FOREST PEST CONDITIONS IN CALIFORNIA 2004

A PUBLICATION OF THE CALIFORNIA FOREST PEST COUNCIL

THE CALIFORNIA FOREST PEST COUNCIL

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

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

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

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

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

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

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

This report, ***Forest Pest Conditions in California 2004***, is compiled for public and private forest land managers and other interested parties to keep them informed of conditions on forested land in California, and as a historical record of forest insect and disease trends and occurrences. The report is based largely on information provided by three sources: (1) information generated by Forest Health Protection, Pacific Southwest Region, USDA Forest Service, while making formal detection surveys and biological evaluations, (2) reports and surveys of conditions on private lands provided by personnel of the California Department of Forestry and Fire Protection, and (3) the statewide Cooperative Forest Insect and Disease Survey, in which federal, state, and private foresters and land managers participate.

This report was prepared by Forest Health Protection, USDA Forest Service, Pacific Southwest Region in cooperation with other member organizations of the Council, published by the California Department of Forestry and Fire Protection and distributed by the two agencies. The report is available in color at the following website: http://www.fs.fed.us/r5/spf/publications/fhp-doc.shtml

Cover: High elevation pine surveys were conducted in 2004. The Eddys, Upper Sacramento drainage (left); Shadow Lake, Mt. Lassen National Park (right).

FOREST PEST CONDITIONS IN CALIFORNIA 2004

ABSTRACT

The important forest insect and disease conditions in California in 2004 are given. Included are bark beetles, defoliators, abiotic injury, dwarf mistletoes, declines and root, foliage, rust and canker diseases. No reports of animal damage were received. The section on surveys and evaluations includes summaries of the White Pine Blister Rust Screening Program, 25 years of tree mortality in eastside pine thinning plots, detecting vegetation changes in California using satellite imagery, a description of high elevation white pine surveys in the State, and a summary of aerial survey in California.

Key words: California, forest diseases, forest insects, surveys, tree mortality

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

SUMMARY

INSECTS

Bark and Engraver Beetles

Activity of bark beetles was variable, but with the exception of Jeffrey pine beetle reports, generally indicated an upward trend throughout California in 2004. Mountain and western pine beetle were widely reported. Activity by Jeffrey pine beetle was about at 2003 levels in northeastern California, but was generally down in the central and southern portions of the M261E ecoregion; populations increased in the San Bernardino and San Gabriel Mountains. In southern California, populations of western pine beetle dropped dramatically for unknown reasons, while red turpentine beetle populations increased dramatically. The fir engraver caused increasing levels of white fir mortality throughout much of the state. Although pine engravers were not widely reported, activity was described as somewhat increased in the east-central and southern Sierra Nevada. Populations of the pinyon ips were at greatly reduced levels from 2003. The red turpentine beetle was present at rates described as light to moderate.

Defoliators and Others

A wide variety of defoliators and miscellaneous insects were reported. Douglas-fir tussock moth trap catches were up, increasing to near outbreak levels in some areas. The lodgepole needleminer outbreak in Yosemite National Park continued at moderate to high levels. The outbreak of pandora moth on the Inyo National Forest also continued in 2004. Trap catches of the European gypsy moth remained low.

DISEASES

Abiotic

Drought, drought and frost, fire, and ozone damage were reported in 2004. Drought conditions in southern California remained severe. There was an increase in incense-cedar mortality throughout northeastern California attributed to drought and to a less extent to *Phloeosinus* bark beetles. Failure and snapping off of green-crowned true fir in stands burned in 1999, 2000 and 2001 were reported. Maple leaf scorch was common.

Biotic

Several canker conditions were reported in 2004. Diplodia blight is still apparent on ponderosa pine in various areas, including the upper Sacramento River Canyon. Madrone canker was reported as chronic in interior north coast counties. The pitch canker pathogen was isolated from several Douglas-fir at Badger Hill. Several declines also were reported, and in most cases the causes were unknown.

Seven additional plant species were found to be susceptible to *Phytophthora ramorum* in California. Additional hosts were also detected in Europe and Oregon; in all, 64 susceptible species have been identified. Newly recognized hosts include important horticultural plants and species common in the wildland and grown for Christmas trees.

Reports of root disease continued. Port-Orford-cedar root disease continued to expand and cause tree mortality in the upper Sacramento River Canyon. No new infestations were noted in the eradication effort area at Scott Camp Creek.

FOREST PEST CONDITIONS IN CALIFORNIA - 2004

FOREST INSECT CONDITIONS - 2004

BARK and ENGRAVER BEETLES, and BORERS

Bark and engraver beetle activity increased somewhat in the southern Sierra Nevada (M261E) in 2004.

AMBROSIA BEETLES, *Monarthrum scutellare* and ***M. dentiger***
Ambrosia beetle attacks often occurred in association with *Phytophthora ramorum*-infected (throughout the range of *P. ramorum*) or *Armillaria*-infected tanoaks. Of significant note were dying tanoaks in northwestern Sonoma County near Cazadero and Annapolis (M263A).

CALIFORNIA FIVESPINED IPS, *Ips paraconfusus*
Several occurrences were noted at tops of felled ponderosa pine killed by western pine beetles at Boggs Mountain Demonstration State Forest in Lake County (M261B).

CALIFORNIA FLATHEADED BORER, *Melanophila californica*
The California flatheaded borer was involved in much of the Jeffrey pine mortality that occurred in southern California mountains. *M. californica* is particularly important as a mortality agent in areas where the Jeffrey pine beetle does not occur, but also occurs in trees infested with *D. jeffreyi*. The relationship between *Ips* (particularly *I. pini*) and *M. californica* is unclear. The two species are often found in the same tree, raising questions about whether *M. californica* can kill trees on its own. Dying Jeffrey pines infested by these two insects were widespread in southern California, particularly in the San Gabriel and San Bernardino Mountains and in the Peninsular Ranges.

DOUGLAS-FIR BEETLE, *Dendroctonus pseudotsugae*
Mortality of small diameter Douglas-fir was reported from Sonoma, Mendocino, and Humboldt Counties (M263A). In a representative area southwest of Willits (Mendocino County), 8 killed trees averaged 5.8 inches dbh.

FIR ENGRAVER, *Scolytus ventralis*
The fir engraver, along with the fir roundheaded borer, red fir dwarf mistletoe, Cytospora canker and drought stress, has caused extensive red fir mortality in northwestern California. Specific locations include Etsel Ridge on the Mendocino National Forest, North Yolla Bolly Mountains in the Middle Eel-Yolla Bolly Wilderness, and South Fork Mountain on the Shasta-Trinity National Forest (M261B), many of the higher peaks in the Trinity Alps Wilderness, Russian Wilderness, Marble Mountains Wilderness and the southern side of Mt. Ashland (M261A).

Scattered individual and small groups of white and red fir killed by the fir engraver beetle were apparent again this year in Latour State Forest, Shasta County (M261D). Further east, fir mortality occurred at higher elevations in many of the same general areas where pine mortality occurred. Mortality was noted in the vicinity of Fredonyer Pass, Lassen County, and in the CalPines subdivision, Adin Pass area, and west of Goose Lake, Modoc County. Most beetle activity was in the pole-to-intermediate size classes. Fir engraver beetle activity in the Shingletown area, Shasta County, declined. Scattered white fir mortality has occurred around Battle Creek Meadows, Tehama County over the past few years.

Fir engraver-related mortality increased dramatically in northeastern California during 2004, a result of 2003 attacks. Mortality on the Modoc National Forest was up dramatically in 2004 from 2003. There are areas of heavy white fir mortality over thousands of acres throughout the Warner Mountain range (M261G). The more notable areas include Cedar Pass (Warner Mountain Ranger District) and Adin Pass (Big Valley Ranger District). Mortality in white fir was apparent in many locations throughout the east side and transition zones of the Lassen and Plumas National Forests (M261D, M261E). Fir mortality is continuing due to dry conditions, overstocked stands and the low tolerance of white fir to droughty sites.

Figure 1. Fir mortality just west of Truckee along I-80.

High levels of red fir (associated with dwarf mistletoe, Cytospora canker, *Scolytus*) and white fir (associated mainly with *Scolytus*) mortality are occurring throughout many areas of the Tahoe National Forest (M261E). *Scolytus ventralis* is the primary tree killer of the disease-stressed trees. Other outbreaks of the bark beetle have been found in the Lake Tahoe Basin.

Increased white and red fir mortality and top kill occurred in scattered small to moderate pockets above about 5,500 ft over a large area from the Eldorado National Forest south through the Stanislaus National Forest. Individuals and groups of white firs are continuing to die throughout the southern Sierra. True fir mortality and top-kill associated with the fir engraver continued at increased levels in 2004 in several locations, primarily in the southern part of M261E. White fir top-kill and mortality continued to be scattered throughout the Tule River/ Hot Springs and Greenhorn Districts and in the Piute Mountains, Greenhorn District, Sequoia National Forest.

True fir mortality continued to be high in much of southern California. In many, if not most, cases, mortality was caused by insect-disease complexes, including annosus root disease, leafy mistletoe, fir roundheaded borer, along with the fir engraver. In some cases trees were on such droughty sites that *S. ventralis* was the major pest involved in mortality. For example, white fir growing on the steep, south-facing slope of the Arctic Circle portion of Highway 18 (San Bernardino Mountains, between the Big Bear Dam and the community of Running Springs) died in 2003 and 2004. Dead trees on the slope above the highway are being removed for reasons of public safety, and helicopter logging has been chosen as the most feasible method. An extensive die-off of true firs is still occurring around the communities of Lake Arrowhead and Big Bear Lake, San Bernardino County. Recent fir engraver attacks and true fir mortality were visible along Canfield Road on Palomar Mountain, San Diego County.

An outbreak of the bark beetle has been observed in the Tehachapi Mountains amounting to approximately 10% of the trees. However, most of the white firs appeared to have been dead for at least a year with little recent beetle activity. Continued below average precipitation is likely to maintain the beetle outbreak throughout the southern part of the state.

FIR ROUNDHEADED BORER, *Tetropium abietis*
Tetropium abietis has increased in numbers in southern California because of the large amount of severely stressed white fir, as discussed under the fir engraver.

FLATHEADED FIR BORER, *Melanophila drummondi*
Several Douglas-fir were killed southwest and east of Willits, Mendocino County. East of Willits, a group of four trees averaging 14.7 inches dbh was killed; and southwest of Willits, 11 trees averaging 10.3 inches dbh (5.0 to 20.6 inches) were killed. Two of the trees east of Willits were also infected with *Leptographium wageneri*, the cause of black stain root disease.

JEFFREY PINE BEETLE, *Dendroctonus jeffreyi*
In northeastern California, Jeffrey pine beetle (*Dendroctonus jeffreyi*) activity and related mortality continued near the 2003 levels. Mortality associated with this beetle has not increased much despite several years of below normal precipitation. Scattered large tree mortality could be found throughout northeastern California as well as a few groups of smaller diameter trees. Specific areas with Jeffrey pine beetle activity include a few miles west of Badger Mountain (M261D) on the Hat Creek Ranger District, Lassen National Forest; several small groups of Jeffrey pine mortality east of Said Valley and State Highway 139, Lassen County; and on private land in Alpine Meadows (M261E) off of State Highway 89 between Truckee and Lake Tahoe.

Figure 2. Large diameter Jeffrey pines killed by Jeffrey pine beetle, Alpine Meadows, Placer County.

In the southern Sierra, Jeffrey pine beetle-related mortality increased somewhat throughout the M261E region in 2004. Scattered mortality of older Jeffrey pine continued in the vicinity of Clarks Fork east to Kennedy Meadows, Summit Ranger District, Stanislaus National Forest. Jeffrey pine beetle continued to be active in the Piute Mountains, Greenhorn District, Sequoia National Forest.

Numbers of Jeffrey pines infested and killed by Jeffrey pine beetle increased over 2003 in the San Bernardino and San Gabriel Mountains. Beetles were observed in trees throughout the San Bernardino Mountains and at Crystal Lake and higher elevations on the north slopes of the San Gabriel Mountains.

A new outbreak is killing large numbers of trees in the Tehachapi Mountains. This bark beetle activity is active and ongoing, with approximately 10% of the trees impacted. A continuing drought in the area along with overstocking of the stands should encourage this outbreak until normal rainfall conditions return.

MONTEREY PINE IPS, *Ips mexicanus*
Two large clusters of Bishop pine, on State property and within neighboring private properties north of the town of Mendocino, had attacks by both *Ips mexicanus* and associcated attacks of sour sap beetles. The large clusters were associated with meandering drainages, and the trees on private properties may have been stressed by growing in lawns unwatered in the summertime.

Monterey pine ips, combined with red turpentine beetle, drought, snow breakage and advancing age, was involved in mortality of knobcone pine in northwestern California. Some specific locations include Whiskeytown National Recreation Area, Lakehead, and Bonanza King (M261A).

MOUNTAIN PINE BEETLE, *Dendroctonus ponderosae*
Within a group of ponderosa pines killed by western pine beetle on Boggs Mountain Demonstration State Forest, one pole-sized tree (9.0 inches dbh) was attacked only by mountain pine beetle. This tree had a broken top.

Mountain pine beetle infested several large foxtail pines struck by lightning on China Mountain, and South China Mountain in the Scott Mountains (M261A).

In northeastern California, *D. ponderosae* activity was elevated this year, similar to the higher levels of mortality associated with this beetle during 2003. Most mortality associated with mountain pine beetle attacks was found in sugar pine, although higher levels of lodgepole pine mortality were also detected in some areas. In many areas the attacked sugar pine trees are under additional stress due to white pine blister rust (*Cronartium ribicola*) infection and moisture stress. Areas of sugar pine mortality on the Lassen National Forest included adjacent to State Highway 36 between the junction of State Highway 32 and Morgan Summit to the west (M261D), and near Philbrook Reservoir on the south end of the Almanor Ranger District in small diameter trees (M261E).

