FOREST PEST CONDITIONS IN CALIFORNIA -- 1997

A Publication of the California Forest Pest Council

THE CALIFORNIA FOREST PEST COUNCIL

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

1. Coordination of detection, reporting, and compilation of information on forest insects, diseases, and animal damage.

2. Evaluation of conditions centered upon forest insects, diseases, and animal damage.

3. Control recommendations made to forest managing agencies and landowners.

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

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

This report, FOREST INSECT AND DISEASE CONDITIONS IN CALIFORNIA -1997, 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 an historical record of forest insect and disease trends and occurrences. The report is based largely on information provided by three sources: (1) the state-wide Cooperative Forest Insect and Disease Survey, in which federal, state, and private foresters and land manager participate, (2) information generated by Forest Pest Management, Pacific Southwest Region, USDA-Forest Service, while making formal detection surveys and biological evaluations, and (3) reports and surveys of conditions on private lands provided by personnel of the California Department of Forestry and Fire Protection.

This report is prepared by Forest Pest Management, USDA Forest Service, in cooperation with other member organizations of the Council and the Council's Standing Committees. The report is published and distributed by the California Department of Forestry and Fire Protection.

Stephen Jones, Editorial Committee Chair

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EXECUTIVE SUMMARY

Insects

Mortality associated with bark beetles was generally low throughout northern California and the central and southern Sierras. Some pockets of mortality associated with Jeffrey pine beetle and fir engraver still exist on the east side from the Lake Tahoe Basin to Lassen Volcanic National Park, but the extent, intensity, and visual impact has waned dramatically from the early 1990's and the height of the drought. Mortality remains associated with overstocked stands and poor quality sites.

The pine reproduction weevil continued to cause damage to 4,000 to 5,000 acres of pine plantations on the Groveland District, Stanislaus National Forest. Indications are that the infestation will continue to cause damage in 1998.

An outbreak of Douglas-fir tussock moth may be imminent in the Hume Lake District, Sequoia National Forest and the northern end of the Sequoia-Kings Canyon National Park. About 23,000 acres are involved. Defoliation is generally restricted to the 1997 growth on white fir within the mixed-conifer type, and numerous egg masses are present.

The California budworm caused noticeable defoliation of Douglas-fir around Trinity Lake for the second consecutive year. Light defoliation on various ridges totals about 5,000 acres. Comparisons with the 1981-1985 outbreak at the same locations provide a reasonable expectation that the current problem will not make a dramatic increase.

Populations of the lodgepole pine needleminer have increased at some locations in Yosemite National Park and new areas of defoliation are expected within the next two to four years. Pine mortality is anticipated for some areas.

The catches of gypsy moth remain low in California. Only six moths, one per each of six counties, were trapped in 1997.

Mortality associated with bark beetles in general was low in southern California in 1997. The predicted ample precipitation in the winter of 1997-98 should result in continued low mortality rates in southern California and along the Central California Coast.

Pathogens and Abiotic Influences

Flood-related damage to conifers and hardwoods in riparian areas was reported for several parts of northern and central California. Heavy rains in 1997 flooded vast areas of California, causing mud-slides which uprooted trees and standing water which suffocated tree roots.

In June 1997, the Board of Forestry established the Coastal Pitch Canker Zone of Infestation with the intent of slowing the spread of *Fusarium subglutinans* f. sp. *pini*, the cause of pitch canker. This is the first "Zone of Infestation" declared for a pathogen. The zone covers 23.1 million acres, including parts of 21 counties (17 counties presently infested and 4 adjacent counties that might reasonably be expected to become infested in the near future). Although the number of counties affected did not increase in 1997, the pathogen continued to spread and damage intensified in all three of California's native Monterey pine stands and in ornamental plantings throughout the infested area.

Another canker disease, Diplodia blight of pines, was exceptionally damaging along the Pacific coast from Santa Cruz County north into Oregon. Shoot dieback was observed on ponderosa pines at numerous locations in Central and Northern California, particularly on trees growing at elevations of roughly 1,000 to 2,500 ft in the foothills around the Sacramento Valley. Mature and over mature trees were more likely to be infected. Individual trees varied considerably in the number of blighted twigs, with the most severely affected showing evidence of chronic infection and reduced vigor.

Douglas-fir needle cast affected several acres of seedlings and saplings on the Stoneyford District, Mendocino National Forest and the Pineridge District, Sierra National Forest. This is the first report of the fungal subspecies, *Rhabodocline weirii* ssp. *weirii*, in the Coast Range and southern Sierra Nevada.

FOREST INSECT CONDITIONS

Report To The California Forest Pest Council From The Insect Committee

Dave Schultz, Chair
George Ferrell, Secretary

FOREST PEST CONDITIONS IN CALIFORNIA -1997

FOREST INSECT CONDITIONS

WESTERN PINE BEETLE, *Dendroctonus brevicomis*

M261D - Southern Cascades. Mortality associated with the western pine beetle remained at low levels throughout the eastern portion of this section. A few small pockets of mortality were identified on the east edge of the Shasta National Forest --- around Fort Mountain and Soldier Mountain. South of the Thousand Lakes Wilderness, Lassen National Forest, pockets of ponderosa pine mortality were detected near Huckleberry Mountain, Bunchgrass Valley, and just east of the Pacific Gas and Electric campground at North Battle Creek Reservoir. On the southern edge of the Almanor District, Lassen National Forest, a pocket of ponderosa pine was killed by western pine beetle just east of Snow Mountain.

M261E - Sierra Nevada. Mortality associated with western pine beetle in the northern Sierra has declined to low background rates. Some activity is continuing in overstocked stands on the westside of the Tahoe National Forest. Specific areas of mortality include Clerkins Ranch, McCulloch Spring, and a small pocket just west of Plum Valley on the Nevada City District. Ponderosa pine mortality was also detected just west of Malakoff Diggins State Historical Park on Bureau of Land Management lands. Mortality in the Volcano plantation, Foresthill District, has also increased over the past year.

Numerous, small group-kills of ponderosa pine are scattered throughout the Plumas National Forest. Overstocking is the primary factor involved with this mortality. More prominent groups were seen on the Feather River District at: just south of Hungry Hunt Peak; near the 23N46X spur off Forest Service Road 28; just south of Rogers Cow Camp; Carey Gulch; between Grouse Hollow Creek and Devils Gulch on road 22N29; on the 23N39X spur south of Buck Creek; just east of Dogwood Peak; near Jackson Ranch and Curtain Falls in the Middle Fork of the Feather River drainage; near the Golden Trout Crossing along the South Fork, Feather River drainage; and along 20N35 near Strawberry Valley. Western pine beetle and mountain pine beetle can be implicated in scattered pockets of ponderosa pine mortality on the Mt. Hough District. Pockets of mortality were detected just north of the Buckhorn Mine; west of Devils Punch Bowl near Grizzley Peak; directly west of Mt. Hough; near Dixie Creek off Highway 89; along road 28N32 near Hunt Canyon; Franks Valley; Engel Mine Upper Camp; and around Flemings Sheep Camp. A few areas of ponderosa pine mortality on the Beckwourth District include: along Antelope Creek north or Wemple Cabin; immediately west of Squaw Valley Peak; Happy Valley, several spots were noted around the northwest side of Lake Davis; immediately to the east of Dixie Mountain; Bloomer Lake area; and just south of McRae Meadow.

Mortality associated with the western pine beetle remained generally low in the central and southern Sierra Nevada, appearing as scattered individual or small groups of ponderosa pine. Attacks on pine injured by fire in the Ackerson Complex Fire (Stanislaus National Forest) remained within expected limits. Increased mortality was reported from a 25-year-old pine plantation on the Mariposa District, Sierra National Forest, following stand management activities in and around the plantation. Western pine beetles were also associated with ponderosa pine mortality in the Diamond-O Campground, Groveland District, Stanislaus National Forest -- the trees had also been attacked by the red turpentine beetle.

M261G - Modoc Plateau. Ponderosa pine mortality is apparent on the west side of the Big Valley District, Modoc National Forest, where overstocking exists. Areas of note include the Donica and Splawn Mountain areas. Size classes affected are poles to pre-dominants.

M262B - Southern California Mountains and Valleys. Populations of western pine beetle were low, but some activity was observed in the San Jacinto Mountains (Riverside County) and on the Los Coyotes Indian Reservation (San Diego County), where ponderosa and Coulter pines, respectively, were attacked. A few sawlog-size Coulter pines on Laguna Mountain (San Diego County) were killed by this beetle.

PINE ENGRAVER BEETLES, *Ips* spp.

M261E - Sierra Nevada. *Ips paraconfusus* is abundant in snow and wind breakage material and logging slash in the Volcano plantation, Foresthill District, Tahoe National Forest. However, the beetles have not moved into standing residual trees.

Top-kill involving pine engravers was reported on the Hat Creek District, Lassen National Forest, along Highway 299 from the State Campground at Hat Creek west to Four Corners.

Pine engraver activity remained generally low in the central and southern Sierra Nevada. Pine engravers along with the western pine beetle caused mortality within a 25-year-old plantation on the Mariposa District, Sierra National Forest. Pine engravers also attacked severely fire-injured Jeffrey pine in a 35-year-old plantation near Alta Summit, Greenhorn District, Sequoia National Forest. Several, large-diameter, ponderosa pine along the Highway 50 corridor near Pollock Pines, El Dorado County, evidenced advanced top-kill likely associated with pine engraver activity.

M262A - Central California Coast Ranges. Mortality in 10 to 15-year-old Coulter pines in a plantation on Chews Ridge (Monterey County) was associated with engraver beetles. The plantation was severely overstocked, and road clearing had created slash in which the beetles had bred.

