

USDA Forest Service
Pacific Southwest Region
Forest Pest Management

A Publication of the California Forest Pest Council

Forest Pest Conditions in California —1995

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The California Forest Pest Council

The California Forest Pest Council (formerly the California Forest Pest Control Action Council) was founded in 1951. 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 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.

The report, *Forest Insect and Disease Conditions in California —1995*, 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 managers participate,
2. information generated by Forest Pest Management, Pacific Southwest Region, USDA-Forest Service, while making formal detection surveys and biological evaluations,
3. reports and surveys of conditions on private lands provided by personnel of the California Department of Forestry and Fire Protection, and
4. surveys and detections of the California Department of Food and Agriculture.

This report was prepared by the U.S. Forest Service and the California Department of Forestry and Fire Protection, and published and distributed by the California Department of Forestry and Fire Protection in cooperation with the Council's Standing Committees.

Allen Robertson, Editor-in-Chief
Steve Jones, Editorial Committee Chair

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Executive Summary

Bark Beetles

Tree mortality caused by bark beetles continued in the east side forests of the northern Sierra Nevada and southern Cascade ranges in spite of the wet winter of 1994-95. Fir engraver beetle on true firs and Jeffrey pine beetle on Jeffrey pine accounted for much of the mortality. Western pine beetle caused mortality of ponderosa pine in some portions of this region and in the Sacramento River Canyon and along the Trinity River north of Trinity Lake. The mountain pine beetle continued to kill sugar pine scattered throughout northern California and was common in ponderosa and lodgepole stands from Lassen County southward to El Dorado County. It also killed some lodgepole pines damaged by needleminers in the Stanislaus National Forest and Yosemite National Park. The Douglas-fir beetle remained at low levels. Other bark beetles and wood borers were common associates of the more damaging bark beetles.

Defoliators

The recent outbreak of white fir sawfly in Lassen County collapsed. Tent caterpillar was prevalent on bitterbrush from northern Lake Tahoe into the southern portion of the Southern Cascades ecoregion. Lodgepole pine needleminer caused moderate to high defoliation over 8,000 to 10,000 acres of the Stanislaus National Forest and Yosemite National Park. A new species of *Timema* defoliated Douglas-fir in Humboldt and Mendocino County. Defoliation by the Douglas-fir tussock moth was not observed, but trap catches are markedly up in some parts of the central and norther Sierra Nevada ecoregion and the Modoc Plateau. Similar increases preceeded the last outbreak in California by two to three years.

Pine pitch canker

The disease continues to spread to new areas and is now reported from 14 coastal and adjacent inland counties, from San Diego to Mendocino. With the report of the disease at Cambria, the pathogen is now present in all three of California's native Monterey pine stands.

Port-Orford-cedar root disease

Phytophthora lateralis was reported for the first time in native stands of California outside of the Smith River

watershed. The pathogen has been identified in one area, at the headwaters of Potato Patch Creek, which is part of the Klamath River watershed. Signs and symptoms indicate that the disease has been present at the site for about 2 years.

White pine blister rust

The introduced pathogen *Cronartium ribicola* continues to be reported on sugar pine at new locations, and is spreading into high elevation white pine ecosystems, being reported on: foxtail pine, at Lake Mountain on the Klamath National Forest; on western white pine, from the south fork of Cold Creek (4 miles south of Donner Lake) up to the Pacific Crest Trail; and on western white pine, at 7,500 foot elevation, on the Lake Tahoe Basin.

Animal damage

A variety of mammal species have caused damage to forest trees. The damage varies by region of the state and by land ownership. All of California's major timber producing regions and timber types have reported damage by vertebrate species. Species most commonly identified as causing problems were deer, pocket gopher, domestic stock, rabbits and hares, porcupine, woodrat and black bear.

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Status and Control of Insects

A Report to the Forest Pest Council from the Insect Committee
Bruce Roettgering, Chair
Laura Merrill, Secretary

WESTERN PINE BEETLE, *Dendroctonus brevicomis*

M261B - Northern California Coast Ranges

Scattered attacks by western pine beetle and flatheaded borers were noted in Lake County near Cobb.

M261A - Klamath Mountains

Although the winter of 1994-95 was very wet as a whole, the month of February was very clear and dry, and large ponderosa pine began to fade in northwestern California during the month of February. These trees were attacked during the summer or fall of 1994, which was extremely dry. Areas where early fading of larger ponderosa pine was evident included the Sacramento River canyon from Lakehead to Dunsmuir, the upper Trinity River above Clair Engle Lake, along the Highway 299 corridor from Buckhorn Summit west to Douglas City, and around the Hayfork Valley.

Western pine beetle was the most common bark beetle associated with scattered ponderosa pine mortality in Greenhorn Park, Siskiyou County. Associated beetles included the mountain and red turpentine beetles.

M261B - Northern CA coast ranges.

There was some ponderosa pine mortality observed by aerial survey in the extreme southeast end of the Six Rivers National Forest. Aerial survey also observed scattered, light mortality of large ponderosa pine over several thousand acres in a Late Successional Reserve to the east of Anthony Peak on the Mendocino National Forest.

M261D - Southern Cascades.

Scattered mortality of ponderosa pine continued to occur on the Goosenest Ranger District east of Mt. Hebron, on McCloud Flats and eastward to about Ponderosa (Siskiyou County), in the Lake Britton-Burney area (Shasta County), and along Highway 44 southeast of Poison Lake (Lassen County).

M261E - Sierra Nevada.

Ponderosa pine mortality increased in some areas in the northern portion of the section. Both western pine beetle and mountain pine beetle often were found attacking the same tree. Areas of activity include several areas on the Sierraville District, Tahoe National Forest, and in the area around Boca and Stampede Reservoirs (Nevada County) on the Truckee District. Typical mortality patterns have been small groups (5-10 trees) scattered throughout the host type. In scattered, single, large DBH ponderosa pine, western pine beetle alone is causing mortality particularly on the east side of the Lassen, Plumas and Tahoe National Forests. This and mortality from other bark beetles is included in Table 1.

Mortality associated with western pine beetle and the mountain pine beetle remained at generally low levels in the southern half of the section, consisting of scattered, small groups of ponderosa pine and scattered individual sugar pine, respectively.

M261G - Modoc Plateau.

Ponderosa pine mortality associated with western pine beetle and mountain pine beetle increased in 1995 on the Big Valley Ranger District, Modoc National Forest. Mortality was most noticeable in the Dutch Flat and Knox Mountain areas. On the adjacent Doublehead District, increasing levels of ponderosa pine mortality associated with western pine beetle were noted on Timber Mountain.

M262B - Southern California Mountains and Valleys

Western pine beetle was the primary bark beetle involved in Coulter pine mortality in southern California. Low levels (1 to 5%) of mortality were reported on 180 acres of the Cleveland National Forest and on 85 acres of the Pala Reservation, San Diego County.

MOUNTAIN PINE BEETLE, *Dendroctonus ponderosae*.

M261A - Klamath Mountains

Sugar pine mortality caused by drought and mountain pine beetle has continued across northern California. Scattered sugar pines of all size classes were killed on the Six Rivers and the western part of the Klamath National Forests.

Mountain pine beetle caused scattered mortality of sugar pine in Greenhorn Park, Siskiyou County. It also contributed to ponderosa pine mortality either alone or in conjunction with the western pine beetle. The red turpentine beetle was a common associate in both tree species.

M261D - Southern Cascades.

Scattered old-growth sugar pines faded on isolated cinder cones south of Medicine Lake. At least a dozen large sugar pines were killed by a combination of lightning strike, drought and mountain pine beetle on top of a cinder cone adjacent to the Pole Springs Road on the Lassen National Forest. Mountain pine beetle and *Ips emarginatus* were the causal agents of ponderosa pine mortality near Old Station, Hat Creek Ranger District, Lassen National Forest. Mortality was detected mainly in large, overstory pines on rocky outcrops or lava fields. Other areas of increased mortality in ponderosa pine on the Lassen National Forest include Crazy Harry Gulch, Bogard Buttes and in and around Blacks Mountain Experimental Forest. Attacks by mountain pine beetle were primarily concentrated in the smaller size trees while western pine beetle was often associated with larger dbh trees. Submersion and mountain pine beetle were responsible for lodgepole pine mortality along Highway 44 near Hog Flat and McCoy Flat Reservoirs on the Eagle Lake District, Lassen National Forest. Individual trees and groups of lodgepole pine were killed by the mountain pine beetle between Tamarack Trailhead and Lake Eiler, Lassen National Forest.

M261E - Sierra Nevada.

Several stands throughout the northern portion of the Sierra Nevada section are experiencing ponderosa pine mortality associated with mountain pine beetle. Areas of activity include several areas on the

Sierraville District, Tahoe National Forest, and in the area around Boca and Stampede Reservoirs (Nevada County) on the Truckee Ranger District. Typical mortality patterns have been small groups (5-10 trees) scattered throughout the host type.

Mortality of lodgepole pine also occurs on the Sierraville and Truckee Districts. Areas experiencing high levels are Lemon Canyon (Lemon Canyon Road), Davies Creek, Rice Canyon (89-55 Road west of Highway 89) in Sierra County, Sagehen Basin, Alder Creek, Donner Camp (Nevada County) and the Silver Creek drainage along the Truckee River south of Truckee (Placer County) have increased levels of lodgepole pine mortality in all size classes. Large groups of lodgepole pine died this year in the area immediately north of Squaw Valley off of Highway 89. Lodgepole pine trees covering about 100+ acres are dead in Donner Memorial State Park on the southeast shore of Donner Lake (Nevada and Placer Counties). This was the largest contiguous kill of lodgepole pine noted this year. Pockets of lodgepole pine mortality continued to occur in a variety of areas around Lake Tahoe, including Slaughterhouse Canyon, Meeks Creek and wetland areas on the south shore, and in the Twin Lakes Campground and several other areas on the Mammoth Ranger District, Inyo National Forest.

