CALIFORNIA

APRIL 2006

Forest Health *highlights*

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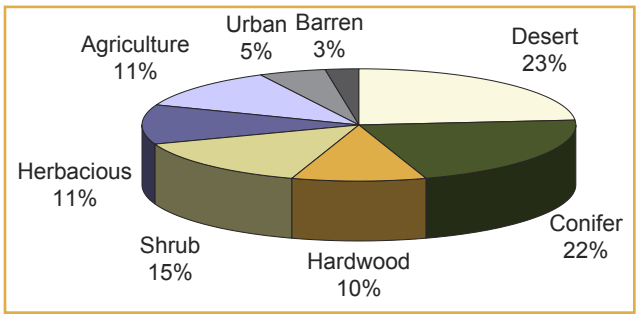
Forest Resource Summary

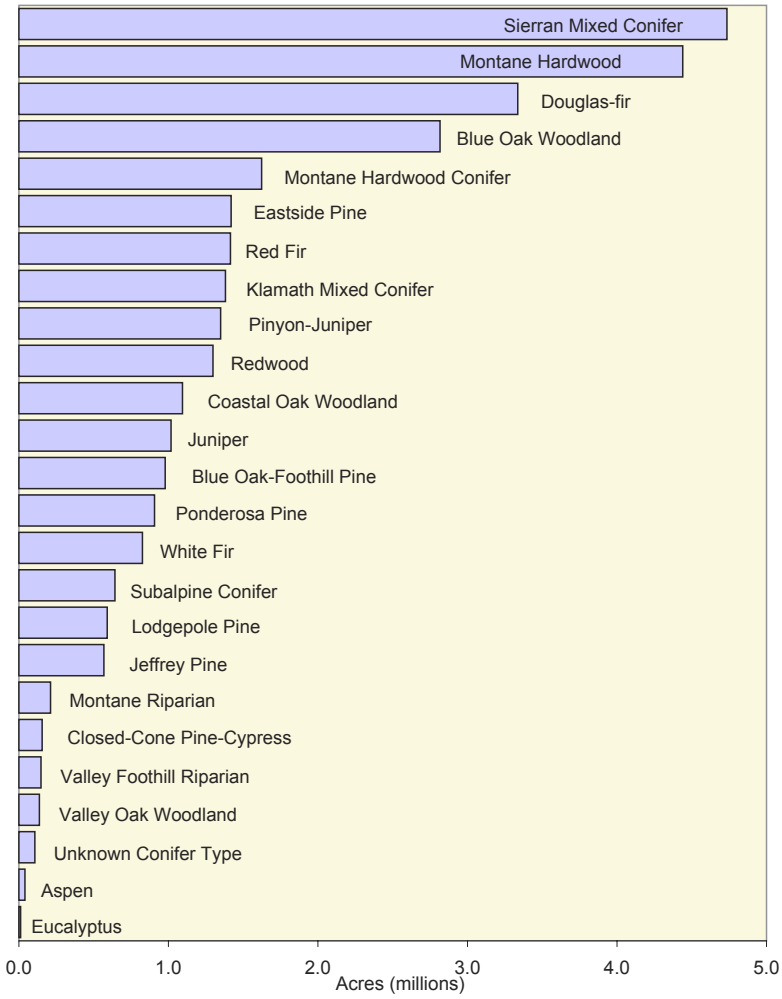
The USDA Forest Service and the California Department of Forestry and Fire Protection regularly maps, measures, monitors and assesses California's forested lands. California's forests are among the most complex and diverse in the nation, with 25 major forest types occurring on over 32 million acres of forested land throughout the state.

Approximately 33% of California is forested. These forest resources are susceptible to a variety of forest pests depending largely on tree species composition, tree stocking, drought, air pollution and other environmental factors.



California land cover types by percent of total land base.

This report represents selected highlights of forest health conditions in California in 2005. Some of this information has been taken from the annual report of the California Forest Pest Council, *Forest Pest Conditions in California - 2005.* It does not purport to be a historic review or an in-depth consideration of any particular forest insect or disease organism or abiotic influence.

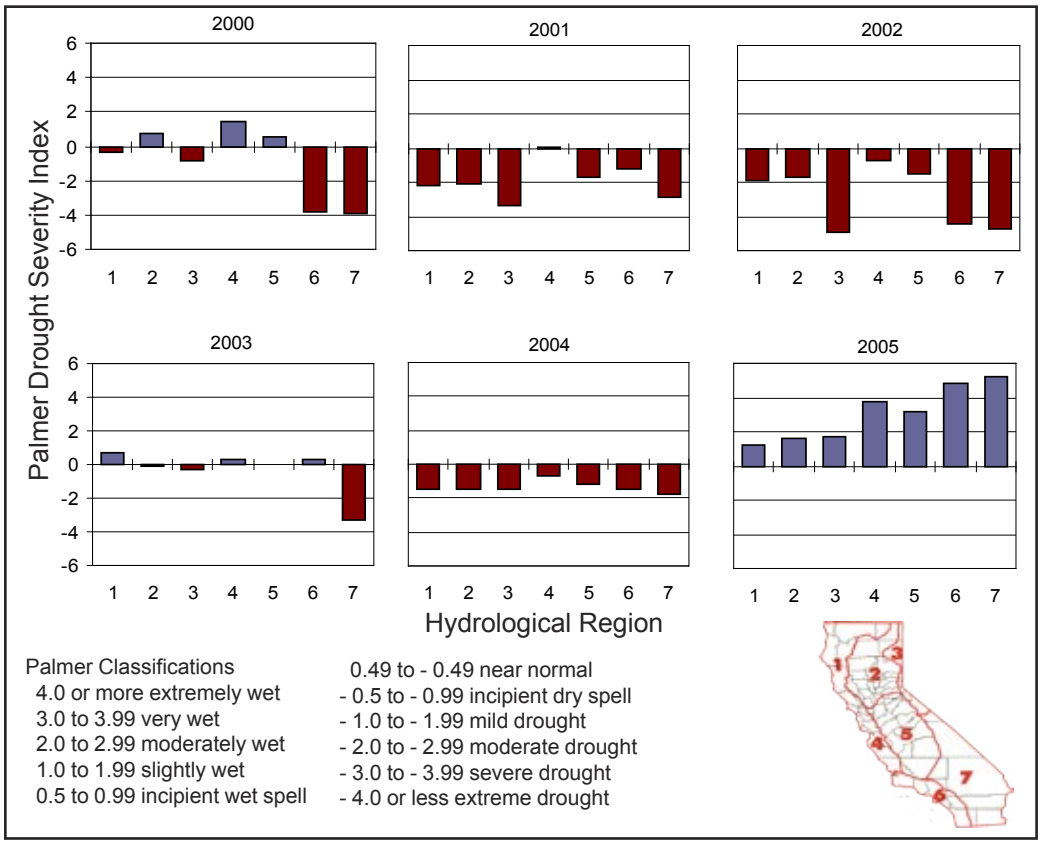


Acres of major forest types throughout California.

National Forests of California

There are 18 National Forests in California, totaling over 20 million acres of land. These National Forests account for 25 percent of National Forest recreation nationwide and about half of the public wildland recreation in California. National Parks and other federal, state, county and private lands provide the remainder. http://www.fs.fed.us/r5/

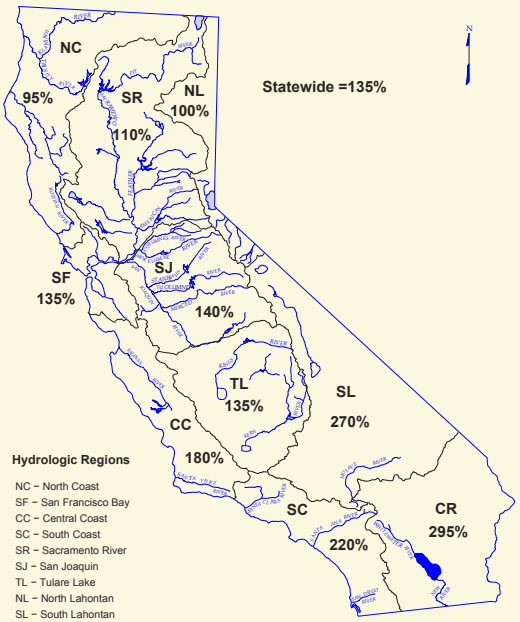
California emerged from four years of drought conditions with above average springtime precipitation in 2005. Statewide snowpack conditions in April were 135% above average. The moist, cool spring contributed to increased tree vigor and was a probable factor in the dramatic decrease in some pest activity (already decreasing in 2004). Conditions remained slightly wet to extremely wet in most of the State throughout the year.



