FOREST PEST CONDITIONS IN CALIFORNIA 2002

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—2002***, 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 at the following website: http://www.r5.fs.fed.us/fpm/fhp_doc.htm.

TABLE OF CONTENTS

California Forest Pest Council

Table of Contents

Cover photo: Tree mortality and removals around Lake Arrowhead. (Photo by Laura Merrill, USDA Forest Service)

LIST OF FIGURES

LIST OF TABLES

SUMMARY OF CONDITONS

Insects

Bark Beetles. The winter of 2001-2002 was dry in southern California. The San Bernardino Mountains and the Peninsular Ranges received historically low precipitation rates. This also marked the fourth consecutive year of drought. The result has been elevated vegetation mortality – pines, white fir, cedar and chaparral – affects over 151,000 acres in the San Bernardino Mountains with tree mortality on 114,000 acres. The magnitude and extent of mortality has produced fuels that pose major threats to life and property, ecosystem structure, function and long-term sustainability. Losses also include high value landscape trees and aesthetics.

Mortality on other federal lands in southern California is less severe due to differences in climate, vegetation density and access and ownership patterns. About 8,000 acres are affected on the Cleveland National Forest and 2,000 acres are involved on the Angeles National Forest.

Although some tree mortality was locally significant in northern California, mortality was low region-wide relative to past droughts. Western pine beetle, fir engraver, red turpentine beetle, mountain pine beetle, Jeffrey pine beetle and pine engravers were the most frequently reported insects. Should the winter months of 2003 prove to be dry, increased tree mortality in northern California is anticipated for 2003.

Defoliators. Populations of fruittree leafroller (southern California) and lodgepole pine needleminer (Yosemite National Park) remained high. The fall webworm declined and populations of the California budworm remained low. Few gypsy moths were trapped by the California Department of Food and Agriculture. Long unreported, the Pandora moth appears to be in the initial stages of outbreak in Jeffrey pine on the Inyo National Forest.

Diseases

Abiotic. Damage was associated with drought, particularly in Southern California, fire, frost and ozone. Damage from salt, heat, wind and low temperatures were not reported.

Biotic. For the past several years, Diplodia blight of pine was conspicuous in northern California. However, in 2002 it all but disappeared except for an area along the middle Fork of the Stanislaus River. Cytospora canker of true fir is reported annually, but Cytospora canker of poplars and willows is rarely reported. It occurred on the east side of the Sierra Nevada and southern Cascades in 2002.

New pitch canker infections continue to occur within the 18 counties of the Zone of Infestation. Rate of spread this past year may be slower as compared to earlier years in

areas where the disease is well established. However in stands where the disease has recently become established, incidence and severity are increasing rapidly.

Isolation of *P. ramorum* from redwood, Douglas-fir and canyon live oak brought the total number of known native species affected in California to 22. The number of infected counties is now 12 with the addition of Humboldt and Contra Costa Counties. The confirmation of *P. ramorum* on the Los Padres National Forest near Big Sur is the first report from a National Forest. All confirmations remain within 50 miles of the Pacific Ocean.

A second, previously undescribed species, *P. nemarosa*, is occasionally isolated from lethal cankers on tanoak and coast live oak and from foliar lesions on tanoak and California laurel. In forest settings it is usually associated with the death of single trees rather than expanding patch of mortality characteristic of *P. ramorum*.

Foliage diseases were apparently less frequent in 2002. Port-Orford-cedar root disease continues to expand and cause tree mortality in the upper Sacramento River Canyon. The southern extent of white pine blister rust has now been established in the area of Breckenridge Mountain on the Sequoia National Forest.

Status and Control of Animal Pests

Damage to trees was reported from 25 counties in California. A variety of species were involved with pocket gopher, black bear, deer, woodrats and tree squirrels being the most troublesome in terms of acres affected.

FOREST PEST CONDITIONS IN CALIFORNIA - 2002

BARK and ENGRAVER BEETLES, and BORERS

CEDAR BARK BEETLES, ***Phloeosinus* sp**. Cedar bark beetles were found in small diameter (<4 inches dbh) incense-cedars in early summer causing branch dieback and tree mortality. Most observations were in the Moonlight Valley and Hamilton Mountain areas of the Eagle Lake Ranger District, Lassen National Forest (M261D). Cedar bark beetles were also observed in green slash this spring in the Headquarters area of the Lassen Volcanic National Park (M261D).

DOUGLAS-FIR ENGRAVER, ***Scolytus unispinosus***. A rare outbreak of the Douglas-fir engraver occurred in the Concow area of Butte County (M261E). Both top-kill and tree mortality were observed, mostly in widely dispersed, pole-size trees. One area of concentrated mortality was observed in an area logged in 2001. Douglas-fir slash from the operation had been colonized by the engraver and subsequently, sub-merchantable, residual Douglas-fir were killed. Douglas fir engraver damage was also observed in the Moonlight Valley and Hamilton Mountain areas of the Eagle Lake Ranger District, Lassen National Forest (M261D). Damage consisted of scattered branch dieback and/or top-kill.

FIR ENGRAVER, ***Scolytus ventralis***. Top-kill and mortality of white fir caused by the Fir engraver were observed extensively throughout the drier areas of northeastern California. Notable areas of high mortality or top kill are Hamilton Mountain, Indicator Peak, Harvey Mountain, Butte Creek near Lassen Volcanic National Park, Poison Butte, and Ashurst Lake on the Eagle Lake Ranger District, Lassen National Forest.

Scattered white fir mortality (30 to 40 trees/acre) was found throughout all dense stands on the west side of Harvey Mountain, Eagle Lake Ranger District, Lassen National Forest (M261D). Mostly small diameter trees (<10" dbh) were affected and many of these were heavily infected with dwarf mistletoe. Several other areas of top-killed white fir were also detected. Additional areas on the Lassen National Forest include: the forest south of Swain Mountain Experimental Forest over to the west to Benner Creek Campground, between Tumble Buttes and Cornel Spring within the Thousand Lakes Wilderness, Bear Wallow Butte (near the southeast corner of the Thousand Lakes Wilderness), and along Highway (Hwy) between the Ashpan Winter OHV parking and Twin Bridges.

Scattered white fir mortality was also found throughout the Warner Mountain range (M261G). The Warner range has experienced two consecutive years of below normal precipitation and white fir mortality attributed to drought and the fir engraver is becoming very apparent. Notable areas include: the northeastern corner of the South Warner wilderness from Dusenbury Peak north to Conklin Canyon, south of Hwy 299 near Payne Peak and Sheep Rock, and in the drainages from South Deep Creek north to Cedar Creek. In the northern Warners mortality is concentrated on the eastern slope from Daniels Creek north to Bucher Creek and in the western portion of Fort Bidwell Indian Reservation. White fir mortality also increased on some private land northeast of Manzanita Mountain known as Calpines (M261G).

White fir mortality and top-kill was observed in several areas on the Plumas National Forest (M261E) — Horton Ridge, Bagley Pass, Mt. Ingalls, Mt. Jura, Babcock Peak, several square miles on the northern edge of

the forest north of Evans Peak, Eisenheimer Peak and Antelope Lake, the area south of Doyle, and throughout the west-side Feather River Ranger District. Scattered top killing of white fir was observed over several square miles around the Deannes Valley area southwest of Quincy (Mt. Hough Ranger District) and along FS Road 94 at Lumpkin Ridge and near Tamarak Flat on the Feather River Ranger District.

Scattered top-kill and mortality of white fir was found on the Almanor Peninsula, Plumas County (M261D). The affected area is developed with residential housing and has many areas that are over crowded with white fir. Little mortality has occurred among the ponderosa pine, incense cedar, and sugar pine in the area. The fir engraver also caused scattered mortality of white fir in the vicinity of Paradise, Butte County (M261D).

Both top-kill and elevated levels of whole tree white fir mortality were detected in a few areas on the Tahoe National Forest (M261E). Areas of top-kill include Maiden Valley to Treasure Mountain and along Deer Creek (located southeast of the junction of Primary Forest Route 54 and Hwy 49). Areas of whole tree mortality include the east side of Keystone Mountain (located just south of Loganville Campground on Hwy 49), the area around Second Divide (located about 2.5 miles north of Downieville) and Canada Ridge on the Foresthill Ranger District.

Increasing true fir mortality and top-kill associated with the fir engraver were found in several locations in the central and southern Sierra Nevada, primarily in the southern part of M261E. Considerable top-kill and mortality were scattered throughout the Tule River/ Hot Springs and Greenhorn Districts, Sequoia National Forest. Top-kill and mortality of scattered individuals and small groups of white fir were observed near Kings Beach on the north shore of Lake Tahoe.

The fir engraver damaged white fir in the drought stressed mixed conifer forests of the San Bernardino Mountains and the Peninsular Ranges. Trees particularly affected were those infected with annosus root disease and/or leafy mistletoe.

FLATHEADED FIR BORER, ***Melanophila drummondi***. Scattered mature and pole-sized Douglas-fir around the Scott Valley, Siskiyou County (M261A) suffered top-kill, branch dieback and tree mortality due to attacks by the flatheaded fir borer. Two years of drought have contributed to an expansion in borer activity, which can be chronic on drier sites.

JEFFREY PINE BEETLE, ***Dendroctonus jeffreyi***. Jeffrey pine beetle activity and related mortality continued near that of 2001. Scattered large tree mortality could be found throughout northeastern California as well as a few groups of smaller diameter trees. On the Modoc National Forest about five trees were attacked in late summer near Said Valley Reservoir on the Big Valley Ranger District (M261G). This area had scattered single tree mortality in 2001.

Scattered mortality (single trees or small 2-3 tree groups) continued in the Butte Creek area on the Eagle Lake Ranger District, Lassen National Forest (M261D). A couple of large diameter pines within Crags Campground, Lassen Volcanic National Park faded this spring from attacks incurred last fall (M261D).

Jeffrey pine beetle mortality was generally low in the southern part of the M261E ecosection. Pockets of Jeffrey pine beetle mortality were observed on the south shore of Lake Tahoe in the vicinity of Camp Richardson. Increased mortality to older large, scattered Jeffrey pine was found in the Niagara Creek area on the Summit District, Stanislaus National Forest.

The Jeffrey pine beetle was abundant in the San Bernardino Mountains. In particular, trees infested with dwarf mistletoe were attacked by this species.

MOUNTAIN PINE BEETLE, ***Dendroctonus ponderosae***. Mountain pine beetle activity was elevated this year as dry conditions persisted throughout northern California. Most mortality associated with mountain pine beetle attacks was found in lodgepole pine although in areas where ponderosa pine and lodgepole grow together, ponderosa pines were attacked and killed as well.

Several areas of pine mortality were detected on the Modoc National Forest (M261G). The mortality is attributed to stand density, drought, *Ips pini*, western pine beetle and mountain pine beetle. Areas to note include the west side of the Warner Mountain range, throughout the Big Valley Ranger District and the southern edge of the Devils Garden Ranger District between Hwys 91, 139 and 299. Additional pockets of pine mortality were also observed on the northeastern edge of the Devils Garden Ranger District north of County Road 181 from Crowder Flat east to Goose Lake. Lodgepole pine mortality was visibly higher than in recent years on the east end of the McCloud Flats and on the Goosenest Ranger District in Siskiyou County (M261D).

On the Lassen National Forest several areas of mortality were detected. Several small pockets of lodgepole pine and ponderosa pine mortality were located south and east of McCoy Flat Reservoir (M261D). Many more recently attacked trees in the same area were still green by early fall. Mortality continued around the perimeter of Hog Flat Reservoir in both ponderosa and lodgepole pine, but not all of the dead and dying trees had evidence of mountain pine beetle attack (M261D). In addition, a few small groups of ponderosa pine and sugar pine were killed this summer on the northeast slope of Bogard Buttes, Lassen National Forest (M261D). Scattered lodgepole and ponderosa pine groups of 2-3 trees were also noted in the area where Hwy 44 and Lassen County Road A-21 intersect (M261D). Scattered lodgepole pine mortality was found along Butte Creek, which stopped flowing very early again this spring, from the north end of Lassen Volcanic National Park to Hwy 44 (M261D).