In the central portion of the section, lodgepole mortality continued around Sample Meadow on the Pineridge District, Sierra National Forest. Some mortality from mountain pine beetle was evident in lodgepole pine defoliated by the lodgepole needleminer in the Stanislaus National Forest and Yosemite National Park.

M261G - Modoc Plateau.

Ponderosa pine mortality associated with western pine beetle and mountain pine beetle increased in 1995 on the Big Valley District, Modoc National Forest. Mortality was most noticeable in the Dutch Flat and Knox Mountain areas.

M262B - Southern California Mountains and Valleys

Populations of mountain pine beetle were low in the San Bernardino and San Jacinto Mountains, although some mortality attributed to this insect was reported from private land in Idyllwild.

FIR ENGRAVER, *Scolytus ventralis*.

M261A - Klamath Mountain

Very high white fir mortality occurred in the Taylor Creek Late Successional Reserve (Klamath National Forest) over the past couple of years. The south end of the mortality area extends into the Trinity Alps Wilderness.

M261B - Northern California Coast Ranges.

There was scattered white fir mortality on the Mendocino National Forest, particularly just below the eastern crest along Black Butte, Mendocino Pass, and Anthony Peak. More well-defined were areas of low white fir mortality near Shell Mountain in the Middle Eel-Yolla Bolla Wilderness.

M261D - Southern Cascades.

White fir mortality continues on the east side of the Sierra Nevada throughout the Southern Cascades section. Fir engraver, over stocking, off-site species, and a decrease in annual precipitation 8 of the past 10 years have contributed to extremely high levels of fir mortality. For several years very high white fir mortality has continued in the Ball Mountain Late Successional Reserve on the Goosenest District, Klamath National Forest. Mortality has tapered off in other areas which previously had high white fir mortality. Specific areas that now have a low, scattered level include Mt. Shasta and Hambone Butte. On the Lassen National Forest, white fir mortality continues on Pegleg and Harvey Mountains, Eagle Lake Ranger District. Red fir mortality has increased substantially on the Eagle Lake District as well. Particular areas include Gillman Basin, Fox Mountain, and Hamilton Mountain (M261E). Numerous white fir of all sizes were killed by fir engravers between the Tamarack Trailhead and Lake Eiler, Hat Creek District, Lassen National Forest.

Southward on the Plumas National Forest, Clarks Peak, the area around Lake Davis, and areas near the Dixie Mountain State Game Refuge (Milford Ranger District) have high white fir mortality. On the adjacent Greenville District, Franks Valley and Wheeler Peak watersheds have levels of similar

mortality.

M261E - Sierra Nevada.

On the Sierraville District, Tahoe National Forest, Treasure Mountain, the area along Highway 89 south of Sierraville to Truckee, the east side of the Bald Mountain Range, Tros Canyon, Henness Pass, and the Bonta Creek Drainage (Sierra County) have high levels of mortality related to the fir engraver. The mortality is primarily in white fir, however, fir engraver and wood borers have also caused some red fir mortality at the higher elevations. On the Truckee District substantial increases in fir mortality were noted in the Sagehen Basin and Worn Mill Canyon (east of Stampede Reservoir, south of the 1994 Crystal fire).

In and around the Angora Highlands Subdivision at South Lake Tahoe, white fir mortality has declined to near or slightly above pre-drought levels. The majority of residual live trees exhibit evidence of attack, including pitch streaming (not a consistent indicator), patches of dead cambium scattered along the main stem, dead branches scattered through the live crown, thin and/or chlorotic crowns, and dead, thin and/or chlorotic tops. Low vigor among these fir places them at an increased risk for mortality. Moderate levels of white fir mortality, due in part to fir engraver activity, were evident in several other locations, including the north shore of Lake Tahoe. Above normal red fir mortality continued in the vicinity of Genoa and Bliss Peaks on the east side of Lake Tahoe. The fir engraver and roundheaded fir borer were associated with this mortality.

Dead tops and mortality became noticeable in late summer in mid-elevation mixed conifer and fir stands in Tuolumne, Calaveras and Amador Counties. The roundheaded fir borer, *Tetropium abietis*, was often found infesting the lower bole of fir killed by the fir engraver.

M261G - Modoc Plateau.

Fir engraver beetle, high stand densities and low annual precipitation for several years have resulted in high levels of fir mortality in Modoc County. Mortality in white fir continued in 1995 in several areas such as Roney Flat, Niles Canyon, Hunters Ridge, Manzanita Ridge and several canyons near Deer Spring Ridge on the Big Valley Ranger District. Extreme mortality (in excess of 80% of the stands) has occurred in some of these areas over the past three years. Numerous groups of fading white fir were evident along the west slope of the Warner Mountains north of Cedar Pass. In 1995 the number of acres affected in the Warner Mountains increased 15% above the acres detected in 1994.

On the other hand, white fir mortality on private lands west of Goose Lake and in the Cal Pines subdivision, Modoc County, was estimated to be less than 5% this year. Considering the abundant precipitation during the winter and spring of 1995, the number of fading trees in the spring of 1996 should be at or near pre-drought levels in these areas. In southwestern Modoc County, few fading white firs were evident from Highway 299, a sharp contrast to the previous two years.

M262B - Southern California Mountains and Valleys

The fir engraver was a factor in the low levels of white fir mortality on the San Bernardino National Forest and on 200 acres of Cuyamaca State park in San Diego County.

PINE ENGRAVER BEETLES, *Ips* spp.

261A - Central California Coast

Ips mexicanus and *I. plastographus* infested Monterey pine blowdown at New Brighton State Beach following a January storm. The infested material was barked and hauled away prior to emergence.

263A Northern California Coast

Bishop pine log decks near Point Arena were mass attacked in late winter by two species. The logs were infested at a 3:1 ratio by *I. plastographus* to *I. mexicanus*.

M261A - Klamath Mountains

Pine engravers killed knobcone pines near Whiskeytown Lake, Shasta County. These trees were near winter storm breakage piled by crews for burning at some later date. A few top-killed ponderosa pines were noticed around Scott Valley, Siskiyou County.

M261D - Southern Cascades.

Ips emarginatus and mountain pine beetle were the causal agents of ponderosa pine mortality near Old Station, eastern Shasta County. Mortality was detected most frequently in large, overstory pines on rocky outcrops or lava fields.

M261E - Sierra Nevada.

During late March and early April, wet, heavy snow storms hit the Foresthill area, Placer County, causing extensive breakage of branches and whole trees. Tree tops snapped off at about 10-15 feet above ground in an elevational band between 3,500 - 4,200 feet. Damage occurred over some 2,000 acres primarily in the Volcano Plantations, Tahoe National Forest. The material was infested with *Ips paraconfusus* by late May. The Foresthill Ranger District responded with an aggressive program to buck up and chip material that was close to roads. As of September, the remaining snow breakage material is still being utilized by pine engravers. Additional projects will be conducted next year to remove additional down material prior to beetle flight.

Ips emarginatus and Jeffrey pine beetle were found in several trees east of Boca Reservoir (Nevada County), and along the 08 Road in the Pole Creek drainage, Truckee District, Tahoe National Forest.

M262B - Southern California Mountains and Valleys

Engraver beetles were involved in low levels (1 to 5%) of Jeffrey pine mortality on 770 acres on Big Pine Mountain on the Los Padres National Forest. Both roundheaded and flatheaded borers were also involved, but the Jeffrey pine beetle was not found, nor has it been reported west of the San Bernardino Mountains. Engravers were probably also involved in scattered patches of low levels of Jeffrey and ponderosa pine mortality on the Angeles National Forest. Engravers also played a role in light mortality of Jeffrey x Coulter pine hybrids on Thomas Mountain in the San Bernardino National Forest. Pinyon pines dying from black stain root disease in the eastern portion of the San Bernardino Mountains were also infested with pine engravers, which are usually the immediate cause of death, although trees have been observed to die of the disease alone. Pinyon black stain in that area is widespread and longstanding, and mortality can be expected to continue indefinitely. Private property owners within the infested area have expressed concern about this mortality.

DOUGLAS-FIR BEETLE, *Dendroctonus pseudotsugae*.

263A - Northern California Coast

Douglas-fir beetle infested a small number of Douglas-firs felled by storms near Piercy, Mendocino County. It was associated with the flatheaded fir borer in attacks on Douglas-firs northwest of Willits and near Gualala, Mendocino County.

M261A - Klamath Mountains

A few very scattered trees were attacked by Douglas-fir beetle along the upper Sacramento River between Lake Siskiyou and Gumboot Lake. There were also a few Douglas-firs attacked along the lower part of Fawn Creek, which is a tributary to the upper Sacramento. A few poorly growing Douglas-firs were killed by Douglas-fir beetle near Gunsight Peak west of Yreka. In addition to stress from extended drought, most of these trees had severe dwarf mistletoe infections.

During 1994 two pheromone blends were compared in their ability to cause Douglas-fir beetle to fatally attack old dwarf mistletoe-infected Douglas-firs in an area of Siskiyou County located between Sawyers Bar and Cecilville. Attacks induced by one of the formulations resulted in considerable frass being produced by the late summer of 1994. All of these trees appeared very green and healthy when examined during the summer of 1995. The attacks were apparently not successful.

JEFFREY PINE BEETLE, *Dendroctonus jeffreyi*.

M261D - Southern Cascades.

Mortality caused by Jeffrey pine beetle attacks on drought-stressed trees has been increasing for several years throughout the host range in northeastern California. Currently fading trees and green-

attacked trees were common in the northern end of Lassen Volcanic National Park and adjacent parts of the Lassen National Forest. On the Forest, specific locations of current Jeffrey pine mortality include: Summit Lake, Duck Lake, near the Highway 89 and Butte Lake entrances to the Park, along Lost Creek and around Lost Spring, and along the Pole Springs Road. Mortality is occurring in both large overstory trees, and also in groups of young pole-size trees. Mortality of old growth Jeffrey pine continued in the area between the Tamarack Trailhead and Lake Eiler, Lassen National Forest.