Figure 3. Sugar pine mortality caused by drought, mountain pine beetles and overcrowded trees; American River Ranger District, Tahoe National Forest.

Several conifer stands on the Lassen National Forest, particularly on the Almanor and Eagle Lake Ranger Districts, had substantial amounts of blowdown during the 2002-2003 winter. The cause was attributed to heavy snow loads and a big wind event in December. During 2004 several of the residual ponderosa pine trees around these blowdown areas were attacked and killed by mountain pine beetles (M261E). The small group kills were very numerous and affected around 3 to 5 trees each. Sugar pine mortality on the American River Ranger District, Tahoe National Forest (M261E) remained quite high for the second year in a row. Substantial numbers of sugar pines have been killed.

There are several areas on the Tahoe National Forest where some level of lodgepole pine mortality is always detected. These are typically monoculture stands characterized by trees over 80 years of age and greater than 8 inches dbh. Scattered individual lodgepole pine mortality was noted along the Little Truckee River between Sierraville and Truckee (M261E). High levels of mountain pine beetle-caused mortality of lodgepole pine were also detected along Interstate 80 between Donner Lake and Cisco Grove. Most of this mortality occurred as individual trees as opposed to group kills. Many of the trees along this stretch of highway have very unhealthy looking crowns so additional mortality is expected in the future (M261E).

The 2001 Star Fire on Foresthill Ranger District, Tahoe National Forest (M261E), continued to have a large number of dead and dying sugar pine from fire injuries and bark beetle attacks.

Mortality associated with the mountain pine beetle continued on the Sequoia National Forest along the Divide Highway from Quaking Aspen (Tule River District) south through the Greenhorn Mountains and on Breckenridge Mountain (Greenhorn District).

Mountain pine beetle populations, particularly in the San Bernardino and San Jacinto Mountains (M262B), have been at moderate levels during the multi-year drought and mortality event. There are no data on whether numbers have fallen in 2004 as they have for the western pine beetle. One interesting area of mortality is in a pinyon (*Pinus monophylla*) stand north of Big Bear Lake. Black stain root disease, caused by *Leptographium wageneri*, has been found in the area in the past, but it is not known if the *D. ponderosae*-infested trees have root disease. Mountain pine beetle-infested trees were first observed in the area in 2003, and numbers of trees killed have increased. The infested pinyons are a few miles east of a stand of ponderosa pines. There are no other mountain pine beetle hosts in the immediate vicinity of the infested pinyons.

OAK BARK BEETLES, *Pseudopityophthorus* spp.
Scattered black oak and cost live oak mortality was observed in the Mesa Grande area, San Diego County. Six recently dead oaks examined showed some level of oak bark beetle activity, but the beetle did not seem to be the cause of death.

PINE ENGRAVER BEETLES, *Ips* spp.
Ips pini continues to be associated with Jeffrey pine mortality in the Piute Mountains (Sequoia National Forest) in 2004. The California five-spined ips, *I. paraconfusus*, is associated with ponderosa pine mortality on Breckenridge Mountain (Sequoia National Forest) and on the Bass Lake District, Sierra National Forest in 20 to 40 year-old ponderosa pine plantations in the Miami Peak-Miami Basin area north and east of Oakhurst. The western pine beetle was often found with the pine engravers in both areas.

PINYON IPS, *Ips confusus*
Mortality continued at lower levels in 2004, in the same areas of high mortality reported in 2003, in single leaf pinyon throughout the eastside of the Sierra Nevada from the Humbolt-Toiyabe National Forest south throughout the range. It appears as though populations of *Ips confusus* have dropped off dramatically compared to levels in 2003. Forest Health Protection personnel out of Susanville concluded that there are at least two generations of *Ips confusus* per summer in the area south of Minden, Nevada and possibly a third if there is emergence in October, 2004.

Figure 4. Single leaf pinyon pine mortality attributed to drought and *Ips confusus*; Toiyabe National Forest, near Bridgeport, CA.

Figure 5. Aerial view, single leaf pinyon mortality, Bridgeport.

Forest Health Protection personnel from the Susanville office conducted an assessment of pinyon mortality in 2003 as part of a westwide assessment throughout the pinyon type. Plots were installed on the Inyo, San Bernardino and on the California portion of the Toiyabe National Forest. All plots were in single leaf pinyon, *Pinus monophylla*. Pinyon mortality was highest on the Toiyabe National Forest (27%) and lowest on the Inyo National Forest (1%). Pinyon mortality on the San Bernardino National Forest was 12% in the sampled plots.

RED TURPENTINE BEETLE, *Dendroctonus valens*

The red turpentine beetle is a close associate of the western pine beetle. Attacks of red turpentine beetle were often in association with western pine beetle attacks of ponderosa pine on Boggs Mountain Demonstration State Forest (M261B).

Red turpentine beetle activity was noted on ponderosa pines attacked and killed by the western pine beetle across northeastern California (Siskiyou, Modoc, and Lassen Counties).

Red turpentine beetle activity was found in association with other bark beetles and/or with fire injured trees throughout northeastern California. An area with elevated levels of red turpentine beetle attacks was in the Prattville underburn, Almanor Ranger District, Lassen National Forest (M261D).

Light to moderate levels of red turpentine beetle activity occurred in the southern part of M261E on trees injured to varying degrees by wildfire and prescribed burns. Low levels of red turpentine beetle activity also continued in the Diamond-O Campground, Groveland District, Stanislaus National Forest.

Endemic levels of red turpentine beetles have been noted throughout the southern and central Sierra Nevada and the Coastal Range. The beetle has often been found in conjunction with other bark beetle activity. Individual trees with severe red turpentine beetle attack have been found in the Lake Tahoe area.

The red turpentine beetle has developed very high populations in the Transverse Ranges, particularly the San Bernardino and San Gabriel Mountains. Elsewhere in southern California, populations are also high. On May 15, large numbers of *D. valens* were flying in the community of Wrightwood, providing wildlife viewing opportunities for a Fire Safe Council-organized community fair.

Red turpentine beetle was common on fire damaged Coulter pine in the vicinity of Pine Hills near Julian; and on Jeffrey pine in the Kitchen Valley area, San Diego County. Five Coulter pine near Big Pine Pool in the Lost Valley area, San Diego County, were heavily attacked by the beetle. Jeffrey pine and fire damaged Coulter pine on Cuyamaca Peak, San Diego County, had numerous red turpentine beetle attacks.

WESTERN OAK BARK BEETLE, *Pseudopityophthorus pubipennis*

Galleries of the beetle were noted in *Armillaria*-killed tanoaks in the Cazadero and Annopolis areas of Sonoma County, and in dead white oaks in Ukiah, Mendocino County (M263A).

WESTERN PINE BEETLE, *Dendroctonus brevicomis*

On 12 sites in the southwest portion of Boggs Mountain Demonstration State Forest, 43 ponderosa pines were killed by the western pine beetle (M261B). Killed trees averaged 16.4 inches dbh (4.2 to 30.6 inches). Most western pine beetle-attacked trees also were attacked by red turpentine beetles. Where dwarf mistletoe was also present, dwarf mistletoe ratings were low (DMR of 2).

Following two winters with low water content in the snowpack, mortality caused by the western pine beetle has increased in northwestern California. There are single trees and small groups scattered from Clear Lake northward to Oregon (M261A, M261B). Even some of the older pine plantations are beginning to experience small group kills. A combination of drought, high stocking levels, black stain root disease and western pine beetle have caused large group kills of ponderosa pine at McCloud Flats (M261D). Specific areas of high mortality include the Mud Flow Research Natural Area, Elk Flat, Ash Creek Sink, Algoma and Harris Mountain.

Light mortality of ponderosa pine killed in 2003 by the western pine beetle was noted at several locations west of the Cascades - Weaverville, Trinity County; Bella Vista, Shingletown, and the upper Sacramento River drainage, Shasta County; and Lyonsville, Tehama County. Mortality in these areas this year appears to be less.

Western pine beetle activity continued at 2003 levels throughout most of northeastern California. Individual dead trees as well as small and large groups of dead ponderosa pines are widely scattered across the northeastern counties. Areas of notable mortality include McCloud Flats, Siskiyou and Modoc Counties, the Big Valley Mountain, Lassen County, and in the vicinities of White Horse, Adin Pass, the south Warner Mountains and west of Goose Lake, Modoc County. On Big Valley Mountain and in the White Horse area, most of this mortality was from trees that faded over the winter; a smaller percentage of trees were killed this year. The most notable areas on the Modoc National Forest were on the Warner Mountain Ranger District in the area of Cedar Pass (M261G), and near Adin Pass on the Big Valley Ranger District.

Groups of ponderosa pine mortality were apparent on some of the drier east side sites on the Plumas and Lassen National Forests (M261E, M261D). Continued activity was evident in the vicinity of Bass Lake, on the east side of Goat Mountain and in the Miami Creek Basin on the Bass Lake District, Sierra National Forest.

Activity also continued in the southern Sierra Nevada (M261E) in 2004. The largest increase in western pine beetle-caused mortality was concentrated in the southern Sierra Nevada on the Sequoia National Forest - on Breckenridge Mountain, in the Greenhorn Mountains south of Alta Sierra on the Greenhorn District, and along the Divide Highway on the Tule River and Hot Springs Districts.

Numbers of trees killed by western pine beetles in the San Bernardino and San Jacinto Mountains dropped dramatically in 2004. Monitoring traps caught numerous beetles in early May and early June, but subsequent catches were low. The apparent population drop of the beetle is unexplained. There were numerous host trees available and the drought had continued through the winter of 2003 and 2004. In April and May, several hundred pines in developed recreation sites on the San Bernardino National Forest were sprayed with carbaryl to protect them against this and other bark beetle species.

Recent western pine beetle activity was noted on Coulter pine in the group camp areas, Heise County Park, and on fire damaged Coulter pine on Cuyamaca Peak, San Diego County. A few Coulter pine in and around Angel's Landing Inn, San Diego County, were recently attacked.

WOOD BORERS, *Semanotus* sp.

Dieback of mountain mahogany due to drought and woodborers (Buprestids) was detected over most of the drier portions of the Modoc and Lassen National Forests (M261D, M261E, M261G). Galleries of what looked like *Chaetophloeus heterodoxus*, the mountain mahogany bark beetle, were also observed in the mountain mahogany.

DEFOLIATORS

CALIFORNIA OAKWORM, *Phryganidia californica*

California oakworm fed on live oak near the Trinity River and tanoak on Horse Linto Creek at the Hoopa Reservation (M261A).

DOUGLAS-FIR TUSSOCK MOTH, *Orgyia pseudotsugata*

Douglas-fir tussock moth trap catches were up on several plots in northeastern California in 2003. There were 19 plots that averaged greater than 25 male moths per trap. However, 2004 monitoring trap catches decreased slightly for most plots on private land in Lassen, Modoc, and Shasta Counties. Only one plot, Burney Mountain, showed a significant increase from an average catch of 13 moths per trap in 2003 to 31 in 2004. During the field season of 2004 Forest Health Protection staff monitored other life stages in these areas to determine if populations were increasing to outbreak levels. Sampling of the early larval stages in each of these plots indicated no increase in population levels.

Increasing Douglas-fir tussock moth populations were detected over a broad area in the central and southern Sierra Nevada from the Eldorado National Forest (El Dorado County) south to the Sequoia National Forest (Kern County) (M261E). Low level larval activity and very light feeding injury, restricted to the current year foliage, was observed in the following locations: Placerville and Amador Districts (Eldorado National Forest); Calaveras, Miwok and Summit Districts (Stanislaus National Forest); Yosemite National Park; Bass Lake District (Sierra National Forest); Sequoia and Kings Canyon National Parks; and the Hume Lake, Tule River, Hot Springs and Greenhorn Districts (Sequoia National Forest). Limited egg mass sampling on the Stanislaus National Forest, Yosemite National Park and the Sierra National Forest indicate that if egg and larval survival are good, increased defoliation can be expected in 2005-2006.

An increase in the population of Douglas-fir tussock moth has been noted in Fresno and Tulare Counties. Although no serious defoliation has yet occurred, there is concern that the populations are increasing and heading towards an outbreak. Next year may be of particular concern with the defoliator.

FALL WEBWORM, *Hyphantria cunea*

Defoliation of Pacific madrone by the fall webworm occurred again this year at various locations on the Foresthill Divide, Placer County, notably along the Foresthill Divide Road east of Foresthill (M261E). Scattered light to moderate defoliation of madrone due to feeding by the fall webworm was also present in localized areas along Highway 4 in Calaveras County (M261E).

FRUITTREE LEAFROLLER, *Archyps argyrospila*

The fruittree leafroller outbreak continued on the San Bernardino National Forest, and moderate levels of defoliation also occurred on Palomar Mountain in San Diego County. The primary host is California black oak, *Quercus kelloggi*.

GYPSY MOTH, *Lymantria dispar*

The California Department of Food and Agriculture (CDFA) trapped three male moths as of September 30, 2004. The catches by county were: Marin 1, Nevada 1, San Diego 1. This is three less than captured in 2003 and the same number as captured in 2002. None of the counties reported in 2003 had a capture at the increased Delta/GM trap density of 25 traps per square mile in a four square mile area around a find.

LODGEPOLE PINE NEEDLEMINER, *Coleotechnites milleri*
The lodgepole pine needleminer outbreak in Yosemite National Park that began with the 1992 to 1994 generation continued with low to high levels of defoliation and low mortality in 2004 (M261E). Aerial surveys delimited a total of 34,500 acres of defoliation. High levels of defoliation occurred over an estimated 25,800 acres, with low levels over about 8,700 acres. Defoliation expanded to the east in the Unicorn and Fletcher Creek watersheds and to a new area of defoliation in Rodgers Canyon. Several dozen lodgepole pines died due to the effects of needleminer defoliation and related factors in the Sunrise High Sierra Camp and the adjacent Backpacker's Camp.