Scattered individual lodgepole pine mortality was noted along the Little Truckee River between Sierraville and Truckee (M261E). High levels of mortality of lodgepole pine caused by mountain pine beetle were also detected on private ownership along Trout Creek located just northwest Truckee.

Mortality associated with the mountain pine beetle remained generally low throughout most of the southern M261E and M261F ecosections. Mountain pine beetle activity in lodgepole pine continued in the Lake Tahoe Basin (M261E) with mortality pockets continuing on the south shore near Saxon and Trout Creek drainages on the south shore.

Large diameter ponderosa and sugar pines were attacked by mountain pine beetles in areas of the San Bernardino and San Jacinto Mountains (M261B). This bark beetle species was less abundant than the western pine beetle, which has a shorter life cycle and is able to respond more quickly to abundant resources (drought stressed trees).

Fire damage and mountain pine beetle. Mountain pine beetle attacks were common in sugar pines located in recently burned wildfire areas in northeastern California. The Storrie Fire, Lassen National Forest (M261D), and the Star Fire, Tahoe National Forest (M261E), had a large number of dead and dying sugar pine from fire injuries and bark beetle attacks.

PINE ENGRAVER BEETLES, *Ips* spp. Pine mortality related to engraver attacks sharply declined from that of recent years in all areas of northeastern California. The only area were mortality continued at high rates was on the Modoc National Forest near Said Valley Reservoir in ponderosa and Jeffrey pine (M261G). Lower boles from the previous years top-killed trees were attacked in early summer and two new group kills (30 to 50 pines) were noted in late summer. Elsewhere, scattered top-kill in ponderosa and Jeffrey pine caused by *Ips pini* was evident in areas 2-3 miles northwest of Chilcoot on the Plumas National Forest where mortality was heavy last year (M216E). Many of the pines in this area are heavily infected with dwarf mistletoe.

The pine engraver also continued to infest downed Jeffrey pine and Jeffrey pine slash resulting from thinning operations in several areas on the Mammoth and Mono Lakes Districts (M261E). Some mortality and top-kill of residual pines in the thinned areas has been observed. *Ips pini* was also associated with Jeffrey pine mortality in the Zephyr Cove area on the west shore of Lake Tahoe.

Ips paraconfusus was associated with ponderosa pine mortality along with the western pine beetle and the red turpentine beetle in an underburned section of the Wrights Creek plantation, Mi-wok District, Stanislaus National Forest. The California fivespinned engraver also was found in dying pines and portions of pines in the San Bernardino Mountains, the Peninsular Ranges, and in plantations in the San Gabriel Mountains and the mountains north of Castaic Lake. In places with very high mortality, e.g. the San Bernardino Mountains, pine engravers were not as common as the western pine beetle.

Mortality of singleleaf pinyon associated with the pinyon ips continued moderate to high in areas on the east side of the Sierra Nevada (M261E) from Bridgeport, Mono County south through Inyo County. Increasing singleleaf pinyon mortality continued between Rock Creek and Sherwin Meadows in Mono County and in the vicinity of Kennedy Meadows area in Tulare County. Pinyon ips populations were high in singleleaf pinyon stands in the eastern portions of the San Bernardino Mountains, particularly in areas with blackstain root disease. Also attacked were *Pinus californiarum* in the Santa Rosa Mountains, particularly in housing developments where wells for domestic water use may have lowered the water table, and in areas around trees damaged in the Palm Fire. Mortality also occurred among drought-stressed singleleaf pinyons on the Mount Pinos District of the Los Padres National Forest, with the pinyon ips infesting the trees.

PINE REPRODUCTION WEEVIL, ***Cylindrocopturus eatoni***. Pine reproduction weevil damage was observed in the 30-acre Torch Fire Plantation, Hat Creek District, Lassen National Forest (M261D). Approximately forty percent of the 7- to 10-year-old trees were killed. Damage was also found in a ponderosa pine plantation near Montgomery Creek, Shasta County (M261A).

RED TURPENTINE BEETLE, ***Dendroctonus valens***. The red turpentine beetle again caused mortality of pole-size ponderosa pine in the Pondosa Burn plantation, Siskiyou County (M261D). The outbreak started in 2000 when beetles killed trees in or adjacent to research plots where deep soil tilling and tree thinning had been conducted prior to the mortality. Scattered mortality has continued since then in areas that received thinning but were not tilled. Higher rates of mortality were noted on rocky sites with poor soil development. Beetle populations apparently increase in freshly created stumps, but brood success decreases in standing trees. On a given site, this results in a wave of mortality that quickly subsides.

The red turpentine beetle was found in association with other bark beetles and/or with fire-injured trees throughout northeastern California. Areas with elevated rates of red turpentine beetle attacks were the Sugar

Hill Plantation underburn, Warner Mountain Ranger District, Modoc National Forest (M261G), Star Fire, Tahoe National Forest (M261E), and the Swain's Hole underburn, Eagle Lake Ranger District, Lassen National Forest (M261D).

Figure 1. Jeffrey pine beetle.

Light to moderate levels of red turpentine beetle activity occurred in the southern part of M261E on trees injured to varying degrees by wildfire and prescribed burns. Red turpentine beetle attacks continued at the base of Jeffrey pines in the Crater wildfire and on sugar and ponderosa pines in the Star wildfire, Georgetown District, Eldorado National Forest. Red turpentine beetle activity was present in several areas in the McNally wildfire, Sequoia National Forest. Low levels of red turpentine beetle activity also continued in the Diamond-O Campground, Groveland District, Stanislaus National Forest and red turpentine beetle activity was present, along with western pine and pine engravers, in the Wright's Creek prescribed burn, Mi-wok District, Stanislaus National Forest.

D. valens was abundant on all pine species examined in the San Bernardino Mountains, the San Jacinto Mountains, the Laguna Mountains, the Santa Ana Mountains, and Black Mountain and Lost Valley in San Diego County.

WESTERN PINE BEETLE, ***Dendroctonus brevicomis.*** Ponderosa pine mortality from western pine beetle increased in northwestern California due to drought stress (M261A, M261D). Numerous small spots of ponderosa pine mortality are visible near the south end of the Scott Valley. Several large spots of ponderosa pine have been killed on the McCloud Ranger District in the Mud Flow Research Natural Area, and in nearby stands that have black stain root disease (M261D). Some group kills near the Ash Creek Sink appear to be the result of overstocking and drought stress. There is a large area of scattered pine mortality centered on Slate Mountain, near the Shasta and Trinity County line (M261D). Other areas with high levels of activity include the north end of the Middle Eel-Yolla Bolla Wilderness (M261A) and Letts Lake in Colusa County (M261B).

Scattered individual ponderosa pines and small groups of trees were killed by the western pine beetle in the Shingletown and Manton areas, Shasta and Tehama Counties respectively (M261D). Mortality began in 2001 and apparently is drought-related. No evidence of disease or other predisposing factors were found. Red turpentine beetles were found colonizing many of the trees.

Figure 2. Conifer mortality on west shore of Lake Arrowhead (left) and above Idyllwild

Scattered mortality in large, old growth ponderosa pine was observed throughout northeastern California in 2002. Dead and dying trees were usually found among dense stands of small diameter pine and white fir. Notable locations include: the area of Swain's Hole Reservoir, the Highway 44 corridor (M261D), and the lower east slope of Fredonyer Pass (Hwy 36, M261E) on the Eagle Lake District, Lassen National Forest. Other areas with several pockets of mortality include the north edge of the Ishi Wilderness, along the Mill Creek drainage from Black Rock Campground east to Big Bend, and along the Hwy 32 corridor between Potato Patch Campground and Elam Campground (M261D).

National Forest Service lands and private lands in and around the communities of Susanville and Janesville also had elevated levels of western pine beetle related mortality. Other areas with scattered ponderosa pine mortality include Adin, Cassel, Hat Creek, Old Station, and the Pit River area between Burney and Beiber (M261D).

The Headquarters area of the Lassen Volcanic National Park experienced mortality of about fifteen percent of the ponderosa pine growing along Hwy 36 (M261D). Affected trees ranged in size from 6 to 20 inches dbh. Several large group kills (30 to 50 trees) of ponderosa pine were observed on private land west of Mineral along Hwy 36 (M261D).

Ponderosa pine mortality was observed in several areas on the Plumas National Forest (M261E). Areas to note include the forested areas south of Doyle and Milford and west of Chilcoot, and the area located between Sloat and Lake Davis on the Beckwourth Ranger District. Mortality was also observed throughout the western portion of the Feather River Ranger District.

Several areas of pine mortality were detected on the Modoc National Forest (M261G). The mortality is attributed to stand density, drought, *Ips pini*, western pine beetle and mountain pine beetle. Areas to note include: the west side of the Warner Mountain range, throughout the Big Valley Ranger District, the southern edge of the Devils Garden Ranger District between Highways 91, 139 and 299. Additional pockets of pine mortality were also observed on the northeastern edge of the Devils Garden Ranger District north of County Road 181 from Crowder Flat east to Goose Lake.

Western pine beetle activity generally increased in the southern Sierra Nevada (M261E) in 2002 with much of the activity occurring in scattered and small mortality groups. Increased activity was particularly evident in the vicinity of Bass Lake and the Miami Creek Basin on the Bass Lake District, Sierra National Forest, and in the

Wrights Creek area, Mi-wok District, Stanislaus National Forest, and in several locations on the Hume Lake District, Sequoia National Forest.

Mortality of pines was high in 2002 in many parts of the San Bernardino Mountains and Peninsular Ranges, the portions of southern California experiencing the most severe drought conditions. Western pine beetles were the most common mortality agent associated with dead and dying Coulter and ponderosa pines, even attacking smaller diameter trees not occupied by *Ips paraconfusus*. In some areas, tree mortality was very high. For example, Coulter pines in Lost Valley in San Diego County experienced more than 80% mortality. A similar outbreak in 1958 was reported by R.C. Hall and John R. Pierce, who reported an infestation covering about 1,000 timbered acres (Hall, Ralph C. 1958. Forest insect conditions, Lost Valley – Cleveland National Forest, reconnaissance survey, spring 1958. U.S. Department of Agriculture – Forest Service, California Forest and Range Experiment Station, Division of Forest Insect Research. Unpublished report. 3 p.). The mortality level was not reported, but was apparently much lighter than what was seen in 2002. Scattered mortality of ponderosa and Coulter pines infested with *D. brevicomis* was also seen in the San Gabriel Mountains, which were experiencing a less severe drought.