In Lassen National Park, mortality was noted around Manzanita Lake, Table Mountain, Butte lake and throughout the northern portion of Lassen National Park. Of particular note was an 800 tree group-kill near Lost Creek along Highway 89 just north of the summit.

M261E - Sierra Nevada.

The Milford Ranger District, Plumas National Forest, recorded increases in Jeffrey pine beetle-related mortality in the Squaw Creek drainage, the upper Indian Creek drainage, south of Antelope Lake, and on Stoney Ridge. Group kills involving small diameter trees and single tree mortality in large diameter trees was most common.

Extensive small group kills associated with Jeffrey pine beetle were noted along Smithneck Creek, Rice Canyon, Cold Creek, Onion Valley and Antelope Valley on the Sierraville District, Tahoe National Forest. On the Truckee Ranger District extensive Jeffrey pine mortality is evident throughout the Truckee River drainage along Highway 89 south of Truckee, particularly along the 08 Road in the Silver Creek, Pole Creek and Deep Creek drainages. Mortality is also evident along Highway 267 south east of Martis Reservoir (Placer County). Several small pockets of dead trees are also visible along Interstate 80 between Truckee and Donner Lake.

Mortality associated with the Jeffrey pine beetle continued at above background levels in the vicinity of Lake Tahoe, adjacent areas on the Toiyabe National Forest in Nevada, and on the Inyo National Forest. Large mortality centers occurred on the east shore of Lake Tahoe in or near Secret Harbor, Slaughterhouse Canyon, Spooner Summit, Glenbrook and Round Hill. Pockets of Jeffrey pine mortality were evident on the south shore between Myers and Tahoe Valley. Jeffrey pine mortality also continued on the Mammoth Ranger District in Mono County in the vicinity of the Inyo Craters, Deadman Creek, Old Shady Rest Campground, and scattered between the Mammoth Scenic Loop and the Obsidian Flat/Deadman Campground roads.

M262B - Southern California Mountains and Valleys

Jeffrey pine beetle populations were low in the San Bernardino Mountains when compared to recent years. Jeffrey pine mortality was low, and some of the mortality which did occur within the range of this beetle was caused by other insects.

RED TURPENTINE BEETLE, *Dendroctonus valens*.

M261B - Northern California Coast Ranges

Reports of red turpentine beetles were on the increase in ponderosa pine around Cobb, Lake County. A few large trees near Hearst, Mendocino County, had numerous attacks, some as high as 12-to-15 feet above ground line.

M261E - Sierra Nevada.

Red turpentine beetles were found attacking residual lodgepole pines following a timber sale near the north shore of Prosser Creek Reservoir, and in the Donner Camp area, Truckee District, Tahoe National Forest. Attacks did not result in tree mortality. Red turpentine beetles were also noted in the snow damage trees on the Foresthill District, Tahoe National Forest (see pine engravers). Very low levels of red turpentine beetle were found on pine under attack by the Jeffrey pine beetle in the Lake Tahoe Basin and on the Inyo National Forest.

M262B - Southern California Mountains and Valleys

The red turpentine beetle was common in its hosts in the mountains of southern California, but no tree mortality was attributed to this insect.

FLATHEADED FIR BORER, *Melanophila drummondi*.

261A - Central California Coast

Flatheaded fir borer combined with *Armillaria* root disease to kill mature Douglas-fir near Scotts Valley, Santa Clara County.

263A - Northern California Coast

Flatheaded fir borer combined with Douglas-fir beetle to kill Douglas-fir northwest of Willits and near Gualala, Mendocino County. In Humboldt County, the borer combined with *Armillaria* root disease to kill Douglas-fir at the west end of the Salmon Creek drainage.

M261A - Klamath Mountains

The north-facing slope along the Klamath River had very visible fading of Douglas-fir. The extended drought conditions have allowed the flatheaded fir borer to complete development in a large number of trees on these low quality sites. Douglas-fir mortality also was scattered throughout Greenhorn Park, a large tract of wildlands near the city of Yreka, Siskiyou County. Attacks of the flatheaded fir borer were associated with dead and dying trees as well as live trees with pitch streaming and weakened crowns.

M261B - Northern California Coast Ranges

Groups of pole-sized and larger Douglas-fir were killed in northeastern Mendocino County where Douglas-fir blended with oak woodland.

M261G - Modoc Plateau.

The flatheaded fir borer was a common associate of the fir engraver on the Big Valley District, Modoc National Forest. Infested areas include Roney Flat, Niles Canyon, Hunters Ridge, Manzanita Ridge and several canyons near Deer Spring Ridge. Borers were also associated with the fir mortality in the Warner Mountains, Modoc County.

ROUNDHEADED FIR BORER, *Tetropium abietis*.

M261A - Klamath Mountains

There is an area of red fir mortality near Trinity Mountain above Horse Linto and Tish Tang Creeks in the Trinity Alps Wilderness Area. Dwarf mistletoe, cytospora canker, drought, fir engraver and roundheaded fir borer have all played some role in the mortality.

M261D - Southern Cascades.

Roundheaded fir borer and fir engraver beetle have caused an increase in red fir mortality on the Eagle Lake District, Lassen National Forest. Areas include Gillman Basin, Fox Mountain, and Hamilton Mountain (261E).

M261E - Sierra Nevada.

In the southern portion of the section, the roundheaded fir borer was often found infesting the lower bole of fir killed by the fir engraver.

CALIFORNIA FLATHEADED BORER, *Melanophila californica*

M262B - Southern California Mountains and Valleys

The California Department of Forestry and Fire Protection reported group kills of Jeffrey pine by the flatheaded borer on private land in Garner Valley, San Jacinto Mountains. Flatheaded borers also were involved in tree mortality on private land in the communities of Idyllwild, Riverside County, and Wrightwood, San Bernardino County.

DOUGLAS-FIR ENGRAVER, *Scolytus unispinosus*.

263A - Northern California Coast

This engraver killed a few *Armillaria* infected Douglas-firs northwest of Willits, Mendocino County, and pole-sized Douglas-fir west of Salmon Creek in Humboldt County.

M261A - Klamath Mountains

The Douglas-fir engraver was present in the tops and limbs of most of the trees attacked by the flatheaded fir borer or the Douglas-fir beetle.

CEDAR BARK BEETLES, *Phloeosinus* spp.

M261B - Northern California Coast Ranges

Mortality and branch flagging occurred in several ornamental Leyland cypress in hot, dry areas southeast of Ukiah, Mendocino County. Some of the trees were also infected with *Seiridium cardinale*, a canker fungus spread by the beetles.

M261A - Klamath Mountains

The forest adjacent to the northern end of Trinity Lake and many other areas in northern California had extensive mortality of understory incense-cedar. These trees were infested with cedar bark beetles during the extremely dry summer of 1994. In addition to drought-stress, these trees had often been suppressed for many years and many also had been severely wounded during previous logging. A small percentage of the cedar mortality was comprised of thrifty appearing trees.

M261G - Modoc Plateau.

Cedar bark beetles, scales and wood borers caused decline and death of several cedars on the Big Valley Ranger District, Modoc National Forest. Mortality and top kill were quite evident in the Niles Flat and Roney Flat areas.

PINE REPRODUCTION WEEVIL, *Cylindrocopturus eatoni*

M261D - Southern Cascades

This weevil caused scattered mortality of ponderosa pine in a plantation near Whitmore, Shasta County. Infestations were mostly limited to the upper and outer portions of the crowns. A secondary invader that colonized the mainstems was a bark beetle in the genus *Carphoborus*. Brush competition appears to have contributed to the outbreak.

M261E - Sierra Nevada.

Three-year old ponderosa pine seedlings were killed for the second year in a plantation on the Groveland District, Stanislaus National Forest. Mortality and damage were found over five to six acres and associated with heavy brush competition.

MODOC BUDWORM, *Choristoneura retiniana*.

M261G - Modoc Plateau.

Feeding could be detected on individual white fir trees near Benton Meadow in the Warner Mountains this year, but there is so much faded foliage from white fir mortality caused by the fir engraver that it is difficult to gauge the severity of the defoliation.

A CALIFORNIA SPRUCE BUDWORM, *Choristoneura carnana californica*.

M261A - Klamath Mountains

Feeding was noted on four Douglas-fir seedlings in a plantation adjacent to Highland Ridge and Five Mile Creek on the Weaverville District, Shasta-Trinity National Forest.

DOUGLAS-FIR TUSSOCK MOTH, *Orgyia pseudotsugata*.

M261D - Southern Cascades and M261G - Modoc Plateau

Male moth catches from "early warning" monitoring traps throughout northeastern California indicate a general increase in the number of male moths caught when compared to 1994 counts. Egg mass surveys are planned for the winter and larval surveys will be conducted in the spring of 1996. Plots in these general areas will receive particular attention: Eagle Lake Ranger District, Lassen National Forest; Warner Mountain Ranger District, Modoc National Forest and the Goose Lake area, Modoc County.

M261E - Sierra Nevada

Male moth catches from monitoring traps indicate a general increase in the number of male moths at plots in Schneider Creek, Feather River Ranger District, Plumas National Forest; and one plot on each of the Downieville and Nevada City Ranger Districts, Tahoe National Forest. Egg mass and larval surveys are planned in conjunction with the surveys that will occur in the Southern Cascades and Modoc Plateau Regions.

For the first time in several years, trap catches showed consistent, substantial increases in monitoring plots located on the Eldorado and Stanislaus National Forests. Numbers from two of 10 plots increased on the Mariposa Ranger District, Sierra National Forest, while numbers from traps on the Mammoth District, Inyo National Forest, remained at very low levels. Similar increases preceded the last outbreak in California (1987-89) by two to three years.

