United States Department of Agriculture

Major Forest Insect and Disease Conditions in the United States:

2014 Update

Forest Service FS -1078 December 2016

Disclaimer

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2014 Update

COMPILED BY GARY MAN
FOREST HEALTH PROTECTION

Cover photo: *Roundheaded pine beetle outbreak, Lake Canyon, San Juan National Forest, Dolores County, Colorado. Image produced by the 2015 National Agriculture Imagery Program at 1:14,000 scale and 1-meter resolution.*

Forest Service FS-1078 December 2016

U.S. Department of Agriculture
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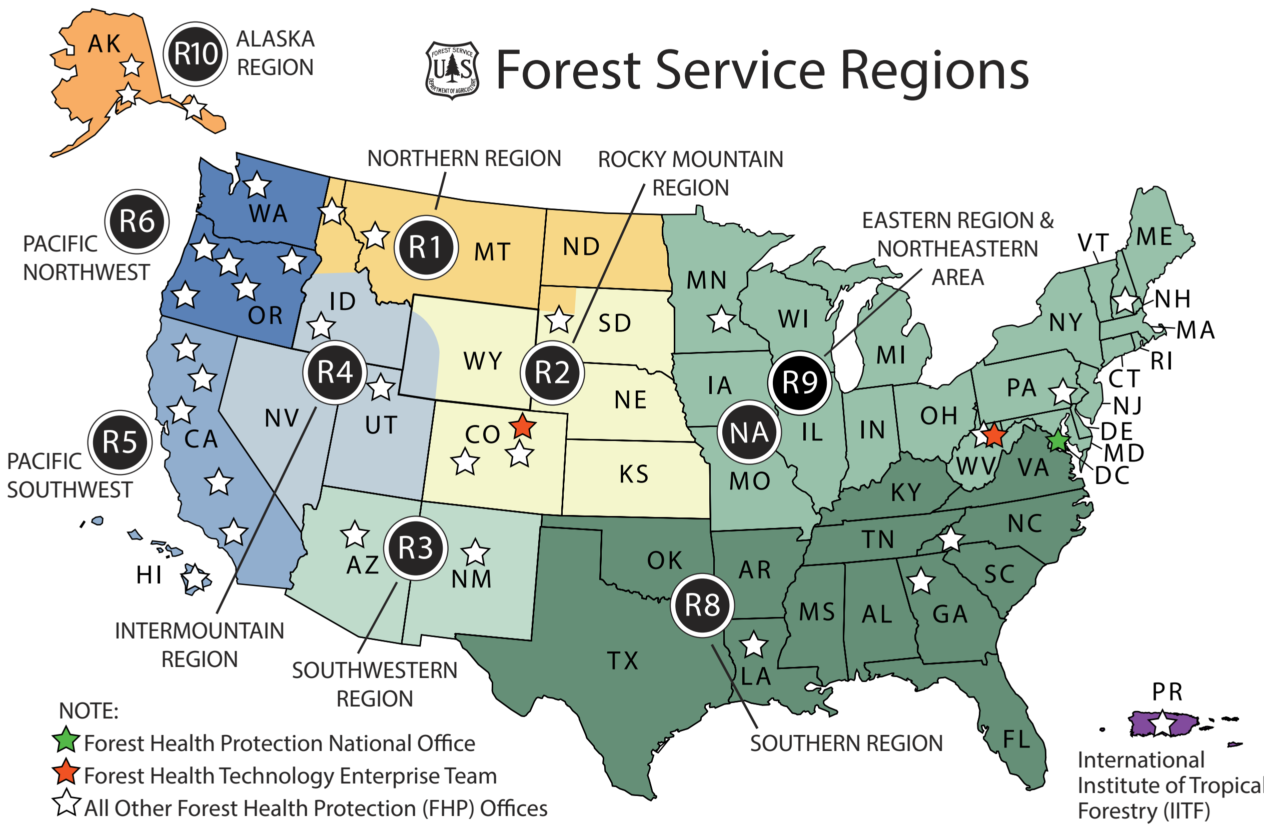
Preface

This report on the major insect and disease conditions of the Nation's forests represents the 64th annual report prepared by the U.S. Department of Agriculture, Forest Service. The report focuses on the 20 major insects and diseases that annually cause defoliation and mortality in U.S. forests. The 2007 report, *Major Forest Insect and Disease Conditions in the United States 2007* (http://www.fs.fed.us/foresthealth/publications.shtml#reports) provides background on the 20 insects and diseases described in this report. Refer to the 2007 report for more detailed information. This 2014 update provides a national summary of the major changes and status of these 20 forest pests with updated charts, tables, and maps. Additional information on these and other pests is available at http://www.foresthealth.fs.usda.gov/portal.

The information in this report is provided by the Forest Health Protection program of the Forest Service and its State partners. This program serves all Federal lands, including National Forest System lands, lands administered by the U.S. Departments of Defense and the Interior, and tribal lands. The program also provides assistance to private landowners through State foresters and other State agencies. Key elements of the program are detecting and reporting insect and disease epidemics. State and Forest Service program specialists regularly conduct detection and monitoring surveys.

For additional information about conditions, contact a Forest Service office listed on the next page (see map for office coverage) or your State forester.

Forest Service Regions and Area



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Executive Summary/Introduction

As America's forests come under greater stress from natural and human-caused impacts, the flora and fauna are responding in different ways. Some species are flourishing while others are becoming increasingly at risk for extirpation or even species extinction. In some cases, insects and diseases are major contributors to this species decline. For example, mountain pine beetle and white pine blister rust are largely responsible for restricting the distribution range of whitebark pine. The hemlock woolly adelgid is reducing the species distribution of the Eastern and Carolina hemlock, especially along riparian areas. All the species mentioned are considered key species in the niches they occupy. To protect these species—and all species—forests must be surveyed for insects and diseases so that Federal and State agencies and other stakeholders can take timely and appropriate management action to ensure forests remain resilient and sustainable for generations. The overall mortality that insects and diseases cause varies by year and by pest. The chart in figure 1 illustrates mortality variations during the past 17 years.

Acres of Tree Mortality Caused by Insects and Diseases

In 2014, mortality caused by insects and diseases was reported on over 4.6 million acres nationally. This represents a 0.1 million-acre increase from 2013, when mortality was reported on 4.5 million acres. During the past 3 years, reported mortality has more or less held steady after a peak in 2009, when mortality was reported on 11.8 million acres. One pest caused slightly more than 36 percent of the mortality—the mountain pine beetle, a native insect found in forests of the Western United States.

Although mortality is represented in the chart, defoliation can also significantly affect our forests. The western spruce budworm caused nearly 2.1 million acres of defoliation damage in 2014, a 0.5-million-acre increase from 2013. European gypsy moth defoliation was reported at almost 393,000 acres in 2014, a decrease of 181,000 acres from

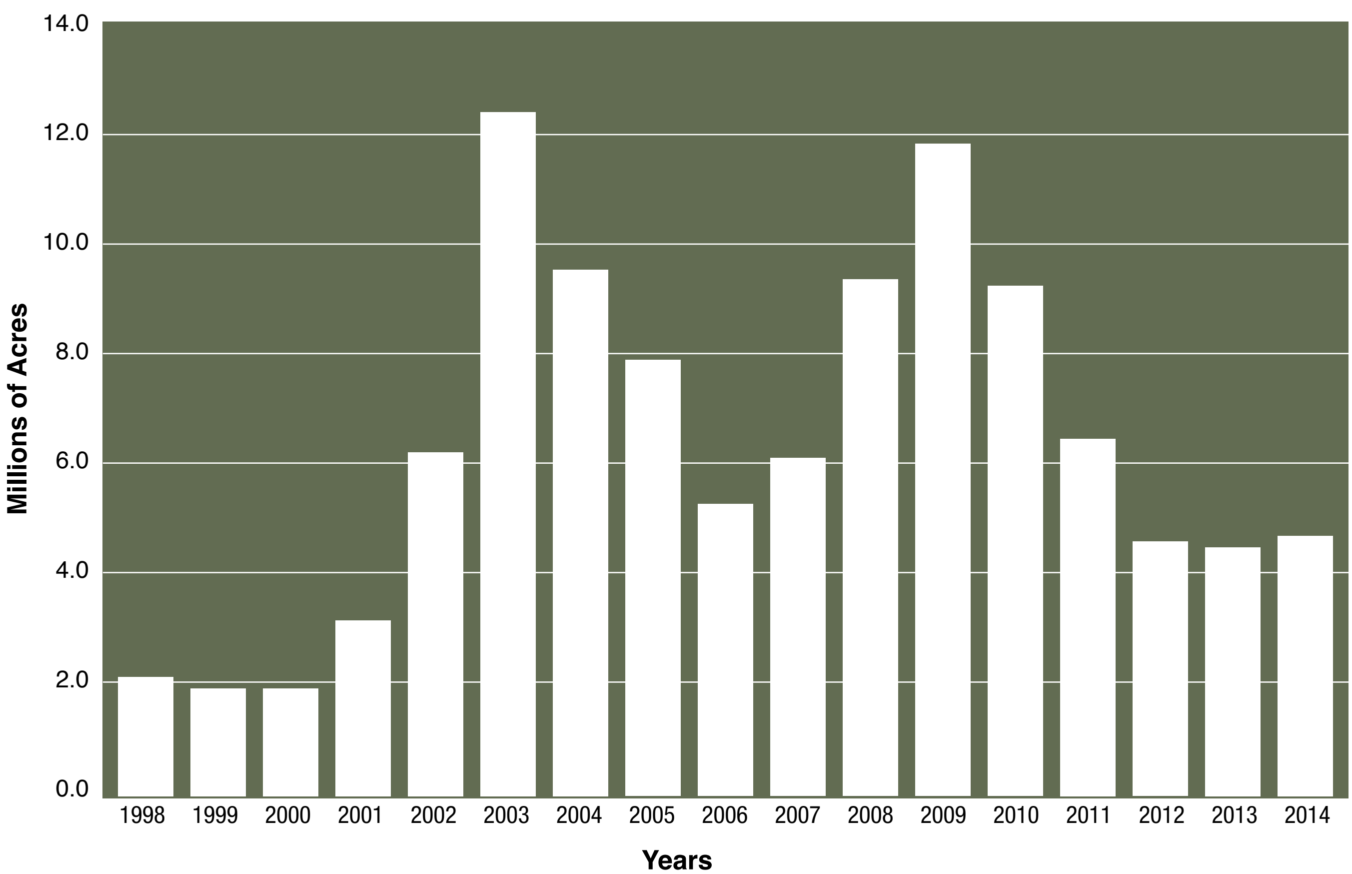


Figure 1. Surveyed acres of mortality from 1998 to 2014.

2013. A single defoliation event does not typically cause tree mortality; however, taken together with continued attacks or severe abiotic factors, such as weather and drought, trees can succumb to these defoliating insects.

Data are displayed at the county scale. It should be noted that if damage was reported at just one location in the county, the whole county is displayed as affected. This protocol is used because data for some pests are collected only at the county level. In addition, if the damage was reported at a finer pixel size, many areas would not be visible at the scale used in this publication. For example, numerous counties reported southern pine beetle mortality in 2014, but most individual infestations were small. When added together, the total area affected was only about 2,955 acres of mortality. The maps in this publication represent only what is reported as mortality or defoliation and not the total infestation of a pest. In any given year, some areas are not surveyed because of physical limitations, such as forest fires, weather events, or limited resources.

Data collected from ground and aerial surveys used in this report represent a single snapshot in time for a given year. More frequent surveys are conducted in specific areas on a case-by-case basis. By combining these surveys over time, this report captures general trends and conditions of the 20 selected insects and diseases across multiple years. Trend data across multiple years is helpful to identify and predict insect and disease outbreaks.

Every year, hundreds of native and nonnative insects and diseases damage our Nation's forests. The following pages provide descriptions of 20 major insects and diseases that contribute to annual forest mortality and defoliation. An additional section, Pests To Watch, describes pests that have the potential to become major threats and that the Forest Service and its partners are monitoring.

Mountain Pine Beetle

Dendroctonus ponderosae Hopkins

The mountain pine beetle (MPB) outbreak across the West continues to decrease in both area affected and intensity, especially in the lodgepole pine forest type (fig. 1). Populations are increasing in some States and in other forest types such as ponderosa and high-elevation pines (figs. 2 and 3).

The Southwestern Region has had little recent MPB activity. In Arizona, outbreaks of MPB activity have been increasing in southwestern white pine and this activity is occurring further south than historically recorded. In 2014, the MPB activity on the San Francisco Peaks remained at approximately the same level as 2013. In the White Mountains, there was a slight decrease in acres affected by MPB, however, activity is still occurring on a significant landscape level.

Active MPB epidemics continue in the Rocky Mountain Region. Although epidemics have subsided in many areas—often due to suitable host depletion—susceptible forests remain throughout the region. In the Black Hills of South Dakota and northeastern Wyoming, MPB activity continues at epidemic levels. Populations are generally static or declining, but there are notable areas of high activity especially west of Lead and west of Hill City. In western Wyoming, the MPB epidemic continues to heavily infest high-elevation five-needle pines and lodgepole pines in the Absaroka and Wind River Ranges on the Shoshone and adjacent lands. Much of western and southern Wyoming has extensive areas of host depletion, but susceptible lodgepole pine forests remain, especially in north central Wyoming's Bighorn National Forest. MPB activity continues at low levels in ponderosa pine on the eastern Bighorns in Johnson and Sheridan Counties.