M262B - Southern California Mountains and Valleys. A few pinyon pines in campgrounds in the San Jacinto and San Bernardino Mountains were killed by Ips. Contributing factors included soil compaction and low precipitation.

In the eastern San Bernardino Mountains, large expanses of pinyon are infected with black stain root disease, and Ips are associated with widespread mortality in the infected trees.

Ips were also associated with scattered mortality in Coulter plantations on Laguna Mountain in San Diego County and on the north slope of Sawmill Mountain on the Angeles National Forest (Los Angeles County). The latter infestation was above "normal" background mortality. Both plantations were overstocked.

FIR ENGRAVER, *Scolytus ventralis*.

M261A - Klamath Mountains. Fading of true firs was markedly reduced from 1996.

M261B - Northern California Coast Ranges. Fading of true firs was markedly reduced from 1996.

M261D - Southern Cascades. Fir engraver mortality continued to decrease across most of this section; however stand conditions, primarily overstocking, continue to cause chronic levels of white fir mortality in some areas. Areas to note include Huckleberry Mountain and Bunch Grass Valley, Hat Creek District, and around Ridge Lake; Domino Spring Campground; and along road 29N34, Almanor District, Lassen National Forest. One area of true fir mortality was detected in Lassen Volcanic National Park along the trail between Manzanita Lake Campground and Lassen Peak.

M261E - Sierra Nevada. Mortality of true fir has returned to pre-drought, background frequency in most areas in the northeastern part of the state. Most continuing mortality can be attributed to stand conditions, primarily overstocking and droughty sites on the eastside. A few areas of moderate to high true fir mortality were noted on the Tahoe National Forest. Areas include the Lavezzola Creek

drainage and around Upper and Lower Salmon Lakes on the Downieville District, and in the Babbit Peak Research Natural Area on the Sierraville District. Two areas on the eastside of the Lassen National Forest have above background levels of true fir mortality, near Hamilton Mountain and immediately south of Coyote Peak, Eagle Lake District.

There were a few new areas of scattered true fir mortality on the Plumas National Forest. On the Feather River District areas detected include: Carey Gulch, near Boehme Ranch, around the Haskins Valley Summer Home tract southeast of Bucks Lake, Bach Creek Ridge, Dogwood Creek drainage, and areas along Gibsonville Ridge near Bunker Hill and Independent mines. A few areas of true fir mortality of note on the Mt. Hough District include the Squirrel Creek drainage along road 25N18, immediately north of Lee Summit; just south of Kettle Rock and along 27N58 north of Cool Springs. The areas around Adams Peak and near McRae Meadow, Beckwourth District, and on the west edge of Plumas Eureka State Park, continue to have above background rates of white fir mortality.

Mortality and top-kill associated with fir engraver activity continued to be low in the central and southern Sierra Nevada.

M261G - Modoc Plateau. While the magnitude of standing dead trees is still extremely high in the Warner Mountains, there were no new centers of Scolytus activity. Several stands exhibit an occasional dead or fading tree, indicative of the cyclic mortality within this ecosystem. Stand conditions remain such that another wave of mortality could be induced by consecutive years of below normal precipitation.

Top-kill and mortality are still apparent on Manzanita Ridge, Big Valley District, Modoc National Forest. However, the number of firs involved are much lower than the number over each of the past five years.

M262B - Southern California Mountains and Valleys. The fir engraver was active in southern California in 1997, causing top-kill and tree mortality. Damage was greatest in the upper French Valley on Palomar Mountain (San Diego County), where an estimated 75 trees were affected, and to a lesser degree on Black Mountain on the San Bernardino National Forest (Riverside County). Contributing factors include infection by annosus root disease, mistletoe infection, overstocking, and miscellaneous other debilitating agents.

RED TURPENTINE BEETLE, *Dendroctonus valens*.

M261D - Southern Cascades. Attacks were common on ponderosa pines injured during prescribed burns and on pines injured during mechanical thinning in older pine plantations on McCloud Flats, Shasta-Trinity National Forests.

M261E - Sierra Nevada. Red turpentine beetles attacked residual trees following a thinning harvest in the Boca Springs area, Tahoe National Forest. Attacks have not resulted in mortality. Similarly, mortality has not occurred thus far from numerous attacks on ponderosa and Jeffrey pine in the Madallena Fire area (1996, Beckwourth District, Plumas National Forest).

Intensity of red turpentine beetle activity varied following prescribed underburns in several locations in the central and southern Sierra, including the Indiana Summit Research Natural Area, Mono Lake District, Inyo National Forest; Big Mountain, Amador District, Eldorado National Forest, and in the Barnes underburn, Kings River District, Sierra National Forest. Red turpentine beetle attacks continued on fire-injured trees in the Ackerson Complex wildfire area in Tuolumne and Mariposa Counties. Attacks were abundant in pine stands near Fraser Flat, Miwok District, Stanislaus National Forest, following thinning and underburning. Numerous red turpentine beetle attacks were found in a 35-year-old Jeffrey pine plantation on trees heavily injured during a prescribed burn near Alta Summit, Greenhorn District, Sequoia National Forest. With the exception of the Alta Summit plantation, little mortality has been associated with the red turpentine beetle attacks.

Red turpentine beetle attacks continued for the third year on ponderosa pines in the Dimond-O Campground, Groveland District, Stanislaus National Forest. Since 1995, 10 of 36 trees attacked by the red turpentine beetle have died; all 10 trees that died were also attacked by the western pine beetle and/or woodborers.

M262B - Southern California Mountains and Valleys. *Dendroctonus valens* was common in Jeffrey pine on Laguna Mountain (Cleveland National Forest, San Diego County) in the Ecological Study Area, which has a high incidence of annosus root disease and dwarf mistletoe infection. High populations of this beetle were also found in fire scorched Jeffrey pine in the Holcomb burn in the San Bernardino Mountains.

MOUNTAIN PINE BEETLE, *Dendroctonus ponderosae*.

M261A - Klamath Mountains. Mortality of all tree species from all causes was substantially lower in 1997 than in 1996. Large, older sugar pine killed by the mountain pine beetle continued to represent a high proportion of the mortality detected by aerial survey.

M261D - Southern Cascades. A large proportion of the mortality detected on the Goosenest District, Klamath National Forest, was 4 to 10 inch diameter ponderosa pine and lodgepole pine killed by the mountain pine beetle.

M261E - Sierra Nevada. Mortality associated with mountain pine beetle remains high in several areas of lodgepole pine on the Truckee District, Tahoe National Forest. The affected pines are found either in frost pockets or in riparian areas. Sagehen Creek and several areas along the Truckee River have recorded the most mortality. Tree age, size, and stand conditions are implicated as major factors in susceptibility to mountain pine beetle attacks. In addition, several small groups (trees per group) of ponderosa pine trees in the Donner plantation, Truckee District, Tahoe National Forest, were killed by mountain pine beetle this year.

Mixed pockets of ponderosa (mountain and western pine beetles) and Jeffrey pine (Jeffrey pine beetle) mortality were found on the east side of the Plumas National Forest. Specific areas include: along Antelope Creek north of Wemple Cabin, immediately west of Squaw Valley Peak, Happy Valley, several spots around the northwest side of Lake Davis, immediately to the east of Dixie Mountain, and near Bloomer Lake.

Mountain pine beetle activity continued generally low in the central and southern Sierra Nevada. Exceptions were areas of lodgepole pine mortality in the southern end of the Lake Tahoe Basin. Those areas include Pioneer Trail and other localized areas in the vicinity of Myers, the Trout Creek drainage, and the Upper Truckee-Angora Creek drainage (El Dorado County).

M261G - Modoc Plateau. Mountain pine beetle in combination with western pine beetle caused mortality where overstocking exists on the west side of the Big Valley District, Modoc National Forest. Areas include the Donica and Splawn Mountain areas. Size classes affected are poles to pre-dominants.

JEFFREY PINE BEETLE, *Dendroctonus jeffreyi*.

M261D - Southern Cascades. Jeffrey pine mortality remains moderate to high on the west side of the Lassen National Forest and in Lassen Volcanic National Park. Jeffrey pine mortality was detected just south of West Prospect Peak and Eskimo Hill, immediately north of the Northern Fork of the Deer Creek drainage, and northeast of Red Mountain (Hat Creek District). Also on the Lassen National Forest, but within the Thousand Lakes Wilderness boundary, there are small pockets of Jeffrey pine mortality around Eiler Lake, Barrett Lake and Box Lake. On the Almanor District, a small group kill was identified near Buzzard Springs.

Within Lassen Volcanic National Park, low rates of Jeffrey pine mortality were detected at Manzanita Lake Campground, the Lost Creek crossing on Highway 89, and just northwest of Widow Lake on the eastern park boundary. However, this is the fourth consecutive year of mortality in these areas.

M261E - Sierra Nevada. Jeffrey pine mortality remains at moderate to high levels on the eastside of the Tahoe National Forest. Specific areas include Onion Creek, Sierraville District; along Interstate 80 near the town of Truckee between Donner Lake and Highway 89 north; Jackass Point; Klondike Meadow; and in the Pole Creek drainage, Truckee District. The past two wet years do not appear to have had an affect on mortality levels in these areas. Beetles are attacking and killing all size classes from 40 inches d.b.h. down to 3 inches d.b.h.

Mixed pockets of Jeffrey pine (Jeffrey pine beetle) and ponderosa pine (western and mountain pine beetles) mortality were found on the eastside of the Plumas National Forest. (For specific areas, see mountain pine beetle, M261E).