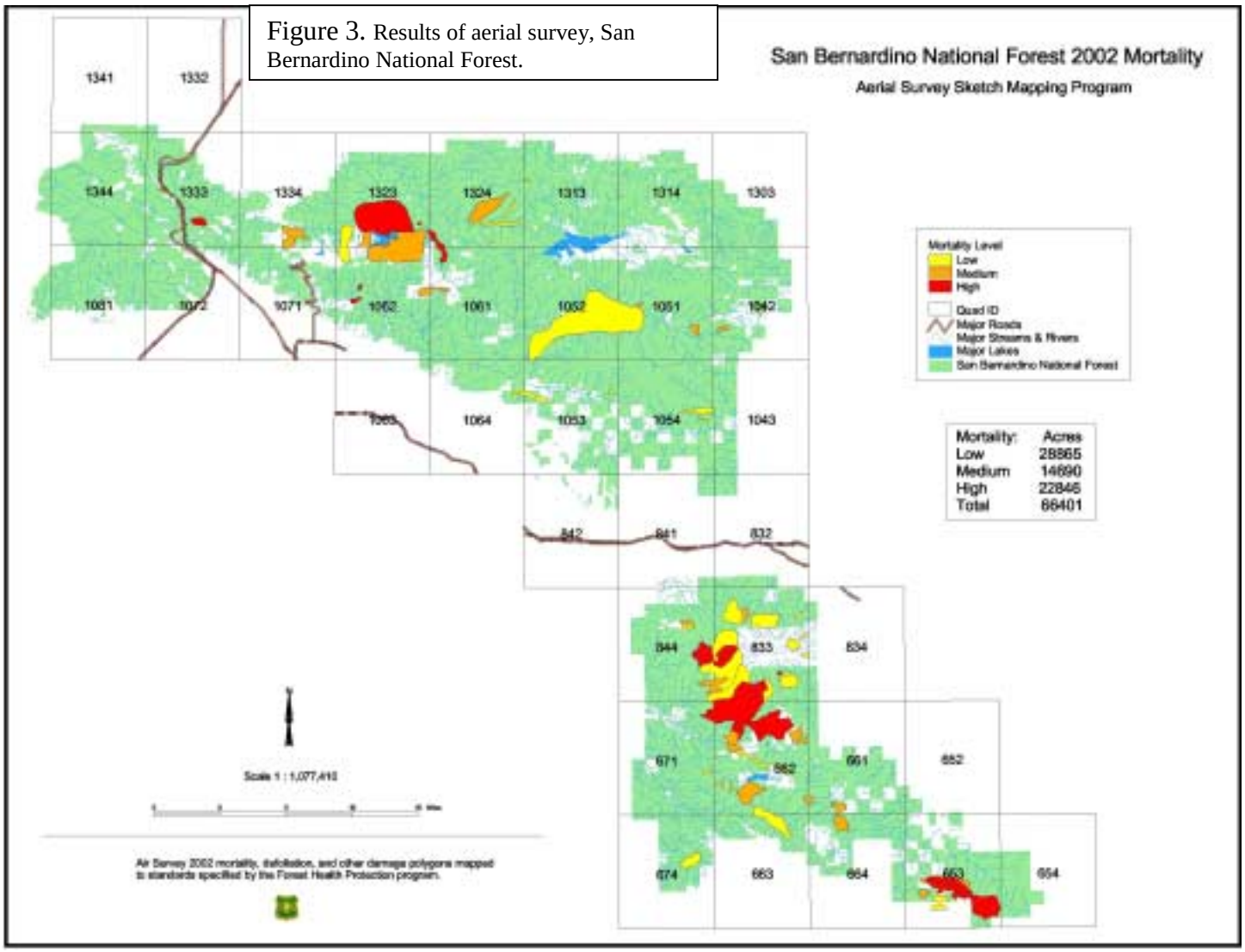

Figure 3. Results of aerial survey, San Bernardino National Forest.

DEFOLIATORS

CALIFORNIA BUDWORM, ***Choristoneura carnana californica***. Defoliation was not readily apparent this year within a previously chronic infestation area on the east side of Trinity Lake (M261A).

DOUGLAS-FIR TUSSOCK MOTH, ***Orgyia pseudotsugata***. Average trap catches for 2002 decreased for most plots compared to 2001 catches (See Surveys and Evaluations). Only 6 plots (5 traps/plot) on public lands averaged 25 or more moths per trap (Table 1). Trap catches were consistently low for all plots on state and private land in Shasta, Modoc, Lassen and northern Plumas Counties.

Table 1. Location of *Early Warning* Plots Where Traps Averaged More Than 25 Male Moths Per Trap.

Location	Area	County	# of plots with >25 moth average
Placerville RD	Plummer Ridge	El Dorado	2
Bass Lake RD	North of Bass Lake	Madera	1
Bass Lake	West of south entrance to Yosemite NP	Mariposa	1
Yosemite NP	near Henness Ridge southwest of Chinquapin	Mariposa	1
Nevada City RD	Cherry Hill	Nevada	1

FALL WEBWORM, ***Hyphantria cunea***. Dieback and mortality of madrones is becoming very evident in northwestern California. A combination of insect and fungal leaf spot defoliation, in addition to a canker disease and drought, are responsible for the mortality. However, webworm defoliation of madrones in the Klamath River and Trinity River drainages was much lower than in recent years (M261A). Scattered light to moderate defoliation of madrone due to feeding by the fall webworm was present in localized areas in several locations in Eldorado, Amador and Calaveras Counties (M261E).

FRUITTREE LEAFROLLER, ***Archyps argyrospila***. The fruittree leafroller outbreak in the San Bernardino Mountains completed its fourth year, and fresh egg masses were seen in late summer, suggesting that populations may be high in 2003 as well. California black oak over an estimated 25,000 to 30,000 acres were affected. Amounts of defoliation were similar to those observed in 2001.

The characteristic damage and egg masses were observed on California black oak in the Castaic Mountains. This may be the first report of this insect from that location.

GYPSY MOTH, ***Lymantria dispar***. The California Department of Food and Agriculture trapped three male moths as of August 20, 2002 – one in Fresno County and two in Los Angeles County. This number is similar to that of 2001.

LODGEPOLE PINE NEEDLEMINER, ***Coleotechnites milleri***. The increase in lodgepole needleminer populations in Yosemite National Park that started with the 1992-94 generation continued in 2002 (M261E). Population increases were seen at 22 of 28 monitoring plots. Numerous adult moths were noted flying in the

vicinity of Tuolumne Meadows. Four plots that had decreasing densities were so severely defoliated that larval populations were limited by available host foliage. Aerial surveys (August, 2002) found approximately 20,427 acres of low-severity defoliation and about 31,257 acres of high-severity defoliation. Severe weather (hailstorms) during the pupal stage at Tuolumne Meadows in 2001 and increased levels of parasitism noted in some plots has not resulted in a widespread population decrease. The increased population densities will likely result in severe defoliation over an area extending from Tenaya Lake nearly to Tuolumne Meadows with moderate to high mortality of host trees expected. Populations south and east of Tuolumne Meadows show an increasing trend, but densities are expected to remain below the threshold for visible defoliation. North of Tuolumne Meadows, moderate defoliation is expected in the Dog Lake, Delaney Creek and Dingley Creek Basins. Complete defoliation and high levels of mortality are expected in the vicinity of Sunrise High Sierra Camp.

Lodgepole needleminer larvae were found feeding in western white pine foliage at Cathedral Lake. Larvae have been reported feeding on other tree species during periods of high population levels when lodgepole pine foliage is seriously reduced.

PANDORA MOTH, ***Coloradia pandora***. An incipient pandora moth outbreak was detected in June on the Mammoth and Mono Lake Districts, Inyo National Forest (M261E). Light to moderate defoliation in the upper half of the crowns of Jeffrey and lodgepole pines was observed over about 5,200 acres. Feeding injury was restricted to the older foliage. Locations involved include an area south of the Crestview Roadside Rest west of Hwy. 395, south and east of Lookout Mountain, south and east of Dry Creek and east of Highway 395 from Wilson Butte north of the Bald Mountain road. Pandora moth outbreaks usually last for 3 to 4 generations and increased defoliation is expected over the next 4 to 6 years.

PINE NEEDLE SHEATHMINER, ***Zelleria haimbachi***. Since 1997 there has been increasing sheathminer activity on ponderosa pine east of Pondosa (old Pondosa Burn), Siskiyou County (M261D). A spring survey found no insects. Pesticide treatments in 2000 and 2001 likely contributed to the population collapse.

PINE SAWFLY, ***Neodiprion fulviceps***. Hundreds of acres of planted ponderosa pine were defoliated near the Military Pass Road (Siskiyou County) on the Shasta-Trinity National Forest (M261A).

WHITE FIR SAWFLY, ***Neodiprion abietis***. White fir defoliation was visible along the Pomeroy Road in the vicinity of Deer Mountain., Goosenest District, Klamath National Forest (M261D).

OTHER INSECTS

AFRICANIZED HONEY BEE, ***Apis mellifera scutellata***. This bee was found for the first time in the city of Santa Barbara and in areas of the Owens Valley in Inyo County. These new finds extend the colonized area to approximately 59,830 square miles and includes all of Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Tulare and Ventura Counties and includes portions of Inyo, San Luis Obispo and Santa Barbara Counties (Plant Health and Pest Prevention Services, California Department of Agriculture, Detection Advisory PD48-02. See http://www.cdfa.ca.gov/phpps/pdep/ahbca02.pdf).

GOUTY PITCH MIDGE, ***Cecidomyia piniinopis***. Attacks from the gouty pitch midge continued to cause shoot dieback and distortion in a ponderosa pine plantation north of Covington Mill, Trinity County (M261A). To a lesser extent, damage to terminals occurred from the western pineshoot borer. Although damage was

severe on some individual trees, most trees exhibited good height growth and little or no midge damage. The single species planting may be a factor in the damage – surrounding stands are mixed conifer.

Gouty pitch midge damage was observed in early summer in Jeffrey pine growing in a plantation north of Lassen Volcanic National Park, Hat Creek District, Lassen National Forest (M261D). Attacks ranged from a few shoots to nearly all shoots on an individual tree; most resulted in dieback.

JEFFREY PINE NEEDLEMINER, ***Coleotechnites* sp.** near ***milleri***. High populations of the Jeffrey pine needleminer were observed from areas of the San Bernardino Mountains known to have been infested in the past, particularly along Hwy 18 in the vicinity of Snow Valley and on the south side of Big Bear Lake.

LEAF BEETLES, ***Chrysomela* sp**. Feeding by high populations of a chrysomelid beetle, *Chrysomela* prob. *interrupta*, caused moderate to heavy defoliation of willows in riparian areas south of the Tioga Pass Entrance Station to Yosemite National Park (M261E).

MAPLE LEAFHOPPER SCORCH, A leafhopper. Many locations in Shasta and Siskiyou Counties (M261A) had widespread symptoms of maple scorch. The Cow Creek area near Ingot was affected early this year. The upper parts of the Eel River drainage above Covelo showed symptoms (M261B). Indian Creek and the Feather River Canyon in Plumas County had high levels of maple leaf scorch (M261E). Studies have shown a high correlation between leafhopper populations and scorch symptoms.

PINYON NEEDLE SCALE, ***Matsucoccus acalyptus***. The 2001 outbreak in the Cuddy and Lockwood Valleys of Kern and Ventura Counties continued. An estimated 2,500 acres of singleleaf pinyon were affected.

SPIDER MITE, ***Oligonychus subnudus***. Feeding by this spider mite caused injury to 2-0 ponderosa pine seedlings at the Forest Service Placerville Nursery in Eldorado County (M261E). The feeding injury caused extensive foliage discoloration over about 4,000 square feet of 9 nursery beds and abundant mite eggs were found over a border area of an additional 4,000 square feet.

SPRUCE APHID, ***Elatobium abietinum***. Infestations of the spruce aphid are a chronic problem on planted Sitka spruce in the Eureka area, Humboldt County (263A). During the past couple of years, damaging infestations have reportedly expanded into native stands. A survey of Sitka spruce from Ferndale to Stone Lagoon confirmed that many trees, both native and planted, exhibit symptoms of infestation, i.e. reduced needle retention. Infestations are difficult to confirm since the insects are only present on spruce in the winter and early spring and many trees are too large to readily inspect. Further evaluation will be warranted if the damage continues.

WESTERN PINESHOOT BORER, ***Eucosma sonomana***. The western pineshoot borer continues to damage plantation ponderosa pine near Pondosa, Siskiyou and Shasta Counties (M261D) and north of Lookout, Modoc County (M261G). Damage (stunted terminals) varies widely across the plantations but exceeds 50% in some areas. Two new formulations of the moth's sex pheromone are being tested for efficacy in preventing damage.

WOOD BORERS. Wood boring beetles were found mining beneath the bark of dead lodgepole pine on the west shore of Lake Almanor, Plumas County (M261D) without evidence of mountain pine beetle attack. Moisture stress, due to a fluctuating water table near the reservoir and drought, is suspected to be the underlying cause of mortality.

Semanotus sp. continued attacking juniper along Hwy 395 south of Red Rock Road in 2002. Attacks resulted in mostly top kills or large branch kills (341D).

Table 2. Miscellaneous Reports of Forest Insects in California, 2002

Insects			Where Examined or Reported	
Common Name	**Scientific Name**	**Host**	**County**	**Remarks**
Pine needle scale	*Chionaspis pinifoliae*	Ponderosa pine	Shasta	Plantation, near Etna, CA
Scale	*Physokermes* sp.	Ponderosa pine	Shasta	Plantation, near Etna, CA

FOREST DISEASE CONDITIONS - 2002

ABIOTIC DAMAGE

Drought. Black oaks in southern Lassen County (M261E and M261D) were noticed heading into dormancy in late August, although not as extensively as last year, as drought conditions continued. Scattered branch dieback was observed during the summer in trees growing on some of the poorer sites.

Many oaks in the San Bernardino Mountains outside the area infested by the fruittree leafroller (e.g., along Hwy 18 between Running Springs and Big Bear Lake) had poor leaf production because of drought. From a distance these oaks resembled those defoliated by the fruittree leafroller.

Drought, bark beetles, overstocking of stands and other stressing agents have contributed to exceptionally high amounts of pine mortality in the San Bernardino Mountains in southern California, particularly around the communities of Idlewild and Lake Arrowhead. A task force representing state, federal and private cooperators is being formed to address the fuel and fire issues involved. Even if precipitaiton returns to normal in the winter of 2002-2003, tree mortality will persist in 2003 because of the high bark beetle populations present.

Fire. Fire injured trees continued to die within 2000 and 2001 prescribed or wildfire areas. Mortality occurred in all species that sustained excessive injuries to cambium and/or crowns. Areas with elevated mortality levels

Figure 4. Dead pines adjacent to private property in Idyllwild.

associated with fire injury are the Star Fire, Tahoe National Forest (M261E), the Storrie Fire, Lassen National Forest (M261D), underburned areas within the Blacks Mountain Experimental Forest, Lassen National Forest (M261D), and underburned areas near Poison Lake, Eagle Lake District, Lassen National Forest (M261D).

A pocket of ponderosa and Jeffrey pine mortality was observed within a rocky area of the Crystal Fire, Tahoe National Forest (M261E). After further inspection it was noted that many of these dead or fading trees lacked signs of bark beetle attack. As evidenced from the amount of bark charring, all of these trees were burned to some extent during the 1994 fire. These trees may have sustained significant root and/or cambium damage during the burn and are now severely water stressed, as 2002 is the driest the area has been since the fire.

Frost. A pocket of sapling-sized lodgepole pine suffered frost damage this spring near McCoy Flat Reservoir, Eagle Lake Ranger District, Lassen National Forest (M261D). Damage resulted in dead shoots throughout the top half of the crowns. The bushy appearance of these trees suggests that this is a normal occurrence in this area.

Ozone. In 1987, a network of 24 ozone-monitoring plots was established in the Lake Tahoe Basin (M261E) by the University of California – Davis. Each plot contained 15 Jeffrey pines to be used as bioindicators for ozone injury. Personnel from the Lake Tahoe Basin Management Unit re-visited the plots in 1991. Twenty-two of the 24 plots were found and re-rated for ozone injury in September, 2002. The percentage of trees showing ozone injury was: 1987 = 27; 1991 = 39; 2002 = 24. These data do not reflect the severity of ozone injury to individual trees but it does suggest the amount of injury may have peaked. In the 15 years since these plots were installed, 92 (28%) of the original 330 trees have died.

Several Forest Health Monitoring (FHM) ozone bioindicators plots were evaluated in the Sierra Nevada. Approximately 70 of these plots are scattered throughout California and attempt to use 15 different plant species that are known to be sensitive to ozone. Ponderosa and Jeffrey pines have been used for many years to detect the presence of air pollution damage and are included in the FHM list of bioindicators. Another species that appears to be an excellent indicator plant is blue elderberry (*Sambucus mexicana*). Blue elderberry has a wide distribution in California, including elevations below where ponderosa pine occurs, and shows a distinct foliar discoloration in response to ozone.

Figure 5. Ozone damage on blue elderberry.

BIOTIC DAMAGE

ANIMAL DAMAGE Lodgepole pines were stripped of their bark throughout their upper boles by Douglas squirrels (*Tamiasciurus douglasii*) near Chester, Plumas County (M261D). Patches of stripped bark varied in size and were located mostly in the upper boles. About 40 % of the pole-size and greater trees in a 100-acre area were affected. [This report is from a source other than the Animal Damage Committee.]

CANKER DISEASES

CYTOSPORA CANKER OF TRUE FIR, caused by ***Cytospora abietis***. Cytospora canker is typically found in association with infections of true fir dwarf mistletoe (*Arceuthobium abietinum*) in red and white fir, where the pathogen causes moderate to severe branch flagging. A second year of drought caused flagging in the following locations: Russian Wilderness (M261A), Trinity Alps Wilderness (M261A), Thousand Lakes Wilderness (M261D) and South Fork Mountain (M261B).

Cytospora abietis caused branch flagging in red fir near Robinson Flat Campground, Foresthill Ranger District, Tahoe National Forest (M261E) and Grizzly Summit, Feather River Ranger District, Plumas National Forest (M261E).

CYTOSPORA CANKER OF POPLARS AND WILLOWS, caused by ***Cytospora chrysosperma***. *Cytospora chrysosperma* was detected in poplars and willows at lower elevations on the eastside of the Sierra Nevada and southern Cascades. Areas with high mortality were limited to drier locations. Scattered willow dieback could be detected in nearly all stands and in some areas as much as 60 % of willow stems were killed. Non-native poplars, especially Lombardy poplars, suffered severe dieback and even mortality. It is not clear whether drought or Cytospora infection was the major cause of the observed mortality.

DIPLODIA BLIGHT OF PINES, caused by ***Sphaeropsis sapinea*** (***Diplodia pinea***). Widespread foliar and twig dieback of ponderosa pine caused by *Sphaeropsis sapinea* was conspicuous in northern California from 1993-1999. It now has all but disappeared from the central and southern Sierra Nevada (M261E). One exception to this was found along the Middle Fork of the Stanislaus River at Sandbar Flat Campground on the Stanislaus National Forest (Tuolumne County). Here, mature ponderosa pines show both old foliar dieback scattered throughout the live crown and some that is more recent. The cumulative effect is that some trees have lost more than 50% of their crown to this pathogen.

In 1999, 20 overstory ponderosa pines east of Groveland in San Jose and Berkeley Camps (Middle Fork and South Fork of the Tuolumne River, respectively) were mapped, evaluated and photographed in order to document and track the effect of Diplodia blight. Loss of live crown due to blight varied from 10 to 90%. In the following three years, only one has died and this tree had lost 90% of its crown in 1999. Western pine beetles attacked this tree in 2000 and it was dead the following year. Other pines that suffered up to 85% crown dieback are still alive.

Twig dieback caused by *Sphaeropsis sapinea* was observed again on scattered ponderosa pines in the upper Sacramento River Canyon (Shasta County, M261A). Prior to an outbreak that developed in the late 1990s, this disease was rarely reported in northern California. Damage from the disease has steadily decreased in recent

years, but still persists at low levels in some areas. Since the disease was rarely recorded in the past, it is difficult to say if the current condition represents endemic levels. Long-term effects are unknown.

MADRONE CANKER, ***Nattrassia mangiferae*** and/or ***Botryosphaeria dothidea***. Madrone mortality and dieback caused by twig and branch cankers continued to increase in 2002. Cankers were present from the north end of the Yolla Bolla Wilderness to the Oregon border (M261A, M261B). Areas where madrone canker was particularly visible include Hwy 299 from Weaverville to Willow Creek, along the Klamath River drainage from Klamath River to Weitchpec, along the Trinity River drainage from Weitchpec to Willow Creek, the South Fork of the Trinity River, the area between Gasquet and Orleans and in the western half of the Trinity Alps Wilderness, including the drainages of the New River and North Fork of the Trinity River (M261A, M261B).

PITCH CANKER, caused by ***Fusarium circinatum***. Monterey pines at three monitoring plots in Santa Cruz County (261A) continued to show little or no new infections of pitch canker. Most surviving trees in the plots previously experienced infections, some quite severe. Since 2000, one tree died and two more appear to be dying. The decline and mortality of these trees appear to be due to damage suffered many years ago, rather than recent or current infections.

Pitch canker continues to be active only in 18 counties, all of which are within the declared Zone of Infestation (ZOI) that extends from San Diego to Mendocino. Within the ZOI, new infections are occurring both on previously uninfected Monterey pines as well as those with previous infections. In areas where the disease is well established, the rate of disease spread appears to have slowed over the last several years. However, accelerated tree mortality attributable to pitch canker continues to occur, and in stands where the disease has recently become established, incidence and severity are increasing rapidly. Statewide, pitch canker continues to be a problem primarily near the coast. The coastal effect is evident on a local scale as well. On the Monterey Peninsula, a survey of permanent plots conducted in the summer of 2002 showed that pitch canker remained more severe in plots nearest the coast, as compared to plots only a few miles farther inland. This survey also showed that disease severity has leveled off in most plots since 2002.

New pitch canker infections continue to occur in Cambria, though perhaps at a slower rate this past year as compared to earlier years. Some heavily infected trees appear not to be sustaining new infections, and perhaps are showing early indications of disease remission. Planted stands in Morro Bay appear to be declining rapidly due to pitch canker. Farther south along the Highway 101 corridor, pitch canker is evident but not obviously worse than in the recent past. Ornamental plantings and associated naturalized reproduction continue to be affected along highway corridors in San Mateo and San Francisco Counties with especially heavy infestations from Ano Nuevo north along Highway one and along Interstate 280 in the vicinity of Daly City.

Although Monterey pine remains the most heavily impacted species, Knobcone pines are severely affected in many areas where they co-occur with Monterey pine. Bishop pines in both planted and native stands are also affected. Some stands of Douglas-fir in the Santa Cruz Mountains show extensive tip dieback, which is at least partly due to pitch canker.

DECLINES

ASPEN DECLINE, cause unknown. Aspen stands declining from undetermined causes have been observed in several locations in Mono County in and around the Mono Lake and Mammoth Districts, Inyo National Forest.

Specific locations include aspen stands west of Conway Summit, southwest of McLaughlin Spring, Kelty Canyon and south and west of Sawmill Meadow.

CHAPARRAL DECLINE, caused by ***Botryosphaeria dothidea***. Chaparral dieback remains extensive on the Mountaintop and San Jacinto Districts, San Bernardino National Foarest (M262B). The condition has been accentuated by the current drought.

SUDDEN OAK DEATH, caused by ***Phytophthora ramorum.*** University of California researchers (Rizzo and Garbelotto) confirmed Coast redwood, Douglas-fir, canyon live oak susceptibility to *Phytophthora ramorum*, bringing the total number of known native species associated with *P. ramorum* in California to 22 (Table 3). Isolations of *P. ramorum* came from the sprouts, branches and needles of coast redwood at Jack London State Park in Sonoma County and Henry Cowell State Park in Santa Cruz County. The infected Douglas-firs were found at another site in Sonoma County. DNA tests have also been conducted on diseased sprouts growing from the base of mature redwood trees in Marin, Alameda, and Monterey counties. The presence of the pathogen in the sampled trees has been strongly suggested by repeated positive DNA identification.

Table 3. California Plant Species Known To Be Associated with *Phytophthora ramorum*

Big leaf maple	Coffeeberry	Shreve oak
California black oak	Douglas-fir	Tanoak
California buckeye	Honeysuckle	Toyon
California hazelnut	Huckleberry	Western starflower
California laurel	Manzanita	
Canyon live oak	Pacific madrone	
Cascara	Poison oak	
Coast live oak	Rhododendron	
Coast redwood	Salmon berry	

The number of counties with one or more infected sites is now 12. *Phytophthora ramorum* was confirmed to be in Humboldt and Contra Costa Counties. The Humboldt infestation is in Redway in southern Humboldt County in the middle of an old growth redwood forest populated with homes. Confirmation was from California laurel.

The confirmation of *P. ramorum* on the Los Padres National Forest near Big Sur is the first report of Sudden Oak Death on a National Forest. The site, part of a larger infestation that extends inland 20 miles from the coast to 3,000 feet in elevation and is adjacent to the Ventana Wilderness, is behind locked gates that access private properties. This and all other confirmations remain within 50 miles of the Pacific Ocean.

Positive polymerase chain reaction (PCR) tests indicated that *P. ramorum* was present in maple leaves from the Sierra Nevada foothills near Auburn. However, this report remains unconfirmed because the pathogen has not been successfully isolated from the area via cultural methods. Symptoms did reappear in summer 2002 but numerous isolation attempts from maple and other species have failed.