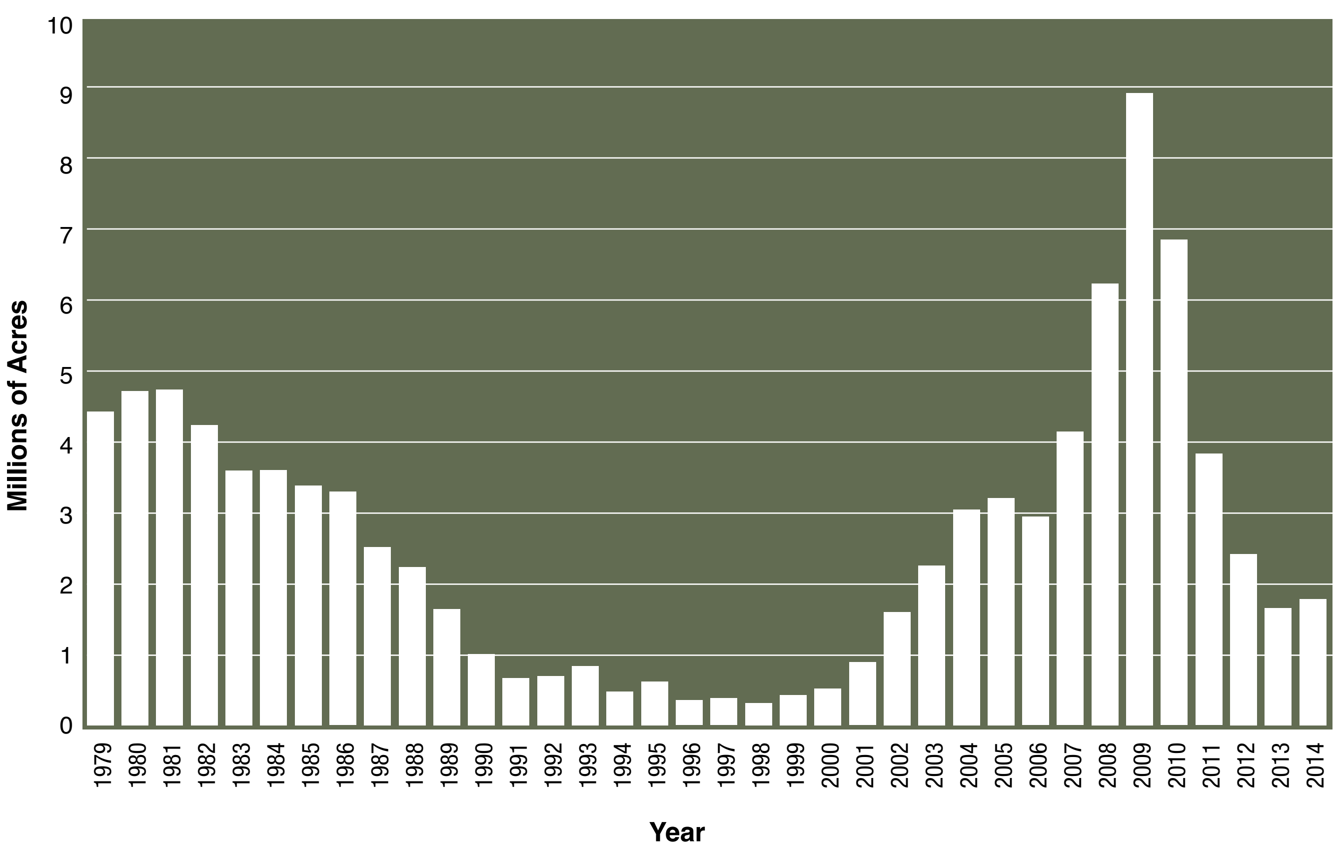


Figure 1. Mountain pine beetle activity decreased significantly in 2014 in much of the Western United States.

The MPB epidemic in north central Colorado has declined significantly, but active infestations remain in Larimer and Boulder Counties. In southern Colorado, MPB activity has increased in ponderosa pine on the Uncompahgre Plateau, and active pockets of activity were noted in Montrose, San Miguel, and Custer Counties.

The MPB outbreak in the Intermountain Region is rapidly declining. Much of the preferred, susceptible host trees have been killed where the outbreak has been occurring for many years. Lodgepole pine mortality increased on the Boise and Caribou-Targhee National Forests and Bureau of Reclamation lands in Idaho and on State and private lands in Utah. Ponderosa pine mortality increased on the Fishlake National Forest in Utah, the Toiyabe National Forest in Nevada, and on Bureau of Land Management land in Idaho. Whitebark pine mortality increased on the Humboldt-Toiyabe National Forest in Nevada, the Bridger-Teton in western Wyoming (fig. 3), and Bureau of Land Management land in Idaho.

Mortality of pine species attributed to MPB was detected across the Northern Region in 2014, although most areas of past activity continue to decline in intensity. However, some areas of significant mortality were noted, including areas with increased mortality 10 to 15 years after the initial outbreak began. Lodgepole pine remains the principal host and accounts for approximately 90 percent of all mortality detected.

In northern Idaho, mortality detected in 2014 remained largely the same as that detected in 2013. Modest decreases in mortality of the lodgepole pine type were offset by increases detected in both ponderosa pine and western white pine types. Lodgepole and ponderosa pines were affected on lands around the Clearwater National Forest, and western white pines and whitebark pines were detected principally in the St. Joe Ranger District of the Idaho Panhandle National Forest (fig. 4).

In Montana, acres affected by MPB increased. The Beaverhead-Deerlodge National Forest experienced most of the beetle-caused mortality within the State in lodgepole, whitebark, and limber pine host types. High mortality was also noted around the Lolo National Forest, with significant increases in the Gallatin National Forest. The Bitterroot area

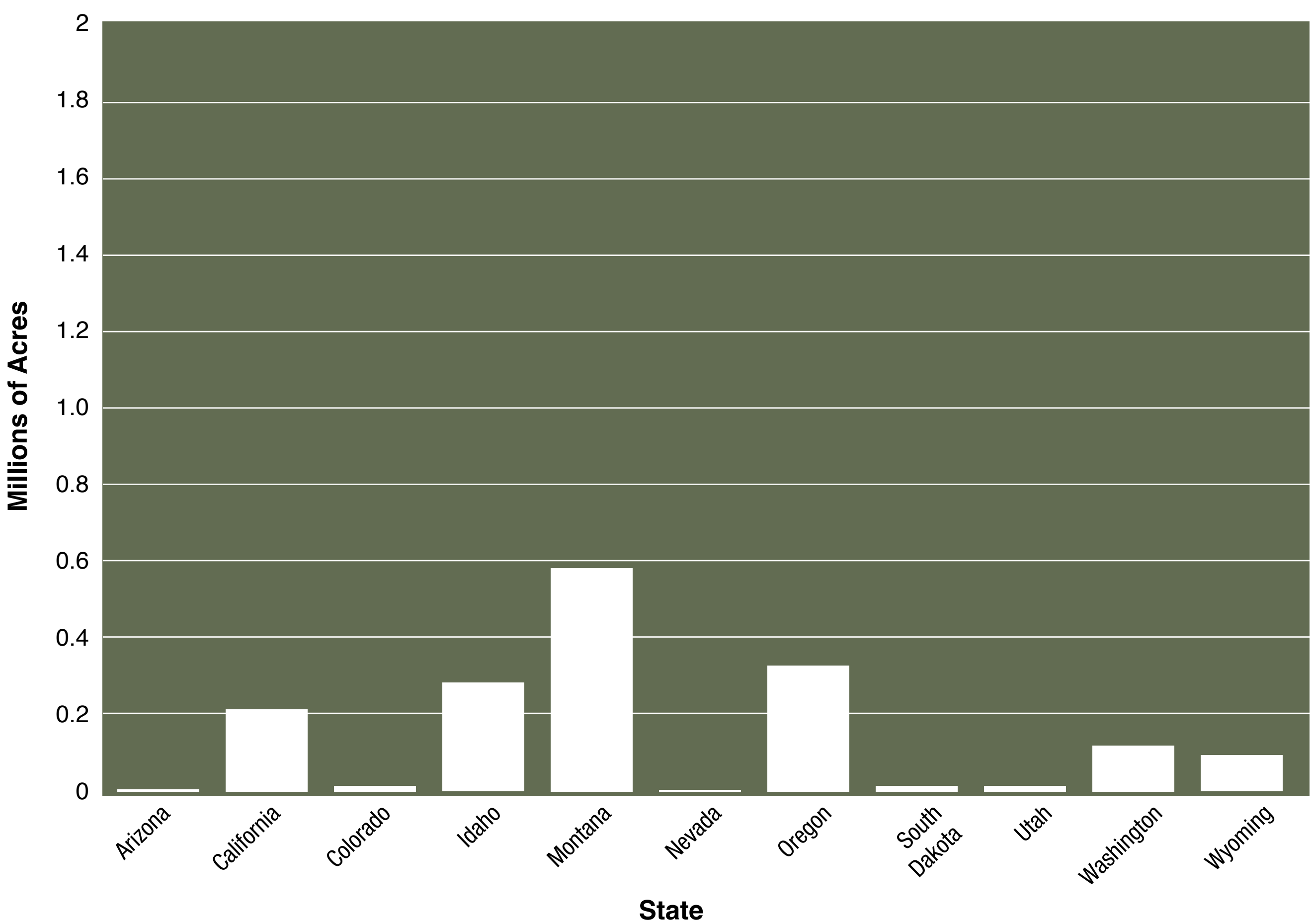


Figure 2. Mountain pine beetle mortality in 2014 by State.

also continued to experience high levels of mortality. The greatest decreases in mortality occurred around the Lewis and Clark National Forest in all three host types.

Areas with mortality due to MPB increased in Oregon and Washington compared to 2013 levels. In Washington, tree mortality due to MPB increased slightly but remained near the lowest level observed in the last decade. MPB-caused mortality of lodgepole pine increased from 2013, while mortality declined in all other pine hosts. The most concentrated areas of lodgepole and ponderosa pine mortality in Washington occurred in the Colville National Forest in northern Ferry County and central Chelan County near Lake Chelan and within the Okanogan-Wenatchee National Forest. Increased mortality of these hosts also occurred in northern Kittitas County. In Oregon, tree mortality due to MPB increased for the second consecutive year. This was primarily due to high-intensity, localized damage in areas with remaining, highly susceptible lodgepole and five-needle pines (whitebark, western white, and sugar pines). Concentrated lodgepole pine mortality was most apparent in Klamath and Lake Counties on the Fremont-Winema National Forests and in Baker and Grant Counties at the southern end of the Blue Mountains in the Malheur and Wallowa-Whitman National Forests.

In California, MPB activity was observed throughout much of its host range in 2014.

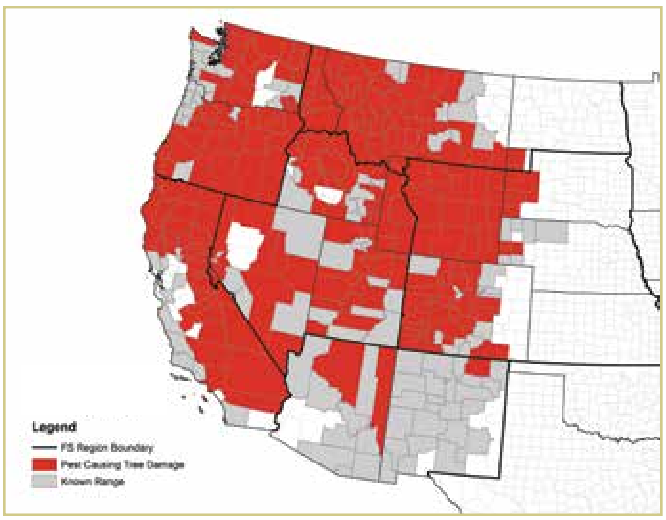


Figure 3. Counties that reported mountain pine beetle in 2014.

Figure 4. Mortality in Idaho.
Photo by USDA Forest Service.

Figure 5. Lodgepole pine mortality Bridger-Teton National Forest, WY.
Photo by Brytten Steed, USDA Forest Service.

Gypsy Moth

Lymantria dispar Linnaeu

Gypsy moths (GMs) occur in all or parts of 19 States and the District of Columbia (fig. 1). In any given year, insect populations may increase anywhere within the generally infested area causing detectable tree defoliation, which can result in damage to trees (fig. 2). Overall defoliation caused by GMs decreased from 2013 levels, although some States had increases in certain areas (table 1).

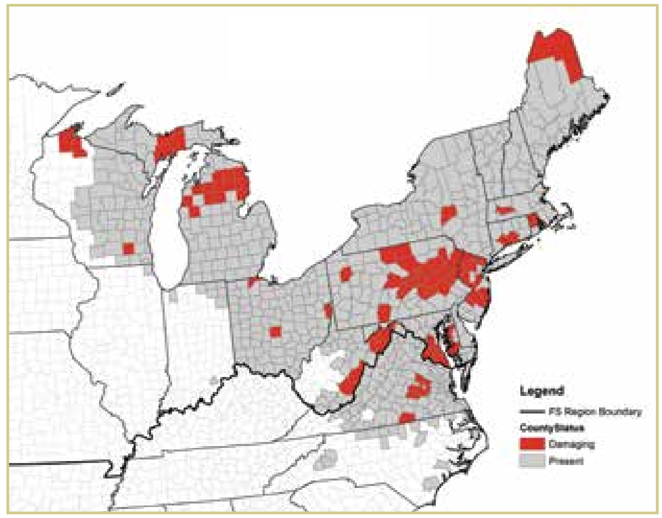


Figure 1. Counties that reported gypsy moth damage in 2014.

In Maine, a few acres of defoliation were recorded in Aroostook County on the same island where it was found in 2013 on the border of Maine and New Brunswick, Canada. Moderate defoliation was reported in Hampshire County, MA. The central part of the State (Worcester County), in areas where GM was seen defoliating oak species, saw a dramatic decline in populations due to *Entomophaga maimaiga* fungus. There was no significant defoliation reported in New Hampshire or Vermont, but in Rhode Island, localized defoliation occurred in Providence and Kent Counties (no acres reported). Defoliation was mapped in Middlesex and New Haven Counties, CT (fig. 3).

