California Forest Pest Conditions 2012

A publication of the
California Forest Pest Council

CALIFORNIA FOREST PEST CONDITIONS 2012

Contributors:

California Department of Forestry and Fire Protection
Kim Camilli, Forest Pathologist
Jack Marshall, Forest Pathologist
Don Owen, Forest Entomologist
Tom Smith, Forest Pathologist

USDA Forest Service
Pete Angwin, Plant Pathologist, Northern California Shared Service Area
David Bakke, Regional Pesticide Use Specialist and Invasive Plants Program Manager
Matthew Bokach, Ecologist
Beverly Bulaon, Entomologist, South Sierra Shared Service Area
Phil Cannon, Regional Plant Pathologist
Danny Cluck, Entomologist, Northeastern California Shared Service Area
Tom Coleman, Entomologist, Southern California Shared Service Area
Joan Dunlap, Forest Geneticist
Susan Frankel, Plant Pathologist, Pacific Southwest Research Station
Zachary Heath, Aerial Survey Program Manager
Melody Lardner, Plant Pathologist, Southern California Shared Service Area
Martin MacKenzie, Plant Pathologist, South Sierra Shared Service Area
Jeff Moore, Aerial Survey Specialist
Brent Oblinger, Aerial Survey Specialist
Sheri Smith, Regional Entomologist
Cynthia Snyder, Entomologist, Northern California Shared Service Area
Bill Woodruff, Plant Pathologist, Northeastern California Shared Service Area
Meghan Woods, GIS Analyst, Forest Health Monitoring, Sanborn Map Company

California Department of Food and Agriculture
Cheryl Blomquist, Plant Pathologist
Kevin Hoffman, Environmental Program Manager
Suzanne Rooney Latham, Plant Pathologist
Erin Lovig, Environmental Scientist
Duane Schnabel, Branch Chief, Integrated Pest Control

United States Department of Agriculture, APHIS
Jinya (Jack) Qui, Pest Survey Specialist

University of California/California Cooperative Extension Service
Maia Beh, Sudden Oak Death Outreach Coordinator
Akif Eskalen, Plant Pathologist
Tom Gordon, Plant Pathologist
Greg Giusti, Forest Advisor
Patricia Maloney, Ecologist, Plant Pathologist
Katie Palmieri, Public Information Officer

Phytosphere Research, Inc.
Elizabeth Bernhardt, Plant Pathologist
Tedmund Swiecki, Plant Pathologist

Nevada Division of Forestry
Gail Durham, Forest Health Specialist
Roland Shaw, Forester III

United States Customs and Border Protection
Robin Wall, California Agriculture Liaison

Cover Photos

Top: Maple leaf scorch, caused by *Xylella fastidiosa*, taken along Highway 50 in El Dorado County. Photo Credit: Bill Woodruff

Middle: Mountain pine beetle-caused mortality of whitebark pine on June Mountain. Photo Credit: Martin MacKenzie

Middle: Cape Ivy (*Delairea odorata*), an invasive plant along the coastal hills throughout central California, smothering native vegetation at Brazil Ranch, on the Los Padres National Forest. Photo Credit: Dave Bakke

Bottom: Devil's Postpile National Monument blowdown event. Photo Credit: Beverly Bulaon

Table of Contents

List of Figures

List of Maps

List of Tables

THE CALIFORNIA FOREST PEST COUNCIL

The California Forest Pest Council, a 501(c)(3) 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, plant pathologists, biologists, and others interested in the protection of California's urban and wildland forests from injury caused by biotic and abiotic agents. The Council's objectives are to establish, maintain, and improve communication among individuals who are concerned with these issues. These objectives are accomplished by:

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

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

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

4. Reviewing policy, legal, and research aspects of forest pest management and submitting recommendations to appropriate authorities.

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

The California Board of Forestry and Fire Protection 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 was prepared by Forest Health Protection, USDA Forest Service, Pacific Southwest Region and the California Department of Forestry and Fire Protection with other member organizations of the Council. It was published by the California Department of Forestry and Fire Protection and distributed by it and the USDA Forest Service.

The report can be found online at: http://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fsbdev3_046704.

California Forest Pest Conditions 2012

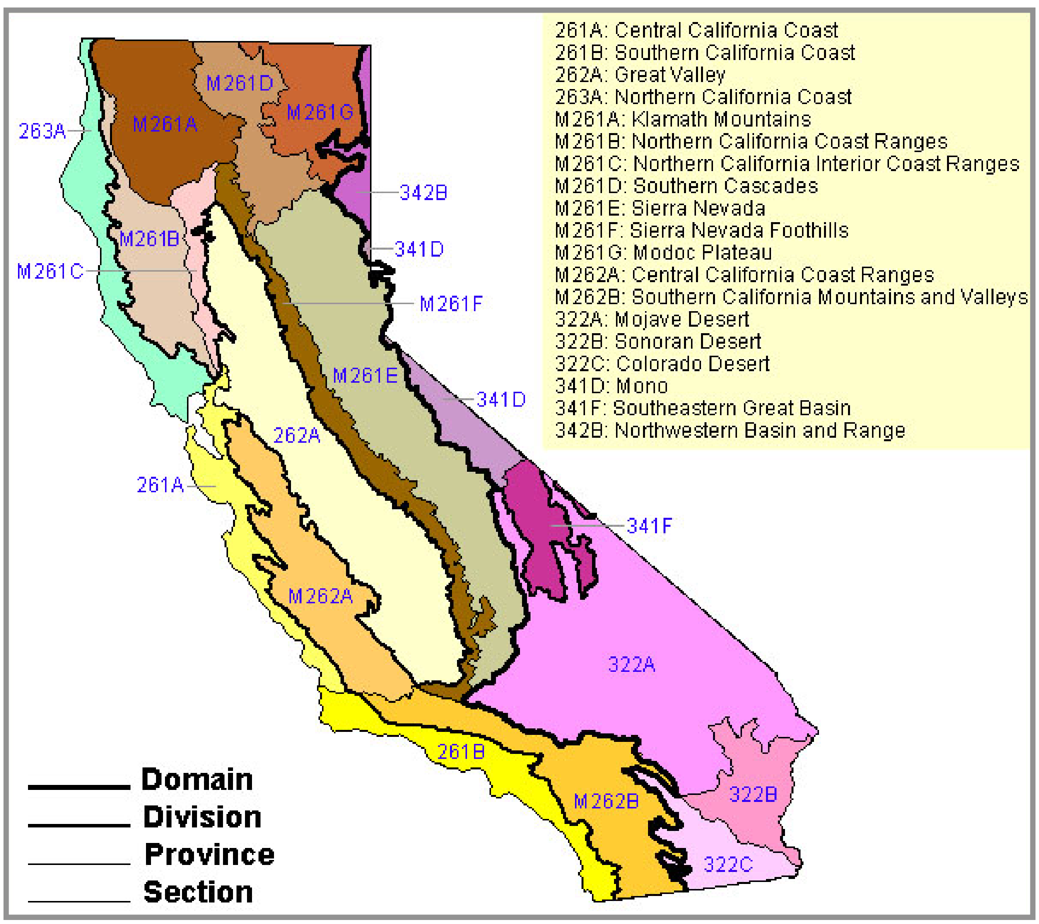
Introduction

By Tom Smith and Katie Palmieri

The 2012 edition of the California Forest Pest Conditions Report covers forest health and pest issues impacting California's forests, woodlands, and urban trees throughout the 2012 year, and is intended to be a resource for forest managers, pest management specialists, landowners, and other interested parties both within and outside of California.

The annual Forest Pest Conditions Report was first published in 1949 as the California Forest Insect Report. Over the years sections have been added, covering forest diseases, abiotic damage, animal damage, invasive weeds, aerial detection and monitoring of forest mortality, and firewood movement into California as well as within its borders. New in 2012 is a report from the United States Customs and Border Protection, covering issues related to invasive wood boring pests via the importation of wood packaging material. As exotic invasive pests and diseases of all types remain the greatest threat to the health of California's urban and wildland forests and woodlands, potential pathways for their introduction are a top concern.

This report is a publication of the California Forest Pest Council and its associated members; therefore, the information provided is from numerous sources. The primary source for forest health issues related to federally managed lands in California is the USDA Forest Service, Pacific Southwest Region, Forest Health Protection. Most of the information concerning issues on state and private lands is provided by the Forest Pest Management Unit of the California Department of Forestry and Fire Protection (CAL FIRE). Other major sources for



Map 1: Ecoregions of California, Bailey.

information include the California Department of Food and Agriculture (CDFA), the University of California (UC), and UC Cooperative Extension. Without the valuable input from personnel within these and many other organizations, as well as concerned individuals, this publication would not be possible.

Information in this report is organized into several sections, including Insect Conditions, Disease Conditions, Abiotic Conditions, Animal Damage, Invasive Plants, and Monitoring. Incidents of pests and pest damage are referenced by counties or according to ecological units of California as defined in Ecoregions and Subregions of the United States (Map 1, Bailey, et al., 1994).

This report is also available online at: www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fsbdev3_046704.

2012 Significant Events

By Tom Smith

California's rainfall was below normal in 2012 and followed erratic patterns, with late spring and early summer rains during times of the year that are normally dry. Snowpack was also low, averaging only 55 percent of normal. These variances had profound impacts on general forest health, insects, and diseases across the state, including:

- Western pine beetle and mountain pine beetle activity increased.
- White fir sawfly defoliation was widespread in northeastern California.
- Satin moth-caused defoliation of aspens was locally important as was California oakworm-caused defoliation.
- The goldspotted oak borer continued to spread and kill oaks in San Diego County.
- The polyphagous shot hole borer (new ambrosia beetle) and associated *Fusarium* caused mortality of various hardwood trees in Los Angeles and Orange Counties.
- Sudden oak death mortality intensified in coastal counties and a new northern isolated site in Humboldt County was discovered.
- Pitch canker disease damage increased in the Point Reyes National Seashore area.
- Anthracnose diseases were common throughout the state.
- Decreased snowpack resulted in cold damage to many smaller trees and understory vegetation in the Sierra Nevada Mountains.
- A major wind event uprooted and killed many trees on the east side of the Sierra Nevada Mountains in the Devils Postpile National Monument area.
- Black bear damage to conifers remained a serious problem in northern coastal counties.
- Funding cuts resulted in the elimination of California's noxious weed program.

Insect Conditions

Insect Conditions in Brief

By Danny Cluck

BARK BEETLES

Bark beetle-caused conifer mortality increased throughout California in 2012 due in part to the dry conditions that followed a below normal precipitation year (75 percent of average statewide) and a below normal snowpack (April 1st snowpack was 55 percent of average statewide). Undesirable stand conditions, including dense stocking, altered species composition, and high levels of disease also contributed to elevated levels of bark beetle activity.

Western pine beetle-caused mortality of ponderosa pine and Coulter pine increased in nearly all parts of the trees' ranges. Large groups of ponderosa pines were killed on lower elevation and drier sites or sites impacted by root disease and fire. Within existing outbreak areas, mountain pine beetle continued to cause high levels of mortality in whitebark and lodgepole pine. Mountain pine beetle activity in sugar pine also increased in many locations. Jeffrey pine beetle activity increased slightly throughout the state in 2012, while fir engraver beetle activity generally declined from 2011 levels. Douglas-fir beetle activity was observed in northeastern California for the first time in many years, where it was found attacking large diameter trees in dense stands.

DEFOLIATORS

Douglas-fir tussock moth populations increased in a few areas based on pheromone trap catches. High trap-catch locations were subsequently sampled for larval and/or egg mass density to further define population levels. Only one plot on the Tahoe National Forest (NF) had larval populations that were high enough to qualify as an incipient outbreak; however, there was no visible defoliation at the site nor was there in any other area of the state.

Defoliation caused by the white fir sawfly was widespread in northeastern California. Defoliation was heaviest on sapling and pole-sized trees and on the lower crowns of mature trees. White fir in some defoliated areas also sustained frost injury to elongating shoots in late spring. The combined damage resulted in completely defoliated crowns rather than just the loss of older foliage due to sawfly feeding. Activity by the black oak leaf miner remained high in both intensity and number of acres on the Tahoe NF in 2012, yet no tree mortality has been documented as a result of this 8-year outbreak. Satin moth feeding on aspen caused heavy defoliation of stands in the Lake Tahoe Basin and on the Lassen NF. This was the first report of this insect causing defoliation of aspen in several years. The California oakworm outbreak continued in the Carmel and Monterey areas, causing heavy defoliation of blue, valley, and coast live oaks.

INVASIVE INSECTS

The polyphagous shot hole borer, an invasive ambrosia beetle, has emerged as a significant pest in southern California. In 2012 it was associated with tree injury and was found carrying a newly identified species of *Fusarium*. This insect-disease complex has caused dieback and tree mortality of numerous native and non-native hardwood species.

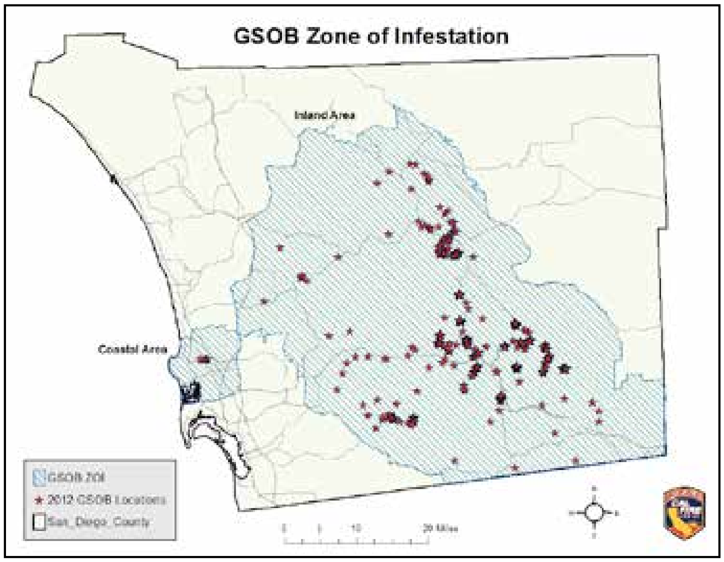
The invasive goldspotted oak borer continued its slow spread through San Diego County, killing approximately 1,500 oaks in 2012. A Zone of Infestation was established on September 12, 2012 for San Diego County by the California Board of Forestry and Fire Protection to increase awareness of the potential threat to the rest of the state and further support control efforts.

Invasive Insects

Goldspotted Oak Borer

Agrilus auroguttatus

Contributions by: Kim Camilli and Tom Coleman



Map 2: Goldspotted oak borer Zone of Infestation.

Map by: K. Camilli

M262B

The goldspotted oak borer, an invasive wood boring beetle, continued to kill coast live oak and California black oak in eastern San Diego County (M262B), with 1,567 dead trees identified during the 2012 annual USDA Forest Service aerial survey. Tree mortality continued within the Cleveland NF, Descanso Ranger District, and also expanded to northern and southwestern regions of the county.

Over the last two years, a coordinated multiagency effort has been made to slow the spread of the goldspotted oak borer. Yet, the looming threat of this beetle moving beyond San Diego County required additional proactive steps to be taken. In response to this need, a Zone of Infestation was established on September 12, 2012 for San Diego County by the California Board of Forestry and Fire Protection. The Zone of Infestation, which consists of two areas totaling 1.25 million acres in San Diego County, has significantly bolstered the goldspotted oak borer effort and elevated awareness of its potential threat to the state.

Polyphagous Shot Hole Borer

Euwallacea sp.

Contributions by: Kim Camilli, Tom Coleman, Akif Eskalen, and Tom Smith

261B

The polyphagous shot hole borer, *Euwallacea* sp., has been linked to tree injury and mortality on private land in Los Angeles and Orange Counties (261B). First detected in southern California in 2003, it had not previously been associated with tree injury; however, in 2012, the ambrosia beetle was found carrying a new species of *Fusarium* (yet to be fully identified). This insect-disease complex caused dieback and tree mortality of numerous native and non-native hardwood species in 2012, including English oak and box elder in the urban

Fig 1: Exudate on English oak.

Photo by: K. Camilli

Fig 2: Adult polyphagous ambrosia beetle.

Photo by: K. Camilli

areas of Los Angeles County. California sycamore, California bay laurel, coast live oak, big-leaf maple, and avocado (cvs. Hass, Bacon, Fuerte, and Nabal) are also susceptible to the insect-disease complex and have shown cankering and crown dieback in urban areas, including several botanical gardens and arboretums. Symptoms have varied by species, but often include white powdery exudate either dry or surrounded by wet discoloration of the outer bark in association with a single beetle exit hole. Preliminary survey data conducted by Eskalen et al. from UC Riverside in 2012 showed that many trees in the urban landscape were heavily infested with this insect-disease complex, including several botanical gardens and arboretums. While it has not been detected on public lands, an infestation was found adjacent to the Angeles NF.

European Gypsy Moth
Lymantria dispar
Contributions by: Sheri Smith and California Department of Food and Agriculture

Border Protection Stations intercepted different life stages of gypsy moths (see Table 1) four times during 2012.

Table 1: European gypsy moth interceptions, 2012.

Border Protection Station	2012 Interception Dates	Origin	Found On	Life Stage
Truckee	April 6	Indiana	antique truck	old egg mass
Truckee	May 5	Michigan	antique auto	old egg mass
Yermo	August 9	Michigan	trailer	pupae
Yermo	August 9	Michigan	trailer	old egg mass


261B

Asian Gypsy Moth
Lymantria dispar
Contributions by: Sheri Smith and California Department of Food and Agriculture (CDFA)

In September 2012, one Asian gypsy moth was trapped in San Diego County (261B). CDFA and the USDA Animal and Plant Health Inspection Service are using established protocols to follow up on this detection.

Emerald Ash Borer
Agrilus planipennis
Contribution by: Jack Qui

A total of 128 traps were placed in California statewide to survey for the emerald ash borer (EAB) in 2012. The traps were distributed in 24 counties. Results for all of the traps were negative for EAB. Among the 128 trapping sites, 76 were identified as grids that had potential ash trees from a computer model developed by the USDA Forest Service, Forest Health Technology Enterprise Team (FHTET). Most of the 76 grid sites were located on city streets or at residences, parks, or schools. Seventy-three percent of the 284 grid sites did not have ash trees. The USDA APHIS Plant Protection and Quarantine national program will continue to use the FHTET model with modifications for the 2013 EAB survey.

Palm Weevils
Rhynchophorus ferrungineus (red palm weevil)
Rhynchophorus palmarum (South American palm weevil)
Contribution by: Kevin Hoffman

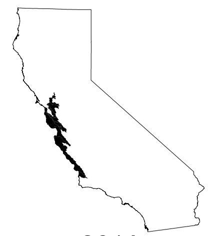
The red palm weevil (*Rhynchophorus ferrungineus*) was first found in California in 2011. In 2012, the California Department of Food and Agriculture (CDFA) trapped for exotic palm weevils in the southern part of the state. A thousand traps were deployed in 12 counties containing lures for the red palm weevil and the South American palm weevil. A single red palm weevil was found in Laguna Beach, Orange County, very near previous finds. For the South American palm weevil (*Rhynchophorus palmarum*), CDFA trapped 34 insects in San Diego County and one in Imperial County, all within 10 miles of the Mexican border (M262B). No regulatory or treatment activities occurred.

M262B

Light Brown Apple Moth
Epiphyas postvittana
Contribution by: Duane Schnabel

Trapping and inspections for the light brown apple moth (LBAM) continued throughout California in 2012. LBAM is an invasive pest native to Australia with a large host range, including numerous forest and shade trees (both native and exotic) as well as various crops. Counties regulated for LBAM include: Sonoma, Napa, Marin, Solano, Contra Costa, Alameda, Santa Clara, San Francisco, San Mateo, Santa Barbara, Santa Cruz, Monterey, San Benito, Los Angeles, San Luis Obispo, Yolo, San Diego, and San Joaquin. Delimitation trappings for potential outlier sites were conducted in: Monterey (two sites), Sacramento (one site), San Diego (three sites), San Joaquin (13 sites), San Luis Obispo (two sites), Santa Barbara (four sites), and Tuolumne (one site) Counties. Pheromone dispenser treatments were deployed in isolated LBAM infestations in Cuyucos (San Luis Obispo County), King Island/Guard Road (San Joaquin County), and Goleta (Santa Barbara County). The LBAM infestations in East San Diego (San Diego County); Davis (Yolo County); and Lockeford, Manteca, and King Island/Guard Road (San Joaquin County) were declared eradicated and interior quarantines were removed.

M261E



261A

American Tent Caterpillar
Malacosoma americanum
Contribution by: California Department of Food and Agriculture
(A and Q Pest Report No. 20-2012)

In May 2012, two separate vehicles contaminated with tent caterpillar pupae, cocoons, and egg masses pulled into the Truckee Border Protection Station (Placer County, M261E) – one with an infested trailer (Delaware plates) and one with infested metal framing material (New York plates). The Delaware trailer was thoroughly cleaned and the framing materials were fumigated.

Fig 3: American tent caterpillar egg masses, larvae, and pupae in the wheel well of a trailer.

Photo by: Truckee Border Station

Balsam Woolly Adelgid
Adelges piceae
Contributions by: Jack Marshall and Cynthia Snyder

Balsam wooly adelgid (BWA) was first reported in California in a 1928 publication, wherein the author reports BWA collected from *Abies pectinata*, *A. nobilis*, *A. nobilis* var. *glauca*, and *A. grandis* in Golden Gate Park and from *A. grandis* in Hillsborough (San Mateo County, 261A). No dates were given for the CA collections, but the assumption is that they were made before 1928. The author also indicated that it was quite likely that BWA was more widely distributed. BWA was later found in Palo Alto (Santa Clara County, 261A) (host unknown) in 1934 and at UC Berkeley (Alameda County, 263A) in 1958. Nothing was reported again until 1986, when a very light

Fig 4: Gouting caused by branch infestations of balsam wooly adelgid.

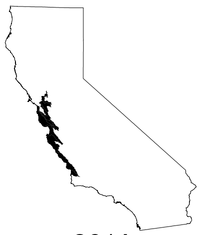
Photo by: C. Snyder

263A

Fig 5: Balsam wooly adelgid causing mortality in grand fir on the Mendocino Coast.

Photo by: C. Snyder

262A



261A

263A

infestation on Nordman fir (*Abies nordmanniana*) was found in Sacramento at Capitol Park (Sacramento County, 262A) and an extremely heavy infestation was found on a true fir in Los Altos (Santa Clara County, 261A).