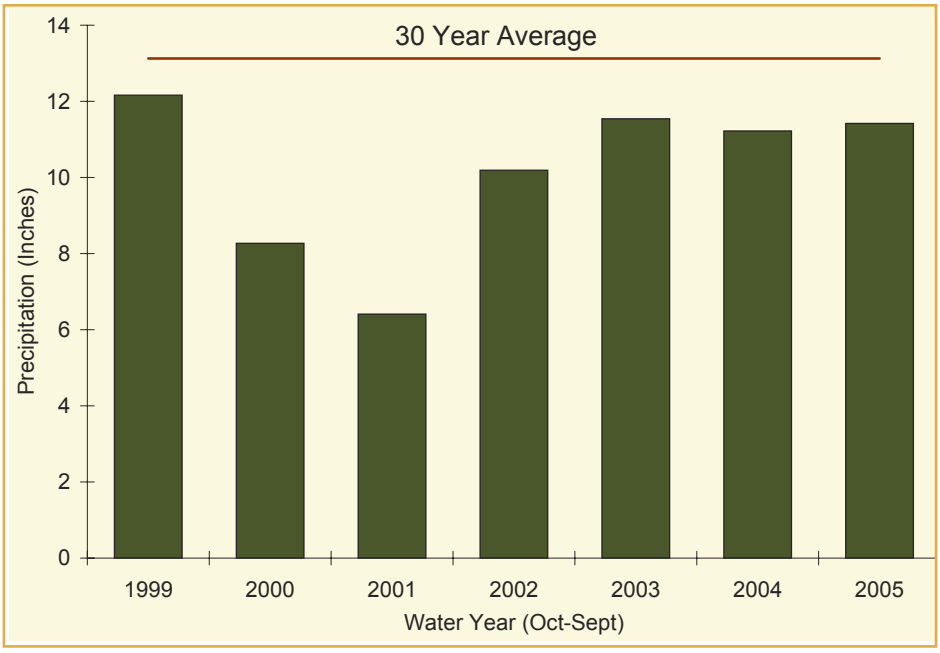
Palmer Classifications

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

Department of Water Resources
California Cooperative Snow Surveys
Seasonal Precipitation
In percent of average
October 1, 2004 through April 30, 2005



Drought-induced pest activity occurred on the Warner Mountain Ranger District of the Modoc National Forest where precipitation was 13% below the 30-year average



Annual precipitation from 2001-2005 in Cedarville, CA (near Modoc National Forest), compared to the 30-year average.

Mountain pine beetle caused mortality of ponderosa pine, lodgepole pine and whitebark pine continued to increase on the Modoc National Forest as very little drought relief came to this area during the 2004-2005 water year.

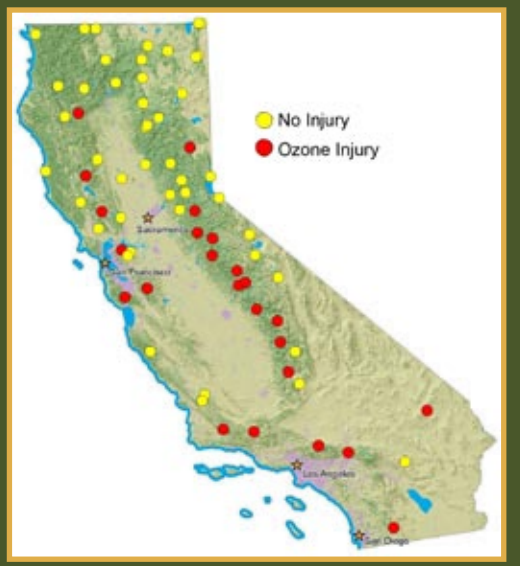
Fir engraver, overstocking and drought conditions resulted in top kill and whole tree mortality of white fir in Cedar Pass, Warner Mountain Ranger District, Modoc National Forest. Photos by Sheri Smith.

P-3 Indicator Summary:

The USDA Forest Service's Forest Inventory and Analysis (FIA) uses biomonitoring to monitor the potential impact of tropospheric ozone (smog) on forests. Bioindicators are plants that exhibit a visible response to ozone pollution.

65 plots were visited in 2005 in California; ozone injury was present on 27 biosites (Map below). Of the 27 positive plots, there were 4 biosites where injury was first detected in 2005 (weather patterns were somewhat different this year, resulting in injury in places where it is not usually observed). Indicator species with validated injury were ponderosa pine, Jeffrey pine, blue elderberry and skunkbush.

Additional analysis of ozone injury detected by the FIA program will be reported in the upcoming FIA 5-Year Report for California as well as a Pacific Northwest General Technical Report. The FIA ozone Access database for California, Oregon, and Washington, for 2000-2005 will be available soon.



27 plots were positive for ozone injury in California in 2005.

Map and data courtesy of Sally Campbell, Pacific Northwest Research Station

Intensified Ozone Monitoring and Assessment of Ozone Impacts on Conifers in Southern California*

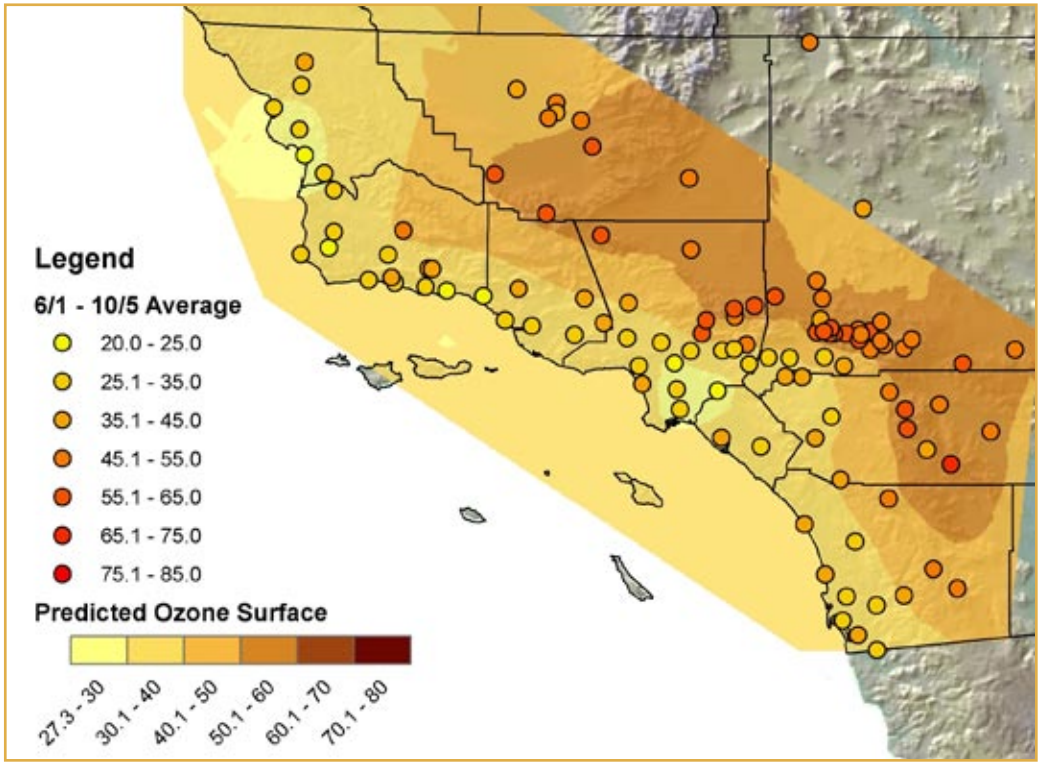
Michael Arbaugh, Andrzej Bytnerowicz, Pacific Southwest Research Station, and James Allison, Forest Health Protection

Tropospheric ozone is a phytotoxic gaseous air pollutant formed by photolysis from air pollution generated by large metropolitan areas, during transport over long distances to rural areas. Ozone, together with drought and bark beetles, is one of the key stressors affecting forest trees adjacent to urban areas. Recently passive samplers have been used to measure ambient ozone concentrations. Passive samplers allow O3 distribution to be characterized at forest stand and landscape scales. Because they are inexpensive, easy to use and do not require electricity to operate, passive samplers are especially suited to remote areas. Large-scale evaluations have already been performed for the Sierra Nevada. In this study several sources of funding were utilized to establish an extensive network of 37 passive ozone samplers in southern California mountains, foothills and desert. Samplers were changed every 2-weeks between May and September 2005. Several active ozone monitors were installed to provide calibration of passive samplers on-site. Passive and active ozone sampler data were then used to develop spatial estimates of ozone distribution in the mountains of Southern California for the summer of 2005.