Jeffrey pine mortality continued to decline throughout most of the central and southern Sierra Nevada. Exceptions were areas around Lake Tahoe, including the vicinity of Myers and the Upper Truckee-Angora Creek drainage in the south (El Dorado County), the Burton Creek drainage near Tahoe City, and the vicinity of Sunnyside in the north (Placer County). Mortality also continued in the Spooner Summit area (Douglas and Lyon Counties, Nevada) and around Inyo Craters, Mammoth District, Inyo National Forest.

M262B - Southern California Mountains and Valleys. Mortality associated with the Jeffrey pine beetle was low in southern California and was highest under certain exceptional site conditions, such as fire and local flooding at two sites in the San Bernardino Mountains (Holcomb Creek and the upper Santa Ana River drainage, respectively).

FLATHEADED FIR BORER, *Melanophila drummondi*.

M261A - Klamath Mountains. Douglas-firs on the northwest side of Round Mountain, Shasta County, have been in decline for many years. Attacks and galleries of the flatheaded fir borer are common on dead and declining Douglas-firs over hundreds of acres. Larger trees exhibit declining height growth, thin crowns, and repeated attacks from the borer, while intermixed ponderosa pine are growing well. Hail damage in the spring made the trees look worse. Since the area receives adequate precipitation, soil conditions may be limiting Douglas-fir growth.

CEDAR BARK BEETLE, *Phloeosinus* sp.

M261C - Northern California Interior Coast Ranges. Incense-cedars grown as ornamentals in foothill locations such as Stoneyford (Colusa County) were reported to be infested with cedar bark beetles at the time of death. A species of *Phloeosinus* was involved in the death of ornamental cypresses southwest of Redding, Shasta County.

CALIFORNIA FLATHEADED BORER, *Melanophila californica*

M262B - Southern California Mountains and Valleys. The California flatheaded borer killed scattered old-growth Jeffrey pines on Laguna Mountain (Cleveland National Forest). Most of the larger diameter pines on the mountain have been killed within the last 30-50 years; thus mortality associated with flatheads is now much lower than reported historically. Affected trees were sometimes infested with the red turpentine beetle as well.

PINE REPRODUCTION WEEVIL, *Cylindrocopturus eatoni*

M261C - Northern California Interior Coast Ranges. This weevil caused scattered mortality of ponderosa pine seedlings over several hundred regenerated acres of the Finley Burn, Tehama County.

M261D - Southern Cascades. Pine reproduction weevil was detected in the Lava Progeny Test Site, Big Valley District, Modoc National Forest. Damage to residual trees was minor.

M261E - Sierra Nevada. The pine reproduction weevil continued to cause damage to pine plantations on the Groveland District, Stanislaus National Forest. Approximately 4,000 to 5,000 acres are affected, which is about 50% of the acres planted since 1988. Mortality ranges up to 38% of the current stocking, and approximately 1,500 acres had greater than 5% mortality in 1997. Indications are that the infestation will continue high in 1998.

BRANCH AND TWIG BEETLES, *Carphoborus* spp. and *Pityophthorus* spp.

M261E - Sierra Nevada. Mortality of Jeffrey pine in 7- to 9-year-old plantations on Breckenridge Mountain (Greenhorn District, Sequoia National Forest) continued in the spring and early summer of 1997. Ten plantations ranging in size from 2 to 38 acres (187 total acres) were affected. Mortality ranged from <1% to about 12% of current stocking. Twig beetles associated with the mortality included *Carphoborus pinicolens*, *Pityophthorus tuberculatus*, *P. confertus*, *P. jeffreyi*, and an unidentified *Pityophthorus*. Autumn surveys indicated a decline in mortality.

DOUGLAS-FIR TUSSOCK MOTH, *Orgyia pseudotsugata*.

M261D - Southern Cascades and M261G - Modoc Plateau. Results of pheromone monitoring indicate a significant reduction in trap catches of male moths in 1997 relative to 1995 and 1996, which is consistent with the lack of reported activity in areas other than the Sequoia National Forest and the Sequoia/Kings Canyon National Parks. (See Surveys and Evaluations, Douglas-fir Tussock Moth)

M261E - Sierra Nevada. Increasing Douglas-fir tussock moth populations have been detected on the Hume Lake, Hot Springs and Greenhorn Districts, Sequoia National Forest, and in the Sequoia-Kings Canyon National Parks in Tulare, Fresno and Kern Counties. Initial observations indicate that approximately 23,000+ acres of federal, state, and adjacent and intermingled private lands are involved in locations generally bounded on the north by the Hume Lake District and the Big Stump entrance to the Sequoia-Kings Canyon National Parks and the Tiger Flat area below Portuguese Pass (Greenhorn District) to the south. Defoliation is generally restricted to the 1997 growth and numerous 1997-1998 egg masses are present. Egg mass surveys are scheduled for February 1998 to quantify the extent and potential severity of the infestation.

GYPSY MOTH, *Lymantria dispar*.

Statewide. One individual male moth was trapped by personnel of the Department of Food and Agriculture, Division of Plant Industry, in each of six counties in 1997 -- Contra Costa, El Dorado, Kern, Nevada, Riverside, and San Diego Counties. There were no reported properties with egg masses or pupal cases. This low number may be related to greatly decreased populations in the eastern United States and the resulting decrease in the probability of egg masses and pupae coming into the state on vehicles and

household goods from the East.
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MODOC BUDWORM, *Choristoneura retiniana*.

M261G - Modoc Plateau. There were no reports of defoliation this year.

CALIFORNIA BUDWORM, *Choristoneura carnana californica*.

M261A - Klamath Mountains. The California budworm caused noticeable defoliation on Douglas-firs around Clair Engel (Trinity) Lake for the second consecutive year. There may be as many as 5,000 acres of light defoliation scattered in locations such as Bowerman Ridge, Papoose Ridge, Feeney Ridge, Feeney Gulch, Trinity Mountain and Hay Gulch. There are a few pockets of moderate defoliation which may total 80 acres. The most severe defoliation is on suppressed understory Douglas-firs.

These and other areas in Trinity and Shasta Counties were involved in the 1981-1985 outbreak of *Choristoneura carnana californica*. An egg mass survey conducted in the vicinity of the dismantled Trinity Mountain Guard Station found an average of 8.3 new egg masses per m^2 of foliage. This is consistent with the light defoliation observed in overstory trees, and is considerably lower than the 29 egg masses per m^2 recorded in 1982 during the previous outbreak in this area. After two consecutive years of outbreak, a reasonable expectation is a stable or declining budworm population.

PINE NEEDLE SHEATHMINER, *Zelleria haimbachi*

M261D - Southern Cascades. Pine needle sheathminer abundance on ponderosa pine east of Pondosa, Siskiyou County (old Pondosa burn) changed little in 1997. A survey conducted this spring found an average of 0.9 larval mines per shoot. This compares with 1.4 and 1.8 mines per shoot during the previous two years and 9.4 mines per shoot during the outbreak year of 1994. Of 20 shoots sampled, 16 had minor feeding damage. It is not known if the current population is at an endemic level or still declining.

LODGEPOLE PINE NEEDLEMINER, *Coleotechnites milleri*

M261E - Sierra Nevada. Lodgepole needleminer population levels remain low in the Tuolumne Meadows area of Yosemite National Park and no visible defoliation is anticipated. Populations have increased around Tenaya Lake and new areas of defoliation are expected within the next two to four years. Extensive areas of heavy lodgepole pine defoliation exist both north and south of the high visitor-use zone along the Highway 120 corridor. Continued defoliation and mortality is anticipated for these areas. (See Surveys and Evaluations, Lodgepole pine needleminer.)

WHITE FIR NEEDLEMINER, *Epinotia meritana*

M261G - Modoc Plateau. Needleminer defoliation detected in 1996 around Manzanita Mountain and Sweagert Flat (Big Valley District, Modoc National Forest) was not apparent this year. Some white fir mortality did result from combined factors of defoliation, fir engraver attacks, and prior drought stress.

SILVERSPOTTED TIGER MOTH, *Halisidota argentata*

M261E - Sierra Nevada. Feeding damage was detected on Douglas-fir in a mixed conifer stand in the San Juan Ridge area, Nevada City District, Tahoe National Forest. Seedlings and saplings were affected. Defoliation of Douglas-fir was also reported from Placer County. Feeding damage was detected on giant sequoia at the Foresthill Seed Orchard, Foresthill District, Tahoe National Forest. About 20 trees were affected.

Localized defoliation of white fir and Douglas-fir associated with silverspotted tiger moth feeding was reported from several locations in the central Sierra Nevada. Specific areas on the Eldorado National Forest included the Badger Hill Breeding Arboretum; and Balderston, Mace Mill Road, Volcanoville Road and Darling Ridge on the Georgetown District. Locations on the Stanislaus National Forest included Summit Level Ridge and along Black Springs Road on the Calaveras District and along the Long Barn-Clavey Road on the Miwok District.

CALIFORNIA OAKWORM, *Phryganidia californica*.

M261A - Klamath Mountains. Several thousand acres of tanoak were defoliated on Tish Tang Ridge above Horse Linto Creek. The defoliation covered several linear miles of road leading up to the trailhead to the Trinity Alps Wilderness. The trees refoliated by mid-summer.

FRUITTREE LEAFROLLER, *Archips argyrospilus*

M262B - Southern California Mountains and Valleys. Defoliation by the fruittree leafroller was light (less than 10% of foliage consumed) to moderate (10 - 50% of foliage consumed) in portions of the San Bernardino Mountains which are commonly infested by this insect, including the vicinity of Lake Gregory and Lake Arrowhead, Miller Canyon, and Fredalba. No black oak mortality is anticipated as a result of this level of defoliation.

TENT CATERPILLAR, *Malacosoma* sp.

M261A - Klamath Mountains. Tent caterpillars defoliated *Ceanothus* sp. on the Yolla Bolla and Hayfork Districts, Shasta-Trinity National Forests. There was some concern about loss of forage for range cattle, but there was little shrub mortality.