PANDORA MOTH, *Coloradia pandora*
The pandora moth outbreak, first detected in June 2002, continued on the Mammoth and Mono Lake Districts, Inyo National Forest (M261E) in 2004. Light larval feeding and defoliation on Jeffrey pine was observed over about 5000 to 10,000 acres. Moderate feeding was very localized and occurred on less than 1000 acres in the vicinity of Lookout Mountain and south and east of Dry Creek.

Last instar larvae of *Coloradia pandora* were seen feeding on Jeffrey pine on Laguna Mountain, San Diego County. Only a few were seen, but observations were casual. The presence of observable numbers may indicate the onset of an outbreak.

PINE CATKIN SAWFLIES, *Xyela* spp.
Numerous reports were received from the Truckee/Donner Lake area of cream-colored, legless larvae dropping from Jeffrey pines. Based on the timing and description, these most likely were larvae in the genus *Xyela*, which infest male cones of various pines.

OTHER INSECTS

ASPEN GALL WASP, unknown species
Aspen galls were detected on small aspen trees at Bidwell Springs (M261D), located just south of Highway 44 near the Butte Lake Road (northeast entrance to Lassen Volcanic National Park). Most branches of all 4-year-old regeneration were infested, likely with some type of gall wasp. To date there is no apparent loss of growth or any resulting tree mortality.

COOLEY SPRUCE GALL APHID, *Adelges cooleyi*
Galls were collected from Brewer's spruce near Golden Russian Lake, Waterdog Lake, Paynes Lake, Horseshoe Lake and Little Duck Lake in the Russian Wilderness (M261A).

DOUGLAS-FIR TWIG WEEVIL, *Cylindrocopturus furnissi*
Many reports of damage on pole- or sapling-sized Douglas-fir were from Sonoma, Mendocino, and Humboldt Counties. Severe damage was observed in Robinson Creek drainage in Mendocino County. Moderate damage was noted in Cherry Creek drainage in Mendocino County (M263A).

JEFFREY PINE NEEDLEMINER, *Coleotechnites* sp. near *milleri*
A needleminer similar in appearance to the lodgepole needleminer was detected in Jeffrey pine in a residential area north of the town Truckee and in the southwest corner of the junction of Interstate 80 and State Highway 89 south, again in 2004. The same areas experienced an outbreak of this insect in 1996. Approximately 600 acres were affected in 2004. Tree mortality is not expected unless Jeffrey pine beetle activity increases in the area.

PINE REPRODUCTION WEEVIL, *Cylindrocopturus eatoni*
Young ponderosa pines were killed by the pine reproduction weevil on a small parcel in Paynes Creek, Tehama County. The parcel was harvested approximately 5 years ago and subsequently planted. Pine mortality was higher in open areas versus areas that received partial shade from residual oaks. Drought during the past 5 years likely contributed to the mortality.

PONDEROSA PINE TWIG SCALE, *Matsucoccus bisetosus*
An infestation of twig scale is impacting ponderosa pines along Black Butte Road, west of Shingletown, Shasta County. Symptoms include twig and branch dieback, roughened bark, and shortened needles. It is unknown how long the infestation has been present.

RED GUM LERP PSYLLID, *Glycaspis brimblecombei*
Red gum lerp psyllid continues to contribute to the decline of planted eucalypts at several rest stops along Interstate 5 between Corning and Dunnigan (262A).

Various reports of the lerp psyllid affecting red gums have been received from the Central Valley around Sacramento. Individual trees are severely affected and often losing their leaves or outright dying from attack if left uncontrolled. The insect has been primarily a nuisance in shade tree situations from the loss of leaves, dropping of the insect shells and unsightly conditions. Until predators and parasites of the pest insect become well established the lerp psyllid damage will continue.

SCALES, *Physokermes* sp.
A light infestation of scales was found in true fir Christmas trees near Camino, El Dorado County.

SEQUOIA PITCH MOTH, *Vespamima sequoiae*
The moth remains a constant nuisance to ornamental Monterey pines throughout areas where the host is planted.

SPRUCE APHID, *Elatobium abietinum*
Although planted spruce along Highway 101 from Fortuna northward have chronic dieback from the spruce aphid, increased levels of feeding and high numbers of aphids collected in samples were noted near Big Lagoon in Humboldt County (M263A).

THE OBTUSE SAWYER, *Monochamus obtusus*
The obtuse sawyer was found infesting dying Douglas-fir in a Christmas tree plantation near Camino, El Dorado County.

TIP MOTH, *Rhyacionia zozana*
Young ponderosa pines were damaged by tip moths, probably *Rhyacionia zozana*, at a progeny test site in the Flat Woods area, north of Hillcrest, Shasta County.

WESTERN PINESHOOT BORER, *Eucosma sonomana*
The western pineshoot borer continues to damage plantation ponderosa pine near Pondosa, Siskiyou and Shasta Counties and north of Lookout, Modoc County. Damage, in the form of stunted terminals, varies widely across the plantations, but exceeds 50% in some areas.

RECENT INTRODUCTIONS

MEDITERRANEAN PINE ENGRAVER BEETLE, *Orthotomicus erosus*

The Mediterranean pine engraver, *Orthotomicus* (*Ips*) *erosus*, is a well-documented bark beetle pest of pines in the Mediterranean region, the Republic of South Africa, and Chile. It also occurs in China and Fiji. The beetle is one of the most common intercepted at U.S. ports. From 1985 to 1996, it was the second most commonly intercepted bark beetle, being intercepted 340 times from 19 different countries. The consequences of successful introduction into California are uncertain, but of concern because *O. erosus* has caused considerable damage in plantations in Europe, has found *Pinus radiata* to be a favorable host in South Africa, and because the beetle carries pathogengic fungi.

In 2004, *O. erosus* was trapped in relatively large numbers in five California counties (Kern, Tulare, Fresno, Madera, and Merced) by personnel from the California Department of Food and Agriculture. The beetles responded to Lindgren funnel traps baited with ethanol, a-pinene, and the aggregation pheromone for the Eurasian spruce engraver, *Ips typographus* (R.L. Penrose, California Department of Food and Agriculture, personal communication). Ground checking in Visalia and Kingsburg (both Tulare County) revealed overwintering populations of larvae, pupae, and adults in cut logs of Italian stone pine, *Pinus pinea*, and Aleppo pine, *Pinus halepensis*, at multiple locations (S.J. Seybold, J.C. Lee, and R.L. Penrose, site visit, December 8-9, 2004). Old brood galleries were evident in cut logs of Monterey pine, *Pinus radiata*, and in the stumps of *P. radiata* Christmas trees cut in December 2003. The old galleries in some cases suggested extremely large populations of the pest without much evidence of either natural enemies or interspecific competition in these hosts. To date the insect has not been found in standing trees.

FOREST DISEASE CONDITIONS - 2004

ABIOTIC DAMAGE

Drought

Drought conditions are continuing in the southern part of the state, particularly in Los Angeles, San Diego, San Bernardino, Riverside, and Orange Counties (Figure 7). Various species of oaks as well as other hardwoods have been especially affected. Individual trees have died without any other apparent primary cause of death. Secondary pests such as bark beetles, woodborers, *Hypoxylon* spp., and *Armillaria* spp. associated with annosus root disease are common. Death of individual trees both in the forest and in backyard situations will continue until normal rainfall patterns return and may continue for a period even after that due to the stressed conditions of the trees. Drought conditions are also helping to fuel the bark beetle epidemic in the conifer forests of the area.

Drought and Frost

There was an increase in incense-cedar mortality throughout northeastern California attributed to drought, frost, and to a lesser extent, *Phloeosinus* spp. bark beetles. In addition, early flagging of incense-cedar near Susanville (M261D) was attributed to drought. Many of the ponderosa and Jeffrey pines at the lower and drier sites throughout northeastern California experienced high levels of drought-induced needle cast this year compared to previous years (M261E, M261D). Aspen foliage dieback was reported on the Lassen National Forest, Eagle Lake Ranger District (M261D). This may have also been due to drought stress.

Fire

Fire damaged and scorched trees are to be found throughout the fire areas of southern California. Individual trees continue to die from the damage to their crowns, roots, and cambium. Scorched trees are also more likely to be attacked by bark beetles and are encouraging the bark beetle outbreak in southern California.

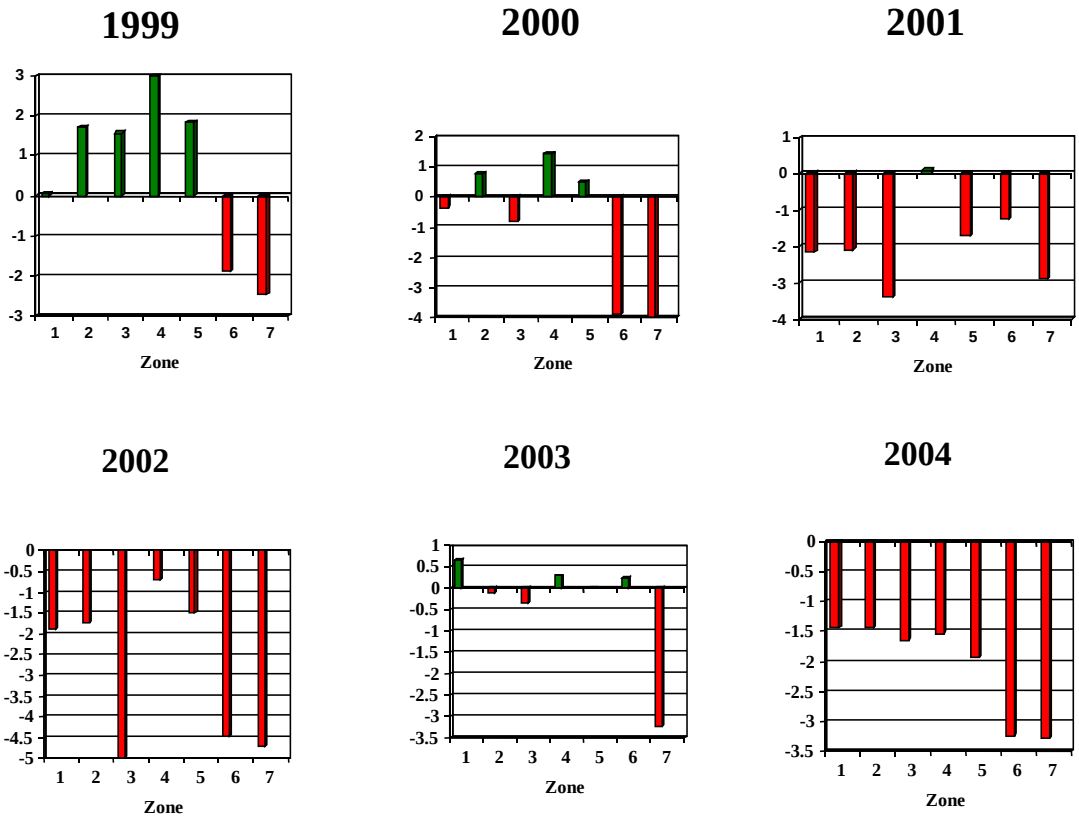
Figure 6. Green-crowned tree with extensive decay snapped off in 2004; bole damaged in 1999 Bucks Fire.

Fire-injured red and white fir trees with green crowns, but extensive bole decay, failed this past year in the 1999 Bucks Fire, Plumas National Forest (M261E). This condition has also been observed in a few true fir trees on the 2001 Star Fire, Tahoe National Forest (M261E), and the 2000 Storrie Fire, Lassen National Forest (M261D). Although the trees had green crowns, many of them had been essentially girdled in the fires. Woodborers and ambrosia beetles, especially ambrosia beetles, were present shortly after the fire damage, attacking the dead cambium/phloem areas and working into the sapwood, possibly accelerating the decay.

Ozone

Ozone damage has been observed on both conifers and hardwoods in the San Bernardino Mountains. Ozone levels as well as general pollution problems appear to be increasing in the greater Los Angeles area.

Palmer Drought Indices



Palmer Classifications

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

Figure 7. Palmer Drought Indices through August 2004.

Maple leaf scorch
Maple leaf scorch, sometimes attributed to leafhoppers and bacteria, was very prevalent in northwestern California this year. A large number of affected trees were visible in the Sacramento River drainage along the Interstate 5 corridor and along the Trinity River drainage along Highway 299 (M261A).

Indian Creek, Meadow Valley, and the Feather River Canyon in Plumas County, and the North Yuba River in Sierra County had high levels of maple leaf scorch again this year (M261E). Although some scorch may be related to leafhopper activity, no leafhoppers were associated with symptoms in these areas. Leaf scorch was also detected on maple in the Deer Creek area along Highway 32 (M261E). It appears as though several years of leaf scorch are contributing to branch kill and tree mortality in some areas.

BIOTIC DAMAGE

CANKER DISEASES

CHINKAPIN CANKER, cause unknown
Branch dieback and mortality of chinkapin was observed along a two mile segment at the summit of the Bald Hills Road, Humboldt County between Orick and Weitchpec, near Schoolhouse Peak (263A). The disease was widespread and affected all ages of chinkapin. No pathogen or other potential cause has been isolated from affected trees.

Figure 8. Chinkapin canker mortality along the Bald Hills Road, Humboldt County.

CYTOSPORA CANKER OF TRUE FIR, caused by ***Cytospora abietis***
Cytospora canker, along with red fir dwarf mistletoe, the fir engraver beetle, the fir roundheaded borer, and drought stress, is associated with extensive red fir mortality in northwestern California. Specific locations include Etsel Ridge on the Mendocino National Forest, North Yolla Bolly Mountains in the Middle Eel-Yolla Bolly Wilderness, and South Fork Mountain on the Shasta-Trinity National Forest (section M261B), many of the higher peaks in the Trinity Alps Wilderness, Russian Wilderness, Marble Mountains Wilderness and the southern side of Mt. Ashland (M261A).