In 2012, BWA populations were found on grand fir along a 20-mile stretch of coastal Mendocino County (263A) from the mouth of Ten Mile River, south to Dark Gulch. Woolly stem infestations were found at all 14 sites, but only the Ten Mile River locations had noticeable-to-moderate gouting of branches. Where gouting was occurring, crowns seemed most affected on leeward sides and at mid-crown locations. Fir engraver beetle-killed trees were found at Ten Mile River and Inglenook, but a close association between these attacks and BWA infestation was not determined. One property near Cleone had over half of its 70 grand fir infested, with heavily infested stems showing lots of pitching. No trees there had died from these infestations.

Native Insects

Bark Beetles

Jeffrey Pine Beetle

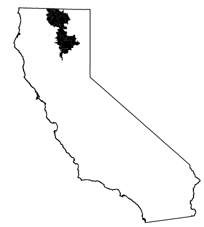
Dendroctonus jeffreyi

Contributions by: Beverly Bulaon and Danny Cluck

Jeffrey pine beetle activity continued to increase at the northwest entrance visitor center in Lassen Volcanic National Park (Shasta County, M261D), where approximately 50 Jeffrey pine trees were killed in 2012, ranging from 12-50 inches DBH. Approximately 12 larger diameter (>20 inches DBH) Jeffrey pine were also killed along Goumaz Road, Lassen NF (Lassen County, M261D). Additional areas where low, but increasing levels of Jeffrey pine beetle activity were observed, included the Lakes Basin (Plumas County, M261E) and along Highway 139 north of Said Valley Reservoir, Modoc NF (Lassen County, M261D).

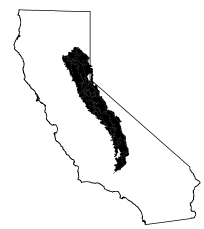
Fig 6: Large pitch tubes associated with Jeffrey pine beetle attacks, Lassen Volcanic National Park.

Photo by: D. Cluck



M261D

Low populations of Jeffrey pine beetle persisted in the Lake Tahoe Basin Management Unit around their most popular visitor areas and campgrounds: Camp Richardson, Fallen Leaf Lake, Tallac Historic Site, and Emerald Bay (El Dorado County, M261E). While Jeffrey pine beetle causes eventual mortality, site conditions such as poor soils, prior dwarf mistletoe infection, and dense stocking contributed to reduced vigor, making trees susceptible to attack. In Mono County (341D), the only notable activity was along Deadman Creek Road within a geothermal site that continues to have one to two mature Jeffrey pines attacked annually.



M261E

Mountain Pine Beetle

Dendroctonus ponderosae

Contributions by: Beverly Bulaon, Danny Cluck, Jack Marshall, and Cynthia Snyder

Mountain pine beetle continued to cause high levels of mortality of pine species in several locations during 2012. The most significant mortality areas were whitebark and western white pine stands in the Warner Mountain Range (Modoc County, M261G), lodgepole stands at Medicine Lake (Siskiyou County, M261D), and lodgepole and whitebark pine surrounding June Mountain (Inyo County, M261E). Mountain pine beetle activity also increased in sugar pine.

341D

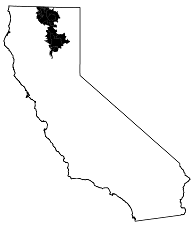
Lodgepole pine mortality continued in and around Martin's Dairy Campground near the Shovel Creek drainage on the Klamath NF (Siskiyou County, M261D). The campground and surrounding stands are part of the headwaters of the Little Shasta River and are adjacent to the Little Shasta Meadow Botanical Area, home to many species of flora unique to the area. It is also within the Goosenest Late-Successional Reserve. These stands have had ongoing lodgepole pine mortality due to mountain pine beetle attacks since the major outbreak of 2006. Most of the mature

Fig 7: Mountain pine beetle mortality continues as predicted by D. Cluck in 2006 in Martin's Dairy Campground.

Photo by: C. Snyder

M261G

M261G



M261D

lodgepole pine within the campgrounds have been killed and subsequently removed as hazard trees. This has left a dense white fir forest, with scattered young and very few residual mature lodgepole pines.

Mountain pine beetle activity in lodgepole and whitebark pine continued in northeastern California. In the Warner Mountains of Modoc NF (Modoc County, M261G), mountain pine beetles continued to attack larger diameter (>10 inches DBH) western white and whitebark pines. Attacks on lodgepole pine increased at Medicine Lake, Modoc NF (Siskiyou County, M261D), where several large groups of dead trees (>20) were observed. On the Lassen NF, mountain pine beetle were found killing lodgepole pine near Ashpan Butte and Bunchgrass Valley (Shasta County, M261D).

Mountain pine beetle activity in lodgepole pine stands throughout southern Sierra forests has slowly subsided to background levels. High Meadows, Lake Tahoe Basin Management Unit (El Dorado County, M261E), continued to see minor beetle activity move into outlying areas, but overall levels significantly diminished. Eagle Meadows, Stanislaus NF (Tuolumne County, M261E), had a few new group kills of five to eight trees, most of which were already in poor condition near roads or in campgrounds. June Mountain Ski Area (Mono County, M261E) has been the most severely devastated with an average of 50 percent or more of whitebark large-tree canopy loss compounded over six years since the start of the outbreak. Mountain pine beetle appears to be moving downslope in elevation, transitioning from pure whitebark stands to more dominant lodgepole pine stands. Beetle attack behavior in lodgepole stands is similar to whitebark stands, with approximately 45 percent of the largest trees attacked (>15 inches) within any given stand with a basal area of >120 ft^2/acre. South of June Mountain (Glass Creek Wilderness), beetles remained in the whitebark pine belt, attacking clumps of two to five large diameter trees. Along both north and south ranges of the Rock Creek Watershed, in the Wheeler Ridge and Hilton Lakes areas (Mono County, M261E), beetle activity decreased, but groups of two to four fading trees per acre were still observed near previously killed trees.

Fig 8: Mountain pine beetle mortality in whitebark pine, June Mountain, Inyo NF.

Photo by: B. Bulaon

M261E

M261A

M261B

Mountain pine beetle is the primary cause of mortality in mature sugar pine in northwestern California. Scattered mortality of single trees or small pockets of two to three trees can be found throughout the range of the species. Of note were some scattered mature trees on Gordon Hill in the Six Rivers NF (Del Norte County, M261A). These trees were often growing in very dense stands. A few sugar pines were also killed by mountain pine beetle in the southwest portion of Mendocino County (M261B) along Fish Rock Road. At least one tree was predisposed to attack as it had road bladed soil pushed over the uphill side of its root system.

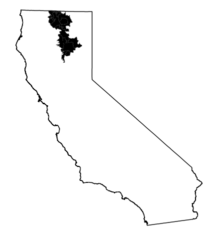
Mountain pine beetle attacks increased on scattered large diameter sugar pines (>24 inches DBH) in many mixed conifer areas within the western portions of the Lassen and Plumas National Forests (Lassen and Tehama Counties, M261D and Plumas County, M261E).

Large diameter sugar pine (>30 inches DBH) mortality caused by a combination of mountain pine beetle and white pine blister rust continued in the southern latitudes. On the Sequoia NF (Kern and Tulare Counties, M261E), mature sugar pines were declining in stands where basal area was greater than 200 ft^2/acre, and incense-cedar regeneration dominated the understory. This was most noticeable (one to two trees per acre) along the Western Divide Highway. Other areas of activity were Pinecrest Basin Recreation Area, Stanislaus NF (Tuolumne County, M261E), where four (~25 inch DBH) sugar pines were killed, as well as along a 10-mile stretch of Forest Service Road 14 to Cherry Lake (Tuolumne County, M261E), where 20 groups of one to four (~18 inch DBH) sugar pines were killed. Two sugar pines per acre of various sizes were being killed along Forest Service Road 6, El Dorado NF (El Dorado County, M261E) and along Dinkey Creek Road, Sierra NF (Fresno County, M261E).

M261E

Western Pine Beetle
Dendroctonus brevicomis
Contributions by: Beverly Bulaon, Danny Cluck, Tom Coleman, Don Owen, and Cynthia Snyder

Western pine beetle activity generally increased in response to below normal precipitation. Activity was reported at elevated levels in most locations in northeastern California. Elsewhere in northern California, sharp increases in beetle activity occurred in ponderosa pine stands impacted by black stain root disease. In southern California, activity was mostly restricted to ponderosa and Coulter pine within previously burned areas. Elevated tree mortality in the southern Sierra Nevada Mountains mostly occurred among lower elevation ponderosa pines.



M261D

A property owner in Old Station (Shasta County, M261D) lost numerous mature ponderosa pines to attack by western pine beetle starting in 2011 and increasing in 2012. The property is adjacent to the 2008 Sugarloaf Fire that occurred on the Lassen NF. Perusal within the fire perimeter revealed that western pine beetle was killing trees that were damaged, but not directly killed by the fire. Such latent attacks by the western pine beetle are not unusual. Expansion of beetle activity beyond the fire perimeter may be a consequence of elevated beetle numbers and tree stress due to drought.

M261B

Scattered, low vigor ponderosa pines were killed by the western pine beetle in areas impacted by black pineleaf scale in the Burney and Fall River areas (Shasta County, M261D).

Western pine beetle continued to be the primary cause of ponderosa pine mortality in northern California, especially in overstocked plantations. The McCloud Flats area of the Shasta-Trinity NF (Siskiyou County, M261D) continued to have extensive western pine beetle-caused mortality due to overstocking and black stain root disease (caused by *Leptographium wageneri*). The Pilgrim Creek area of McCloud Flats has experienced extensive ponderosa pine mortality for more than 40 years. Nearly 7,000 acres with 2 to 30 trees per acre were affected in 2011. A single stand of approximately 250 acres experienced nearly 100 percent mortality during 2011 and 2012. Many other stands in the area have large patches of mortality that continue to expand.

Fig 9: Western pine beetle-caused mortality in ponderosa pine following snow damage at Horse Mountain, Mendocino NF, Upper Lake RD.

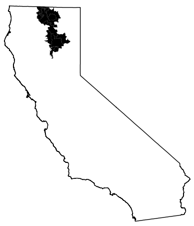
Photo by: C. Snyder

Western pine beetle-caused mortality was noted in areas with dense stocking along the Log Springs (M9) Road on the Mendocino NF, (Lake County, M261B). A stand of approximately 250 acres along the M9 Road contained several large pockets (>20 trees) of mortality that continued to grow and coalesce. Increased tree mortality in dense stands in the Humbug Creek drainage, Klamath NF (Siskiyou County, M261A), was also noted.

M261A

On Horse Mountain, Mendocino NF (Lake County, M261B), the two previous winters produced unusual amounts of heavy snow and high winds causing approximately 50 acres of blow down

M261B



M261D

M261E

M262B

and broken stems in ponderosa pine plantations. This led to an increase in western pine beetle activity in residual trees and surrounding stands. Western pine beetle also caused small pockets of mortality along the edges of areas that burned in the last four to five years. This was noted on the Round Valley Reservation near Covelo (Mendocino County, M261B), where approximately 10 acres of ponderosa pine have annually had scattered pockets of mortality following the 2008 MEU Lightning Fire.

Western pine beetle attacks on ponderosa pine increased throughout northeastern California. Notable areas (groups of ~15 trees) included Rail Mountain, Buck Creek, and an area just north of Canby along Highway 139 on the Modoc NF (Modoc County, M261D). High levels of activity were also observed within and adjacent to the 2008 Sugarloaf Fire on the Lassen NF (Shasta County, M261D).

Scattered western pine beetle-caused mortality in the southern Sierras was found within overstocked, large diameter ponderosa pine stands and drier low elevation sites. Twelve ponderosa pines were attacked at the Bass Lake Visitors Center (Madera County, M261E) next to older group kills that have occurred each year since 2009. Homeowners in Tuolumne County (M261E) have been removing attacked trees as they occur, but have not been addressing density through prevention thinning. Ponderosa pines growing next to long-term water sources (e.g., rivers, creeks, lakes, etc.) throughout the California Gold Country (Tuolumne, Madera, Mariposa, Fresno, Placer, and Tulare Counties, M261E) started to be attacked by western pine beetles due to extremely low water levels.

Western pine beetle activity was again concentrated in the Sierra NF, primarily within the Blue Canyon Watershed (Fresno County, M261E) and Pilot Peak area (Mariposa County, M261E). Groups of dead ponderosa pines (8 to 12 trees, averaging >18 inches DBH) were once again detected within Blue Canyon along Peterson Mill Road, Soaproot and Nutmeg Saddles, Dinkey Creek, and around Bretz Mill Campground. Plantations near Pilot Peak, which were previously thinned, masticated, and burned to prevent large-scale mortality, had high levels of western pine beetle activity (>30 trees). Densely stocked native stands (>200 ft^2/acre) between these plantations were also attacked by western, red turpentine, and pine engraver beetles.

Western pine beetle continued to kill Coulter pine and ponderosa pine previously injured by wildfire on the Angeles NF (Los Angeles County, M262B). Tree mortality was scattered throughout areas of the Station Fire on the Angeles NF. Ponderosa pine mortality was detected at higher levels than in 2011 near Barley Flats Rd, Messenger Flats Campground, Lightning Point Campground, and Charlton Flats Picnic Area. Tree mortality spanned 426 acres in these areas.

Fig 10: Continued large group mortality of mature ponderosa pines due to western pine beetle within Blue Canyon Watershed, High Sierra RD, Sierra NF.

Photo by: B. Bulaon

Coulter pine was killed by western pine beetle in the areas of Figueroa Mountain, San Rafael Mountain, Santa Cruz Peak, and Big Pine Mountain on the Los Padres NF (Santa Barbara County, M262B). Aerial surveys mapped 1,185 acres across the four areas. Tree mortality occurred at low levels in 2010 and 2011 from western pine beetle, but significantly increased in 2012.

Fig 11: Douglas-fir killed by Douglas-fir beetle, Lassen NF.

Photo by: D. Cluck

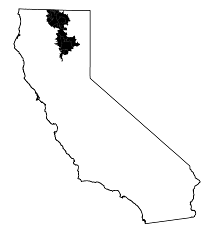
Fig 12: Reddish frass on lower bole indicating attack by Douglas-fir beetle, Plumas NF.

Photo by: D. Cluck

Red Turpentine Beetle
Dendroctonus valens
Contributions by: Beverly Bulaon, Jack Marshall, and Don Owen

263A

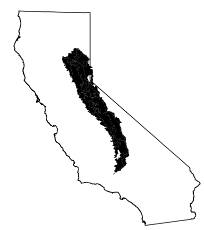
Large Monterey pines with severe crown thinning were found over a few acres near Cleone (Mendocino County, 263A). Red turpentine beetle attacks near tree bases were partly responsible for the decline, along with Schweinitzii root disease and lack of irrigation of the surrounding lawn.



M261D

Red turpentine beetles colonized ponderosa pines killed by western pine beetle in the vicinities of Burney, Fall River, and Old Station (Shasta County, M261D). They were also associated with western pine beetle attacks in overcrowded large diameter ponderosa pine stands and boles of snapped ponderosa pines from recent winter damage within Tuolumne, Calaveras, Madera, and Mariposa Counties (M261E). Several pines (>18 inches DBH) at Pinecrest Campground on the Stanislaus NF (Tuolumne County, M261E) were attacked multiple times by red turpentine beetles up to 10 feet from ground line.

Douglas-fir Beetle
Dendroctonus pseudotsugae
Contribution by: Danny Cluck



M261E

Douglas-fir beetles killed several groups of Douglas-fir within the southeastern portion of the Lassen NF and the northeastern portion of the Plumas NF (Lassen and Plumas Counties, M261E). Groups of up to 50 attacked trees, mostly consisting of densely stocked larger diameter stems (>18 inches DBH), were found in north facing drainages in the areas of Willard Creek, Janesville, and Wheeler Peak. This was the first Douglas-fir beetle activity recorded in these areas in many years.

Fir Engraver
Scolytus ventralis
Contributions by: Beverly Bulaon, Danny Cluck, Tom Coleman, Jack Marshall, and Cynthia Snyder

Fir engraver beetle-killed trees were found at the mouth of the Ten Mile River and in Inglenook (Mendocino County, 263A) in areas infested with balsam woolly adelgid (*Adelges piceae*). However, a clear association between the two pests was not established.

Fir engraver beetle activity in northwestern California is often closely associated with stress conditions, such as overstocking, drought, and root disease infections. Activity levels in 2012 were much lower than in the past several years, perhaps due to increased precipitation in 2010 and 2011.

Fir engraver beetle-caused mortality continued to decline throughout northeastern California. However, significant white fir mortality still occurred in some areas. One of these areas was

M261D

within Blacks Mountain Experimental Forest, where many white firs previously injured by fire were attacked by fir engraver beetles and/or woodborers (Lassen County, M261D).

Fir engraver beetles attacked white fir that had been severely defoliated by the Douglas-fir tussock moth on the San Bernardino NF (San Bernardino County, M262B). Tree mortality was isolated to 87 acres near the Bear Mountain Ski Resort. The Douglas-fir tussock moth outbreak subsided, so tree mortality associated with the fir engraver will likely decline in 2013.

California Fivespined Ips
Ips paraconfusus
Contributions by: Beverly Bulaon and Don Owen

Top-kill occurred in the crowns of numerous mature ponderosa pines near the intersection of Tamarack and Bateman Roads, east of Whitmore (Shasta County, M261D). The damage was most likely caused by *Ips paraconfusus*, with drought stress being a predisposing factor.

Small groups of pines throughout the west side of the southern Sierra Nevada Mountains were blown down and/or snapped off by severe windstorms that occurred early in the winter season. Many of these trees were eventually attacked by *Ips* sp. (most likely *Ips paraconfusus*). Attacks were concentrated on smaller diameter stems (<9 inches DBH). Last year along Hull Creek Road (Tuolumne County, M261E), three >22 inch DBH ponderosa pines were uprooted during a storm and removed as firewood by local residents. The remaining 20 foot tops of each downed tree were left and subsequently infested by *Ips* sp. that reproduced and moved into surrounding green trees. Seventy trees were killed by *Ips* sp. (3 to 6 inches DBH) in 2011 and another 20 were killed in 2012.

Fig 13: Mortality caused by western pine and Ips bark beetles along Hull Creek Rd. (Tuolumne Co.). Unusual soil properties may have contributed to tree stress.

Photo by: B. Bulaon

M261E

Storm damage also led to hundreds of small trees (<6 inches DBH) being attacked and killed by *Ips* sp. in the area of Sky Ranch, Sierra NF (Madera County, M261E) and along Highway 120 where tight groups of pine regeneration lined the road (Tuolumne County, M261E).

Pinyon Ips
Ips confusus
Contribution by: Tom Coleman

M262B

Black stain root disease continued to predispose singleleaf pinyon pine to attack from the pinyon Ips on the San Bernardino NF (San Bernardino County, M262B). Tree mortality was recorded across 259 acres near Highway 38 east of Big Bear City. Tree mortality has been persistent in the area for five years and will likely continue in 2013. Red turpentine beetle and mountain pine beetle concurrently attacked trees with the pinyon Ips in the area.

Tree mortality associated with the pinyon Ips expanded in areas west of Frazier Park on the Los Padres NF, Mt. Pinos Ranger District (Kern County, M262B). Singleleaf pinyon pines were killed across 364 acres. Heterobasidion root disease was frequently associated with forest stands in the area.

Pine Engraver Beetles
Ips spp.
Contributions by: Beverly Bulaon, Jack Marshall, and Cynthia Snyder

Ips mexicanus attacked and killed a large Monterey pine in the Virgin Creek area of

MacKerricher State Park (Mendocino County, 263A).

Fig 14: *Ips* sp. have been causing widespread mortality in knobcone pine in the Whiskeytown National Recreation Area.

Photo by: C. Snyder

Engraver beetles continued to attack pitch canker-infected Monterey and Bishop pines in the Point Reyes National Seashore area (Marin County, 263A).

Ips spp. were noted on Horse Mountain on the Mendocino NF (Lake County, M261B) where two consecutive winters with heavy snow and high winds created approximately 50 acres of down and broken-topped ponderosa pine trees. *Ips* spp. also caused mortality of knobcone pine around Whiskeytown National Recreation Area (Shasta County, M261C). These trees were stressed due to high density, drought, and human-caused damage.

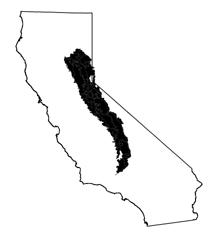
263A

The severe blowdown that occurred within Reds Meadows Recreation Area, Inyo NF, Devils Postpile National Monument (Mono County, M261E), and a 2-mile stretch through Yosemite National Park near Mono Pass trail (Tuolumne County, M261E) was primarily in dense lodgepole pine and red fir-dominated forests. Pine engravers were surprisingly scarce, and were only found in a few uprooted lodgepole pines, with attacks scattered along the topsides and undersides. Beetles selected areas where trees had toppled and "piled up," infesting the shaded portions of boles and trunks.

M261C

Oak Bark Beetle
Pseudpityophthorus pubipennis
Contribution by: Tom Smith

Interior live oak and blue oak at a couple of locations in El Dorado and Placer Counties (M261F) exhibited foaming spots along their trunks caused by oak bark beetle and associated ambrosia beetle (*Monarthrum* spp.) attacks. In each case, recently cut oak firewood had been stacked next to these trees. The attacks were initiated by bark beetles that were attracted to the firewood or that emerged from it. The otherwise healthy trees appeared to be pushing the beetles out with foamy sap and were expected to survive.



M261E

M261F

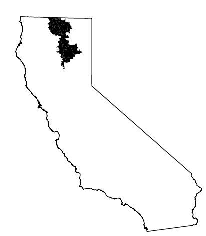
Defoliators

Black Oak Leaf Miner
Eriocraniella aurosparsella
Contribution by: Danny Cluck

Black oak leaf miner activity was apparent on approximately 10,000 acres in the Blue Canyon area, Tahoe NF (Placer County, M261E). This is the eighth consecutive year of blotch mining activity on California black oak foliage in this area. The leaf mining results in partial defoliation that so far has not resulted in any branch dieback or tree mortality.