GYPSY MOTH, *Lymantria dispar***Statewide**

Nineteen moths were trapped in eight counties - Los Angeles, Napa, Nevada, San Francisco, Santa Barbara, Santa Clara, Santa Cruz and Sonoma. Numbers trapped were about the same as in 1994 with the exception of an area in Santa Cruz County near Felton (6 moths and one property with egg masses), and an area in Nevada County near Grass Valley (5 moths). The finds in Nevada County were within a high density delimitation zone established in 1994.

TENT CATERPILLAR, *Malacosoma* sp.**M261D - Southern Cascades.**

Tent caterpillar defoliation of bitterbrush was very apparent throughout the southern portion of the Southern Cascades section. Individual branches were completely consumed and tent formation exceeded 2-3 tents per bush in some areas. Bitterbrush mortality is not expected as a result of the defoliation this year, however these areas will be monitored next year to determine if the tent caterpillar populations are causing damage and/or mortality.

M261E - Sierra Nevada.

The western tent caterpillar, *Malacosoma californicum*, was prevalent on bitterbrush in areas from northern Lake Tahoe to north of Truckee, including Hobart Mills (Placer County) and areas west of Burton Creek State Park in the Lake Tahoe Basin. Populations appear to be in the second or third year of an outbreak.

WHITE FIR SAWFLY, *Neodiprion nr. deleoni* and *abietis***M261D - Southern Cascades.**

Outbreak populations of the white fir sawfly between Eagle Lake and Lake Almanor, Lassen and Plumas Counties, and on the north side of Cornaz Peak, Shasta County, have collapsed to endemic levels. A reduced compliment of foliage exists on trees that were defoliated during the past couple of years.

M261E - Sierra Nevada.

Sawfly activity has been detected over the past three years along the south fork of Long Valley Creek

and into the Willow Creek drainage on the Beckwourth District, Plumas National Forest. No mortality was attributable to this feeding.

Moderate amounts of defoliation were attributed to feeding by white fir sawfly on lower white fir branches in several locations on the Placerville District, Eldorado National Forest.

LOGGEPOLE PINE NEEDLEMINER, *Coleotechnites milleri*.

M261E - Sierra Nevada.

The lodgepole pine needleminer caused moderate to high defoliation in areas of the Stanislaus National Forest and Yosemite National Park in Tuolumne and Mariposa Counties. Areas with evident, recent defoliation include Horse Meadow (Emigrant Basin Primitive Area), Falls Creek near Kendrick Peak, Lyell Canyon near Ireland Creek, Cathedral Fork/Echo Creek and May Lake. Total area involved is estimated to be about 8,000 to 10,000 acres. Some mortality caused by mountain pine beetle was evident in lodgepole needleminer defoliated areas.

GOUTY PITCH MIDGE, *Cecidomyia piniinopsis*.

M261D - Southern Cascades

A 30-year-old, mixed plantation of ponderosa and Jeffrey pines in the Manzanita Chute northwest of Lassen Volcanic National Park contained many trees with visible infestations. Fairly conspicuous flagging of branch tips occurred in an older pine plantation near the Cypress Camp Trailhead to the Thousand Lakes Wilderness, Lassen National Forest.

M261E - Sierra Nevada.

Moderate levels of branch flagging caused by the gouty pitch midge occurred in several areas of the Wrights Creek plantation on the Mi-wok District, Stanislaus National Forest.

PINE NEEDLE SHEATHMINER, *Zelleria haimbachi*

M261D - Southern Cascades

An outbreak of the pine needle sheathminer persists on ponderosa pine east of Ponderosa (old Ponderosa burn), Siskiyou County. Defoliation last year resulted in the nearly complete loss of 1994 needles on the most heavily damaged trees. Populations in 1994 were estimated at 9.4 larvae per shoot. Although 1995 populations were significantly less at 1.8 larvae per shoot, they were still high enough to cause noticeable defoliation. On trees that had lost most of their 1994 foliage, 1993 needles served as the primary oviposition site for the current generation.

TIMEMA, *Timema* spp.

263A - Northern California Coast

A new species of Timema has defoliated Douglas-fir of all sizes on Rainbow Ridge in Humboldt County and Pine Ridge in Mendocino County. (The name *T. douglasi* has been proposed, but is unpublished.) The dense stand on Rainbow Ridge had nearly 15% mortality over the last two years. The dead trees were mostly pole-sized Douglas-fir with low live crown ratios when defoliation began. A few of the defoliated trees were attacked by *Hylastes nigrinus* and had *Armillaria* root disease. A few other *Timema* sightings include areas near Lake Sonoma (Sonoma County), northwest of Ukiah, and Leggett, both in Mendocino County.

SEQUOIA PITCH MOTH, *Syanthedon sequoiae*

M261B - Northern California Coast Ranges

About 125 Monterey pine near Lakeport and Blue Lakes (Lake County) were reported to have extensive attacks.

CALIFORNIA OAKWORM, *Phryganidia californica***263A - Northern California Coast**

Tanoaks were defoliated northwest of Cloverdale and east of Yorkville in Mendocino County. Most of the defoliated tanoaks are within areas logged one to two years ago.

FRUITTREE LEAFROLLER, *Archips argyrospilus*+**262B - Southern California Mountains and Valleys**

Light defoliation of black oak was observed in the Mendenhall Valley within the boundaries of the Cleveland National Forest.

AFRICANIZED HONEY BEE, *Apis mellifera scutellata***322B and C - Sonoran Mojave and Sonoran Colorado deserts**

Thirteen naturally moving swarms and one colony were detected in California as of December 1, 1995. Additional swarms were found and eradicated on ships in ports. All of Imperial County, a large portion of southeastern Riverside County, and a lesser portion of northeast San Diego County are now considered colonized. Following the 12th find on the north shore of the Salton Sea, the colonized area was considered to include 8253 square miles. No swarms have been found in forested areas of the state thus far.

To date there have been no major human stinging incidents in California. In 1995 there were two human fatalities in Arizona attributed to stinging by the Africanized honey bee (AHB), in addition to two previous fatalities in Texas - one attributed to AHB and one to European honey bees with Africanized introgression.

Table 1. Mortality from Bark Beetles within the National Forest System, California, 1995*

Locale	Acres of Mortality**			Volume (MMBF)		
	Pine	Fir	Total	Pine	Fir	Total ***
Northern California	75653	121089	196745	50	183.3	335.3
Cascade North Sierra	163019	163376	316395	53	105	269
Central/South Sierra	57829	35024	92849	27.5	30.9	149.5
Southern California	1558	1405	2963	0.7	0.1	2
Total	288059	320894	608952	131.2	319.3	755.8

* Mortality is seldom from bark beetles alone as other factors (e.g. drought) and agents (e.g. root diseases) predispose trees to successful attack.

** Pine includes ponderosa, Jeffrey, sugar, and lodgepole pines; fir includes white fir, red fir, and Douglas-fir.

*** Includes background mortality volume on non-outbreak acres as well as outbreak mortality volume.

Table 2, Insects of Lesser Importance in California — 1995

Insects	Where Examined or Reported		
Scientific & Common Names	Host	County	Remarks
<i>Asterolecanium minus</i> Oak pit scale	LO	Santa Cruz	Several coast live oaks near Scotts Valley had branch flagging from a combination of pit scale and twig decline fungi.
<i>Contarinia</i> spp. Douglas-fir needle midges	DF	Sonoma, Lake	Three species were associated with needle damage in Christmas tree plantations near Sonoma and Kelseyville.
<i>Euthoracaphis umbellulariae</i> California laurel aphid	CL	Santa Cruz	Excessive sooty mold was the result of an infestation near Scotts Valley.
<i>Melissopus latiferreanus</i> Filbertworm	LO	Mendocino	Infested acorns had associated drippy nut bacterial ooze that caused unsightly sidewalk spotting on the Medocino College campus.
unknown Aphid	AE	Mendocino	Extensive honeydew was a problem on a scenic drive into a winery near Hopland.
unknown Cicada	DF	Shasta, Trinity, Siskiyou	Cast nymphal skins very abundant, some minor oviposition damage to twigs.
unknown Thrips	DF	Santa Clara	Thrips were collected from "curly needles" in a Christmas tree plantation.
unknown Weevil	BP	Mendocino	An unidentified weevil caused branch and leader dieback in planted trees near Navarro.
unknown <i>Sesiidae</i> A pitch moth	KxM	Riverside	An unidentified pitch moth was reared from larvae collected in a plantation in the San Jacinto Mountains.

Host Abbreviations

AE - American elm, BP - Bishop pine, CL - California laurel, DF - Douglas-fir, IC - Incense-cedar, LO - Live oak

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Status and Control of Disease

A Report to the California Forest Pest Council from the Disease Committee

John Pronos, Chair

John Kliejunas, Secretary

ABIOTIC DISEASES**DROUGHT-RELATED EFFECTS**

M261D - Southern Cascades

Incense-cedar with thin crowns were common in the vicinities of Whitmore (Shasta County) and Weed (Siskiyou County). Crowns have thinned from the top down and outside in, indicating extended drought

stress. Wood borers were associated with scattered mortality of these trees.

M261E - Sierra Nevada

Declining and recently dead Douglas-fir at a progeny test site near Feather Falls (Butte County) exhibited symptoms of drought stress, i.e. crown thinning from the top down and outside in. Genetic predisposition and localized soil conditions may also have been contributing factors.

WINTER FLECK

M261A - Klamath Mountains

In the Spring, ponderosa pine reproduction on the west side of the Fountain Fire burn (Shasta County) exhibited discreet tan flecking on the upper surfaces of the needles. The cosmetic damage resulted from exposure to low temperatures and snow.