TENT CATERPILLAR, *Malacosoma constrictum.*

M261C - Northern California Interior Coast Ranges. Pacific tent caterpillars were quite common this spring on blue oaks in the northern Sacramento Valley from Cottonwood to Redding, although defoliation was not noticeable. A severe outbreak of this insect occurred in the same area in 1987 and 1988. The increasing population may be a precursor to another outbreak. This year's mild spring weather should have favored survival of the caterpillars.

BLACK PINELEAF SCALE, *Nuculaspis californica*

M261A - Klamath Mountains and M261D - Southern Cascades. Groups of sugar pines on Rainbow Ridge west of Mt. Shasta, Siskiyou County, are infested with black pineleaf scale and exhibiting symptoms of needle chlorosis and thin crowns. Foliage samples from sugar pines in the city of Mt. Shasta revealed additional, but less damaging infestations of the scale.

GOUTY PITCH MIDGE, *Cecidomyia piniinopsis*.

M261D - Southern Cascades. A combination of a low snow pack, drying winds, and gouty pitch midge infestation caused high mortality in several young ponderosa pine plantations to the northwest of Mt. Shasta (Siskiyou County).

BLUE ALDER AGRILUS, *Agrilus burkei*

M261E - Sierra Nevada. Extensive alder mortality associated with attacks by the blue alder agrilus was reported along the Kern River on the Cannell Meadows District, Sequoia National Forest. The mortality extends for about 15 miles north of Kernville in the Kern River corridor, including the Kern River Fish Hatchery.

WHITE GRUBS, Scarabidae.

M261D - Southern Cascades. June beetle larvae killed white fir Christmas tree seedlings at a plantation in Shingletown, Shasta County. Mortality was quite high, over 50% in some areas. Virtually all lateral roots had been consumed on dead seedlings. The grubs probably existed on the previous crop of Christmas trees and associated vegetation, causing no noticeable damage to the larger trees. When the site was cleared of vegetation and planted, the seedlings offered the only food for the grubs.

AFRICANIZED HONEY BEE, *Apis mellifera scutellata*

322B - Sonoran Mojave Desert and 322C - Sonoran Colorado Desert. Southern portions of the Sonoran Mojave Desert (Riverside

County) and all of the Sonoran Colorado Desert are considered "Africanized." Feral bees in this area are likely to be Africanized honey bees or Africanized hybrids. The known range of the bee in 1997 increased slightly with finds in Palm Springs and Anza Borrego Desert State Park. Areas within 20 miles of a confirmed find are considered Africanized, as it is not uncommon for swarms to travel that distance when seeking a nest site. Thus, areas of the San Bernardino National Forest can now be considered Africanized. The third reported multiple stinging incident in California occurred in August in the vicinity of El Centro, Imperial County. To date there have been no human fatalities in California associated with this insect.

AUSTRALIAN CERAMBYCID BEETLE, *Phoracantha recurva*

261B - Southern California Coast and M262B - Southern California Mountains and Valleys. This eucalyptus borer was discovered in 1995 in a laboratory colony of the very similar *P. semipunctata* maintained by the Department of Entomology, U. of California, Riverside.

It is doubtful if *P. recurva* was in the state prior to this year, and since 1995 it has been found in Riverside, San Bernardino, Orange, San Diego, and Los Angeles Counties. The population appears to be developing rapidly and P. recurva may become the dominant eucalyptus-boring species in some areas because of its seasonal activity and shorter development, egg to adult. The effect of a second eucalyptus borer on California's eucalyptus trees is unclear, but *P. recurva* is attacked by the same biological control agents that have been reared and released by the Department of Entomology, U.C., Riverside. (See, California Plant Pest and Disease Report, Vol. 16, Nos. 1-2, pp. 19-21.)

Table 1. Insects of Lesser Importance in California --1997

Insects Where Examined or Reported

Common Name	Scientific Name	Host	County	Remarks
Bud mite	*Trisetacus alborum*	SP	Siskiyou	Densely planted young sugar pine, near Happy Camp.
Buprestid beetle?	*Agrilus angelicas*	QW	Monterey	Caused twig dieback along Highway 68 between Monterey and Salinas.
Fir bud scale	*Physokermes concolor*	WF	Lassen	Blacks Mountain
Needle weevil	*Scythropus elegans*	PP PP	Modoc, Yuba	Lava Progeny Test Site. Over an 80-acre area.
Omnivorous leafroller	*Platynota stultana*	PP & DF	Butte	1-0 container seedlings at the Chico Genetics Resource Center.
Oystershell scale	*Lepidosaphes ulmi*	WL	San Bernardino	Extensive dieback in the drainage in front of the Deerlick Station, San Bernardino Mountains.
Pine needle scale	*Chionaspis pinifoliae*	JP	San Bernardino	High infestation in one area of Barton Flats.
Pine sawflies	*Neodiprion* sp.	PP	Shasta	Feeding on 10-12 ft tall pines at Shasta Lake City.
Slug sawfly	Tenthredinidae	CI	Shasta	Defoliation occurred around Hillcrest
Sugar pine tortrix	*Choristoneura lambertiana*	PP	Butte	Feeding on nursery stock at Chico Genetic Resource Center
Western tussock moth	*Orgyia vetusta*	BO	Placer	One report
Western yellow-striped armyworm	*Spodoptera praefica*	PP & DF	Butte	1-0 container seedlings at the Chico Genetics Resource Center.

HOST ABBREVIATIONS

BO --California black oak CI --Deer brush DF --Douglas-fir JP --Jeffrey pine PP --Ponderosa pine
QW --Interior live oak SP -Sugar pine WF -White fir WL - Willow

FOREST DISEASE CONDITIONS

Report To The California Forest Pest Council From The Disease Committee

Bill Woodruff, Chair
Susan Frankel, Secretary

FOREST DISEASE CONDITIONS

ABIOTIC DISEASES

AIR POLLUTION

M261E --Sierra Nevada. Twenty-six monitoring plots located between 4,000 and 8,000 feet elevation on the Sierra National Forest were assessed for foliar ozone injury. The plots were first established in 1977 and last visited in 1995. Overall, the visible effects of ozone were less in 1997 than in 1995. In the last 2 years, 77% of the plots showed either less chlorotic mottle or no change in injury rating. One change that was apparent over most of the survey area was a reduction in the number of years needles were retained on the branches of many trees.

M262B --Southern California Mountains and Valleys. The ozone injury index (OII) ranges between 0 (low) and 100 (high). The OII serves as a comparison for other locations where ozone injury to ponderosa or Jeffrey pines has been measured. The OII of the permanent plots established by the Los Padres National Forest in the Tecuya Mountains on the Mt. Pinos District was about 26. In the central and southern Sierra Nevada the OII ranges between 10-20 in Yosemite Park to 30-40 in Sequoia National Park and Mountain Home State Park. In the Barton Flats area of the San Bernardino Mountains the index is about 50, while the worst index observed in the San Bernardino Mountains is 65 at Crestline.

DESSICATION INJURY

M261E --Sierra Nevada. Ponderosa pines in a plantation along Tamarack Road (near Burney, Shasta County), exhibited chlorotic needles and branch tip dieback, apparently from repeated dessication injury. The damage could have been caused by heat, drying winds, drought, or a combination of these factors.

HAIL

M261A --Klamath Mountains. Hail damage was noted on several sections of BLM land east of Clair Engle (Trinity) Lake. Mature Douglas-fir trees were stripped of foliage. About 250 acres were also stripped of foliage in an area north of Highway 36 near Forest Glen (Trinity County). An area of several hundred acres was less severely damaged north of the Scott Valley on the Klamath National Forest. The latter two areas were mainly plantations, with some intermixed natural stands. Species damaged were Douglas-fir, Pacific madrone, and ponderosa pine.

WILDFIRE AND PRESCRIBED BURNS

M261D --Southern Cascades. Conifer mortality continues to be apparent following underburns near Ward Springs, Freebe and Ballard Reservoirs, Hat Creek District, Lassen National Forest. Fire-related mortality was also detected in Lassen Volcanic National Park south of Butte Lake in Jeffrey pine stands, between Teal Lake and Ash Butte in fir, and west of Crater Butte along the Pacific Crest Trail, also in fir-dominated stands.

M261E --Sierra Nevada. Ponderosa and Jeffrey pine mortality continues in the area burned by the Cottonwood fire in 1994, Sierraville District, Tahoe National Forest. Although there is some bark beetle activity, most of the continuing mortality is associated with injuries (cambium kill) sustained during the fire. Pockets of mortality are visible in Badenaugh Canyon, and in the Smithneck and Rock Creek drainages.

Bark beetles heavily attacked ponderosa and Jeffrey pines in the Madallena Fire area (burned 1996, Beckwourth District, Plumas National Forest). No mortality has resulted to date from the attacks.

Some ponderosa pine mortality was detected between Pecks Valley and Greenville Rancheria associated with a prescribed underburn, Mt Hough District, Plumas National Forest.

M261F --Sierra Nevada foothills. Fire and drought-related mortality continued in the Barkley area burned by wildfire in 1994. Very little bark beetle activity has been detected in this area since the fire. This indicates that most of the mortality is associated with fire-related damage, primarily cambium scorch.

FLOOD DAMAGE

M261E --Sierra Nevada. Flood-related damage to conifers and hardwoods in riparian zones was reported for several areas on the Plumas National Forest. Areas of note include the Feather River District: the drainages just south of Bald Eagle Mountain, the Mill Creek drainage north of Bucks Lake, Dogwood Creek, and Blackrock Creek; and the Mt. Hough District: Willow Creek, Indian Creek in Genesee Valley, north of Keddie Peak along Road 28N32, Wolf Creek northwest of Greenville campground, and in the Indian

Creek and Pierce Creek drainages northwest of Antelope Lake. Two areas of flood damage were reported from the Beckwourth District --- Jackson Creek and Consignee Creek along Highway 70.