Douglas-fir Tussock Moth
Orgyia pseudotsugata
Contributions by: Beverly Bulaon, Kim Camilli, Danny Cluck, and Don Owen

Douglas-fir tussock moth trap catches in 2011 increased for the first time in five years in several locations of northeastern California and the southern Sierras. Plots with high trap counts were located on the Tahoe, Lassen, Eldorado, and Stanislaus National Forests (M261E), and on private timberland near Burney (M261D). In both regions, larval and/or

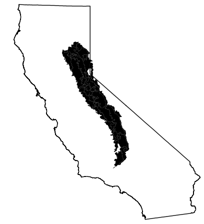


M261D

Table 2: Number of Douglas-fir Tussock Moth pheromone detection survey plots by trap catch for 2000-2012 for California

Year	Total # of Plots	NUMBER OF PLOTS WITH AN AVERAGE MOTH CATCH PER TRAP OF:												
		0<10	10<20	20<25	25<30	30<35	35<40	40<45	45<50	50<55	55<60	60<65	65<70	70<75	75+
2000	185	154	15	4	4	0	1	2	2	2	0	0	1	0	0
	100%	83%	8%	2%	2%		<1%	1%	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%		<1%	<1%						
2002	168	126	31	5	3	3	0	0	0	0	0	0	0	0	0
	100%	75%	18%	3%	2%	2%									
2003	163	53	42	11	11	10	14	13	3	1	4	0	1	0	0
	100%	32%	26%	7%	7%	6%	8%	8%	2%	1%	2%		1%		
2004	174	68	43	6	16	11	6	5	3	0	2	1	1	0	0
	* 93%	39%	25%	3%	9%	6%	3%	3%	2%		1%	<1%	<1%		
2005	195	139	15	11	7	4	3	2	3	1	0	0	0	1	1
	*95%	71%	8%	5%	4%	2%	2%	1%	2%	<1%				<1%	<1%
2006	164	98	26	8	8	5	3	4	3	4	2	0	1	1	1
	100%	60%	16%	5%	5%	3%	2%	2%	2%	2%	2%		<1%	<1%	<1%
2007	164	157	6	0	0	1	0	0	0	0	0	0	0	0	0
	100%	96%	4%			<1%									
2008	155	155	0	0	0	0	0	0	0	0	0	0	0	0	0
	100%	100%													
2009	147	144	3	0	0	0	0	0	0	0	0	0	0	0	0
	*93%	98%	2%												
2010	142	134	6	2	0	0	0	0	0	0	0	0	0	0	0
	*90%	94%	4%	1%											
2011	146	100	23	5	7	5	2	2	1	2	1	0	0	0	0
	*90%	68%	16%	3%	5%	3%	1%	1%	<1%	1%	<1%				
2012	133	76	18	5	7	4	7	3	4	4	4	1	1	0	0
	*82%	57%	14%	4%	5%	3%	5%	2%	3%	3%	3%	<1%	<1%		

*Some Plots were not collected due to weather egg mass surveys were conducted at plots with high trap counts. The only site with larval densities that indicated incipient outbreak population levels was on the Tahoe NF, southwest of Saddleback Mountain (Sierra County, M261E). No Douglas-fir tussock moth defoliation was mapped anywhere in California during the 2012 aerial detection survey flights.



M261E

The outbreak of the Douglas-fir tussock moth at Big Bear Lake ended in 2012. The outbreak started in 2009 and impacted many of the white fir in the Big Bear area (San Bernardino County, M262B). Typical Douglas-fir tussock moth outbreaks last three to four years, and each year can be thought of as a different phase. In 2010 (second year, peak phase), defoliation was visible on most host trees and caterpillar numbers increased. In 2011 (decline phase), defoliation was repeated on all trees, but caterpillar numbers declined sharply. In 2012, no new defoliation was found and caterpillars were scarce.

Fall Webworm
Hyphantria cunea
Contributions by: Beverly Bulaon, Danny Cluck, and Tom Smith

Fig 15: Fall webworm larva and feeding injury to madrone leaf surface, Tahoe NF.

Photo by: D. Cluck

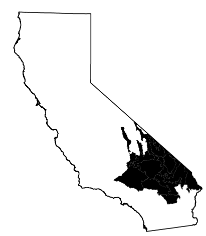
Fig 16: Webbing and feeding injury on madrone leaves caused by fall webworm, Tahoe NF.

Photo by: D. Cluck

Fall webworm defoliated the entire crowns of many pacific madrones in the Foresthill area (Placer County, M261E) along the Foresthill Divide Road. This was the second year of defoliation for many trees in this area. Fall webworm defoliation was also common on madrone in Nevada County (M261E). Trees tended to be on north facing slopes at 3,000 ft elevation and above. Many trees were severely defoliated and some showed signs of leaf blight.

Damage from fall webworm remained chronic on alder, madrone, and cottonwood along Highways 88 and 49 in Amador and El Dorado Counties (M261E). Even though entire trees have been covered in webs, no host tree mortality has ever been reported

Pinyon Sawfly
Neodiprion edulicolus
Contribution by: Beverly Bulaon



322A

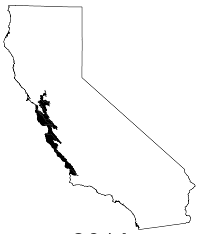
Minimal to no sawfly activity was noted in Death Valley National Park (Inyo County, 322A) in 2012. Trees that had been defoliated for the past three years were exhibiting new growth and retaining older needles.

Fruittree Leaf Roller
Archips argyrospila
Contribution by: Tom Coleman

M262B

Defoliation from the fruittree leaf roller expanded on the San Bernardino NF from Crestline to the communities around Lake Arrowhead (San Bernardino County, M262B). Tree mortality was not associated with the caterpillar feeding, but high levels of defoliation (>75 percent) were noted in some areas along Highway 138 and Crest Forest Drive. Defoliation predominantly occurred on California black oak, with minor levels of injury observed on interior live oak and canyon live oak.

M261B



261A

California Oakworm
Phyrganidia californica
Contributions by: Kim Camilli, Tom Coleman, and Jack Marshall

Shrub- and tree-sized canyon live oaks were severely defoliated by California oakworm along Bottle Rock Road (Lake County, M261B). The infestation was nearly five acres in size in 2011, and appreciably increased in 2012, especially east of Bottle Rock Road.

California oakworm outbreaks continued in the Carmel Valley area and the northeastern edge of the Monterey Ranger District on the Los Padres NF (Monterey County, 261A). High levels of defoliation were detected in 2011, with the outbreak covering an estimated 8,860 acres on public and private land. Coast live oak was the primary defoliated species, but caterpillar populations also fed on valley and blue oak. Defoliation occurred at very high levels (>75 percent) across all three oak species. A smaller outbreak was also detected in Santa Paula on the southern edge of the Los Padres NF in Ventura County (M262B), where similar levels of defoliation were limited to coast live oak.

Fig 17: White fir sawfly larvae feeding on foliage, Lassen NF.

Photo by: R. Mahnke

White Fir Sawfly
Neodiprion abietis
Contributions by: Danny Cluck and Don Owen

Defoliation of white fir caused by a *Neodiprion* sp. (*N. abietis* complex) of sawfly occurred in a number of locations on private land in northern California: northeast of Little Grass Valley Reservoir (Plumas and Sierra Counties, M261E); near Jackson Lake (Nevada County, M261E); and on Deer Springs Ridge (Modoc County, M261G). The amount of private land impacted was estimated at 500-1,000 acres per location. Notable areas of defoliation on National Forests included Hog Flat and Hamilton Mountain, Lassen NF (Lassen County, M261D); Smith Peak and Little Grass Valley Reservoir, Plumas NF (Plumas County, M261E); and Jackson Meadows Reservoir, Tahoe NF (Sierra County, M261E). Feeding by this sawfly is largely restricted to older needles and typically is worse on understory trees. Outbreaks are usually short lived and dieback or mortality is unlikely unless other stressors are present.

M262B

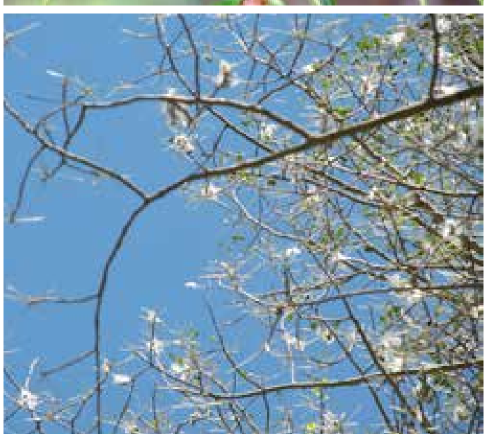


Fig 18: Satin moth defoliation of aspen.

Photo by: R. Shaw

M261E

Satin Moth
Leucoma salicis
Contributions by: Danny Cluck and Tom Smith

Satin moths defoliated many aspen trees within the greater Lake Tahoe Basin area in 2012 (Placer and El Dorado Counties, M261E). Slight to locally severe defoliation occurred in scattered stands around the basin.

Satin moth-caused defoliation of aspen was observed in a 10-acre stand on Diamond Mountain (Lassen County, M261E) and in a 2-acre stand at the north entrance to Lassen Volcanic National Park (Shasta County, M261D). Both stands were almost completely defoliated early in the growing

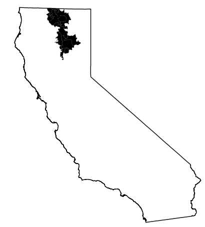
Fig 19: Western tent caterpillars on bitterbrush, Lassen NF.

Photo by: D. Cluck

M261G

season, but trees re-foliated significant portions of their crowns by the end of summer.

Western Tent Caterpillar
Malacosoma californicum
Contribution by: Danny Cluck


M261D

Defoliation of bitterbrush (*Purshia tridentata*) by western tent caterpillar feeding was observed near Susanville (Lassen County, M261D). Many shrubs growing within ponderosa and Jeffrey pine stands were partially to completely defoliated across several hundred acres.

Other Insects

Ponderosa Pine Tip Moth
Rhyacionia zozana
Contribution by: Don Owen

Damage from *R. zozana* remained light in ponderosa pine plantations near Goose Valley (Shasta County, M261D). A majority of trees in the plantations have reached a height where continued damage is unlikely.

Black Pineleaf Scale
Nuculaspis californica
Contribution by: Don Owen

Black pineleaf scale infestations on ponderosa pine that were reported during the last two years in the intermountain area of eastern Shasta County (M261D) continued in 2012. Infested areas included stands around Goose Valley, Black Ranch Road, Fall River Mills, McArthur, and Glenburn. Depending on location, various factors were compounding the impact of the scale – low site and dwarf mistletoe being two of the most important. Chlorotic foliage was the most common symptom, but in many areas trees had thin crowns due to poor needle retention and shortened needles. A number of landowners chose to thin and improve stands by removing the most heavily infested/damaged trees. Some widely scattered tree mortality due to western pine beetle was present. The area of infestation was estimated to be up to 4,000 acres.

Samples were taken in late June and early July to determine scale development. Scale crawlers were first noted on July 9^{th}, but apparently began hatching during the week prior. A treatment using the systemic pesticide Safari® is being evaluated as a control for the scale on ornamental pines.

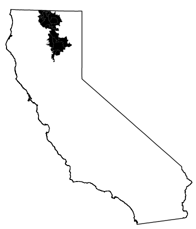
Ponderosa Pine Twig Scale
Matsucoccus bisetosus
Contribution by: Don Owen

Evidence of *M. bisetosus* was noted on numerous trees at two locations in eastern Shasta County (M261D). Ponderosa pines of various sizes along Walker Road in Glenburn exhibited scattered branch dieback due to infestation. These trees were infested with black pineleaf scale as well. The damage from *M. bisetosus* alone was not severe enough to cause any significant impact on affected trees, but was contributing to the overall poor vigor of trees in the area. On Aubrey Ridge, west of Goose Valley, ponderosa pine planted after the Fountain Fire exhibited roughened branch bark and evidence of birds feeding on the scale on upper boles. Both symptoms indicate high scale populations, although no branch dieback was present. Previous reports of damage from the scale in eastern Shasta County were made in 2010 and 2011.

M261B

Incense-Cedar Scale
Xylococculus macrocarpae
Contribution by: Jack Marshall

Scores of seedlings and small sapling sized incense-cedar near Salmina (Lake County, M261B) were infested with incense-cedar scale in 2009 and 2010. Heavy infestations led to either direct mortality or ensuing attacks by a species of *Phloeosinus*. Many infested trees were removed; consequently, the damage was less in 2012.

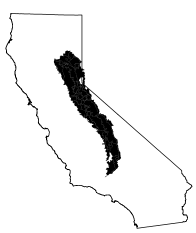


M261D

Pine Needle Sheathminer
Zelleria haimbachi
Contributions by: Don Owen and Tom Smith

Defoliation by the pine needle sheathminer, reported in 2007, was present again on ponderosa pine on the east side of Aubrey Ridge, a few miles west of Burney (Shasta County, M261D). Approximately 250 acres of pine plantation (established following the Fountain Fire) were affected. Defoliation has varied from year to year, with no apparent significant impact.

Defoliation of isolated stands of ponderosa pine was present in the Lake Tahoe Basin (Placer and El Dorado Counties, M261E). Several pine stands showed significant loss of needles; however, the stands were small in size and isolated from one another. The cause appeared to be needle cast until further examination identified the pine needle sheathminer.



M261E

Gouty Pitch Midge
Cecidomyia piniinopis
Contributions by: Don Owen, Jack Marshall, and Tom Smith

Emerging midges were found along ponderosa pine twigs in sapling-sized trees in Boggs Mountain Demonstration State Forest (Lake County, M261B) in 2011. Only a few infested trees were found. The site was revisited in 2012; damage had not increased.

Branch tip flagging caused by the gouty pitch midge remained low across Hatchet Mountain (Shasta County, M261D). While midge activity was present, in most cases it was insufficient to girdle branch tips.

Gouty pitch midge activity was noted on ponderosa pine in Calaveras County (M261E) on private timber lands. Young plantation trees of 8 to 12 ft in height showed flagging of the terminals and upper branch tips. However, more damage occurred in the area due to snow breaking the tops of the trees than was attributed to pitch midge.

Alder Flea Beetle
Macrohaltica ambiens (= Altica ambiens)
Contributions by: Jack Marshall and Don Owen

Damage to white alders along portions of Alder and Kelsey Creeks (adjacent to Bottle Rock Road, Lake County, M261B) decreased significantly in 2012.

White alders were defoliated by the alder flea beetle in the North Canyon Creek drainage, a tributary of the South Fork of the American River (El Dorado County, M261D). Trees re-foliated by the end of the season.

Snout Moths
Dioryctria sp.
Contribution by: Don Owen

Wounded Douglas-fir in a seed orchard near Goose Creek (Shasta County, M261D) were attacked by what is most likely a species of *Dioryctria*. Attacks were marked by clumps of frass loosely held together by silk webbing and occurred on girdling wounds that had been intentionally inflicted to stimulate cone production.

Sycamore Whitefly
Unknown species
Contribution by: Tom Smith

Whiteflies were found heavily infesting the leaves of California sycamore along John F. Kennedy Drive in the Woodcrest area of Riverside (Riverside County, M262B). The whitefly species was unknown, but may have been an undescribed species called sycamore whitefly that has been reported in Egypt.

Monterey Pine Weevil
Pissodes radiatae
Contribution by: Jack Marshall

Nearly two dozen Monterey pine saplings were killed in a thicket in Sea Ranch (Sonoma County, 263A). Monterey pine is not native to the area and overly dense stocking may have contributed to the Monterey pine weevil attacks.

Weevil
Scythropus spp.
Contribution by: Don Owen

Foliage feeding by a species of *Scythropus* was prominent again for a second year on ponderosa pine in plantations south of Goose Valley (Shasta County, M261D). More than 200 acres were impacted. Adult weevils were abundant in mid-April.

Disease Conditions

Disease Conditions in Brief

By Tom Smith

Precipitation was below normal from October 2011 to October 2012, but fell short of drought conditions. A large percentage of the rainfall occurred during March and early April, while the prime snowfall months (November to February) were relatively dry. This lack of insulating snow resulted in frost and cold damage to vegetation at higher elevations. Additionally, late season rains facilitated a buildup of foliar pathogens not typically seen in similarly dry years.

Introduced exotic pathogens continued to be primary contributors to disease issues across the state. The 14 sudden oak death quarantine counties experienced a substantial new wave of die off as a result of the two prior wet springs, and the disease moved into areas within the 14 counties that had previously been free from *Phytophthora ramorum* (the pathogen that causes sudden oak death). In addition to wildland finds, seven California nurseries were found positive for *P. ramorum* in 2012.

Pitch canker, white pine blister rust, and Port-Orford-cedar root disease continued to affect and kill trees. Pitch canker intensified in the Point Reyes National Seashore area, and work to identify trees genetically resistant to white pine blister rust continued. Eradication of Port-Orford-cedar root disease was a priority at small, isolated locations in northwestern California.

A new insect and disease complex was identified in Orange and Los Angeles Counties in 2012. The complex has killed avocados, coast live oaks, and box elders, and is causing symptoms on numerous other urban hardwood shade trees. Both the causal agents, an ambrosia beetle and the *Fusarium* fungus it carries, appear to be previously unrecorded species. Work to identify the causal agents, survey the extent of the problem, and develop potential control options has begun.

A survey for maple leaf scorch and the associated bacterium *Xyllela fastidiosa* was conducted in various parts of northern California. The condition appears to be intensifying each year, and in 2012, led to early foliage color change and leaf fall from big-leaf maple trees.

Various native diseases remained a problem in California. Foliar diseases were influenced by late spring and early summer precipitation. Oak and sycamore anthracnose were common in parts of California, and madrone foliar leaf blight continued. Previously unrecognized foliar diseases of oaks were identified and are being characterized. Foliar and tip blight problems related to lack of timely rainfall continued, and early leaf bronzing of blue oaks

Fig 20: Maple leaf scorch, Scott Mountain, Siskiyou Co.

Photo by: W. Woodruff

due to extreme summer heat was common.

Other significant disease problems in the state were Elytroderma needle blight and various root diseases. Elytroderma was very common throughout the southern Sierra Nevada Mountains, and root diseases, including Heterobasidion root disease, black stain root disease, and Armillaria continued to cause large tree losses in various parts of California.

Introduced Diseases

Pitch Canker
Fusarium circinatum
Contributions by: Tom Gordon and Jack Marshall

Pitch canker remained evident in many locations in central coastal California. In the native Monterey pine (*Pinus radiata*) forest on the Monterey Peninsula, it was no more conspicuous in mature trees than it has been in recent years, which was presumably due to the occurrence of systemic induced resistance. To better characterize the progression of pitch canker in younger trees, plots were established at six locations to monitor the frequency of new infections. At each location, 50 trees were tagged, and the number of infected branches was recorded in September, 2011. In January of 2012, new infections were observed on some trees in each of the plots. New infections (as a percentage of infections present in September) ranged from 13 to 41 percent. Likewise, in May, new infections occurred in all plots at rates ranging from 22 to 88 percent. Considering all six plots, the number of infections increased by 24 percent from September to January of 2012 and by 47 percent over the next 4-month interval. The frequency with which new infections occurred in the assessment plots indicated a higher level of activity than previously suspected.

At Point Reyes National Seashore (NS) in western Marin County (M263A), density of bishop pine often exceeded 1,000,000 stems per acre in areas impacted by the Vision Fire (16 years ago), resulting in intense tree-to-tree competition and aggravating pest conditions. In some locations, severely infected trees were being killed by pine engraver beetles. To monitor development of pitch canker at Point Reyes NS, 16 plots were established in native stands of bishop pine in 2011. All 16 plots were re-evaluated in September of 2012 and modest increases in the incidence and severity of pitch canker were observed.


263A

Pitch canker was present at a Christmas tree farm in Solano County, making it the most inland site for the disease in California, and planted symptomatic Monterey pines continued to be found in Sonoma County (northernmost location in California).

White Pine Blister Rust
Cronartium ribicola
Contributions by: Kim Camilli, Joan Dunlap, and Tom Smith

A survey was conducted of the southern Sierra Nevada Range and the Tehachapi Mountains to determine whether white pine blister rust had expanded its range southward in the last decade. No incidences of rust were found in the Tehachapi Mountains, and the only rust found south of its former known range in the Sierras was within a couple of miles of the former most southern known location.

<u>White Pine Blister Rust Resistance Program</u>
The Region 5 Genetic Resources staff has a program of screening primarily sugar pine (*Pinus lambertiana*) for natural genetic resistance to white pine blister rust (*Cronartium ribicola*). Screening for major gene resistance (MGR) occurs at the Placerville Nursery, Eldorado NF, and for slow rust resistance (SRR) at two field sites on the Happy Camp Ranger District, Klamath NF. In winter 2012, 458 new sugar pine and 99 new western white pine (*P. monticola*) families were screened for major gene resistance; 46 families had MGR, with one being a western white pine. On federal lands, 14 out of 277 sugar pine families, whose parent trees were from the Plumas, Klamath, Shasta-Trinity, Lassen, Tahoe, and San Bernardino National Forests, had MGR. In winter 2013, rust-resistance screening will include approximately 264 sugar pine families from northern California National Forests and private industry lands. In addition, rust resistance will be examined in 53 families of western white pine. As of 2012, about 1,800 MGR sugar pines have been identified on federal, state, and private lands.

On the Klamath NF, activities related to SRR evaluations continued with the planting of 1,459 trees from 271 families, an additional 16 trees from two MGR western white pine families at the Happy Camp Outplanting (HCOPS) field site, and 3,048 untested seedlings from 125 non-MGR North Zone families at the nearby Classic field site, all grown at the Placerville Nursery. This year, evaluations led to the selection of 42 new sugar pines with SRR traits from 847 surviving trees in nine fields (planted from 1989 to 1997) at HCOPS and from one 1983 progeny test site. This genetic material will be used for a new Northern California seed orchard (containing MGR and MGR with SRR sugar pines) being developed at the Foresthill orchard site.

In addition to these activities, a 2006 experiment to examine the heritability of SRR was re-evaluated in 2012. Of the initial 7,650 individuals planted, 6,100 sugar pines (which were alive in 2011) were scored for rust resistance. The percentage of live trees had declined from 79 percent in 2011 to 48 percent in 2012. The susceptible control family was mostly dead or infected with rust, and the best slow rusting families identified in the 2010 and 2011 readings were maintaining their high survival and resistance traits. The results continued to provide evidence for the usefulness of SRR with MGR in Region 5's Sugar Pine Rust Resistance Program and were consistent with the genetic approach to SRR for western white pine in other regional programs.