After significant defoliation in 2013, GM populations collapsed in New York with no significant damage detected. GM activity in New Jersey remained low in 2014, and decreased from 2013 levels. In Maryland, GM populations overall increased slightly across the State. Populations decreased in Garrett and Allegany Counties where the majority of the suppression activities have occurred the last few years. Defoliation was reported in Charles, St. Mary's, and Talbot Counties in 2014. Delaware did not detect any infestations of GM in 2014. In Pennsylvania, up to 99 percent of GM larvae were dead as a result of infection by virus and fungus diseases after oak trees were defoliated. Outbreaks of GM were observed in the central and eastern parts but in most of the State populations remained low. The *Entomophaga maimaiga* fungus caused a moderate collapse in the building GM population in some areas of West Virginia, but population densities above treatment thresholds were observed in Grant, Hardy, Nicholas, Pendleton, and Pocahontas Counties. In Ohio, two areas of defoliation were reported.

Table 1. Gypsy moth defoliation by State in 2014.

State	Acres
Connecticut	1,337
Maine	8
Maryland	1,418
Massachusetts	231
Michigan	41,735
New Jersey	1,328
Ohio	176
Pennsylvania	334,470
West Virginia	12,109

GM populations in Michigan remained mostly stable, increasing slightly over 2013 levels. Heavy defoliation was mapped in several counties in the north-central Lower Peninsula (fig. 4). On the west side of the Hiawatha National Forest, defoliation was reported in aspen and mixed hardwoods. Defoliation decreased dramatically in 2014 in Wisconsin. Defoliation was reported in only two counties: Ashland and Jefferson. In the State, 49 of 82 counties are now infested with GM. Defoliation was not reported in Iowa, Illinois, Indiana, Minnesota, or Missouri in 2014.

Across the South, GM populations remained low in 2014. In Virginia, surveys located 18 small GM infestations in six counties (Amelia, Chesterfield, Hanover, Henrico, Mecklenburg, and Powhatan) in the Piedmont and near the I-95 corridor between Richmond and Fredericksburg. This makes the fifth consecutive year of virtually no detectable defoliation due to GM.

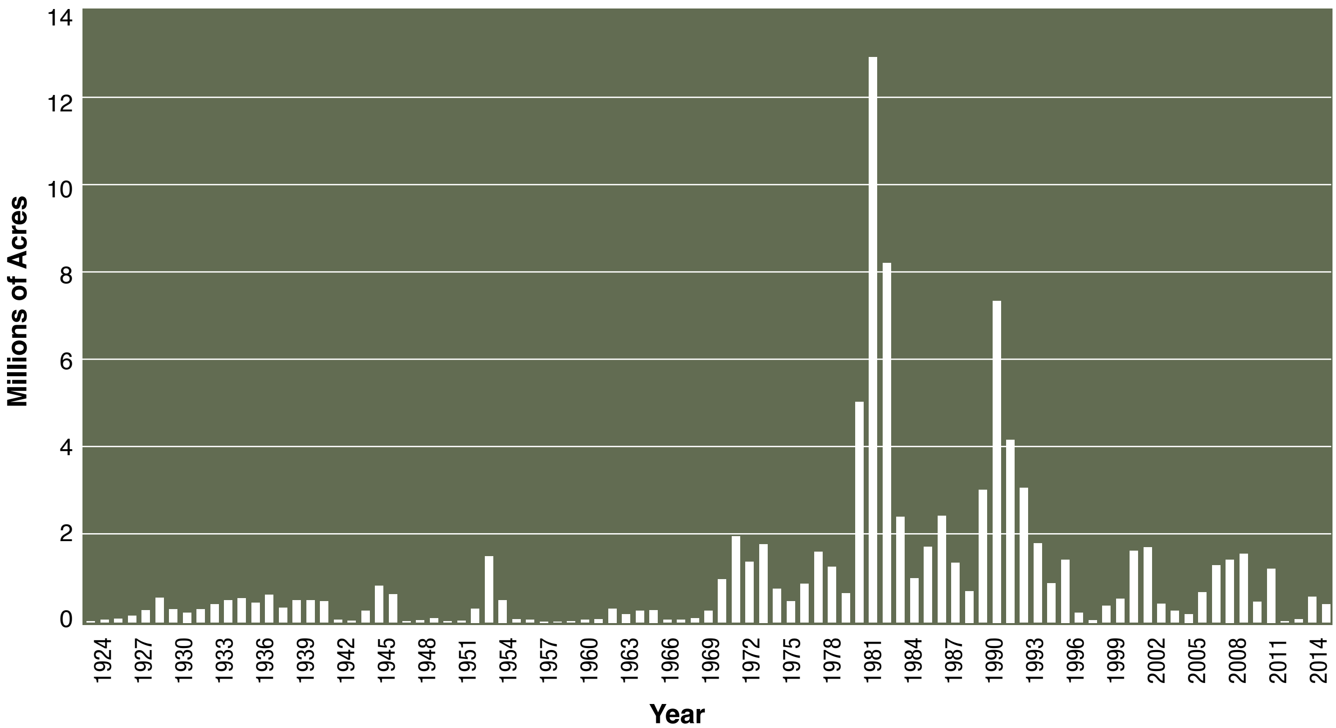


Figure 2. Gypsy moth defoliation from 1924 through 2014.

Figure 3. Summer defoliation of trees in urban area.
Photo by USDA Forest Service.

Figure 4. Caterpillar on leaf with feeding damage.
Photo by USDA Animal and Plant Health Inspection Service.

Southern Pine Beetle

Dendroctonus frontalis Zimmermann

In Alabama, Florida, Georgia, North Carolina, South Carolina, Tennessee, and Virginia, spots were present and reported but Southern Pine Beetle (SPB) populations were not considered in outbreak status (figs. 1-2 and table 1).

SPB infestations have continued on the Tombigbee National Forest in Mississippi during 2014. The Trace Unit of the Tombigbee National Forest experienced their worst levels of beetle activity since the outbreak began in 2012. There were 181 new spots detected (in addition to 60 spots that carried over from 2013), impacting more than 400 acres throughout the unit.

In Delaware, SPB was found in Sussex County. SPB traps at Cape Henlopen State Park and Assawoman Wildlife Area continued to trap beetles, though at lower numbers overall. Ground surveys at these two locations detected no new SPB damage in 2014. A 1-acre spot of fresh SPB attacks and older mortality was discovered in a loblolly pine thinning operation in October.

In New Jersey, SPB impacted 2,016 acres; this represents a decrease of approximately 3,630 acres from 2013 (fig. 3). SPB impacts are concentrated in the southern portion of the State, south of the Mullica River. Although small areas with SPB are found just north of the Mullica River, heavy populations are not yet established in those areas.

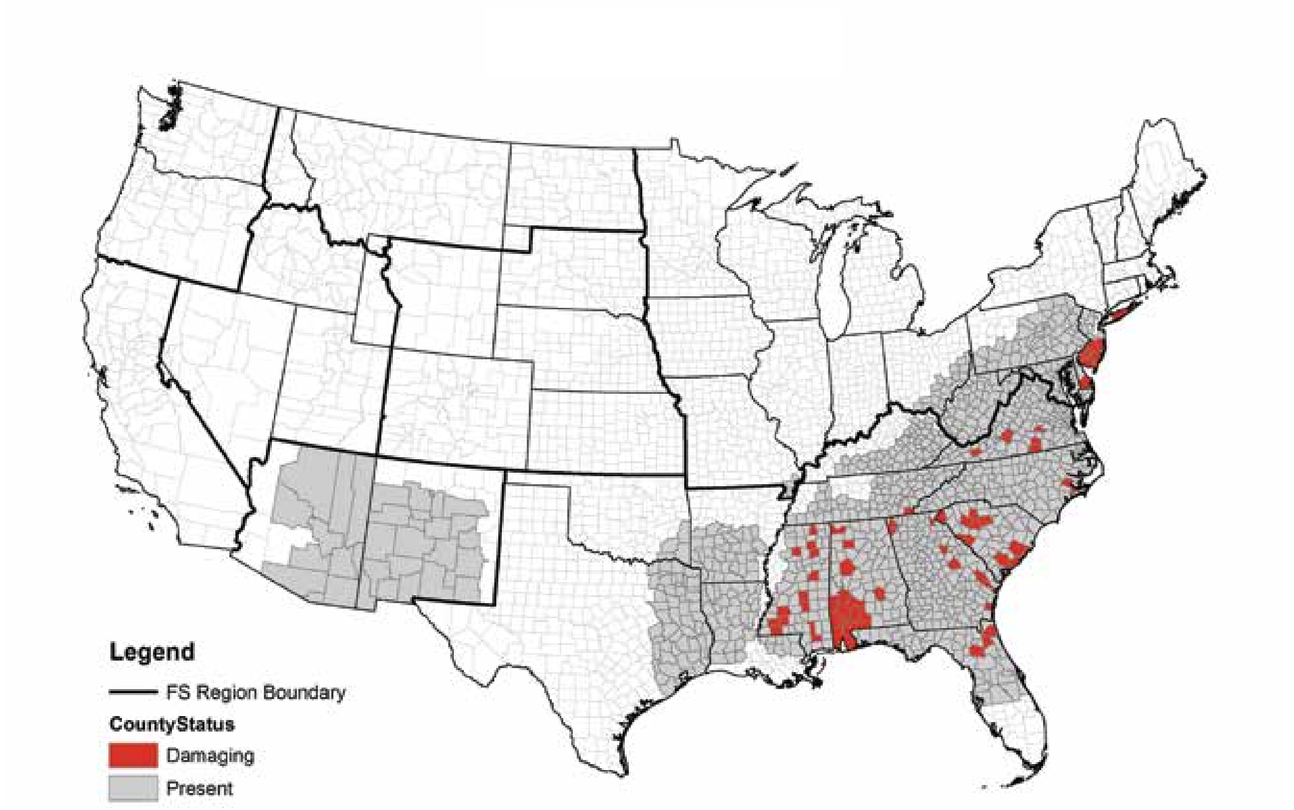


Figure 1. Counties that reported southern pine beetle infestations in 2014.

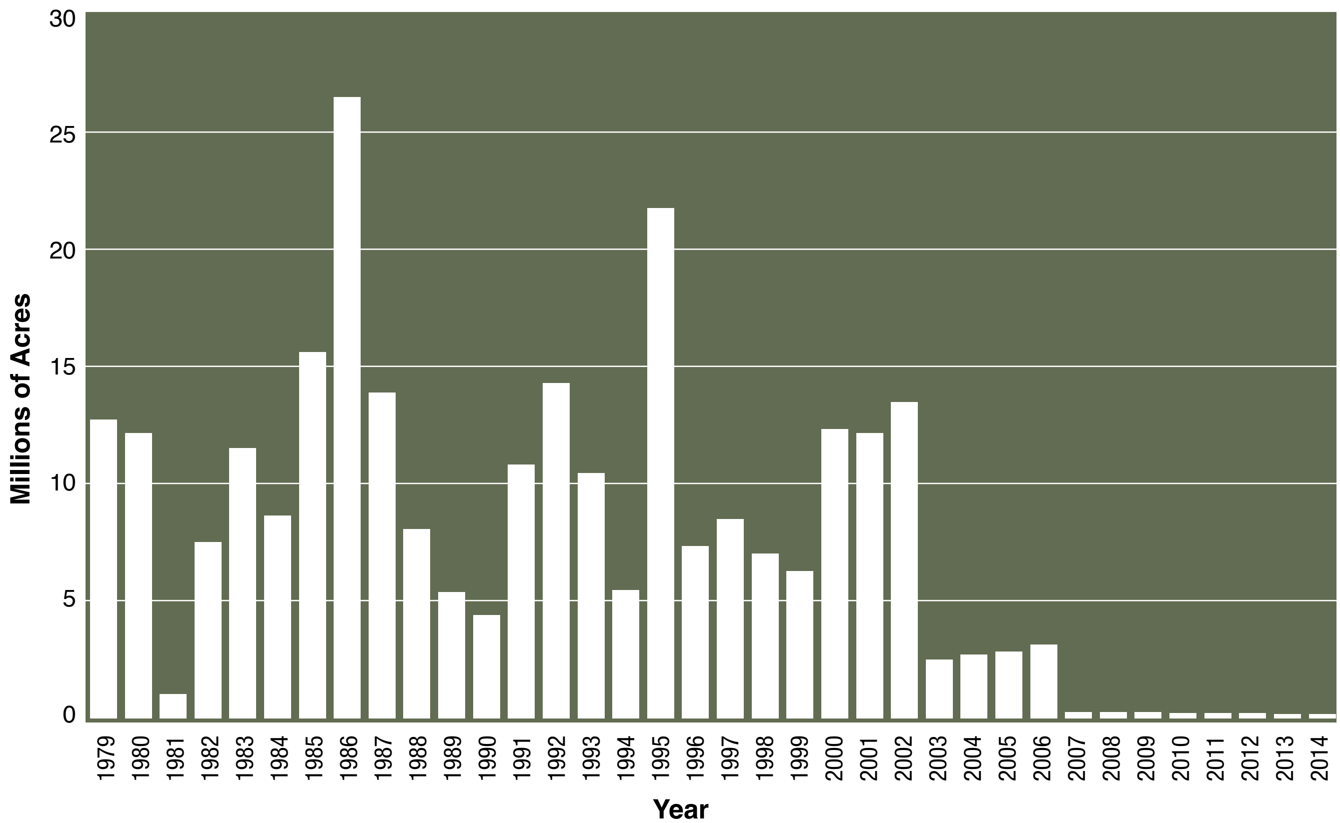


Figure 2. Southern pine beetle (SBP) outbreaks, 1979 to 2014. Note: The surveys after 2007 counted the number of outbreak acres differently than in previous years. All acres in the county previously were counted if a single spot was positive for SPBs. The surveys after 2007 reflect the estimated number of areas affected by SPBs.