CANKER DISEASES

PITCH CANKER, caused by *Fusarium subglutinans* f.sp. *pini*

261A --Central California Coast. In June 1997, the Board of Forestry established the Coastal Pitch Canker Zone of Infestation with the intent of slowing disease spread. This is the first time a zone of infestation was declared for a pathogen. The zone covers 23.1 million acres, including parts of 21 counties (17 infested counties and 4 adjacent counties that might reasonably be expected to become infested in the near future).

Although the total number of counties infested with pitch canker remained at 17, the disease continues to spread and intensify in all three of California's native Monterey pine stands and within ornamental plantings throughout the infested area.

An intensive survey of the Cambria native Monterey pine stand (2,500 acres) found pitch canker to be more prevalent than previously thought. The survey, done by citizen volunteers, the California Department of Forestry, and Greenspace The Cambria Land Trust, found that the pathogen has been in the Cambria stand at least five to seven years prior to 1994 (when it was first officially identified in Cambria). High levels of infestation were found at San Simeon State Park and the Lodge Hill section of the city of Cambria (San Luis Obispo County). Areas of heaviest infestation appear to be correlated with high densities of people and small parcels of land, along main arteries of transportation, near wood waste processing sites, Christmas tree farms, and campgrounds.

The Pebble Beach Company reported that out of 2,500 potted Monterey pines propagated from native trees, 300 are showing resistance to pitch canker (Monterey County).

TANOAK DECLINE, Unknown

261A --Central California Coast. Mature tanoak in two locations near Bonny Doon (Santa Cruz County) are dying due to an unknown cause. Trees on the edges of clearings are dying, while those in interior portions of stands are healthy. Infections may be associated with sapsucker damage. On the bole, pie-shaped sections of heartwood and adjacent sapwood and cambium are dead. Pole-size Douglas-fir in both locations are dying as well. A *Diplodia* sp. (*Sphaeropsis*) has been recovered from the dying tanoak at one location. A pathogenicity test with the recovered fungus is planned.

DIPLODIA BLIGHT OF PINES, caused by *Sphaeropsis sapinea* (*Diplodia pinea*)

M261A --Klamath Mountains, M261C --Northern California Interior Coast Ranges, M261D --Southern Cascades, M261E --Sierra Nevada, 261F --Sierra Nevada Foothills, 262 --Great Valley. Shoot dieback caused by Sphaeropsis sapinea was observed on ponderosa pines at numerous locations in Northern California: Weaverville, Trinity County; Whiskeytown National Recreation Area, Old Shasta, and Bella Vista, Shasta County; Sacramento River canyon from Mountain Gate to Dunsmuir, Shasta County; Paradise, Butte County; at various locations in El Dorado County from Camino and Placerville to Georgetown; and Manton, Tehama County. Diseased trees were growing at elevations of roughly 1,000 to 2,500 feet. The range of observations suggest the disease was widespread at this elevational band. Mature and over mature trees were more likely to be infected. Individual trees varied considerably in the number of blighted twigs, with the most severely affected show--Klamath Mountains. Black oak in the Sacramento River Canyon from Lakehead to Dunsmuir and around Whiskeytown Lake (Shasta County) were severely infected by foliage diseases caused by the fungi *Septoria quercicola* and *Cylindrosporium kelloggii*. Infected leaves began to turn brownish-orange in August, had numerous small angular spots, and dropped prematurely. Late spring and summer rains apparently favored infection.

DOUGLAS-FIR NEEDLE CAST, caused by *Rhabdocline weirii* ssp. *weirii*

M261B --Northern California Coast Ranges. Douglas-fir needle cast affected several acres of seedlings and saplings on the Stoneyford District, Mendocino National Forest. This is the first report of this fungal subspecies in the coast ranges.

M261E --Sierra Nevada. The Pineridge District, Sierra National Forest, reported premature loss of 1996 foliage from Douglas-fir in approximately 10 Sections in the San Joaquin River drainage west of Huntington Lake and along Stump Springs Road. The cause was

identified as *Rhabdocline weirii* ssp. *weirii*. Needle yellowing was readily observable in April, but by early summer the affected foliage had dropped and evidence of the disease was no longer conspicuous. The only previous report of this fungal subspecies in California was in 1927 from the Quincy area (Plumas County).

ELYTRODERMA DISEASE, caused by *Elytroderma deformans*

M261D --Southern Cascades. Elytroderma disease is established on the west side of Lake Almanor, Plumas County. The disease has infected up to 90 percent of the crowns of most of the trees in 30-year-old plantations of ponderosa and Jeffrey pine. Approximately 100 acres of plantations in three stands are affected.

M262B --Southern California Mountains and Valleys. Elytroderma disease was widespread on Jeffrey pines in the Laguna Mountain Area, San Diego County.

SYCAMORE ANTHRACNOSE, caused by *Apiognomonia veneta* (*Gnomonia platani*)

M262B --Southern California Mountains and Valleys. Sycamore anthracnose caused by Apiognomonia veneta (Gnomonia platani) was common on sycamore (Platanus spp.) in the Dripping Springs Campground on the Palomar District, Cleveland National Forest.

NURSERY DISEASES

CHARCOAL ROOT ROT, caused by *Macrophomina phaseolina*

Seedling mortality from charcoal root rot decreased from approximately 15% of the 2-0 red fir crop at Placerville Nursery in 1996 to less than 1% in 1997. Moderate temperatures in summer reduced seedling stress and made the soil environment less conducive to the disease development. Damage to Douglas-fir, white fir, sugar pine, pinyon pine and giant sequoia (all 1-0 seedlings) was also low.

SMUT, caused by *Ustilago* sp.

Smut caused dieback of about 5% of the California brome being grown for seed at the Placerville (El Dorado County) and Humboldt (Humboldt County) Nurseries. The smut also serves as a food source for the smut beetle that mines into the seed heads.

RUST, caused by *Puccinia* sp.

This rust killed approximately 20% of the California fescue planted for seed at Humboldt Nursery (Humboldt County).

RED BAND NEEDLE BLIGHT, caused by *Mycospharella* (*Scirrhia*) *pini*

The imperfect stage (*Dothistroma septospora*) of red band needle blight killed less than 5% of the sugar pine at Humboldt Nursery. Needles were dead from the tip to the needle mid-point and damage was spotty throughout the crop.

PHOMOPSIS CANKER, caused by *Phomopsis occulata*

Less than 1 percent of the western hemlock at Humboldt Nursery had pitchy lesions at the base of their crowns and dead tops, but healthy root systems. The lesions were caused by *Phomopsis occulata* and occurred on transplanted plugs grown at a private nursery.

ERGOT, caused by *Claviceps* spp.

Great Basin wild rye grown at Placerville and Humboldt Nurseries was infected with Claviceps spp. Seeds showed two stages of ergot expression. First the seeds appeared orange, caused by the asexual stage of the fungus. Later the seeds enlarged and turned black. The black kernels are the fungus' sclerotia, its overwintering stage. Ergot sclerotia are poisonous to humans and livestock and at high levels is a hazard to foraging animals. Infections rates at both nurseries were low (less than 1%) and most ergots could be picked off the seed-drying tables and destroyed.

CONTAINER NURSERY PATHOGENS

The Chico Genetic Resource Center container nursery (Butte County) experienced insignificant losses (%) to gray mold (caused by Botrytis cinerea), *Fusarium* sp., and an unknown root rot. Several seed sources that have historically demonstrated a pattern of high losses to Fusarium root rot again showed this pattern.

ROOT DISEASES

ANNOSUS ROOT DISEASE, caused by *Heterobasidion annosum*

M261E --Sierra Nevada Section. Five mixed-conifer sites that were evaluated for insects and pathogen activity were found to have annosus root disease on either red or white fir. The locations include one site on the west side of Lake Tahoe along the road to Fallen Leaf Lake; two timber stands on the Stanislaus National Forest (Groveland and Calaveras Ranger Districts); and two recreation sites on the Sequoia National Forest (Quaking Aspen Campground and Lewis Camp Trailhead). Identification of this root disease was confirmed by the presence of viable fruiting bodies inside of stumps. These findings support the belief that annosus root disease is well established in Sierra Nevada mixed-conifer stands and is commonly present in stands where trees have been cut.

M262B --Southern California Mountains and Valleys. Annosus root disease was commonly found in the national forests in southern California. Annosus root disease was responsible for the death of several large ponderosa x Jeffrey pines on the Monterey District, Los Padres National Forest.

ARMILLARIA ROOT DISEASE, caused by *Armillaria* sp.

262A --Great Valley. Four grafted trees in the Douglas-fir seed orchard at the Chico Genetic Resource Center had evidence of Armillaria mellea. The dead trees were near stumps of trees that had previously been removed. It is unknown if Armillaria root disease contributed to tree mortality. In a separate area, *Armillaria* sp. continues to cause mortality in old Chinese maple (*Acer truncatum*). Three trees were lost this year.

BLACK STAIN ROOT DISEASE, caused by *Leptographium wageneri*

M261E --Sierra Nevada. Black stain root disease was identified in 50-foot tall Douglas-firs in the USDA-Forest Service Seed Orchard at Foresthill in Placer County. The disease has killed two trees and has infected two to four adjacent trees.

M262B --Southern California Mountains and Valleys. Black stain root disease and the pinyon ips were found causing mortality in singleleaf pinyon pine on about 5,500 acres on the Mountaintop and San Jacinto Districts, San Bernardino National Forest.