USDA Animal Plant Health Inspection Service (APHIS) issued Federal regulations for *P. ramorum*. The regulations restrict interstate movement of host materials and soil that present a risk for pathogen movement.

The Federal quarantine was significantly different from the California state regulation implemented in May 2001. Negotiations continued all year to "harmonize" the rules and develop an enforceable quarantine.

Field and laboratory studies proved that *P. ramorum* can survive in soil transported on tourists' shoes (Tjosvold, UCCE Santa Cruz) and infested soil can cause infection in bay leaves that can then infect living bay seedlings (Davidson, USDA-Forest Service research). For this and other specifics on the disease, and research updates from the California Oak Mortality Task Force, visit the Internet site http://www.suddenoakdeath.org.

Phytophthora nemarosa. A second, previously undescribed Phytophthora species is occasionally isolated from lethal cankers on tanoak and coast live oak, and from foliar lesions on tanoak and California laurel (bay) in areas where *P. ramorum* is active. Its DNA sequence indicates a close relationship to *P. ilicis* (a foliar pathogen of holly) and *P. psychrophila* (newly described from European oak forest soils). In culture it grows more slowly, and with a lower temperature optimum, than *P. ramorum*. In tanoak log inoculation tests, cankers caused by *P. nemarosa* grew nearly as rapidly as those of *P. ramorum*. In the forest setting it is usually associated with single tree deaths rather than the expanding patches of mortality characteristic of *P. ramorum*.

DWARF MISTLETOES

Areas of heavy dwarf mistletoe infection revealed themselves again this year as drought conditions created severe water stress in infected trees. Heavily infected trees on poorer sites suffered severe branch dieback and in some cases died. Some of the more dramatic locations where this occurred were east of Chilcoot (Jeffrey pine) and south of Doyle (Jeffrey and ponderosa pine), Plumas National Forest (M261E) and Harvey Mountain (white fir) and northwest of Eagle Lake (Jeffrey and ponderosa pine), Lassen National Forest (M261D).

RED FIR DWARF MISTLETOE, caused by ***Arceuthobium abietinum***, f.sp. ***magnificae***. Red fir dwarf mistletoe was found infecting intermingled Brewers spruce at Eaton Lake in the Russian Wilderness on the Klamath National Forest (M261A).

FOLIAGE DISEASES

ELYTRODERMA DISEASE, caused by ***Elytroderma deformans***. Branch mortality on young pines due to Elytroderma disease was observed in Lassen Volcanic National Park along Hwy 89 near Manzanita Lake, at Eskimo Summit on Hwy 44, (M261D) and Moonlight Pass, Eagle Lake District, Lassen National Forest (M261E). Environmental conditions were favorable for the production of the black fruiting bodies of *Elytroderma deformans* on pine needles this year as they were found throughout Lassen, Plumas, and Shasta Counties. Elytroderma disease continues to be widespread on Jeffrey pines in the Laguna Mountain area, Descanso District, Cleveland National Forest (M262B).

SUGAR PINE NEEDLE CAST, caused by ***Lophodermella arcuata***. High levels of infection by *L. arcuata* occurred on western white pine in the vicinity of the South Cow Creek Campsite, Latour State Forest (M261D) in 2001. Infected needles began fading this spring and were shed later in the summer. The localized nature of the outbreak is typical of needle diseases and probably relates to site conditions that favor high humidity. The campsite is located on flat ground in an otherwise steep drainage and is shaded by ridges to the south and west.

There is an abundance of springs on the slope opposite the campsite. Thin crowns on some trees suggest repeated yearly infections. Sugar pines in the area were not affected.

TRUE FIR NEEDLE CAST, caused by ***Lirula abietis***. True fir needle cast persisted on white-fir along Hwy 28 on the Front Country and Mountaintop Districts, San Bernardino National Forest (M262B).

ROOT DISEASES

ANNOSUS ROOT DISEASE, caused by ***Heterobasidion annosum***. Annosus root disease was identified in ponderosa pine in an opening in the Hirz Bay Campground on the Shasta-Trinity National Forest (M261A). (See second paragraph under Armillaris root disease below.)

ARMILLARIA ROOT DISEASE, caused by ***Armillaria* sp**. Several pockets of ponderosa pine mortality appeared during the past few years in areas replanted after the 1992 Cleveland Fire on the Pacific Ranger District, Eldorado National Forest (M261E). Planting on these sites had been done in either 1993 or 1995. At one site white mycelial fans of *A. mellea* were present at the base of recently killed pines. Live sprouts of California black oak were within 20 feet of the dead trees and probably provided the source of fungus inoculum. Most oak sprout stems were about 3" DBH and presumably grew after the 1992 wildfire.

At another site within the burn, pine seedlings and saplings were dead or dying but no black oak stumps or sprouts were present, and no evidence of *A. mellea* was found on any of the pines. The stumps at this location were almost all ponderosa pine. Wood samples from the roots of several dead pine saplings were collected and left in moist plastic bags for 10 days. After this incubation period, all of the samples contained the asexual stage of *H. annosum*. Additional pine mortality is expected from these two root diseases, but they do not appear to be widely distributed.

BLACK STAIN ROOT DISEASE, caused by ***Leptographium wageneri***. Black stain root disease and associated bark beetles continued to kill ponderosa pines on a site south of Viola, Shasta County (M261D). Root disease centers and the adjacent forest were recently clearcut, eliminating most diseased trees, but the disease resurfaced on trees that edged the cut. Most forest beyond the cut is mixed conifer, which should help reduce or eliminate future spread.

Pockets of black stain root disease were found in 40-year-old plantation of Douglas-fir on the Happy Camp Ranger District, Klamath National Forest. The area is in the Happy Camp Fire Protection project. The plantation resulted from tractor logging of a previous fire (M261A).

Black stain root disease was detected in two ponderosa pine stands 3 and 5 miles east of Crowder Flat workstation, Modoc National Forest (M261G). These areas of mortality were located during aerial surveys and later verified for black stain root disease on the ground.

PORT-ORFORD-CEDAR ROOT DISEASE, caused by ***Phytophthora lateralis***. Port-Orford-cedar root disease continues to expand and cause tree mortality in the upper Sacramento River Canyon, Siskiyou and Shasta Counties (M261A). 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.

An isolated infestation was discovered on Scott Camp Creek in the upper part of the Sacramento River drainage late in 2001. There was a proposal to eradicate the isolated spot by commercially logging the infected trees plus a buffer. Administrative delays prevented logging during the dry season in 2002. There are plans to implement the project during the dry season in 2003.

RUST DISEASES

INCENSE-CEDAR RUST, caused by ***Gymnosporangium libocedri***. Incense-cedar rust combined with drought and high stand densities may be the cause of scattered cedar mortality and branch dieback near Portola, Plumas County, during the summer (M261E). Nearly all cedars in this area were infected and many had fading brooms.

WHITE PINE BLISTER RUST, caused by ***Cronartium ribicola***. Munzer Meadow and other areas of Breckenridge Mountain (Sequoia National Forest) were examined for blister rust on sugar pine or *Ribes* in 1996 and 2000. Only one instance of rust sporulation on *Ribes* was found in 1996. In May of 2002 these areas were again surveyed and *Cronarium ribicola* was present and fruiting on sugar pine branches at several locations within T28S, R32E, Sec. 19, SW¼, SW¼. These locations are now the known southern extent of the rust in California. The Tehachapi Mountain Range and the host range in the San Bernardino, Angeles and Los Padres National Forests will be examined periodically in the future for southward extension of the pathogen.

TRUE MISTLETOES, *Phorodendron* spp.

True (leafy) mistletoes and drought continue to cause dieback and decline in hardwoods and white firs in developed recreation sites on all national forests in southern California.

MISCELLANEOUS DISEASES

Decline and mortality of various oak species (blue, interior live, and black) were recorded from a number of residential properties in Redding, Shasta County (M261C). Watering for lawns and planting of exotic plants were common denominators. No specific causal agents were identified.

Ornamental redwood in a lawn in Red Bluff, Tehama County (M261C) suffered top dieback. Drought stress was suspected as the primary cause – Red Bluff is known for its high summer temperatures.

An unidentified condition was noted on Jeffrey pine near Janesville (342B). Older needles were browned from the tips down, while current year's needles were unaffected. An abiotic cause, such as winter dessication, was suspected.

STATUS AND CONTROL OF ANIMAL PESTS - 2002

Compiled by David Bakke, USDA Forest Service

This report summarizes the Animal Damage Committee's annual survey of vertebrate damage to forest trees. The survey is accomplished through reports submitted by various landowners and land managers throughout the state, on a submittal form provided by the Committee. The 2002 surveys were electronically mailed out to federal, state, and private land managers. The survey requests, by species of animal, the tree species damaged, the age class damaged, how many acres and how many tree per acre are affected, whether the damage is found in plantation or natural stands, the trend in damage, and any control measures used. In 2002, 35 surveys were returned, a lower response rate than the past few years. The distribution of the reporting forms via e-mail seems to be limiting responses from private industry, as it is difficult to maintain a current mailing list. Also, this year's mailing may have missed the California Department of Forestry and Fire Protection.

Survey forms were returned by representatives of the USDA Forest Service (27), private timber companies (7), and the University of California Cooperative Extension (1).

Incidences of damage to trees was reported from 25 counties in California. Counties represented in the 2002 report: Amador, Butte, Colusa, El Dorado, Fresno, Glenn, Humboldt, Lake, Lassen, Madera, Mariposa, Mendocino, Modoc, Mono, Nevada, Placer, Plumas, San Diego, Shasta, Sierra, Siskiyou, Tehama, Trinity, Tulare, and Tuolumne.

Species Causing Damage and Scope of the Damage

A variety of animal species are causing damage to forest trees. Some species are causing damage throughout the state; others are relatively minor in scope and are localized. Refer to Table 4 for a display of acres affected by species and reporting party.

Table 4 - Acres Reported to be Receiving Some Level of Animal Damage

Species	USFS	Private	UC Coop	Totals	% of total
Birds	*	0	0	*	<1
Black Bear	0	10,120	0	10,120	17
Deer	5,550	3,500	0	9,050	15
Domestic Stock	1,860	0	80	1,940	3
Elk	36	0	0	36	<1
Ground Squirrels	250	0	0	250	<1
Mice/Voles	0	2000	80	2,080	3
Porcupine	180	0	0	180	<1
Pocket Gopher	10,786	3,700	0	14,486	24
Rabbit	425	2,000	0	2,425	4
Tree Squirrels	0	10,000	0	10,000	16
Woodrats	325	10,000	20	10,345	17
TOTALS	19,412	41,320	180	60,912	

* Incidence of damage was reported but no information as to how many acres that were affected.

SPECIES ACCOUNTS. In the following accounts, the numbers in parentheses in the display of damage trend and control methods indicates the number of responses attributed to each trend or method listed.

Based on the responses, it would seem that animal damage on the National Forests in California has been decreasing as a result of an overall reduction in harvest intensity. The low numbers of new plantations, and the aging of existing plantations on Forest Service lands have resulted in less acreage in the targeted age classes sought by most of the animals discussed below.

Birds:

CalVeg Class Affected: Black Oak Woodland
Damage Trend: Static (1)
Control Methods: None (1)
Damage Location: San Diego
Comments: The type of damage was not specified in the report, nor was acreage or age classes.

Black Bear:

CalVeg Class Affected: Douglas fir-Tanoak, coast redwood.
Damage Trend: increasing (1), static (1)
Control Methods: none (2)
Damage Location: Humboldt, Mendocino
Comments: Damage is variable across ownerships, however targeted trees are generally 20-60 years old, and average density of damage is approximately 5-10 trees per acre. In one report it was noted that some plantations have 75% or more of the trees affected. The damage is in a variable mosaic, focusing primarily on less than 16-inch diameter trees, but occasionally up to 26-inch diameter. The initial bear damage (stripping of bark) may not girdle the tree, but in subsequent years, the same tree is often stripped some more, resulting in girdling and mortality.

Deer:

CalVeg Class Affected: Douglas fir-tanoak, Douglas fir-pine-madrone, mixed conifer-fir, mixed conifer-pine, ponderosa pine, red fir, coast redwood, blackoak woodland, other (aspen).
Damage Trend: static (9), decreasing (7), increasing (2)
Control Methods: none (11), Vexar tubing (7), Chemical Repellants (2)
Damage Location: Amador, Butte, Colusa, El Dorado, Glenn, Lake, Lassen, Madera, Mariposa, Mendocino, Modoc, Nevada, Placer, Plumas, San Diego, Shasta, Sierra, Siskiyou, Tehama, Trinity, Tuolumne.
Comments: Damage throughout the forested parts of the state, primarily in conifer plantations from 1 year-old seedlings to saplings 10 years of age. Damage ranges from 10 to 350 trees per acre. Based on the fact that about half the reports indicated no control methods, it would appear that damage is not sufficiently serious in many cases to affect management goals. It would appear that of the control methods, the use of physical barriers is preferred.

Domestic Stock:

CalVeg Class Affected: Douglas fir-tanoak, Douglas fir-pine-madrone, Jeffrey pine, mixed conifer-fir, mixed conifer-pine, ponderosa pine, coast redwood, blackoak woodlands, other (aspen).
Damage Trend: Static (9), decreasing (4)
Control Methods: Salt block locations (1), none (8), fencing (3), Vexar tubing (1).
Damage Location: Amador, El Dorado, Lassen, Madera, Mariposa, Mendocino, Mono, Plumas, San Diego, Shasta, Siskiyou, Trinity, Tulare, Tuolumne.
Comments: Most respondents reported damage from trampling to seedlings in plantations younger than 5 years of age. Damage to 10 to 150 trees per acre. Cattle grazing and trampling damage appears to be an issue with aspen regeneration and management, noted on two reports from the Forest Service. Fencing is being used to protect aspen stands. On the Cleveland NF, damage to native grass regeneration was noted.

Elk:

CalVeg Class Affected: Douglas fir-tanoak, red fir
Damage Trend: Increasing (1)
Control Methods: BGR (1)
Damage Location: Siskiyou
Comments: Elk damage is similar to deer, in that seedlings up to 5 years old seem to be preferred. Damage varies (50 trees per acre in Douglas fir, up to 300 trees per acre in red fir). Comments noted the rising populations of elk in Siskiyou county, so increased damage in the future should be expected. There was also a note about minor elk damage being seen in Modoc county.

Ground Squirrels:

CalVeg Class Affected: Jeffrey pine, mixed conifer-pine, black oak woodlands.
Damage Trend: Static (1), Increasing (1)
Control Methods: None (2)
Damage Location: Madera, San Diego
Comments: Little information reported on ground squirrel damage. These squirrels appear to be focusing on young seedlings, but are not affecting very high numbers per acre.

Mice and Voles:

CalVeg Class Affected: coast redwood
Damage Trend: Increasing (1), static (1).
Control Methods: None (1), bait (1).
Damage Location: Mendocino.
Comments: This damage would appear to be somewhat variable in the coast redwood type as the two reports received were considerably different in content. Mice and voles are utilizing young seedlings 1-5 years of age, but the amount of damage is quite variable (15-20 trees per acre in one area and 150-200 trees per acre in another). The bait type was not specified in the one report indicating baiting is being done.

Porcupine:

CalVeg Class Affected: eastside pine, mixed conifer-fir, mixed conifer-pine, ponderosa pine.
Damage Trend: Static (3)

Control Methods: None (3)
Damage Location: Butte, Madera, Mariposa, Nevada, Placer, Plumas, Sierra, Tehama, Tuolumne.
Comments: Damage from porcupines affected a wide range of ages, from plantations 10 years old to wildstands and plantations up to 80 years of age. Locations noted primarily on Forest Service lands, affecting 2 to 15 trees per acre. No control methods considered based on the low rates of damage.

Pocket Gopher:

CalVeg Class Affected: Douglas fir-tanoak, Douglas fir-pine-madrone, Jeffrey pine, mixed conifer-fir, mixed conifer-pine, ponderosa pine, red fir, black oak woodland.
Damage Trend: Static (19), decreasing (5), increasing (1)
Control Methods: Trapping (0), anti-coagulant bait (1), strychnine bait (8), None (17).
Damage Location: Amador, Butte, Colusa, El Dorado, Fresno, Glenn, Lake, Lassen, Madera, Mariposa, Mendocino, Modoc, Nevada, Placer, Plumas, San Diego, Shasta, Sierra, Siskiyou, Tehama, Trinity, Tulare, Tuolumne.
Comments: Damage throughout the forested parts of the state. Most damage is to seedlings and in plantations less than 15 years of age. Damage ranges up to 250 seedlings per acre. Most landowners are not conducting any control measures for gophers. Several reports noted that gophers are widely present but their damage is not sufficiently widespread to record or control.

Rabbits:

CalVeg Class Affected: Douglas fir-pine-madrone, Douglas fir-tanoak, mixed conifer-fir, mixed conifer pine, ponderosa pine, eastside pine, coast redwood.
Damage Trend: decreasing (1), static (2), increasing (1)
Control Methods: None (2), Vexar tubing (2).
Damage Location: Butte, Mariposa, Mendocino, Plumas, Shasta, Siskiyou, Tehama, Trinity, Tuolumne.
Comments: Damage is noted in planted seedlings less than 5 years old. Level of damage are highly variable (from 1-10 trees per acre up to 150-200 trees per acre).

Tree Squirrels:

CalVeg Class Affected: Coast redwood.
Damage Trend: Static (2).
Control Methods: None (2).
Damage Location: Mendocino.
Comments: Widespread damage noted in one report from coastal Mendocino County, but only affecting 20 trees per acre, ranging from 10 to 60 years of age.

Woodrats:

CalVeg Class Affected: Coast redwood, Douglas fir-tanoak.
Damage Trend: Static (2), decreasing (1), increasing (1)
Control Methods: None (4).
Damage Location: Mendocino, Trinity.

Comments: Damage mostly found in coast redwood and Douglas fir forests. Damage in plantations up to age 60. Damage seen after precommercial thinnings and foliar spray of competing vegetation. Affecting up to 20 trees per acre. No control proposed by any respondent.

SURVEYS AND EVALUATIONS – 2002

THE 2002 DOUGLAS-FIR TUSSOCK MOTH PHEROMONE DETECTION COOPERATIVE SURVEY.

Average trap catches for 2002 decreased for most plots compared to 2001 catches (Table 5). Data were collected for 168 plots (5 traps/plot) during 2002 resulting in 162 plots (95%) with an average of <25 males per trap and the remaining 6 plots (4%) averaging 25 or more moths per trap. Plots that averaged >25 moths per trap were located on the following Ranger Districts: Placerville (Eldorado NF), Bass Lake (Sierra NF), and Nevada City (Tahoe NF). In addition to these plots monitored on National Forest lands, there was one plot that exceeded 25 moths per trap in Yosemite National Park near Henness Ridge, southwest of Chinquapin, Mariposa County.

Increase and decline in trap counts are very common with Douglas-fir tussock moth (DFTM) populations. Based on the results of the 2002 monitoring, significant activity by DFTM is not anticipated within the plot system area during 2003. During the coming field, federal and state Forest Health Protection will monitor other life stages in the areas where DFTM activity exceeded an average of 25 males per trap. Field going personnel are urged to continue to check for evidence of feeding and defoliation on white fir throughout the susceptible host type this coming summer and fall.

TABLE 5. Number of Douglas-fir Tussock Moth Pheromone Detection Survey Plots by Trap Catch, 1979 to 2002.

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

	100%	97%	1%		1%	1%									
1991	143	135	4	1	0	0	2	1	0	0	0	0	0	0	0
	100%	94%	3%	1%			1%	1%							
1992	164	156	3	0	2	1	0	0	0	0	1	0	1	0	0
	100%	95%	1%		1%	1%					1%		1%		
1993	143	135	8	0	0	0	0	0	0	0	0	0	0	0	0
	100%	94%	6%												
1994	151	139	11	1	0	0	0	0	0	0	0	0	0	0	0
	100%	92%	7%	1%											
1995	158	77	35	13	16	7	7	3	0	0	0	0	0	0	0
	100%	49%	22%	8%	10%	4.5%	4.5%	2%							
1996	149	33	26	16	8	7	12	9	5	8	6	8	5	1	5
	100%	22%	17%	11%	6%	4%	8%	6%	3%	6%	4%	6%	3%	1%	3%
1997	142	88	27	10	9	4	3			1					
	100%	62%	19%	7%	6%	3%	2%			<1%					
1998	159	81	22	11	9	6	3	10	7	5	2	1	1	1	0
	100%	51%	14%	7%	6%	3%	2%	6%	4%	3%	1%	<1%	<1%	<1%	-
1999	159	126	20	5	3	2	2	0	0	0	1	0	0	0	0
	100%	79%	13%	3%	2%	1%	1%	-	-	-	1%	-	-	-	-
2000	185	154	15	4	4	0	1	2	2	2	0	0	1	0	0
	100%	83%	8%	2%	2%		<1%	2%	1%	1%			<1%		
2001	183	95	57	13	10	6	0	1	1	0	0	0	0	0	0
	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%									

WHITE PINE BLISTER RUST RESISTANCE SCREENING PROGRAM, STATUS REPORT FOR FY-2002

During FY-2002, the program screened 904 sugar pine families from candidate trees suspected of carrying major gene resistance (MGR) to blister rust; 70 new proven MGR trees were found. This brings the total number of live, proven resistant trees in the Pacific Southwest Region to 1,399 families. For FY 2003, we plan to sow approximately 900 sugar pine candidate families which comprise seed from Forest Service, state, and industry cooperators. In addition, we will be sowing 4 seedlots each of foxtail and whitebark pine as an initial step towards developing greenhouse protocols, in light of the general susceptibility of five-needled pines to blister rust infection.

A total of 2,607 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). Of those, 1406 were MGR seedlings from 70 known MGR parent trees and 1201 were MGR seedlings from receptor trees with unknown MGR-pollen sources. At Happy Camp, 5129 seedlings from earlier plantings were evaluated for slow rust resistance traits. Selections and scion collections were made on 157 slow rust-resistant individuals for their establishment in Forest Service seed orchards. In anticipation of further rust resistance evaluations, the Happy Camp site was expanded by 10 acres.

Six new sugar pine plantations were established on the Sierra and Sequoia National Forests; this is in addition to the four established last year on the Eldorado and Stanislaus National Forests. The plantations are comprised of MGR, SRR, and susceptible materials; with this combination of resistant types, monitoring infection levels and

changes in virulence of the local rust are possible. Database updating and maintenance were performed as needed.

The pilot administrative study entitled, *Mortality Analysis of Sugar Pine Seedlings for Identifying Heritable Slow Rusting Resistance to White Pine Blister Rust – A study to improve efficiency of screening methods*, was initiated in the previous year. The major objective is to identify slow rust resistance seedlings early in the greenhouse because subsequent field tests can take 10 years to complete. Seed from 48 sugar pine families was sown and cultured in spring and then inoculated with rust in Fall 2001. Rust scoring was completed; however, mortality assessments are ongoing. A second similar study is being planned for the autumn of 2002. Another administrative study examining the effectiveness of inoculating sugar pine cuttings with blister rust began in the previous year, but the difficulty in rooting sugar pine cuttings led to its cancellation. Further work on developing protocols for rooting sugar pine is being done at the PSW Institute of Forest Genetics.

REFORESTATION AND TIMBER STAND IMPROVEMENT REPORT, REGION 5 GENETIC RESOURCE PROGRAM, SUMMARY STATEMENT – FISCAL YEAR 2002

Threats to forest health continue to be the central focus of the Region 5 Genetic Resource Program. In fiscal year 2002, seventy new sugar pine parent trees were identified as having Major Gene Resistance (MGR) to blister rust of 904 parents evaluated at the Placerville Nursery. A total of nearly 1,400 MGR parent trees have been identified on lands managed by the National Forest System, other federal agencies, State of California and private landowners collaborating through cooperative agreements. More than 33% of the Region's inventory of sugar pine seed is from rust-resistant seed sources. At the Happy Camp Disease Garden, 157 seedlings were identified as possessing both MGR and forms of Slow Rust Resistance (SRR), controlled by multiple genes. More than 52,000 seedlings are currently under evaluation for SRR. Ten new acres were prepared this year to accommodate future SRR evaluation of sugar pine and other 5-needle pines susceptible to blister rust. Twenty acres were prepared at the Foresthill and Badger Hill orchards to accommodate the propagation of rust resistant clones, six acres of which were established this year. In order to monitor the spread and severity of blister rust, 6 new one-acre sites were established with resistant and non-resistant seedlings; these are in addition to 14 sites previously established for the same purpose. A breeding program continues to produce seed essential to eventually providing a better understanding of SRR inheritance.

Resistance to Port Orford cedar root rot is being evaluated as part of a cooperative program that includes Oregon State University, Regions 5 and 6, BLM, state agencies and private land owners. This year, 137 candidate resistant parent trees were selected for stem dip screening. Twelve of these candidates showed some resistance to the disease and will be further evaluated in the root dip screening and field validation tests. To date, 117 parents have been identified as showing various levels of resistance to the root rot disease out of a total of over 1,200 parent trees that have been screened. Two Port Orford cedar provenance tests, 8.5 and 11 acres are being maintained for future evaluation of seed movement and the development of breeding plans focused on disease resistance. Small amounts of resistant seed have already been made available for reforestation and restoration projects on northern California forests.

Seed orchards of other important conifer species are beginning to produce seed. Seventy-eight pounds of high quality seed were produced within a Douglas-fir orchard at the Chico Genetic Resource Center. This was added to existing inventories for this species and over 100 pounds of seed previously collected from ponderosa pine orchards. Five progeny evaluation plantations were converted to seed production areas. Seed orchards and progeny evaluation plantations continue to be evaluated for information and maintained as premiere collections

of genetic diversity. They represent important resources to prevent the erosion of genetic diversity from introduced diseases and wildfire. Initial meetings to explore cooperative agreements for their continued maintenance were held with State and private collaborators. A cooperative effort to test second generation ponderosa pine is being primarily financed by private cooperators.

SOUTHERN CALIFORNIA FIVE-YEAR DWARF MISTLETOE SUPPRESSION PROGRAM

Dwarf mistletoes continue to be a serious problem in developed recreation areas throughout southern California. The Five-Year Dwarf Mistleto Suppression Program continued on the Angeles, Cleveland, Los Padres and San Bernardino National Foresets (M262 and M262B). The results for 2002 are as follows: Angeles, Los Angeles District – 78 trees pruned on 51 acres treated; Cleveland, Descanso District – 70 trees pruned and 2 trees removed on 10 acres; Los Padres, Ojai District – 129 trees pruned and 27 trees removed on 10 acres; Los Padres, Mt. Pinos District – 390 trees pruned and 59 trees removed on 150 acres. In addition, five new tree climbers were trained on the Mt. Pinos District.

DETECTING VEGETATION CHANGES IN CALIFORNIA USING SATELLITE IMAGERY

The California Land Cover Mapping and Monitoring Program (LCMMP) is a cooperative program between the USDA Forest Service and the California Department of Forestry and Fire Protection (CDF). The program was launched in 1995 to address long-term monitoring strategies and uses Landsat Thematic Mapper (TM) satellite imagery to derive land cover change over five-year time periods. The final products from this program provide critical information on the impacts of vegetation change over large areas and cumulative views of change over time.

Figure 6. Project areas for measuring land change over five-year periods.

Project Area	Monitoring Dates (nominal)	Change Data Complete
Southern Sierra	1996 to 2001	2002
Northeastern	1994 to 1999	2000
South Coast	1997 to 2002	2003
North Coast	1998 to 2003	2004

In FY2002 the North Coast and Cascade Northeast Project areas were completed (Figure 5). The North Coast project area assessed approximately 14 million acres. Results show that 97.8% of the land area assessed does not have detectable vegetation change between 1994 and 1998. Decreases in vegetation occur on approximately 1.4% of the project area and increase on about .8% of the project area. Most of the changes are due to harvest, regrowth and fire.

The Cascade Northeast project area assesses vegetation cover changes between 1994 and 1999 on approximately 11 million acres. Results show that 96.1% of the land area does not exhibit a detectable vegetation change between 1994 and 1999. Decreases across all vegetation types occur on approximately 2.2% of the project area and increases on about 1.6% of the project area. Regrowth, harvest, and fire are the major identified causes of change throughout the project area.

Statistical reports will be published in early 2003 for both project areas.

PRELIMINARY RESULTS OF 2002 AERIAL SURVEY IN CALIFORNIA

Mortality numbers increased substantially for national forests in 2002, but were down for national parks. Large areas with low amounts of mortality were found on national forests north of the Tehachapi Mountains. Figure 7 shows the areas covered by the aerial detection survey for mortality and defoliation.

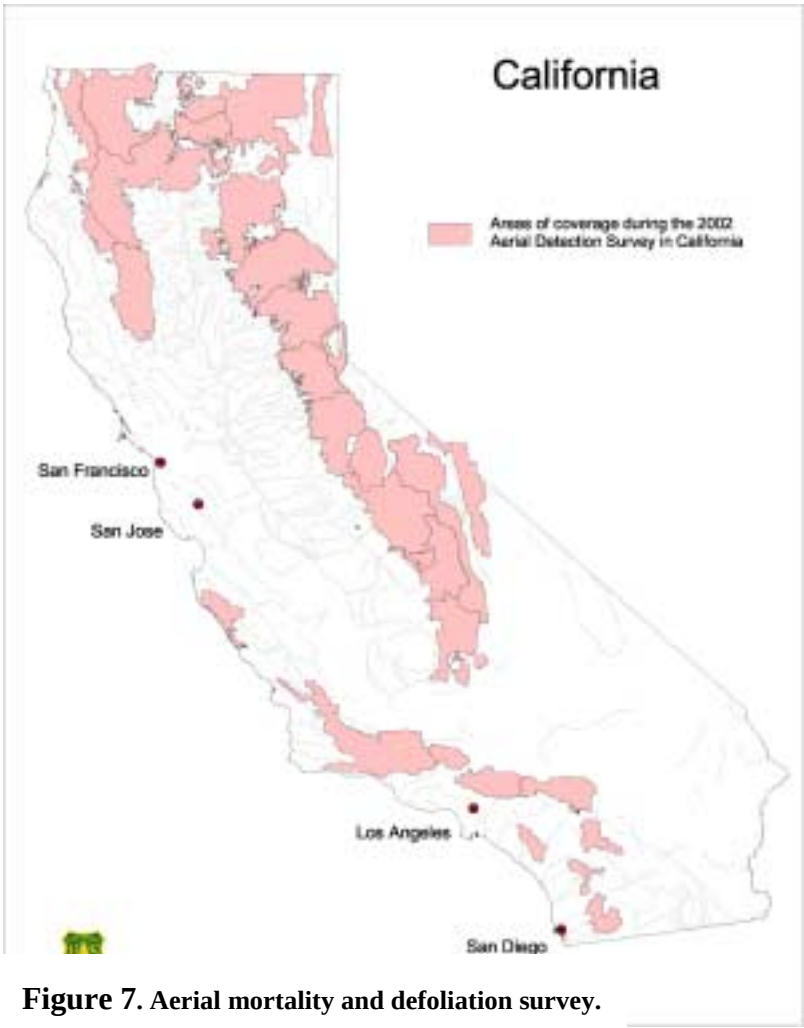

Figure 7. Aerial mortality and defoliation survey.

TABLE 6. Aerial Observation of Acres with Mortality and Defoliation, 2002*

	National Parks	National Forests	Total
Mortality	4,043	1,096,242	1,100,285
Defoliation	51,684	32,138	83,822
Top Kill	67	44,190	44,257

* total acres flown: 25,358,176

DEMONSTRATION THINNING PLOTS IN THE EASTSIDE PINE TYPE ON THE LASSEN NATIONAL FOREST. In 1978-1979 the Forest Service established plots in the eastside pine type to show the effects of thinning on pest-caused losses in areas of high tree mortality. The stands chosen were mostly pole-size ponderosa pine mixed with some white fir and incense-cedar, growing on medium to low sites, and ranging in age from 70 to 90 years. Within the demonstration plots, four levels of stocking density -- 40, 55, 70 and 100 percent of normal basal area -- were established to demonstrate the biological and economic alternatives available for management planning. (Normal basal area is the basal area that a stand should have reached when fully stocked with trees, which in the demonstration areas, ranges from 185 to 215 sq ft/ac, depending on site quality.) Twenty-three years after thinning, the treatments had reduced mortality from 95 to 100 percent of the level in unthinned stands (Table 7).

TABLE 7. Commercial Tree Mortality by Stocking Level, 23 years after thinning

Year	Residual Stocking After Thinning			
	40%	55%	70%	100%
	Trees per Acre			
1980	0.0	0.2	0.2	2.4
1981	0.0	0.0	0.7	2.4
1982	0.0	0.5	0.3	3.6
1983	0.0	0.1	0.8	4.1
1984	0.0	0.0	0.0	1.0
1985	0.0	0.2	0.0	0.6
1986	0.0	0.0	0.0	1.3
1987	0.0	0.0	0.0	1.4
1988	0.0	0.0	0.0	0.0
1989	0.0	0.4	0.0	2.6
1990	0.0	0.0	0.0	2.6
1991	0.0	0.0	0.0	1.8
1992	0.0	0.2	0.0	3.0
1993	0.0	0.2	0.3	5.2
1994	0.0	0.0	0.0	4.8
1995	0.0	0.0	0.3	0.4
1996	0.0	0.2	0.0	1.3
1997	0.0	0.2	0.0	1.3
1998	0.0	0.0	0.0	0.0
1999	0.0	0.0	0.0	0.9
2000	0.0	0.2	0.3	0.0
2001	0.0	0.2	0.3	0.9
2002	0.0	0.1	0.0	0.9
Mean	0.0	0.1	0.14	1.85
Range	0	0-0.5	0-0.8	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.

LIST OF COMMON AND SCIENTIFIC NAMES

INSECTS

Common Name	Scientific Name
Bark Beetles	
California fivespined engraver	*Ips paraconfusus*
Cedar bark beetles	*Phloesinus* spp.
Douglas-fir engraver	*Scolytus unispinosus*
Fir engraver	*Scolytus ventralis*
Flatheaded fir borer	*Melanophila drummondi*
Jeffrey pine beetle	*Dendroctonus jeffreyi*
Mountain pine beetle	*Dendroctonus* ponderosae
Pine engraver	*Ips pini*
Pine engravers	*Ips* spp.
Pinyon ips	*Ips confusus*
Red turpentine beetle	*Dendroctonus valens*
Western pine beetle	*Dendroctonus brevicomis*
Defoliators	
California budworm	*Choristoneura carnana californica*
Douglas-fir tussock moth	*Orgyia pseudotsugata*
Fall webworm	*Hyphantria cunea*
Fruittree leafroller	*Archips argyrospilus*
Gypsy moth	*Lymantria dispar*
Lodgepole pine needleminer	*Coleotechnites milleri*
Pandoa moth	*Coloradia pandora*
Pine sawfly	*Neodiprion fulviceps*
White fir sawfly	*Neodiprion* spp.
Tree Regeneration Insects	
Gouty pitch midge	*Cecidomyia piniinopis*
Pine needlesheath miner	*Zelleria haimbachi*
Pine reproduction weevil	*Cylindrocopturus eatoni*
Western pineshoot borer	*Eucosma sonomana*
Other	
A scale	*Physokermes* sp.
Africanized honey bee	*Apis mellifera scutellata*
Maple leafhopper scorch	A leafhopper
Pine needle scale	*Chionaspis pinifoliae*
Spider mite	*Oligonychus subnudus*

Spruce aphid	*Elatobium abietinum*
Wood borer	*Semanotus* sp.

DISEASES AND THEIR CAUSAL PATHOGENS

Common Name of the Disease	Scientific Name of the Pathogen
Cankers	
Cytospora canker of true fir	*Cytospora abietis*
Cytospora canker of poplars and willows	*Cytospora chrysosperma*
Diplodia blight of pines	*Sphaeropsis sapinea* (*Diplodia pinea*)
Madrone canker	*Nattrassia mangiferae*, *Botryosphaeria dothidea*
Pitch canker	*Fusarium circinatum*
Declines	
Aspen decline	unknown
Sudden oak death	*Phytophthora ramorum*
Phytophthora canker	*Phytophthora nemarosa*
Dwarf Mistletoes	
Red fir dwarf mistletoe	*Arceuthobium abietinum* f.sp. *magnificae*
White fir dwarf mistletoe	*Arceuthobium abietinum* f.sp. *concoloris*
Foliage Diseases	
Elytroderma disease	*Elytroderma deformans*
Sugar pine needle cast	*Lophodermella arcuata*
Root Diseases	
Annosus root disease	*Heterobasidion annosum*
Armillaria root disease	*Armillaria* sp.
Black stain root disease	*Leptographium wageneri*
Port-Orford-cedar root disease	*Phytophthora lateralis*
Rusts	
Incense-cedar rust	*Gymnosporangium libocedri*

TREES

Common Name	Scientific Name
Conifers	
Pines	
Bishop pine	*Pinus muricata*

Coulter pine	*Pinus coulteri*
Foxtail pine	*Pinus balfouriana*
Jeffrey pine	*Pinus jeffreyi*
Knobcone pine	*Pinus attenuatta*
Lodgepole pine	*Pinus contorta* var. m*urrayana*
Monterey pine	*Pinus radiata*
Ponderosa pine	*Pinus ponderosa*
Singleleaf pinyon	*Pinus monophylla*
Sugar pine	*Pinus lambertiana*
Western white pine	*Pinus monticola*
Whitebark pine	*Pinus albicaulis*

True firs

Red fir	*Abies magnifica*
White fir	*Abies concolor*

Others

Brewer spruce	*Picea breweriana*
Douglas-fir	*Pseudotsuga menziesii*
Incense-cedar	*Libocedrus decurrens*
Port-Orford-cedar	*Chamaecyparis lawsoniana*
Redwood	*Sequoia sempervirens*
Sitka spruce	*Picea sitchensis*

Hardwoods

Oaks

Blue oak	*Quercus douglasi*
California black oak	*Quercus kelloggii*
Canyon live oak	*Quercus chyrsolepis*
Coast live oak	*Quercus agrifolia*
Interior live oak	*Quercus wislizenii*
Shreve oak	*Quercus parvula* var. *shreveii*

Other

Aspen	*Populus tremuloides*
Big-leaf maple	*Acer macrophyllum*
Blue elderberry	*Sambucus mexicana*
California laurel (bay)	*Umbellularia californica*
California buckeye	*Aesculus californica*
California hazelnut	*Corylus cornuta*
Cascara	*Rhamnus purshiana*
Coast redwood	*Sequoia sempervirens*
Coffeeberry	*Rhamnus californica*
Honeysuckle	*Lonicera hispidula*
Huckleberry	*Vaccinium ovatum*
Lombardy poplar	*Populus nigra*

Manzanita	*Arctostaphylos manzanita*
Pacific madrone	*Arbutus menziesii*
Poison oak	*Toxicodendron diversiloba*
Poplar	*Populus* spp.
Rhododendron	*Rhododendron macrophyllum*
Salmonberry	*Rubus spectabilis*
Tanoak	*Lithocarpus densiflorus*
Toyon	*Heteromeles arbutifolia*
Willow	*Salix* spp.

OTHER

Western starflower	*Trientalis latifolia*

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AGENTS REPORTED IN 2001 BUT NOT IN 2002

AMBROSIA BEETLES, *Monarthrum scutellare* and *M. dentiger*.
CALIFORNIA FIVESPINED IPS, *Ips paraconfusus*.
DOUGLAS-FIR BEETLE, *Dendroctonus pseudotsugae*.
OAK BARK BEETLES, *Pseudopityophthorus* spp.
TWIG BEETLES, *Pityophthorus* spp., and others.
WESTERN OAK BARK BEETLE, *Pseudopityophthorus pubipennis*.
CALIFORNIA OAKWORM, *Phryganidia californica*.
ELM LEAF BEETLE, *Xanthogaleruca luteola.*
MODOC BUDWORM, *Choristoneura retiniana*.
OAK RIBBEDCASE MAKER, *Bucculatrix albertiella*.
PACIFIC TENT CATERPILLAR, *Malacosoma contrictum*.
PONDEROSA PINE TIP MOTH, *Rhyacionia zozana*.
SATIN MOTH, *Stilpnotia salicis.*
SHORTHORNED GRASSHOPPERS, Acrididae.
A NEW LERP PSYLLID, *Eucalyptolyma maideni*.
BALSAM FIR GALL MIDGE, *Paradiplosis tumifex*.
OAK PIT SCALE, *Asterolecanium* sp.
PONDEROSA PINE TWIG SCALE, *Matsucoccus bisetosus.*
PITCH MOTHS, *Synanthedon sequoiae* (Sesiidae) and *Dioryctria* spp. (Pyralidae).
REDGUM LERP PSYLLID, *Glycaspis brimblecombei*.
ROOT WEEVILS, unknown.
XYELID SAWFLIES, *Xyela* spp.
Chloride damage.
Heat.
Wind.
Winter damage
CHINKAPIN CANKER, cause unknown.
OAK DIEBACK, cause unknown.
INCENSE-CEDAR DIEBACK, cause unknown.
TANOAK DECLINE.
DOUGLAS-FIR DWARF MISTLETOE, caused by *Arceuthobium douglasii*.
GRAY PINE DWARF MISTLETOE, caused by *Arceuthobium occidentale.*
HEMLOCK DWARF MISTLETOE, *Arceuthobium tsugense* subsp. *tsugense.*
PINYON PINE DWARF MISTLETOE, caused by *Arceuthobium divaricatum*.
WHITE FIR DWARF MISTLETOE, caused by *Arceuthobium abietinum*, f.sp. *concoloris.*
SYCAMORE ANTHRACNOSE, caused by *Gnomonia* (*Gloeosporium*) *platani*.
BROWN CUBICAL BUTT ROT, caused by *Phaeolus schweinitzii*.
WESTERN GALL RUST, caused by *Endocronartium harknessii*.

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

FOREST PEST DETECTION REPORT

I. FIELD INFORMATION (See instructions on reverse)			
1. County:	**2. Forest (FS only):**	**3. District (FS only):**	
4. Legal Description: **T. _____ R. _____** **Section (s) _____** **5. Date:**	**6. Location:** **UTM:**	**7. Landownership:** National Forest [ ] Other Federal [ ] State [ ] Private [ ]	
8. Suspected Cause of Injury: 1. Insect [ ] 5. Chemical [ ] 2. Disease [ ] 6. Mechanical [ ] 3. Animal [ ] 7. Weed [ ] 4. Weather [ ] 8. Unknown [ ]	**9. Size of Trees Affected:** 1. Seedling [ ] 4. Sawtimber [ ] 2. Sapling [ ] 5. Overmature [ ] 3. Pole [ ]	**10. Part(s) of Tree Affected:** 1. Root [ ] 5. Twig [ ] 2. Branch [ ] 6. Foliage [ ] 3. Leader [ ] 7. Bud [ ] 4. Bole [ ] 8. Cone [ ]	
11. Species Affected:	**12. Number Affected:**	**13. Acres Affected:**	
14. Injury Distribution: 1. Scattered [ ] 2. Grouped [ ]	**15. Status of Injury:** 1. Decreasing [ ] 2. Static [ ] 3. Increasing [ ]		**16. Elevation:**
17. Plantation? 1. Yes [ ] 2. No [ ]	**18. Stand 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
1475 S. State Street
Ukiah, CA 95482

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

Completing the Detection Report Form

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

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

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

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

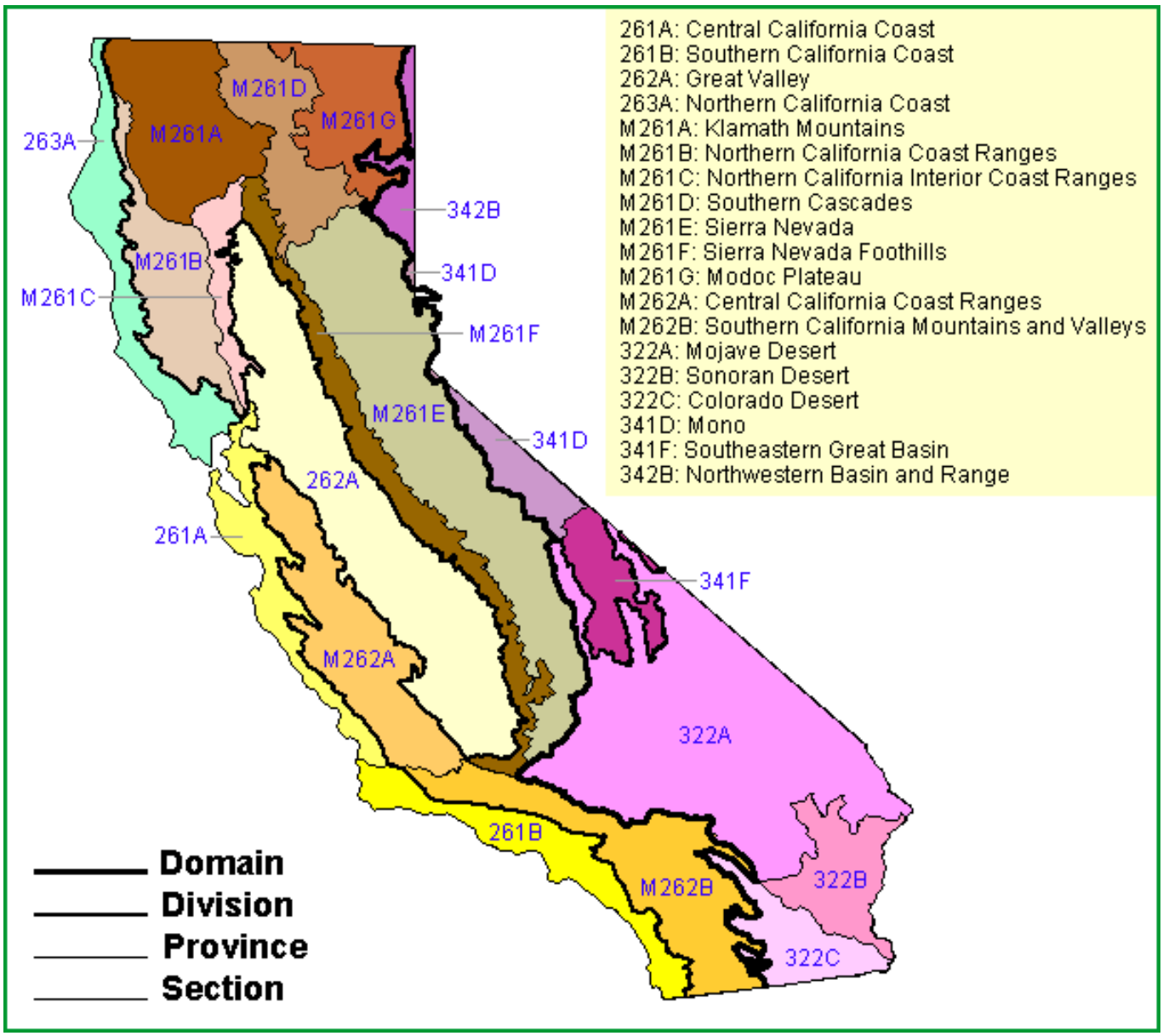
Action Requested (Block 24): Mark "Field Evaluation" only if you consider the injury serious enough to warrant a professional site evaluation. Mark "Information Only" if you a reporting a condition that does not require further attention. All reports will be acknowledged and questions answered on the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

Figure 8. California Ecological Units.



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