Ozone injury on Jeffrey pine. Photo courtesy of USDA Forest Service, Pacific Southwest Research Station.

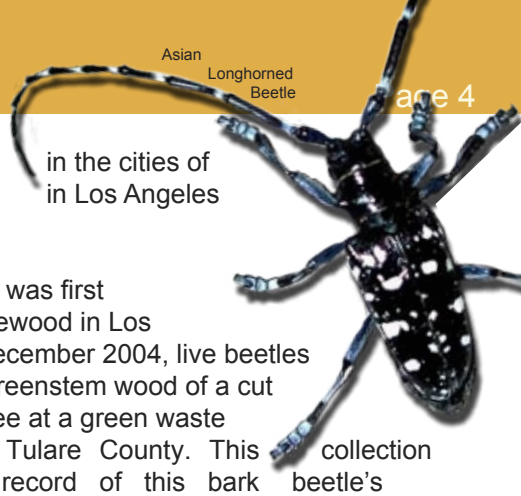
**Poster presented at the 2006 FHM Working Group Meeting. January 30-February 2, 2006. Charleston, SC.*

Available on the Forest Health Monitoring Web Page.



Average 2005 summer ozone season for Southern California. Courtesy: Mike Arbaugh, PSW

Introduced Species



Three **Asian longhorned beetles** were discovered on the grounds of a warehouse in Sacramento in June of 2005. Further investigation of the warehouse turned up wooden pallets with larval galleries and exit holes. No additional beetles were found in subsequent surveys of the surrounding urban forest or the trace-forward sites.

There were two **Asian Gypsy moth** finds in California during 2005. One moth was found in San Pedro, Los Angeles County and the other in Santa Ana, Orange County.

Several **Mediterranean pine engraver beetles** (first detected in 2004) where found in urban areas of the Central Valley in baited funnel traps. Larvae, pupae, and adults have also been recovered from cut logs of Aleppo pine, Italian stone pine and Monterey pine. The banded elm bark beetle was collected in funnel traps from Inyo, Lassen, Los Angeles, Mono and Nevada Counties In addition, it has been collected beneath the bark of Ulmus spp. in Inyo and Yolo Counties.

The **red-haired bark beetle** (first found in Los Angeles County in 2004) was trapped in the cities of Newhall and Valencia, in Los Angeles County.

Phloeosinus armatus was first discovered infesting firewood in Los Angeles, in 1989. In December 2004, live beetles were recovered from greenstem wood of a cut ornamental Cypress tree at a green waste processing facility in Tulare County. This collection represents the first record of this bark beetle's occurrence outside of the Los Angeles Basin. The only recorded California host is Italian Cypress, *C. sempervirens*.

The Australian insect ***Phoracantha recurva*** was first detected in southern California in 1995. The beetle, along with another closely related Eucalyptus borer *P. semipunctata*, is responsible for widespread Eucalyptus mortality in California. *Phoracantha recurva* was discovered in Shasta County in November 2004 attacking Eucalyptus trees in Redding. This is the first report of the insect in the county.

New infestations of **pitch canker disease** were found in large, planted Monterey pines in a private campground in Olema, CA in northwestern Marin County and in a mature Monterey pine plantation and adjacent native Bishop pines in the Drakes Estero portion of Point Reyes National Seashore. These infections in Marin County mark the most northern coastal sites in California wherein symptoms have been reported and sampled.

Port-Orford-cedar root disease continues to spread and intensify along the known infested waterways. Monitoring of the Port-Orford-cedar eradication treatments at Scott Camp Creek in the upper part of the Sacramento River drainage revealed no new infestations of *P. lateralis.*

White pine blister rust continues to be a significant problem of sugar pine throughout the known range of the pathogen in California. Specifically, WPBR infestations were noted in Mountain Home State Forest, killing young and old sugar pines. Most young trees and seedlings in the forest are affected. The disease continues to spread out within the area. This population of the rust pathogen is especially virulent and appears to have overcome genetic resistance in the host population. Results from second-year field work on evaluating the incidence of blister rust continued with the focus on whitebark, foxtail, and western white pine stands. A total of 113 longterm monitoring plots were established over two years. Rust was found on the northern population of foxtail pine, western white, and whitebark pine, but not on limber, Great Basin bristlecone or the southern population of foxtail pine.

The distribution of ***Phytophthora ramorum*** in California did not change significantly in 2005 (there were no new counties) but a new find in Willow Creek (Monterey County) extended the infestation south to just above the San Luis Obispo County line. Infestations intensified in Southern Humboldt County around Redway expanding north into the Salmon and Seely Creek watershed. Thousands of trees (mostly tanoak) were killed in western Sonoma and western Marin Counties and the Big Sur area of Monterey County. 16 new hosts were identified in 2005. The total number of known susceptible species stands at 100, across more than 55 genera. For a complete list, visit:

www.suddenoakdeath.org

Distribution of sudden oak death, December 12, 2005

Since 2000, the USDA Forest Service and California Department of Forestry and Fire Protection have been collaborating on a comprehensive program to address sudden oak death, caused by *Phytophthora ramorum*, in California. Early detection and some delimitation monitoring was carried out via aerial survey, watershed, and ground-based vegetation survey. Five projects were implemented in 2005; the results of which are summarized below:

Aerial Survey (Jeff Mai, USDA-FS and Walter Mark, CalPoly). This 2005 aerial and ground-check survey covered 23 counties in the state and mapped approximately 81,000 acres of hardwood mortality. 13.5 million acres were surveyed in 2005; approximately 75% of the surveyed area was on private land. Ground surveys, following aerial surveys, covered seven California counties and identified four new findings in Humboldt County, expanding the known infested area for the county to include two additional watersheds. Hardwood mortality was mapped over the Los Padres National Forest and along the Big Sur coast and noted in the southern-most known *P. ramorum*-infested areas (Willow and Plaskett Creeks), just north of the San Luis Obispo County border. For detail results of aerial and ground surveys, see accomplishment report, maps and other publications at http://www.fs.fed.us/r5/spf/.

P. ramorum-caused oak mortality in Sonoma County. Photo: Jeff Mai

Watershed Monitoring (David Rizzo, UC-Davis). Eighty-eight locations were established in perennial watercourses in 2004 and 2005 to monitor for the presence of *Phytophthora ramorum* throughout coastal central and northern California as well as portions of the Sierra Nevada mountains. Most of the monitored areas have limited or no *P. ramorum* at this time, but are near the epidemic range of *P. ramorum* and considered high-risk for invasion by *P. ramorum*. Two currently infested sites in Sonoma County were included as a baseline for successful recovery of *P. ramorum*. Twenty-one stream courses were infested with *P. ramorum*. *P. ramorum* was detected at all sites with a priori knowledge of forest infestation. *P. ramorum* was found at six sites without prior knowledge of forest infestation in Humboldt, Contra Costa, and Monterey counties. Forest infestations have been confirmed at all six sites, with the exception of Willow Creek in Monterey County, where symptomatic trees have been identified but not confirmed for *P. ramorum* presence. Another six sites downstream of known forest infestations had *P. ramorum* recovered, including three sites at least 4km away from known forest infestation. This monitoring has extended the southern range of *P. ramorum* to Willow Creek, 3km further south in Monterey County.

Ground-Based Targeted Risk Survey (Ross Meentemeyer, Sonoma State University). 392 high-risk locations were assessed across California based on the disease risk model developed by Meentemeyer et al (2004). The pathogen was detected at 45 of the 392 (12%) locations assessed across the state. Of the 45 sites that *P. ramorum* was detected, 16 occurred in Marin County, 3 in Alameda, 1 in Contra Costa, 1 in Mendocino, 1 in Solano, 6 in Santa Cruz, 7 in Sonoma, 3 in Monterey, 3 in San Mateo, and 4 in Santa Clara. The pathogen was not discovered in any currently uninfested counties, but *P. ramorum* DNA was detected at one site nearly 30 miles from the nearest known infection in Humboldt County. However, it has not been possible to replicate this result through subsequent sampling and culture analysis. Distance-decay analysis of the 392 locations indicates that the probability of *P. ramorum* occurrence decreases exponentially with increasing distance from known centers of infection and its probability of presence decreases substantially beyond 20 km.