WATER DAMAGE TO PINE FOLIAGE

M261D - Southern Cascades

Ponderosa and Jeffrey pine reproduction on Coyote Flat, west of Lake Almanor (Plumas County), suffered extensive foliage damage this spring. Sites where damage was observed were relatively open, low lying areas. All needles on small trees to approximately 3 feet high were completely brown or brown mottled. Taller trees had a distinct demarcation between brown lower needles and green needles above. The demarcation existed at the same level across a given site, indicating a distinct layer of damage, such as might be caused by standing water. Stems of damaged trees were green and firmly rooted in the ground. Some smaller trees had dead buds, but the majority did not. While ponderosa and Jeffrey pines were uniformly affected, intermixed white fir and lodgepole pine showed no damage.

RED BELT, winter needle desiccation

M261D - Southern Cascades

Several miles of red belt damage to ponderosa pine occurred along the eastern and northeastern edge of Goose Valley near Burney (Shasta County). Recent tree mortality due to the western pine beetle was scattered among the damaged trees. The redbelt, combined with low site conditions, has the potential to aggravate existing bark beetle activity.

OZONE

M261E - Sierra Nevada

In August and September, 1995, 26 air pollution monitoring plots were visited on the Sierra National Forest (Mariposa, Madera, and Fresno Counties). When compared to injury ratings recorded in 1993, the general trend was either no change or higher injury scores. Forty-six percent of the plots showed increased injury, 39% no change, and 15% showed less injury.

Plots with trees experiencing the largest increases in injury were mainly at elevations of 4000 and 5000 feet, while the few plots with slightly improved scores were at 6000 feet or higher. It is anticipated that future ozone injury ratings may increase if precipitation continues at normal or above levels.

STORM DAMAGE

M261D - Southern Cascades

High winds and heavy rains in December of 1994 caused windthrow of several hundred acres of knobcone pine on the west side of Siskiyou Lake (Siskiyou County). Most of the material was salvaged during the summer. Heavy snows in 1994-95 resulted in a major avalanche on the south side of Mt.

Shasta (Siskiyou County). Over a million board feet of red fir were felled by the avalanche which covered several hundred acres. Some of the material will be salvaged.

CANKER DISEASES

PINE PITCH CANKER, *Fusarium subglutinans f. sp. pini*

261A - Central California Coast

Late in 1994, pine pitch canker was confirmed on Monterey pine in the Cambria area, San Luis Obispo County. The disease is now present in all three of California's native Monterey pine stands. It is well established at San Simeon State Park, several miles north of the town of Cambria, and is present in Cambria proper. Two infected trees along Highway 1 in Cambria were removed early in 1995. All symptoms of the disease were present in the stand at San Simeon State Park, including tree mortality. The disease is presumed to have been present in the area at least 2 to 3 years prior to its discovery. The Pine Pitch Canker Task Force, a coalition of governmental, private, and non-profit groups formed by the California Forest Pest Council, held its first meeting in December 1994. A major effort of the task force has been the dissemination of information on pitch canker, with the intent of lessening the impact and spread of the disease. Management and research priorities have been identified; future efforts will concentrate on funding and coordinating proposed activities. Reports from the Task Force are available.

263A - Northern California Coast

Symptoms of pine pitch canker in Monterey pine in northern Santa Rosa have not significantly increased beyond those noted a few years ago. A resampling of the infected Monterey pine in Ukiah (Mendocino County) was negative for the fungus.

MADRONE CANKER, *Fusicoccum aesculi*

263A - Northern California Coast

Madrone canker killed clumps of Pacific madrone northwest of Willits (Mendocino County).

PHOMOPSIS CANKER, *Phomopsis lokoyae*

263A - Northern California Coast

Phomopsis lokoyae caused branch and top kill of Douglas-fir saplings near Philo (Mendocino County) and along Salmon Creek (Humboldt County).

M261B - Northern California Coast Ranges

A few planted Douglas-fir saplings and pole-sized trees northeast of Lake Mendocino (Mendocino County) had branch and top kill caused by to *Phomopsis lokoyae*.

SERIDIUM CANKER, *Seridium cardinale*

261A - Central California Coast

Seridium cardinale caused branch flagging of redwood near Carmel (Monterey County).

M261B - Northern California Coast Ranges

Several stems of Leyland cypress southeast of Ukiah (Mendocino County) were infected with *Seridium cardinale*. The infected stems were also infested with cedar/cypress bark beetles.

WILLOW DIEBACK, Unknown canker fungi

Several weeping willow trees in the Redwood Valley area had various levels of branch mortality associated with elongated branch cankers. The pathogen was not identified.

FOLIAGE DISEASES

CYCLANEUSMA NEEDLECAST, *Cyclaneusma minus*

263A - Northern California Coast

Cyclaneusma needlecast infected planted Monterey pine west of Boonville and south of Mendocino (Mendocino County). At the Boonville site, Bishop pine were planted along with Monterey pine, but Bishop pine was not infected.

SEPTORIA LEAF BLIGHT, *Septoria quercicola*

M261A - Klamath Mountains

Black oaks along many drainages were affected by *Septoria* leaf blight. Early mortality of foliage and defoliation occurred along the Scott and Klamath Rivers (Siskiyou County), and the Trinity River (Trinity and Humboldt Counties).

263A - Northern California Coast

For the past two years, a few black oaks west of Ukiah (Mendocino County) have had severe *Septoria quercicola* infections, resulting in crown dieback.

M261B - Northern California Coast Ranges

Black oaks were defoliated prematurely in July and August around Lake Pillsbury, Mendocino National Forest (Lake County), because of heavy infection by *Septoria quercicola*.

LEAF SPOTS ON CALIFORNIA LAUREL, *Pseudomonas lauracearum*, *Colletotrichum gloeosporioides*, *Monochaetia* sp.

261A - Central California Coast

Angular leaf spots caused by *Pseudomonas lauracearum*, *Colletotrichum gloeosporioides*, and *Monochaetia* sp. caused bay trees to appear blighted in wet areas near Scotts Valley (Santa Cruz County).

OAK ANTHRACNOSE

M261 and M261F - Northern California Interior Coast Ranges and Sierra Nevada Foothills

Anthracnose symptoms were present on blue and valley oaks in the upper Sacramento Valley (Shasta County), although not nearly as prevalent or severe as in 1993. Premature defoliation was rare, presumably due to the combination of mild symptoms and moderate summer weather.

SYCAMORE ANTHRACNOSE

M262B Southern California Mountains and Valleys

Sycamore anthracnose caused heavy defoliation of western sycamore in the Upper Big Tujunga Canyon, Arroyo-Seco Ranger District, Angeles National Forest (Los Angeles County). Damage was noted in late May at 3500 foot elevation. Anthracnose was also very common along the West Fork San Gabriel River on the Mt. Baldy Ranger District, Angeles National Forest (Los Angeles County).

NURSERY DISEASES

FUSARIUM ROOT AND HYPOCOTYL ROT, *Fusarium* spp.

Growth of red fir container stock at Chico Genetic Resource Center (Butte County) was suppressed by *Fusarium* hypocotyl rot. Shading improved the condition of the seedlings.

UNKNOWN

At Chico Genetic Resource Center (Butte County), container stock of a number of shrub species exhibited dieback symptoms, including leaf spotting, marginal and tip necrosis, and water soaking. Species affected included deerbrush, buckbrush, mountain mahogany, and red alder. Both 1-0 and 2-0 stock were affected, but causal agent was not identified. It is suspected that cultural practices, mainly acidification of irrigation water, may be involved.

BACTERIAL CANKER, *Pseudomonas syringae*

The bacterial canker of *Camptotheca acuminata* re-occurred during the winter at the Chico Genetic Resource Center (Butte County). Levels were not as severe as in 1994, but several areas in the production orchard were affected by stem dieback.

CHARCOAL ROOT ROT, *Macrophomina phaseolina*

Macrophomina phaseolina killed approximately 5% of the 1-0 red fir crop at Placerville Nursery (El Dorado County). Two years ago the nursery discontinued fumigating with methyl bromide, which has allowed a build-up of pathogen microsclerotia in the soil. The disease was limited to one field.

SOILBORNE DISEASES, *Fusarium* spp. and *Phoma* spp.

Two-year-old red fir, white fir and Douglas-fir at Humboldt Nursery (Humboldt County) were killed by *Fusarium* and *Phoma*. Damage levels ranged from 1% to 10% in several nursery beds.

WILLOW BLIGHT, *Venturia saliciperda*.

Willow cuttings at Humboldt Nursery (Humboldt County) died back due to willow blight. The fungus caused dieback of lateral branches, the affected areas turned black, and leaves shrivelled and dropped. The blight affected approximately 15% of the crop.

ROOT DISEASES**PORT-ORFORD-CEDAR ROOT DISEASE, *Phytophthora lateralis*****263A - Northern California Coast**

Port-Orford-cedar root disease was found in two ornamental plantings along Highway 101 near Lost Man Creek north of Orick (Humboldt County) and near High Prairie Creek near Requa (Del Norte County). Each case involved only a single Port-Orford-cedar.

M261A - Klamath Mountains

Port-Orford-cedar root disease was identified in the headwaters of Potato Patch Creek on the Smith River National Recreation Area (Del Norte County). This is part of the Klamath River watershed and is the first identification of this disease in native stands of Port-Orford-cedar in California beyond the Smith River watershed. Based on the size and condition of the trees that have died, it is estimated that

the pathogen was introduced 2 to 4 years ago. Additional creeks within the Smith River watershed that were identified in 1995 as being infested include Jones Creek and a small tributary of the North Fork Smith River near Stone Corral (Del Norte County).

LAMINATED ROOT ROT, *Phellinus weirii*

M261A - Klamath Mountains

A laminated root disease pocket that was previously reported near the Boulder Creek Trailhead, Klamath National Forest (Siskiyou County), was found to be considerably larger than originally identified. Multiple coalescing centers in white fir and Douglas-fir cover an area about 100 acres in size. Mortality and windthrow were occurring in these centers. Management activities to address the disease are planned in part of this root disease pocket.

ANNOSUS ROOT DISEASE, *Heterobasidion annosum*

M261B - Northern California Coast Ranges

A large ponderosa pine below Road 210 and north of the Boggs Mountain Demonstration State Forest office (Lake County) was dying due to annosus root disease. The tree is adjacent to an annosus monitoring plot.

M261D - Southern Cascades

A survey of a bald eagle roosting area on the Gooseneck Ranger District, Klamath National Forest (Siskiyou County), found much of the area affected by annosus root disease. Numerous annosus root disease centers in ponderosa pine were present and pine mortality is continuing. Sizeable openings were present and roost trees were being lost. In addition to annosus root disease, one moist area was affected by black stain root disease, caused by *Leptographium wageneri* var. *ponderosum*.

M261E - Sierra Nevada

Annosus root disease was identified in white fir in the McFarland area in southwest Plumas County, four miles southwest of Meadow Valley. The pathogen was positively identified in white fir stumps and in blowdown in three stands. The disease is thought to exist at varying levels in most of the white fir/mixed-conifer stands in the area. Mortality has resulted when infected trees were subsequently infested with fir engraver beetles. However, white fir mortality was scattered, and most of the fir appeared to be outgrowing the effects of the root disease.

Annosus root disease was responsible for white fir mortality and windthrow in a mixed conifer stand in the Wallace Canyon area, Georgetown Ranger District, Eldorado National Forest (Placer County). Approximately 25% of the stand, located at an elevation of 5200 feet, was estimated to be affected. The area was never logged prior to the 1960s and only logged once since, yet annosus root disease is well established.

ARMILLARIA ROOT DISEASE, *Armillaria* spp.

261A - Central California Coast

Armillaria, in combination with flathead borers, killed saw timber-sized Douglas-fir near Scotts Valley (Santa Cruz County).

263A - Northern California Coast

Armillaria root disease and Douglas-fir engraver beetle killed pole-sized Douglas-fir at the west end of Willits (Mendocino County), and at the west end of Salmon Creek drainage in Humboldt County. *Armillaria* also attacked a few Douglas-fir weakened by *Timema douglasi* defoliation on Rainbow ridge (Humboldt County). Many planted Douglas-fir seedlings were killed near Gualala (Mendocino County).

M261B - Northern California Coast Ranges

Armillaria root disease killed many seedlings and saplings of ponderosa pine, Douglas-fir and incense cedar, and small clumps of manzanita, near Loch Lomond (Lake County). In the same area, a few pole-sized and one saw timber-sized Douglas-fir were killed. A large American elm near Hopland (Mendocino County) was also killed by *Armillaria*.

M261E - Sierra Nevada

Armillaria root disease was found on about a dozen dead 10-year old planted giant sequoia saplings in a plantation on the Hume Lake Ranger District, Sequoia National Forest (Tulare County). One 49 inch DBH overstory giant sequoia was also killed. In each instance, the pathogen was present at the root collar of trees that died in 1995 or 1994. Mortality was restricted to less than one-half acre. To complicate the situation, conks of *Heterobasidion annosum* were found in one incense-cedar and one white fir stump within the pocket of mortality. *Armillaria* appeared to be the primary culprit, but it is unknown what triggered this fungus to be so aggressive.

BLACK STAIN ROOT DISEASE, *Leptographium wagnerii*

263A - Northern California Coast

Several scattered occurrences of black stain root disease were noted in Mendocino County including: Pine Ridge west of Ukiah; one mile east of Mendocino; Devil's slide area west of Boonville; near Point Arena Air Force Station; and along Signal Ridge west of Hendy Woods State Park.

261A - Central California Coast

A large Douglas-fir near Scotts Valley (Santa Cruz County) was killed by black stain root disease.

M261E - Sierra Nevada

Black stain root disease was associated with yellowing crowns, needle drop, stress cone crops and mortality of pole and small saw timber-sized Douglas-fir in mixed conifer stands at two separate locations on private land in the Spring Garden Ridge area near Quincy (Plumas County).

Black stain root disease was killing two Douglas-firs near State Highway 120 one mile west of the Big Oak Stump entrance to Yosemite National Park (Tuolumne County). The affected trees were growing in a densely stocked mixed-conifer stand at about 4400 feet elevation. Black stain has not been commonly reported in this area of the Sierra Nevada.

DWARF MISTLETOES, *Arceuthobium* spp.

M261A - Klamath Mountains

Dwarf mistletoes continue to affect a wide range of conifer species throughout this area. *Arceuthobium siskiyouense* was infecting knobcone pine near Red Mountain on the Smith River National Recreation Area, Six Rivers National Forest (Del Norte County). *A. abietinum* f.sp. *magnificae*, in conjunction with *Cytospora abietis*, was causing tree decline and mortality of red fir stands on South Fork Mountain (Trinity County).

M261E - Sierra Nevada

Moderate to heavy infestations of red fir dwarf mistletoe (*Arceuthobium abietinum* f. sp. *magnificae*) were found in the northwestern portion of the Lake Tahoe Basin Management Unit (Placer County) north of Burton Creek State Park. Branch flagging was common on infected fir and assumed to be caused by *Cytospora* canker. Active fruiting of *Cytospora abietis* was observed in mid July at an elevation of about 7400 feet.

M261B - Northern California Coast Ranges

Western dwarf mistletoe (*Arceuthobium campylopodum*) infections on ponderosa pine near Loch Lomond (Lake County) were severe enough to guide silvicultural prescriptions on a harvest plan.

M262B - Southern California Mountains and Valleys

Western dwarf mistletoe (*Arceuthobium campylopodum*) continued to heavily infect Jeffrey pine in recreation areas throughout southern California. The USDA Forest Service Pacific Southwest Region's

"5-Year Dwarf Mistletoe Control Program" is continuing on the Angeles, Cleveland, Los Padres and San Bernardino National Forests. Acreages in the 5-year Dwarf Mistletoe Control Program in FY95 were: Angeles - 30 acres, Cleveland - 60 acres, Los Padres - 85 acres and San Bernardino - 296 acres. Control measures include broom pruning, branch pruning, thinning and tree removal.

TRUE MISTLETOE, *Phoradendron* spp.

M262B Southern California Mountains and Valleys

True mistletoe (*Phoradendron* spp.) continued to cause dieback and decline in black oaks on Liebre Mountain on the Saugus Ranger District, Angeles National Forest (Los Angeles County).

WHITE PINE BLISTER RUST, *Cronartium ribicola*

M261A - Klamath Mountains

Foxtail pines on Lake Mountain, Klamath National Forest (Siskiyou County), were examined in 1994 for blister rust. Most of the trees observed had evidence of infection, although it was light and causing minimal damage. Regeneration and recruitment of foxtail pine was limited, but it is unknown what effect blister rust is having on this situation.

M261E - Sierra Nevada

Blister rust caused conspicuous branch flagging or small tree mortality of sugar pine on all Ranger Districts of the Sierra National Forest (Mariposa, Madera, and Fresno Counties), at the University of California's Whitaker Forest (Tulare County), and in the northern portion of the Lake Tahoe Basin Management Unit (Placer County). At Lake Tahoe, western white pine growing at 7,450 feet was reported as a host.

Much of the branch mortality on the Sierra National Forest involved cankers on 1990 and 1991 wood. Some of these infected trees also contained cankers that dated back to the early 1980s. Dead branches were often 30 feet or more above the ground. Current year aecia, uredia and telia were not commonly seen. It was common to find branch flagging restricted to 1995 and sometimes 1994 tissue that was not due to blister rust. The cause of this flagging remains unknown.

Branch flagging caused by white pine blister rust was common and very striking on sugar pines growing on ridge tops, mid-slopes and stream bottoms on the Lassen, Plumas, Tahoe and Eldorado National Forests.

White pine blister rust has infected western white pine along the South Fork of Cold Creek in northern Placer County, 4 miles south of Donner Lake. The heaviest infections occurred on saplings. Occasional cankers can be found in pine taller than 40 feet. The disease was distributed in the western white pine from South Fork Cold Creek up to the Pacific Crest Trail. Many mixed conifer stands on the Miwok and Groveland Ranger Districts (Calaveras and Tuolumne Counties) are heavily infested.

263A - Northern California Coast

One sugar pine sapling with multiple branch flagging was detected near the entrance to the Point Arena Air Force Station (Mendocino County).

WESTERN GALL RUST, *Peridermium harknessii*

261A - Central California Coast

Western gall rust infection levels were wiping out a small acreage Monterey pine Christmas tree plantation near Walnut Creek (Contra Costa County).

263A - Northern California Coast

Isolated stands of planted Bishop pine west of Boonville and planted or seeded Monterey pine west of Ukiah (Mendocino County) were infected with western gall rust.

MISCELLANEOUS

DRIPPY NUT, *Erwinia quercina*

263A - Northern California Coast

Interior oaks on the Mendocino College campus (Mendocino County) had bacterial ooze caused by *Erwinia quercina*. The bacteria caused dripping from filbertworm-infested acorns and resulted in an unsightly mess on the campus sidewalks.

HAZARD TREES

M262A and M262B — Central California Coast Range and Southern California Mountains and Valleys Section

Hazardous trees, especially coast live oak, continued to be a problem in campgrounds and recreation areas on the Palomar Ranger District, Cleveland National Forest (San Diego County), and in Santa Ynez Recreation Area, Santa Barbara Ranger District, Los Padres National Forest (San Luis Obispo County).

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Status and Control of Animal Pests

A Report to the Forest Pest Council from the Animal Damage Committee
Prepared by: John Borrecco

Introduction

This report summarizes the Animal Damage Committee's annual survey of vertebrate damage to forest trees. The survey is accomplished by mailing a simple form to private timber companies, federal and state agencies, and other organizations who manage forested lands in California. The survey form requests summary information by pest species regarding species of trees injured, age class of trees, acres over which damage occurs, number of trees per acre damaged, whether damage occurs in plantations or other areas, the general trend in damage relative to past conditions, and control methods used. Results of this survey are reported as part of the California Forest Pest Council's annual overview of forest pest conditions in California.

In August, 1995, 102 survey forms were mailed to federal and state agencies, private timber companies, and other private organizations managing forested lands in California. A total of 43 (42% return) responses were received.

Respondents and Location of Reports

Survey forms were returned by representatives of the U.S. Forest Service (n=17); California Department of Forestry and Fire Protection (n=7); private timber companies (n=13); and various other organizations (n=6) including the National Park Service (4) and the Bureau of Land Management (1).

Incidence of damage to trees was reported from 37 counties representing over 1/2 of the land area of

California. Counties represented: Alpine, Amador, Butte, Calaveras, Del Norte, El Dorado, Fresno, Humboldt, Kern, Kings, Lake, Lassen, Los Angeles, Madera, Mariposa, Mendocino, Modoc, Mono, Monterey, Nevada, Placer, Plumas, Riverside, San Benito, San Bernardino, San Diego, Santa Barbara, Shasta, Sierra, Siskiyou, Sonoma, Tehama, Trinity, Tulare, Tuolumne, Ventura, and Yuba.

Species Causing Damage

A variety of animal species are causing damage to forest trees and the damage varies by region of the state and by land ownership (Table 1). Species most commonly identified in this survey (as well as in previous years) as causing problems are deer (51% of respondents), pocket gopher (51%), domestic stock (35%), porcupine (28%), rabbits and hares (21%), black bear (19%), and tree squirrel (14%). Deer, pocket gophers, rabbits and hares, and livestock feeding injuries on trees occur throughout the State. Damage by other species tends to be more limited geographically.

Scope Of Damage

Damage from all species was reported on about 475,926 acres (Table 2). All of California's major timber producing regions and timber types have reported damage by vertebrate species. Based on the acres of damage, the species ranking changes considerably from the above ranking and from previous years: woodrat (25% of the acres), porcupine (23%), black bear (20%), deer (20%), pocket gopher (6%), domestic stock (5%), and all others (<1%). This change in ranking of species is the result of one new respondent reporting large numbers of acres affected by woodrats and porcupines. This same respondent also reported a total of 336,813 acres for four species which also accounts for the substantial increase in the total acres reported over previous years (2 to 3 times). Otherwise, the rankings are similar as in previous years.

Table 3. Number of damage responses reported by vertebrate species (N=43).

Species	USFS	CDF	Private	Other	Total
Beaver	2	0	0	0	2
Birds	1	0	0	0	1
Black Bear	2	2	3	1	8
Deer	13	3	6	0	22
Woodrat	0	1	3	0	4
Elk	1	0	1	0	2
Meadow Mice	1	0	0	0	1
Mountain Beaver	0	0	1	0	1
Pocket Gopher	14	1	7	0	22
Porcupine	8	1	3	0	12
Rabbits and Hares	7	1	1	0	9
Tree Squirrels	2	1	3	0	6
Domestic Stock	12	0	3	0	15
Feral Pigs	0	0	0	1	1
Ground Squirrels	2	0	2	0	4
Total	65	10	33	2	110
(n)	(17)	(7)	(13)	(6)	(43)

Table 4. Number of acres reported to be receiving some level of damage.

Species	USFS	CDF	Private	Other	Total
Beaver	2	0	0	0	2
Birds	8	0	0	*	8
Black Bear	310	*	96813	0	97123
Deer	39975	210	54140	0	94325
Woodrat	0	0	120040	0	12040
Elk	340	0	40	0	380
Meadow Mice	50	0	0	0	50
Mountain Beaver	0	0	*	0	*
Pocket Gopher	28724	60	1410	0	30194
Porcupine	7815	0	100140	0	107955
Rabbits and Hares	1081	10	200	0	1291
Tree Squirrels	500	*	1020	0	1520
Domestic Stock	21826	0	90	0	1005
Feral Pigs	0	0	0	1005	1005
Ground Squirrels	32	0	85	0	117
Total	100663	280	373978	1005	475926
(%)	21%	<1%	79%	<1%	100%

*incidence of damage reported but no information as to how many acres were affected.

Species Accounts

BEAVER

Species Damaged: Aspen.

Damage Trend: Static.

Control Methods: None (2/2).

Damage Location: Lassen, Nevada, Placer, Plumas, and Sierra Counties.

Comments: Damage reported to pole-sized trees and to some 3 to 4 year-old aspen in streamside management zones and around meadows in the northeastern part of the State (M261D Southern Cascades and M261E Sierra Nevada ecological sections).

BIRDS

Species Damaged: Ponderosa pine.

Damage Trend: Increasing.

Control Methods: None (1/1).

Damage Location: El Dorado County.

Comments: Sapsucker injuries to about 50 small ponderose pine saplings in a mixed Douglas-fir/ponderose pine plantation (M261E).

BEAR

Species Damaged: Douglas-fir, redwood, white fir, ponderosa pine and western white pine.

Damage Trend: Increasing.

Control Methods: Sport hunting (3/8), none (5/8).

Damage Location: Del Norte, Humboldt, Madera, and Trinity Counties.

Comments: Damage was reported in both plantations and natural stands to poles and small saw timber from 10 to 90 years old. Levels of damage vary from 1 to 60 trees/acre. Black bears are primarily a problem on private timber lands on the north coast of California in the redwood and Douglas-fir forest types (263A, M261A and M261B ecological sections). A few incidences of bear damage were reported in the Smith River National Recreation Area, Six Rivers Nation Forest and on the Minarets Ranger District, Sierra National Forest in Madera County (M261E).

DEER

Species Damaged: Douglas-fir, redwood, ponderosa pine, Jeffrey pine, sugar pine, lodgepole pine, western white pine, white fir, red fir, incense cedar, giant sequoia, canyon and scrub oak.

Damage Trend: Static.

Control Methods: Seedling protectors (13/22), repellents (5/22), and none (7/22).

Damage Location: Alpine, Amador, Butte, Calaveras, El Dorado, Fresno, Humboldt, Lake, Lassen, Los Angeles, Madera, Mariposa, Mendocino, Modoc, Mono, Nevada, Placer, Plumas, Riverside, San Bernardino, Shasta, Sierra, Siskiyou, Sonoma, Tehama, Trinity, Tulare, Tuolumne, and Yuba Counties.

Comments: Most damage occurs to seedlings 1 to 10 years old in plantations. Levels of damage reported varied from 5 to 350 trees/acre. Seedling protectors include plastic mesh tubes and netting. Repellents include BGR and Plant Pro-Tec (garlic units).

Injuries occur in all major timber types in the M261A-B, M261D-G, M262A-B, and 263A ecological sections.

WOODRAT

Species Damaged: Redwood and Douglas-fir.

Damage Trend: Static.

Control Methods: None (4/4)

Damage Location: Humboldt, Mendocino, and Sonoma Counties.

Comments: Damage occurred to sapling and pole sized trees from 5 to 20 years old at levels up to 150 trees/acre. Injuries result in dead, spiked tops. Woodrat damage is primarily reported from private industry lands on the Northern CA coast (263A). One company reported injuries occurring on 120 thousand acres.

ELK

Species Damaged: Douglas-fir, white fir, ponderosa pine, and Sitka spruce.

Damage Trend: Static.

Control Methods: None (2/2).

Damage Location: Humboldt and Siskiyou Counties.

Comments: Damage occurs to seedlings and saplings 1 to 7 years of age at levels of 25 to 300 trees/acre. Damage most often reported from the Klamath Mountains (M261A) and Northern CA coast (263A).

MEADOW MOUSE

Species Damaged: Douglas-fir, red fir, white fir, and ponderosa pine.

Damage Trend: Increasing.

Control Methods: None (1/1).

Damage Location: Siskiyou County.

Comments: Damage reported to seedlings 1 to 3 years of age at levels of 50 to 100 trees/acre in the Klamath mountains (M261A) and Southern Cascades (M261D) ecological sections.

MOUNTAIN BEAVER

Species Damaged: Douglas-fir, redwood, and hardwoods.

Damage Trend: Insignificant.

Control Methods: None (1/1).

Damage Location: Humboldt County.

Comments: Damage observed but considered insignificant. Injuries by this animal are generally reported from the Northern CA coast (263A) and coast ranges (M261B), and from the western part of the Klamath mountains (M261A) ecological sections.

POCKET GOPHER

Species Damaged: Douglas-fir, white fir, red fir, ponderosa pine, Jeffrey pine, Coulter pine, sugar pine, lodgepole pine, western white pine, pinyon pine, giant sequoia, incense cedar, deodora cedar, redwood, canyon live oak.

Damage Trend: Static to increasing.

Control Methods: Baiting (9/22), trapping (4/22), vegetation control (3/22), seedling protectors (1/22), none (9/22).

Damage Location: Alpine, Amador, Butte, Calaveras, El Dorado, Fresno, Humboldt, Kern, Lassen, Los Angeles, Madera, Mariposa, Modoc, Mono, Nevada, Placer, Plumas, Riverside, San Bernardino, San Diego, Shasta, Sierra, Siskiyou, Tehama, Trinity, Tulare, Tuolumne, and Yuba Counties.

Comments: Most damage to seedlings occurs in plantations 1 to 10 years old. Levels of damage reported range from 1 to 500 trees/acre. Damage occurs throughout all sections of the Sierran steppe, mixed and coniferous forest and meadow ecological province (M261A-G), the Central CA coast ranges and Southern CA mountains (M262A-B) and Northern CA coast (263A).

PORCUPINES

Species Damaged: Douglas-fir, redwood, red fir, white fir, ponderosa pine, and Jeffrey pine.

Damage Trend: Static.

Control Methods: Hunting (1/12), none (11/12).

Damage Location: Butte, Calaveras, Fresno, Humboldt, Lassen, Madera, Mariposa, Modoc, Mono, Nevada, Placer, Plumas, Shasta, Sierra, Siskiyou, and Tehama Counties.

Comments: Injuries occur to seedlings through mature trees in plantations and natural stands at levels of damage ranging from 1 to 200 trees/acre. Injuries were reported throughout the Sierran steppe, mixed and coniferous forest and alpine meadow ecological province (M261A-G) and Northern CA coast (236A).

RABBIT & HARE

Species Damaged: Douglas-fir, redwood, Coulter pine, ponderosa pine, Jeffrey pine, lodgepole pine.

Damage Trend: Static.

Control Methods: Seedling protectors (4/9), and none (5/9).

Damage Location: Butte, Humboldt, western Kern, Lake, Mono, Plumas, Riverside, San Bernardino, Shasta,

Siskiyou, Tehama, Trinity, and Ventura Counties.

Comments: Damage reported to seedlings 1 to 10 years old in plantations at levels of 1 to 400 trees/acre. Injuries occurred in Northern CA coast and coast ranges (263A and M261B), Southern Cascades (M261A), the Central CA coast ranges and Southern CA mountains (M262A-B), and scattered locations in the Sierra Nevada (M261E) ecological sections.

TREE SQUIRREL

Species Damaged: Douglas-fir, redwood, ponderosa pine, sugar pine, incense cedar, and big leaf maple.

Damage Trend: Increasing.

Control Methods: Metal bands and hunting (1/6), none (5/6).

Damage Location: Fresno, Mendocino, Nevada, Siskiyou, Sonoma, and Tulare Counties.

Comments: Reports from private forest lands concerned bark stripping and top kill, especially of redwood poles to mature trees on the northern CA coast (263A). Similar injuries were reported in Nevada County for Douglas-fir, incense cedar, and big leaf maple. Forest Service reports concerned cone cutting, especially of rust resistant sugar pine in the Klamath Mountains (M261A), Southern Cascades (M261D), and Sierra Nevada (M261E) ecological sections.

DOMESTIC STOCK

Species Damaged: Douglas-fir, redwood, white fir, red fir, Coulter pine, ponderosa pine, Jeffrey pine, lodgepole pine, sugar pine, western white pine, giant sequoia, incense cedar, and California black oak.

Damage Trend: Static.

Control Methods: Placement of salt blocks (3/15), seedling protectors (1/15), herding (1/15), fences (3/15), none (9/15).

Damage Location: Alpine, Butte, Calaveras, Fresno, Kern, Lassen, Madera, Mariposa, Mendocino, Modoc, Mono, Nevada, Placer, Plumas, Riverside, San Bernardino, San Diego, Shasta, Sierra, Siskiyou, Sonoma, Tehama, Trinity, Tulare, Tuolumne, and Yuba Counties.

Comments: Most respondents reported damage to seedlings 1 to 10 years old in plantations. Levels of damage varied from 1 to 200 trees/acre. One respondent reported browsing by both cattle and sheep, and one indicated that cows primarily cause injury by trampling seedlings. Cows also damaged riparian plantings following fire. Injuries occurred throughout the State in the 263A, M261A-G, and M262B ecological sections.

GROUND SQUIRREL

Species Damaged: Coulter pine, ponderosa pine, Jeffrey pine, giant sequoia, red fir, and white fir.

Damage Trend: Static.

Control Methods: Seedling protectors (1/4); grain baits, smoke bombs and shooting (1/4); none (2/4).

Damage Location: Fresno, Mono, Nevada, Riverside, and San Bernardino Counties.

Comments: Damage is occurring to seedlings 1 to 5 years old in plantations at levels of 2 to 500 seedlings/acre. Problems reported in the Southern CA mountains (M262B) and Sierra Nevada (M261E) ecological sections.

FERAL PIG

Species Damaged: Blue and valley oak.

Damage Trend: Static.

Control Methods: Fence and direct reduction of pigs (1/1).

Damage Location: Monterey and San Benito Counties. (Pinnacles National Monument).

Comments: Consumption of mast and physical destruction of seedlings from rooting activity in the Central

CA coast ranges (M262A) ecological section.

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Status and Control of Weeds

A Report to the California Forest Pest Council from the Weed Committee
 Ken Fleming, Chair
 Paul Violet, Secretary

Weed Control Survey

The Weed Committee conducted a survey of private and public forest land managers. Respondents (66 out of 186 polled) included most large timberland owners in California, the U.S.F.S Region 5, National Park Service, Glendale Fire District, and forestry consultants. The survey was conducted to determine the intended purpose and type of weed control activities that were carried out in 1995. The results are summarized in Tables 5 and 6. As can be seen, both private and public managers performed significant site preparation and conifer release. Public land managers utilized prescribed burning as a tool to enhance fire protection. Private land managers relied heavily on chemical treatments and both public and private managers performed significant amounts of mechanical/hand treatments.

Table 5. Acres of weed control performed on Private Lands in California - 1995.

Method	Site Prep	Conifer Release	Right of Way	Research	Weed Control	Fire Protection	Total
Burning	7280	0	35	0	0	140	7455
Mechanical	8837	3774	150	70	5	110	12946
Hand	4061	8019	84	0	0	65	12229
Glyphosate	4372	11144	289	5	209	5	16024
Hexazinone	9686	8741	0	2	60	60	18549
Triclopyr	5389	24136	930	2	317	555	31329
2,4 D	2233	6248	127	0	0	310	8918
Atrazine	148	1223	0	0	11	20	1402
Oust	254	1655	0	0	0	0	1909
Spike	0	0	0	0	25	0	25
Total	42260	64940	1615	79	627	1265	110786

Table 6. Acres of weed control performed on Public Lands in California - 1995.

Method	Site Prep	Conifer Release	Right of Way	Research	Weed Control	Fire Protection	Total
Burning	3355	0	0	5	0	22393	23753
Mechanical	5302	30	7	3536	3984	29586	42953
Hand	114		60	0	265	69	
Glyphosate	803	9458	3	21	100	0	10385
Hexazinone	23	964	0	0	0	0	987
Triclopyr	635	7023	0	0	0	0	7658
Total	10232	47031	93	33	3901	26446	87736

Horizontal Line

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Surveys and Evaluations

A Report to the California Forest Pest Council from the Insect and Disease Committees

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.) Fourteen years after thinning, the treatments had reduced mortality from 90 to 100 percent of the level in unthinned stands (Table 7).

Sugar Pine Genetics Program.

In the 1994-1995 screening cycle, 88 mature cone-bearing new parents with major gene resistance (MGR) to white pine blister rust were identified Regionwide. Progeny of 1,760 candidates (94,080 sugar pine seedlings) were inoculated and evaluated for MGR to white pine blister rust. Progeny identified with MGR (1,776 individuals) were transplanted to the Happy Camp disease garden for slow rusting mechanism evaluation.

For the 1995-1996 screening cycle, progeny of 3000 sugar pine families were grown at greenhouses located at the Placerville Nursery (El Dorado County). These seedlings were inoculated at 3 months of age. Three hundred and sixteen (316) new rust resistant trees were identified. The Region has identified a total of 985 mature, cone producing, rust resistant sugar pine trees in natural forest stands.

All factors indicated that 1995 would be another blister rust wave year over much of the Sierra Nevada Range. Leaves of Ribes, mostly gooseberry, were covered with blister rust, and telia were developing well.

Observations were made on five, twelve-year-old evaluation plantations. Infections indicate wave years also occurred in 1989 and 1992.

Some family selections for "slow rusting" resistance to white pine blister rust were found at Pondorado High School in Camino (El Dorado County). The five acre site was planted with 96,000 sugar pine trees in 1992. In addition, 27,000 trees are planted at Happy Camp (Siskiyou County) for slow rusting screening.

Through cooperative efforts between personnel of the Genetic Resource Program and Sierra Pacific Industries (SPI), thirty-two pounds of rust resistant seed were produced in the Camino SPI seed orchard (El Dorado County). The seed was divided equally between SPI and the Forest Service. This seed will be used for reforestation on the Eldorado National Forest.

Selections of seed from 89 western white, 123 foxtail and 100 white bark pines were made available to start research on resistance in these species. These same lots are in stratification for February sowing for development of screening methodology and resistance identification.

Table 7. Commercial Tree Mortality By Stocking Level, Sixteen Years After Thinning *

Residual Stocking After Thinning**

Dead Trees Per Acre

Year	40%	55%	70%	100%
1980	0	0.2	0.2	2.4
1981	0	0	0.7	2.4
1982	0	0.5	0.3	3.6
1983	0	0.1	0.8	4.1
1984	0	0	0	1
1985	0	0.2	0	0.6
1986	0	0	0	1.3
1987	0	0	0	1.4
1988	0	0	0	0
1989	0	0.4	0	2.6
1990	0	0	0	2.6
1991	0	0	0	1.8
1992	0	0.2	0	3
1993	0	0.2	0.3	5.2
1994	0	0	0	4.8
1995	0	0	0.3	0.4
Mean	0	0.1	0.2	2.3
Range	0	0-.5	0-.8	0-5.2
Percent Mortality Reduction Compared with Normal Basal Area	100	95.7	91.3	--

*Commercial trees are 8 inches dbh and larger, with straight boles, yeilding at least one 10 foot long with a 6 inch top. Trees were killed by the mountain pine beetle.

**Percent of normal basal area.

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Hierarchy of Ecological Units in California

Division	Province	Section
HUMID TEMPERATE DOMAIN		
260 Mediterranean	261 CA Coastal Chaparral	261A Central CA Coast Forest and Shrub
	262 CA Dry Steppe	261B Southern CA Coast
	263 CA Coastal Stepp, Mixed	262A Great Valley
		263A Northern CA Coast and Redwood Forest
M260 Mediterranean Regime Mountains	M261 Sierran Steppe, Mixed and Coniferous Forest and Alpine Meadow	M261A Klamath 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 Range
		M262B Southern CA Mountains & Valleys
DRY DOMAIN		
320 Tropical/Subtropical Desert	322 American Semi-desert and 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

Conifer and hardwood vegetation type distribution in California (CALVEG) with domaine and section lines from the National Hierarchical Framework of Ecological Units.

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