Branch flagging of red fir moderately to severely infected with dwarf mistletoe was also reported in the northern and central Sierra Nevada.

DIPLODIA BLIGHT OF PINES, caused by ***Sphaeropsis sapinea* (*Diplodia pinea*)**
Shoot dieback caused by *Sphaeropsis sapinea* was observed again this year on ponderosa pines in the Sacramento River Canyon, Shasta County. Repeated infections on some trees are leading to significant crown dieback and mortality. A combination of western gall rust and Diplodia blight continue to cause branch dieback on ponderosa pine in the southwestern portion of McCloud Flats (M261D).

Sphaeropsis sapinea continues to kill ponderosa pine branches along the North Yuba River in the Goodyear Bar and Downieville area of Sierra County (M261E). A few of the heavily infested pines have died since 2003.

Shoot dieback from *S. sapinea* was observed on ponderosa pines in the foothills of the Sacramento Valley. Most of the damage was along sections of Highway 49 in Placer and Nevada Counties. The most severe damage was in the upper reaches of the South Yuba River Canyon.

DOUGLAS-FIR CANKER, cause unknown
Douglas-fir with declining and old dead tops were inspected east of Bella Vista, Shasta County. The trees are at 1200 ft elevation on a north-facing slope above Little Cow Creek. The tops of all damaged trees had been completely or partially girdled by cankers, none of which appeared active. Drought during 2002 or earlier is presumed to have predisposed the trees to damage.

MADRONE CANKER, caused by ***Nattrassia mangiferae*** and/or ***Botryosphaeria dothidea***
The canker disease remains a chronic problem on madrone in interior north coast counties (M263A). Nearly 30 clumps of madrone had dieback or mortality reported within the developed recreation use areas of Lake Mendocino.

PHOMOPSIS CANKER, caused by ***Phomopsis lokoyae***
Increased branch dieback on Douglas-fir was noted in the Cazadero area of Sonoma County.

PITCH CANKER, caused by ***Fusarium circinatum***
Increased branch and tree mortality was observed along coastal San Mateo County and northward into San Francisco County (261A). The disease is becoming prevalent on Monterey pines in San Francisco and Marin Counties. Observations indicate a decrease in branch and tree mortality in Sonoma County. The disease was not observed in Mendocino County.

In February 2004, *F. circinatum* was confirmed from two Douglas-fir clones at a USDA Forest Service Douglas-fir seed orchard near Camino in El Dorado County; both affected trees were subsequently destroyed. Later that month, three additional Douglas-fir in the orchard were found to carry propagules (possibly spores or mycelium) of the pitch canker fungus upon their foliage; later examinations between March and August 2004, however, revealed no new isolations of the fungus from foliage, branches, or cones. On affected Douglas-fir, disease symptoms were either very slight (one case only) or totally absent, and thus the presence of the pathogen would likely not have been detected unless alerted to the situation by the discovery in New Zealand of the pathogen upon Douglas-fir scion wood from the seed orchard (first reported by New Zealand Forest Research in November 2003).

Concerns were raised that the pathogen could be coming from outside of the seed orchard. General surveys have been conducted of both pine and Douglas-fir Christmas trees throughout El Dorado and surrounding counties. A special emphasis has also been placed on any shade tree problems in that part of the state. The fear was that shade trees (planted Monterey pines, Douglas fir and other susceptible pine species) or Christmas trees could harbor the pathogen and have been the route via which *F. circinatum* entered the area. So far the pathogen has not been detected outside of the seed orchard. None of the shade trees or Christmas trees observed had any symptoms that remotely resembled those of pitch canker.

A project to monitor the spore production and spread by *F. circinatum*-infected trees in the Santa Cruz and San Francisco areas was completed. Spore trap results indicated that most of the spore production occurred during times of high rainfall or high humidity. The trapping method was very easy and could readily be used to monitor spore release in other areas of the state when needed.

Torrey Pines State Reserve was surveyed for pitch canker disease. Although not a highly susceptible species, Torrey pine is susceptible in laboratory inoculations. The concern was that seed collection in the reserve could move the disease from an infested part of the state (San Diego County) to an uninfested area (Placer County). No symptoms of the disease were found anywhere within the reserve and the reserve was declared to be disease free. However infected Monterey pines were found in a golf course on the edge of the reserve and it was felt that the reserve should be surveyed in the future prior to any cone harvesting to determine whether or not it is still disease free.

DECLINES

INCENSE-CEDAR DECLINE, cause unknown

Incense-cedars are continuing to suffer from a decline of unknown origin. Sections of the trees will die out. Typically, the symptomatic trees are saplings or small trees. Individual branches may die or the dead area may be an entire zone of the tree. The zone varies from tree to tree, sometimes being the bottom or the top, but usually occurs in the middle of the tree. No pathogens have been noted or isolated and only secondary insects have been found. Drought is suspected as a contributing factor. In the Sierra Nevada, the main areas of incense-cedar decline have been near Foresthill in Placer County and near Bass Lake in Mariposa and Madera Counties.

SUDDEN OAK DEATH, *caused by Phytophthora ramorum*

Technically, sudden oak death is the common name for the canker disease of oaks and tanoak caused by *P. ramorum*, while other common names are used for the *P. ramorum* leaf spots and other symptoms on other hosts. However, all *P. ramorum*-caused diseases are discussed here as a group.

General. Lake and San Francisco Counties were confirmed with *Phytophthora ramorum*-infected trees, bringing the total number of infested California counties to fourteen. The first detection of *P. ramorum* in Lake County was from California bay laurel trees in a stand primarily composed of tanoak, California bay laurel, Douglas-fir, and poison oak near a perennial stream. The infestation is just east of a confirmed *P. ramorum* infestation in Sonoma County. In San Francisco County, two *P. ramorum*-infected coast live oak trees were found in the AIDS Memorial Grove. A map of the distribution of *P. ramorum* in California is available at www.suddenoakdeath.org.

P. ramorum confirmations also increased within the known infested counties. Eleven positives in seven areas were detected via aerial survey in Humboldt County a few miles from the Redway suppression area. The infested areas are north and northwest of the Garberville Airport, and between Redway and Briceland. Suppression projects are planned for these new finds.

On the Los Padres National Forest, the number of *P. ramorum*-infested areas in the Ventana Wilderness (Monterey County) more than doubled in size since 2003 with the infested area estimated at over 7,000 acres. This aerial survey has not been ground-checked, but a substantial portion of this mortality is tanoak and coast live oak that appears to be Sudden Oak Death. The infestation near Plaskett Creek expanded from a few visible trees in 2003 to over 600 acres.

Recently dead trees with *P. ramorum* symptoms were also prevalent along the Panoramic Highway, Mt. Tamalpais State Park and Marin Municipal Watershed lands from the turn-off to Muir Woods, north to Alpine lake (Marin County). New outbreaks also occurred at the Stewarts Point Reservation and other areas in western Sonoma County.

Within the infested area of the state, numerous landscape trees have been removed for safety and other concerns. The state has a program for helping to fund these removals. Numerous sites have been checked to ensure proper compliance with the state rules and regulations regarding this program. Sites have been checked in Napa, Sonoma, Monterey, Alameda, San Mateo, and Santa Cruz Counties.

Figure 9. *P. ramorum*-caused mortality of tanoak, Los Padres National Forest.

New hosts. In 2004, the number of plants known to be susceptible to *P. ramorum* increased by 25 species to a total of 64 species in over 40 genera. Many recently recognized hosts are horticultural plants not native to California forests. For a complete list see www.suddenoakdeath.org. Native plants recognized as susceptible to *P. ramorum* in 2004 include California wood fern (*Dryopteris arguta*), False Solomon's seal (*Smilacina racemosa*), and Andrew's clintonia bead lily (*Clintonia andrewsiana*).

***P. ramorum* in nurseries**. In 2004, *P. ramorum* was detected in 55 nurseries throughout California. Nine nurseries were detected by the California National *P. ramorum* Nursery Survey, with the remainder detected primarily by trace back and trace forward investigations. As required by the USDA Animal and Plant Health Inspection Service (APHIS) *P. ramorum* quarantine, all nursery stock detections are destroyed and the nurseries monitored for two years. *Phytophthora ramorum* was also recovered from about 170 nurseries in over 20 states and in British Columbia. The detections were primarily from trace forward and trace back investigations triggered by the detection of *P. ramorum* in a large nursery in Azusa (Los Angeles County) and in a few other nurseries in Southern California, Oregon and elsewhere. In the Azusa nursery, over 1 million camellias were destroyed to fulfill quarantine requirements. In response to the shipments of potentially infected nursery stock, eighteen states, Canada and USDA APHIS imposed emergency regulations for *P. ramorum* with several states banning all nursery stock from California. In late April, the USDA APHIS held all host plants in all California nurseries until inspections could be completed to demonstrate the nursery was pathogen-free. For more information see www.cdfa.ca.gov or www.aphis.usda.gov/ppq/ispm/sod.

***P. ramorum* watershed monitoring**. Stream monitoring provides a method of early detection for P. ramorum infestation. A network of thirty-five sampling locations was established by Dave Rizzo, UC-Davis, in February 2004 to monitor for the presence of *Phytophthora ramorum* in rivers, streams, and creeks throughout coastal northern California watersheds. The primary areas of focus include Alameda, Contra Costa, Del Norte, Humboldt, and Mendocino Counties. These are areas where detection of P. ramorum has been limited, but ecological parameters and risk models predict as high-risk areas for P. ramorum infestation. Two sites in Sonoma County were also included to provide a baseline for successful recovery of the pathogen.

Disease-free leaves of *Rhododendron* were placed in mesh bags and secured with rope to stream banks in watercourses for 1 to 3 week intervals in order to bait for *Phytophthora* species. Length of time that leaves were left in the streams was dependent on stream flow and water temperature. In general, perennial watercourses were selected to allow for year-round sampling. Leaves were recovered from streams and returned to the laboratory. Symptomatic leaves were plated on *Phytophthora*-selective media.

P. ramorum was successfully recovered at all sites with *a priori* knowledge of infestation from forest surveys and at three additional sites downstream of known forest infestations, but where no plants were infected immediately adjacent to the stream site. The first of these sites is along Copeland Creek on the CSU Sonoma campus, approximately 7 km downstream from heavily infested Fairfield Osborn Preserve. Another of these sites is along the South Fork of the Eel River, approximately 8 km downstream of known infestation in the town of Redway in Humboldt County. The third site with P. ramorum recovery approximately 3 km downstream of known infestation is along Indian Creek in Mendocino county. Additionally, *P. ramorum* was recovered at three sites without prior known forest infestation. Two sites, along Bear Creek and Abrigo Creek in Briones Regional Park in Contra Costa County, have had *P. ramorum* recovery from trees at other locations approximately 2 km away within the park, but not adjacent to or upstream from these sites. *P. ramorum* has since been recovered in 2004 from bay trees adjacent to Bear Creek only. Another site in Redwood Creek, approximately 1 km west of the town of Redway, has had successful *P. ramorum* recovery without known adjacent or upstream forest infestation.

Suppression efforts. *Phytophthora ramorum* was discovered on California bay laurel in a forested rural residential area of Redway in Southern Humboldt County on several homeowners' properties in 2002. Surveys that year in Humboldt County and the North Coast found no further areas of infestation. Since the pathogen appeared to be present in only a confined area and did not spread as fast as anticipated, a slow-the-spread project was deemed worthwhile. In an effort to slow the spread of *Phytophthora ramorum*, the Humboldt County Department of Agriculture, the California Department of Forestry and Fire Protection, and the University of California Cooperative Extension removed and disposed of 77 California bay laurel trees infected with *Phytophthora ramorum* in Humboldt County. The project took place February 19 and 20, 2004 in the County's only known area of infestation on six different properties.

Follow-up monitoring of soil, water, and plants in the area indicate the pathogen was still present in the water, soil and vegetation. *Phytophthora ramorum* was recovered from the South Fork of the Eel River, approximately 8 km downstream of known infestation. Aerial survey in 2004 detected 11 positives in seven areas a few miles from the Redway suppression area (between Redway and Briceland). Suppression projects are planned for these new finds and additional treatments are planned in 2005 for the 2004 Redway suppression area.

The *P. ramorum* infections in Redway are approximately 110 miles from the four confirmations in Mendocino County and about 128 miles from the *P. ramorum* infestation under eradication in Brookings, Oregon. The geographic isolation of the Redway site makes re-infestation of Humboldt County via windblown rain from the other known infestations unlikely.

DWARF MISTLETOES

DOUGLAS-FIR DWARF MISTLETOE, *Arceuthobium douglasii*
Mixed conifer stands that are heavily infested with Douglas-fir dwarf mistletoe are common in several areas on the southern side of Mount Ashland (M261A).

GRAY PINE DWARF MISTLETOE, *Arceuthobium occidentale*
The gray pine dwarf mistletoe remains a problem throughout the range of gray pine. Trees have died from infection in Placer, El Dorado, Yolo, Fresno, Madera and Tulare Counties. The foothills on both sides of the San Joaquin Valley are generally infested.

MOUNTAIN HEMLOCK DWARF MISTLETOE, *Arceuthobium tsugense* subsp. *mertensianae*
Scattered mountian hemlock heavily infected with dwarf mistletoe were reported in Mount Lassen Volcanic National Park, along the trail from State Highway 89 to Shadow Lake (M261D). Little mortality was noted.

PINYON PINE DWARF MISTLETOE, *Arceuthobium divaricatum*
The dwarf mistletoe was commonly associated with pinyons affected by drought throughout much of the host's range.