SPB was discovered in the pine barrens of Long Island, NY, in the fall of 2014, the first time SPB has been found in New York, and the northernmost known extent of the beetle (fig. 4). Efforts were underway to thoroughly delineate the populations.

No SPB activity was reported for Ohio or Maryland.

Table 1. Southern pine beetle activity by State in 2014.

State	Acres	Spots
Alabama	17	123
Florida	35	15
Georgia	304	25
Mississippi	335	227
New Jersey	2,012	
North Carolina	16	1
South Carolina	169	24
Tennessee	10	1
Virginia	56	6
Total	2,955	422

Figure 3. Infestation in urban setting.
Photo by Robert Anderson, USDA Forest Service.

Figure 4. Pitch flow.
Photo by Erich G. Vallery, USDA Forest Service.

Emerald Ash Borer

Agrilus planipennis Fairmaire

The emerald ash borer (EAB) continues to be found in new States and many new counties across the United States. By the end of 2014, the EAB was found in the District of Columbia and 24 States: Arkansas, Colorado, Connecticut, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin. New infestations were found for the first time in Arkansas and New Jersey (fig. 1).

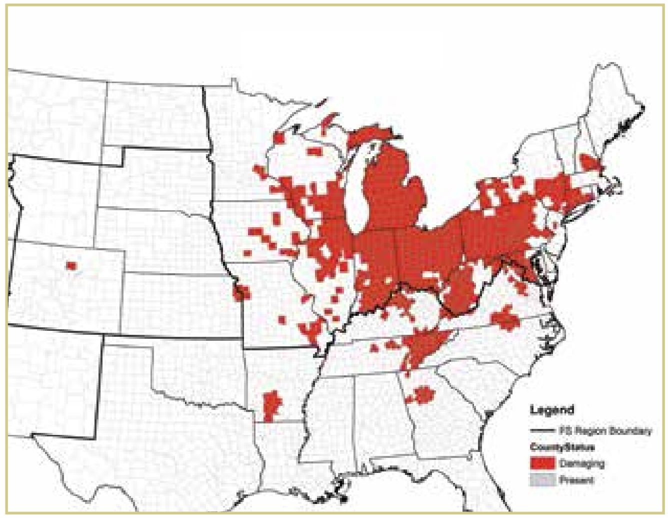


Figure 1. Quarantined counties as a result of the emerald ash borer infestation as of 2014.

EAB now occurs in six States in the Southern Region. The beetle was found for the first time in Arkansas in 2014. It was found in six south Arkansas counties: Clark, Dallas, Columbia, Nevada, Hot Springs, and Ouachita. In Georgia, EAB was discovered in DeKalb and Fulton Counties in July 2013, and it is now found in nine additional counties. In Tennessee, EAB is found in 27 counties in eastern Tennessee. In Kentucky, EAB has been confirmed in 28 counties, and the entire State is now under quarantine. In North Carolina, EAB activity in the nearby counties of Person, Vance, and Warren was first reported in 2013. In 2014, EAB was not found in any additional counties, although new sites within these infested counties were detected.

In the Northeast, EAB is found in every State except Delaware, Maine, Rhode Island, and Vermont.

In May 2014, EAB was positively identified in Somerset County, NJ, and in September, EAB was found in Burlington and Mercer Counties, NJ.

Surveys in 2014 found EAB outbreaks in Merrimack, Rockingham, and Hillsborough Counties, NH. In Connecticut, EAB has been detected in Fairfield, Hartford, Litchfield, Middlesex, New Haven, and New London Counties. There was significant damage only in New Haven County. In July 2014, one new infestation was found in Boston, Suffolk County, MA. In New York, EAB was positively confirmed in two new counties in 2014: Broome and Westchester. Older infestations were growing exponentially, especially those in Monroe, Steuben, and Albany counties. Eight additional counties in Pennsylvania were added to the infestation list: Adams, Berks, Crawford, Greene, Lebanon, Schuylkill, Susquehanna, and York. EAB continues to spread throughout West Virginia and has been found in nine new counties; Hardy, Jackson, Logan, Mason, MacDowell, Ohio, Pleasant, Wood, and Wyoming.

Seven new counties were reported with EAB in Illinois: Logan, Menard, Peoria, Perry, Sangamon, Tazewell, and Williamson. EAB has spread nearly statewide, particularly in the Chicago metro area. In Indiana, EAB was present in 79 counties. Only four counties remain free of EAB and not quarantined. There were nine new county records for EAB in 2014 in Iowa: Bremer, Black Hawk, Boone, Henry, Jasper, Mahaska, Muscatine, Story, and Union. No new Michigan county records were reported in 2014. The Lower Peninsula was generally infested. In the Upper Peninsula, EAB was found in several counties throughout the peninsula and is expected to continue spreading through the ash resource. In Minnesota, Olmsted and Dakota Counties were newly quarantined in 2014. Populations are intensifying and spreading within the quarantined counties. In Missouri, there were new records in Clay and St. Charles Counties in 2014. EAB was detected in the Kansas City, MO, area (Clay County) and detected for the first time in the St. Louis area (St. Charles County).

Ohio reported five new counties with EAB infestations: Athens, Harrison, Jackson, Meigs, and Washington (fig. 2). In Wisconsin, there were 10 new county records: Adams, Buffalo, Calumet, Columbia, Door, Grant, Jefferson,

Figure 2. Ash tree killed by emerald ash borer, central Ohio.
Photo by Steven Katovich, USDA Forest Service.

Monroe, Oneida, and Sheboygan. Infestations have now been found in 29 counties. The core of the population is still in the southeastern counties of the State, and scattered ash tree mortality is limited to this area.

In July 2014, EAB was confirmed in Leavenworth County, KS, bringing the total number of EAB-positive counties in Kansas to three. Johnson and Wyandotte Counties saw additional numbers of EAB, indicating a growing population.

Since EAB's detection in Boulder, CO, in September 2013, intensive surveys have been conducted in Boulder and surrounding communities. A larger area is presumed to be infested, but no EAB has yet been found outside Boulder County.

Sudden Oak Death

Phytophthora ramorum Werres et al.

Sudden oak death (SOD) continues to be the primary cause of oak and tanoak mortality in coastal California and Oregon according to aerial surveys (fig. 1). SOD was confirmed by California Department of Food and Agriculture (CDFA) inside Trinity County for the first time in 2014. Trinity County is now the 15th California county known to have SOD (fig 2).

Although the pathogen advanced little in 2014, SOD still is having a tremendous impact. Three new areas were identified with mortality: two in Redwood National and State Park and one on private land in the Mad River Drainage (fig. 3).

In Curry County, OR, the pathogen continues to be detected by aerial survey, stream monitoring, verified ground surveys, and lab tests.

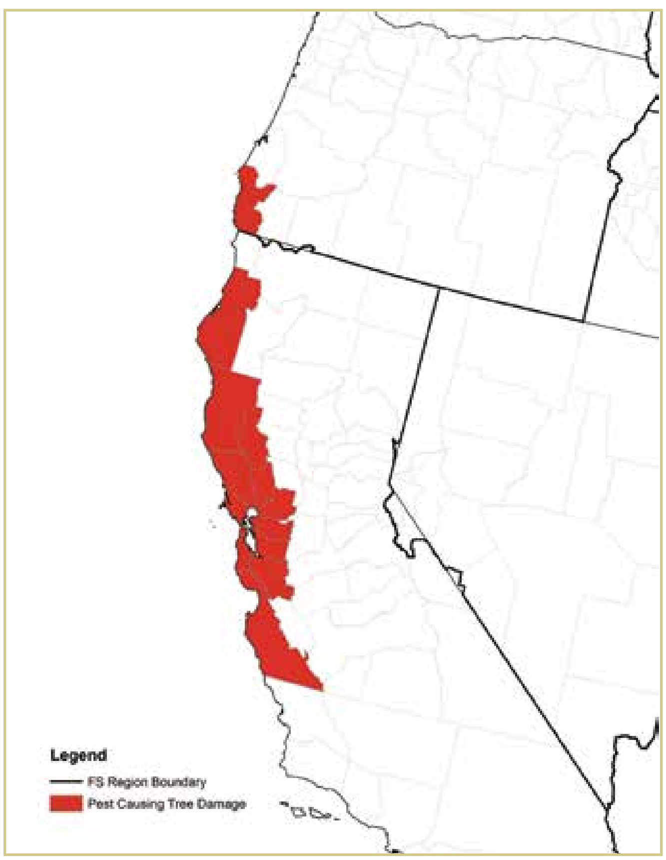


Figure 1. Counties that reported sudden oak death in 2014.

Figure 2. Sudden oak death symptoms.
Photo by Bruce Moltzan, USDA Forest Service.

Figure 3. Tip droop symptom of sudden oak death on tanoak.
Photo by Joseph O'Brien, USDA Forest Service.

Spruce Beetle

Dendroctonus rufipennis Kirby

Spruce beetle (SB) populations continued to increase in the central and southern Rocky Mountains and the Intermountain area. Populations in Alaska remain low (fig 1).

SB activity in New Mexico increased during 2014. The Santa Fe National Forest had two-thirds of the activity, with the remainder occurring on the Carson National Forest. As in the past few years, most activity was within the Pecos Wilderness on the Santa Fe National Forest along the timberline and north of the Santa Barbara Divide on the Carson National Forest. These areas are in the vicinity of a large windthrow event that occurred in 2007. Some activity was noted on the Tres Piedras Ranger District of the Carson National Forest, adjacent to the Colorado border, where a large outbreak is occurring on the Rio Grande National Forest.

In Colorado, significant SB activity is occurring primarily on San Isabel, San Juan, Rio Grande, and Grand Mesa-Uncompahgre-Gunnison National Forests, Bureau of Land Management, and surrounding lands. Activity is moving north and eastward on both sides of the Continental Divide, with significant spruce mortality evident from the Weminuche Wilderness to north of Monarch Pass. Activity has also increased substantially in the Sangre de Cristo Mountains, east of the San Luis Valley, as well as to the east in the Wet Mountains. Impact is evident throughout the entire elevation range of Engelmann spruce, from approximately 9,500 feet up to 12,000 feet (timberline). In northern Colorado, SB caused new tree mortality from the Rabbit Ears Range and east through the southern Medicine Bow Mountains and into northern Rocky Mountain National Park.

In western Wyoming, stand-replacing mortality due to SB attack continues in areas not already host-depleted in the Absaroka Mountains. Mortality is also increasing in the Wind River Range. SB-caused tree mortality also continues in areas not already host depleted in the south central Wyoming's Medicine Bow National Forest and adjacent lands in Carbon and Albany counties trees. The Bridger-Teton National Forest in western Wyoming experienced the largest single-year increase where spruce mortality increased to over 400,000 trees killed in 2014 (fig. 2).

In 2014, SB-caused tree mortality doubled in the Intermountain Region. This is the fourth consecutive year of increased spruce mortality. Most of the spruce mortality was mapped in Utah, where it was detected at some level on all national forests and most other ownerships. The Uinta-Wasatch-Cache, Ashley, and Fishlake National Forests have significant outbreaks. Spruce mortality on private lands in Utah nearly doubled. SB-caused mortality was reported on several forests in southern Idaho.

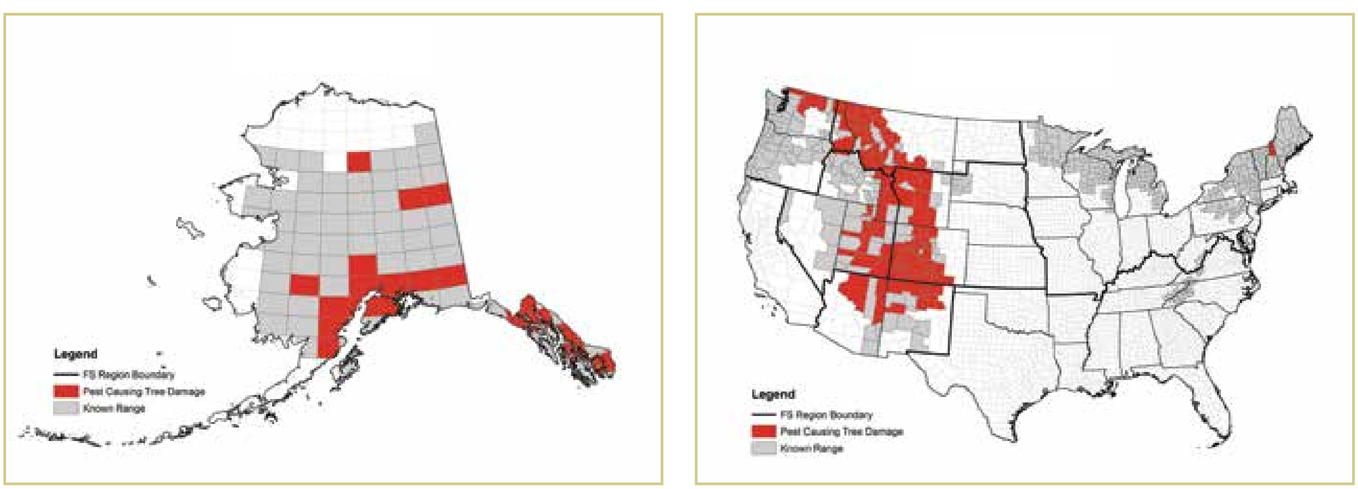


Figure 1. Spruce beetle-caused tree mortality detected in 2014 by aerial detection surveys.

Mortality attributed to SB was similar to the 10-year average in Washington. The majority of mortality has occurred in western Okanogan and eastern Whatcom Counties. The most significant damage detected this year is in the vicinity of the Pasayten Wilderness (fig 3).