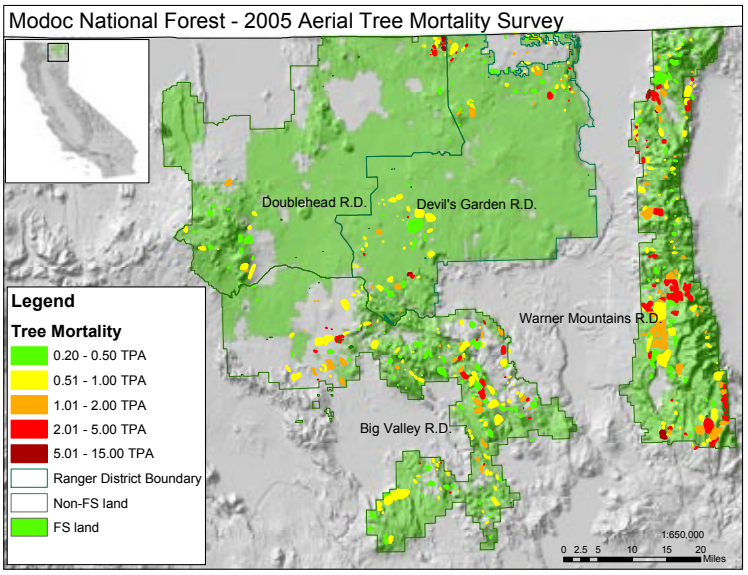
California National *P. ramorum* Survey (Don Owen, CDF). Detection surveys in eastern Butte and Yuba Counties, including a road survey combined with vegetation transects to record hosts of *P. ramorum* and sample symptomatic host tissue, and a stream survey that utilized rhododendron leaves as bait for *Phytophthora* spp. in stream water were conducted. A total of 35 vegetation transects were surveyed and 11 streams baited. Roughly 170 miles of roadside vegetation was scanned while driving through areas identified as moderate to high risk for sudden oak death. Eight vegetation samples were collected for lab diagnosis. *P. ramorum* was not detected by any of the survey methods. The only confirmed *Phytophthora* infection was from symptomatic bay leaves collected near Pulga, Butte County, which yielded *P. pseudosyringae*. This *Phytophthora* was also recovered during last year's survey from symptomatic bay leaves collected in San Luis Obispo County. View the complete survey report at: www.suddenoakdeath.org.

Survey of Southern Humboldt County (Valachovic, Lee and others). A new *P. ramorum*-infested site in Humboldt County has been confirmed 6 miles north of the Garberville/Redway area on Humboldt Redwoods State Park property along the Avenue of the Giants. The site features a moderately steep hillside dissected by ephemeral drainages running directly into the South Fork Eel River. Old-growth redwood, in places with an understory of nearly pure California bay laurel, grows on the site's lower slopes; the stand grades into a Douglas-fir/tanoak and madrone mix on upper slopes. Symptoms are found in both forest types. Tanoak shoots and bark, as well as California bay laurel leaves from the site all yielded *P. ramorum*. Numerous symptomatic hosts, including California black oak, madrone, and Douglas-fir, have since been observed on the site and sampled; results are pending.

Bark and Engraver Beetles

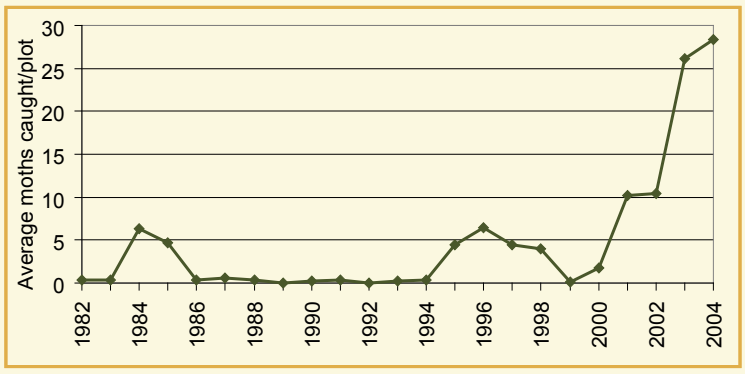
Overall **mountain and western pine beetle** activity declined statewide in 2005, with the exception of the Modoc National Forest where mountain and western beetle-caused mortality was observed on ponderosa, lodgepole and whitebark pine on the Warner Ranger District. Mountain and Jeffrey pine beetle and drought-related mortality in southern California continued to decline from the drastic levels seen in 2003. Activity continued at low levels in the San Bernardino, San Jacinto, and San Gabriel Mountains.

Levels of **fir engraver beetle**-caused mortality were high in many areas in 2005. The fir engraver in combination with drought, dwarf mistletoe, *Cytospora abietis* canker and the fir roundheaded borer caused considerable branch killing and tree mortality in higher elevation stands in northern California. Specifically, scattered fir mortality was found on the Tahoe and Modoc National Forests.



Defoliators

During 2005, **Douglas-fir tussock moth** traps were installed in 196 plots (5 traps/plot) with data collected for 187 plots (data for 9 plots were not collected). There were 165 (84%) plots with an average of <25 males per trap and 22 plots (11%) that averaged 25 or more moths per trap. Twenty-six percent of the plots averaged >25 males moths per trap in 2004 indicating a downward trend in overall trap counts this past year compared to last. Plots that averaged >25 moths per trap for 2005 were located on the following Ranger Districts: Amador and Placerville (Eldorado NF), Devil's Garden (Modoc NF) and Calaveras, Miwok and Summit (Stanislaus NF). In addition to these plots monitored on National Forest lands there were five plots that exceeded an average of 25 moths/trap on lands of other ownership. Four of these plots were located in Yosemite National Park and 1 was in Shasta County on private land near Burney Mountain, monitored by CDF.

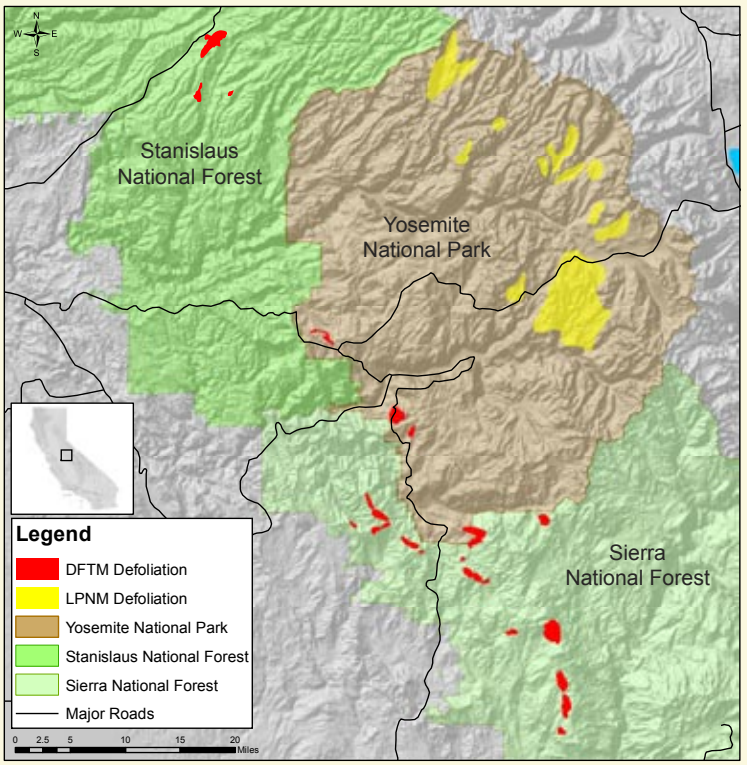


Douglas-fir tussock moth pheromone trap catch summary for the Sierra National Forest and Yosemite National Park. Courtesy Kathy Sheehan

An egg mass survey was conducted in the plot near Burney Mountain, Shasta County within a 2 mile radius of the plot in the spring of 2005. No egg masses of the tussock moth were found during the survey. Additional surveys will be completed during 2006 in this area as the trap count remained high for 2005.

Increases and declines in trap counts are very common with DFTM populations. Based on the results of the 2005 trap monitoring, there may be some increases in activity in 2006 in some locations, in addition to the areas where defoliation was detected in 2005. During the field season of this year, Forest Health Protection staff will monitor other life stages in the areas where DFTM activity exceeded an average of 25 males/trap and/or where notable larval activity occurred. Aerial detection surveys mapped 12,711 acres of defoliation in the central Sierra Nevada range.

Lodgepole needleminer populations remained high in several areas of Yosemite National Park. A total of 31,030 acres of defoliation were detected in the park. Aerial detection surveys found most of the defoliation to be discontinuous with no mortality observed.