RED FIR DWARF MISTLETOE, *Arceuthobium abietinum* f.sp. *magnificae*
Red fir dwarf mistletoe, along with cytospora canker, the fir engraver beetle, the fir roundheaded borer, and drought stress has caused extensive red fir mortality in northwestern California. Specific locations include Etsel Ridge on the Mendocino National Forest, North Yolla Bolly Mountains in the Middle Eel-Yolla Bolly Wilderness, and South Fork Mountain on the Shasta-Trinity National Forest (section M261B), many of the higher peaks in the Trinity Alps Wilderness, Russian Wilderness, Marble Mountains Wilderness and the southern side of Mt. Ashland (M261A).

SUGAR PINE DWARF MISTLETOE, *Arceuthobium californicum*
An unusually severe infestation of sugar pine dwarf mistletoe was found along the Trail of 100 Giants in the Giant Sequoia National Monument. This site is within the boundaries of the Hot Springs Ranger District. Overstory sugar pines had Hawksworth ratings of 5 or 6 and some had recently died. The mountain pine beetle (*Dendroctonus ponderosae*) was also implicated in the death of these pines. Heavily infested pines had conspicuous dwarf mistletoe witches' brooms in the lower two thirds of the crown. White pine blister rust (*Cronartium ribicola*) is also active in the area and has killed most of the sugar pine in the understory. The combined effect of these pests is eliminating sugar pine from the site.

WESTERN DWARF MISTLETOE, *Arceuthobium campylopodum*
Several ponderosa pines killed by western pine beetle at Boggs Mountain Demonstration State Forest also had dwarf mistletoe infections (M261B). None of the trees was severely infected, with an average DMR of 2.

WHITE FIR DWARF MISTLETOE, *Arceuthobium abietinum* f.sp. *concoloris*
The white fir dwarf mistletoe remains a problem throughout the range of white fir. Smaller trees can become quite stunted and young trees are often killed by infection. Even larger trees have died from attack by the parasitic seed plants. Incidence and impact of white fir dwarf mistletoe continues to be heavy at South Fork Mountain (M261B). Particularly high levels of infection have been observed near Shaver Lake in Fresno County and near Lake Arrowhead in San Bernardino County.

OCCURRENCE AND SEVERITY OF DWARF MISTLETOE ON NATIONAL FOREST LANDS

Data from USDA Forest Service, Forest Inventory & Analysis (FIA) records were summarized for the occurrence and severity of dwarf mistletoes on California National Forests. FIA plots are distributed on a 3.4 kilometer grid throughout the state and are visited on a 10-year cycle. Hawksworth dwarf mistletoe ratings are taken on all conifer species within the inventory plots. The table below summarizes the current status of dwarf mistletoe infections.

Table 1. Summary of dwarf mistletoe data from FIA records for California National Forests.

National Forest	Number of Conifer Species Infected	Most Frequently Infected Species	Most Severely Infected Species
Angeles	5	White fir	Pinyon pine
Cleveland	2	Jeffrey pine	Jeffrey pine
Eldorado	9	Red fir	Red fir
Inyo	6	Pinyon pine	Pinyon pine
Klamath	12	Douglas-fir	Douglas-fir
Lassen	8	White fir	Jeffrey pine
Los Padres	6	Pinyon pine	Pinyon pine
Mendocino	9	White fir	White fir
Modoc	6	White fir	Lodgepole pine
Six Rivers	10	Douglas-fir	Red fir
Plumas	8	White fir	Jeffrey pine
San Bernardino	6	White fir	Jeffrey/Pinyon pine
Sequoia	10	White fir	Red fir
Shasta-Trinity	13	White fir	White fir
Sierra	10	Red fir	Red fir
Stanislaus	13	Red fir	Red fir
Tahoe	10	White fir	White fir
Lake Tahoe Basin	7	Red fir	Red fir
Toiyabe	6	Jeffrey pine	Pinyon pine

FOLIAGE DISEASES

ELYTRODERMA DISEASE, caused by ***Elytroderma deformans***

Elytroderma disease was noted on many ponderosa pines around the edge of Battle Creek Meadows, Tehama County. The disease did not appear to be having a significant impact on the trees at this time. The disease is common on Jeffrey pines in the Laguna Mountain area on the Cleveland National Forest (M262B).

SUGAR PINE NEEDLE CAST, caused by ***Lophodermella arcuata***

Lophodermella arcuata, cause of sugar pine needle cast, was reported on sugar pine in the vicinity of Silver Lake, north of Whitmore, Shasta County.

ROOT DISEASES

ANNOSUS ROOT DISEASE, caused by ***Heterobasidion annosum***
Annosus root disease remains a problem in various parts of the state. The root disease continues to cause scattered pockets of mortality in ponderosa pine on McCloud Flats on the Shasta-Trinity National Forest (M261D). Scattered pockets of mortality are also present on the southern side of Mount Ashland on the Klamath National Forest (M261) and near Board Camp on the Mendocino National Forest (M261B).

Decay characteristic of *Heterobasidion annosum* was found on stumps of white fir harvested as part of a salvage operation near Battle Creek Meadows, Tehama County. Trees had been killed by the fir engraver beetle, but drought conditions and infection by *H. annosum* were likely predisposing factors.

The disease has become a problem in stump culture of true fir Christmas trees in El Dorado County. Landowners practicing stump culture are often unaware of the need for stump treatment and the disease has managed to make a foothold in such situations.

Annosus root disease has also been observed in forest situations scattered throughout the southern Sierra, San Bernardino and San Gabriel Mountains. *Heterobasidion annosum* is especially damaging in the Laguna Mountain area of the Cleveland National Forest and in recreation areas on the San Bernardino National Forest.

30-Year old annosus root disease centers on the Stanislaus National Forest. In 1974, the USDA Forest Service, Forest Health Protection Staff (then called Forest Insect & Disease Management) in California completed a Pest Damage Inventory (PDI) on the Stanislaus National Forest. The PDI is a methodology to quantify tree mortality over large areas using aerial photography, photo interpretation and ground checking. *Heterobasidion annosum* often creates a recognizable pattern of mortality characterized by an enlarging pocket of dead and dying trees that can remain active for many years. In ecological terms such openings, regardless of cause, are called gaps.

In 1980 and 1981 about 100 gaps that were identified from aerial photos on the Stanislaus National Forest during the 1974 PDI were visited and mapped. Eighty-one were confirmed to be caused by annosus root disease and all involved the S-type of *H. annosum* that affects true firs. These gaps were revisited in 1986, 1989, 1995/1996 and most recently in 2004. The purpose of this work was to document mortality and follow rates of enlargement over time.

Information gathered over the past 30 years indicates that root disease centers in true fir remain active, but do not enlarge as rapidly as has been found with *H. annosum* in pine stands (P-type). In the 15 years from 1974 to 1989, fir mortality in gaps increased from 3.2 trees to 6.4, and mean gap area increased by 52%. Mortality occurred unevenly along the periphery of the expanding centers and rarely extended beyond 26-33 feet from 1974 center boundaries. Firs killed during the study were almost always colonized by insects, primarily the fir engraver beetle (*Scolytus ventralis*), while roundheaded and flatheaded fir borers were found at the base of many larger trees. More information on the dynamics of annosus root disease in true fir stands will be available after the most recent data is analyzed, but preliminary indications are that tree mortality and gap enlargement rates have slowed down subsequent to the 1989 visits.

ARMILLARIA ROOT DISEASE, caused by ***Armillaria* sp.**
Many dead tanoaks were reported in the Cazadero and Annapolis areas of Sonoma County. Most trees did not have symptoms of *Phytophthora ramorum* infection. Elsewhere in the north coastal counties, dead tanoaks along downhill sides of both paved and unpaved roads are frequently found to be killed by *Armillaria*. Such trees usually have fill placed over much of their root systems.

Armillaria root disease, sometimes called shoe string root rot, has been observed attacking numerous incense- cedar stumps in a cut-over area near Shaver Lake in Fresno County. *Armillaria* appears to be utilizing the incense-cedar stumps as a preferred host.

Figure 10. Black stain root disease center, Blacks Mountain; first reported in 1939. Crown dieback (left), and remonumenting (right).

BLACK STAIN ROOT DISEASE, caused by ***Leptographium wageneri***
Two Douglas-fir (15.7 and 27.7 inches dbh) with black stain root disease east of Willits were eventually killed by flathead fir borers. A combination of drought, high stocking levels, *Leptographium wageneri* and western pine beetle have caused large group kills of ponderosa pine at McCloud Flats (M261D). Specific areas of high mortality include the Mud Flow Research Natural Area, Elk Flat, Ash Creek Sink, Algoma and Harris Mountain. Mature ponderosa pine mortality resulting from black stain root disease continues in the Heart Rock area east of Highway139 in northern Lassen County (M261G) at a slower rate than in 2003.

The site of the first report of black stain root disease on ponderosa pine in California (in 1939 by J. W. Bongberg) was remonumented at Blacks Mountain Experimental Forest in Lassen County (M261G). The root pathogen continues to kill ponderosa pine in that area.

PORT-ORFORD-CEDAR ROOT DISEASE, caused by ***Phytophthora lateralis***
A small group (3 to 4 trees) of infected Port-Orford-cedar was noted in Redwood National Park near the west end of the Hiouchi Bridge along US Highway 199 (263A). Five active infestation areas were noted along the French Hill Road from Camp Six to Humboldt Flat (M261A). Camp Six was the site of an unsuccessful attempt to eradicate *Phytophthora lateralis* in 1991-92.

Living Port-Orford-cedar hosts, but no current mortality, were seen along Patrick Creek and Shelly Creek along the Patrick Creek Road from the Monumental Mine site to the Smith River (M261A). Active Port-Orford-cedar root disease had been noted in the area as recently as five years ago. There was also no sign of recent disturbance or human activity that could move pathogen inoculum to uninfected Port-Orford-cedar above the creek.

Phytophthora lateralis continues to cause tree mortality in the upper Sacramento River Canyon, Siskiyou and Shasta Counties. The pathogen continues to spread and intensify along the main stem of the Sacramento River from Dunsmuir to Shotgun Creek (M261A). This condition is expected to continue for years to come along the main stem of the Sacramento River, where the disease is well established from Dunsmuir to the mouth of Shotgun Creek. Management efforts are aimed at preventing new infestations elsewhere in the Sacramento and Trinity River drainages. Monitoring of the Port-Orford-cedar eradication treatments at Scott Camp Creek in the upper part of the Sacramento River drainage (M261A) revealed no new infestations of Port-Orford-cedar root disease.

PHYTOPHTHORA ROOT ROT, caused by ***Phytophthora cinnamomi***
Phytophthora root rot continues to be a major problem for Christmas tree growers in the foothills of the central Sierra. Significant losses have occurred to true firs in El Dorado and Nevada Counties. Growers are switching to disease resistant varieties of true fir and to Douglas fir, which appears to be fairly resistant to the root pathogen.

SCHWEINITZII ROOT DISEASE, caused by ***Phaeolus schweinitzii***
Phaeolus schweinitzii was observed affecting small groups of Douglas-fir at the Mud Flow Research Natural Area at McCloud Flats (M261D).

RUST DISEASES

WESTERN GALL RUST, caused by ***Peridermium harknessii***
Many ponderosa pines in the southwest portion of Boggs Mountain Demonstration State Forest have high levels of branch mortality from western gall rust infections (M261B). One large ponderosa pine, a 28.7 inch dbh tree, was so riddled with branch infections that the tree had severe crown dieback.

Figure 11. Blister rust canker on whitebark pine, Goosenest Mountain.

Some Coulter pine in the vicinity of Julian, San Diego County, had extensive western gall rust cankers.

WHITE PINE BLISTER RUST, caused by ***Cronartium ribicola***
White pine blister rust is present in scattered locations on western white pine and whitebark pine in northwestern California. In western white pine, low levels were found in several locations on the Shasta-Trinity National Forest (between Middle and Lower Deadfall Lake, near Cement Bluff Lake and along the trail to Horseshoe Lake and High Lake, along the Pacific Crest Trail at Chipmunk Lake, and at Paynes Lake), and between Duck Lake and High Lake in the Russian Wilderness. Higher levels of white pine blister rust were present in western white pine near Upper and Middle Boulder Lakes at the Trinity Alps Wilderness, near Kings Castle in the Marble Mountain Wilderness, at Pettijohn Basin, Black Rock Lake and North Yolla Bolly Mountain in the Yolla Bolly Middle Eel Wilderness (all M261A), and at Reading Peak in Lassen Volcanic National Park (M261D).

White pine blister rust was present in low levels in whitebark pine in several locations on the Shasta- Trinity National Forest (between Middle Deadfall Lake and Mount Eddy, on Mount Shasta along the lower part of the Clear Creek Trail, and in the West Parks Lake Basin and China Mountain), between Duck Lake and High Lake and at

Bingham Lake in the Russian Wilderness, near Kings Castle in the Marble Mountain Wilderness (all M261A), on the Klamath National Forest at Goosenest Mountain, and at Lassen National Park at Reading Peak (both M261D).

Some of the heaviest blister rust infection observed was in the area of Mountain Home State Forest, Tulare County. This appears to be from a strain of the fungus that has overcome resistance in the host sugar pines. Nearly all such resistant pines that were outplanted in the forest are now dead from the disease. Larger trees are also dying in the state forest, a change from the past when mostly smaller trees were infected and killed by the rust pathogen.

Several surveys did not find any evidence of the rust in the Tehachapi Mountains or further south.

TRUE MISTLETOES

TRUE MISTLETOE, *Phoradendron* spp.
No significant true mistletoe problems were reported in north coastal counties. Suppression projects on several Reservations in San Diego County are ongoing.