The 2012 cone crop on sugar pine was quite variable. In southern California, the crop was very light, so cones were collected from only a few proven MGR trees. However, some additional trees were selected for future MGR screening, supporting the efforts to increase the number of MGR parent trees identified in that region. In central and northern California, the cone crop was large enough to warrant cone collections from proven MGR trees in the Lake Tahoe Basin Management Unit and on the Lassen NF as well as from 120 new MGR candidate trees on the Klamath and Six Rivers National Forests and private industry lands. The regional nursery in Camino received a total of 125 bushels of cones from 32 proven MGR sugar pine trees. As part of an ongoing genetic conservation effort in high-elevation white pines, cones were also collected from 60 trees (25 whitebark, 30 Great Basin bristlecone, and five foxtail pine) using funds from USDA Forest Service State and Private Forestry, Forest Health Protection. The collections were made on the Inyo, Stanislaus, and Mendocino National Forests as well as Lassen Volcanic National Park. The Pacific Southwest Region 5 genetics staff coordinated the cone collection work with National Forest staff, including Deschutes NF and Forest Service smokejumpers in Redding, staff from a non-profit cooperator in the Lake Tahoe area, and contractors.

Fusarium Dieback/Polyphagous Shot Hole Borer Complex on Avocado, Coast Live Oak, Box Elder, and Other Trees
Fusarium sp.
Contributions by: Akif Eskalen

Fig 21: Beetle exit holes on avocado trunk.

Photo by: A. Eskalen

261B

An undescribed new species of *Fusarium* was causing problems for the avocado industry and impacting numerous species of shade trees in Los Angeles and Orange Counties (261B) in 2012. The fungus was transmitted by the polyphagous shot hole borer (*Euwallacea* sp.), a newly found species of ambrosia beetle. The landscape trees that most commonly exhibited dieback or attack were coast live oak, English oak, box elder, and California sycamore. Numerous other native and exotic trees were also impacted to various degrees. Typical symptoms included single beetle entry holes associated with a white powdery exudate, staining, or gumming on the bark. The exudates were found on the trunk and main branches of infested trees and were often associated with an area of brown discolored necrosis under the bark. The beetle-fungus complex was found in many street and backyard trees as well as in several botanical gardens. Delimitation surveys on the extent of the infestation and research on the beetle, fungus, and potential methods of control are ongoing.

Fig 22: Beetles and galleries in castor oil plant.

Photo by: A. Eskalen

Sudden Oak Death
Phytophthora ramorum
Contributions by: Maia Beh, Kim Camilli, Phil Cannon, Susan Frankel, Erin Lovig, Jack Marshall, and Katie Palmieri

A wave of new *Phytophthora ramorum*/sudden oak death (SOD)-related oak and tanoak mortality was confirmed in 2012 throughout California's 14 infested counties. According to the 2012 USDA Forest Service annual *P. ramorum* aerial survey, 375,000 dead oak and tanoak over 54,000 acres were mapped in California's SOD-impacted forests, compared to 38,000 trees over 8,000 acres in 2011. The increase in infestation levels was attributed to the mild, wet springs in those regions in 2010, 2011, and 2012.

Urban Status
In the greater Bay Area, symptoms on California bay laurel (*Umbellularia californica*) have been increasing over the past two years in locations where spring monitoring for the pathogen has been conducted, acting as an early warning system that the disease is spreading into new areas within the quarantine zone. More than 10,000 trees were surveyed in spring 2012 by over 500 volunteers during 19 SOD Blitzes (a citizen science-based campaign in which community members gather symptomatic bay leaves for laboratory diagnosis) throughout central and northern coastal California. Blitz results confirmed the establishment of *P. ramorum* in urban and residential areas that have not had significant infection previously. Urban outbreaks were detected in Santa Cruz County, Carmel Valley Village (Monterey County), and in a southwestern sector of Golden Gate Park (San Francisco County) near Middle Lake (several miles from the previously infected site in the AIDS Memorial Grove). Most of the Bay Area locations sampled had increased levels of infection, with the East Bay infestation having transitioned from a "newly arrived" status (2011) to epidemic levels on bay trees (2012), suggesting oak and tanoak infection levels in those areas are likely to increase. Survey results are available at: nature.berkeley.edu/garbelotto/english/sodblitzresults.php.

Wildland Status - Northern Region
Humboldt County - *Phytophthora ramorum* was recovered from several Humboldt County waterways for the first time in 2012: the east and west forks of Mattole Canyon Creek (main stem found positive in 2011), Grindstone Creek, and an upper tributary of Grizzly Creek (main stem found positive in 2011).

Redwood Valley (Redwood Creek watershed) *P. ramorum* containment efforts continued in 2012 in response to the SOD outbreak discovered in the area in 2010 (more than 50 miles north of the nearest previously known infestation). This is California's largest landscape-level, collaborative containment/eradication project to date. Its close proximity to immense tanoak forests in Redwood National and State Parks and on Hoopa Tribal lands, as well as productive timber lands stretching all the way to the Oregon border, has made it an area of high priority. The first phase of the containment effort treated over 370 acres, and included the removal of all infested trees as well as those species that support ample sporulation of the pathogen (bay and tanoak) within 100 meters of an infected tree.

Mendocino County – A waterway in Russian Gulch State Park was positive for *P. ramorum* prior to 2012, but no terrestrial plants had ever been associated with the watershed. Then in 2012, a small tanoak tree within the park tested positive for stem cankers. Surrounding saplings had twig infections, yet adjacent bays were negative for the pathogen.

MacKerricher State Park had a 2-acre patch of infested tanoaks removed in 2010. One hundred remnant tanoaks were injected with Agri-Fos® each year thereafter; however, in 2012, one of the injected trees developed cankers. The infested tree was removed, along with two adjacent trees with single cankers on their trunks.

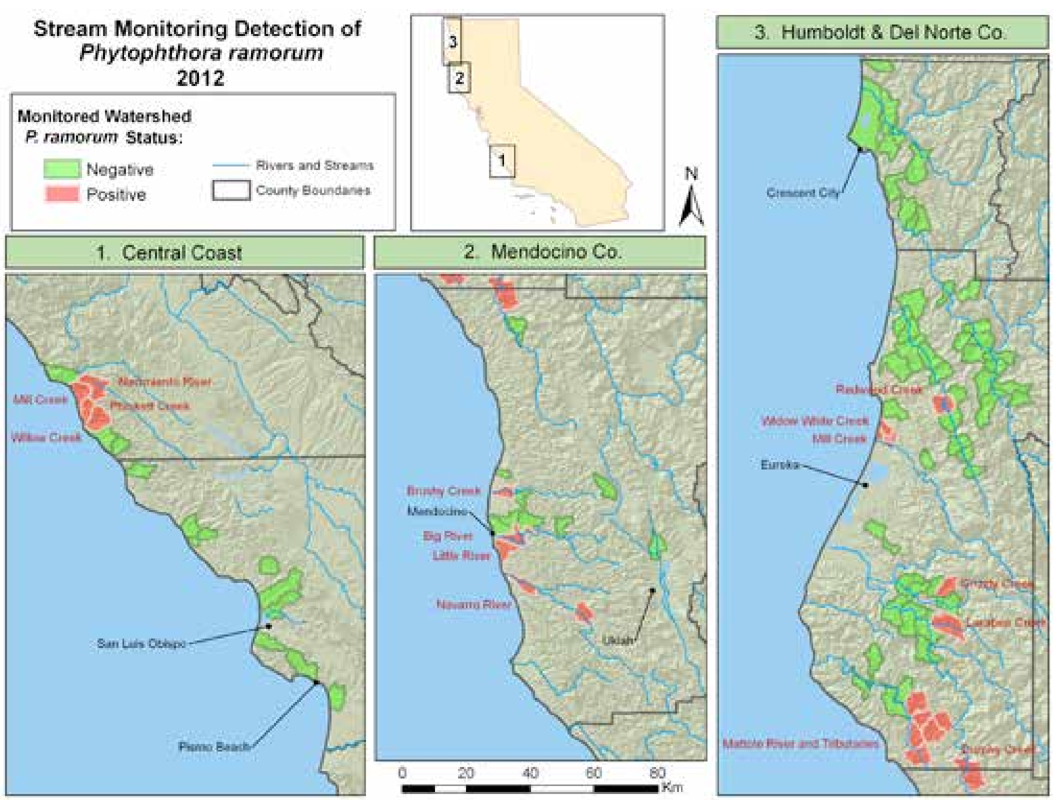
Inglenook tanoak samples were confirmed positive in January 2012 as a result of a landowner reporting dead and dying tanoaks. Surveys conducted over neighboring properties yielded a total of 11 infested sites, with infection levels ranging from a single tanoak to nearly 100 tanoaks (over a 3-acre parcel). Other hosts in the area with infected foliage were grand fir, salal, and one planted California bay laurel.

Montgomery Woods State Park had two patches of tanoak mortality identified during 2012 aerial surveys. Additionally, a newly infested property was identified east of Montgomery Woods off of Running Springs Road; however, this area does not flow into Big River as the Montgomery Woods drainages do, but flows into a drainage feeding the Russian River. The small ownership had infected tanoaks (stem and twigs) and bays, but no dying trees, thus it was not detected via aerial survey.

Hendy Woods State Park had several newly identified *P. ramorum*-positive tanoaks in 2012, as well as a few trees that had died from infection. Initial finds in the park were made in 2011; more than 200 infected tanoaks and several bays were felled.

Wildland Status - Central Region

In 2012, there was an intensification of *P. ramorum* throughout much of the central California coastal range. Especially large flare-ups on the coastal mountainside were observed just south of Carmel, between Santa Cruz and San Francisco, in the Point Reyes National Seashore area, and from Guerneville to the coast along the Russian River.



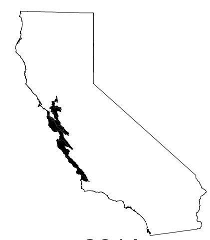
Map 3: Stream monitoring detection of *P. ramorum*, 2012.

Map by: C. DeLong

Fig 23: Tanoak mortality from sudden oak death on Mescal Ridge, Los Padres NF.

Photo by: T. Coleman

Wildland Status - Southern Region



261A

Phytophthora ramorum stream baiting surveys of 16 watercourses in Monterey and San Luis Obispo Counties (261A) produced 34 sets of baits that were gathered during each collection period. Previous positive streams (Mill, Nacimiento Plaskett, and Willow Creeks) remained PCR and culture positive. San Carpoforo Creek (northern San Luis Obispo County) was found PCR positive for the first time. Additional sampling is being conducted in the area around San Carpoforo Creek.

The 2008 wildfires in the Big Sur region suppressed, but did not eradicate, *P. ramorum* from the landscape, according to results published in 2012 (Beh, et al., 2012). The pathogen was recovered both one and two years post fire from vegetation growing in burned forests, and, in some cases, with no difference in frequency than from vegetation in unburned forests. However, *P. ramorum* recovery one year after the wildfires tended to take place in areas with the lowest burn severities, while pathogen recovery two years post fire occurred in areas with greater burn severities and was largely influenced by high levels of pre-fire disease prevalence and low levels of post-fire bay mortality. In areas where *P. ramorum* was not recovered even two years post fire, burn severities and levels of post-fire bay mortality tended to be high. Patchy burn patterns that left green, *P. ramorum*-infected bay may have allowed these trees to serve as inoculum reservoirs that led to infection of newly sprouting vegetation.

Regulations

Eight new hosts were added to the USDA Animal and Plant Health Inspection Service *P. ramorum* Associated Host List in 2012: *Ilex cornuta* (Buford, Chinese, or horned holly); *Illicium parviflorum* (yellow anise); *Larix kaempferi* (Japanese larch); *Magnolia denudate* (lily tree); *Mahonia nervosa* (creeping Oregon grape); *Molinadendron sinaloense*; *Trachelospermum jasminoides* (star or Confederate jasmine); *Veronica spicata* Syn. *Pseudolysimachion spicatum* (spiked speedwell). The addition of these hosts brings the total number of regulated hosts in California and the U.S. to 137.

The California Board of Forestry and Fire Protection permanently adopted an Emergency Notice for the Outbreak of Sudden Oak Death Disease (regulation 14 CCR § 1052.5) on March 7, 2012. The new rule insures that landowners and foresters have the ability to quickly cut and commercially utilize hardwoods in the event of a SOD outbreak without having to

Table 3: CDFA, Plant Health and Pest Prevention Services, *Phytophthora ramorum* Program, Positive Nurseries, 2012

#	COUNTY	TYPE*	Type of Inspection	SHIPS INTERSTATE	DATE INSPECTED	CONFIRMED POSITIVE	Actions Taken	Previously Positive	Infective Plants
1	Orange	P	Compliance	yes	3.27.2012	4.13.2012	Confirmed Nursery Protocol	No	1. *Loropetalum chinense* (1g) 2. Loropetalum chinense (5g) 3. *Rhododendron Azalea* (5g) 4. *Trachelospermum jasminoides* (15g)
2	San Joaquin	P	Compliance	No	4.9.2012	4.27.12	Confirmed Nursery Protocol	Yes (2011)	1. *Camellia sasanqua* 'Cleopatra' (5g) 2. *Camellia japonica* 'Mathotiana Supreme' (5g) 3. *Camellia japonica* 'Bella Rosa' (5g)
3	Sacramento	R	CNP Follow Up Inspection	No	3.30.2012	5.3.2012	Confirmed Nursery Protocol	Yes (2008,2011)	*1. loropetalum chinense 'Rubrum' (5g)* *2. Rhododendron sp 'Baursault Purple' (1g)* *3. Rhododendron sp 'Minnetonka'(3g)* *4. Rhododendron sp 'War Dance' (3g)*
4	Mendocino (Quarantined)	P	Nursery Stock Standard of Cleanliness	No	5.8.2012	6.1.2012	The nursery is not under compliance and does not ship interstate. The county will begin implementation of nursery stock standards of cleanliness to address the infestation.	Yes (2008,2010)	1. *Camellia sp.*
5	Mendocino (Quarantined)	P	Compliance	No	5.8.2012	6.4.2012	The nursery is no longer participating in the program. The county will begin implementation of nursery stock standards of cleanliness to address the infestation.	No	1. *Camellia sp.*
6	Sacramento (Regulated)	P	Compliance	Yes	5.22.2012	6.6.2012	Confirmed Nursery Protocol	Yes (2005, 2006, 2007, 2011)	1. *Viburnum tinus* 'Spring Bouquet'
7	Sacramento (Regulated)	R	Compliance	No	5.16.2012	6.18.2012	Confirmed Nursery Protocol	No	1. Rhododendron sp. 'Boule de Neige' 2. Camellia japonica 'Pink Parade '
	Placer (Regulated)	N/A	Public Inquiry	N/A	8.14.2012	8.28.2012	Residential and Landscaped Commercial Settings Protocol.	N/A	1. Rhododendron sp.

TOTAL SOD POSITIVE NURSERIES IN 2012 = 7 (5-Production, 2-Retail)

* Type of Business

P = Producer- a commercial producer who grows and sells a total of $1,000 or more of nursery stock in one year

R = Retailer- an operator of a sales outlet which has no growing grounds except small areas devoted to the production of plants for local distribution, and those producing less than $1,000

L = Landscaper- a landscape contractor who maintains a sales yard or holding yard for nursery stock he/she handles

J = Jobber/broker/commission merchant- a dealer who buys and resells nursery stock at wholesale file the normal Timber Harvest Plan (THP). More information on the Notice is available at www.bof.fire.ca.gov/regulations/proposed_rule_packages/sudden_oak_death_emergency_regulation_2011/combined_sod_45-daynotice_123011.pdf.

Nursery Status

Seven California nurseries were found *P. ramorum* positive in 2012. Two of the nurseries had positive soil and four of the confirmed sites had been found positive in previous years. One landscape confirmation was also identified and was traced back to a California nursery that had been found positive for the pathogen in 2006 and 2009.

Port-Orford-Cedar Root Disease

Phytophthora lateralis

Contribution by: Pete Angwin

A single isolated Port-Orford-cedar died at a water drafting site along Aikens Creek at Aikens Creek Campground (Humboldt County, M261A) in 2012. The site was approximately ¼ mile from where Aikens Creek flows into the Klamath River. The phloem of the dead tree had stain characteristics of Port-Orford-cedar root disease. Subsequent genetic (PCR) analysis confirmed the presence of *Phytophthora lateralis*. Access to the drafting site was blocked because of the potential to spread the disease.

Fig 24: Dead Port-Orford-cedar at Aikens Creek Campground, Orleans RD, Six Rivers NF.

Photo by: P. Angwin

Every year since 2008, genetic (PCR) tests have been performed at Scott Camp Creek in the upper Sacramento River drainage (Siskiyou County, M261A) to detect the presence of *P. lateralis* at the 3-acre eradication site. The pathogen has not been detected since 2008. Similar tests were conducted in 2012, and again, the pathogen was not detected. Symptomatic or diseased Port-Orford-cedars have not been found outside the treatment area since the original infection was identified in 2001. Results indicate that the eradication effort performed in 2003-2005 was successful.

Fig 25: Port-Orford-cedar seedling bait to detect *Phytophthora lateralis* at Scott Camp Creek, eradication treatment area, Shasta-Trinity NF.

Photo by: P. Angwin

Phytophthora Root Rot

Phytophthora cinnamomi

Contribution by: Tom Smith

Phytophthora cinnamomi was found in a stand of dying, mature, mixed species oaks in a subdivision in the community of Paradise, Butte County (M261F). The trees were surrounded by lawns that were well watered. The combination of watered lawns and native California oaks often results in incidences of *Phytophthora* root disease.

Native Diseases

Foliar Diseases

Oak Anthracnose
Cryptocline cinerescens
Contribution by: Kim Camilli

Fig 26: Oak anthracnose on coast live oak.

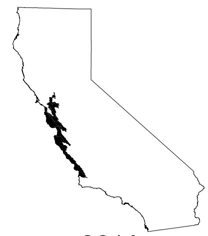
Photo by: K. Camilli

Oak anthracnose was very heavy on 10 acres in the Silverado area of San Diego County (261B). Wet and windy conditions prevailed during the spring, which was conducive to sporulation and infection of new leaves and small twigs. Most healthy trees recovered from infection, although stressed trees with thin crowns and dieback were slow to do so.

261B

Sycamore Anthracnose
Apiognomonia veneta (Discula platani)
Contribution by: Kim Camilli

Sycamore trees over the past few years have been seriously impacted by sycamore anthracnose. In 2012, many trees had little to no foliage remaining in Monterey and San Benito Counties (261A). Some trees showed signs of decline because of the consecutive years of infection and resulting stress.



261A

Oak Leaf Blister
Taphrina caerulescens
Contributions by: Suzanne Rooney Latham and Tom Smith

Oak leaf blister was found at a property near the town of Winters in Yolo County (262A). Damage was primarily on blue oak. Impacted trees were expected to recover as the damage was only superficial. Late spring and early summer rains were likely the cause of the outbreak. Oak leaf blister was also reported around Redding (Shasta County) on California black oak and interior live oak.

262A

Other Phytophthora Diseases
Phytophthora nemorosa
Contribution by: Jack Marshall

Rain patterns over the past two years favored a buildup of *Phytophthora nemorosa* in the same areas where *P. ramorum* was found. Symptoms were the same on the foliage of California bay laurel and tanoak for both *Phytophthora* species, making field detection surveys problematic for incidence of sudden oak death (263A).

263A

Foliar Blight of Madrone
Mycosphaerella sp. and *Monochaetia* sp.
Contribution by: Jack Marshall

Madrones in Napa, Sonoma, Mendocino, and Humboldt Counties continued to have spring reports of severe foliar blight. Sampling over the past three years yielded both *Mycosphaerella* sp. and *Monochaetia* sp. from similarly symptomatic trees. Wet springs continued to favor local outbreaks (263A).

263A

Fir Needle Cast
Lirula abietis-concoloris
Contribution by: Jack Marshall

Lirula needle cast caused moderate defoliation of many grand firs southeast of Bridgeville, Humboldt County (263A).

Blights and Cankers

M261F

Diplodia Blight of Pines
Diplodia pinea
Contribution by: Don Owen

Diplodia blight in the Sacramento River Canyon and other areas of northern California remained at low levels. The dry spring weather that started in mid-April 2012 was not conducive to infection. In contrast, wet weather during ponderosa pine bud break and shoot elongation tends to favor the disease. (M261F)

M261E

Elytroderma Needle Blight
Elytroderma deformans
Contributions by: Beverly Bulaon and Martin MacKenzie

In the spring of 2010, US Geological Survey observers in Sequoia King's Canyon National Park reported an increase in Elytroderma damage within the park. While initial observations confirmed patches of necrotic tissue within twig tips and needle discoloration consistent with Elytroderma infections, there were no signs of fruiting bodies or upswept branch tips on adjacent trees. A year later the symptoms were more pronounced. In 2012, fruiting bodies of *Elytroderma deformans* were widespread within the entire western range of the southern Sierra Nevada Mountains. The wet springs of 2010 and 2011 most likely led to spore abundance and new infections, after which the fungal fruiting bodies developed. Elytroderma is a native fungus, and it is anticipated to recede back to endemic levels if normal rainfall patterns return (M261E).

M262B

Bacterial Leaf Scorch/Maple Leaf Scorch
Xylella fastidiosa
Contributions by: Kim Camilli, Melody Lardner, and Bill Woodruff

Extensive injury to sweetgum from *Xylella fastidiosa* was found on four city blocks in Chino, CA, and throughout the City of Moreno Valley, CA. Similar injury has been observed in San Bernardino and Riverside Counties (M262B). The xylem-limited bacterium Xylella

Fig 27: Big-leaf maple with heavy maple leaf scorch along CA State Route 3, Scott Mountain, Siskiyou Co.

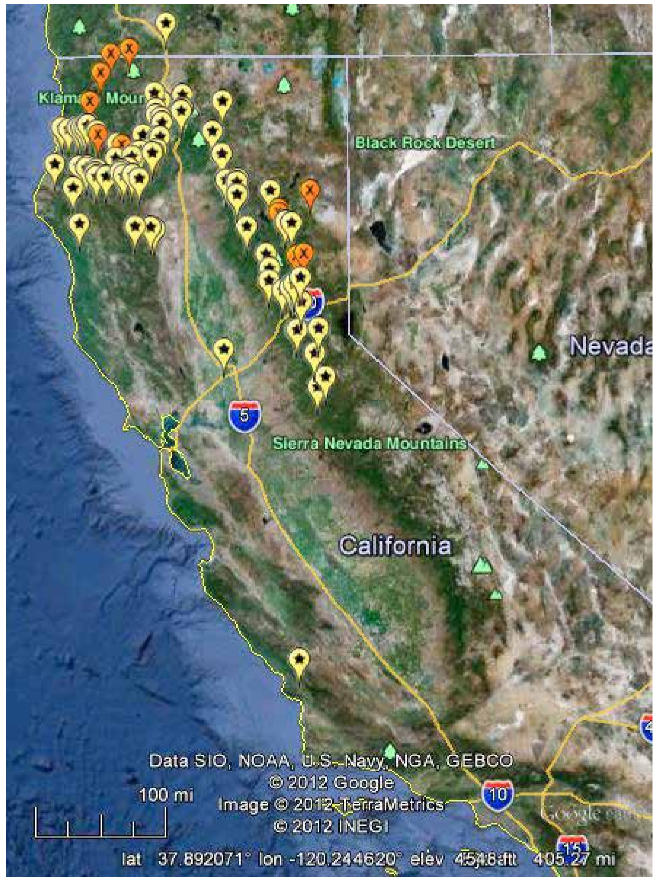
Photo by: W. Woodruff

Fig 28: Big-leaf maple with maple leaf scorch near the southern end of CA State Route 3 in Trinity Co., 9 miles south of Hayfork.