2005 Douglas-fir tussock moth (DFTM) and lodgepole needleminer (LPNM) Defoliation - Aerial Survey Sketch Mapping Program.

Cytospora Canker

The branch flagging and mortality of red fir caused by Cytospora canker in association with red fir dwarf mistletoe (also noted in 2003) continued to be visible in numerous areas in the central Sierra Nevada (Tuolumne, Calaveras and Amador Counties) and on the Stanislaus National Forest. Most of the injury is occurring in areas above 6,500 feet elevation. Trees that survive will have dead branches scattered within their crowns which may lead to hazardous conditions in recreation sites. Significant outbreaks of Cytospora canker have also been noted in Nevada, El Dorado, and Placer Counties. Injury has consisted of dieback of branch tips in affected fir trees and continues to infect red fir branches near Robinson Flat Campground on the Tahoe National Forest. Branch dieback of red fir and, to a lesser degree, white fir continues in Latour State Forest, Shasta County. Affected trees often suffer from dwarf mistletoe and have experienced a higher rate of mortality from the fir engraver beetle.

Heavy infestation of cytospora canker of true fir. Photo by Dave Schultz.

Black Stain Root Disease

Ponderosa pine mortality due to a combination of drought, high stocking, **black stain root disease** and western pine beetle at McCloud Flats (McCloud Ranger District, Shasta-Trinity National Forest) has decreased compared to previous years. However, mortality caused by black stain root disease was evident at the Mud Flow Research Natural Area, Elk Flat, Ash Creek Sink, Algoma and Harris Mountain. Scattered pockets of mortality are also present in dense Douglas-fir stands in the Eel River Late Successional Reserve south of the Van Dusen River near Dinsmores (Mad River Ranger District, Six Rivers National Forest). Scattered pockets of Douglas-fir mortality due to black stain root disease was also present between Soda Creek and the northwest shore of Pillsbury Lake, and several centers are present at the Pillsbury Homesite Tract near the northeastern shore of Pillsbury Lake (Upper Lake Ranger District, Mendocino National Forest). Mature ponderosa and Jeffrey pine mortality resulting from black stain root disease continues in the Heart Rock area east of Hwy 139 in northern Lassen County. In southern California, mortality of singleleaf pinyon pine in the San Bernardino Mountains was also associated black stain root disease centers.

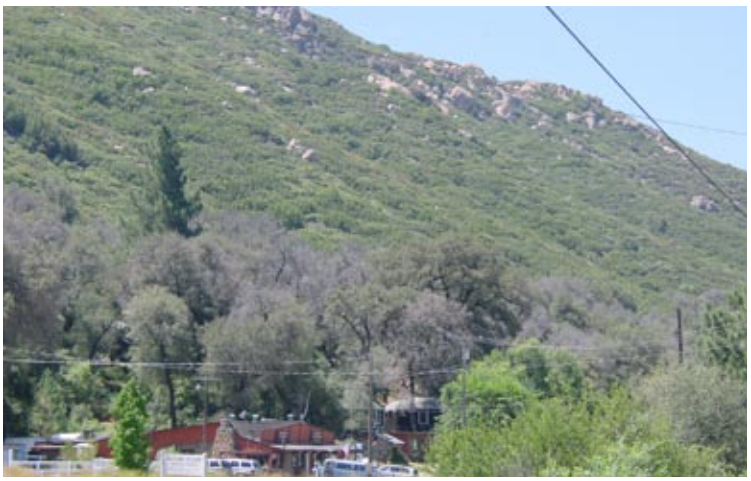
Annosus Root Disease

Annosus root disease continues to be problematic throughout California forests. Specifically, Annosus caused mortality of ponderosa pine was noted on McCloud Flats on the Shasta-Trinity National Forest. The pathogen was also found to be infecting an undetermined number of aggregations of white fir south and west of Manzanita Mountain on the Big Valley Ranger District, Modoc National Forest. Annosus root disease in white fir was also found near the headwaters of Thompson Creek on the Mt. Hough Ranger District, Plumas National Forest.

Unknown Disease

An unknown condition was found causing extensive mortality in live oak in southern San Diego County. Mortality occurred over 30 square miles in both young and mature trees, in dry and mesic sites, and in clumped and scattered trees. A few trees were examined closely. No evidence of *Armillaria* infection was found. Tissue was collected from around a bleeding canker but no pathogenic organisms were isolated. Investigations are continuing.

Mortality caused by black stain root disease and western pine beetle near Algoma campground, Shasta-Trinity National Forest. Photo by Dave Schultz.



An unknown pathogen causing extensive mortality in live oak in southern San Diego County. Photo by Laura Merrill

Public agencies, landowners, and natural area managers have formed working partnerships to address invasive plants through outreach, inventory, prevention, treatment, and monitoring of priority weeds. Typically parties work together through Weed Management Areas. These cooperative efforts have demonstrated great success by increasing efficiency of control efforts across ownerships, and raising awareness about the problems caused by invasive weeds. Brief descriptions of some of the main target invasive weeds of California forests are as follows:

Yellow starthistle (*Centaurea solstitialis*) is widespread throughout much of California, with an estimated 12 million acres infested throughout the state. This noxious weed was introduced into California in the mid-1800's. Control efforts include chemical, biological, cultural (burning and mowing), and grazing. Although it is widespread through much of California, especially in the Central Valley and the State's oak woodlands, there is an eastward leading edge in the Sierra Nevada Mountains that is being mapped and monitored. Eradication efforts are ongoing to the east of this leading edge; otherwise control and restoration methods are being used to reduce the impacts of this weed. Several insects have been introduced over the last twenty years as biological control agents, and more recently, a host-specific rust has been introduced.

The Brooms (primarily French broom, *Genista monspessulana*; and Scotch broom, *Cytisus scoparius*; but also Spanish broom, *Spartium junceum*) were introduced into California in the mid-1800's primarily as an erosion control planting. It is estimated that over 1 million acres are infested with brooms in California. The qualities that made brooms useful initially now make it difficult to control (tolerance for most soil conditions, nitrogen fixing, able to grow year-around, copious production of long-lived seeds). It can be found in wildlands throughout the state. Dense stands of older broom present a high fire hazard. Control efforts include chemical, cultural (burning, cutting, pulling), biological, and grazing. Current efforts are being made to identify additional biological agents that can be introduced for broom control.

The knapweeds (spotted, *Centaurea maculosa*; diffuse, *C. diffusa*; squarous, *C. squarrosa*; Russian, *Acroptilon repens*) are examples of species in California that are generally considered for eradication. They are found throughout California. All are on California's noxious weed list. Russian knapweed was introduced into California's Central Valley in the nineteenth century directly from Europe as a contaminant in agricultural seed. It is likely that the other knapweeds were introduced through interstate movement of contaminated seed early in the twentieth century. More recently, new wildland locations of knapweeds have been the result of vehicle or equipment movement from infested parts of the West into uninfested areas of the state, often as a result of wildfire suppression activities. This has spurred the development of equipment washing techniques as a prevention tool for noxious weed introductions. Knapweed occurrences are generally considered for eradication using herbicides and cultural methods such as burning, pulling, mulching, and cutting.

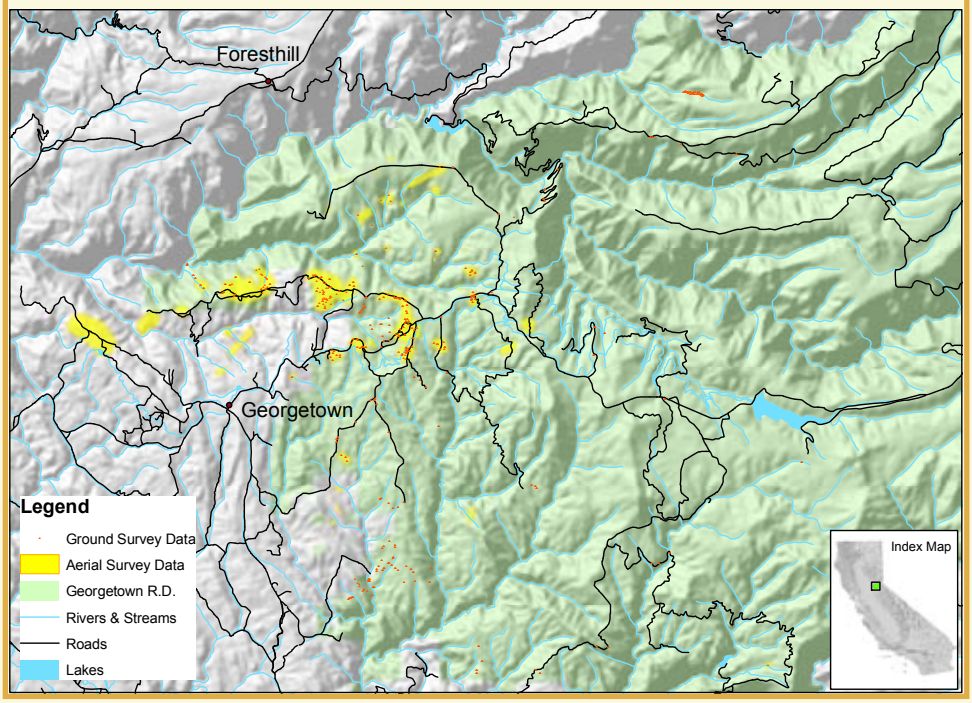
Scotch Broom Aerial Survey

A pilot survey was completed in coordination with the Eldorado National Forest (ENF) and Forest Health Protection to aerially map Scotch broom occurrences within a portion of the forest, primarily the western portion of Georgetown Ranger District. The survey was completed in May, 2005 during peak flowering to map areas where Scotch broom had greater than 50% cover.