SURVEYS AND EVALUATIONS - 2004

WHITE PINE BLISTER RUST RESISTANCE SCREENING PROGRAM, STATUS REPORT FOR FY 2004

During FY 2004 the program screened 552 sugar pine families from new candidate trees suspected of carrying major gene resistance (MGR) to blister rust; 65 proved to be from MGR trees. This brings the total number of live, proven resistant trees in the Pacific Southwest Region to 1536 families. Due to the very low frequency of the MGR gene in northern California forests, another 243 families from that area were re-screened, in order to identify additional resistant seedlings that had inherited the MGR gene from an unknown pollen parent tree; 473 seedlings from 195 parents were found to be resistant. Spring 2004 sowing contained about 580 sugar pine families; screening will be done in Winter 2004/2005. Families from the northern California forests were sown in larger numbers per family in order to increase the likelihood of capturing MGR seedlings due to the pollen parent. Additional seedlings of these families were sown as 'Placerville by-pass' seedlings, i.e., seedlings that will bypass the MGR rust screening and be screened in the field for multiple gene resistance. This 'bypass' approach should increase, at a faster rate, the number of seedlings with multiple-gene resistance than would occur using the typical two-phase screening approach. A description of the approach being taken for the northern forests can be found in a 2004 Pacific Southwest Region report called "Development Strategy for Sugar Pine Blister Rust Resistance on Northern California Forests".

In September 2004 the identification of 362 new sugar pine candidate trees was completed on the northern California national forests and other industry lands. In addition, cones were collected from 47 whitebark, 10 foxtail, and 10 limber pines in the southern Sierra and southern California. Twenty-three lots of western white, four lots of foxtail, and four lots of whitebark seedlings have been propagated for a second-year at the Placerville nursery to evaluate the protocol for their greenhouse development and to incorporate into screening.

A total of 2102 MGR sugar pine seedlings were planted at the Happy Camp Disease Garden for evaluation of multigenic, non-MGR forms of resistance, also called 'slow rust resistance' (SRR). These seedlings either inherited the MGR gene from known MGR parent trees or from unknown parent trees who contributed MGR-pollen. In addition, 75 whitebark pine, 30 limber pine, 25 bristlecone pine, and 13 screened MGR western white pine were planted for long-term rust evaluation in this field situation. At Happy Camp, 56 individuals, from plantings that contain 872 live plants of 1589 originally established, were selected for slow rust resistance traits. This material was grafted into Forest Service seed orchards and a subset into private industry cooperator orchards.

Survival surveys were done in the 1986 through 1993 slow rust test plantations at the Happy Camp Outplant Site. Comprehensive rust evaluations were also done on the 2002 and 2003 slow rust plantings. We are currently evaluating the 1994 slow rust planting for selection of resistant individuals.

Ribes sanguinium leaves infected with blister rust in the telial stage were collected from five key locations in our continuing effort to monitor the frequency and spread of the two virulent strains, vCr1 (sugar pine) and vCr2 (western white pine), in northern California. The Poker Flat sugar pine progeny/provenance test was evaluated to assess the impact of the developing vCr1 epidemic. Aeciospores were collected from 30 sugar pine, 3 western white pine, and 3 foxtail pine in support of DNA investigations in cooperation with Region 1.

Funding was secured for two three-year projects: (1) In summer 2004 a field assessment began on the impact of white pine blister rust on high-elevation white pine species in California. Reconnaissance surveys were made and permanent plots established in whitebark, bristlecone, limber, and foxtail pine stands. Field work will continue in 2005. In addition, a GIS-based database is being developed to identify current information on white pine and blister rust locations in the field. (2) The second project enables an expansion of the program to southern California where cones will be collected from about 1600 sugar pine and 100 limber pines. Seedlings from these trees will be screened for rust resistance and genetic analyses are planned as well. The 2004 cone crop was not remarkable; however, the outlook for 2005 is very hopeful so the genetic cone collection for sugar pine is planned for that year. Limber pine cones were collected from one stand this year and will continue as a crop arises. As a complement to the white pine survey in (1), sugar pine and limber pine were assessed in September 2004 for the occurrence of white pine blister rust in the southern California mountains. Plots were established for long-term monitoring and reconnaissance surveys done over a large area of the sugar and limber pine geographic distributions there. White pine blister rust was not observed in any of the plots or survey areas.

DEMONSTRATION THINNING PLOTS IN THE EASTSIDE PINE TYPE ON THE LASSEN NATIONAL FOREST.

In 1978-1979 the USDA Forest Service established plots in the eastside pine type to show the effects of thinning on pest-caused losses in areas of high tree mortality. The stands chosen were mostly pole-size ponderosa pine mixed with some white fir and incense-cedar, growing on medium to low sites, and ranging in age from 70 to 90 years. Within the demonstration plots, four levels of stocking density - 40, 55, 70, and 100 percent of normal basal area - were established to demonstrate the biological and economic alternatives available for management planning. (Normal basal area is the basal area that a stand should have reached when fully stocked with trees, which in the demonstration areas, ranges from 185 to 215 sq ft/ac, depending on site quality.) Twenty five years after thinning, the treatments had reduced mortality from 93 to 100 percent of the level in unthinned stands (Table 2).

TABLE 2. Commercial Tree Mortality by Stocking Level, 24 years after thinning[a]

Year	Residual Stocking After Thinning[b] 40%	55%	70%	100%
		Trees per Acre		
1980	0.0	0.2	0.2	2.4
1981	0.0	0.0	0.7	2.4
1982	0.0	0.5	0.3	3.6
1983	0.0	0.1	0.8	4.1
1984	0.0	0.0	0.0	1.0
1985	0.0	0.2	0.0	0.6
1986	0.0	0.0	0.0	1.3
1987	0.0	0.0	0.0	1.4
1988	0.0	0.0	0.0	0.0
1989	0.0	0.4	0.0	2.6
1990	0.0	0.0	0.0	2.6
1991	0.0	0.0	0.0	1.8
1992	0.0	0.2	0.0	3.0
1993	0.0	0.2	0.3	5.2
1994	0.0	0.0	0.0	4.8
1995	0.0	0.0	0.3	0.4

1996	0.0	0.2	0.0	1.3
1997	0.0	0.2	0.0	1.3
1998	0.0	0.0	0.0	0.0
1999	0.0	0.0	0.0	0.9
2000	0.0	0.2	0.3	0.0
2001	0.0	0.2	0.3	0.9
2002	0.0	0.1	0.0	0.9
2003	0.3	0.0	0.3	1.7
2004	0.0	0.1	0.0	2.6
Mean	0.0	0.1	0.14	1.87
Range	0.0-0.3	0.0-0.5	0.0-0.8	0.0-5.2
Percent Mortality Reduction				
Compared with normal Basal Area	100	95.0	92.0	—

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

[b.] Percent of normal basal area.

DETECTING VEGETATION COVER CHANGES IN CALIFORNIA USING SATELLITE IMAGERY

During FY 2004 the cooperative California Land Cover Mapping and Monitoring Program (LCMMP) saw the completion of the Southern Sierra Project Area (SSCDP), initiation and 75% completion of the Southern California Project Area (SCCDP), and an early start on the Northern Coast Project Area (NCCDP) which was used to support a Northwest Forest Planning Document. Currently, the program is in it's second cycle of the long-term monitoring, and has approximately 10 years worth of data and information for each project area complete to date. For FY 2005 a report showing the trends of vegetation changes and how they relate to forest health will be completed. Figure 10 shows the project areas in the state.

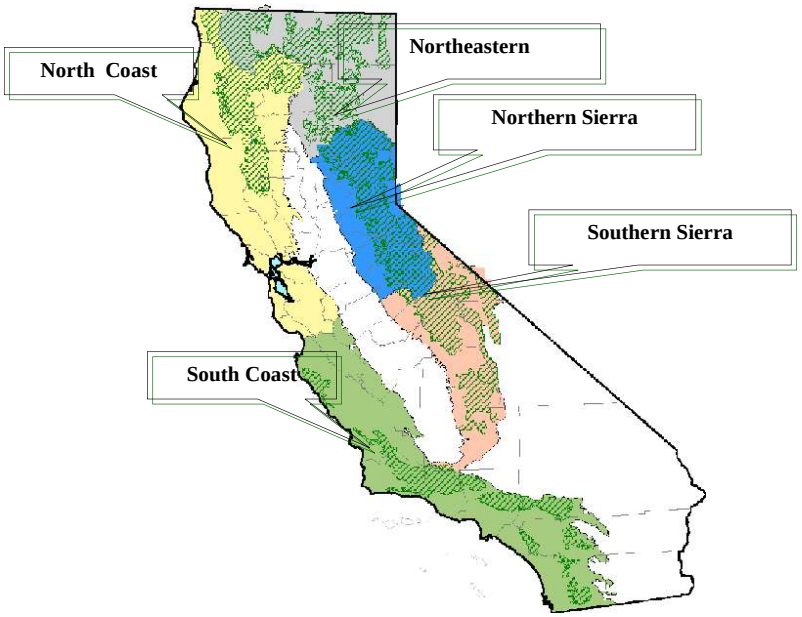


Figure 12. California Land Cover Mapping and Monitoring Program areas in California.

The 9.7 million acre SSCDP project area is complete as of the end of FY 2004 and the accuracy assessment is underway. Cause collection for the southern Sierra project area is also complete and shows wildfire as the major cause of change from the 1995-2001 timeframe assessed. 90% of the South Coast project area is complete and is capturing changes from 1996 and 1996 to 2002. These dates "miss" the major mortality event occurring primarily on the San Bernardino National Forest occurring from 2002 to 2003. Another cooperative effort is being conducted to map the changes due to drought-induced mortality during the 2002-2003 timeframe. The two projects will have a combined report available in early FY 2005.

Final reports for Southern Sierra project area and the South Coast project area will be available by the end of FY 2005.

For more information please go to http://www.fs.fed.us/r5/spf/about/fhp.shtml.

HIGH ELEVATION WHITE PINE SURVEYS IN CALIFORNIA

Field studies to evaluate high-elevation white pines for the incidence and severity of white pine blister rust, caused by *Cronartium ribicola*, were initiated in 2004 with funding from the USDA Forest Service Forest Health Protection forest health monitoring program. Five species of white pine are keystone species in the high elevation ecosystems of California. Limber (*Pinus flexilis*), foxtail (*Pinus balfouriana*), Great Basin bristlecone (*Pinus longaeva*), whitebark (*Pinus albicaulis*), and western white (*Pinus monticola*) pines provide numerous benefits, including soil stabilization and wildlife forage and habitat. In California, the incidence of white pine blister rust is well documented for sugar pine (*Pinus lambertiana*); however, the presence and impacts of the pathogen on the five high elevation five-needled pines are not well known. The objectives of the field studies are to determine the current range and levels of blister rust associated with western white, whitebark, foxtail, limber and bristlecone pines in California, and to establish plots for long-term monitoring of rust incidence and severity in these species over time. Field work consists of reconnaissance surveys and plot establishment throughout the geographic range of the California white pines. Simultaneously, a database to collate current and future information on white pines and blister rust will be developed, as well as link these to data from other geographic areas.

In 2004, the first of two field seasons, surveys were initiated and monitoring plots established in all high-elevation white pines except western white pine. Twelve limber pine plots were established in scattered locations distributed over its geographic range, from the southern Sierra Nevada to the Santa Rosa Mountains in Riverside County. No blister rust was observed in any of the 12 plots. Plots located in stands of Great Basin bristlecone pine, the oldest known conifers in the world, in the White Mountains also did not reveal any blister rust.

In Northern California, blister rust on foxtail pine was confirmed in two plots on the Klamath National Forest. Preliminary data analyses show that the incidence of rust on the northern populations of foxtail pine was 18 and 30%. In the Sierra Nevada, 13 of 24 plots in whitebark pine stands had infected trees. Rust incidence in the whitebark plots with infected trees ranged from 8 to 71%. These findings suggest a need for more surveys in the range of these species and where blister rust hazard is predicted to be high. Field work will continue through 2005, including plot establishment in western white pine.

Southern California forests were also examined and plots established. A survey of most of the major and minor roads in three Southern California National Forests (Los Padres, Angeles, and San Bernardino National Forests) and 4 Southern California counties (Ventura, Los Angeles, San Bernardino, and Riverside Counties) was completed in 2004. No white pine blister rust was observed on limber pine, sugar pine or *Ribes* spp. A total of 13 white pine blister rust study plots, nine sugar pine plots and four limber pine plots, were established to provide a system for periodically surveying southern California for the presence of white pine blister rust.

SOUTHERN CALIFORNIA AND SOUTHERN SIERRA QUARTERLY AERIAL SURVEY PROJECT FY 2004 HIGHLIGHTS

A quarterly aerial survey program has been implemented to capture forest damage, primarily drought-induced mortality and wildfire caused mortality that has occurred from March 2004 through September 2004 over southern California forested areas including the San Bernardino, Cleveland, and Angeles National Forests, and portions of the Los Padres, Sequoia and Inyo National Forests. Portions of BLM, BIA and to a lesser extent adjacent private lands are also included in this survey. The graph below (Figure 11) incorporates the third quarterly survey occurring from September1 through September 10, 2004. The first quarterly survey was conducted in March 2004 and the second was conducted in June 2004. Note that all ownerships are represented and that National Forests are used as reference for all ownerships.

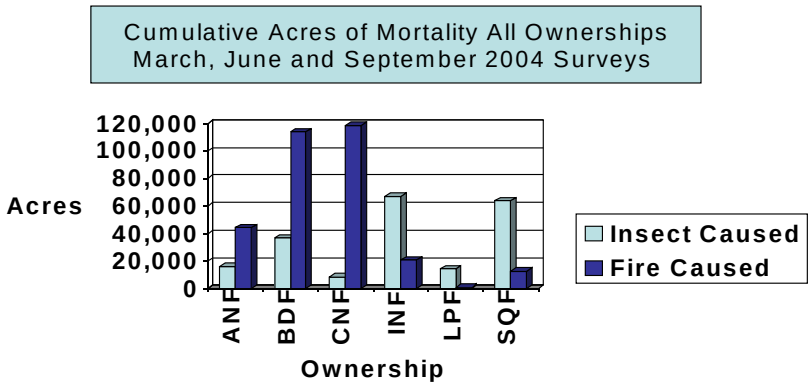


Figure 13. Cumulative acres of mortality on six national forests, September 2004.