Photo by: W. Woodruff

remains a problem all over southern California, but does not appear to have spread into the native forests.

Maple Leaf Scorch (MLS) on big-leaf maple has thus far been found in Amador, Butte, Calaveras, El Dorado, Humboldt, Lassen, Mendocino, Nevada, Placer, Plumas, San Louis Obispo, Sierra, Siskiyou, Shasta, Tehama, Trinity, Yolo, and Yuba Counties. MLS is easily observed along roads and highways in these regions (M261A, M261B, M261D, M261E, M262A, 262A, and 263A).



Map 4: Locations sampled for *X. fastidiosa* in 2012 (yellow) and earlier (orange).

Photo by: W. Woodruff

In 2012, big-leaf maple leaf and branch samples were collected from 85 trees in 16 counties and sent to Xylella labs at Rutgers University, UC Riverside, UC Davis, and Texas A&M University for DNA analysis. Map 4 indicates the locations sampled in 2012 (yellow) and earlier (orange). Only Rutgers University was successful in detecting *Xylella fastidiosa* in 18 of 108 samples using PCR techniques. None of the four labs were successful in culturing the bacteria from any sample. If bacteria are successfully cultured in 2013, it will be sent to UC Davis for the purpose of inoculating big-leaf maple seedlings and completing Koch's Postulates to confirm that *X. fastidiosa* is the cause of MLS. Images of MLS trees and leaves are shown in Figures 27 and 28.

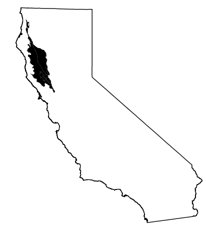
Douglas-fir Canker
Diaporthe lokoyae or *Dermea pseudotsugae*
Contribution by: Pete Angwin

In 2011, extensive Douglas-fir mortality was detected in low elevation drainages on the Klamath NF, west of Yreka (Siskiyou County, M261A). The Douglas-fir in the stands were found to be affected by Douglas-fir cankers (either *Diaporthe lokoyae* or *Dermea pseudotsugae*) and Douglas-fir twig beetles (*Pityophthorus pseudotsugae*), which led to lethal attack by the flatheaded fir borer (*Melanophila drummondi*). Mortality continued into the spring of 2012, but aerial surveys in September revealed very little new mortality over the summer.

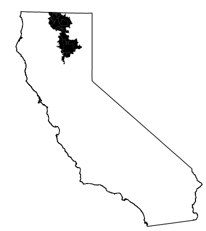
Cytospora Canker
Cytospora chrysosperma
Contribution by: Tom Smith

A stand of mature aspen in a Lake Tahoe Basin (M261E) subdivision was reported to be dying. Most of the trees were suffering from cytospora canker. The stand was quite old, had been broken up by housing construction, and was likely dying from old age. Little regeneration has been permitted by property owners; however, with the older stand dying off, opinions toward multi-generational stands are beginning to shift into a more favorable position.

M261A



M261B



M261D

M261E

M262A

262A


262A

Botryosphaeria Canker
Botryosphaeria sp.
Contribution by: Tom Smith

Rows of coastal redwoods used as windbreaks were reported to be sick and dying in the Marysville area of the Sacramento Valley (262A). The trees had been densely planted and were regularly watered. Extreme summer temperatures, which are typical of the area, added to poor growing conditions. All of the trees exhibited Botryosphaeria canker symptoms.


263A

Seiridium Canker
Seiridium sp.
Contribution by: Jack Marshall

Seiridium-caused branch cankers were collected from Lakeport, Lake County (Monterey cypress); Ukiah (redwood), Hopland (Monterey cypress), and Caspar (Monterey cypress), Mendocino County; and Sea Ranch (Monterey cypress), Sonoma County (263A, M261B).

Rust Diseases


M261B

Western Gall Rust
Endocronartium harknessii
Contributions by: Jack Marshall and Tom Smith

Both young plantations and large, native ponderosa pines had western gall rust bole and branch infections on Boggs Mountain Demonstration State Forest (Lake County). The disease also continued to be a problem for ponderosa pine regeneration in the Bartlett Springs area of Lake County (M261B). Many branch galls and flagged branches were observed along the northern Sonoma and Mendocino County coasts in both native Bishop pine and planted Monterey pine (263A).


M261E

Fewer reports were received in 2012 of western gall rust infections in the foothills of the central Sierra Nevada Range. Infections were so severe in 2011 that they were visible in aerial surveys (M261E).

Various Rusts
Endocronartium harknessii, Cronartium ribicola, Cronartium coleosporioides
Contributions by: Beverly Bulaon and Martin MacKenzie

Most rust fungi sporulated more intensively than in previous years as a result of the 2012 wet spring. Observations at the same sites over the past three years indicated that western gall rust was sporulating in great abundance in 2012. Some very good examples of aecial sporulation of both stalactiform and white pine blister rusts were also observed (M261E).

Root Diseases

Armillaria Root Disease
Armillaria spp.
Contributions by: Jack Marshall, Don Owen, and Tom Smith

A few Douglas-fir trees were killed by Armillaria east of the Fort Bragg Grange in Mendocino County. The disease was also associated with grand fir mortality and windthrow in the area (263A).

Armillaria was also found killing trees in a grove of aspen at Northstar Ski Resort in the Lake Tahoe Basin (M261E). The trees were overly mature for the species and some California black oaks had previously died nearby. The first indication that the trees had any root rot was when they toppled over after wind or snow storms.

Numerous incense-cedar trees planted on a residential property in Shasta Lake City, Shasta County (M261A) were also found declining or dead as a result of Armillaria. The trees were planted among native black oak and survived well for many years. They began to exhibit decline, however, after landscaping changes and irrigation were initiated. Pine needle scale (*Chionaspis pinifoliae*) was also present on the cedars.

M261A

Heterobasidion Root Disease
Heterobasidion spp.
Contributions by: Pete Angwin, Jack Marshall, Brent Oblinger, and Tom Smith

263A

<u>*Heterobasidion irregulare*</u>
A long-term study plot at Boggs Mountain Demonstration State Forest (Lake County, 263A) was initiated in 1970 with six rows of planted ponderosa pine radiating outward from an active *Heterobasidion irregulare* root disease center. The last detected mortality was observed in 1998, but the plot was inspected again in 2011 and 2012. No further mortality has occurred, and the remaining trees appeared to be healthy. The California Department of Forestry and Fire Protection (CAL FIRE) will conduct a final evaluation of the area and then terminate this study.

Several large, mature madrone trees that were either dead or in serious decline were examined at Empire Mine State Park in Nevada County (M261E). The dead trees were found during aerial surveys. Conks of *H. irregulare* (confirmed using PCR) were found at the base of live and dead trees. The disease was also found causing similar symptoms and fruiting bodies on madrones and ponderosa pines at a nearby CAL FIRE Conservation Camp where madrones dying of unknown causes had previously been recorded.

Fig 29: *Heterobasidion occidentale* fruiting bodies from an infected white fir stump in Unit 24 of the Smokey Project Area, Grindstone RD, Mendocino NF.

Photo by: P. Angwin

<u>*Heterobasidion occidentale*</u>
Conks of *H. occidentale* (identified by host association only) were found on a grand fir stump east of the Fort Bragg Grange in Inglenook (Mendocino County, 263A). A few windthrown grand fir were found nearby, but these were not recent, and Heterobasidion root disease could not be confirmed on the fallen trees.

Fig 30: Old *Heterobasidion occidentale* fruiting bodies from an infected white fir stump in Unit 124 at Elk Flat, Shasta-McCloud management Unit, Shasta-Trinity NF.

Photo by: P. Angwin

Fruiting bodies of *H. occidentale* were widespread on fir stumps in several Smokey Project Area units of the Buttermilk Late Successional Reserve on the Grindstone Ranger District of the Mendocino NF (Tehama County, M261B). Declining red and white fir trees were also common throughout the reserve. Fir engraver beetle (*Scolytis ventralis*) had attacked and killed many of the firs affected by Heterobasidion root disease. The disease was most prevalent in Unit 1 (33 acres), which is adjacent to Masterson Group Campground, and in Unit 24 (20 acres).

Fig 31: Laminant decayed wood from an infected white fir stump in Unit 176 at Elk Flat, Shasta-McCloud management Unit, Shasta-Trinity NF.

Photo by: P. Angwin

Heterobasidion root disease was common in white fir in mixed conifer stands in the McCloud Flats

Fig 32: Black stain root disease in dying Douglas-fir in Unit 241-9 of the Crawford Timber Sale area of the Happy Camp RD, Klamath NF.

Photo by: P. Angwin

area of the Shasta-McCloud Management Unit, Shasta-Trinity NF (Siskiyou County, M261D). In 2012, *H. occidentale* fruiting bodies were found in white fir stumps in Unit 124 at Elk Flat, and laminant decay typical of *H. occidentale* decay was found in stumps in Unit 176.

M261D

Black Stain Root Disease
Leptographium wageneri
Contributions by: Pete Angwin, Beverly Bulaon, Martin MacKenzie, and Don Owen

Black stain root disease killed scattered groups of Douglas-fir in a single-species plantation on the east side of Aubrey Ridge, a few miles west of Burney, Shasta County. The 12-acre stand was established following the Fountain Fire and has received no thinning or other disturbance. Mortality has occurred for at least two years and has typically started as a single tree with subsequent spread to adjacent trees (M261D).

The McCloud Flats area of the Shasta-McCloud Management Unit, Shasta-Trinity NF, Siskiyou County (M261D), continued to have extensive ponderosa pine mortality due to overstocking and the combined effects of black stain root disease (*Leptographium wageneri*), Heterobasidion root disease (*Heterobasidion irregulare*), and western pine beetle (*Dendroctonus brevicomis*). In 2011, the Pilgrim Creek area of McCloud Flats had extensive ponderosa pine mortality across nearly 7,000 acres, with 2 to 30 trees per acre being affected. Since 2010, a single stand of approximately 250 acres has experienced nearly 100 percent mortality. Many other stands in the Pilgrim Creek area had large patches of mortality that continue to spread.

M261A

Dead and dying Douglas-fir with black stain root disease were observed alongside an old log landing in Unit 241-9 of the Crawford Timber Sale Area of the Happy Camp Ranger District, Klamath NF (Siskiyou County, M261A).

Pinyon Mortality Complex
Multiple Agents
Contribution by: Martin MacKenzie

341D

At 9,000 ft elevation in the White Mountains (Inyo NF, Mono County, 341D), chronic mortality of singleleaf pinyon pine was found surrounding Grand View Observation Point. Field observations supported the concept of a multiple component decline involving drought, Pinyon Ips (*Ips confusus*), black stain root disease (*Leptographium wageneri*), and twig beetles (*Pityogenes* and *Pityophthorus* spp). Pinyon Ips appeared to attack trees initially infected with black stain root disease. As Ips come with their own complement of stain fungi, this fungi was overgrowing black stain root disease, making recovery of *Leptographium wageneri* from fading trees difficult. By the time trees turned red, black stain root disease fungus was difficult to discern. Black stain root disease-impacted trees can be identified by their production of basal resin and failure to produce fully elongated needles.

Schweinitzii Root Disease
Phaeolus schweinitzii
Contribution by: Jack Marshall

263A

Conks of *Phaeolus schweinitzii* were found on stumps and at the bases of Sitka spruce in the vicinity of Big Lagoon County Park in Humboldt County (263A).

P. schweinitzii conks were also found on stumps, bases of live stems, and standing dead

Monterey pines along the Mendocino County coast, from Caspar Creek, north to Cleone. Some of the tree crowns were fading, but no past or present windthrow was detected in any of these areas (263A).

Mistletoes

261B

Grey Pine Dwarf Mistletoe

Arceuthobium occidentale
Contributions by: Kim Camilli and Tom Smith

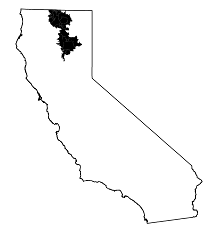
Grey pines over approximately 5,000 acres of Figueroa Mountain (Santa Barbara County, 261B) were infected with dwarf mistletoe. The majority of the trees had low to moderate infection levels, but there were scattered locations where infection rates were severe.

M261F

Dwarf mistletoe infection remained high in the American River State Recreation Area near Auburn (Placer County, M261F), with individual trees throughout the area having succumbed to infection.

Lodgepole Pine Dwarf Mistletoe

Arceuthobium americanum
Contribution by: Pete Angwin



M261D

Moderate levels of lodgepole pine dwarf mistletoe were present at Martin's Dairy Campground on the Goosenest Ranger District of the Klamath NF (Siskiyou County, M261D). Most infections were limited to the lower crown, with dwarf mistletoe ratings (DMR) of 2 to 4. (Note: A DMR of 0 is the lowest possible rating, while a rating of 6 is the highest.)

Douglas-fir Dwarf Mistletoe

Arceuthobium douglasii
Contribution by: Pete Angwin

Douglas-fir dwarf mistletoe is affecting management in several units of the Jess Project Area, Salmon River Ranger District of the Klamath NF (Siskiyou County, M261A). This mistletoe was particularly widespread and severe in Units 13 (80 acres) and 16 (50 acres), where at least two-thirds of the affected Douglas-fir had dwarf mistletoe ratings of 4 to 6.

Fig 33: Heavy infestation of Douglas-fir dwarf mistletoe in Unit 13 of the Jess Project Area of the Salmon River RD, Klamath NF.

Photo by: P. Angwin

M261A

Abiotic Conditions

Heat and Drought

Contributions by: Beverly Bulaon, Martin MacKenzie, Don Owen, and Tom Smith

In California, blue oaks grow on some of the harshest sites that will sustain trees. One adaptation to survive such conditions is the ability to shed leaves in response to drought stress. Blue oaks are well adapted to California's Mediterranean climate and in most years trees do not shed leaves until the fall. During drought years, however, leaves are often shed earlier, typically in response to the summer's highest temperatures. In 2012, many blue oaks in the northern end of the Sacramento Valley and the central Sierra foothills changed color at the beginning of August during a spate of daily high temperatures over 100° F. The response varied across the landscape and between individual trees (262A, M261F).

Fig 34: Blue oaks in the lower foothills of Calaveras, Sierra, and Tuolumne Counties with symptoms of drought stress.

Photo by: M. MacKenzie

Blue oaks in the lower foothills of Tuolumne, Stanislaus, and Calaveras Counties (M261E) displayed symptoms of drought stress as early as mid-July. Groups of defoliated blue oaks as large as 10 acres or more could be seen from a distance, with most affected areas at the tops of knolls or hills. The condition is best described as being drought deciduous, which blue oaks only exhibit in drought years (M261F).

Frost Damage/Winter Injury

Contributions by: Beverly Bulaon, Martin MacKenzie, Patricia Maloney, and Roland Shaw

Severe frost damage was visible throughout the Lake Tahoe Basin and surrounding areas in the north-central Sierra Nevada. Shrubs and small trees appeared burnt from the damage, which occurred as a result of limited or no snow fall from November through January. Snowpack provides insulating protection to low plants, including seedlings and saplings, during periods of extremely cold temperatures.

Fig 35: Shrubs and small trees appear burnt from frost damage due to a lack of insulating snowpack.

Photo by: R. Shaw

Winter injury was also ubiquitous in the southern Sierra Nevada, where it was observed on trees and large brush. Winter injury is a general term for foliar damage that occurs when pronounced temperature fluctuations during the winter cause localized mortality on needles. Manzanita (green, white, and pinemat species) and white thorn *Ceoanothus* species at elevations above 5,000 ft were most notably affected.

A condition called "red belt" was so widespread among lodgepole pines that it was visible by aerial surveys. This injury was weather related and was caused by rapid changes in winter temperatures. Injury often occurs within a specific elevation range, such that affected trees across

Fig 36: White thorn (*Ceanothus* species) displaying symptoms of winter die-back; this symptom was widespread in many brush species of the Sierra Nevada in spring, 2012.

Photo by: B. Bulaon

Fig 37: Photo of meadow at the trailhead of Tuolumne grove. Needles of only the lodgepole pines were affected by the strange warm-cold fluctuations in temperature during the 2011-2012 winter ("Red Band" effect).

Photo by: B. Bulaon

Fig 38: Picture of dead sapling ponderosa pines due to winter snow damage, followed by pine engravers, Calvin Crest, Bass Lake RD.

Photo by: B. Bulaon

M261E

an elevation band appear as a belt of red color. Damage in 2012 only occurred on lodgepole pines in cold drainages and meadows, other pines or firs within the same area showed no injuries. Lodgepole, Stony Creek, and Fir Campgrounds in Sequoia-Kings Canyon National Park (Fresno County, M261E) displayed symptoms so severe that only 2012 needles were green. Calls from several National Forests in the southern Sierras reported gradations of this event occurring. Hull Creek Campground (Stanislaus NF), Tuolumne Meadows in Yosemite National Park (Tuolumne County), and along the Rubicon River (Eldorado NF, El Dorado County) were some of the areas that reported this problem.

Snow Breakage
Contributions by: Beverly Bulaon, Martin MacKenzie, and Tom Smith

Groups of saplings toppled by snow were mass attacked by engraver beetles (Sky Ranch Road, Sierra NF, Madera County). Beetles attacked perfectly green wind thrown trees while mechanically damaged trees sustaining broken limbs or tops were often not heavily attacked.

A stand of Douglas-fir on Sierra Pacific Industry land in Calaveras County was found with broken tops. The trees were all sapling size and were growing at an extremely fast rate on an excellent site in a cold pocket. It is believed that the trees suffered from snow break due to the micro-site conditions and their previous rapid growth, as leader growth of several feet per year was not strong enough to support snow accumulation.

Wind Damage
Contributions by: Beverly Bulaon and Martin MacKenzie

An anomalous wind event occurred throughout the southern and central Sierra Nevada Range in 2011, resulting in scattered patches of severe damage. Pockets of trees were uprooted or blown down along roads and trails in the Sierra, Inyo, and Eldorado National Forests as well as Yosemite National Park (M261E). In the lower and mid-elevation range of these forests, wind damage centered in dense clumps of young pines, along exposed aspects or where there were root-diseased trees. Groups of older mortality pockets caused by western pine beetle around Pilot Peak (Sierra NF, Bass Lake Ranger District, Mariposa County) were also damaged by wind and now present high-fire hazard areas. Broken trees were sheared mid-bole, with whole crowns lying nearby (Sierra NF, High Sierra Ranger District, Fresno County). However, few beetle attacks on the standing snags were observed.

From November 30 to December 1, 2011, an extreme wind event occurred in the upper Middle Fork of the San Joaquin River, unprecedented in its magnitude and direction. The unusual aspects of this event were: long wind durations, atypical wind direction, and high intensity wind (July 2012 Hilimire, Devils Postpile National Monument). The National Oceanographic Atmospheric Association (NOAA) determined winds through the valley to be traveling in

Fig 39: Significant blowdown and uprooting of lodgepole and whitebark pines along Mammoth Crest Trail from a severe winter storm in December 2011, Mammoth Lake RD, Inyo NF.

Photo by: B. Bulaon

a north/northeast direction at speeds of 90 to 150 mph (nearly equivalent to a category 5 hurricane; July 2012 Hilimire). Reds Meadow Valley (Mammoth Lake Ranger District, Inyo NF, Mono County, M261E), including Devils Postpile National Monument (Madera County) and surrounding areas, were particularly hard hit. Hundreds of acres were affected, thousands of trees were uprooted or broken, and several administration structures were destroyed by falling trees. A detailed assessment of several Devil's Postpile sites found 86 percent of trees were uprooted and 14 percent were broken (red fir is 10 times more prone to uproot than snap). Windthrown trees averaged 22 inches in diameter, with green live trees more susceptible to uprooting than dead trees (2012 Hilimire). Examination of uprooted trees found no evidence of root disease, prior damage, or other site conditions that may have contributed to windthrow, and root masses were solid and intact. Visits to untreated sites during the summer of 2012 found random pine engraver (*Ips* spp.) activity on lodgepole pines, which was not as severe as expected. Mountain pine beetle attacks were also scarce. Woodborers were prevalent on downed red firs, but few or no fir engravers were found on standing or downed trees. Phloem checks of downed trees showed that the wood was very dry, with little pitch oozing from cut stumps or mechanical injuries. Monitoring of affected sites will continue.

The same wind event that impacted trees at Devil's Postpile National Monument affected populations of *Pityophthorus boycei* twig beetles overwintering in twigs of lodgepole pine on an exposed ridge site at 8,000 ft near Silver Lake on CA Highway 88. In December 2012, no living insects were found in a sample of 50 twigs. Sampling through 2012 indicated populations of twig beetles and damage levels declined.

Fig 40: Mature lodgepole pines at Devils Postpile National Monument uprooted by severe winter storm, December 2011.

Photo by: B. Bulaon

Eighty miles southwest in Sonora (Tuolumne County), the same wind event blew over several trees with impaired root systems. One tree cut a

Fig 41: A tree with Armillaria root disease fell on a parked car during a wind event.

Photo by: M. MacKenzie

dentist's office in half and another tree with Armillaria mushrooms fruiting on its base fell on a parked car.

Storm Damage
Contributions by: Beverly Bulaon and Martin MacKenzie

Observation of singleleaf pinyon (*Pinus monophyla*) at 9,000 ft elevation in the White Mountains revealed that many trees had a few recently dead branches. Upon closer examination, it was noted that the dead branches fell into two categories: those that bore the pitchtubes of twig beetle species (*Pityophthorus* and *Pityogenes* spp.) and those that did not. Dead branches that did not have pitchtubes were torn from the main stem, presumably as a result of snow damage. Winter snow damage in 2011-2012 was significantly higher than the previous year.

Lightning
Contributions by: Beverly Bulaon and Martin MacKenzie

M261E

Numerous late summer storms brought a considerable amount of lightning without rain to the Sierra Nevada Mountains. A large sugar pine (40 inches DBH) was struck by lightning in Crystal Springs Campground (Sequoia-Kings National Park, Tulare County) and was subsequently attacked by mountain pine and red turpentine beetles (M261E).

Abnormal Decline of Black Oak
Contributions by: Martin MacKenzie and Tom Smith

For some years, botanists on Stanislaus NF have been reporting an unknown decline of black oaks, documenting that many leaves on some of these trees die early in the summer and remain attached throughout the winter. The trees leaf out the next year, but do not shed the dead leaves. After a couple of years in this condition, the trees often die. Several of these trees have been located on the Groveland Ranger District (Tuolumne County) and will be monitored to see if this is truly decline or just an anomaly of past weather conditions impacting susceptible trees. Unlike the drought deciduous condition described previously for blue oaks, this condition has been expressed by individual trees scattered across the landscape (M261E).

Similar California black oak decline has been seen in Nevada and Sierra Counties from Grass Valley to Downieville. The affected area will also be monitored (M261E, M261F).

Herbicide Damage
Contributions by: Elizabeth Bernhardt, Cheryl Blomquist, Suzanne Rooney Latham, Don Owen, Tom Smith, and Tedmund Swieki

M261A

A group of interior live oak, covering approximately a ¼ acre in the town of Mountain Gate, Shasta County (M261A), exhibited significant shoot dieback in late spring 2012 that was initially thought to be related to infection by anthracnose fungi. Infections appeared to have started in the new leaves and/or shoot tips and eventually killed the shoots. Stem tissue below the shoot dieback was alive (green) and often supported adventitious growth with stunted and deformed leaves. The California Department of Food and Agriculture (CDFA) diagnostics lab consistently isolated unidentified species of *Gnomoniopsis* and *Tubakia* from the leaf spots and dead shoots, leading to concern that this might be a new disease outbreak. Of the numerous native and non-native plants in the area, only the live oak showed extensive shoot dieback. Minor leaf spot symptoms were seen on a few California black oaks. By early August, symptoms had progressed to severe defoliation and extensive shoot necrosis, with all new epicormic growth severely stunted and deformed. Although the landowners did not report any herbicide use, an adjacent property owner had removed at least two large live oaks in March and applied glyphosate (Roundup) to kill the stumps. All affected oaks were close enough to the treated stumps to suspect herbicide damage via root graft translocation. Observed damage, especially deformation of new growth, was consistent with glyphosate phytotoxicity. Similarly, these symptoms were observed at other sites where oak stumps had been treated with glyphosate during the wet season. *Gnomoniopsis* and *Tubakia* infections may have occurred before glyphosate damage developed, but growth of the pathogens into twigs was likely favored by the phytotoxicity. Pathogenicity tests and taxonomic descriptions of the two new fungal species are underway.

Suspected herbicide damage was also observed on oak trees and foothill pines on a residential property in east Redding, Shasta County. Both interior live oak and black oak showed leaf spotting similar to what was observed on mildly impacted trees at the Mountain Gate site. Small foothill pines appeared to be dying. All damage occurred on a steep hillside that was broadcast treated with a mixture of herbicides to control grass and other unwanted vegetation (M261A).

M261A

Animal Damage

Black Bear
Ursus americanus
Contributions by: Jack Marshall

Bear damage continued in redwood and Douglas-fir stands off Bald Hills Road Northeast of Orick in northern Humboldt County.

As reported in 2011, a wave of bear damage to redwood and grand fir occurred near Westport in the Ten Mile River drainage of Mendocino County. Black bears girdled the bases of grand fir and top killed some of the largest redwoods near the mouth of the Ten Mile River drainage. On the large redwoods, girdling began some 60 ft up on the boles. Damage continued in 2012, but mostly to redwood.

Further north, black bear sightings increased near Big Lagoon in Humboldt County, but no tree mortality was associated with the increased number of sightings (263A).

Porcupine
Erethizon dorsatum
Contributions by: Jack Marshall

Porcupines were suspected in the partial girdling of redwoods near Fort Bragg in Mendocino County (263A).

Gray Squirrels
Sciurus sp.
Contributions by: Tom Smith

Squirrels chewed off the branch tips of several ponderosa pines in the Garden Valley area of El Dorado County (M261E). Only the very tips of the branches, including the buds, were cut off. Older needles remained on the branches, resulting in thinned crowns that lacked new growth. The cut branches formed a carpet of needles and buds on the ground beneath the trees. Damage occurred early in the growing season with none of the trees completely stripped of their foliage. The trees were expected to recover.

Anticoagulant Rodenticides
A New Forest Pest Issue
Contributions by: Greg Giusti

The exposure of non-target animals to second generation rodenticides has become such a looming issue that it was the subject of two presentations at the 2012 annual California Forest Pest Council meeting. While the prevalence of rodenticides in non-target species has been discussed privately by many resource professionals for some time, only recently has empirical data been generated to validate concerns.

Rodenticides are generally classified into two “generations.” Older, first generation products (warfarin, diphacinone, or chlorophacinone) have been available since the end of World War II and require multiple feedings to achieve a lethal dose by the target species. Conversely, newer, second generation products (brodifacoum, bromadiolone, and difethialone) are “acute” toxicants, requiring only a single application to deliver a lethal dose. In each case, these materials are all registered for use indoors and outdoors; within 100 ft of a structure; and for target commensal rodents (house mice, roof rats, and Norway rats).

Second generation rodenticides also have extended residue times in liver tissue following ingestion:

Bromadiolone (2nd generation)	248 days
Brodifacoum (2nd generation)	217 days
Difethialone (2nd generation)	118 days
Diphacinone (1st generation)	90 days
Warfarin (1st generation)	35 days

This suggests that lower exposure rates from secondary poisoning can reside in the body longer, allowing time for accumulation of further toxicants and prolonged exposure to the anti-clotting effects of the chemicals.

Additionally, second generation rodenticides are significantly more potent for certain mammal taxa. For example, dogs (canids) are highly sensitive to these products:

Acute Oral Toxicity to Dogs (LD50 values in mg ai/kg)	
Brodifacoum (2nd generation)	0.25-1
Difethialone (2nd generation)	4
Bromadiolone (2nd generation)	8.1
Warfarin (1st generation)	20-50
Chlorophacinone (1st generation)	50-100

In the early 1990s, the California Department of Fish and Wildlife (CDFW) began receiving reports of possible anticoagulant toxicosis in animals with symptoms of unexplained body cavity bleeding and lack of blood clotting. It was suspected that these poisonings were the result of secondary exposure.

In a more thorough review of data from 1992-2000, CDFW found the following residues in necropsied animals:

Brodifacoum (2nd generation)	66 percent
Bromadiolone (2nd generation)	19 percent
Diphacinone (1st generation)	8 percent
Chlorophacinone (1st generation)	7 percent
Difethialone (2nd generation)	1 percent

This information clearly demonstrated that second generation anticoagulants have been introduced into the environment and have been incorporated into the food web. The list of species found to be exposed to these products include: golden eagles, great-horned owls, barn owls, red-tailed hawks, Cooper's hawks, Canadian geese, coyotes, San Joaquin kit foxes, bobcats, kangaroo rats, mountain lions, turkey vultures, martens, minks, and fishers.

In one study, CDFW determined that 100 percent (14 out of 14) of necropsied mountain lions had exposure to either brodifacoum and/or bromadiolone. Another study assessed fisher populations in the Sierra Nevada. Of the 58 individuals tested, 79 percent (46) were exposed to one or more anticoagulant rodenticides. Thirteen percent were exposed to first generation products and 96 percent were exposed to second generation materials; four died.

Anticoagulant rodenticide data gathered through 2012 suggests:

1. Widespread exposure to both predators and scavengers;
2. Mortalities are associated with exposure;
3. There may be multiple pathways of exposure (i.e., urban, rural, and wilderness); and
4. A determination needs to be made as to the type of use to which these materials are being subjected (legal and illegal activities).

Invasive Plants

Status of Invasive Plants

By Dave Bakke

Invasive plants damage ecosystems around the world. They displace native species, change plant community structure, and reduce the value of habitat for wildlife and other native species. They may also disrupt physical ecosystem processes, such as fire regimes, sedimentation and erosion, light availability, and nutrient cycling. They can impact our health, agriculture, and recreation. The impact is especially severe in California, with its rich diversity of natural resources. California is home to 4,200 native plant species and is recognized internationally as a "biodiversity hotspot." Approximately 1,800 non-native plants also grow in the state, of which about 200 are recognized as invasive by the California Invasive Plant Council. Many of these invasive plants occur in forested areas of the state, and some of them can be especially troublesome in these environments. This report focuses on those species; however, there is much more invasive plant work underway in the state than is described here.

Current Management Situation

The economic conditions affecting California resulted in a major change to invasive plant management efforts in 2011. The elimination of general fund support for the California Department of Food and Agriculture's (CDFA) noxious weed program, combined with the expiration of federal stimulus funding (provided since 2009 through the USDA Forest Service) and low levels of Forest Service funding for National Forests, left many of the state's ongoing local invasive plant management efforts on shaky financial ground. In 2012, some efforts began to provide an alternative coordination structure in California, utilizing existing networks and other organizations outside of CDFA (e.g., California Invasive Plant Council, California Invasive Species Council, and other non-profits).

California Invasive Plant Council (Cal-IPC)

The nonprofit California Invasive Plant Council (Cal-IPC) provides information to help land managers more effectively address invasive plant issues. In 2012, Cal-IPC focused on mapping and risk assessment as well as prevention.

Mapping and Risk Assessment
Cal-IPC focused on four interrelated projects in 2012: 1) mapping the current distribution of invasive plants using expert knowledge and collected GIS datasets; 2) modeling the potential suitable range for some species under climate change conditions; 3) adding functions to CalWeedMapper; and 4) working with several areas in California to develop regional plans. The statewide mapping effort will help land managers identify opportunities for regional invasive species response collaboration.

In 2012, Cal-IPC also completed the compilation of distribution data for all 204 invasive species in their inventory. The results have been used to identify management opportunities, including surveillance, eradication, and containment depending upon each species' presence and extent in a particular region.

Species distribution models were also developed to project areas in California with suitable climate for specific species under current and future (2050) conditions. Seventy-nine models have been completed. The goal of these models is to help land managers with climate adaptation planning.

The CalWeedMapper system (calweedmapper.calflora.org), a partnership with the Calflora

Database, displays the results of mapping and modeling projects. Users may view maps, download local management opportunities for invasive plants, and contribute new observations. CalWeedMapper is linked with Calflora so that point locations contributed to Calflora will appear on CalWeedMapper.

Cal-IPC is now using results of previous projects to develop regional management plans with local land managers. These management plans identify high-priority species for eradication or surveillance efforts and are intended to help Weed Management Areas apply for funding in the future. So far, there are plans in progress for five central Sierra counties, three central coast counties, Shasta-Siskiyou, and the North Coast.

Prevention

Land managers work to reduce the impact of invasive plants in wildlands. Their work in infested areas makes it especially important for them to follow Best Management Practices (BMPs) to help minimize the accidental spread of invasive plants. In 2012, Cal-IPC published the 3rd edition of "Preventing the Spread of Invasive Plants: Best Management Practices for Land Managers," which presented a set of voluntary prevention measures and ready-to-use checklists to help those managing wildlands, including BMPs for fire and fuel management.

Transportation and utility corridors are at-risk sites for the introduction and spread of invasive plants. Seeds and other propagules can be transported by vehicular traffic to other locations. Construction and maintenance activities can introduce or spread invasive plants through project materials and ground disturbance. In 2012, Cal-IPC published "Preventing the Spread of Invasive Plants: Best Management Practices for Transportation and Utility Corridors," which presented voluntary guidelines to help prevent the introduction and spread of invasive plants.

For more information on Cal-IPC's efforts, contact Mapping Program Manager Dana Morawitz (dfmorawitz@cal-ipc.org) or Science Program Manager Elizabeth Brusati (edbrusati@cal-ipc.org).

California Conservation Crew (CCC)

As part of the statewide 2009 American Recovery and Reinvestment Act (ARRA) funding used in California, two CCC crews were established to work on invasive plant projects in the state. One crew worked in Northern California, the other in Southern California. The effort ended in 2012 with the closing of the grant and the exhaustion of funds. The following successes were realized as a result of this opportunity:

- Multiple participants (CCC Corps members) learned the safe and proper use of hand and power tools, such as chainsaws and chipper machines.
- Some participants saved funds earned to pay for certified driving schools and driver's testing, and obtained High School Diplomas and Driver's Licenses through classes offered while at CCC base centers.
- Participants had a direct impact on the preservation of wildlands and ecosystems.
- Through exposure to environmental protection issues, participants gained experience and insight into potential career paths.
- Some participants developed greater reading, writing, map reading, public speaking, and cognitive rationalization skills while engaged in daily program activities.
- A majority of participants attained stable living conditions at CCC base centers (located in Camarillo and Greenwood) where they could continue educational pursuits and acquire proper nutrition on a daily basis in a healthy and safe environment.

2012 Invasive Plant Species Updates

The following updates highlight invasive plants with impacts or risks of impacts to California forest lands. It is not intended to represent all of the invasive plant work accomplished in California in 2012. Reports were received from many sources, including state-level organizations, Weed Management Areas, counties, and state and federal agencies.

Each species is listed by its common name, then by its scientific name. If the species is considered noxious by the state of California, the California Department of Food and Agriculture (CDFA) rating is provided. The CDFA noxious rating is followed by the Cal-IPC rating. Appendix A (page 73) contains a brief description of both the CDFA noxious weed ratings and the Cal-IPC ratings. Sources of common names, scientific names, and species descriptions are in part from DiTomaso and Healy 2007.

Ongoing Target Species

Yellow Starthistle
Centaurea solstitialis
CDFA - C; Cal-IPC - High

Yellow star thistle (YST) probably remained the most common and well known noxious weed in California. It was introduced to California from its native Southern Europe in the 1850s and now infests approximately 20 million acres in the state. Most forested landscapes experience YST encroachment along roads first, then openings, as well as in areas that have recently burned. YST has shown it can invade most bioregions. It can grow into dense stands, crowding out native vegetation, providing physical barriers to recreation and access, reducing forage and land values, and depleting soil moisture. Although it is too extensive in California to be eradicated, localized eradication or containment remained a goal in 2012 within many forested areas. In the Sierra Nevada Mountains, a containment line was established with the goal of controlling YST at the eastern leading edge of the foothills. If successful, millions of acres of forested lands in the mid- and upper-elevations of the Sierra Nevada can be protected.

Many counties in the Sierra foothills have conducted cooperative YST control projects with private landowners through cost share activities. In most cases, the herbicide was provided by the county while the control work was paid for by the landowner. As a result of state funding reductions, the extent of leading edge work in 2012 was reduced, putting past progress at risk.

- El Dorado/Amador Counties – The Eldorado NF, in collaboration with other members of the El Dorado WMA, continued treating along the leading edge of yellow starthistle.
- San Diego County – Treated and/or surveyed six yellow starthistle sites in the county and discovered and treated two new yellow starthistle infestations.

Spotted Knapweed
Centaurea biebersteinii
CDFA - A; Cal-IPC - High

These highly competitive plants can form dense stands, ranging from bushy annuals to perennials with deep taproots that exclude native vegetation and wildlife. The genus *Centaurea* has over 500 species worldwide, none of which are native to California.

Spotted knapweed is a biennial or perennial and is extremely invasive wherever it occurs. Flowers are white, pink, or purple, and the flower bracts (phyllaries) are without spines. Seed viability of this species has been observed to be anywhere from 8 to 15 years. Spotted knapweed can also reproduce vegetatively from lateral roots below the soil surface. Native to Europe, it has been found in all the areas of the state except deserts.

- Tahoe NF – Manual treatments continued along Interstate 80, Foresthill Divide Road, and along local forest roads.
- El Dorado Noxious WMA, Sierra Pacific Industries, and the Eldorado NF, Pacific Ranger District – Eradication efforts for spotted knapweed were ongoing through 2012 in Silver Creek (the only known location for this plant in western El Dorado County). Established after the 1992 Cleveland Fire, this population has demonstrated the need for continuous, long-term eradication efforts.

Saltcedar, Tamarisk
Tamarix ramosissima
CDFA - B; Cal-IPC - High

Tamarix spp.
Saltcedar is an aggressive invader of riparian areas in arid regions throughout the western United States. Tamarisk replaces native riparian species and can degrade habitat for local wildlife, increase wildfire danger, and decrease stream flows. Its name derives from its ability to extract salts from the soil through its roots and excrete the salt through its leaves, increasing surface soil salinity, which in turn inhibits native plant establishment and growth. Flowers are white to pink.

- Napa County – The Flood Control District treated tamarisk along the Calistoga reach of the Napa River using mechanical removal or girdling and treating with imazapyr.

Dalmatian Toadflax
Linaria dalmatica subsp. *dalmatica*
CDFA - A; Cal-IPC - Moderate

This perennial plant was originally imported to California from the Mediterranean region of Europe in the late 1800s as an ornamental because of its showy snapdragon-like yellow flowers. The wide ranging, deep root system can generate new shoots, and root fragments can develop into new plants. It is found throughout California. Seed production is prolific, and seeds can remain viable for 10 years.

- Since the herbicide picloram is no longer registered in California, research is underway to examine the efficacy of new herbicides against toadflax; aminocyclopyrachlor appears to be promising.

Scotch Thistle
Onopordum acanthium ssp. *acanthium*
CDFA - A; Cal-IPC - High

Native to Europe, this biennial species was once used in Scotland as a barrier around castles. Scotch thistle has spiny leaves, conspicuously spiny-winged stems, and spiny flower heads with white or purple flowers. It is most easily controlled in the early rosette stage. Once it reaches mature size (1.5 to 3 m tall), nearly impenetrable thickets can occur. It typically grows in disturbed areas, often with high soil moisture, and can be found throughout the state. It reproduces via seed, which can remain viable in the soil for several decades.

- Calaveras County – The Scotch thistle site in Arnold is less than 0.1 acre and is stable and well defined. The county has the plant under control and pulls 5 to 20 rosettes every year. There were no adult plants to spread the seed.

Musk Thistle
Carduus nutans
CDFA - A; Cal-IPC - Moderate

Native to Europe, this biennial species was introduced to the United States in the early part of the 20th century and is now relatively widespread. However, in California, its current distribution is largely limited to the Klamath Mountains, Cascades, Modoc Plateau, and northern Sierra Nevada Mountains. The stems have prickly wings and the leaves are prickly. Flowers are purple to pink and borne on solitary stems that often are bent over, leading to another common name of nodding thistle. Seeds do not normally survive long in the soil.

- Nevada County, Nevada/Placer WMA, and the Tahoe NF – The infestation of musk thistle within Sierra and Nevada Counties is at a critical juncture. The size and locations of these populations are at a stage where eradication still remains a viable option. In 2012, Nevada County collaborated with the California Department of Fish and Wildlife, CDFA, and the CCC to treat the largest musk thistle infestations in the Truckee River Canyon. The Tahoe NF treated several hundred acres around Boca Hill, Boca Reservoir, and Stampede Reservoir. A large pocket on the south side was also treated in 2012 by contractors hired by the Truckee River Watershed Council and the Truckee Ranger District weed crew. The Boca Hill infestation has been manually treated since 1997. Sites along the Boca Reservoir and near the dam have been manually treated since 2002, and sites along Stampede Reservoir have been manually treated since 2005.
- Eradication work continues on localized populations in Siskiyou County.

Thistles (Canada, Italian, Plumeless)
Cirsium arvense (Canada)
CDFA – B; Cal-IPC - Moderate
Carduus pycnocephalus (Italian)
CDFA – C; Cal-IPC - Moderate
Carduus acanthoides (Plumeless)
CDFA – A; Cal-IPC - Limited

Found throughout California forestlands, the bull thistle is the most common of these invasive thistles. It is a biennial species that reproduces from seed and is often found in recently disturbed areas, such as harvest units, burned areas, and roadsides, and can be a direct competitor with conifer seedlings. Canada thistle, a perennial that is also found throughout California, grows in clumps and can reproduce vegetatively from its extensive root system as well as from seed. Italian thistle is an annual found throughout northern and central California. Its stems have prickly wings and prickly leaves. Plumeless thistle is a biennial that is closely related to both Italian and musk thistle and is found primarily within Northern California.

Generally thistles are more commonly found in pastures and meadows, riparian habitats, and disturbed sites (along roads, power lines, etc.). Thistles reduce recreational access, grazing value, and wildlife habitat. If dense enough, once they dry out at the end of the summer, they can rapidly increase rates of fire spread.

Canada thistle

- Tahoe NF – Canada thistle spread in Antelope Valley along a stream and within an aspen stand that burned in the Cottonwood Fire. This occurrence was on the Tahoe NF, adjacent to Department of Fish and Wildlife land on the Sierraville Ranger District.

Italian thistle

- Siskiyou County – An infestation of Italian thistle was located on three private parcels and one county parcel (~25 acres in all) in the town of Forks of Salmon. The Salmon River Restoration Council has continued to work towards eradication of these populations by digging, pulling, and mulching.

Plumeless thistle

- Calaveras County – After 2011 treatments, what had been a 5-acre infestation was reduced to a ½ acre, with scattered plants. In 2012, the county revisited the Dunn's Ranch plumeless thistle site, surveyed 50 acres, and found 85 plants that were then sprayed or pulled. The county also sprayed areas where there were concerns that germination might take place.

Perennial Pepperweed, Tall Whitetop
Lepidium latifolium
CDFA – B; Cal-IPC - High

Perennial pepperweed, a native of Eurasia, has small white flowers and an extensive, creeping root system. It can reproduce vegetatively from the roots, and physical disturbance of the root system can lead to further spread, as new plants grow from root fragments. Highly competitive, it often forms dense colonies that displace native vegetation and wildlife. It is typically found in moist or seasonally wet sites, including wetlands, riparian areas, meadows, roadsides, and irrigation ditches. It is found throughout California.

- Plumas NF – For the fourth consecutive year, the Beckwourth Ranger District treated a large population of tall whitetop by grazing with sheep and goats. In addition, several smaller populations were hand pulled each summer for the last six years, resulting in a halt to expansion.
- Napa County – The Flood Control District worked on clearing patches in riparian areas; about three to four acres each year were treated with imazapyr.

Oblong Spurge
Euphorbia oblongata
CDFA – B
Carnation Spurge
E. terracina
Cal-IPC - Moderate

Oblong spurge is uncommon in California, but is expanding. The root system is not as extensive as leafy spurge. The sap may have irritant properties, but toxicity problems have not been reported.