In 2014, SB activity decreased 45 percent compared to 2013 in Alaska. Although SB activity mapped in 2014 still remains low relative to historical numbers, SB remains the leading cause of spruce mortality in southern Alaska.

Figure 3. Spruce beetle damage.
Photo by Steven Munson, USDA Forest Service.

Figure 2. Spruce beetle damage on Engelmann spruce.
Photo by Steven Munson, USDA Forest Service.

Western Bark Beetles

Numerous Species

Western bark beetle (WBB) mortality in 2014 increased by nearly 600,000 acres, primarily due to fir engraver, mountain pine beetle, spruce beetle, and western pine beetle. In 2014, nearly 4.0 million acres of WBB-induced mortality were reported (fig. 1). The following section describes the conditions of selected WBB reported for 2014 (table 1).

Douglas-Fir Beetle

The amount of mortality reported for Douglas-fir beetle (DFB) in the mixed conifer forests throughout New Mexico increased in 2014, although the amount of mortality mapped with Douglas-fir as the host decreased from 2013 levels. The decline was most notable on the Lincoln National Forest, where little new mortality was observed following several years of high mortality in Douglas-fir, as well as ponderosa pine and white fir. Most of the mortality mapped in 2014 was on the Carson and Santa Fe National Forests. Some of the activity on the Santa Fe National Forest was in areas adjacent to recent wildfires.

DFB-caused mortality in northern Idaho and Montana in 2014 was detected at similar levels as the 2013 survey. DFB-caused mortality was detected on all land ownership types—Federal, State, tribal, and private lands. Tree mortality occurred in spatially isolated pockets scattered throughout the region and large groups where new outbreaks continued in two northern Idaho locations and in one Montana area. Mortality was still noticeable despite the decrease in DFB outbreaks in northern Idaho within Clearwater and Idaho Counties where low levels of mortality had occurred on private lands near the Dworshak Dam and reservoir near Orofino, ID. In Montana, a DFB outbreak on the Rocky Boy's Indian Reservation is associated with a severe wind event in 2011 that blew down many stems infected with root and butt rot.

DFB-caused mortality increased on all ownerships in Utah, especially on the Manti-LaSal National Forest. In southern Idaho, there are concerns that DFB-caused mortality may have been underestimated during the 2014 surveys because of the hot, dry year; the mortality signature

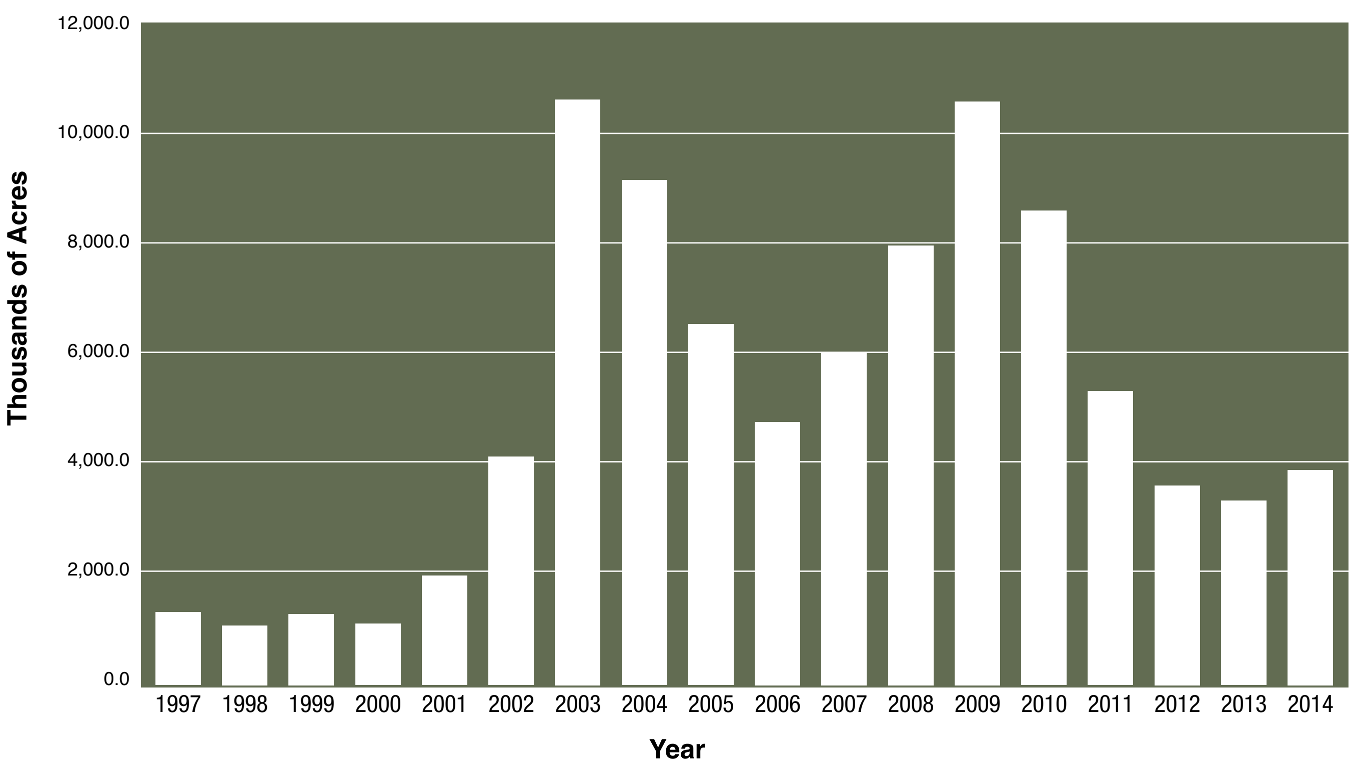


Figure 1. Western bark beetle outbreaks from 1997 to 2014.

was indistinguishable due to multiple years of budworm defoliation; and smoke from large wildfires prevented clear observations.

Mortality attributed to DFB increased in 2014 compared to 2013 in Oregon and Washington. In Oregon, significant activity was recorded in the Columbia River Gorge and Blue Mountains. In the Columbia River Gorge, increases in DFB-caused mortality are attributed to a winter storm in January 2012 that caused extensive Douglas-fir blowdown and breakage in Hood River and Wasco Counties in Oregon and Skamania and Klickitat Counties in Washington. Another area with significant activity is in the Blue Mountains covering the Umatilla and Wallowa-Whitman National Forests in Oregon. In Washington, another concentrated area of DFB mortality was detected in northern Kittitas and southern Chelan Counties. In central Washington, the increase in DFB is attributed to wildfires in 2012 and high levels of chronic defoliation by western spruce budworm.

Douglas-fir mortality caused by the DFB has decreased in Arizona by approximately three times that recorded in 2013. The bulk of the mortality continues to be detected in central and eastern Arizona in the White Mountains on both the Apache-Sitgreaves National Forest and on the White Mountain Fort Apache Tribal Lands. Small groups were generally mapped, but some extensive areas of both white fir and Douglas-fir were detected. Acres of Douglas-fir mortality caused by DFB on the San Francisco Peaks are similar to 2013. Generally, there is both MPB and DFB mortality in the same area.

In Colorado, levels of Douglas-fir tree mortality caused by DFB vary widely, from scattered mortality in some stands to almost the total loss of mature Douglas-fir in others. Overall, there was less damage observed than last year.

In Wyoming, DFB-caused mortality has remained at low levels for several years. The most notable new Douglas-fir mortality caused by DFB was detected in Hot Springs County in 2014.

Jeffrey Pine Beetle

Jeffrey pine beetle-caused mortality occurred at higher levels in 2014 than 2013, however, mortality remained low. Scattered Jeffrey pine mortality occurred on the Bridgeport and Carson Ranger Districts of the Humboldt-Toiyabe National Forest along the California-Nevada border.

Table 1. Trends for selected western bark beetles and infested acres detected in aerial surveys during 2014.

Bark Beetle(s)	Host(s)	Acres Detected with Bark Beetle Activity in 2014*
Mountain pine beetle, *Dendroctonus ponderosae* Hopkins	Ponderosa pine (*Pinus ponderosa* C. Lawson), lodgepole pine (*P. contorta* Douglas ex Louden), white pines and others (*Pinus* spp.)	1,748,637 acres
Spruce beetle, *Dendroctonus rufipennis* (Kirby)	Engelmann spruce (*Picea engelmannii* Parry ex Engelm.), white spruce (*P. glauca* [Moench] Voss), Sitka spruce (*P. sitchensis* [Bong.] Carr.)	734,084 acres
Douglas-fir beetle, *Dendroctonus pseudotsugae* Hopkins	Douglas-fir (*Pseudotsuga menziesii*)	192,284 acres
Jeffrey pine beetle, *Dendroctonus jeffreyi* Hopkins	Jeffrey pine (*Pinus jeffreyi* Balf.)	44,390 acres
Western pine beetle, *Dendroctonus brevicomis* LeConte	Ponderosa pine, Coulter pine (*Pinus coulteri* D. Don)	331,043 acres
Western balsam bark beetle, *Dryocoetes confusus*, Swaine	Subalpine fir (*Abies lasiocarpa* (Hook.) Nutt.)	13,471 acres
Fir engraver beetle, *Scolytus ventralis* LeConte	True firs (*Abies* spp.)	716,595 acres
Pine engraver, *Ips pini* (Say), Arizona five spined ips, *Ips lecontei* Swaine	Ponderosa pine	17,379 acres
Pinyon ips, *Ips confusus* (LeConte)	Pinyon pine (*Pinus edulis* Engelm.) Singleleaf pinyon (*Pinus monophylla* Torr. & Fen.)	111,069 acres

*The number of dead trees per acre varies.

Pine engraver beetles and California flat-headed borers *(Phaenops californica)* were associated with much of the Jeffrey pine mortality.

Fir Engraver Beetle

In Arizona, fir engraver beetle (FEB) was the second most prominent agent mapped during aerial detection surveys, after *Ips* engraver activity in ponderosa pine. Activity has persisted in the White Mountains, both inside and out of the Wallow fire perimeter. Some activity was also recorded on the Coronado and Tonto National Forests. In New Mexico, activity was observed throughout the State and increases observed on all national forests.

Figure 2. Fir engraver damage on white fir.
Photo by Donald Owen, California Department of Forestry and Fire Protection.

Figure 3. Fir engraver damage on fir.
Photo by Kenneth E. Gibson, USDA Forest Service.

In the Intermountain Region, FEB-caused fir mortality increased nearly eight-fold in 2014 (fig. 3). Most of the fir mortality occurred on national forest and private lands in Utah and national forest lands in Nevada. In Utah, tree mortality caused by the FEB increased from less than 500 acres in 2013 to more than 10,000 acres affected in 2014. Most of the Utah fir mortality occurred on the national forests (with the exception of the Ashley National Forest) and private lands. Fir mortality increased nearly three-fold in Nevada, occurring primarily on the Bridegeport, Carson City, and Ely Districts of the Humboldt-Toiyabe National Forest. In southern Idaho, FEB-caused mortality increased but remained endemic in 2014.

FEB activity increased significantly in northern Idaho compared to 2013. Increases and subsequent damage were most notable in Idaho and Kootenai Counties. Activity across western Montana remained relatively low. However, Lake County saw an increase in impacted acres compared to last year.

Mortality attributed to FEB increased significantly since 2013, but remains below the 10-year average for the Pacific Northwest. Increases in Washington were primarily in the Blue Mountains, while scattered, endemic levels occurred in most other areas of the State. In Washington, concentrated fir mortality was observed in northern Kittitas County, southern Chelan County, and the Olympic Peninsula. Increases were observed in the Umatilla and Wallowa-Whitman National Forests in northeast Oregon, and in drought-prone areas in central and southwest Oregon.

In Colorado, 2014 saw a dramatic increase in the detection of FEB. These beetles are killing large-diameter white fir nearly everywhere the host is found. Mature white fir trees in and near Ouray, CO, have been killed by FEB over the course of several years. Significant FEB activity has also been recorded in the vicinity of Pagosa Springs within Archuleta County.

FEB-related true fir mortality increased compared to 2013 due to the severe drought, particularly in northern California. All size classes of white fir were attacked by FEBs in 2014 with the greatest infestations found in densely stocked, lower elevations and drier sites that were historically pine dominant. Top-kill of red fir by FEB was prevalent throughout the Sierra Nevada range, with some larger trees dying due to the combination of woodborers and engravers.

Pine Engraver Beetle

In the Intermountain Region, pine engraver beetle (PEB)-caused tree mortality increased. PEB- caused mortality was most active in dense ponderosa pine stands. Tree mortality was reported in Utah on the Uinta-Wasatch-Cache National Forest and in southern Idaho on the Boise and Payette National Forests. A few Jeffrey pine were killed on the Humboldt-Toiyabe National Forest in Nevada.

PEB occurs throughout Oregon and Washington, usually killing small-diameter trees and the tops of larger trees. Ground observations confirmed that PEB and California five-spined *Ips* are occurring together in the Columbia River Gorge area. Other areas with significant PEB activity include Ferry, Stevens, and Pend Oreille Counties in Washington. In Oregon, most PEB damage is occurring in Lake and Klamath Counties and in the Blue Mountains.

Western Pine Beetle

Western pine beetle (WPB) populations remained at relatively low levels across the West but increased in the Rockies and California.

The amount of ponderosa pine mortality attributed to WPB decreased substantially in 2014 throughout the Southwestern Region. In Arizona, the majority of the activity occurred on the Apache-Sitgreaves National Forests and on the Fort Apache Indian Reservation. In New Mexico, the mortality that was observed in 2014 was on the Gila and Lincoln National Forests and the Mescalero Apache Indian Reservation in the southern portion of the State. Less tree mortality was observed on many portions of the Lincoln National Forest, where heavy ponderosa mortality had been mapped during the prior 2 years.