Of the invasive plants documented on the ENF, Scotch broom has the greatest presence. During the aerial survey, 51 discrete areas were mapped with >50 % Scotch broom cover. These areas averaged 64 acres in size with a total area mapped of approximately 3,300 acres. Approximately 25 new areas were mapped, when compared to previous GIS point data, which documents an additional 179 smaller infestations elsewhere on the district/ forest.

Future aerial surveys for Scotch broom and other invasive native/nonnative plants are being considered elsewhere in the region.

Scotch Broom Distribution, Georgetown Ranger District
2005 Aerial and Ground Survey Data

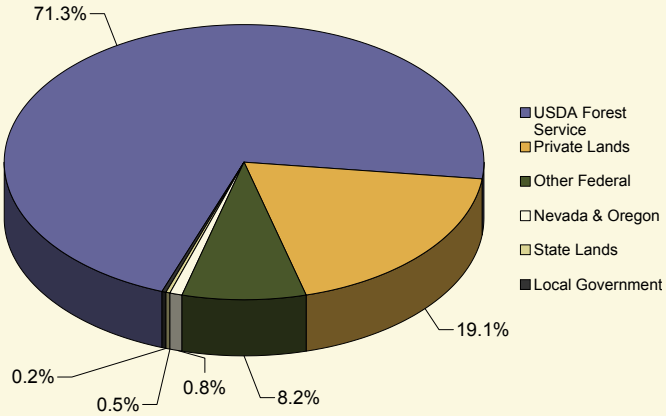


Annual Forest Health Protection (FHP) aerial surveys have been completed for Sequoia Kings Canyon, Lassen, and Yosemite National Parks, and all Pacific Southwest Region forests. Approximately 28 million acres were flown during the 2005 annual aerial surveys. The area flown also includes other federal, state and private lands. When possible, FHP surveys were conducted with personnel from the USDA Forest Service on the forests, US Department of Interior Park Service, Bureau of Indian Affairs and the California Department of Forestry and Fire Protection. Biotic damage-causing agents include bark beetles, defoliators, fungi and bear. Abiotic damage-causing agents include fires, mudslides, flooding and windthrows. Area and pest-specific results are referenced elsewhere in this document. Complete 2005 Aerial Survey results are available at:

http://www.fs.fed.us/r5/spf/fhp/fhm/aerial/

Fire damage may not be all-inclusive. For complete fire history, go to:

http://www.fs.fed.us/r5/fire/
and
http://www.fire.ca.gov/cdf/incidents/



Acres flown by ownership in 2005.

Google Earth

The 2005 Aerial Survey data has been made available through Google Earth. This allows users to view flight lines, areas with mortality or other injury, and photograghs of the annual and special aerial surveys.

The *Directions* function allows users to retrieve driving directions to individual polygons (to the nearest road).

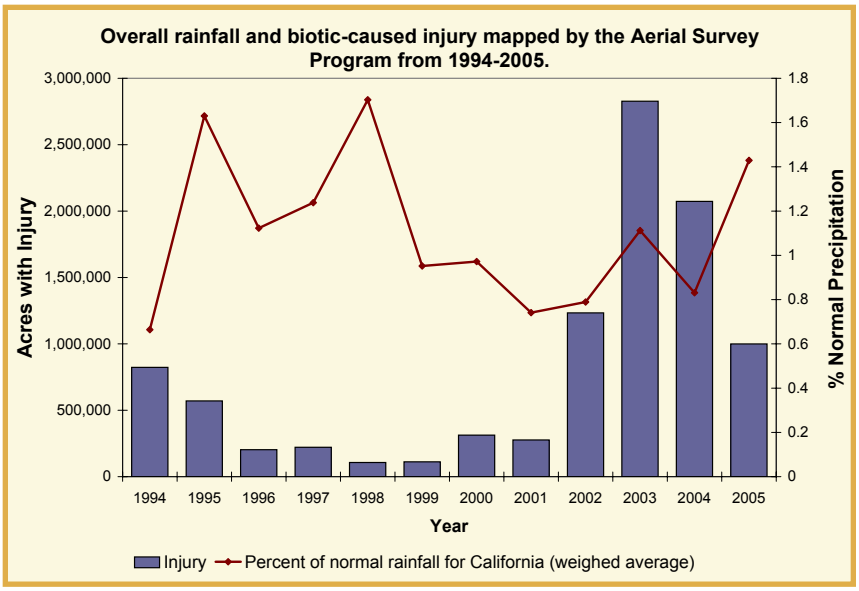
Google Earth data can be downloaded at:

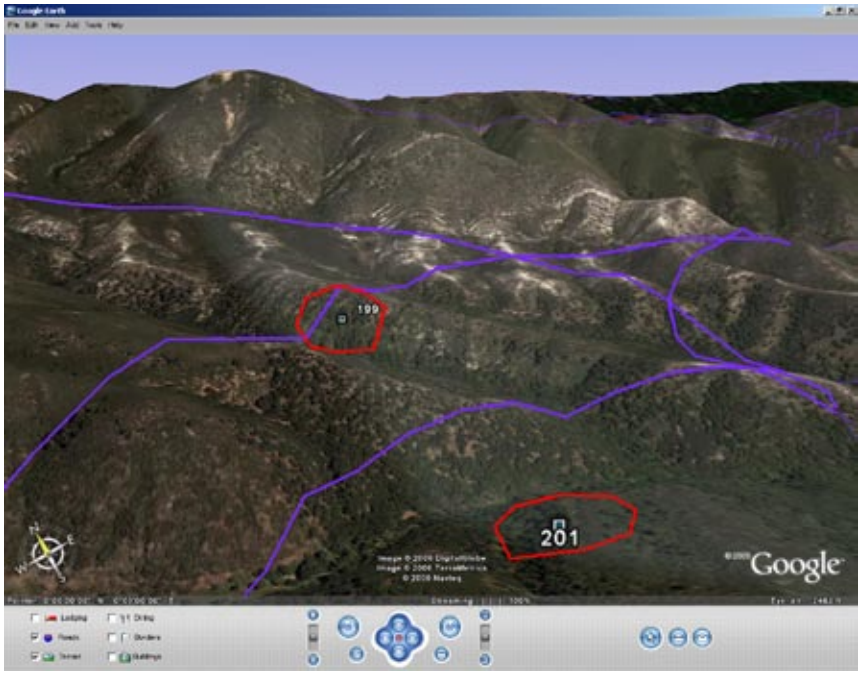
www.fs.fed.us/r5/spf/fhp/fhm/aerial/

Acres mapped with injury in 2005.