Carnation spurge, also known as false caper, is a short-lived perennial herb found in coastal southern California and the Bay Area. Carnation spurge spreads by seed. The seed bank can last from three to five years. Carnation spurge is reported to cause dermatitis and vision impairment and has allelopathic properties. It can form dense patches in a wide variety of habitats, such as disturbed grasslands, coastal bluffs, dunes, salt marshes, riparian areas, and oak woodlands. Although it was recently introduced to southern California and is not yet widely distributed, it appears to be rapidly spreading, especially after fires and into undisturbed native plant communities.

- Siskiyou County – The Salmon River Restoration Council dug and pulled a small number of oblong spurge on private land in the lower main channel of the Salmon River.

Tree-of-heaven
Ailanthus altissima
CDFA – C; Cal-IPC – Moderate

This is a fast growing deciduous tree with large compound leaves and a creeping root system (up to 15 m in all directions) that suckers freely. The leaves have an unpleasant skunk-like odor, especially when crushed. Clonal thickets are common, and can crowd out native vegetation and wildlife. Native to China, tree-of-heaven was introduced as an ornamental as well as a medicinal plant by Chinese immigrants during the Gold Rush. Flowers are greenish yellow to white. It is scattered throughout California except for deserts, the Great Basin, and areas east of the Sierra Nevada Mountains. This species has been rapidly expanding in recent years in the oak woodlands and mixed pine/oak forests of the Sierra Nevada foothills.

- Siskiyou County – The Salmon River Restoration Council (SRRC) pulled, cut, and continued to partially girdle tree-of-heaven populations on two private parcels. The SRRC treatments in the lower main channel of the Salmon River prevented the larger stand from getting to or crossing the main road. This also prevented the population from entering and traveling in the Salmon River. The SRRC also surveyed four acres in the Forks of Salmon school and river bar population and found no trees or shoots at this site.
- Napa County – The Flood Control District treated occurrences in the riparian zone along the Rutherford reach of the Napa River, using a combination of mechanical removal and girdling/imazapyr treatments.

Brooms (Scotch Broom, French Broom)
Cytisus scoparius (Scotch)
CDFA – C; Cal-IPC - High
Genista monspessulana (French)
CDFA – C; Cal-IPC - High

These species were purposefully introduced into California for erosion control. Although there are other species of broom in California, these are the most common. These woody brush species can be found throughout the state, in low- to mid-elevation woodlands and forests. As nitrogen fixers, these species affect the soil chemistry, and therefore, can encourage other invasive plant species to become established. They also crowd out native vegetation, often developing into dense monospecific stands. Brooms provide strong competition to conifer seedlings and represent lower forage values than does native vegetation. They burn readily and can carry fire into the tree canopy, increasing risks for crown fires. There is often a seedling flush after fires and re-sprouting is common, indicating they are well-adapted to fire disturbance. Brooms have a very long-lived soil seedbank, requiring long-term eradication efforts.

- Marin County – The Marin Municipal Water District developed a long-term vegetation management plan that included a focus on invasive plants, including brooms, which were some of the more problematic invasive plants.

Cheatgrass, Downy Brome
Bromus tectorum
CDFA – not rated; Cal-IPC - High
Medusahead
Taeniatherum caput-medusae
CDFA – C; Cal-IPC - High

Cheatgrass is an annual grass that is native to Eurasia and is found throughout California. It is the most common forage species in the Great Basin. Medusahead, another annual grass, is native to Europe and has been in the western United States since the late 1800s. While cheatgrass is common throughout California, medusahead is more common in oak woodlands. These two grasses are formidable competitors with native grasses and forbs. Once established, medusahead can reach densities of 2,000 plants per square meter, creating a dense litter layer that suppresses other plants and contributes to fire danger in the summer. Although they are not shade tolerant, thus limiting their development in forested areas, they can rapidly invade disturbed sites such as logged or wildfire areas. Once established, they deplete soil moisture earlier in the season and cure earlier than native plants. Because of the early curing, they can affect wildfire timing and interval, resulting in fires occurring more often and earlier in the season. This change in fire regime works against the native species and provides ideal conditions for these grasses to dominate a site. This is especially an issue in the eastside pine type and on the Modoc Plateau.

- New research (Kyser, et al., 2012) examined the effectiveness of low rates of glyphosate herbicide as a selective herbicide treatment against medusahead in sagebrush ecosystems. Results indicated that low rates of glyphosate (~0.25 lbs ae/acre) can effectively control medusahead without long-term damage to sagebrush. In addition, researchers looked at the use of aminopyralid as a selective pre-emergent treatment.

Giant Reed, Arundo
Arundo donax
CDFA – B; Cal-IPC - High

This bamboo-like perennial grass can grow very tall (up to 8 m) and form very dense stands. It has well-developed rhizomes which allows for vegetative propagation from intact and fragmented rhizomes as well as fragmented stems. Arundo was brought into California by the early Spanish settlers. It is found in riparian areas throughout California, especially along coastal waterways in southern and central California and waterways flowing into and through the Sacramento and San Joaquin Valleys. Very dense stands of arundo crowd out native vegetation, decreasing wildlife habitat and affecting water quality by reducing stream shading, changing sediment movement, and reducing stream bank stability. Arundo can carry fire up riparian channels into the forested lands adjacent to streams, and in this sense, acts like other invasive annual grasses (e.g., cheatgrass) in changing the natural fire regime and fire behavior in riparian forests.

- Napa County – The Flood Control District worked to remove arundo from the Oakville, Rutherford, and Calistoga reaches of the Napa River using a combination of imazapyr and glyphosate.

Himalaya Blackberry
Rubus discolor
CDFA – not rated; Cal-IPC – High

Himalaya blackberry, introduced from Eurasia, is the most common non-native bramble invading natural areas of California. It has biennial stems, perennial roots, and edible blackberries. This invasive species can be distinguished from native blackberries in that the stems are angled in cross-section, not round, and the leaves are evergreen, not deciduous. Himalaya blackberry is found throughout California (except the desert areas) and is often associated with moist open sites and riparian habitats.

- Napa County – The Flood Control District treated blackberry throughout the Napa River watershed.

Rush Skeletonweed, Hogbite
Chondrilla juncea
CDFA – A; Cal-IPC - Moderate

An herbaceous perennial or biennial plant, rush skeletonweed is native to Southern Europe and has stiff and wiry stems to about 1 m tall, with milky sap and deep taproots (2 to 3 m). The flowers are bright yellow and borne on stems developing from a rosette. It is not common in California, although it can grow in most areas of the state. In wildlands it is found most often in disturbed roadside and rangeland soil.

- Calaveras County – Skeletonweed control has proven to be difficult. Hand pulling or hoeing left roots in the ground, resulting in new growth. Where skeletonweed was pulled rather than sprayed because the plants were close to seeding, they re-grew from the remaining root. Also, in some cases the plant appeared to die back from chemical activity, but then grew again. Spread occurred onto many properties that the county does not have permission, resources, or time to control.

Gorse
Ulex europaeus
CDFA – B; Cal-IPC – High

Gorse is a spiny evergreen shrub related to the brooms and is native to western Europe as an ornamental or hedge shrub. It forms dense, impenetrable thickets that exclude native vegetation and cause an increase in fire risk. Gorse spreads by seed and has a very long-lived seedbank.

- Calaveras County – Staff revisited the gorse site and found small sprouts coming up through the dead brush. They surveyed and sprayed the sprouts that were scattered in the 5-acre site. The mature plants that were sprayed were dead. Only young sprouts remained on the site, and with continued monitoring and spot spraying, the gorse will remain contained. A relationship with the California Department of Forestry and Fire Protection was initiated to control the gorse, using a prescribed burn. A burn permit was obtained by the landowner; however, complications due to the potential for illegal marijuana plants on site delayed the burn. The county will continue to periodically survey and treat new sprouts until a burn can be completed.

Stinkwort
Dittrichia graveolens
CDFA – not rated; Cal-IPC – Moderate/Alert

Stinkwort is a member of the Asteraceae (sunflower) family. It is native to the Mediterranean region of Europe, North Africa, and the Middle East. It is closely related to the tarweeds and, like them, is strongly aromatic. Stinkwort was first reported in California in 1984 in Santa Clara County. By 2012, it had spread to 36 of California’s 58 counties. Stinkwort is not palatable to animals and can be poisonous to livestock as well as cause contact allergic dermatitis in humans. In California, it is primarily found along roadsides, but its biology suggests that it could also be invasive in open riparian areas, overgrazed rangelands, and oak woodlands. Stinkwort has a unique life cycle among annual plants. Unlike most summer or late season winter annuals, it flowers and produces seed from September to December.

In 2012, efforts began to develop a statewide strategy and action plan for stinkwort. There is still much to learn about the risks this species presents to wildlands in California, including likely elevation ranges and whether it will be a problem off of roadsides or heavily disturbed sites. It has rapidly spread throughout the San Francisco Bay Area, Sacramento Valley, into the foothills, and recently into San Diego County. This may be the next yellow star thistle for California.

Monitoring

Wood Packaging Material

By Robin Wall

Wood packaging material (WPM) continues to be a significant pest pathway that the U.S. Customs and Border Protection (CBP) is addressing. Since 2006, all WPM entering or transiting the U.S. must meet ISPM 15 Standards and be free of pests. Heat treatment and methyl bromide are the approved treatments. Overall, violations of the WPM standards are very low in relation to the total number of regulated and miscellaneous inspections. Of all the agriculture-related examinations nationally, only .04 percent was determined to have non-compliant WPM. In California, that number dropped to .02 percent of the total regulated and miscellaneous CBP inspections.

Nationally, the lack of ISPM 15 marking (non-treatment) is the most common infraction. The interception of non-compliant WPM increased by approximately 13 percent in 2012. Of those cargo shipments intercepted that had non-compliant WPM, 81 percent were miscellaneous commodities, such as machinery, metal products, and finished wood articles. Approximately half of the national interceptions of non-compliant shipments originated from Mexico, followed by China and India.

In California, the number of non-compliant WPM violations has remained mostly the same since FY10. Long Beach is the leading destination intercepting non-compliant WPM in the state. In the last two years, Long Beach has ranked in the top five non-compliant shipment destinations. Most wood-boring pests intercepted in WPM are Cerambycid in shipments from China.

CBP remains vigilant in response to changing trends in wood-boring pest interceptions and associated WPM. Inspectors in the field (Agriculture Specialists and Officers) are trained to detect wood-boring insects and enforce appropriate actions to minimize risks for the introduction of potentially injurious invasive species. CBP maintains a goal of increased WPM import compliance through continued communication and outreach to the trade community.

Fig 42: U.S. Customs and Border Protection inspectors checking wood packing material for pests.

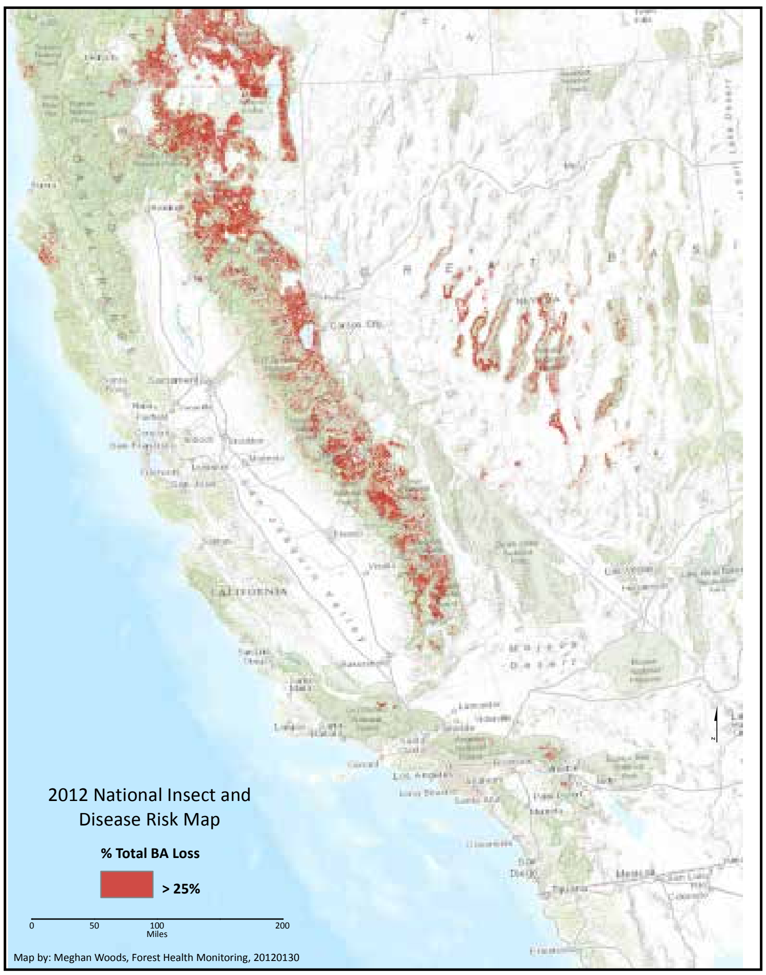
Photo by: R. Wall

Insect and Disease Risk Modeling and Mapping

By Meghan Woods

Insect and Disease Risk Modeling was initiated in California in 1995. A national multi-criterion framework was established to facilitate a standardized modeling approach across all forest health regions to create a seamless set of risk models for forest insects and diseases. Model criteria and parameters vary across the landscape for each host type. Scientific literature, professional knowledge, and statistical data form the basis for the development of the host-specific models. Input criteria for the models include: stand density index (SDI), basal area (BA), quadratic mean diameter (QMD), precipitation, relative humidity, elevation, percent canopy cover, and temperature regime, among others. The most recent results were published in 2006. A new iteration of the national model was completed in 2012, and will be published in 2013.

In April of 2012, all Forest Service regions reviewed initial composite maps generated by the Forest Health Technology Enterprise Team (FHTET). Minor edits were made to pest models. FHTET also developed methods to adjust basal area within the host maps for areas where recent disturbances (fire, pest activity, harvest, etc.) occurred, as well as to adjust for growth. Finalization of both the host surfaces and risk models was completed through cooperative efforts with Forest Service Regions 3, 4, and 6 to ensure seamless coverage and prevent model overlap. Final composite maps were approved by each region in December 2012.



Map 5: National Insect and Disease Risk Map, 2012.

Map by: M. Woods

The Port-Orford-cedar root disease risk model is included in the 2012 composite map. Efforts were made between 2006 and 2012 to improve the host mapping. These efforts made it possible to model Port-Orford-cedar in the same manner as other pests. Also of note, Region 5 will be fully represented in the 2012 Risk Map with the addition of Hawaii to the National Map.

Risk maps are available for 2006 on the USDA Forest Service, Forest Health Monitoring website at: http://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fsbdev3_046705.

Aerial Detection Survey

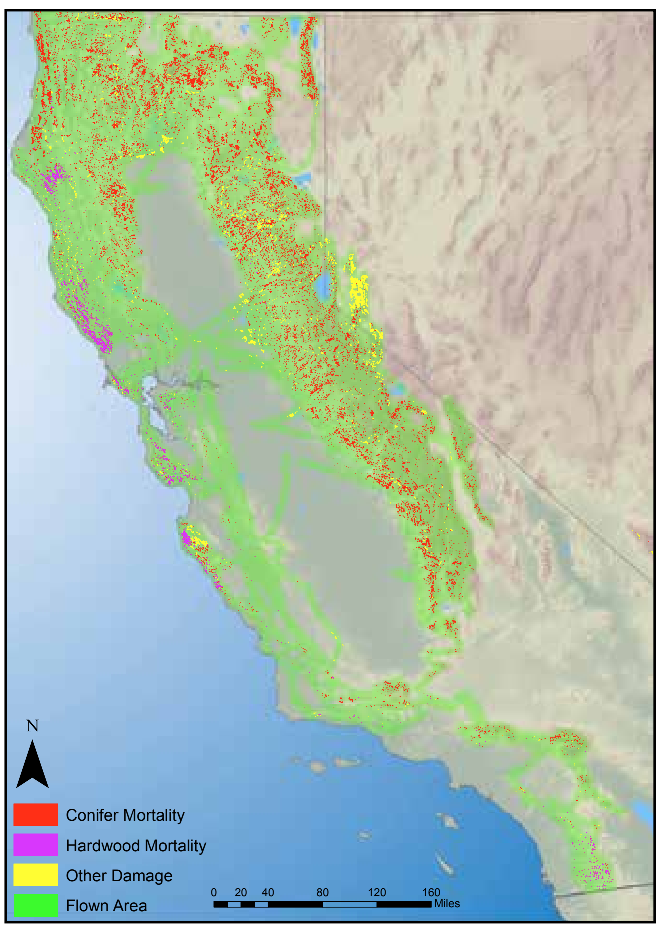
By Zachary Heath, Jeff Moore, and Brent Oblinger

Aerial surveys are conducted annually by Forest Health Protection in order to record and map recent tree mortality and current injury using a digital aerial sketch mapping system. The 2012 surveys covered 47 million acres of California, covering all National Forests and forested National Parks, along with other federal, state, and private lands. The 2012 aerial detection surveys took place from June 13th through September 27th. Data was collected by three observers: Brent Oblinger, Jeff Moore, and Zachary Heath. Flights were typically flown on a 3-mile grid with two observers mapping out opposite sides of the plane.

Mapped mortality remained similar to 2011 levels, with about 511,000 acres of elevated mortality mapped in 2012. An estimated 1.78 million trees were killed. Major mortality events included continued pine beetle activity and an increase in sudden oak death.

Highlights:

- Overall, acres affected by bark beetles were reduced from 2011 and 2010 levels, mainly due to a continued decrease of observed fir mortality.
- Fir mortality attributed to fir engraver decreased to 138,000 acres in 2012, a little more than half of the acreage mapped in 2011. This is the second year in a row of fir mortality decline.
- Pine mortality from western and mountain pine beetle (MPB) increased in 2012, affecting 178,000 and 186,000 acres respectively. MPB acreage more than doubled from 2011.
- Acres affected by Jeffrey pine beetle increased to about 10,300 acres, compared to 8,000 acres mapped in 2011.
- Several pockets of Douglas-fir beetle mortality were mapped on the Plumas NF.
- Oak mortality from goldspotted oak borer in San Diego County remained similar to previous years, at just over 1,130 acres.
- Oak and tanoak mortality from sudden oak death increased dramatically from last year, affecting 54,400 acres compared to 8,000 acres mapped in 2011.
- Other observed diseases included Port-Orford-cedar root disease, pitch canker, and Cytospora canker on fir.
- Feeding from white fir sawfly affected over 15,000 acres in the Sierra Nevada.
- Other defoliator activity included California oak worm, black oak leafminer, pinyon sawfly, fruit-tree leafroller, and flea beetle.



Map 6: Mortality detected in 2012 via aerial survey.

Photo by: Z. Heath

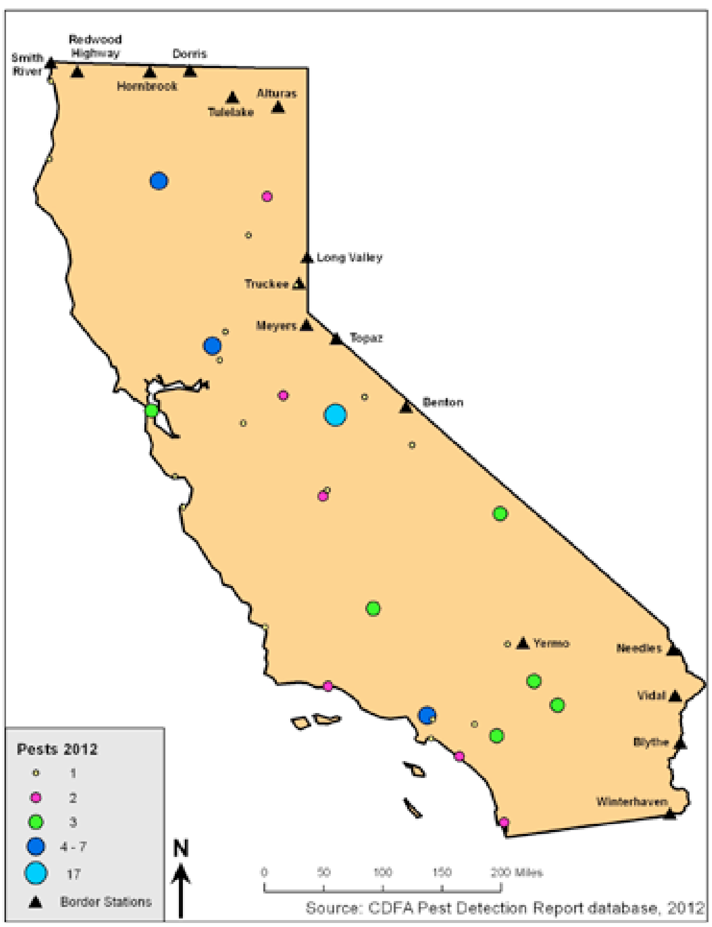
Firewood Movement

By Matthew Bokach

The California Department of Food and Agriculture's (CDFA) 16 border protection stations (Map 7) inspect firewood entering the state in motor vehicles. Any organisms found on or within firewood are collected for identification, and such wood is either confiscated or denied entry. This report summarizes the data on firewood and wood-borne potential pests intercepted between January and October of 2012.

During the first 10 months of 2012, approximately 12.5 million pounds of firewood in 5,082 individual loads entered the state. Almost 90 percent (4,532) of the loads were in private vehicles, but 58 percent of the mass (7.3 million pounds) was in commercial vehicles. Firewood was brought to California from at least 43 other states, Canada, and Mexico. Almost half (48 percent) of the wood was from Oregon; other major origins were Utah (15 percent), British Columbia (13 percent), and California (12 percent). Firewood was bound for over 500 different destinations, the majority of which were in California. Major destinations of commercial firewood included Crescent City (1.5 million lbs), Mira Loma (678,000 lbs), City of Commerce (468,000 lbs), and Reno (434,000 lbs). Major destinations of firewood in private vehicles included Crescent City (1.3 million lbs), Alturas (488,000 lbs), and Woodland (335,000 lbs).

Over this 10-month period, 402 individual organisms were collected from firewood. Of these, 122 (30 percent) were potential forest pests representing four insect taxa: Cerambycidae (long-horned wood borers, 75); Buprestidae (metallic wood borers, 33); Scolytinae (bark beetles, 9); and Isoptera (termites, 5). None of the major invasive species in the United States were identified this year, and this is the first year since data started being collected that no Lepidopteran (butterflies and moths) forest pests were intercepted.