WPB activity increased in southwestern Colorado in the San Juan Mountains. Most of this activity occurred in areas that have long been noted as having significant WPB activity. The majority of the WPB activity occurred in conjunction with “mixed broods” of beetles, which include *Ips pini* and *Dendroctonus adjunctus.*

In the Intermountain Region, ponderosa pine mortality attributed to WPB increased for the second consecutive year. Most of the mortality was mapped in southern Idaho on the Boise National Forest and private land. In central and southern Utah, ponderosa pine mortality attributed to WPB increased. In Nevada, endemic levels of activity were reported.

Mortality from WPB was almost double the levels in 2013 in Oregon and Washington. In Oregon, mortality was most extensive on the Malheur and Ochoco National Forests and the Warms Springs Reservation. In Washington, the areas with the most significant activity include the Colville and the Yakama Indian Reservation and areas south of Spokane. Elevated WPB activity also occurred on both sides of the Columbia River Gorge in Klickitat, Hood River, and Wasco Counties in larger pines concurrently attacked by California five-spined *Ips.*

Ponderosa and Coulter pine mortality from WPB increased in 2014 in California. Areas in northern California with blackstain root disease also had elevated mortality associated with WPB.

Western Spruce Budworm

Choristoneura freemani Razowski

Western spruce budworm (WSBW) defoliation was reported on nearly 2.1 million acres (figs.1 and 2) in 2014, an increase of nearly 416,000 acres from 2013 (table 1).

Defoliation by WSBW continues to be the most widespread damage observed in the Southwest. Most of the WSBW activity in the Southwest occurs in New Mexico, which has a greater proportion of susceptible-host type. Defoliation in New Mexico during 2014 remained at approximately the same level as in 2013. A small amount damage was mapped in the southern portion of the State on the Lincoln National Forest. The vast majority of WSBW-caused defoliation occurs on the Carson and Santa Fe National Forests in the northern part of the State. In Arizona, no areas with WSBW-caused defoliation were mapped during aerial detection surveys. Some areas, however, have chronic budworm activity, including the North Kaibab Ranger District of the Kaibab National Forest and the Chuska

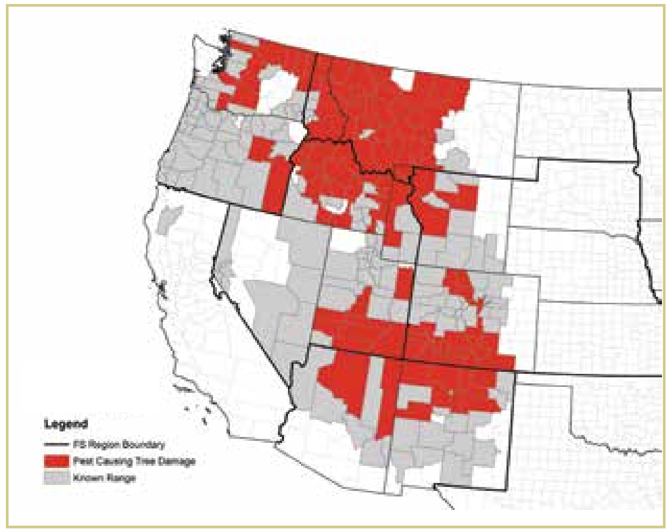


Figure 2. Counties that reported western spruce budworm in 2014.

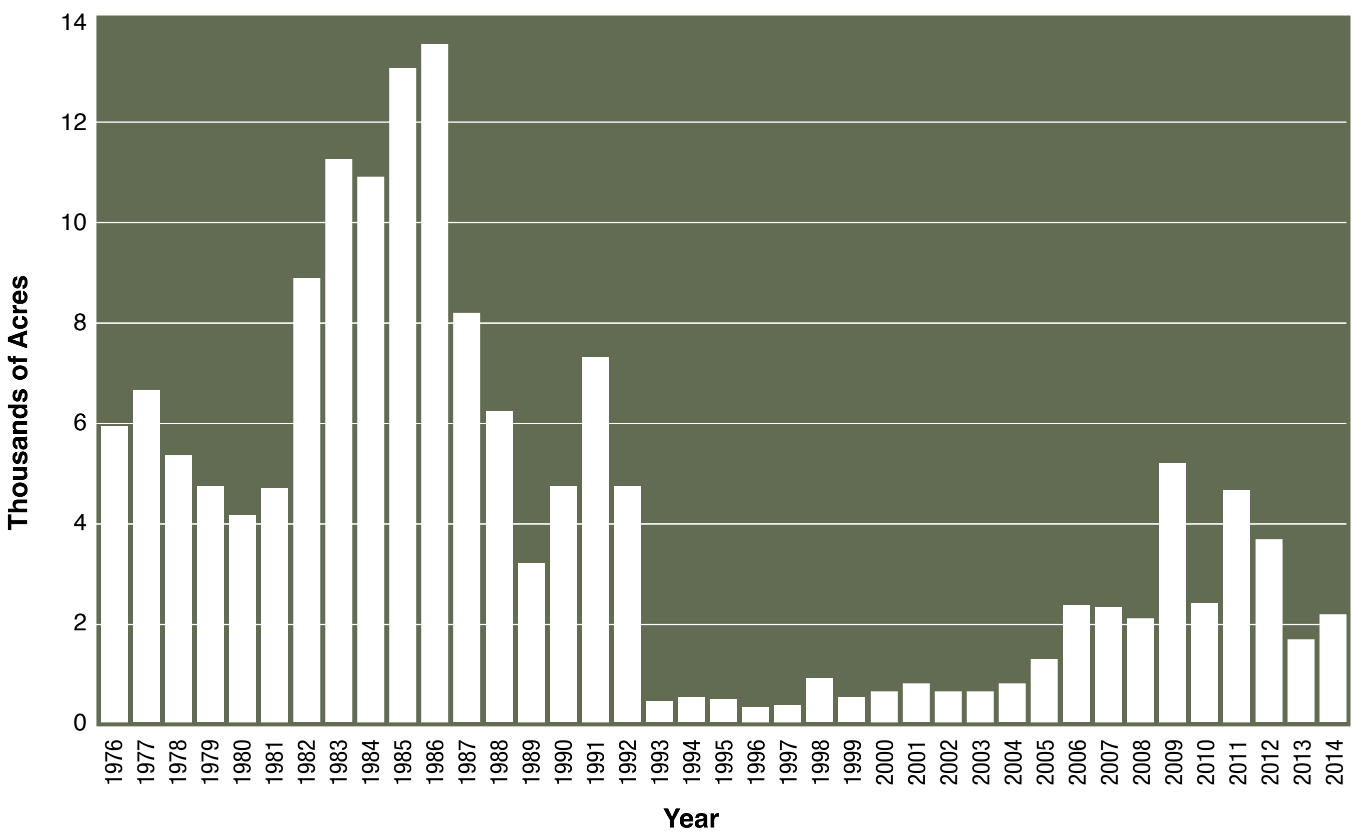


Figure 1. Acres of western spruce budworm defoliation in 2014.

Table 1. Acres (in thousands) with western spruce budworm defoliation by State, 2002 to 2014.

State	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Arizona	11.30	24.00	10.70	11.20	2.50	4.80	1.70	1.27	0.39	3.50	1.66	1.10	0.001
California	-	-	-	-	-	-	-	-	-	-	-	-	-
Colorado	131.10	20.00	20.00	71.40	93.70	390.20	153.40	382.37	212.83	90.27	217.36	156.27	177.68
Idaho	22.60	204.10	64.10	75.30	254.30	360.50	366.20	1,030.56	865.99	1,887.47	717.14	367.57	529.34
Montana	52.40	66.00	177.30	453.70	1,142.20	497.20	577.80	2,576.15	326.34	1,200.78	1,490.94	596.01	878.24
Nevada	-	-	-	-	-	0.70	-	-	-	-	-	-	-
New Mexico	198.80	143.20	238.20	183.80	142.50	452.20	360.40	559.29	317.42	500.54	476.95	298.02	302.71
Oregon	1.90	5.50	6.60	0.30	38.00	98.10	10.00	40.80	108.14	256.08	79.13	0.32	1.34
Utah	7.00	14.70	20.00	40.50	88.60	51.40	7.70	69.71	142.04	28.04	13.56	38.54	47.04
Washington	57.50	139.90	193.20	363.10	555.70	355.80	455.10	414.50	373.08	538.47	511.19	179.88	93.58
Wyoming	134.60	13.30	4.50	6.40	4.40	29.00	34.90	30.32	20.85	34.77	21.42	28.26	52.01
									-	-	-	-	
Total	617.20	630.70	734.60	1,205.70	2,321.90	2,239.90	1,967.20	5,104.97	2,367.09	4,539.93	3,529.36	1,665.97	2081.941

Mountain on the Navajo Nation. Very light levels of WSBW have been noticed in the Kachina Peaks Wilderness for the past 2 years.

In Colorado, WSBW activity tends to be more chronic in the southern part of the State. Activity was widespread but particularly heavy in the Sangre de Cristo and Wet Mountains, as well as on portions of the San Juan National Forest. Heavy defoliation was observed further north than in recent years west of Monument, CO. Light to moderate defoliation was detected on the Pike National Forest and northwest of the U.S. Air Force Academy (fig. 3).

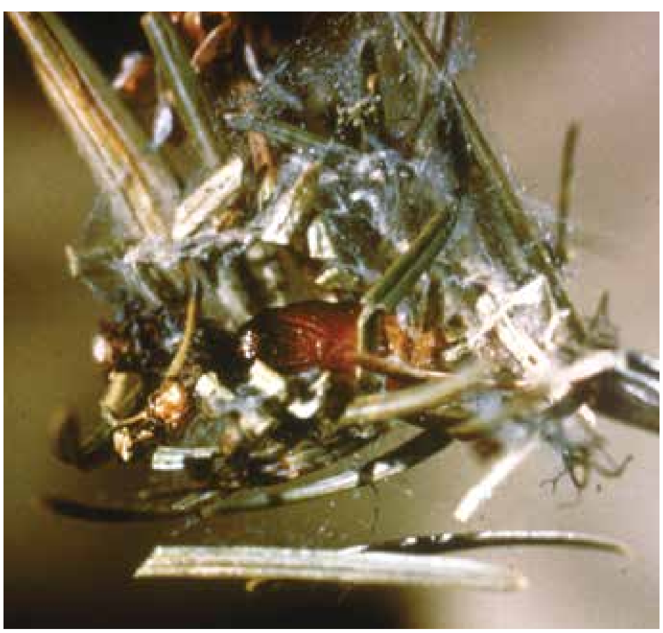


Figure 3. Western spruce budworm Pupae.
Photo by Nancy Campbell, USDA Forest Service.

In Wyoming, heavy defoliation was observed in Douglas-fir stands near Hunter Peak in the Clarks Fork of the Yellowstone River and near South Pass.

In the Intermountain Region, nearly all ownerships saw an increase in WSBW-caused tree defoliation in 2014. The biggest increase occurred in western Wyoming and southern Idaho. However, south-central Idaho has the most area affected. Populations of this insect in Idaho have remained near outbreak levels for 10 consecutive years. In southern Idaho, acres defoliated by budworm were at outbreak levels on the Boise, Payette, and Caribou-Targhee National Forests. Defoliation from budworm was also recorded in most counties in northern Idaho, but defoliation intensity was considered low. In Utah, acres affected by WSBW defoliation increased slightly; most damage occurred on the Fishlake National Forest. No WSBW was mapped in Nevada.

Defoliation from WSBW was recorded in almost every county in the western and central part of Montana in 2014. Defoliation intensity remained high in some areas, especially in counties east of the Continental Divide, where WSBW has been recorded for several years. Areas with significant WSBW defoliation are in the Flathead, Lewis and Clark, and Missoula Counties. This includes national forest lands intermingled with surrounding lands of other ownerships.

In the Pacific Northwest, defoliation attributed to WSBW decreased significantly in 2014. In Oregon, only a few areas of WSBW defoliation were detected in 2014—about the same number of acres as mapped in 2013, and the lowest since 2005 (fig. 4). The defoliation that occurred was on the Malheur National Forest near the Strawberry Mountains. In Washington, detected areas of WSBW defoliation were the lowest since 2003. Mid-elevation forests in Kittitas, Okanogan, and Ferry Counties were most heavily affected. New areas of defoliation were mapped in Stevens, Pend Oreille, and Yakima Counties.

Figure 4. Two Douglas-fir trees side by side; one dead, one alive, Starkey Experimental Forest, Wallowa-Whitman National Forest, northeastern Oregon. Photo by Dave Powell, USDA Forest Service.

Hemlock Woolly Adelgid

Adelges tsugae Annand

The hemlock woolly adelgid (HWA) is currently reported in 19 States from Maine to Georgia, and continues to be found in new counties along the leading edges of the infestation in the North and South (fig. 1).

In Maine in 2014, HWA was detected for the first time in Knox County. Declining hemlocks, due at least in part to HWA-caused damage, were apparent in several coastal communities. Hemlock mortality was picked up in aerial survey for the first time this year on Great Diamond Island, Cumberland County. In Connecticut, the health of hemlock stands continued to show general recovery from HWA, with large areas of the northern half of the State showing excellent new growth. Cold winter temperatures caused a significant decline of HWA populations statewide in Massachusetts. Areas that previously had large populations of HWA are now infested with elongated hemlock scale, which has caused a dramatic decrease in adelgid populations.