Biotic	Pine	Fir	Mixed Conifer	Hardwood	TOTAL
Mortality	217,737	449,010	257,128	29,517	953,392
Defoliation	31,457	12,711	8		44,176
Other Damage	53	1829	33	58	1,973
TOTAL	**249,247**	**463,550**	**257,169**	**29,575**	**999,541**

Abiotic	Pine	Fir	Mixed Conifer	Hardwood	TOTAL
Mortality	19,131	4,299	90,774	15,565	129,769
TOTAL	**19,131**	**4,299**	**90,774**	**15,565**	**129,769**

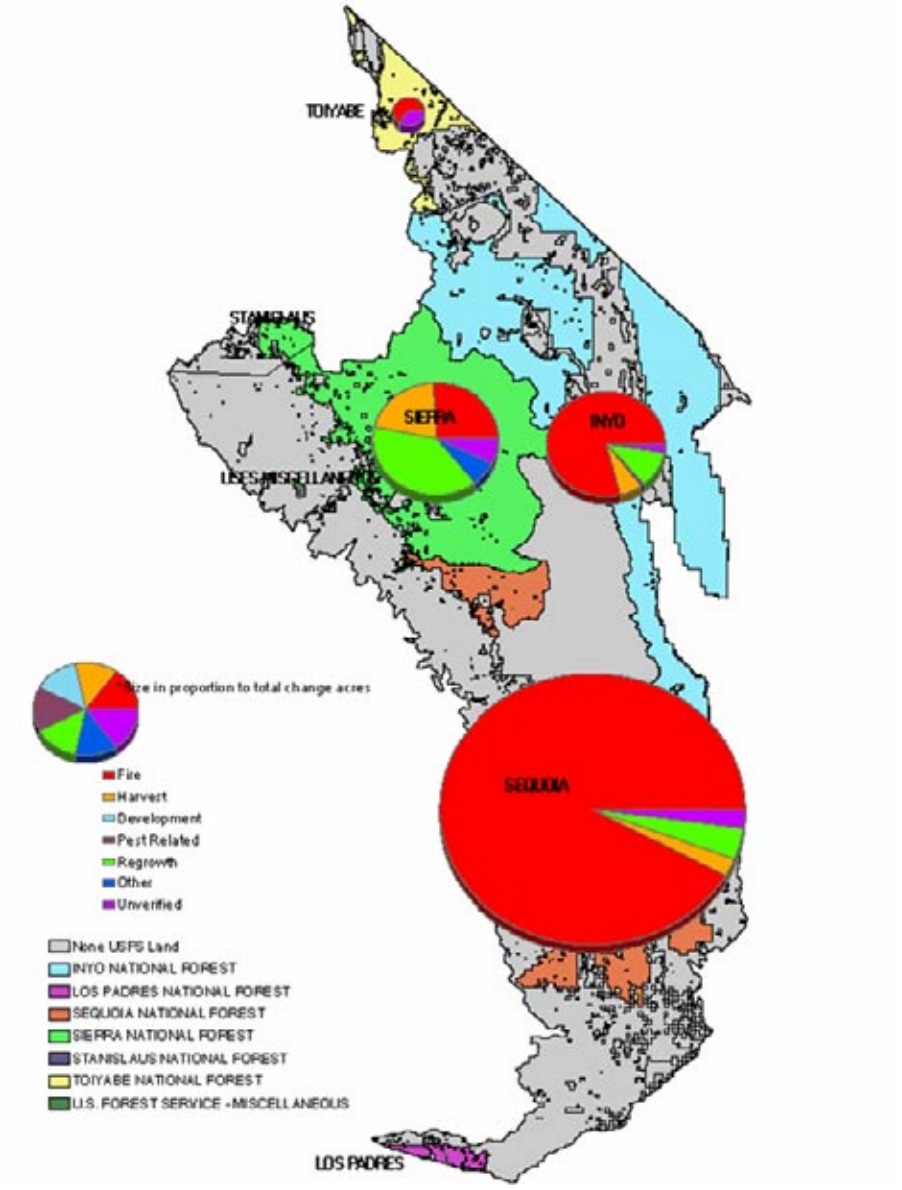




Screen capture of the 2005 aerial survey mortality polygons (red) and flight lines (purple) as viewed through Google Earth.

Click here to download the Google Earth files.

The California Land Cover Mapping and Monitoring Program (LCMMP) uses Landsat Thematic Mapper (TM) satellite imagery to map vegetation and derive land cover change (losses and gains) within five-year time periods. TM satellite imagery has a spatial resolution of 900 square meters (each pixel within a TM image is 30 meters on each side), or about 1/5 of an acre. The purpose of this program is to monitor vegetation changes over time and to provide information about trends. This data can inform managers as to whether landscape management plans and policies are accomplishing their intended purposes. Land cover monitoring information is a key source of information for consultation when starting land management plan revision, preparing wildlife conservation assessments, and developing fire and vegetation policies. During 2005 the cooperative LCMMP saw the completion of the Southern Sierra Project Area and the Southern California Project Area. The Northern Coast Project Area is near completion with just cause attribution remaining. Currently, the program is in its second cycle of the long-term monitoring, and has approximately 10 years worth of data and information for each project area complete to date.



Cause of Change between 1995/1997 through 2001
by National Forest*
*size of pie charts are in proportion to the amount of change on each forest

Highlights from the Southern Sierra

Decreases in conifer accounted for about 58,800 acres of the total decrease in vegetation within the project area.

Hardwood and shrub/chaparral showed a decrease on about 12,600 acres and 15,000 acres, respectively.

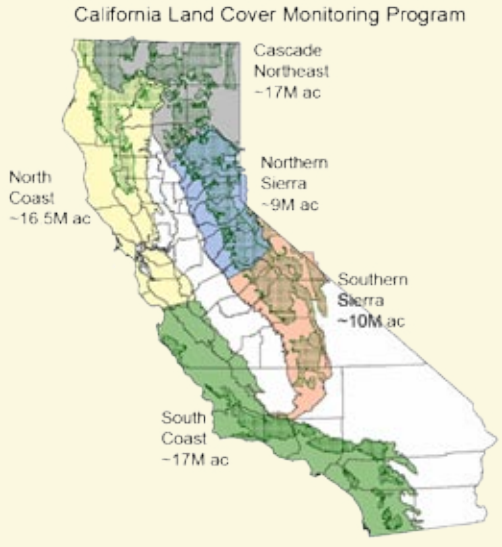
Fire was the primary cause of change in both the conifer and the hardwood vegetation types, affecting about 54,350 acres and 10,370 acres, respectively.

Harvest accounted for approximately 2,900 acres of the total decrease.

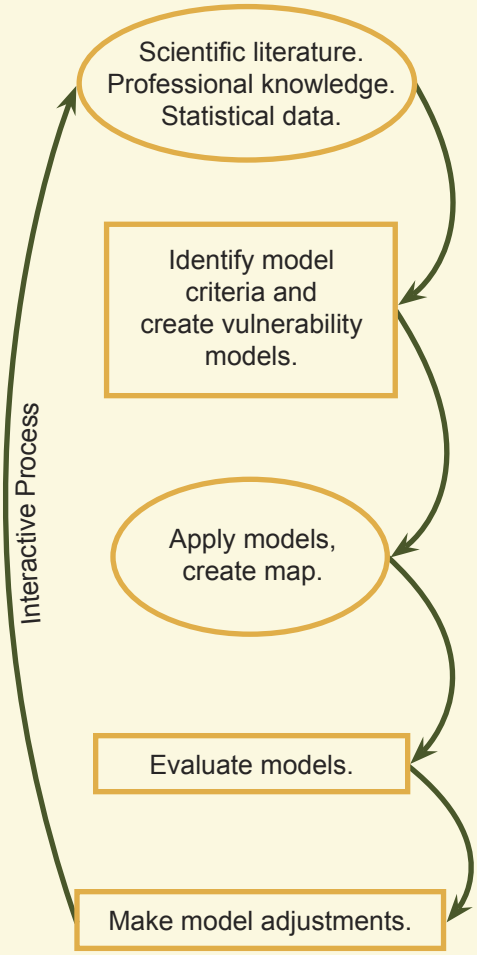
Increases in conifer accounted for approximately 5,500 acres of the total increase in vegetation in the project area.

Shrub/chaparral showed an increase on about 2,400 acres.

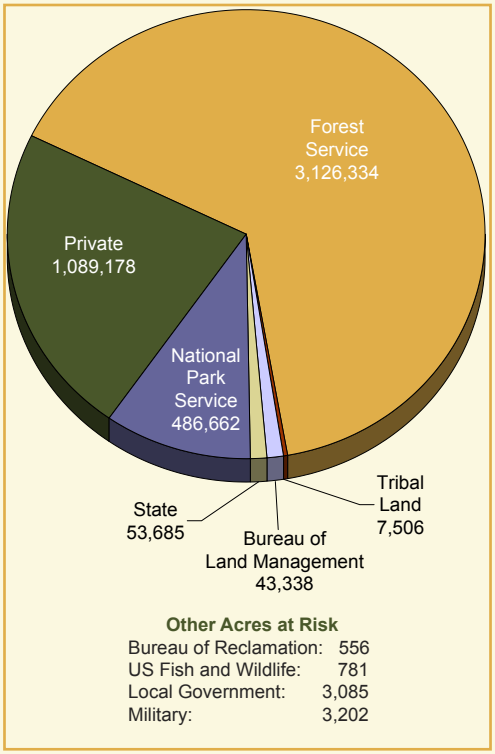
Regrowth was the primary cause for increase in both conifer and shrub/chaparral types, affecting about 4,800 acres and 2,000 acres, respectively.



Methods: how risk is modeled.



Acres at Risk by Ownership in California.

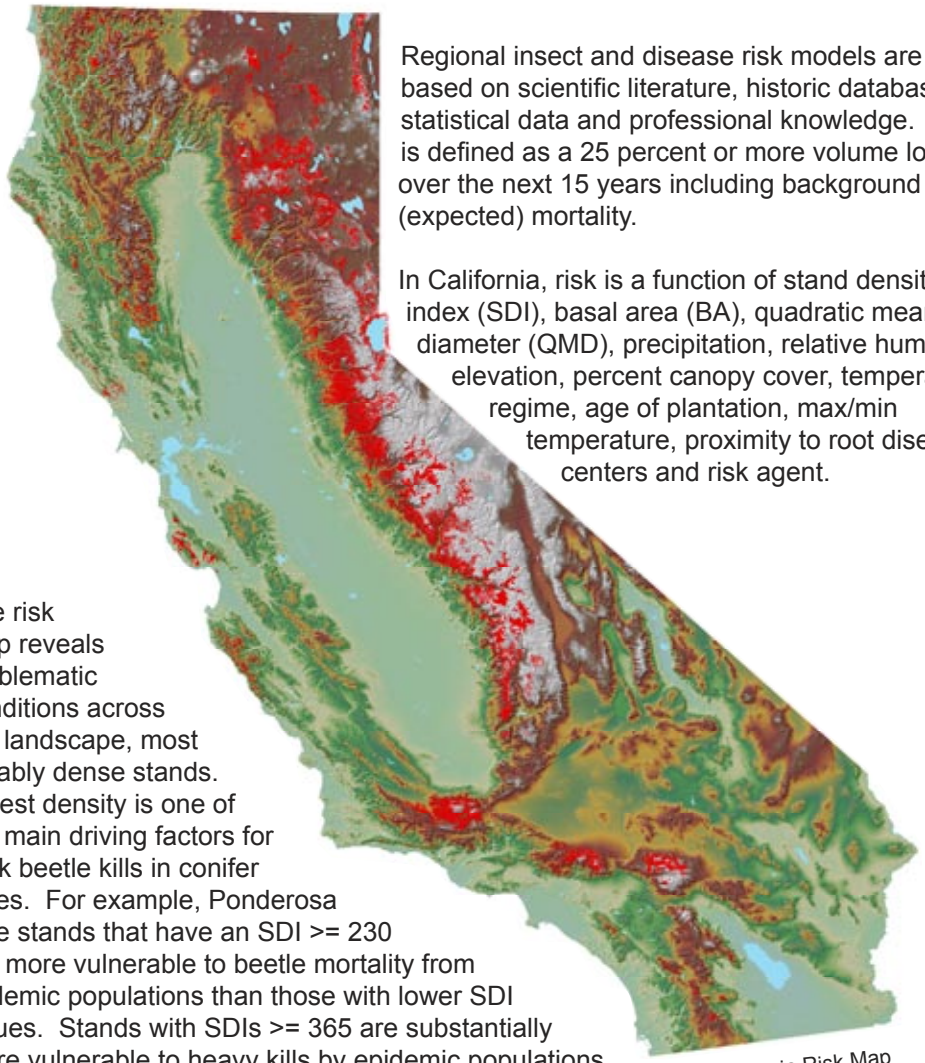


Other Acres at Risk

Bureau of Reclamation:	556
US Fish and Wildlife:	781
Local Government:	3,085
Military:	3,202

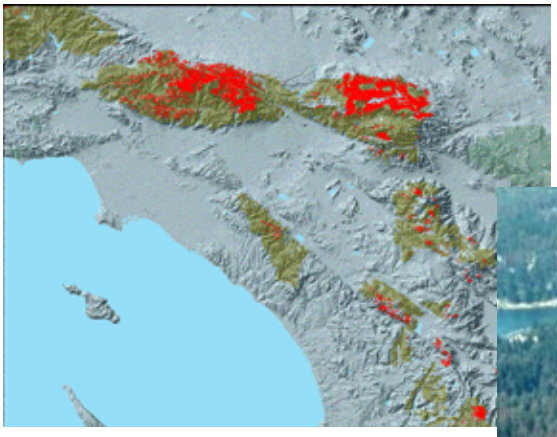
Regional insect and disease risk models are based on scientific literature, historic databases, statistical data and professional knowledge. Risk is defined as a 25 percent or more volume loss over the next 15 years including background (expected) mortality.

In California, risk is a function of stand density index (SDI), basal area (BA), quadratic mean diameter (QMD), precipitation, relative humidity, elevation, percent canopy cover, temperature regime, age of plantation, max/min temperature, proximity to root disease centers and risk agent.



2005 California Risk Map

The risk map reveals problematic conditions across the landscape, most notably dense stands. Forest density is one of the main driving factors for bark beetle kills in conifer types. For example, Ponderosa pine stands that have an SDI >= 230 are more vulnerable to beetle mortality from endemic populations than those with lower SDI values. Stands with SDIs >= 365 are substantially more vulnerable to heavy kills by epidemic populations (Oliver and Uzoh, 1997). Stand density management is a strategic objective of Region 5. The risk map aids in identifying forest stands that are in need management activity to prevent large-scale mortality events.



Risk and actual mortality near Lake Arrowhead, CA

For more information on the Regional Risk Map visit us on the web at:
http://www.fs.fed.us/r5/spf/fhp/fhm/risk/

FOREST PEST DETECTION REPORT

I. FIELD INFORMATION (See instructions on reverse)

1. County:

2. Forest (FS only):

3. District (FS only):

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

5. Date:

6. Location:

UTM:

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

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

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

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

11. Species Affected:

12. Number Affected:

13. Acres Affected:

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

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

16. Elevation:

17. Plantation?
1. Yes ◯ 2. No ◯

18. Stand Composition (species):

19. Stand Age and Site Class:
Age: 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, email and Phone Number:
email: _____ phone: _____
Address 1: _____
Address 2: _____
City: _____ State: _____ Zip: _____

II. Reply (Pest Management Use)

28. Response:

29. Report Number:

30. Date:

31. Examiner's Signature:

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

Contacts and Additional Information

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.

USDA United States Department of Agriculture

Forest Service Pacific Southwest Region

California Department of Forestry and Fire Protection

California Forest Pest Council

If you have questions about forest insects and disease activity in California, please contact one of these regional or field offices. For those wishing to submit insect and disease information to these offices, the form on the inside back cover can be used to submit information to The Cooperative Forest Pest Detection Survey 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 manner indicated on the form.

USDA Forest Service
State and Private Forestry
Forest Health Protection
3237 Peacekeeper Way, Suite 207
McClellan, CA 95652
Michael Bohne 916.640.1283
email: mbohne@fs.fed.us

Forest Health Protection
Shasta-Trinity National Forest
3644 Avtech Parkway
Redding, CA 96002
Dave Schultz 530.226-2437
Pete Angwin 530.226-2436
email: dschultz@fs.fed.us
pangwin@fs.fed.us

Forest Health Protection
Stanislaus National Forest
19777 Greenley Road
Sonora, CA 95370
Beverly Bulaon 209.532.3672, 323
email: bbulaon@fs.fed.us

Forest Health Protection
Lassen National Forest
2550 Riverside Drive
Susanville, CA 96130
Sheri Smith 530.252.6610
Danny Cluck 530.252.6431
Bill Woodruff 530.252.6680
email: ssmith@fs.fd.us
dcluck@fs.fed.us
wwoodruff@fs.fed.us

Forest Health Protection
San Bernadino National Forest
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San Bernadino, CA 92408-3430
Andi Koonce 909.382.2673
Laura Merrill 909.680.1582
James Allison 909.382.2600, 3123
email: akoonce@fs.fed.us
lmerrill@fs.fed.us
jallison@fs.fed.us

Forest Pest Management
CA Dept. of Forestry & Fire Protection
P.O. Box 944246
Sacramento, CA 94244-2460
Jesse Rios 916.653.9476
email: jesse.rios@fire.ca.gov

Forest Pest Management
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6105 Airport Road
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email: tom.smith@fire.ca.gov