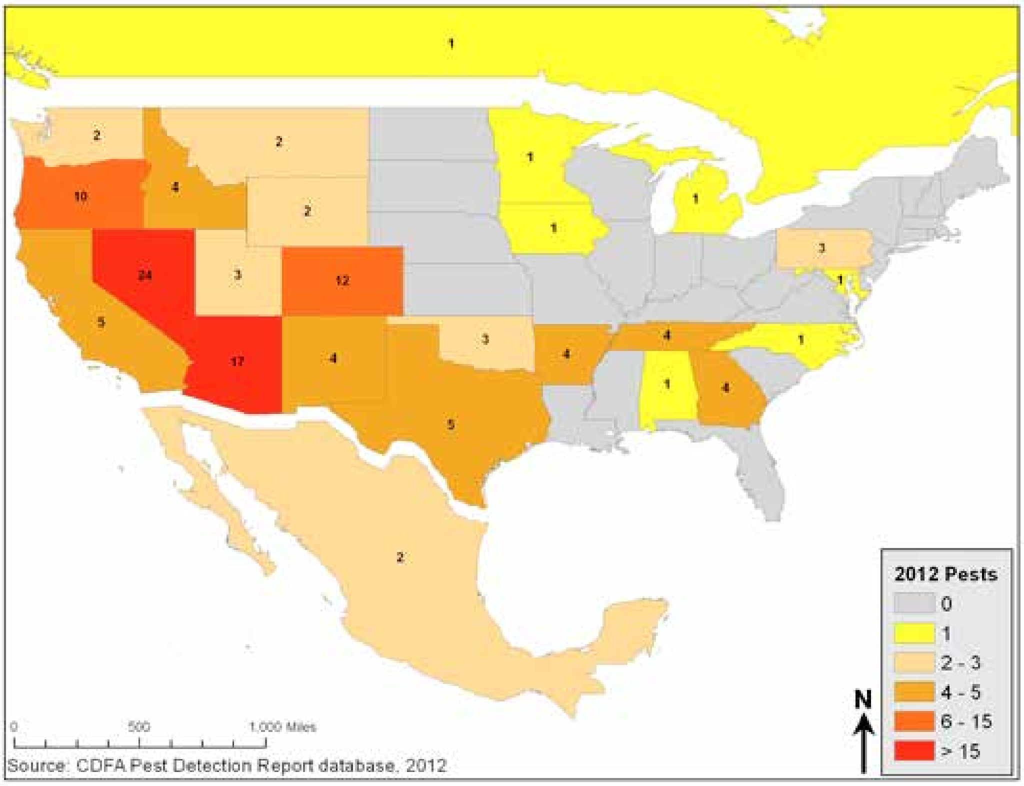


Map 7: Location of CDFA border stations and destinations of forest pests intercepted in firewood, Jan - Oct 2012.

Photo by: M. Bokach

Potential forest pests were transported to California from at least 24 other states and Canada, with Nevada (24), Arizona (17), Colorado (12), and Oregon (10) being the most common origins and Maryland the furthest away (Map 8). Over a third (35) of the 106 vehicles carrying wood-borne insects had California license plates; these vehicles brought firewood and potential pests back from at least 11 other states and Canada. All but five of these were privately owned (i.e., not commercial) vehicles.

Firewood bearing potential pests was en route to 65 different destinations, nearly all of them within California (Map 7). The most common destinations were Yosemite



Map 8: Origin states of potential forest pests brought to California in firewood, Jan - Oct 2012.

Photo by: M. Bokach

National Park (17); the Sacramento and greater Los Angeles urban areas (9 each); and Redding, the San Francisco-Oakland, and Riverside-San Bernardino urban areas (4 each). The average straight-line distance (measured from the border station where the wood was intercepted) that wood-borne potential pests would have travelled was 160 miles.

Compared to the same 10-month period in 2011, all of the trends for 2012 are encouraging. About a quarter less firewood entered the state (12.5 million pounds versus 17.1 million), and less than half the number of potential pests (122 vs. 311) were intercepted in firewood from fewer other states (24 vs. 37). Although the CDFA border stations were open fewer hours in 2012 due to budget cuts, their overall operating hours were not reduced to less than half, so it seems safe to conclude that fewer wood-borne pests were brought to California in 2012. The distribution of pest origins has shifted notably westward: in 2011 the average straight-line distance between origin state centroids and intercepting border stations was 835 miles, while in 2012 it was 662 miles. The proportion of potential forest pests intercepted in vehicles with California license plates jumped from roughly a quarter to over a third, suggesting that fewer visitors from other states are bringing wood-borne pests to the state. In the past, over a third of all the potential pests were intercepted at the Needles station on I-40; however, in 2012, roughly equal proportions were intercepted at five stations: Benton, Vidal, Needles, Truckee, and Meyers. This represents a geographic shift northward along the state's eastern border in terms of where potential pests are entering the state, with no matching shift in firewood/pest destinations.

List of Common and Scientific Names

Insects

Common Name	Scientific Name
Invasive Insects	
American tent caterpillar	*Malacosoma americanum*
Asian gypsy moth	*Lymantria dispar*
Emerald ash borer	*Agrilus planipennis*
European gypsy moth	*Lymantria dispar*
Goldspotted oak borer	*Agrilus auroguttatus*
Light brown apple moth	*Epiphyas postvittana*
Polyphagous shot hole borer	*Euwallacea* sp.
Red palm weevil	*Rhynchophorus ferrungineus*
South American palm weevil	*Rhynchophorus palmarum*
Bark Beetles and Wood Borers	
Ambrosia beetles	*Monarthrum* spp.
California fivespined Ips	*Ips paraconfusus*
Cedar bark beetle	*Phloeosinus* sp.
Douglas-fir beetle	*Dendroctonus pseudotsugae*
Fir engraver	*Scolytus ventralis*
Flatheaded fir borer	*Melanophila drummondi*
Jeffrey pine beetle	*Dendroctonus jeffreyi*
Monterey pine Ips	*Ips mexicanus*
Mountain pine beetle	*Dendroctonus ponderosae*
Oak bark beetles	*Pseudpityophthorus pubipennis*
Pine engraver beetles	*Ips* spp.
Pinyon Ips	*Ips confusus*
Red turpentine beetle	*Dendroctonus valens*
Western pine beetle	*Dendroctonus brevicomis*
Defoliators	
Black oak leaf miner	*Eriocraniella aurosparsella*
California oakworm	*Phyrganidia californica*
Douglas-fir tussock moth	*Orgyia pseudotsugata*
Fall webworm	*Hyphantria cunea*
Fruittree leaf roller	*Archyps argyrospila*
Pinyon sawfly	*Neodiprion edulicolus*
Satin moth	*Leucoma salicis*
Western tent caterpillar	*Malacosoma californicum*
White fir sawfly	*Neodiprion abietis*
Other Insects	
Alder flea beetle	*Macrohaltica ambiens (= Altica ambiens)*
Balsam wooly adelgid	*Adelges piceae*
Black pineleaf scale	*Nuculaspis californica*
Douglas-fir twig beetle	*Pityophthorus pseudotsugae*
Gouty pitch midge	*Cecidomyia piniinopis*
Incense-cedar scale	*Xylococculus macrocarpae*
Monterey pine weevil	*Pissodes radiatae*
Pine needle scale	*Chionaspis pinifoliae*
Pine needle sheathminer	*Zelleria haimbachi*
Pine twig beetle	*Pityophthorus confertus & P. confinis*
Ponderosa pine tip moth	*Rhyacionia zozana*

Ponderosa pine twig scale	*Matsucoccus bisetosus*
Snout moth	*Dioryctria* sp.
Sycamore whitefly	Unknown species
Twig Beetles	*Pityogenes* & *Pityophthorus* spp.
Weevil	*Scythropus* sp.

Diseases and their Causal Pathogens

Common Name	Scientific Name
Cankers	
Botryosphaeria canker	*Botryosphaeria* sp.
Cytospora canker of aspen	*Cytospora chrysosperma*
Diplodia blight of pines	*Diplodia pinea*
Douglas-fir canker	*Diaporthe lokoyae* or *Dermea pseudotsugae*
Pitch canker	*Fusarium circinatum*
Seiridium canker	*Seiridium* sp.
Declines	
Decline of black oak	Multiple agents
Pinyon mortality complex	Multiple agents
Sudden oak death	*Phytophthora ramorum*
Fusarium Dieback/ Polyphagous Shot Hole Borer Complex	*Fusarium* sp. (multiple agents)
Dwarf Mistletoes	
Douglas-fir dwarf mistletoe	*Arceuthobium douglasii*
Grey pine dwarf mistletoe	*Arceuthobium occidentale*
Lodgepole pine dwarf mistletoe	*Arceuthobium americanum*
Western dwarf mistletoe	*Arceuthobium campylopodum*
Foliage Diseases	
Elytroderma needle blight	*Elytroderma deformans*
Foliar blight of madrone	*Mycosphaerella* sp. & *Monochaetia* sp.
Leaf spot on oak	*Tubakia* sp.
Oak anthracnose	*Cryptocline cinerescens*
Oak leaf blister	*Taphrina caerulescens*
Oak leaf blotch	*Gnomoniopsis* sp.
Sycamore anthracnose	Apiognomonia veneta (*Discula platani*)
True fir needle cast	*Lirula abietis-concoloris*
Nursery Diseases	
Sudden oak death	*Phytophthora ramorum*
Leaf Scorch	
Maple Leaf Scorch	*Xylella fastidiosa*
Root Diseases	
Armillaria root disease	*Armillaria mellea, Armillaria* sp.
Black stain root disease	*Leptographium wageneri*
Heterobasidion root disease	*Heterobasidion irregulare* *Heterobasidion occidentale*
Other Phytophthora diseases	*Phytophthora nemorosa*
Port-Orford-cedar root disease	*Phytophthora lateralis*
Phytophthora root rot	*Phytophthora cinnamomi*

Schweinitzii root disease	*Phaeolus schweinitzii*

Rusts

Other rusts	*Cronartium coleosporioides*
Western gall rust	*Endocronartium harknessii* = *Peridermium harknessii*
White pine blister rust	*Cronartium ribicola*

Trees

Common Name	Scientific Name
Conifers	
Pines	*Pinus* spp.
Aleppo pine	*Pinus halepensis*
Bishop pine	*Pinus muricata*
Bristlecone pine	*Pinus longaeva*
Coulter pine	*Pinus coulteri*
Foxtail pine	*Pinus balfouriana*
Gray pine	*Pinus sabiniana*
Italian stone pine	*Pinus pinea*
Jeffrey pine	*Pinus jeffreyi*
Knobcone pine	*Pinus attenuata*
Limber pine	*Pinus flexilis*
Lodgepole pine	*Pinus contorta* var. *murrayana*
Monterey pine	*Pinus radiata*
Ponderosa pine	*Pinus ponderosa*
Singleleaf pinyon	*Pinus monophylla*
Sugar pine	*Pinus lambertiana*
Torrey pine	*Pinus torreyana*
Western white pine	*Pinus monticola*
Whitebark pine	*Pinus albicaulis*
True firs	*Abies* spp.
Grand fir	*Abies grandis*
Noble fir	*Abies nobilis*
Nordman fir	*Abies nordmanniana*
Red fir	*Abies magnifica*
Silver fir	*Abies pectinata*
White fir	*Abies concolor*
Others	
Brewer spruce	*Picea breweriana*
Coast redwood	*Sequoia sempervirens*
Douglas-fir	*Pseudotsuga menziesii*
Engelmann spruce	*Picea engelmannii*
Giant sequoia	*Sequoia giganteum*
Incense-cedar	*Calocedrus decurrens*
Leyland cypress	*Cupressocyparis leylandii*
Monterey cypress	*Cupressus macrocarpa*
Mountain hemlock	*Tsuga mertensiana*
Western hemlock	*Tsuga heterophylla*
Port-Orford-cedar	*Chamaecyparis lawsoniana*
Sitka spruce	*Picea sitchensis*
Hardwoods	
Oaks	*Quercus* spp.
Blue oak	*Quercus douglasii*

California black oak	*Quercus kelloggii*
Canyon live oak	*Quercus chrysolepis*
Coast live oak	*Quercus agrifolia*
English oak	*Quercus robur*
Interior live oak	*Quercus wislizeni*
Shreve oak	*Quercus parvula* var. *shrevei*
Valley oak	*Quercus lobata*

Other

Alder	*Alnus* spp.
Ash	*Fraxinus* spp.
Aspen	*Populus tremuloides*
Avocado	*Persea* spp.
Big-leaf maple	*Acer macrophyllum*
Bitterbrush	*Purshia tridentata*
Box elder	*Acer negundo*
Buford, Chinese, or horned holly	*Ilex cornuta*
California bay laurel	*Umbellularia californica*
California sycamore	*Platanus racemosa*
Camphor	*Cinnamomum camphora*
Ceanothus	*Ceanothus* spp.
Cottonwoods	*Populus* sect. *Aigeiros* spp.
Creeping Oregon grape	*Mahonia nervosa*
Elms	*Ulmus* spp.
Eucalyptus	*Eucalyptus* spp.
Golden (giant) chinquapin (chinkapin)	*Castanopsis chrysophylla*
Japanese larch	*Larix kaempferi*
Laurel sumac	*Malosma laurina*
Lily tree	*Magnolia denudate*
Mountain mahogany	*Cercocarpus* sp.
Pacific madrone	*Arbutus menziesii*
Paper bark tea tree	*Melaleuca quinquenervia*
Poison oak	*Toxicodendron diversilobum*
Poplar	*Populus* spp.
Salal	*Gaultheria shallon*
Spiked speedwell	*Veronica spicata* Syn. *Pseudolysimachion spicatum*
Star jasmine, Confederate jasmine	*Molinadendron sinaloense* *Trachelospermum jasminoides*
Sweetgum	*Liquidambar styraciflua*
Tanoak	*Lithocarpus densiflorus*
White alder	*Alnus rhombifolia*
Willow	*Salix* spp.
Yellow anise	*Illicium parviflorum*

Forest Health Evaluations

Angwin, Peter A. 2012. Biological evaluation of Smokey Project Area, Grindstone Ranger District, Mendocino National. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. N12-02. 5 p.

Bulaon, B.M. and M. MacKenzie 2012. Rancheria Forest Health Project. Kernville Ranger District, Sequoia National Forest. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. SS12-01.

Bulaon, B.M. and M. MacKenzie 2012. Biological Assessment of Insect and Diseases on Reynolds Creek Project, Groveland Ranger District, Stanislaus National Forest. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. SS12-03.

Bulaon, B.M. and M. MacKenzie 2012. Callecat Ecological Restoration Project, Amador Ranger District, Eldorado National Forest. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. SS12-02.

Bulaon, B.M. and M. MacKenzie 2012. Monotti Plantation Thinning (Prop 84 funding proposal), Groveland Ranger District, Stanislaus National Forest. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. SS12-04.

Cluck, Daniel R. 2012. Insect and Disease Evaluation of the Lakes Basin Recreation Area. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE12-01. 18 p.

Cluck, Daniel R. 2012. 2012. Douglas-fir Tussock Moth Pheromone Detection Survey 2011 Report. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE12-02. 7 p.

Cluck, Daniel R. 2012. Insect and Disease Evaluation of the Big Hill Project. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE12-03. 13 p.

Cluck, Daniel R. 2012. Evaluation of grasshopper injury to conifer seedlings in the Foresthill Forest Genetics Center. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE12-04. 2 p.

Cluck, Daniel R. 2012. Considerations for fire-injured tree harvest and hazard tree abatement within the 2012 Reading Fire. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE12-06. 4 p.

Cluck, Daniel R. 2012. Tree mortality and insect activity associated with prescribed fire. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE12-07. 4 p.

Cluck, Daniel R. and William C. Woodruff. 2012. Forest Health Biological Evaluation of the Cuckoo Project. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. NE12-05. 6 p.

Coleman, Tom W. 2011. Douglas-fir tussock moth outbreak, San Bernardino National Forest, Mountaintop Ranger District. 11 December 2011. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. SC-12-01.

Coleman, T.W. 2012. Forest Health Survey of Los Coyotes Reservation, Los Coyotes Reservation. 3 February 2012. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. SC-12-02.

Coleman, T.W. 2012. Western Pine Beetle Activity in Messenger Flats Campground, Angeles National Forest, Los Angeles Ranger District. 3 February 2012. USDA Forest Service, Pacific

Southwest Region, Forest Health Protection Report No. SC-12-03

Coleman, T.W. 2012. Forest Health Survey of Santa Ysabel Reservation, Santa Ysabel Reservation. 3 February 2012. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. SC-12-04.

Coleman, T.W. 2012. Forest Health Survey of Ramona Reservation, Ramona Reservation. 21 August 2012. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. SC-12-05.

Coleman, T.W. 2012. Forest Health Survey of Sycuan Reservation, Sycuan Reservation 21 August 2012. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. SC-12-06.

Snyder, Cynthia L. 2012. Trip report following initial site visit to Soldier Project Area to determine suitability for WBBI funding. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. N12-01. 5 p.

Snyder, Cynthia L. 2012. Evaluation of M9 salvage. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. N12-03. 4 p.

Snyder, Cynthia L. 2012. Trip report following site visit to Elk Flat LSR stewardship project to determine suitability for WBBI funding. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. N12-04. 11 p.

Snyder, Cynthia L. 2012. Trip report following site visit to Murphy Ridge Fuel Break Area to determine suitability for WBBI funding. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. N12-05. 5 p.

Snyder, Cynthia L. 2012. Trip report of insect activity in the Mill Fire. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. N12-06. 10 p.

Other Publications

Angwin, Peter A., Daniel R. Cluck, Paul J. Zambino, Brent W. Oblinger and William C. Woodruff. 2012. Hazard tree guidelines for forest service facilities and roads in the Pacific Southwest Region. USDA Forest Service, Pacific Southwest Region, Forest Health Protection Report No. RO-12-01. 36 p.

Beh, M.M.; Metz, M.R.; Frangioso, K.M.; and Rizzo, D.M. 2012. The key host for an invasive forest pathogen also facilitates the pathogen's survival of wildfire in California forests. New Phytologist 196(4):1145-54.

Kyser, G.B.; Creech, J.E.; Zhang, J.; and DiTomaso, J.M. 2012. Selective control of medusahead (*Taeniatherum caput-medusae*) in California sagebrush scrub using low rates of glyphosate. Invasive Plant Science and Management. 5(1): 1-8.

Appendix A

CDFA Noxious weed ratings (for complete descriptions go to: www.cdfa.ca.gov/phpps/ipc/encycloweedia/winfo_weedratings.htm) include:
A–Rated - Known to be economically or environmentally damaging and is either not known to be established in California or it is present in a limited distribution that allows for the possibility of eradication or successful containment. A-rated pests are prohibited from entering the state. If found in the state, A-rated weeds are subject to state or county enforced action involving eradication or containment.

B–Rated - Known to be economically or environmentally damaging and of limited distribution. B-rated pests are eligible to enter the state if the receiving county has agreed to accept them. If found in the state, they are subject to state endorsed holding action and eradication only to provide for containment, as when found in a nursery. At the discretion of the individual county agricultural commissioner, they are subject to management.

C–Rated - Known to be economically or environmentally damaging and, if present in California, are usually widespread. C-rated organisms are eligible to enter the state as long as the commodities with which they are associated conform to pest cleanliness standards when found in nursery stock shipments. If found in the state, they are subject to regulations designed to retard spread or to suppress at the discretion of the individual county agricultural commissioner. There is no state enforced action other than providing for pest cleanliness.

Q–Rated - An organism suspected to be of economic or environmental detriment, but whose status is uncertain because of incomplete identification or inadequate information.

Cal-IPC ratings (for complete descriptions go to www.cal-ipc.org/ip/inventory/index.php#categories) include:
High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

Moderate – These species have substantial and apparent - but generally not severe - ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance.

Limited – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. These species may be locally persistent and problematic.

In addition to these ratings, if a species evaluation indicates a significant potential for invading new ecosystems, an Alert designation is used so that land managers may watch for range expansions.

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:
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)

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.

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 Forest Health Protection 1323 Club Drive Vallejo, CA 94592	Forest Health Protection Shasta-Trinity National Forest 3644 Avtech Parkway Redding, CA 96002	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 Bernardino National Forest 602 Tippecanoe Avenue San Bernardino, CA 92408-2677

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 PO 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 2690 N. State Street Ukiah, CA 95482	Forest Pest Management CA Dept of Forestry & Fire Protection 4050 Branch Road Paso Robles, CA 93446

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

California Forest Pest Council Executive Board and Officers - 2012

❖ COUNCIL CHAIR:
Bob Rynearson
W.M. Beaty & Associates, Inc.

❖ COUNCIL VICE-CHAIR:
Tim Collins
Sierra Pacific Industries

❖ COUNCIL SECRETARY:
Kim Camilli
California Department of
Forestry and Fire Protection

❖ COUNCIL TREASURER
Steve Jones
California Department of
Forestry and Fire Protection

STANDING COMMITTEES

ANIMAL DAMAGE COMMITTEE:
Chair: Gregory A Guisti
University of California
Cooperative Extension

Secretary: Currently Vacant

DISEASE COMMITTEE:
Chair: Tom Smith
California Department of
Forestry and Fire Protection

Secretary: Patricia Maloney
University of California,
Davis

INSECT COMMITTEE:
Chair: Danny Cluck
Lassen National Forest
USDA Forest Service

Secretary: Beverly Bulaon
Stanislaus National Forest
USDA Forest Service

SOUTHERN CALIFORNIA
PEST COMMITTEE:
Chair: Kim Camilli
California Department of
Forestry and Fire Protection

Chair Elect: Tom Coleman
San Bernardino National Forest
USDA Forest Service

Secretary: Martin Gubrud
Consulting Professional
Forester

WEED COMMITTEE:
Chair: Mark Gray
Regeneration Forester
Sierra Pacific Industries

Secretary: Heather Morrison

EDITORIAL COMMITTEE:
Chair: Tom Smith
California Department of
Forestry and Fire Protection

Editor-in-Chief:
Katie Palmieri
COMTF/UC Berkeley

AT-LARGE DIRECTORS:

Susan Frankel
USDA Forest Service
Pacific Southwest Research Station

Detlev Vogler
USDA Forest Service
Institute of Forest Genetics

Martin MacKenzie
Stanislaus National Forest
USDA Forest Service

Produced and printed in cooperation with the USDA Forest Service,
which is an equal opportunity service provider and employer.