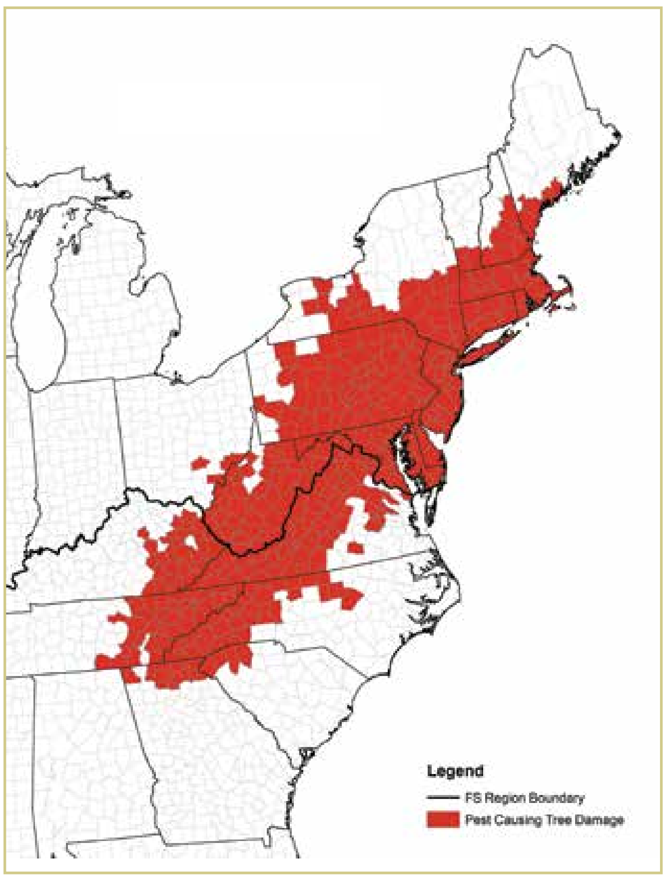


Figure 1. Counties that reported hemlock wooly adelgid damage in 2014.

Figure 2. Hemlock woolly adelgid on hemlock needles. Photo by USDA Forest Service.

HWA was detected for the first time in Windsor County, VT, in 2014. Crown symptoms were more noticeable, and there was some heavy over-wintering mortality in other counties where the insect was previously observed. HWA continued to slowly spread to all of the southern towns in New Hampshire. HWA was detected in Sullivan County, NH, in 2014 (fig 2).

HWA continues to cause damage and mortality to native forest and ornamental eastern hemlock trees in New York. There were three new infested counties found in 2014: Cattaraugus, Chenango, and Onondaga. Damage was most severe in areas that have been infested for several years in the Catskills and the southern part of the State. However, several infested stands within the Finger Lakes region are also beginning to show hemlock mortality. New detections of HWA were found in Pleasants and Ohio Counties, WV.

In Ohio, HWA was found in three additional southern/southeastern Ohio counties: Vinton, Lawrence, and Monroe, where an additional infestation was found outside the original detection in Hocking Hills State Park.

In the South, HWA continues to spread throughout the hemlock range. In Tennessee, HWA continues to cause damage to hemlocks in the mountainous eastern counties of Tennessee. Grundy County was determined to have HWA in 2014, bringing the total number of infested counties in Tennessee to 37 of the 38 with hemlock (fig. 3).

Figure 3. Eastern hemlock mortality caused by Hemlock woolly adelgid.
Photo by USDA Forest Service.

Laurel Wilt Disease/Redbay Ambrosia Beetle

Raffaelea lauricola T.C. Harr., Fraedrich, and Aghayeva
Xyleborus glabratus Eichhoff

In Georgia, four new counties confirmed Laurel Wilt (LW) disease: Brooks, Decatur, Seminole, and Berrien (fig. 1). As of September 2014, the presence of LW disease had been confirmed in a total of 44 counties in Georgia, mostly in redbay. From early 2012 through September 2014, however, 7 of 13 new county detections were from sassafras trees in the absence of known redbay populations. The two most recent new county detections in 2014 were in sassafras from the southwestern corner of Georgia. LW moved out of relatively continuous redbay habitat into a more dispersed host distribution in the Atlantic Southern Loam Plains in Georgia, primarily in scattered pockets of sassafras.

In North Carolina, this disease is currently found in portions of Bladen, Brunswick, Columbus, New Hanover, Pender, and Sampson Counties. Though the disease has been spreading within previously confirmed counties, it was not detected in any new counties in 2014.

In Alabama, LW disease was confirmed in two new counties: Sumter and Hale. Sassafras is considered a secondary host of the redbay ambrosia beetle, but LW is steadily spreading among scattered sassafras stands in Alabama.

In Mississippi, LW disease has been confirmed in Harrison County.

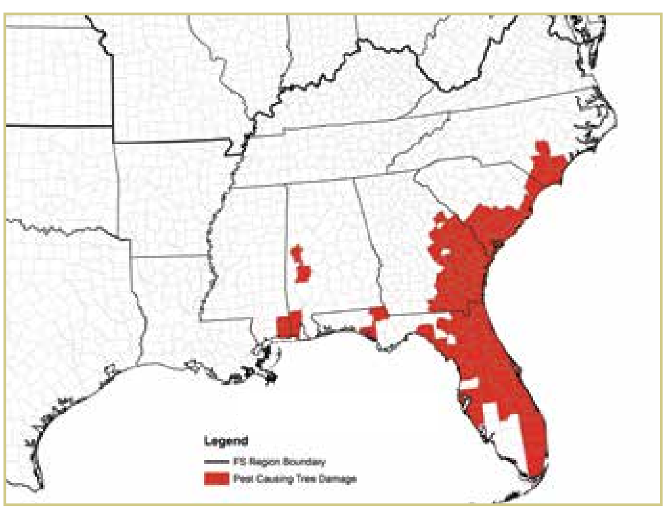


Figure 1. Counties with detected laurel wilt disease as of 2014.

In South Carolina, Aiken and Sumter Counties confirmed LW disease for the first time in 2014. Mortality of redbay and sassafras (Beaufort County only) is now known to occur in scattered locations in 13 counties. Dieback and mortality are locally severe, and most redbays in an affected stand succumb to the wilt (fig. 2).

In Florida, LW disease continues to spread locally and into new areas causing heavy mortality in redbay and related species. LW was confirmed in nine new counties: Collier, Hendry, Holmes, Jefferson, Lafayette, Lee, Leon, Madison, and Monroe (fig. 3).

Figure 2. Vascular staining from fungus associated with the redbay ambrosia beetle.
Photo by Albert (Bud) Mayfield, USDA Forest Service.

Figure 3. Wilted redbay foliage.
Photo by Albert (Bud) Mayfield, USDA Forest Service.

Spruce Budworm

Choristoneura fumiferana Clemens

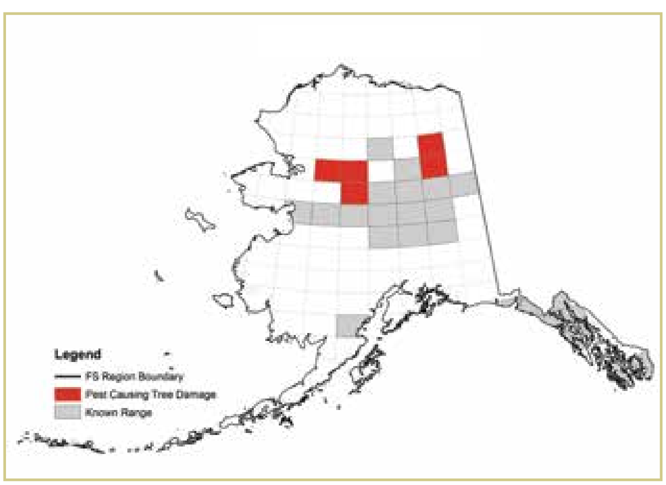
Damage by the spruce budworm (SBW) continued in the Lake States, and although there are signs of building populations, there has been no defoliation reported in New England (fig. 1).

No SBW damage was detected in Maine, although pheromone trap catches of adults continued to rise in 2014. Some mortality from SBW was mapped in Hamilton County, NY. Defoliation by SBW and resulting tree mortality continues in the Lake States (fig. 2). SBW populations increased in the Upper Peninsula of Michigan in 2014. Defoliation was reported on the Ottawa National Forest for the past 5 to 6 years, and mortality to spruce and balsam fir has become significant. On the Hiawatha National Forest, some pockets of SBW were reported on the eastern side in 2014, and, on the western side, much of the balsam and spruce that had been defoliated over the past 5 to 6 years has now died. A continuous infestation of SBW has occurred in the far northeastern counties of Minnesota since 1954. In 2014, the defoliation acreage nearly doubled as the main body of defoliation "moved" to a location nearer the North Shore. Some mortality was observed in the Cloquet Valley State Forest. Damage has been detected in portions of northern Wisconsin for the past 5 years. Defoliation was most severe in Florence and Marinette Counties. Additional areas of light to moderate defoliation were noted in Ashland, Forest, Langlade, Lincoln, Oneida, Price, Portage, Taylor, and Vilas Counties. Scattered defoliation was observed on the Nicolet National Forest, along the Michigan border and on the Park Falls and Medford Districts (fig. 3).

No SBW damage was detected in Alaska in 2014.

Figure 2. Spruce budworm defoliation.
Photo by Joseph O'Brien, USDA Forest Service.

Figure 3. Spruce budworm needle damage.
Photo by Joseph O'Brien, USDA Forest Service.



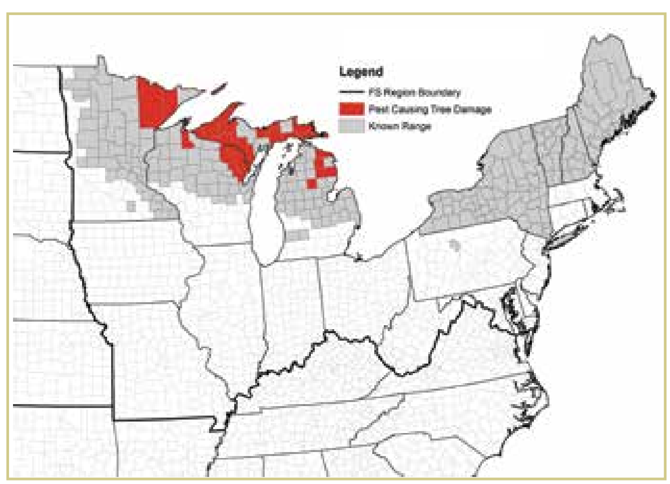


Figure 1. Counties that reported spruce budworm in 2014.

Sirex Woodwasp

Sirex noctilio Fabricius

The woodwasp, *Sirex noctilio,* has been reported in New York, Pennsylvania, Vermont, Ohio, and Michigan. Within the known infestation, much of the worst damage is still found on pine plantations that are overstocked, overmature, or otherwise in declining health (fig. 1). Surveys in Delaware, Maryland, and New Jersey did not detect any *S. noctilio.* It was found for the first time in Clearfield County, PA, bringing the total number of infested counties in the State to 15 of the 67 counties (fig. 2).

Figure 1. Resin beads, characteristic of sirex woodwasp attack on scots pine, New York.
Photo by Kevin Dodds, USDA Forest Service.

Figure 2. Female adult sirex woodwasp.
Photo by David R. Lance, USDA Animal and Plant Health Inspection Service, Plant Protection and Quarantine.

Dwarf Mistletoes

Arceuthobium spp.

Like decay diseases, dwarf mistletoes (DMs) are rarely detected in aerial survey and do not change rapidly from year to year. Yet DMs affect trees and stands, slowly increasing over time, reducing growth, reducing tree longevity, increasing susceptibility to drought, and contributing to deterioration of stand conditions (fig. 1). There have been no new DMs sites reported in 2014. Most estimates of DMs incidence have been made using Forest Inventory and Analysis data.

Figure 1. Dwarf mistletoe-infected black spruce stand, northern Minnesota.
Photo by Steven Katovich, USDA Forest Service.

Figure 2. Close-up of dwarf mistletoe plants and branch swelling on limber pine.
Photo by Dave Powell, USDA Forest Service.

Asian Longhorned Beetle

Anoplophora glabripennis Motschulsky

Infestations of the Asian longhorned beetle (ALB) remained in New York, Massachusetts, and Ohio in 2014 (fig. 1). In Massachusetts, the quarantine area of 110 square miles continued to be in effect. Infested trees in forested areas in the towns of Holden, West Boylston (adjacent to the Wachusett Reservoir), and Boylston are a great concern. As of March 2014, the ALB infestation in the Jamaica Plain suburb of Boston was declared eradicated, and no other infested trees have been found or reported in the Boston area (fig. 2).

Cooperative efforts to eradicate ALB from the quarantined areas in New York City and Long Island were ongoing. In 2014, the Federal quarantine in central Long Island was expanded to include beetle finds just outside of the previously quarantined area near West Babylon (Suffolk County). Currently, 135 square miles in New York State are under quarantine for this pest.

In southwest Ohio, ALB occurs in Tate Township, East Fork State Park, and portions of Stonelick and Monroe Townships in Clermont County.

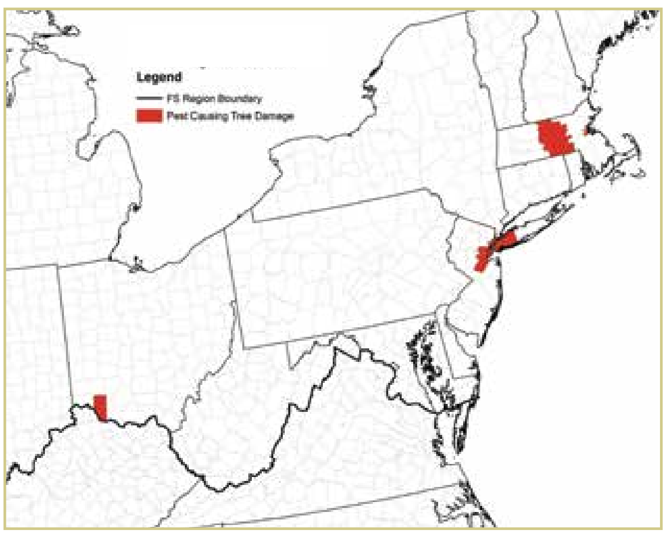


Figure 1. Counties that reported Asian longhorned beetle in 2014.