Figure 14. Progress of salvage timber harvest north of Cedar Pines, San Bernardino NF.

Figure 15. Pine mortality continues in a plantation near Seven Oaks, San Bernardino National Forest. Older mortality in the center of the photograph is surrounded by more recent mortality.

Figure 16. Accumulation of older white fir mortality and recent Jeffrey pine mortality south of Palomar Observatory, Cleveland National Forest.

Figure 17. Plantation after Red Mountain fire, Sequoia National Forest. Recent mastication thinning of this pine plantation has helped to improve its resistance to insect attack.

ANNUAL AERIAL SURVEYS

Annual Forest Health Protection aerial surveys have been completed for Sequoia Kings Canyon, Lassen, and Yosemite National Parks, and all Pacific Southwest Region forests. Approximately 25 million acres were covered during the 2004 annual aerial surveys. This also includes additional areas flown to include state lands over the Tehachapies, Indian Reservations (Tule River, Santa Rosa, Los Coyotes, and Santa Ysabel); when ever possible, surveys were conducted with other USDA Forest Service personnel on the forests, local BIA (one), and CDF (two) foresters. Data is still coming in from the field so at the time of this writing mortality figures are unavailable.

THE 2004 DOUGLAS-FIR TUSSOCK MOTH PHEROMONE DETECTION COOPERATIVE SURVEY

Within Table 3 are the results of the 2004 cooperative Douglas-fir tussock moth (DFTM) pheromone detection survey. In contrast to 2003 when 19 plots averaged greater than 25 male moths per trap, 2004 monitoring trap catches decreased slightly for most plots on private lands in Lassen, Modoc, and Shasta Counties. The exception was the Burny Mountain plot which showed an increase from 13 moths per trap in 2003 to 31 moths in 2004.

Increases and declines in trap counts are very common with DFTM populations. Based on the results of the 2004 monitoring, there may be some increases in activity by DFTM during 2005. During the field season of this year federal and state Forest Health Protection staff will monitor other life stages in the areas where DFTM activity exceeded an average of 25 males/trap. Field going personnel are urged to continue to check for evidence of feeding and defoliation on white fir throughout the susceptible host type this summer and fall.

TABLE 3. Number of Douglas-fir Tussock Moth Pheromone Detection Survey Plots by Trap Catch, 1979 to 2003.

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

	100%	22%	17%	11%	6%	4%	8%	6%	3%	6%	4%	6%	3%	1%	3%	
1997	142	88	27	10	9	4	3			1						
	100%	62%	19%	7%	6%	3%	2%			<1%						
1998	159	81	22	11	9	6	3	10	7	5	2	1	1	1	0	
	100%	51%	14%	7%	6%	3%	2%	6%	4%	3%	1%	<1%	<1%	<1%	-	
1999	159	126	20	5	3	2	2	0	0	0	1	0	0	0	0	
	100%	79%	13%	3%	2%	1%	1%	-	-	-	1%	-	-	-	-	
2000	185	154	15	4	4	0	1	2	2	2	0	0	1	0	0	
	100%	83%	8%	2%	2%		<1%	2%	1%	1%			<1%			
2001	183	95	57	13	10	6	0	1	1	0	0	0	0	0	0	
	100%	52%	31%	7%	5%	3%	0	<1%	<1%	0	0	0	0	0	0	
2002	168	126	31	5	3	3	0	0	0	0	0	0	0	0	0	
	100%	75%	18%	3%	2%	2%										
2003	163	53	42	11	11	10	14	13	3	1	4	0	1	0	0	
	100%	32%	26%	7%	7%	6%	8%	8%	2%	1%	2%		1%			
2004	174	68	43	6		16	11	6	5	3	0	2	1	1	0	0
	* 93%	39%	25%	3%	9%	6%	3%	3%	2%		1%	<1%	<1%			

* 12 plots were not collected due to snow.

LIST OF COMMON AND SCIENTIFIC NAMES

INSECTS

Common Name	Scientific Name
Bark Beetles and Wood Borers	
Ambrosa beetles	*Monarthrum* spp.
California fivespined ips	*Ips paraconfusus*
California flatheaded borer	*Melanophila californica*
Cedar bark beetle	*Phloeosinus* sp.
Douglas-fir beetle	*Dendroctonus psuedotsugae*
Fir engraver	*Scolytus ventralis*
Fir roundheaded borer	*Tetropium abietis*
Flatheaded fir borer	*Melanophila drummondi*
Jeffrey pine beetle	*Dendroctonus jeffreyi*
Monterey pine ips	*Ips mexicanus*
Mountain pine beetle	*Dendroctonus ponderosae*
Oak bark beetles	*Pseudopityophthorus* spp.
Pine engraver	*Ips pini*
Pine engravers	*Ips* spp.
Pinyon ips	*Ips confusus*
Red turpentine beetle	*Dendroctonus valens*
Western oak bark beetles	*Pseudopityophthorus pubipennis*
Western pine beetle	*Dendroctonus brevicomis*
Wood borers	*Semanotus* sp.
Defoliators	
California oakworm	*Phryganidia californica*
Douglas-fir tussock moth	*Orgyia pseudotsugata*
Fall webworm	*Hyphantria cunea*
Fruittree leafroller	*Archips argyrospilus*
Gypsy moth	*Lymantria dispar*
Lodgepole pine needleminer	*Coleotechnites milleri*
Pandora moth	*Coloradia pandora*
Pine catkin sawflies	*Xyela* sp.
Other Insects	
Aspen gall wasp	unknown
Cooley spruce gall aphid	*Adelges cooleyi*
Douglas-fir twig weevil	*Cylindrocopturus furnissi*
Jeffrey pine needleminer	*Coleotechnites* sp. near *milleri*
Needleminers	*Coleotechnites* spp.
Pine reproduction weevil	*Cylindrocopturus eatoni*
Ponderosa pine twig scale	*Matsucoccus bisetosus*
Redgum lerp psyllid	*Glycaspis brimblecombei*
Scales	*Physokermes* sp.
Sequoia pitch moth	*Vespamima sequoiae*
Spruce aphid	*Elatobium abietinum*
The obtuse sawyer	*Monochamus obtusus*
Tip moth	*Rhyacionia zosana*
Western pineshoot borer	*Eucosma sonomana*
Recent Introductions	
Mediterranean pine engraver	*Orthotomicus erosus*

DISEASES AND THEIR CAUSAL PATHOGENS

Common Name of the Disease	Scientific Name of the Pathogen
Cankers	
Chinkspin canker	Unknown
Cytospora canker of true fir	*Cytospora abietis*
Diplodia blight of pines	*Sphaeropsis sapinea*
Douglas-fir canker	Unknown
Madrone canker	*Nattrassia mangiferae* and *Botryosphaeria dothidea*
Phomopsis canker of Douglas-fir	*Phomopsis lokoyae*
Pitch canker	*Fusarium circinatum*
Declines	
Incense-cedar decline	unknown
Sudden oak death	*Phytophthora ramorum*
Dwarf Mistletoe	
Douglas-fir dwarf mistletoe	*Arceuthobium douglasii*
Gray pine dwarf mistletoe	*Arceuthobium occidentale*
Limber pine dwarf mistletoe	*Arceuthobium cyanocarpum*
Mountain hemlock dwarf mistletoe	*Arceuthobium tsugense* subsp. *mertensianae*
Pinyon pine dwarf mistletoe	*Arceuthobium divaricatum*
Red fir dwarf mistletoe	*Arceuthobium abietinum* f. sp. *magnificae*
Western dwarf mistletoe	*Arceuthobium campylopodum*
White fir dwarf mistletoe	*Arceuthobium abietinum* f. sp. *concoloris*
Foliage Diseases	
Elytroderma disease	*Elytroderma deformans*
Sugar pine needle cast	*Lophodermella arcuata*
Root Diseases	
Annosus root disease	*Heterobasidion annosum*
Armillaria root disease	*Armillaria mellea*, *Armillaria* sp.
Black stain root disease	*Leptographium wageneri*
Port-Orford-cedar root disease	*Phytophthora lateralis*
Phytophthora root rot	*Phytophthora cinnamomi*
Schweinitzii root disease	*Phaeolus schweinitzii*
Rusts	
Western gall rust	*Endocronartium harknessii*
White pine blister rust	*Cronartium ribicola*
True Mistletoes	
True mistletoe	*Phorodendron* spp.

TREES

Common Name	Scientific Name
Conifers	
Pines	
Aleppo pine	*Pinus halepensis*
Bishop pine	*Pinus muricata*
Coulter pine	*Pinus coulteri*
Foxtail pine	*Pinus balfouriana*
Gray pine	*Pinus sabiniana*
Italian stone pine	*Pinus pinea*
Jeffrey pine	*Pinus jeffreyi*
Knobcone pine	*Pinus attenuata*
Lodgepole pine	*Pinus contorta* var. *murrayana*
Monterey pine	*Pinus radiata*
Ponderosa pine	*Pinus ponderosa*
Singleleaf pinyon	*Pinus monophylla*
Sugar pine	*Pinus lambertiana*
Torrey pine	*Pinus torreyana*
Western white pine	*Pinus monticola*
Whitebark pine	*Pinus albicaulis*
True firs	
Red fir	*Abies magnifica*
White fir	*Abies concolor*
Others	
Brewer spruce	*Picea breweriana*
Douglas-fir	*Pseudotsuga menziesii*
Engelmann spruce	*Picea engelmannii*
Giant sequoia	*Sequoia giganteum*
Incense-cedar	*Libocedrus decurrens*
Mountain hemlock	*Tsuga mertensiana*
Port-Orford-cedar	*Chamaecyparis lawsoniana*
Coast redwood	*Sequoia sempervirens*
Sitka spruce	*Picea sitchensis*
Hardwoods	
Oaks	
Oaks	*Quercus* spp.
California black oak	*Quercus kelloggii*
Coast live oak	*Quercus agrifolia*
Other	
Aspen	*Populus tremuloides*
Big-leaf maple	*Acer macrophyllum*
California bay laurel	*Umbellularia californica*
California sycamore	*Platanus racemosa*
Camphor	*Cinnamomum camphora*
Chinkquapin	*Castanopsis chrysophylla*

Eucalyptus	*Eucalyptus* spp.
Hackberry	*Celtis occidentalis*
Mountain mahogany	*Cercocarpus* spp.
Pacific madrone	*Arbutus menziesii*
Poison oak	*Toxicodendron diversilobum*
Poplars	*Populus* spp.
Tanoak	*Lithocarpus densiflorus*
Willow	*Salix* spp.

PUBLICATIONS (2003 and 2004)

Adams, David. 2004. Annosus Root Disease in California. California Department of Forestry and Fire Protection, Tree Note No. 6 (revised). 2 p.

Angwin, P.A. 2003. Tannery Campground and Fawn Group Camp Tree Hazard. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. N03-02. 2 p.

Angwin, Pete. 2003. Evaluation of black stain root disease at T-Bone Units 14 and 16. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. N04-01. 3 p.

Angwin, Pete. 2003. Port-Orford-cedar management, Redwood National and State Parks, Little Bald Hills Trail. Pacific Southwest Region, Forest Health Protection. 3400 Memo. 3 p.

Angwin, Pete. 2004. Input for Edson Sale. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. N04-03. 3 p.

Angwin, Pete; Schultz, Dave. 2004. Assessment of Douglas-fir failure at Sims Fire Ignition Site. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. N04-07. 2 p.

Cluck, D.R. 2003. Harvey Mountain GMA administrative study - Monitoring the effectiveness of thinning treatments progress report. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE03-01. 4 p.

Cluck, D.R. 2003. Evaluation of Crater Lake Campground. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE03-06. 6 p.

Cluck, D.R. 2003. Forest insect and disease evaluation of Stand 14, Hamilton Management Area. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE03-09. 3 p.

Cluck, D.R.; Smith, Sheri L. 2004. Briles Bald Eagle Habitat Project. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE04-03. 6 p.

Cluck, D.R.; Smith, Sheri L. 2004. Evaluation of top-killed white fir on Cedar Pass. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE04-05. 6 p.

Cluck, D.R.; Smith, Sheri L. 2004. Evaluation of the Cradle Valley Property. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE04-06. 5 p.

Cluck, D.R.; Smith, Sheri L. 2004. Evaluation of the Homer and Deerheart Lakes Area. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE04-10. 5 p.

Cluck, D.R.; Smith, Sheri L. 2004. Evaluation of the Willow Lake Dispersed Camping Area. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE04-11. 7 p.

Cluck, D.R.; Woodruff, W.C. 2004. Forest insect and disease evaluation of Stand 36, Briles Reservoir. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE04-07. 5 p.

Daterman G.E.;Wenz, J.M.; Sheehan, K.A. 2004. Early warning system for Douglas-fir tussock moth outbreaks in the western United States. Western Journal of Applied Forestry. In press.

Frankel, S.J.; Stanley, M. 2003. Managing Sudden Oak Death for California. pp. 217-221. In: McComb J.A.; Hardy G.; Tommerup, I.C. (eds.), Phytophthora in Forests and Natural Ecosystems. 2nd International IUFRO Working Party 7.02.09 Meeting, Albany, W. Australia. 30th Sept. - 5th Oct 2001. Murdoch University Press.

Frankel, S.J. 2004. Recipe for a forest pathogen quarantine. p. 91. In: Geils, B. (ed.), Proceedings of the 51st Western International Forest Disease Work Conference, Grants Pass, Oregon. August 18 to 22, 2003.

Frankel, S.; Angwin P. 2004. Sudden Oak Death- the year in review (2002). p. 91. In: Geils, B. (ed.), Proceedings of the 51st Western International Forest Disease Work Conference, Grants Pass, Oregon. August 18 to 22, 2003.

Frankel, S.J.; Parke, J.; Alexander, J.; Thomas, C. 2004. USDA Cooperative State Research Education and Extension Service, (CSREES), National *P. ramorum* training for Master Gardeners and others. www.ncipm.org.

Goheen, E.M.; Frankel, S. In Press. SOD quarantine and management in California and Oregon. In: Gottschalk, K.W. (ed), Proceedings of the 31st Annual Hardwood Symposium, Threats to Hardwood Forests. 2003 NHLA Annual Symposium, The Forest Discovery Center, Starlight, IN. May 23-24, 2003. National Hardwood Lumber Association, Memphis, TN.

Hildebrand, D.; Stone, J.; James, R.; Frankel, S. 2004. Alternatives to pre-plant soil fumigation for western forest nurseries. USDA Forest Service. Pacific Northwest Region, PNW Research Station GTR-608. 27 p.

Kliejunas, J.T.; Burdsall, H.H. Jr.; DeNitto, G.A.; Eglitis, A.; Haugen, D.A.; Haverty, M.I.; Micales, J.A.; Tkacz, B.M.; Powell, M.R. 2003. Pest risk assessment of the importation into the United States of unprocessed logs and chips of eighteen eucalypt species from Australia. USDA Forest Service, Forest Products Laboratory, Gen. Tech. Report FPL-GTR-137. 206 p.

Kliejunas, J.; Smith, R.S. 2003. Re-location of the site of the first report of black stain root disease. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. R03-01. 5 p.

Kliejunas, J.T. 2004. Annosus root disease: Effects, biology and prevention in southern California recreation sites. USDA Forest Service, Pacific Southwest Region, R5-PR-006. 2 p.

Kliejunas, J.; Adams, D. 2004. Port-Orford-cedar Root Disease. California Department of Forestry and Fire Protection, Tree Note No. 29. 3 p.

Kliejunas, J.; Woodruff, W.C. 2004. Pine stump diameter and Sporax® treatment in eastside pine type stands. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. R04-01. 7 p.

Kliejunas, J.T.; Otrosina, William J.; Allison, James R. 2004. Uprooting and trenching to control annosus root disease in a developed recreation site: 12 year results. Western Journal Applied Forestry. In press.

Otrosina, W.J.; Sung, S.S.; Kliejunas, J.T.; Smith, S.; Cluck D.R. 2004. Development of black stain root disease on artificially inoculated ponderosa pine. Publication No. P-2004-0538-AMA. Phytopathology 94: S79.

Owen, Don. 2003. The Red Turpentine Beetle (revised). California Department of Forestry and Fire Protection. Tree Note No. 9. 4 p.

Owen, Don. 2003. The Fir Engraver Beetle (revised). California Department of Forestry and Fire Protection. Tree Note No. 10. 4 p.

Owen, Don. 2004. Ips Beetles in California Pines. California Department of Forestry and Fire Protection. Tree Note No. 24. 4 p.

Pronos, J. 2004. Leaning giant sequoias on the Trail of 100 Giants, Giant Sequoia National Monument. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. C04-2. 2 p.

Pronos, J. 2004. Dwarf mistletoe infestation at Sand Flat Campground, Summit Ranger District, Stanislaus National Forest. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. C04-3. 6 p.

Pronos, J. 2004. Examination of a live oak tree in the Early Fire, Groveland Ranger District, Stanislaus National Forest. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. C04-4. 4 p.

Pronos, J. 2004. Gray pine dwarf mistletoe. USDA Forest Service, Forest Health Protection, Forest Insect & Disease Leaflet No. 173. 8 p.

Pronos, J.; Wenz, J. M. 2004. Insect and disease evaluation: Trail of the 100 Giants and Quaking Aspen Campground, Sequoia National Forest/Giant Sequoia National Monument. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. C04-1. 12 p.

Schultz, D.E. 2003. Evaluation of mortality and blowdown at head of Red Cap Creek. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. N03-03. 2 p.

Schultz, Dave. 2004. Input for Edson Sale. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. N04-02. 7 p.

Schultz, Dave. 2004. Marking trees to reduce hazard and improve stand health at Tannery Campground. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. N04-04. 3 p.

Schultz, Dave. 2004. Evaluation of pine mortality. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. N04-05. 2 p.

Schultz, Dave. 2004. Evaluation of Lakehead Community Wildfire Protection Plan. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. N04-06. 2 p.

Smith, Sheri L. 2003. Douglas-fir tussock moth pheromone detection survey 2002 report. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE03-02. 2 p.

Smith, Sheri L. 2003. Preliminary field evaluation of the Sugar Bowl ski area. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE03-04. 15 p.

Smith, Sheri L. 2004. Douglas-fir tussock moth pheromone detection survey 2003 Report. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE04-01. 2 p.

Smith, Sheri L.; Woodruff, W.C. 2004. Field evaluation of the proposed Truckee Service Center project site. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE04-09. 5 p.

Wenz, J. 2004. Status of the Douglas-fir Tussock Moth in Yosemite National Park, California, October, 2004. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. C05-2. 4 p.

Wenz, J.; Pronos, J. 2004. Evaluation of the white fir involved in the Holmes Investigation, Sequoia and Kings Canyon National Parks. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. C05-1. 6 p.

Woodruff, W.C. 2003. Removal of black stain root disease LOP for unit 32D, Prattville Forest Restoration DFPZ Timber Sale. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE03-03. 1 p.

Woodruff, W.C. 2003. Disease and insect conditions in Stand 106, Downieville Ranger District, Tahoe National Forest. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE03-05. 18 p.

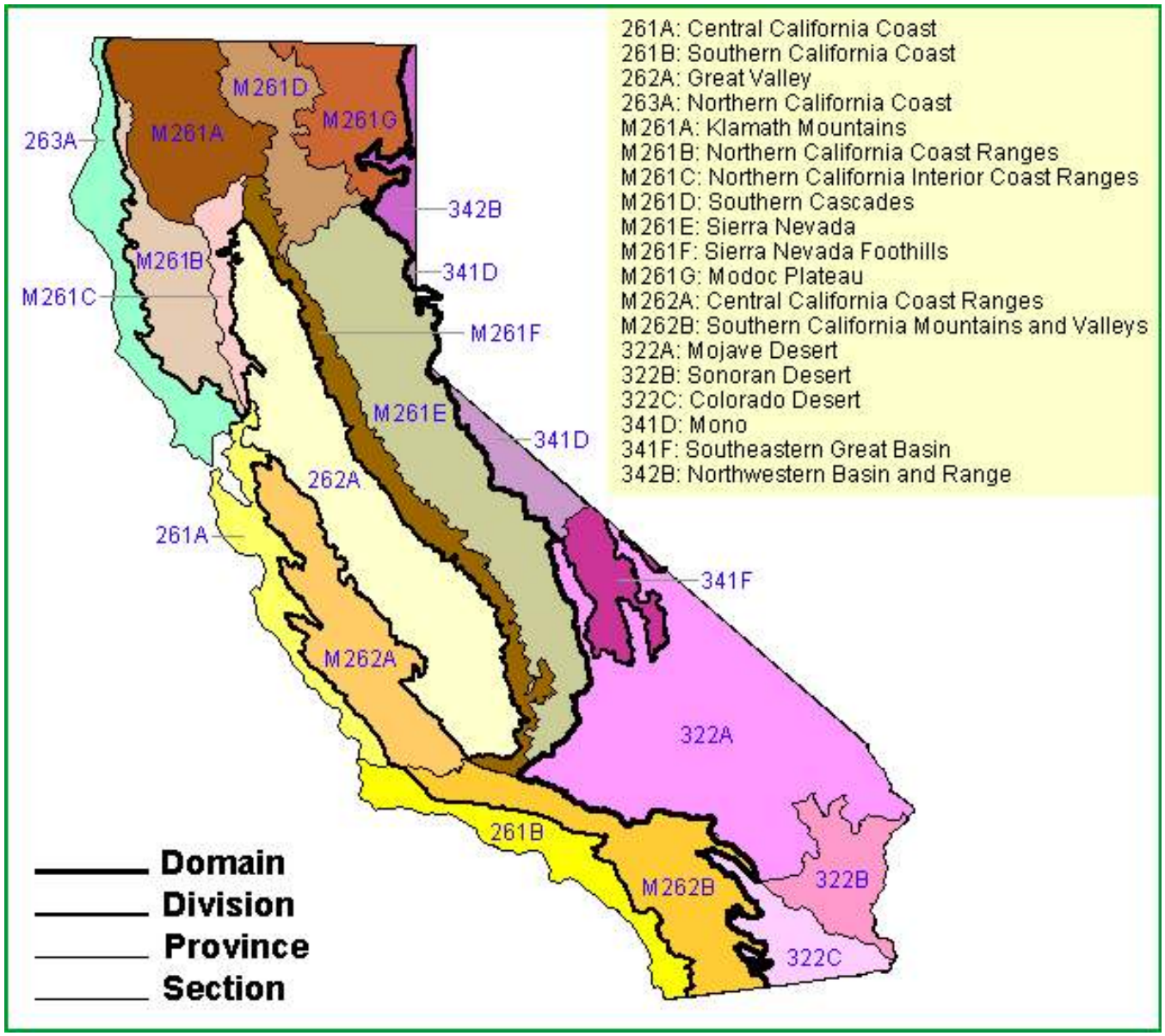
Woodruff, W.C. 2003. Disease and insect conditions in Stand 119, Compartment 381, Almanor Ranger District, Lassen National Forest. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE03-07. 15 p.

Woodruff, W.C. 2004. Disease and insect conditions in Stand 103, Compartment 5, Downieville Ranger District, Tahoe National Forest. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE04-02. 18 p.

Woodruff, W.C. 2004. Annosus root disease survey in the Washington Project Area. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE04-08. 9 p.

Woodruff, W.C.; Cluck, D.R. 2004. Tree Hazards in Paradise Lake Recreation Area. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE04-04. 9 p.

Figure 18. Ecoregions of California.



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

FOREST PEST DETECTION REPORT

I. FIELD INFORMATION (See instructions on reverse)

1. County:

2. Forest (FS only):

3. District (FS only):

4. Legal Description:
T. _____ R. _____
Section (s) _____

5. Date:

6. Location:

UTM:

7. Landownership:
- National Forest ☐
- Other Federal ☐
- State ☐
- Private ☐

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

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

10. Part(s) of Tree Affected:
- 1. Root ☐
- 2. Branch ☐
- 3. Leader ☐
- 4. Bole ☐
- 5. Twig ☐
- 6. Foliage ☐
- 7. Bud ☐
- 8. Cone ☐

11. Species Affected:

12. Number Affected:

13. Acres Affected:

14. Injury Distribution:
1. Scattered ☐ 2. Grouped ☐

15. Status of Injury:
1. Decreasing ☐ 2. Static ☐ 3. Increasing ☐

16. Elevation:

17. Plantation?
1. Yes ☐ 2. No ☐

18. Stand Composition (species):

19. Stand Age and Site Class:

20. Stand Density:

21. Site Quality:

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

23. Sample Forwarded:
1. Yes ☐ 2. No ☐

24. Action Requested:
- 1. Information only ☐
- 2. Lab Identification ☐
- 3. Field Evaluation ☐

25. Reporter's Name:

26. Reporter's Agency:

27. Reporter's Address and Phone Number:

II. Reply (Pest Management Use)

28. Response:

29. Report Number:

30. Date:

31. Examiner's Signature:

R5-3400-1 (Rev. 3/02)

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

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

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

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

Forest Health Protection
Stanislaus National Forest
19777 Greenley Road
Sonora, CA 95370

Forest Health Protection
Lassen National Forest
2550 Riverside Drive
Susanville, CA 96130

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

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

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

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

Forest Pest Management
CA Dept. of Forestry & Fire Protection
17501 N. Highway 101
Willits, CA 95490

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

Completing the Detection Report Form

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

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

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

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

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

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

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

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

CALIFORNIA FOREST PEST COUNCIL
EXECUTIVE BOARD AND OFFICERS-2004

❖ COUNCIL CHAIR:
Scott Johnson
Wilbur-Ellis Company

❖ COUNCIL VICE-CHAIR:
Bill Bailey
Helena Chemical Company

❖ COUNCIL SECRETARY:
Jesse Rios
CA Dept. Forestry and Fire Protection

❖ COUNCIL TREASURER
Brice McPherson
University of California Center for Forestry

STANDING COMMITTEES

ANIMAL DAMAGE COMMITTEE:
❖ Chair: vacant
Secretary: vacant

DISEASE COMMITTEE:
❖ Chair:
Bill Woodruff
USDA Forest Service, FHP

Secretary:
Tom Smith
CA Dept. Forestry and Fire Protection

INSECT COMMITTEE:
❖ Chair:
Chris Fettig
Pacific Southwest Research Station

Secretary:
Maria Morales
Safe Solutions Group

SOUTHERN CALIFORNIA PEST COMMITTEE:
❖ Chair:
Kathleen Edwards
CA Dept. of Forestry & Fire Prevention

Secretary:
Glenn Barley
CA Dept. of Forestry & Fire Prevention

WEED COMMITTEE:
❖ Chair:
Mike Marvier
Sierra Pacific Industries

Secretary:
Craig Ostergaard
Sierra Pacific Industries

EDITORIAL COMMITTEE:
Chair:
Steve Jones
CA Dept Forestry and Fire Protection

Editor-in-Chief:
vacant

❖ MEMBERS AT LARGE:
Danny Cluck
USDA Forest Service, FHP

Roy Richards
Consulting Forester

Susan Frankel
USDA Forest Service, FHP

❖ **Executive Committee Members**