PORT-ORFORD-CEDAR ROOT DISEASE, caused by *Phytophthora lateralis*

M261A --Klamath Mountains. Fish Lake Creek was surveyed from Blue Lake to below Fish Lake for the presence of dying Port-Orford-cedars (Orleans District, Six Rivers National Forest). Monitoring plots were established along the creek to determine rate of spread and disease development in a newly infested drainage. It was found that the disease was already present in trees around Fish Lake, although no infection was identified below the outlet from the lake. Significant numbers of trees are symptomatic along the creek, especially along sections with slow moving water and areas where high water covers flat ground. An environmental analysis of alternatives to address this situation in association with Fish Lake Campground was done and actions are planned for 1998 to reduce the risk of spread to other drainages. (Also see, Surveys and Evaluations, Port-Orford-cedar)

M261B --Northern California Coast Range. The lower stretches of Potato Patch Creek, Humboldt County, were surveyed to locate evidence of Port-Orford-cedar root disease. The private landowner had implemented a treatment strategy of removing all cedars along the creek that might be at risk of infection. About 2.5 miles of this stream on federal and private land have had cedars removed in order to reduce the risk of spread of the disease. Observations will continue to determine efficacy.

M261D --Southern Cascades. Surveys upstream and upslope from the Port-Orford-cedar infection site south of Dunsmuir, Shasta Country, did not identify additional areas with this root disease. This site appears to be the only location in the Sacramento River basin with this root disease. The origin of infection is still unknown.

DWARF MISTLETOES

WESTERN DWARF MISTLETOE, caused by *Arceuthobium campylopodum*

M261A --Klamath Mountains. Approximately 3,000 acres of ponderosa pine plantations and immediately surrounding stands on the Mt. Shasta District, Shasta-Trinity National Forests, were surveyed for dwarf mistletoe. The information is being compiled in a database for use to determine suppression opportunities and needs.

M261E --Sierra Nevada. More than 10,000 acres in the Piute Mountains were surveyed for western dwarf mistletoe infestations by personnel on the Cannell Meadow District, Sequoia National Forest. Jeffrey pine was the primary host infected. Results of the survey will be used to prioritize stands for future treatment.

Dwarf mistletoe suppression projects were completed on three recreation sites, covering 53 acres, on the Sequoia National Forest. The species targeted for pruning and tree removal was western dwarf mistletoe on ponderosa and Jeffrey pines. Sites treated were Long Meadow, Lower Peppermint and Jerky Trailhead Campgrounds.

261B, M262B --Southern California Mountains and Valleys. Dwarf mistletoes continue to be serious problems in national forest recreation areas in southern California. The Five-Year Dwarf Mistletoe Suppression Program was established to reduce their influence on tree longevity. Accomplishments for 1997 are given in Surveys and Evaluations.

TRUE MISTLETOES

TRUE MISTLETOE, caused by *Phoradendron* spp.

261B, M262B --Southern California Coast, Southern California Mountains and Valleys. True mistletoes are continuing to cause dieback and decline in developed recreation sites on all national forests in southern California. Hardwood species as well as conifer species are affected.

RUST DISEASES

WESTERN GALL RUST, caused by *Peridermium harknessi*

263A --Northern California Coast. Branch flagging associated with infection of western gall rust is quite common from Bodega Bay (Sonoma County) to Rockport (Mendocino County) on planted Monterey pines and native Bishop pines. Large numbers of branch galls of roughly the same age indicate that one or more "wave years" of heavy gall rust infection occurred several years ago.

261A-Central California Coast. Numerous infections were found on mature and overmature ponderosa pine near Bonny Doon in Santa Cruz County. Infections are dated to 1992 and 1993, coincidental with wave year infections of blister rust on sugar pine. Associated knobcone pines are not infected.

INCENSE-CEDAR RUST, caused by *Gymnosporangium libocedri*

M261A --Klamath Mountains. Incense-cedars along Squaw Valley Road at Fridays Resort, Siskiyou County, were heavily infected with incense-cedar rust. The gelatinous telial stage of the rust was so heavy that some saplings were bent to the ground from the weight. Abundant telia also generated a number of rust reports by homeowners in the Mt. Shasta area.

WHITE PINE BLISTER RUST, caused by *Cronartium ribicola*

Review of white pine blister rust for 1997 is given in Surveys and Evaluations, Re-Measurement of Disease Survey Plots for White Pine Blister Rust Incidence and Sugar Pine Genetics Program, USDA Forest Service, Pacific Southwest Region.

SURVEYS AND EVALUATIONS

Surveys and evaluations of forest health are conducted every year in California. These may be annual, periodic, or singular in frequency. The surveys, evaluations and projects of this section are not a comprehensive compilation, only those annually followed in this publication or those of current, topical interest.

Aerial Survey

Aerial survey is flown over all national forests and the major national parks in California. The tree mortality observed is sketched on forest maps and these polygons are then referenced against a GIS forest data base to estimate annual forest mortality. Only acres with concentrations of mortality are mapped. What defines a polygon of concentrated mortality is still being debated at a national level, but aerial observers usually map what they see with the exception of "scattered" mortality. In years of high rates of tree mortality, scattered mortality or small groups of mortality may be overlooked; whereas in years of low rates of mortality, scattered mortality or small groups would more likely catch the observers eye. Thus, there is bias in the observations in addition to other observer error and the figures derived can only be considered an approximation of true mortality; but taken over time, they show mortality trends which reflect forest health.

In the past mortality has been largely attributed to bark beetles. Bark beetles are the most visible factor, but mortality is very frequently a result of a "complex" of factors that also includes root diseases, drought, senescence, competition within forest stands as a result of overstocking, and other site specific conditions or agents.

Tree Mortality in 1997. Fir mortality continued to decrease throughout California in 1997 (Table 1). Pine mortality was low in southern California and in the central and southern Sierra, but acres and volumes were up somewhat in far northern California when compared with 1996. However, the overall mortality trend since the end of the drought in the early 1990s is downward.

Table 1. Tree mortality within the national forest system, California --1997[a]

	Pine Mortality			Fir Mortality		
Locale	**Acres**	**Volume**	**no. of trees**	**Acres**	**Volume**	**no. of trees**
Northern California	67,955	38.30	217,561	10,791	25.78	115,308
Cascade/Northern Sierra	4,193	2.39	49,641	3,111	3.33	25,188
Central/Southern Sierra	4,111	6.12	52,672	257	0.32	2,681
Southern California	1,884	0.02	5,633	145	0.00 [b]	602
TOTALS	78,143	46.83	325,507	14,304	29.43	134,802

[a] All volumes are in millions of board feet.

[b] Trace; did not register with computer program.

Table 2. Corrected table for tree mortality within the national forest system, California --1996

	Pine Mortality [a]		Fir Mortality [a]	
Locale	**Acres**	**Volume [b]**	**Acres**	**Volume**
Northern California	**29,207** [c]	7.80	30,225	18.26
Cascade/Northern Sierra	2,030	1.05	6,911	0.70
Central/Southern Sierra	15,677	9.27	21,412	12.83
Southern California	877	0.17	0	0.00
TOTALS	47,791	18.12	58,548	31.79

a Acres with concentrations of mortality as seen by aerial survey.

[b] All volumes are in millions of board feet.

[c] Highlighted numbers are corrected from a transposition error.

Demonstration Thinning Plots in the Eastside Pine Type, 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. Eighteen years after thinning, the treatments had reduced mortality from 90 to 100 percent of the level in unthinned stands (Table 3).

Table 3. Commercial Tree Mortality by Stocking Level, Eighteen Years after Thinning by percentage of trees per acre[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
Mean	0.0	0.1	0.1	2.2
Range	0	0-0.5	0-0.8	0.0-5.2

Percent Mortality Reduction Compared with Normal

Basal Area	100	95.5	95.5	----

[a] Commercial trees are 8 inches d.b.h. 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 (Normal basal area: 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.)

1997 Cooperative Douglas-fir tussock moth pheromone detection survey

Average trap catches for the 1997 cooperative Douglas-fir tussock moth pheromone detection survey showed decreases for several plots compared to 1996 catches (Table 4). Data were collected for 142 plots (5 traps/plot) during 1997. Of these, 125 plots (88%) had fewer than an average of 25 male moths per trap, the remaining plots averaged 25 or more moths per trap. For most plots this is a downward trend from average counts recorded in 1995 and 1996. Plots which averaged 25 moths per trap for 1997 were located on the following Ranger Districts: M261E --- Calaveras, Stanislaus National Forest; Pacific and Placerville, Eldorado National Forest; Downieville and Nevada City, Tahoe National Forest; Mt. Hough, Plumas National Forest; and M261D -- Almanor, Lassen National Forest. In addition to these plots on National Forests, the California Department of Forestry monitored one plot near La Porte (Sierra County) that averaged 25 moths per trap. Noticeable defoliation was not detected in any of the plots.

Year-to-year fluctuations in trap counts are very common with the Douglas-fir tussock moth. Declines can occur prior to reaching outbreak levels, which seems to be the case for most plots when comparing 1996 and 1997. Although high trap catches and defoliation are not anticipated within most areas monitored by the plot system during 1998, a potential outbreak has been detected on the Sequoia National Forest and the Sequoia/Kings Canyon National Parks. (See Douglas-fir Tussock Moth, M261E) Egg mass surveys will be necessary within this area. In addition, Forest Pest Management will continue to monitor other life stages and adult males at established pheromone survey plots and in the areas where monitored activity exceeded an average of 25 males/trap.

Table 4. Number of Male Douglas-fir Tussock Moths Caught per Trap at Pheromone Survey Plots in California, 1979 to 1997.

Year	No. of Plots	Average Moth Catch per Trap (5 traps/plot)													
		<10	<20	<25	<30	<35	<40	<45	<50	<55	<60	<65	<70	<75	75+
1979	102	97	2	1	1	0	1	0	0	0	0	0	0	0	0
	%	95	2	2	2	0	2	-	-	-	-	-	-	-	-
1980	99	99	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	100	-	-	-	-	-	-	-	-	-	-	-	-	-
1981	93	78	10	4	1	0	0	0	0	0	0	0	0	0	0

	%	84	10	4	2	-	-	-	-	-	-	-	-	-	-
1982	95	93	1	0	1	0	0	0	0	0	0	0	0	0	0
	%	98	1	0	1	-	-	-	-	-	-	-	-	-	-
1983	98	87	6	1	1	3	0	0	0	0	0	0	0	0	0
	%	89	6	1	1	3	-	-	-	-	-	-	-	-	-
1984	111	51	18	11	5	7	8	4	3	4	0	0	0	0	0
	%	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
	%	55	13	4	7	6	5	1	2	4	1	2	0	1	-
1986	107	64	16	4	8	6	1	3	0	1	0	1	1	1	1
	%	60	15	4	7	6	1	3	0	1	0	1	1	1	1
1987	108	80	15	4	2	1	1	3	0	1	0	0	1	0	0
	%	74	14	4	2	1	1	3	0	1	0	0	1	-	-
1988	124	105	9	3	3	0	2	1	0	0	0	0	0	0	0
	%	86	9	2	2	0	2	1	-	-	-	-	-	-	-
1989	130	129	1	0	0	0	0	0	0	0	0	0	0	0	0
	%	99	1	-	-	-	-	-	-	-	-	-	-	-	-
1990	138	135	1	0	1	1	0	0	0	0	0	0	0	0	0
	%	97	1	0	1	1	-	-	-	-	-	-	-	-	-
1991	143	135	4	1	0	0	2	1	0	0	0	0	0	0	0
	%	94	3	1	0	0	1	1	-	-	-	-	-	-	-
1992	164	156	3	0	2	1	0	0	0	0	1	0	1	0	0
	%	95	1	0	1	1	0	0	0	0	1	0	1	-	-
1993	143	135	8	0	0	0	0	0	0	0	0	0	0	0	0
	%	94	6	-	-	-	-	-	-	-	-	-	-	-	-
1994	151	139	11	1	0	0	0	0	0	0	0	0	0	0	0
	%	92	7	1	-	-	-	-	-	-	-	-	-	-	-
1995	158	77	35	13	16	7	7	3	0	0	0	0	0	0	0
	%	49	22	8	10	5	4	2	-	-	-	-	-	-	-
1996	149	33	26	16	8	7	12	9	5	8	6	8	5	1	5
	%	22	17	11	6	4	8	6	3	6	4	6	3	1	3

1997	142	88	27	10	9	4	3	0	0	1	0	0	0	0	0
	%	62	19	7	6	3	2	-	-	-	-	-	-	-	-

Lodgepole Needleminer in Yosemite National Park --1997

"Summary: Needleminer population densities have increased sharply around Tenaya Lake. New areas of visible defoliation should be expected to appear in the next two to four years. Most lodgepole pine stands in the area are comprised of healthy comparatively young trees so no mortality is expected in the immediate future. Population densities remain low in the Tuolumne Meadows area with no visible defoliation expected. Extensive areas of heavily defoliated lodgepole forest exist both north and south of the heavy visitor use zone where they are traversed by long sections of the Pacific Crest Trail and the High Sierra Loop Trail. Both continued defoliation and tree mortality should be anticipated in these areas." (Thanks to Dr. T.W. Koerber, Entomological Service Company, Berkeley, CA for providing this information in 1997 and years past. ed.)

Table 5. Lodgepole Needleminer Population Density, Yosemite National Park Mature Larvae and Pupae per 100 Tips --July

YEAR					% Change
PLOT	**1991**	**1993**	**1995**	**1997**	**1995 to 1997**
Upper Tenaya	ND	4	6	72	
Cathedral Creek West	ND	2	ND	8	
Cathedral Creek South	2	2	2	92	
Cathedral Creek East	ND	2	ND	ND	
May Lake	152	368	418	130	
Dog Lake	2	10	2	ND	
West Kyell	ND	ND	2	ND	
Kuna	4	2	ND	ND	
	20.0	48.7	61.4	37.7	- 39.1
Budd Creek	2	8	10	86	
Cathedral Lake	4	4	40	224	
Dingley Creek	2	8	6	8	
Delaney Creek	2	18	10	38	
Dana Meadow	ND	ND	ND	ND	
	2.0	7.6	13.2	71.2	439.4
Olmstead #1	168	278	266	190	
Olmstead #2	14	10	2	14	
Murphy Creek	4	ND	6	8	

Lower Tenaya	ND	ND	ND	18	
Mt. Hoffman	6	6	2	ND	
Pear Pits	2	ND	ND	2	
	35.3	49.0	46.0	38.7	- 15.9
Lembert Dome	ND	2	ND	2	
Campground	ND	ND	ND	ND	
Plot G	4	ND	ND	12	
Plot H	ND	ND	2	2	
Base Camp	ND	2	ND	4	
Plot A	ND	ND	ND	ND	
Plot O	4	4	ND	4	
Tenaya Beach	6	6	12	18	
Tenaya P.A.	26	44	14	68	
	4.4	6.7	3.1	12.2	293.5
ND --Population densities below detection limits.					

Inventory for Port-Orford-cedar on the Six Rivers National Forest

In 1996, the Forest Service established field plots for a vegetation inventory on the Six Rivers National Forest. As part of this inventory, additional plots were established to provide statistically valid information on the population of Port-Orford-cedar (POC) on the Forest. A total of 82 permanent plots were established on the Forest within the area previously mapped as having POC present. Plots outside of the mapped area did not have POC recorded. This provides some validation of the accuracy of the 1992 mapping effort. A wide array of data on the vegetation was gathered. Thirty-one of the plots actually had POC present. Of these, only 3 had trees with POC root disease identified. The total volume of living POC in the mapped area (144,874 acres) on the Forest was about 72 million cubic feet. The proportion of the total conifer growing stock that was POC was 9 percent. The number of POC stems per acre, seedlings and larger, was greater in the area mapped as having disease present. The proportion of the total POC volume that had died during the previous 5 years was higher in the area where root disease was present (32% vs. 7%), as was the mortality volume per acre. Examination of the current size class distribution of POC and the basal area growth during the previous 10 years indicates that POC is reproducing itself and is well represented across all size classes.

Details of this inventory can be found in "Inventory of Port-Orford-cedar on the Six Rivers National Forest --1996" by Gregg DeNitto (December 31, 1997. Report Number N97-3. Forest Pest Management, Northern CA Shared Services Area, Pacific Southwest Region, USDA Forest Service. Redding, CA. 5p. + Tables).

Southern California Five-year Dwarf Mistletoe Suppression Program --Accomplishments in 1997

1. Angeles National Forest, Mt. Baldy Ranger District --Crystal Lake Campground. This project included removal of witches' brooms, branch pruning, and some tree removals. This year, 74 trees were pruned and 4 trees were removed from the 130 acres.

2. Los Padres National Forest, Mt. Pinos Ranger District --Organizational Camps and Mt. Pinos Recreation Area. In 1997, 1,800 trees were pruned and 200 trees were removed from the 130 acres.

3. Los Padres National Forest, Ojai Ranger District --Pine Mountain Area. No trees were removed from the 60 acres that were

treated; 140 trees were either broom or branch pruned.

4. San Bernardino National Forest --Developed Recreation Areas. The project included both broom and branch pruning and tree removals. Four trees were removed and 106 trees were pruned in the 22-acre project.

5. Cleveland National Forest, Descanso Ranger District --Laguna Mountain Recreation Area. This project of 40 acres utilized removal of witches' brooms, branch pruning and tree removals; 278 trees were pruned for the first time, 57 trees were re-pruned because of latent infections, and 38 trees were removed.

Re-Measurement of Disease Survey Plots for White Pine Blister Rust Incidence

Incidence of white pine blister rust (caused by *Cronartium ribicola*) was re-measured at six permanent, one acre plots in northern and central California. The plots were established in 1949-1951 by pathologist Reed Miller of the Pest Control Branch (now Forest Pest Management). A total of 469 sugar pine trees were examined in 1995 or 1996. Blister rust percent infection had increased from 0 in 1949-1950 to an average of 12.2% in 1995-1996. Forty of the 469 trees (8.5%) had lethal bole cankers. Total percent infection ranged from 4.5% at Mayflower Ranch (Klamath National Forest) to 18.4% at Bumblebee Creek (Klamath National Forest). Overall infection was greatest on seedlings and saplings and decreased as tree diameter class increased. There was no obvious correlation between percent sugar pine infected and total number or infected number of Ribes bushes on the plots.

The re-measurements of rust incidence indicated that healthy, reproducing sugar pine remain, despite the presence of the introduced pathogen for some 45 years, in areas where rust may now be considered endemic. Except for the low levels of rust recorded at Mayflower Ranch, (the level may be low because only a few sugar pine were recorded on the plot) there was not much variability in percent infection by plot location.

Additional information can be found in "Re-measurement of Disease Survey Plots for White Pine Blister Rust Incidence" by John Kliejunas (October, 1997. Report Number R97-02. Forest Pest Management, Pacific Southwest Region, USDA Forest Service. San Francisco, CA. 9 p. + Appendices).

Sugar Pine Genetics Program, USDA Forest Service, Pacific Southwest Region.

Fifth year results of testing 200 families from the Klamath Province show 37 percent of the sugar pine dead from rust, 51 percent infected and living, 11 percent rust-free, and 1 percent with bark reaction.

Progeny of 1,128 trees (67,680 seedlings) were grown and inoculated for major gene resistance (MGR) evaluation at the sugar pine greenhouses in Placerville Nursery. The Program has a total of 1,045 rust resistant sugar pine trees.

In 1997, the rust resistance program completed 121 controlled-cross pollinations and collected pollen for future breeding work. Cones were bagged and collected from 1996 controlled-cross pollinations. Assessments for "slow rusting" mechanisms and electronic data collection was completed for 1988, 1989, 1992 slow rusting resistant sugar pine (SRSP) fields. Epidemiological plot data for virulent-race (v-race) development was collected at Happy Camp, Klamath National Forest. (V-race, the rust has the capacity to overcome major gene resistance.) Three rust test fields were prepared, laid-out, planted, matted, and mapped. A spring planting was completed for a total of 4,889 SRSP seedlings and 450 western white pine seedlings (Oregon-Washington Cooperative Project).

V-race aecia on Thompson Ridge (5042), Klamath National Forest, and *Ribes* leaves with telia for v-race monitoring were collected and provided to Bohun Kinloch, Pacific Southwest Research Station. Inoculum was supplemented into 1990-1991 SRSP fields with potted *Ribes nigrum*.

Slow rusting individuals from 1986 and 1987 SRSP fields and 133 major gene resistant (MGR) parents were grafted for seed orchard and clone bank establishment. A total of 1,300 potted grafts were transplanted at Badger Hill clone bank (El Dorado County) and Foresthill seed orchard (Placer County).

Work with other white pines, western white, foxtail and whitebark pines, was enhanced. Fifty whitebark pine and ninety-three western white pine candidates were inoculated during the fall of 1997. Stands of whitebark pine at Mt. Rose, (Douglas County, Nevada), Stevens Peak (Alpine County), Sonora Pass (Mono County) and Carson Pass (Alpine County) were surveyed for rust infection. At Mt. Rose and Carson Pass, rust was observed in 83% of the clumps investigated. Within a clump 34% of the stems were infected. At Stevens Peak, infection was less than 2%; no infections were found at Sonora Pass.

APPENDIX A. National Hierarchy of Ecological Units in California

HUMID TEMPERATE DOMAIN

Division	Province	Section
260-Mediterranean	261-CA coastal chaparral forest and shrub	261A-Central CA coast 261B-Southern CA coast
	262-CA dry steppe	262A-Great Valley
	263-CA coastal steppe, mixed and redwood forest	263A-Northern CA coast
M260-Mediterranean	M261-Sierran steppe, mixed and coniferous forest and alpine meadow	M261A-Klamath mountains regime mountains M261B-Northern CA coast ranges M261C-Northern CA interior coast ranges M261D-Southern Cascades M261E-Sierra Nevada M261F-Sierra Nevada foothills M261G-Modoc plateau
	M262-CA coastal range open woodland, shrub, continuous forest, meadow	M262A-Central CA coast ranges M262B-Southern CA mountains and valleys
DRY DOMAIN		
Division	Province	Section
320-Tropical/subtropical desert and desert	322-American semi-desert	322A-Mojave desert 322B-Sonoran Mojave desert 322C-Sonoran Colorado desert
340-Temperate desert	341-Intermountain semi-desert and desert	341D-Mono
	342-Intermountain semi-desert	342B-Northwestern basin and range

APPENDIX B. Index of Scientific and Common Names

Scientific and common names mentioned in this report are listed in alphabetic order by common name.

Insects

Common name - *Scientific name*

Bark beetles

California fivespined ips - *Ips paraconfusus*

Cedar bark beetles - *Phloeosinus sp.*

Douglas-fir beetle - *Dendroctonus pseudotsugae*

Douglas-fir engraver - *Scolytus unispinosus*

Fir engraver - *Scolytus ventralis*

Jeffrey pine beetle - *Dendroctonus jeffreyi*

Monterey pine ips - *Ips mexicanus*

Mountain pine beetle - *Dendroctonus ponderosae*

Pine engravers - *Ips* spp.

Pinon ips - *Ips confusus*

Red turpentine beetle - *Dendroctonus valens*

Western pine beetle - *Dendroctonus brevicomis*

Defoliators

Black pineleaf scale - *Nuculaspis californica*

California oakworm - *Phryganidia californica*

California budworm - *Choristoneura carnana californica*

Douglas-fir tussock moth - *Orgyia pseudotsugata*

Elm leaf beetle - *Xanthogaleruca luteola*

Fruittree leafroller - *Archips argyrospilus*

Gypsy moth - *Lymantria dispar*

Lodgepole pine needleminer - *Coleotechnites milleri*

Modoc budworm - *Choristoneura retiniana*

Needle weevil - *Scythropus elegans*

Pacific tent caterpillar - *Malacosoma constrictum*

Pine needleminer - *Coleotechnites* sp., nr. *milleri*

Silverspotted tiger moth - *Halisidota argentata*

Slug sawfly - Tenthredinidae

Tent caterpillar - *Malacosoma* sp.

Western tent caterpillar - *Malacosoma californicum*

White fir needleminer - *Epinotia meritana*

Tree regeneration insects

Black vine weevil - *Otiorhynchus sulcatus*

Branch and twig beetles - *Carphoborus pinicolens*
Pityophthorus tuberculatus
Pityophthorus conifertus
Pityophthorus jeffreyi
Pityophthorus sp.

Douglas-fir reproduction weevil - *Cylindrocopturus furnissi*

Gouty pitch midge - *Cecidomyia piniinopsis*

Omnivorous leafroller - *Platynota stultana*

Pine needle sheathminer - *Zelleria haimbachi*

Pine reproduction weevil - *Cylindrocopturus eatoni*

Pine sawfly - *Neodiprion* sp.

Roundheaded fir borer - *Tetropium abietis*

Sugar pine tortrix - *Choristoneura lambertiana*

Western tussock moth - *Orgyia vetusta*

Western yellow-stripped armyworm - *Spodoptera praefica*

Other

Africanized honey bee - *Apis mellifera scutellata*

California flatheaded borer - *Melanophila californica*

Fir bud scale - *Physokermes concolor*

Flatheaded borer - *Agrilus angelicas*

Flatheaded fir borer - *Melanophila drummondi*

Gall wasp - Eurytomidae (seed chalcid)

June beetles - Scarabidae

Smut beetle - *Phalacrus politus*

Mites

Bud mite - *Trisetacus alborum*

PATHOGENS

Common name of the disease - *Scientific name of pathogen*

Cankers

Diplodia blight of pines - *Sphaeropsis sapinea* (*Diplodia pinea*)

Pitch canker - *Fusarium subglutinans* f. sp. *pini*

Phomopsis canker *Diaporthe lokoyae*
Diplodia (*Sphaeropsis*) sp.

Dwarf mistletoes

Western dwarf mistletoe - *Arceuthobium campylopodum*

Foliage diseases

Black oak leaf spot - *Cylindrosporium kelloggii*

Douglas-fir needle cast - *Rhabdocline weirii* ssp. *weirii*

Elytroderma needle disease - *Elytroderma deformans*

Fir needle cast - *Lirula abietis-concoloris*

Fusarium hypocotyl rot - *Fusarium* spp.

Leaf spot of arbutus - *Coccomyces arbutifolius*

Sycamore anthracnose - *Apiognomonia veneta* (*Gnomonia platani*)

Septoria quercicola

Nursery diseases

Charcoal root rot - *Macrophomina phaseolina*

Ergot - *Claviceps* spp.

Fusarium - *Fusarium* spp.

Gray mold - *Botrytis cinerea*

Needle cast - *Dothistroma septospora*

Phomopsis canker - *Phomopsis occulata*

Red band needle blight - *Mycospharella* (*Scirrhia*) *pini*

Dothistroma septospora (imperfect stage)

Rust - *Puccinia* sp.

Smut - *Ustilago* sp.

Root dis em>Peridermium harknessi

Incense-cedar rust - *Gymnosporangium libocedri*

White pine blister rust - *Cronartium ribicola*

True mistletoes

Leafy mistletoe - *Phoradendron* spp.

TREES

COMMON name - *Scientific name*

Conifers

Pines - *Pinus* spp.

Bishop pine - *Pinus muricata*

Coulter pine - *Pinus coulteri*

Jeffrey pine - *Pinus jeffreyi*

Knobcone pine - *Pinus attenuata*

Lodgepole pine - *Pinus contorta* var. *murrayana*

Monterey pine - *Pinus radiata*

Ponderosa pine - *Pinus ponderosa*

Singleleaf pinyon pine - *Pinus monophylla*

Sugar pine - *Pinus lambertiana*

True firs - *Abies* spp.

Red fir - *Abies magnifica*

White fir - *Abies concolor*

Others

Douglas-fir - *Pseudotsuga menziesii*

Incense-cedar - *Libocedrus decurrens*

Port-Orford-cedar - *Chamaecyparis lawsoniana*

Western hemlock - *Tsuga heterophylla*

Hardwoods

Oaks - *Quercus* spp.

Blue oak - *Quercus douglasii*

California black oak - *Quercus kelloggii*

Interior live oak - *Quercus wislizenii*

Other, California natives

Alder - *Alnus* sp.

Chinese maple - *Acer truncatum*

Sycamore - *Platanus* spp.

Tanoak - *Lithocarpus densiflorus*

Shrubs

Ceanothus - *Ceanothus* sp.

Current, gooseberry - *Ribes* spp.

European black current - *Ribes nigrum*

Grasses

California brome - *Bromus carinatus*

California fescue - *Festuca californica*

Great Basin wild rye - *Elymus cinereus*

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