Figure 2. Asian longhorned beetle larvae, United States.
Photo by Dennis Haugen, USDA Forest Service.

White Pine Blister Rust

Cronartium ribicola J.C. Fisch. ex Rabenh

White pine blister rust (WPBR) is a concern throughout the United States where five-needle pines occur. In some areas in the West, the disease is threatening high-elevation five-needle pines critical to the fragile ecosystem. WPBR in the East is of growing concern as a new strain of the rust has been identified that has infected individuals that had previously tested resistant (fig. 1).

There were no new reports of WPBR in 2014 for Delaware, Maryland, New Jersey, Ohio, Pennsylvania, and West Virginia; however, the pest is present in these States (fig. 2). The new strain of the pathogen *Cronartium ribicola,* which was shown to infect previously resistant and immune cultivars of *Ribes,* poses risk. White pine blister rust was noted in several locations and infected trees were reported in stands from Leeds (Androscoggin County), Gray (Cumberland County), and Richmond (Sagadahoc County) in Maine. No significant activity was reported in Rhode Island in 2014. Vermont reported some mortality mapped in Caledonia, Franklin, Orange, and Rutland Counties through aerial survey (fig. 3).

In the Northern Region, which includes northern Idaho, Montana, and North Dakota, western white pine, whitebark pine, and limber pine are hosts of WPBR. High incidences of disease occur on all three hosts. WPBR has spread throughout the range of western white pine in the inland northwest. WPBR has spread throughout the range of limber pine, which dominates several hundred thousand acres in the more arid portions of the area.

Figure 2. Main stem canker girdling the main stem of a young eastern white pine.
Photo by Steven Katovich, USDA Forest Service.

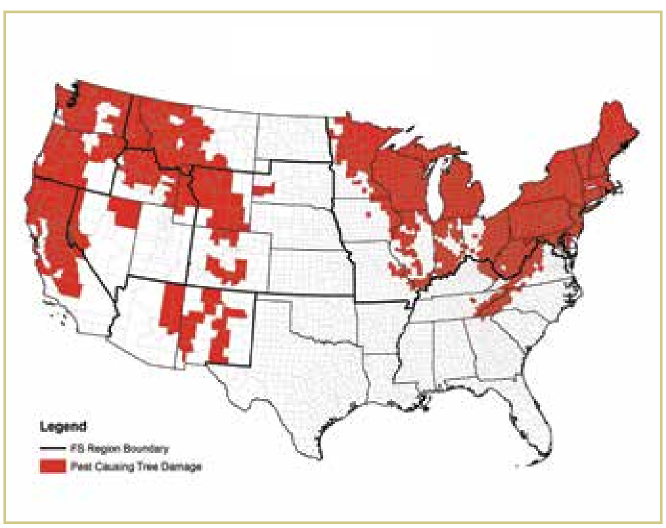


Figure 1. Counties where white pine blister rust was present in 2014.

WPBR continues to spread and intensify in limber pine in Colorado and southern Wyoming, and mortality is occurring in areas where the rust has been present for decades. New infection centers were identified near Allenspark, Ward, and on the northeast slopes of Pikes Peak Mountain in Colorado. No additional infections have been identified within the Rocky Mountain National Park in 2014.

WPBR has been identified on Rocky Mountain bristlecone pine in southern Colorado in the Great Sand Dunes National Park and Preserve. Widely scattered infections by this pathogen occur throughout Wyoming on limber and whitebark pines.

In the Intermountain Region, WPBR has been found on all host types in all States, with the exception of Utah. It is most frequently found on whitebark and limber pines. Western white pine and sugar pine, some of which are infected, are found only on the Humboldt-Toiyabe National Forest along the California/Nevada border. In Utah, the pathogenic fungus has not yet been detected on pine hosts.

Southwestern white pine is the primary host of WPBR in New Mexico and Arizona. WPBR was first detected in New Mexico in 1990 in the Sacramento and White Mountains. It is now advancing and causing widespread crown dieback and mortality. The disease is still colonizing new areas within New Mexico.

In 2014, infected white pines and gooseberry were observed in more moderate hazard sites in the White Mountains of Arizona, and topkill and mortality of sapling and immature pole-sized trees is common in more heavily infested areas.

In California, WPBR remained a problem throughout the Sierra Nevada, affecting sugar pines and other five-needle pines. There are no new locations for 2014 reporting so the range of this pathogen continues in all forests where there are five-needle pine populations from the Southern Sierra Nevada Mountains up to the Oregon Border. However, there are some very high elevation and eastern California five-needle pine stands that appear to date not to have been affected by this WPBR.

Figure 3. Top kill in eastern white pine caused by white pine blister rust.
Photo by Joseph O'Brien, USDA Forest Service.

Oak Wilt

Ceratocystis fagacearum Bretz

Oak wilt (OW) disease conditions in almost all Southern Region States have been static for a number of years with no new positive counties being recorded (fig. 1). Surveys for OW are no longer routinely performed in most States, and serious or widespread damage is generally unknown except in Texas (fig. 2). There, widespread mortality of live oak and Texas red oak continues, and a survey and suppression program is in operation.

In the Northeastern Area, an additional incidence of one more tree in the same New York residential neighborhood where OW disease was first detected was confirmed to be infected. Monitoring of the area is ongoing, and aerial surveys have shown no other infections. As of 2014, OW was not found in any other part of New York.

Ohio confirmed OW disease in Lucas and Portage Counties. The majority of reports are small pockets of less than 1 acre. OW has been verified in Webster County in West Virginia. It is considered present throughout most counties in West Virginia.

In the North Central States, Michigan reported new county records in 2014 for Leelanau, Mason, and Oceana Counties (fig. 3). OW disease continues to increase within the oak resource in Michigan's Upper and Lower Peninsulas. Minnesota reported new OW infestations in Freeborn,

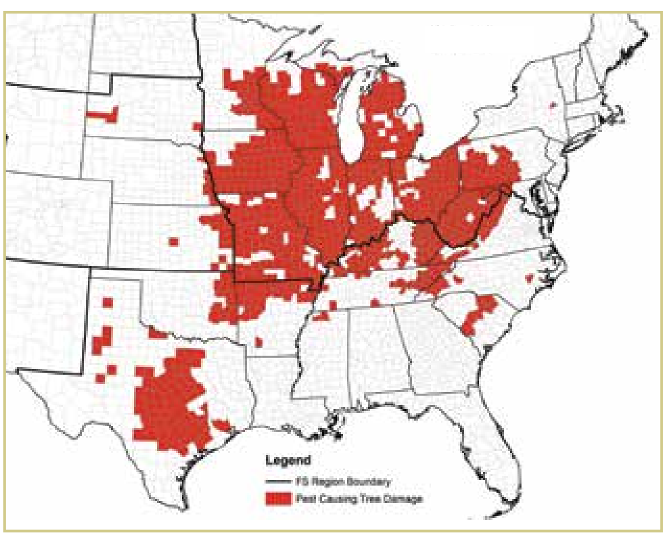


Figure 1. Counties where oak wilt was present in 2014.

Figure 2. Texas red oak leaf showing oak wilt symptoms, Kerrville, Texas.
Photo by Paul A. Mistretta, USDA Forest Service.

Kanabec, and Nicollet Counties. OW symptoms were noticeably more abundant on bur oaks in 2014 than in previous years. Washburn County in Wisconsin also reported new infestations in 2014. Many new infection centers were reported in areas of central Wisconsin where OW has been long established.

In Indiana, new county records for Hendricks and Warren Counties were confirmed. OW is common in the woodlots of northwestern Indiana in the Kankakee River basin, and in all situations, mortality occurs to red and black oak in small spots, less than 1 acre. In Missouri, new county records for Cooper, Dallas, and Polk Counties were confirmed positive for OW.

Figure 3 Northern red oak wilt mortality caused by oak wilt. Michigan.
Photo by Joseph O'Brien, USDA Forest Service.

Fusiform Rust

Cronartium quercuum f. sp. *fusiforme* Hedg. & Hunt ex Cumm.

In the South, fusiform rust causes deformation and mortality regionwide on loblolly and slash pine hosts (figs. 1 and 2), particularly in young plantations. No new areas have been reported in 2014.

Figure 1. Fusiform rust branch gall.
Photo by Robert L. Anderson, USDA Forest Service.

Figure 2. Fusiform rust; fruiting aecia stage.
Photo by USDA Forest Service.

Dogwood Anthracnose

Discula destructiva Redlin

Dogwood anthracnose continues to occur across its historic range in the Northeast including Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and West Virginia, but no new counties or damaged acres were reported in 2014 (fig. 1).

In the Southern Region, dogwood anthracnose disease has now spread to most of the cool, moist high-elevation areas with dogwood host in Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, and Virginia (fig. 2).

Figure 1. Leaf dieback caused by dogwood anthracnose.
Photo by USDA Forest Service.

Figure 2. Twig dieback caused by dogwood anthracnose.
Photo by Robert L. Anderson, USDA Forest Service.

Beech Bark Disease

Cryptococcus fagisuga Lindinger
Neonectria ditissima Tul. & C. Tul. Samuels & Rossman
N. faginata Lohman

Beech bark disease (BBD) has spread continuously in the Northeast and South as far west as Michigan (fig. 1), as far south as central Virginia, and isolated locations in eastern Tennessee and western North Carolina (fig. 2).

In Massachusetts, some dieback and mortality from beech bark disease was mapped by aerial survey in Franklin County.

BBD can be found readily throughout New York State. Damage and mortality was mapped by aerial survey in Delaware, Franklin, Fulton, Greene, Hamilton, and Sullivan Counties.

A total of 14 acres of damage on American beech by BBD was mapped in Lackawanna, PA, through aerial survey (fig. 3).

The known distribution of the beech scale/beech bark disease complex in Virginia has expanded, with BBD confirmed in five additional counties—Grayson, Green, Page, Rappahannock, Rockingham—bringing the total counties in Virginia to 11.

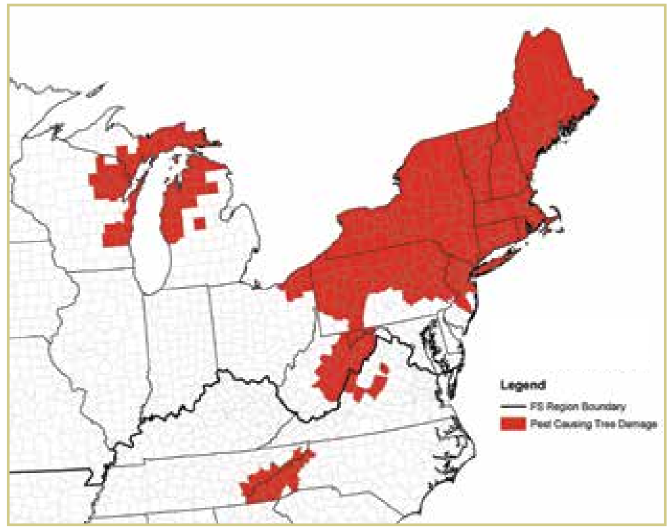


Figure 2. Counties where beech bark disease was present in 2014.

Figure 1. Mortality in an American beech stand affected by beech bark disease in Michigan.
Photo by Joseph O'Brien, USDA Forest Service.

Figure 3. Beech bark disease on American beech.
Photo by Joseph O'Brien, USDA Forest Service.

Butternut Canker

Ophiognomonia clavigignenti-juglandacearum = Sirococcus clavigignenti-juglandacearum
Nair, V.M.G: Chuck Kostichka and J.E. Kuntz

Butternut canker continues to have a damaging effect throughout the entire range of butternut (figs. 1 and 2). No formal surveys were conducted in 2014.

Figure 1. Butternut canker symptoms, Goodhue County, MN.
Photo by Steven Katovich, USDA Forest Service.

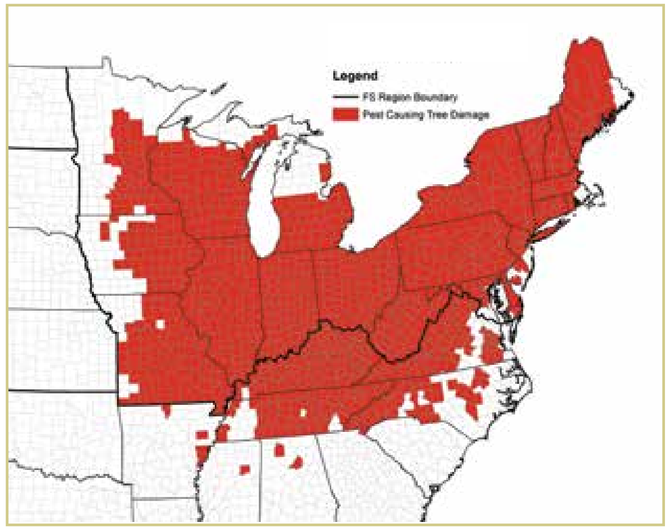


Figure 2. Counties that reported butternut canker in 2014.

Pests To Watch

Coconut rhinocerus beetle *Oryctes rhinoceros*

Coconut rhinoceros beetle (CRB) was first detected on Guam in September 2007. It is native to Southeast Asia and now occurs throughout much of the Western Pacific. It is a serious pest of coconut palm, *Cocos nucifera,* but many other hosts are also reported. The adult beetles damage trees by boring into tree crowns where they injure young, growing tissue and feed on sap (figs. 1 and 2). The subsequent damage can cause tree death. The beetles breed in moist, decomposing organic matter, especially dead coconut trees, leading to a destructive cycle if left unmanaged. Although the beetles can fly up to 2 miles, regularly feeding on coconut palms and returning to the breeding site, spread is primarily through human movement of breeding materials (such as green waste and dead trees).

What was started as an eradication program on Guam in 2007 has now transitioned into a management program. Sanitation of infested sites and trees continues, as well as further development of integrated pest-management tools. