was also noted within Rice Canyon along FS Road 05 where many of the trees suffered fire damage (roots and cambium) from pile burning (Sierraville Ranger District, M261E). Individual lodgepole pine mortality was also reported along the Butte Creek road and in the flats just off Hwy 44 on the Hat Creek District, Lassen National Forest (M261D).

Mortality associated with the mountain pine beetle remained at low levels 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 continuing on the south shore near Trout and Angora Creek drainages. Mountain pine beetle-related mortality involving lodgepole pine continued on the Summit District, Stanislaus National Forest, in the vicinity of Eagle Meadow, Long Valley, Niagara Creek and Herring Creek Reservoir. Mountain pine beetles were also associated with continued lodgepole pine mortality in the Twin Lakes Campgrounds above Mammoth Lakes, Mono County.

Sugar pine. Mortality in sugar pine attributed to mountain pine beetle continues to increase throughout the host range in northern California. Of particular note are individual large trees killed throughout the Foresthill District, Tahoe National Forest (M261E) as well as scattered mortality pockets of three to five trees. Mortality is associated with drought and the attraction to fire injured trees. On the Feather Ranger District, Plumas National Forest, three large sugar pines were killed by mountain pine beetles on south side of Hwy 36 east of Grizzly Forebay (M261E).

Sugar pine mortality was high in the San Jacinto Mountains, with mountain pine beetle as one of the culprits. Trees often suffered branch dieback associated with dwarf mistletoe infection and various subcortical insects (bark beetles, weevils, flatheaded borers) working in the mistletoe and/or drought stressed branches. Some mortality of sugar and ponderosa pine in the San Bernardino Mountains was also associated with mountain pine beetle.

Ponderosa pine. Scattered ponderosa pine mortality associated with mountain pine beetle was detected on the Lassen National Forest along Highway 36 on the eastside of Fredonyer Summit. Red turpentine beetles also attacked these trees. Mortality is visible in small groups of three to 10 trees (M261D).

On the Modoc National Forest, mountain pine beetles were found in association with *Ips pini* and black stain root disease in three large group kills (50 to 100 trees each). Locations are about one mile east of Fourmile Reservoir (Doublehead Ranger District), and sections 2 and 11 west of Dry Valley Reservoir on the Devils Garden Ranger District. Scattered individual trees and small three to five-tree groups are also present throughout the Devils Garden District (M261G).

OAK BARK BEETLES, ***Pseudopityophthorus*** spp. There were several reports of black oak and interior live oak being attacked and killed by oak bark beetles, probably *P. pubipennis*, in the Redding area, Shasta County. Preexisting stress combined with this year's drought were contributing factors.

PINE ENGRAVER BEETLES, ***Ips*** spp**.**
Northern California. Monterey pine ips killed about 200 shore and Bishop pines over the past two years along the coastal bluffs north of the mouth of the Albion River, Mendocino County. A species of *Hylurgops* was also recovered from the stems of dying and recently killed pines. Scattered Monterey pines were killed by this or other *Ips* in Redwood Valley and Potter Valley, Mendocino County (263 A). Ips species continue to be associated with the mortality of pitch canker-infected Monterey pines throughout the Coastal Pitch Canker Zone of Infestation.

A large increase in pine engraver activity was noted throughout northeastern California during 2001, particularly of the pine engraver, *Ips pini*, on the east side of the Sierra Nevada and southern Cascades. More mortality caused by *Ips pini* and drought was detected during 2001 than throughout the whole of the protracted drought period of the late 1980s and early 1990s.

On the Big Valley District, Modoc National Forest, scattered large (50 to 150 trees) and small groups (1 to 10 trees) of ponderosa and Jeffrey pine mortality caused by the pine engraver were detected along Hwy 139 just north and west of Said Valley Reservoir (M261D). Red turpentine beetles attacked several of the trees, many of which have black stain root disease. Additional group kills are visible further north on Hwy 139 towards Adin. A group kill of about 30 trees was also observed on private land between Round Valley Reservoir and Willow Creek Valley west of Hwy 139 (M261D). *Ips pin*i also were found in association with mountain pine beetles and black stain root disease in three large group kills – one about 1 mile east of Fourmile Reservoir (Doublehead District) and the other two are located in sections 2 and 11 west of the Dry Valley Reservoir on the Devils Garden District (M261G).

Scattered ponderosa pine mortality associated with mountain pine beetle and the pine engraver was detected on the Lassen National Forest along Hwy 36 on the eastside of Fredonyer Summit. Mortality is visible in small 3 to 10 tree groups (M261D). Also along Hwy 36, a group kill of gray pines (about 10 trees) occurred in the Paynes Creek area on private land. This area was not ground checked, however the group kill can likely be

attributed to either *Ips paraconfusus* and/or *Ips spinifer*.

Ponderosa pine mortality caused by *Ips pini* was also observed on the west side of Hwy 395 in several areas. Two large group kills of about 40 trees each were detected west of Constantia Road south of Doyle. Two smaller group kills (5 to 10 trees) of pines with high levels of dwarf mistletoe infection were observed on Doyle Grade (M261E). Scattered single large trees and group kills of smaller trees (5 to 10 trees each) are visible from Scott Road northwest of Hallelujah Junction on both public (Plumas National Forest) and private lands (M261E). Also on the Beckwourth Ranger District about two to three miles northeast of Chilcoot, scattered group kills of about 10 trees each were found around the perimeter of an older burn (M261E).

Ips pini were observed top-killing about 16 Jeffrey pine in Sherwin Creek campground, Mammoth District, Inyo National Forest. The pine engravers were found infesting slash left following thinning operations in several areas on the Mammoth and Mono Lakes Districts (M261E). No top-killing of residual pines in the thinned areas has been detected.

The pinyon ips was found associated with some singleleaf pinyon mortality near Swall Meadow south of Lake Crowley, Mono County. Increasing singleleaf pinyon mortality has also been reported in the vicinity of the south fork of the Kern River near Rodeo Flat and around the Kennedy Meadows area in Tulare County (M261E).

Southern California. *Ips* species were found in drought-stressed, off-site planting, e.g. of Coulter pine at low elevations. An examination of dying Jeffrey pines in annosus root disease centers on Laguna Mountain (San Diego County) in June showed a lack of *Ips* attacks, apparently because the populations were too low to take advantage of the large amount of available habitat. Pinyon ips populations were high in the eastern end of the San Bernardino Mountains (i.e., Baldwin Lake, Nelson Ridge, and Onyx Summit), where singleleaf pinyon is infected with *Leptographium wagneri*. In the Santa Rosa Mountains, singleleaf pinyons (the disputed *Pinus californiarum* Bailey) in the vicinity of the Palm fire continued to be killed by pinyon ips. In addition to buildup of populations on fire-killed trees, it is speculated that the water table may be dropping because of new housing in the area that utilizes well water. Pinyon ips and drought were also primary mortality agents for singleleaf pinyon growing in the vicinity of the visitor's center at the Devil's Punchbowl Natural Area and County Park, adjacent to the north side of the Angeles National Forest in Los Angeles County.

PINE REPRODUCTION WEEVIL, ***Cylindrocopturus eatoni***. Several hundred acres of ponderosa pine plantation near the Military Pass Road had extensive mortality due to the pine reproduction weevil. Host trees were up to 8 years old. The area received only one-third to one-half of normal precipitation during the winter of 2000-2001. Many of the dead trees were either J-rooted when planted or growing on very thin soil over a lava cap.

RED TURPENTINE BEETLE, ***Dendroctonus valens***. Red turpentine beetle was common in ponderosa pine on the edges of annosus root disease centers and prescribed burn areas on McCloud Flats (M261D). Red turpentine beetle also killed ponderosa pine saplings in plantations that were under moisture stress on the Goosenest Ranger District, as well as ponderosa pine saplings that had fresh pine chips piled around the base of the trees.

The red turpentine beetle continued to cause mortality of pole-size ponderosa pine in the Pondosa Burn plantation, Siskiyou County (M261D). The outbreak started in 2000 when beetles killed trees in or adjacent to research plots where deep soil tilling and tree thinning had been conducted prior to the mortality. Scattered mortality continued to occur in 2001 in untilled areas that received thinning.

Figure 1- Red Turpentine Beetle attacks

This bark beetle has been common in wildfire and prescribed burn areas in northeastern California over the past five years (Fig. 1). Areas of current activity include within the Divide prescribed fire, located along the Foresthill Divide Road, Foresthill District, Tahoe National Forest (M261E) and within the perimeter of the Storrie Fire which burned on both the Almanor District, Lassen National Forest and the Mt. Hough District, Plumas National Forest in 2000. Red turpentine beetles were also active in a prescribed burn area east of Lost Creek Campground, Lassen Volcanic National Park (M261D).

Red turpentine beetles also were commonly observed in association with other bark and engraver beetles throughout northeastern California. Sampled trees revealed attack at and below the duff line with beetles often working their way out to three feet in dominant roots. On the Modoc National Forest, red turpentine beetle was often associated with pines within the scattered large and small group-kills of ponderosa and Jeffrey pine mortality caused by *Ips pini* (see section on pine engravers). The same type of association was found with pines attacked by mountain pine beetle on the Lassen National Forest, e.g. Fredonyer Summit. On the Almanor Ranger District, scattered red turpentine beetle activity was noted throughout the Prattville area between County Roads 309 and 305 (M261D).

Light to moderate levels of red turpentine beetle activity occurred in the southern part of M261E on trees injured to varying degrees by wildfire and prescribed burns. Red turpentine beetle attacks were observed at the base of Jeffrey pines in the Crater wildfire and the Sand prescribed burn on the Mono Lake District, Inyo National Forest and on sugar, ponderosa and Jeffrey pines in the North Fork wildfire, Mariposa-Minarets District, Sierra National Forest. Low levels of red turpentine beetle activity was also present on Jeffrey pine that had been attacked by the Jeffrey pine beetle and pine engravers in Sherwin Creek Campground south of Mammoth Lakes, Mammoth District, Inyo National Forest.

The red turpentine beetle was abundant in southern California in 2001, attacking pines weakened by drought, annosus root disease and dwarf mistletoe. Abundant attacks were observed on Jeffrey pine in the Laguna Mountain Recreation Area, in ponderosa and Jeffrey pines in the San Bernardino Mountains, and on sugar pine in the San Jacinto Mountains. Attacks were also observed on singleleaf pinyon in the Devil's Punchbowl Natural Area and County Park on the north side of the San Gabriel Mountains. Populations were probably high in other areas as well.

TWIG BEETLES, ***Pityophthorus*** spp. and others. Heavy infestations of twig beetles occurred in singleleaf pine in the Devil's Punchbowl Natural Area and County Park, Los Angeles County. Moderate numbers of twig beetles attacked young Jeffrey pines in a plantation on Frazier Mountain on the Los Padres National Forest.

WESTERN OAK BARK BEETLE, ***Pseudopityophthorus pubipennis***. This bark beetle was found attacking diseased and declining tanoak, coast live oak and California black oak in areas of Monterey County north to the Oregon border. Many of these trees had symptoms that resemble those manifest in Sudden Oak Death (See Disease Section). However, the disease organism has yet to me confirmed north of Booneville, CA. Throughout northern coastal California, this beetle was associated with the mortality of tanoak infected with *Armillaria mellea*.

WESTERN PINE BEETLE, ***Dendroctonus brevicomis.*** Ponderosa pine mortality due to western pine beetle has increased in northwestern California due to drought stress (M261A, M261D). Numerous small spots of ponderosa pine mortality are visible near the south end of the Scott Valley. Several large spots of ponderosa pine 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). Some group kills near the Ash Creek Sink appear to be the result of overstocking and drought stress. Single trees, tops and small groups of ponderosa pine are fading in the Sacramento River Canyon from Pollard Flat to Dunsmuir. Pines continue to die around the edges of a 1999 wildfire in the upper part of the Slate Creek drainage (M261D). In Napa County, the western pine beetle killed small pockets of ponderosa pine in the Las Posadas State Forest.

On the Beckwourth District (Plumas National Forest), scattered mortality in old growth ponderosa pines was noted along Forest Service Road 11, Frenchman Reservoir to Milford (M261E). Ponderosa pine mortality (about 15 trees) associated with western pine beetle and a possible annosus root disease center was also noted on private land near Clipper Mills. On the Feather River Ranger District a pocket of 15 to 18 pines were killed along the roadside of Hwy 70 just north of Jarbo Gap and two pockets of three to eight dead pines were located along the Bear Trap road four to five miles north of Bear Trap Springs (M261E). Also along Hwy 70, a number of small, scattered pockets and individual dead ponderosa pines are visible through the Feather River Canyon between the towns of Halston and Poe (M261E).

In the Lassen area, scattered small group-kills (2 to 5 trees) of ponderosa pine were observed on private land along Highway 36 between Payne's Creek and Mineral (M261D). Group and individual tree mortality was scattered along Hwy 32 around the Potato Patch Campground (Almanor Ranger District) on both private and public (M261E). Three large ponderosa pines were killed across the road from the entrance to Lost Creek campground in Lassen Volcanic National Park (M261D).

Western pine beetles are killing large diameter ponderosa pines with wildfire injuries from the 1999 Pendola fire on the Downieville District, Tahoe National Forest. Mortality is mainly visible within the two fingers of National Forest that extend into the northeast edge of New Bullards Bar Reservoir (M261E).

No specific western pine beetle group-kills were reported from the southern part of M261E and F. Mortality associated with the western pine beetle continued at low levels and was restricted to scattered individual trees and small groups of ponderosa pine. In southern California, western pine beetle continued to attack drought, dwarf mistletoe, and root disease stressed pines. Mortality was particularly high in Coulter pine in the San Jacinto Mountains.

WOOD BORERS

Woodborers (Fig. 2) have also been found in fire-injured trees throughout northeastern California for several years. More specifically, woodborers were found in dying fire-injured pines from a 2- or 3-year-old prescribed burn near Windy Gap on the Eagle Lake District, Lassen National Forest (M261D). *Semanotus* woodborers caused top-kill and branch mortality of juniper along Hwy 395 south of Red Rock Road. Mortality is scattered throughout the host type (M261E).

Figure 2- Wood borer *Monochamus oregonensis*

DEFOLIATORS

ALDER FLEA BEETLE, ***Macrohaltica ambiens***. Heavy defoliation of alders was reported from the San Gabriel Mountains, the San Bernardino Mountains, the San Jacinto Mountains and the community of Montclair in Los Angeles County. It is reasonable to assume that alders in other areas of southern California were also defoliated. The alders surrounding Lake Fulmor in the San Jacinto Mountains were surveyed. Of 59 trees (4 inches (10 centimeters) or more dbh, 34 were defoliated less than 25% (most were not visibly defoliated), 15 were heavily defoliated (75% or more of the leaves affected) and 10 trees were moderately defoliated (>25% and <75% of leaves affected).

CALIFORNIA OAKWORM, ***Phryganidia californica***. The California oakworm defoliated live oak along the Smith River and in the Hoopa Indian Reservation (M261A) and along Hwy 101 near Redway, Briceland and Whitethorn (263A). Light to moderate defoliation was found on live oaks in the Cow Mountain Recreation Area east of Ukiah during surveys for Sudden Oak Death. Farther south, the California oakworm caused major defoliation of coast live oak in the Oak Hills area outside Castroville and in scattered areas elsewhere in Monterey County.

CALIFORNIA BUDWORM, ***Choristoneura carnana californica***. An area along the eastern side of Trinity Lake that has had chronic low-level defoliation for years was surveyed during 2001. Very light feeding damage was detectable only after an intensive search. An egg mass survey was not conducted.

The lack of visible defoliation of Douglas-fir on Trinity Mountain, Trinity and Shasta Counties, and along Bowerman Ridge, Trinity County (M261A) indicates that populations of the budworm have returned to endemic levels. Populations during the previous five years produced noticeable defoliation, but never were high enough to warrant action.

DOUGLAS-FIR TUSSOCK MOTH, ***Orgyia pseudotsugata***. Pheromone trap catches for 2001 decreased for all plots on state and private land in Shasta, Modoc, Lassen and northern Plumas Counties. On public lands in California, average trap catches for 2001 showed increases for a few plots compared to 2000 (Table 2, Surveys and Evaluations). Data were collected for 183 plots (5 traps per plot) during 2001 with 165 plots (90%) with an average of <25 male moths per trap and the remaining 18 plots (10%) averaging 25 or more moths per trap. Light defoliation was detected along the ridgeline near the end of the FS 26N36 road just northwest of Peacock

point on the Almanor District, Lassen National Forest (M261D). However, results of the 2001 monitoring indicate that populations will remain low through 2002 in both private and public forests.

FALL WEBWORM, ***Hyphantria cunea***. The fall webworm continued to defoliate madrones in the Klamath River drainage (261A). Defoliation was less intensive on madrone than in previous years in the Trinity River drainage. Defoliation of Oregon ash was common along Grass Valley Creek, the Trinity River and Weaver Creek along Highway 299 and also along the Klamath River from Interstate 5 downstream to the town of Klamath River.

Figure 3- Fall webworm

Defoliation of madrone by the fall webworm was reported again on private lands in portions of Trinity County (M261A). Some defoliation also occurred just east of Buckhorn Summit into Shasta County. This is part of a much larger outbreak occurring in the Klamath Mountains and northern Coast Ranges, including interior Mendocino County, southeastern Humboldt County as well as southwest Trinity County. Defoliation was considered less damaging than that see in 1999 or 2000.

FRUITTREE LEAFROLLER, ***Archyps argyrospila***. Some California black oaks were defoliated in a residential setting in Meamber Gulch near the Scott River (M261A) in northern California.

In southern California the fruittree leafroller was extremely numerous on California black oak in the San Bernardino Mountains, though not quite as abundant as in 2000. This is the third year that leafroller as been in outbreak. Newly hatched larvae were observed feeding in expanding black oak buds on April 26, though unhatched egg masses were observed that day in nearby cooler microsites. In July a defoliation survey was conducted. Defoliation was less widespread and less intense than in 2000. For example, defoliation was not observed above (east of) Angeles Oaks, elevation 5,800 feet. In 2000, defoliation was observed at 6,500 feet at the west end of Barton Flats, east of Angelus Oaks in the Santa Ana Rive Canyon. Trees completely defoliated on the south side of Hwy 18 on Heaps Peak were less than 10% defoliated in 2001. Abundant fresh egg masses were observed northwest of Lake Gregory and north of Lake Arrowhead however, suggesting a continuation of the outbreak in those areas in 2002. No fresh egg masses were observed in a brief search at the Heaps Peak Arboretum. Approximately 25,600 acres had visible defoliation in 2001. Another 4,000 acres were probably infested but were not surveyed. About 2,500 acres previously infested east of Angelus Oaks in the Santa Ana Canyon in 2000 were not infested in 2001. Some dead trees or trees with marked dieback were observed and this may be a result of the outbreak.

GYPSY MOTH, ***Lymantria dispar***. Pest Detection - California Department of Food and Agriculture trapped five male moths in 2001. The detection trap catches by county were: Alameda 1, Madera 1, Orange 1, San Diego 2, Siskiyou 1. This is 3 counties and 33 moths less than counts in 2000. One San Diego find was within the eradication treatment area of 2000 and the trap density in the area continued at protocol levels of 50 traps per square mile. The find in Siskiyou County occurred at the Lava Bed National Park Visitor Center and the find in Madera County was along Hwy 41 near Oakhurst. In both instances the trap density was increased to 25 traps per square mile in a four square mile area around the find. No moths were trapped within the spring treatment area in Novato, Marin County. No properties with egg masses or pupal cases were found in 2001.

Year 2000. Final counts for 2000, June through December were 37 males and one female trapped – 22 males and one female, Marin County; 7 males San Diego County, 2 males from each of Ventura and San Mateo Counties, and one male in each of Los Angeles, Sacramento, Shasta and Yolo Counties.

LODGEPOLE PINE NEEDLEMINER, ***Coleotechnites milleri***. The increase in lodgepole needleminer populations in Yosemite National Park that started in 1993-94 continued in 2001 (M261E). Population increases were seen at 20 of 28 monitoring plots. The largest increases were observed adjacent to existing high-density populations near Tenaya Lake and Tenaya Gap. Extensive areas of defoliation are visible along Hwy 120 and along all of the major trails leading north and south from Tuolumne Meadows. Aerial surveys (October 2001) showed approximately 15,000 acres of low-severity defoliation and about 25,000 acres of high-severity defoliation. Severe defoliation and tree mortality continued around May Lake. Heavy defoliation is also present around Tenaya Lake and over an extensive area from upper Budd Creek west to Sunrise Camp around the south side of the Cathedral Range. Some tree mortality is occurring around Sunrise High Sierra Camp Lodge and campground developments. Populations in the Tuolumne Meadows area are increasing but still below levels that cause visible defoliation, while populations east of Tuolumne Meadows remain low (Table 5, Surveys and Evaluations). Larvae of the alternate brood needleminer maturing in 2002 were found at Tenaya Beach, Upper Tenaya and Cathedral Creek South.

Severe weather in early July knocked large numbers of infested needles to the ground in areas extending west of Dana Meadow to the east end of Tenaya Lake and from Cathedral Lake north to Dingley Creek and may result in population reductions in the affected areas. A parasitic wasp, *Copodosoma* sp., was found in unusually high numbers at six monitoring plots (Upper Tenaya, Cathedral Creek West, Cathedral Creek East, Budd Creek, Mt. Hoffman and Lembert Dome) and may help reduce populations in the 2001-2003 generation.

MODOC BUDWORM, ***Choristoneura retiniana***. Light defoliation occurred just west of Lily Lake along Forest Service Road 2 on the Warner Mountain Ranger District, Modoc National Forest (M261G).

PACIFIC TENT CATERPILLAR, ***Malacosoma contrictum***. Some blue oaks along ridge tops in the Cottonwood area, Shasta County, were defoliated for a second year by the Pacific tent caterpillar. Overall defoliation was light.

PINE NEEDLE SHEATHMINER, ***Zelleria haimbachi***. Defoliation caused by the sheathminer was less visible than in 2000 in the tops of plantation pines in the War Memorial Plantation near the intersection of Hwy 97 and the Military Pass Road (M261D).

Since 1997 there has been increasing sheathminer activity on ponderosa pine east of Pondosa (old Pondosa burn, Siskiyou County, M261D). A survey this year found an average of 3.8 larval mines per shoot and noticeable defoliation. This is a slight decrease in insect abundance from last year, but still is high enough to

cause damage. Pesticide treatments this year and last were conducted on the most heavily damaged sites.

PINE SAWFLY, ***Neodiprion fulviceps***. Hundreds of acres of planted ponderosa pine were defoliated north of Mount Shasta (Figs. 3 and 4). The War Memorial Plantation near the intersection of Hwy 97 and County Route 12 was defoliated, as well as production plantations on the Klamath and Shasta-Trinity National Forests (M261A). Several sapling-size sugar pines were defoliated by sawflies near Cherry Lake on the Mendocino National Forest (M261B).

Figure 4 and 5- Pine sawfly on ponerosa pine

WESTERN TENT CATERPILLAR, ***Malacosoma californicum***. Western tent caterpillars defoliated bitterbrush over about 8,000 acres of the Truckee Ranger District during 2001. The defoliated extended along Interstate 90 from two miles east of Truckee to the southeast side of Boca Reservoir (M261E).

An additional 20,000 acres of bitterbrush were defoliated in Mono County from Lee Vining south toward Mammoth Lakes and Crowley Lake (M261E). Specific areas affected include Tobacco Flat south to the top of Sherwin Grade and the north side of Hot Creek Gorge. A smaller infestation was noted near O'Harrel Canyon in the Glass Mountains east of Mammoth Lakes.

WHITE FIR SAWFLY, ***Neodiprion abietis***. Several hundred acres of white fir were defoliated along the Pomeroy Road in the vicinity of Deer Mountain (M261D). Feeding by the white fir sawfly was noted for a second year in the vicinity of Latour State Forest headquarters, Shasta County.

Several areas of defoliation were reported during 2000. All of those outbreaks collapsed and only two areas of defoliation were detected this year. Widespread light defoliation of white fir occurred throughout the Mineral Management Area along Roads 30N16 and 29N22 west of Hwy 89, Almanor Ranger District (M261D) and sawfly defoliation was also detected throughout the Cascades area of the Beckwourth Ranger District (M216E).

OTHERS

AFRICANIZED HONEY BEE, ***Apis mellifera scutellata***. The colonized area in California expanded to

include all of Tulare County. Foraging bees were found on roadside plants in or near Lindsay and Posey. The colonized area now includes all of Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Tulare and Ventura Counties and a portion of San Luis Obispo County.

BALSAM FIR GALL MIDGE, ***Paradiplosis tumifex***. This midge has now been confirmed by the California Department of Food and Agriculture as present in far northern California.

GIANT CONIFER APHID, ***Cinara*** spp. Heavy infestations of giant conifer aphids on true fir were reported near Lookout Mountain on the Cannell Meadows District, Sequoia National Forest and on adjacent private land in Danner Meadows, Tulare County (M261E). High numbers of aphids were observed on the trunks of many fir accompanied by extensive deposits of honeydew.

GOUTY PITCH MIDGE, ***Cecidomyia piniinopis***. Attacks by the gouty pitch midge caused shoot dieback and distortion in a ponderosa pine plantation north of Covington Mill, Trinity County (M261A). The western pineshoot borer, *Eucosma sonomana*, damaged terminals to a lesser extent. A moderate pitch midge infestation occurred in a young pine plantation (4 to 6 acres) along the SPI N100 Road and SPI N Road off Hwy 36 on land owned by Sierra Pacific Industries (M261D).

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 TREE HOPPER, ***Platycotis vattata***. Oak tree hoppers caused branch flagging of black oak at Snow Mountain Camp near Nevada City. Owners of the 10 acre parcel described large amounts of honeydew coating cars and sidewalks (M261D).

PINYON NEEDLE SCALE, ***Matsucoccus acalyptus***. Populations are high in Cuddy Valley on and adjacent to the Mount Pinos District of the Los Padres National Forest. About 2,500 accessible acres were infested when surveyed in August 2001. Saplings were most seriously affected by the feeding and defoliation, and some died. For the most part the affected trees were growing in brush, in areas that would once have been kept free of trees by wildfires.

SPRUCE APHID, ***Elaterium abietinum***. Areas of Sitka spruce were moderately damaged in coastal Del Norte County. Long-standing infestations are static on Sitka spruce lining portions of Highway 101 between Fortuna and Eureka in Humboldt County (263A); however, some mortality remains evident.

Table 1. Miscellaneous Reports of Forest Insects in California, 2001

Insects			Where Examined or Reported	
Common Name	**Scientific Name**	**Host**	**County**	**Remarks**
Eucalyptus psyllid	*Ctenarytaina spatulata*	Eucalyptus spp.	Santa Barbara	First county record
Oak pit scale	*Asterolecanium* sp.	Valley oak	Mendocino	Scale plus twig blight equaled moderate twig dieback of large oaks in Potter Valley.
Red gum lerp psyllid	*Glycaspis brimble-combei*	Eucalyptus	Tehama	Visible thinning of crowns along I-5 south Corning.
			Humboldt*	*First County record.
Red imported fire ant	*Solenopsis invecta*	------	Sacramento	Detected at CAL-EXPO; otherwise, has not significantly expanded its range.
Sawfly	*Neodiprion* sp	Douglas-Fir	Trinity	Noticeable in the Ruth Lake area.
Spotted gum lerp psyllid	*Eucalytolyma maideni*	Eucalyptus sp.	Riverside Ventura	New county records.

FOREST DISEASE CONDITIONS - 2001

ABIOTIC DAMAGE

Drought. As the result of an exceptionally dry spring (Figs. 5 and 6), foliage of blue oaks throughout the northern Sacramento Valley (262A, M261C, M261F) changed color early this year, beginning to fade as early as July. Trees on the harshest sites appeared to be the most affected. It was typical to see a combination of fading and green leaves on the same tree, as well as considerable differences between trees. In one area, larger, older trees remained green while smaller surrounding trees faded. This spring very little precipitation fell during March, April and May, the prime months for blue oak growth. May and the first half of June was critically dry, initiating an early fire season and placing blue oaks under conditions more like those that occur toward the end of summer. Internal areas of Humboldt and Del Norte Counties experienced early fall color change to many hardwood species, most notably Oregon white oak and California black oak.

Browning and premature loss of foliage from blue oaks were reported from several foothill locations in the central and southern Sierra Nevada (M261E). Counties where this was reported include Kern, Tulare, Mariposa, Tuolumne and Calaveras. Loss of leaves began in mid- to late-July and continued through September. Most trees retained some foliage although some severely affected individuals were almost completely defoliated. Twig samples examined did not reveal any insects or pathogens that would account for the symptoms. Buds on these samples were still viable and the trees are expected to survive. Inadequate soil moisture could explain the early leaf drop.

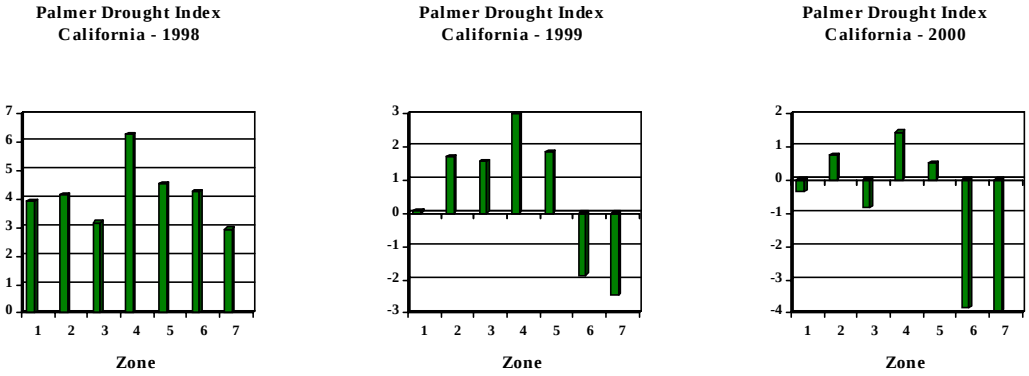
Most black oaks in southern Lassen County were heading into dormancy in late August. Highly noticeable areas (extensive browning of foliage) included Hidden Valley Ranch along Hwy 139 and Milford to Hallelujah Junction along Hwy 395 (342B).

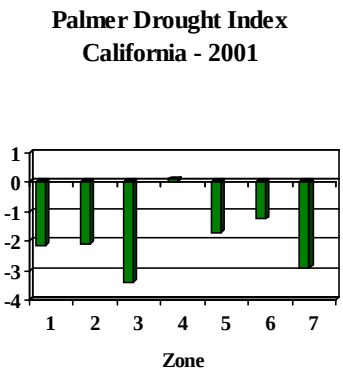
Flooding. Even though the reservoir was dry for most of 2001, pine trees continue to die around the edge of Hog Flat Reservoir from many past summers with flooded roots.

Hail. A severe hailstorm damaged and defoliated about 300 acres of Douglas-fir, incense-cedar, white fir and California black oak along the Pacific Crest Trail in the Marble Mountain Wilderness about six miles north of Etna Summit (M261D).

Heat. Several reports of sunscald on interior live oak were submitted from the Redding area, Shasta County. This tree is particularly susceptible to damage when shade is lost through branch pruning or removal of nearby trees.

Figure 6 - Palmer Drought Index 1998-2001





Palmer Classifications
4.0 or more extremely wet
3.0 to 3.99 very wet
2.0 to 2.99 moderately wet
1.0 to 1.99 slightly wet
0.5 to 0.99 incipient wet spell
0.49 to -0.49 near normal
-0.5 to -0.99 incipient dry spell
-1.0 to -1.99 mild drought
-2.0 to -2.99 moderate drought
-3.0 to -3.99 severe drought
-4.0 or less extreme drought

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Heat. Several reports of sunscald on interior live oak were submitted from the Redding area, Shasta County. This tree is particularly susceptible to damage when shade is lost through branch pruning or removal of nearby trees.

Ozone. (See Surveys and Evaluations section)

Wind. Maple leaf scorch occurred in late spring and early summer in Indian Creek, East Branch Spanish Creek and North Yuba River drainages and along the Bucks Lake Road in Plumas and Sierra Counties (M261E). Similar damage occurred in 1998 and 2000, when hot winds dried the newly forming maple leaves, while the roots were too cold to supply water to them. Lack of soil moisture may have been partly to blame for the desiccation this year.

BIOTIC DAMAGE

ANIMAL DAMAGE

BEAR DAMAGE, caused by ***Ursus americanus***. Damage has been on the rise the past few years, as have the bear populations. Many thousands of trees have been killed, top-killed or damaged by black bears in northern Humboldt and Del Norte Counties over the past few years. Side drainages of the Smith and Klamath Rivers were hard hit. Trees mostly affected are redwood, Douglas-fir and Port-Orford-cedar. Damage was noted on saplings and larger trees and was frequent 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 as damaged, e.g., damage to mature Port-Orford-cedar was widespread in a 20-acre area near the headwaters of the East Fork of Pecwan Creek, Orleans Ranger District (M261B).

BACTERIAL INFECTIONS

DRIPPY NUT DISEASE, caused by ***Erwinia quercina***. Several reports of drippy nut disease on interior live oak were reported from the Redding area, Shasta County. The disease is caused by the bacterium, *E. quercina*, which gains entrance to acorns through insect entrance holes.

CANKER DISEASES

A CANKER FUNGUS, ***Dothiorella*** sp. Branch dieback occurred among tanoaks and canyon live oaks near Ash Camp on the McCloud River (M261A). A few small tanoaks were girdled and killed. A canker fungus,

Dothiorella sp., was isolated from the margin of dead tissue. A pit scale was also found on affected branches and may have contributed to the dieback.

BOTRYOSPHAERIA CANKER ON MANZANITA, caused by ***Botryosphaeria dothidea***. A high percentage of green leaf manzanitas over large areas of the Lassen National Forest (M261G) had some or all of their branches killed by Botryosphaeria canker in the past winter and spring. This may have been a result of warm/dry winter combined with a few light rains occurring while spores of the pathogens were plentiful. The lack of snow cover may have contributed. Most of the manzanitas recovered over the summer.

CYTOSPORA CANKER, caused by ***Cytospora abietis***. Cytospora canker 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 2001, 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)***. Diplodia blight remains evident at many sites, but has decreased in intensity. Shoot dieback caused by the fungus continues on scattered ponderosa pines in the upper Sacramento River Canyon and along Hwy 299 east of Buckhorn Summit, Shasta County (M261A and M261C, respectively). Few of the trees with repeated heavy infections have died. Two new locations with Diplodia blight were reported from the central and southern Sierra Nevada (M261E) in 2001. The two are: Tuolumne County -- Stanislaus National Forest, five miles northeast of Tuolumne City along Basin Creek on scattered overstory ponderosa pine and Tulare County -- on private land six to seven miles north of Glenville in the Balance Rock/Posey area on scattered gray pine.

MADRONE CANKER, caused by ***Nattrassia mangiferae*** and/or ***Botryosphaeria dothidea***. Incidence and severity of madrone twig and branch canker took a marked upswing in northwestern California in 2001. Cankers were present almost everywhere that madrone grows. The disease was most prevalent and severe where heavy fall webworm feeding occurred in 2000. Areas where madrone canker was particularly severe include along State Hwy 299 from Weaverville to Willow creek, along the Klamath River drainage from Klamath River to Weitchpec, along the Trinity River drainage from Weitchpec to Willow Creek, along Forest Service Road 1201 and 11N45 above Orleans, at Fish Lake (Orleans Ranger District), and along the upper end of the south fork of the Trinity River (M261A, M261B).

PITCH CANKER, caused by ***Fusarium circinatum***. The California Board of Forestry's Coastal Pitch Canker Zone of Infection remains in effect and the disease is still a management concern with the Zone. There have been no reports of significant spread within the Zone of Infestation and incidence of branch flagging appears to be less than that characteristic of the several years following detection in 1986. Perhaps populations of several of the insect vectors are lower. Screening for genetically resistant native and ornamental Monterey pine continued this past year in the Ano Nuevo stand. These and other updates on pitch canker within California can be found at: http://frap.cdf.ca.gov/pitch-canker/.

DECLINES

CHAPARRAL DECLINE, cause unknown. Chaparral dieback continues in scattered areas on the Mountaintop District, San Bernardino National Forest and on private lands in the San Jacinto Mountains, Riverside County.

CYPRESS DECLINE, cause unknown. Pygmy cypress is declining in a one-half acre area in Jackson Demonstration State Forest in Mendocino County. Indications of root disease are present, but a specific cause has not been determined.

INCENSE-CEDAR DIEBACK, cause unknown. The mysterious mortality of incense-cedar reported in southern California in 2000 appears to have tapered off.

OAK DIEBACK, cause unknown. Dieback was observed on coast live oak and tanoak on the Monterey District, Los Padres National Forest.

SUDDEN OAK DEATH, caused by ***Phytophthora ramorum***. *Phytophthora ramorum* has been isolated from 15 tree and plant hosts and this list is expected to increase as Drs. David Rizzo and Matteo Garbelotto continue to lead investigations on the pathogen. *P. ramorum* is a bark pathogen causing necrotic cankers and mortality on tanoak, coast live oak, California black oak and Shreve oak. The pathogen also causes leaf spots and/or twig dieback on California bay laurel, rhododendron, big leaf maple, Pacific madrone, huckleberry, California buckeye, manzanita, toyon, California honeysuckle and California coffeeberry. The pathogen has also been recovered from Arrowwood in Germany and the Netherlands and is also scattered widely on ornamental rhododendron.

The known distribution of *P. ramorum* is expanding. It is known to be present in 10 counties in California: Alameda, Marin, Mendocino, Monterey, Napa, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma and one southern Oregon County, Curry. All confirmations are within 50 miles of the Pacific Coast. Since Sudden Oak Death is still a rather new forest disease, there is still much to learn about its host preferences and distribution.

The pathogen sporulates readily upon wetting of tanoak, bay, rhododendron and other leaf spot hosts, so movement of host plant debris is a major concern for transport of the pathogen. The pathogen does not commonly sporulate on oak wood. The California Department of Food and Agriculture imposed an ***Oak Mortality*** regulation in May 2001 that limits the movement of all known hosts.

P. ramorum's mode of spread is not completely understood, but researchers have recovered it from rainwater, soil and leaf litter. The distribution of Sudden Oak Death indicates the pathogen may be airborne, but this has not been proven scientifically. Ted Sweicki of Phytosphere Research has demonstrated that proximity to California bay increases the likelihood that an oak will be infected with *P. ramorum*.

Surveys. Many dead and discolored oaks and tanoaks have been reported from aerial detection surveys in northern coastal counties. Ground checking has established no new infections north of the known site near Boonville in Mendocino County (263A). Suspected trees and sites have been associated with other causes such as *Armillaria mellea*, other *Phytophthora* species (especially on over watered ornamental trees), fire, early fall color change, defoliation by insects and intentional herbicidal treatments in commercial timberlands.

The California Oak Mortality Task Force. The summer of 2000 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. The new leaflet, *Sudden Oak Death Caused by a New Species, Phytophthora ramorum*, is available at www.na.fs.fed.us/SOD.

TANOAK DECLINE, cause unknown. Hundreds of small to mature tanoaks are declining and dying from Annapolis in Sonoma County to north of Gualala in Mendocino County. The trees do not have canker symptoms of tanoaks associated with sudden oak death and samples have been plated for *P. ramorum*, but results have been negative. Crowns are sparse and leaves smaller than normal. Most affected sites are on ridges. A minor amount of Chinquapin in Mendocino County is also affected.

DWARF MISTLETOES

MOUNTAIN HEMLOCK DWARF MISTLETOE, ***Arceuthobium tsugense*** ssp. ***mertensianae***. Mountain hemlock dwarf mistletoe was noted in mountain hemlock of all sizes in an old-growth stand of mountain hemlock, red fir and Brewer spruce along the Pacific Crest Trail, approximately two miles north of Etna Summit (M261A).

PINYON PINE DWARF MISTLETOE, caused by ***Arceuthobium divaricatum***. Heavy infections were reported from the vicinity of Bridgeport, California where infection and drought stress were leading to tree mortality.

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*, associated with the dwarf mistletoe infections, as well as by top-kill and mortality caused by the fir engraver beetle.

WHITE FIR DWARF MISTLETOE, caused by ***Arceuthobium abietinum***, f.sp. ***concoloris***. Incidence and impact of white fir dwarf mistletoe continues to be heavy at South Fork Mountain (Shasta-Trinity and Six Rivers National Forests, M261B). The disease was also 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 levels are increased by branch mortality, caused by *Cytospora abietis*, associated with the dwarf mistletoe infections, as well as by top-kill and mortality caused by the fir engraver beetle.

FOLIAGE DISEASES

ELYTRODERMA DISEASE, caused by ***Elytroderma deformans***. *Elytroderma deformans* is widespread on Jeffrey pines in the Laguna Mountain area, Descanso District, Cleveland National Forest.

SUGAR PINE NEEDLE CAST, caused by ***Lophodermella arcuata***. Sugar pine needle cast was common among trees growing in the upper Soda Creek drainage at the north end of Girard Ridge, Siskiyou County (M261A). Thin crowns on some trees suggested repeated yearly infections.

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

ROOT DISEASES

ANNOSUS ROOT DISEASE, caused by ***Heterobasidion annosum***. Annosus root disease was confirmed in scattered pockets of dead and dying white fir at McBride Springs Campground on the southwestern slope of Mount Shasta (M261D), along the four-mile segment of the Deer Mountain Road, east and west of the Deer Mountain Snowpark (Goosenest District, Klamath National Forest, M261D), and in white and red fir in the upper (northern) campsite loop of Kangaroo Lake Campground (Scott River District, Klamath National Forest). Scattered pockets of dead and dying ponderosa pine were also identified on McCloud Flats along the Pilgrim Creek, Bear Wallow and Edson Creek Roads, and in the Shasta Forest Village subdivision (Shasta-Trinity National Forest, M261D). About 10 sugar pine saplings and one pole-size tree were killed by *H. annosum* near Houghton Creek in Boggs Mountain Demonstration State Forest, Lake County (M261).

ARMILLARIA ROOT DISEASE, caused by ***Armillaria*** spp. Dozens of tanoaks in the Soquel Demonstration State Forest (Santa Cruz County) were killed by a combination of *Armillaria mellea* and *Phytophthora ramorum* infections and attacks by the western oak bark beetle. The small pocket of tanoak south of Boonville that is the most northern verified instance of Sudden Oak Death also had similar pest combinations (263A). Armillaria root disease was occasionally associated elsewhere with dying tanoak, coast live oak, and California black oak infected with *P. ramorum*.

Other instances of this disease were: a few small to mature-size chinquapin were killed by Armillaria in coastal Mendocino County (263A), several pockets of Armillaria were reported in the native Monterey pine stand on Swanton Pacific Ranch near Davenport, Santa Cruz County (261A) and several large black oaks were killed by Armillaria near Adams Springs, Lake County (M261B).

BLACK STAIN ROOT DISEASE, caused by ***Leptographium wageneri.*** Pockets of black stain root disease were found in young Douglas-fir at Ney Springs near Siskiyou Lake (M261A), and scattered in mature ponderosa pine along the Edson Creek Road on McCloud Flats (Shasta-Trinity National Forest, M261D). In surveys conducted during 2000 and 2001, incidence of black stain root disease was found to have increased dramatically in 40 second-growth Douglas-fir stands on the Happy Camp District, Klamath National Forest (M261A). Ornamental Douglas-firs were killed by black stain in Ft. Bragg, Mendocino County (263A).

Black stain root disease was found killing ponderosa pine 0.5 miles west of Highway 139 in northern Lassen County (M261G) in private and federal forests near the southern boundary of the Modoc National Forest. Approximately 40 acres of forest are affected with scattered mortality in the overstory and large numbers of older dead mortality in pole-sized pine. Three miles northwest of this area, black stain root disease continues to be active in the Heart Rock area, killing mature ponderosa and Jeffrey pines in scattered groups throughout the drainage. Pine engravers have been active in the Heart Rock area as well.

BROWN CUBICAL BUTT ROT, caused by ***Phaeolus schweinitzii***. Scattered wind throw, stem breakage and mortality were found in large Douglas-fir in a proposed thinning unit along Forest Service Road 19N07, off the Grayback Road (Forest Service Road 7C01), one mile south of the California-Oregon state line. Butt-swell and numerous *P. schweinitzii* fruiting bodies were also noted in the Mud Flow Research Natural Area on McCloud Flats (M261D).

LAMINATED ROOT ROT, cause by ***Phellinus weirii***. Laminated root rot was identified in a large Douglas-fir stump in a proposed thinning unit along FS Road 19N07, off the Grayback Road, one mile south of the California-Oregon state line. Wind throw and mortality of additional Douglas-fir may have been due to the disease (M261A).

PORT-ORFORD-CEDAR ROOT DISEASE, caused by ***Phytophthora lateralis***. Port-Orford-cedar root disease continues to expand and cause tree mortality in the upper Sacramento River Canyon, Siskiyou and Shasta Counties (M261A). Surveys found and mapped many previously unrecorded populations of Port-Orford-cedar and detected new sites of disease. Port-Orford-cedar is present on the main Sacramento as far down river as Sims. Additional root disease sites were confirmed in Dunsmuir, Castle Crags State Park and near Sweetbriar and Sims. Disease was also confirmed on Scott Camp Creek, a tributary of Siskiyou Lake and the Sacramento River. A total of seven infestations have been identified within the drainage and several other sites are suspect. Port-Orford-cedar root disease also continues to spread near Fish Lake and is now in seven Prot-Orford-cedars immediately below the spillway (Orleans District, Six Rivers National Forest, M261A). No major spread was reported in the coastal areas of Del Norte County (263A).

RUST DISEASES

INCENSE-CEDAR RUST, caused by ***Gymnosporangium libocedri***. Unusually prolific telial production of *G. libocedri* was reported in many areas of the Klamath and Shasta-Trinity National Forests in May 2001, including Ney Springs and below Castle Lake (both near Siskiyou Lake, M261A). Typically, the pathogen only causes minor damage to its host.

WESTERN GALL RUST, caused by ***Endocronartium harknessii***. This rust fungus continues to cause management concerns in ornamental Monterey pine and native Bishop pine in north coastal urban, roadside and recreation sites (261A). Numerous limb and bole infections were noted in ponderosa pine stands in Henry Coe State Park, Santa Clara County (261A).

WHITE PINE BLISTER RUST, caused by ***Cronartium ribicola***. The remeasurement of incidence survey plots was reported in 2001. Copies of report R5-01-01 are available from the USDA-Forest Service, State and Private Forestry, 1323 Club Dr., Vallejo, CA 94592-1110.

TRUE MISTLETOES

True mistletoes, ***Phoradendron*** spp., have been causing dieback and decline of hardwoods located on the LaJolla, Los Coyotes, Campo, Manzanita and LaPosta Reservations in San Diego County. Suppression projects are underway.

SURVEYS AND EVALUATIONS – 2001

THE 2001 DOUGLAS-FIR TUSSOCK MOTH PHEROMONE DETECTION COOPERATIVE SURVEY.

Average trap catches for 2001 showed increases for a few plots compared to 2000 catches (Table 2). Data were collected for 183 plots (5 traps per plot) during 2001 with 165 plots (90%) with an average of <25 male moths per trap and the remaining 18 plots (10%) averaging 25 or more moths per trap. Plots that averaged 25 or more moths per trap were located on the following Ranger Districts and National Forests (NF): Placerville, Eldorado NF; Big Valley, Modoc NF; Beckwourth and Mt. Hough, Plumas NF and Eagle Lake, Lassen NF. In addition to these plots monitored on National Forest lands, there were two plots that exceeded 25 moths per trap in Yosemite National Park and one in Mountain Home State Forest.

Increases and declines in trap counts are very common with Douglas-fir tussock moth populations. Based on the results of the 2001 monitoring, significant activity by this defoliator is not anticipated within the plot system area during 2002. Forest Health Protection will continue monitoring other life stages and adult males in established monitoring sites and in the areas where moth activity exceeded an average of 25 males per trap. Field-going personnel are urged to continue to check for evidence of feeding and defoliation on white fir throughout the susceptible host type this coming summer and fall.

TABLE 2. Number of Douglas-fir Tussock Moth Pheromone Detection Survey Plots by Trap Catch, 1979 to 2001

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%		
2001	183	95	57	13	10	6	0	1	1	0	0	0	0	0	0
		52%	31%	7%	5%	3%		<1%	<1%						

WHITE PINE BLISTER RUST RESISTANCE SCREENING PROGRAM - FY-2001

At the Placerville Nursery in FY-2001, the program screened 825 sugar pine seed lots collected from resistant candidate sugar pine. From this effort, 98 parent trees were identified as major gene resistant (MGR) to blister rust. This brings the total number of live, proven MGR resistant trees to 1,329 within the Pacific Southwest Region. We have sown 904 candidate seed lots to be inoculated and evaluated in FY-2002 and plan to sow a similar number in the spring of 2002 for the next cycle of evaluation.

Seedlings identified with MGR at the nursery are sent to the Happy Camp Disease Garden to evaluate for multigenic or *Slow-Rust* resistance. This year 3,843 MGR sugar pine seedlings were established at Happy Camp. Of this number, 2,844 seedlings were from 142 MGR parent trees (98 new parents and 44 retested MGR parents identified in 1995). The remaining 999 seedlings were from 289 non-MGR parent trees, which had received MGR pollen from natural pollination in native stands. These are referred to as pollen receptor seedlings.

MGR seedlings planted in 1989 were evaluated this year for slow rust resistance after multiple exposures to rust infection. From a total of 3,854 originally planted, 92 individuals from 70 parent trees were found to have promising levels of resistance. Evaluation of seedlings planted in 1990 is currently in progress. Data base updating and maintenance was performed as needed.

The pilot administrative study, *Mortality Analysis of Sugar Pine Seedlings for Identifying Heritable Slow Rusting Resistance to White Pine Blister Rust – A study to improve efficiency of screening methods*, was initiated. Seed from 48 parent trees was sown and cultured. These are now awaiting rust inoculation. An

additional administrative study was initiated to evaluate the effectiveness of inoculating sugar pine cuttings with blister rust. Eighty cuttings from eight parent trees of known and unknown MGR genotype were collected this spring. Initial size data was taken and the cuttings were planted into a soil mix and inoculated with blister rust. Data on needle infection and rooting are now being evaluated.

ASSESSING OZONE INJURY TO PINES IN THE SIERRA NEVADA

For the past 23 years, the status of ozone injury to pines in trend plots on the Sierra and Sequoia National Forests has been reported in this conditions report by Forest Health Protection. Those 54 plots were evaluated for the last time in 2000. Since the plots were established in 1977, numerous trees have died or the foliage became unreachable, and this has significantly reduced the number of sample trees. The results from these injury trend plots will be published in 2002.

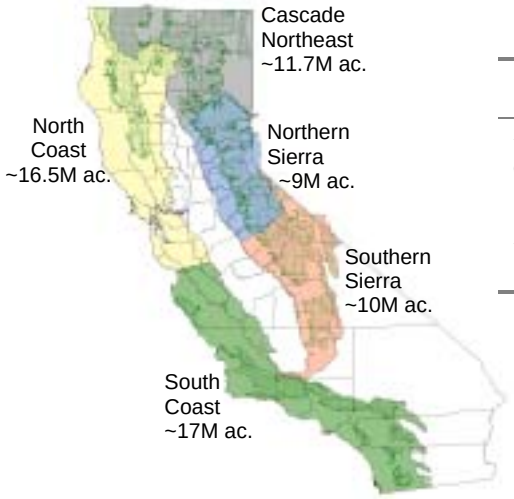
The monitoring of the effects of ozone on California forests will now shift to the ozone indicator of the National Forest Health Monitoring (FHM) Program. Approximately 80 biomonitoring sites will be established throughout the state in forested locations. More than 30 *biosites* have already been installed and evaluated. Previous air pollution monitoring efforts in California have focused on ponderosa and Jeffrey pines. The new FHM program includes these two pine species along with 13 additional ozone sensitive species of trees, shrubs and annual plants.

DETECTING VEGETATION CHANGES IN CALIFORNIA USING SATELLITE IMAGERY

The California Land Cover Mapping and Monitoring Program. In 1995, a cooperative program between the USDA Forest Service and the California Department of Forestry was launched to address long-term monitoring strategies. This program is formally called the California Land Cover Mapping and Monitoring Program (LCMMP). The objective of the LCMMP is to create seamless vegetation and monitoring data across California's landscape for regional assessment across all ownerships and vegetation types. The program uses Landsat Thematic Mapper (TM) satellite imagery to derive land cover change over five-year time periods (Figure 6). 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. These monitoring data provide critical information on the impacts of vegetation change over large areas. They also provide timely data for planners, resource managers, landowners, industry, watershed groups and others for land use planning, biological diversity assessment, resource management and sustainable economic development.

In FY2001 data from the South Coast project area has been aggregated and analysis is underway. The North Coast and Cascade Northeast project areas were completed through the initial change detection process. Cause of change will be collected in November 2001 on the North Coast and late winter 2002 on the Cascade Northeast. A statistical report will be published for the South Coast Project area by the end of 2001. Preliminary data and initial analysis of the completed project areas indicate that changes in forest cover in either conifer or hardwood rangelands are due primarily to wildfire and harvesting.

Figure 7. Project areas for measuring land cover change over five-year periods.



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

Survey for Sudden Oak Death. In an attempt to aide in the identification of oak mortality due to Sudden Oak Death (SOD), a multi-scale effort using remote sensing, aerial surveys and on the ground sampling were used to form baseline information to identify areas affected by oak mortality and SOD. The project area spans from Humboldt County to Monterey County. Baseline land cover change data were derived using TM satellite imagery, employing a multi-temporal Kauth–Thomas transformation. The resultant maps identify "hot spots" of oak mortality and the analysis was focused on the oak woodland vegetation type. Two-meter digital camera imagery was acquired from flights over the project area and, in conjunction with the satellite derived data, aided in identifying the extent of oak mortality. Aerial surveys were conducted to provide another means for detection and monitoring. Mortality areas were identified visually, sketch mapped and photographed on 35mm color film. A handheld Global Position System was used to record the flight line and pinpoint potential SOD sites. Field verification is underway and is imperative to confirm or refute the presence of the disease, as well as validate the satellite data. A total of 66 polygons were sketch mapped and all of them were visited on the ground. To date one of the trees within a polygon in Sonoma County were identified positively with SOD. This collaborative effort streamlines identifying areas potentially affected by SOD, focuses ground efforts to locate new SOD sites, and is prerequisite to the identification of future management opportunities.

Figure 8-Infected tanoaks detected during aerial survey for SOD.

SOUTHERN CALIFORNIA FIVE-YEAR DWARF MISTLETOE SUPPRESSION PROGRAM

Dwarf mistletoe continues to be a serious problem in developed recreation areas throughout southern California. The updated Five-year Dwarf Mistletoe Suppression Program is continuing on the Angeles, Cleveland, Los Padres and San Bernardino National Forests. Table 3 gives the accomplishments for 2001.

TABLE 3. Results of the Five-year Dwarf Mistletoe Suppression Program in 2001

National Forest Ranger District	Trees Pruned	Acres Treated	Acres Surveyed
Angeles			
Los Angeles	154	70	0
Cleveland			
Descanso	50	20	0
Los Padres			
Mt. Pinos	150	245	0
Ojai	60	105	0
San Bernardino			
All districts	52	43	79

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-two years after thinning, the treatments had reduced mortality from 95 to 100 percent of the level in unthinned stands (Table 4).

TABLE 4. Commercial Tree Mortality by Stocking Level, 22 Years After Thinning [a]

	Residual Stocking After Thinning [b]			
Year	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
2001	0.0	0.0	0.3	0.9
Mean	0.0	0.1	0.15	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.

AERIAL SURVEY RESULTS

Table 5 displays total polygon acreage for damage as mapped during aerial surveys conducted in 2001. These acreage estimates include Federal lands and other ownerships for mapped polygons within or near the administrative boundaries of surveyed National Forests and National Parks.

Table 5. Mortality and Defoliation Detected From Aerial Surveys

National Forests and Parks	Mortality Acres	Defoliation Acres	Acres Other Damage
SUBTOTAL NP	34,474	29,568	
SUBTOTAL NF	237,148	4,596	870
TOTAL	271,622	34,164	870

Mortality areas are defined as areas with trees that have recently died as a result of either biotic or abiotic causes (insects, disease, fire, etc…). Defoliation areas are defined as areas containing trees exhibiting recent loss of foliage. Also included above are 870 acres of Other Damage that includes branch dieback in fir noted during the survey of one particular Forest. Other damage may be recorded at the discretion of individual Forests. It is likely that many Forests have large areas with dieback and other damage types that do not fit either defoliation or mortality definitions and are not recorded above.

LODGEPOLE PINE NEEDLEMINER IN YOSEMITE NATIONAL PARK, 2001

There were several outbreaks of the lodgepole pine needleminer in Yosemite National Park in the 20th Century. These ranged from 8 to 18 years in duration. Such outbreaks have resulted in extensive lodgepole mortality through the cumulative effects of defoliation and the susceptibility of stressed trees to attack by the mountain pine beetle. The current outbreak is now in its eighth year.

The data for 2001 presented in Table 5 are from an unpublished report to Yosemite National Park by Dr. Thomas W. Koerber, Entomological Service Company, Box 992, Berkeley, CA 94701. The Council thanks Dr. Koerber and Yosemite National Park for making this information available for the conditions report.

TABLE 6. Lodgepole Pine Needleminer Population Density – Mature Larvae and Pupae – at Traditionally Sampled Locations within Yosemite National Park, Live Needleminers per 100 Tips, July 2001

Plot	1993	1995	1997	1999	2001	%Change, 1999 to 2001
Upper Tenaya	4	6	72	710	1176	
Cathedral Ck W	2	nd	8	40	76	
Cathedral Ck S	2	2	92	1160	1140	
Cathedral Ck E	2	nd	nd	60	132	
May Lake	368	418	130	372	864	
Dog Lake	10	2	nd	50	26 [as]	
West Lyell	nd	2	nd	nd	nd [as]	
Kuna	2	nd	nd	6	8 [as]	
x	48.7	61.4	37.7	299.7	427.7	+ 42.7
Budd Creek	8	10	86	1320	376 [as]	
Cathedral Creek	4	40	224	1912	1150 [as]	
Dingley Creek	8	6	8	78	186 [as]	
Delaney Creek	18	10	38	214	648 [as]	
Dana Meadow	nd	nd	nd	4	8 [as]	
x	7.6	13.2	71.2	891.0	473.6	- 46.8
Olmstead # 1	278	266	190	182	474	
Olmstead # 2	10	2	14	22	32	
Murphy Creek	nd	6	8	4	40	
Lower Tenaya	nd	nd	18	16	82	
Mt. Hoffman	6	2	nd	6	10	
Bear Pits	nd	nd	2	nd	8	
x	49.0	46.0	38.7	38.3	107.7	+ 181.1
Lembert Dome	2	nd	2	12	36	
Campgound	nd	nd	nd	6	2	

Plot G	nd	nd	12	10	100	
Plot H	nd	2	2	6	6	
Base Camp	2	nd	4	10	24 [as]	
Plot A	nd	nd	nd	8	20	
Plot O	4	nd	4	14	20	
Tenaya Beach	6	12	18	102	100	
Tenaya P.A.	44	14	68	170	324	
x	6.7	3.1	12.1	37.5	70.2	+ 87.2

as – Sample collected after July 5 hail storm.
nd – No needleminer larvae or pupae detected in the sample

LIST OF COMMON AND SCIENTIFIC NAMES

INSECTS

Common Name	Scientific Name
Bark Beetles and Woodborers	
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*
Monterey pine ips	*Ips mexicanus*
Mountain pine beetle	*Dendroctonus* ponderosae
Pine engravers	*Ips* spp.
Pinyon ips	*Ips confusus*
Red turpentine beetle	*Dendroctonus valens*
The pine engraver	*Ips pini*
Twig beetles	*Pityophthorus* spp.
Western oak bark beetle	*Pseudopityophthorus pubipennis*
Western pine beetle	*Dendroctonus brevicomis*
Unnamed pine engraver	*Ips spinifer*
Unnamed woodborer	*Semanotus* sp.
Unnamed bark beetle	*Hylurgops* sp.
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

Ambrosia beetles	*Monarthrum scutellare, M. dentiger*
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	
Chinkapin canker	unknown
Cytospora canker	*Cytospora abietis*
Diplodia blight of pines	*Sphaeropsis sapinea* (*Diplodia pinea*)
Pitch canker	*Fusarium circinatum*
Declines	
Pygmy cypress decline	unknown
Sudden oak death	*Phytophthora ramorum*
Oak decline	unknown
Tanoak decline	unknown
Dwarf Mistletoes	
Mountain hemlock dwarf mistletoe	*Arceuthobium tsugense* ssp. *mertensianae*
Pinyon pine dwarf mistletoe	*Arceuthobium divaricatum*
Red fir dwarf mistletoe	*Arceuthobium abietinum* f.sp. *magnificae*
White fir dwarf mistletoe	*Arceuthobium abietinum* f.sp. *concoloris*
Foliage Diseases	
Elytroderma disease	*Elytroderma deformans*
Sugar pine needle cast	*Lophodermella arcuata*
True fir needlecast	*Lirula abietis-concoloris*
Root Diseases	
Annosus root disease	*Heterobasidion annosum*
Armillaria root disease	*Armillaria mellea*

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*

True Mistletoes *Phoradendron* spp.

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*
Unnamed pinyon	*Pinus californiarum*
True firs	
Red fir	*Abies magnifica*
White fir	*Abies concolor*
Others	
Douglas-fir	*Pseudotsuga menziesii*
Incense-cedar	*Libocedrus decurrens*
Pacific madrone	*Arbutus menziesii*
Pygmy cypress	*Cupressus pygmaea*
Port-Orford-cedar	*Chamaecyparis lawsoniana*
Redwood	*Sequoia sempervirens*
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*
Oaks	*Quercus* spp.
Oregon white oak	*Quercus garryana*
Shreve oak	*Quercus parvula* var. *shreveii*
Valley oak	*Quercus lobata*

Other

Big leaf maple	*Acer macrophyllum*
Black walnut	*Juglans nigra*
California bay (laurel)	*Umbellularia californica*
California buckeye	A*esculus californica*
Chinquapins	*Castanopsis* spp.
Elm	*Ulmus* sp.
Hackberry	*Celtis occidentalis*
Oregon ash	*Fraxinux latifolia*
Pacific madrone	A*rbutus mensiesii*
Tanoak	*Lithocarpus densiflorus*
Willow	*Salix* sp.

SHRUBS

Common Name	Scientific Name
Arrowwood	*Viburnum* spp.
Bitterbrush	*Purshia tridentata*
California coffeeberry	*Rhamnus californica*
California honeysuckle	*Lonicera hispidula*
California Huckleberry	*Vaccinium ovatum*
Manzanita	*Arctostaphylos* spp.
Rhododendron	*Rhododendron* spp.
Toyon	*Heteromeles arbutifolia*

AGENTS REPORTED IN 2000, BUT NOT IN 2001

INSECTS

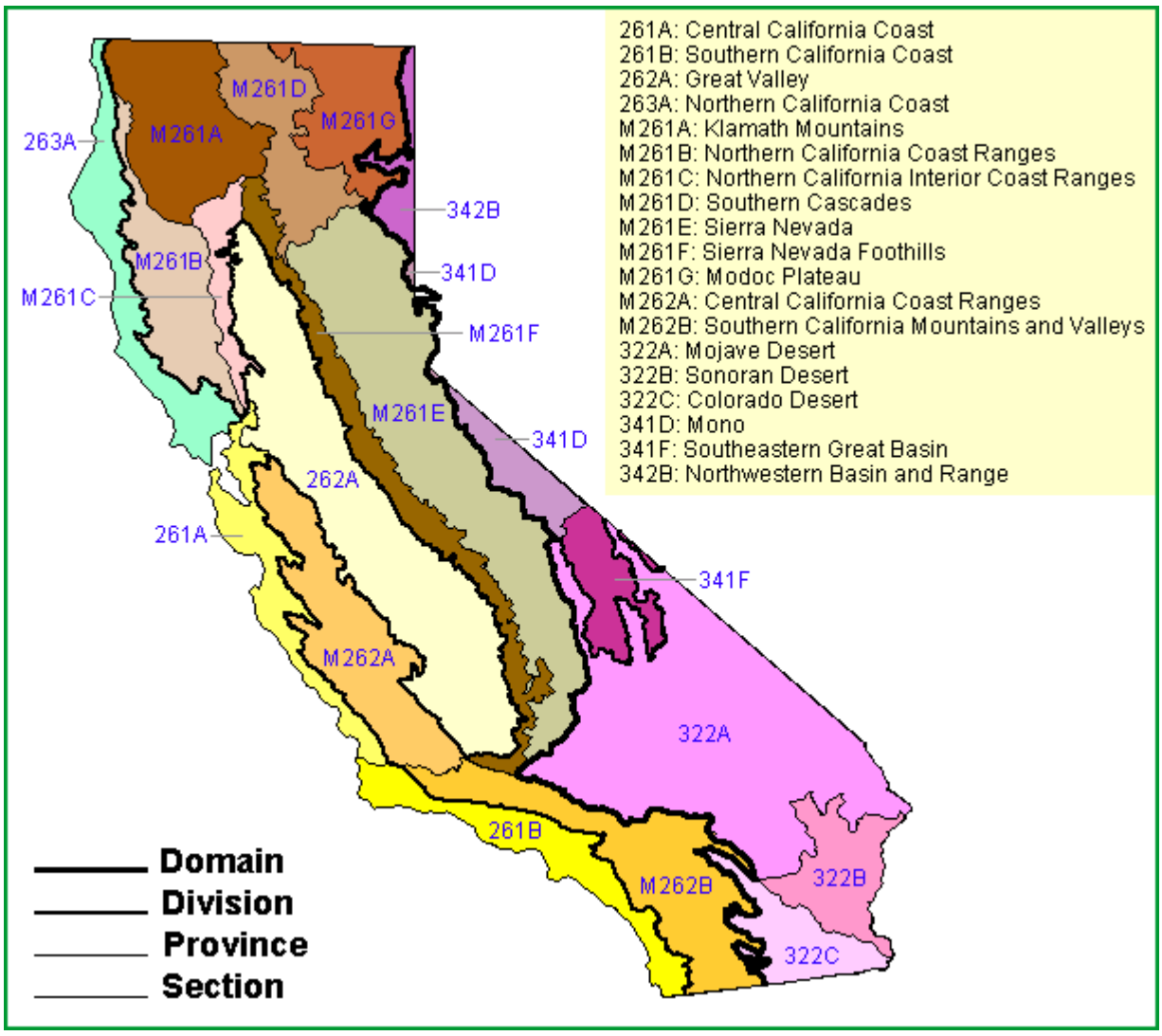
ELM LEAF BEETLE, *Xanthogaleruca luteola.*

OAK RIBBEDCASE MAKER, *Bucculatrix albertiella*.
PONDEROSA PINE TIP MOTH, ***Rhyacionia zozana***.
SATIN MOTH, ***Stilpnotia salicis***.
SHORTHORNED GRASSHOPPERS, Acrididae.
PITCH MOTHS, ***Synanthedon sequoiae*** (Sesiidae) and ***Dioryctria*** spp. (Pyralidae).
PONDEROSA PINE TWIG SCALE, *Matsucoccus bisetosus*.
ROOT WEEVILS, unknown.
XYELID SAWFLIES, ***Xyela*** spp.

PATHOGENS

ASPEN DECLINE, cause unknown.
CHINKAPIN CANKER, cause unknown.
CHLORIDE DAMAGE, caused by road salt
DOUGLAS-FIR DWARF MISTLETOE, caused by ***Arceuthobium douglasii***
GRAY PINE DWARF MISTLETOE, caused by ***Arceuthobium occidentale***.
SYCAMORE ANTHRACNOSE, caused by ***Gnomonia*** (***Gloeosporium***) ***platani***.
WINTER DAMAGE.

CALIFORNIA ECOLOGICAL UNITS



United States Department of Agriculture - Forest Service | California Forest Pest Council

FOREST PEST DETECTION REPORT

I. FIELD INFORMATION (See instructions on reverse)

1. County:

2. Forest (FS only):

3. District (FS only):

4. Legal Description:
T. _____ R. _____
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
707-562-8915

Forest Health Protection
Shasta-Trinity National Forests
2400 Washington Avenue
Redding, CA 96001
530-242-2335

Forest Health Protection
Stanislaus National Forest
19777 Greenley Road
Sonora, CA 95370
209-532-3672

Forest Health Protection
Lassen National Forest
2550 Riverside Drive
Susanville, CA 96130
530-257-2151

Forest Health Protection
San Bernadino National Forest
1824 Commercenter Circle
San Bernadino, CA 92408-3430
909-680-1582

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
916-653-9476

Forest Pest Management
CA Dept. of Forestry & Fire Protection
6105 Airport Road
Redding, CA 96002
530-224-2494

Forest Pest Management
CA Dept. of Forestry & Fire Protection
1475 S. State Street
Ukiah, CA 95482
707-462-8748

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.

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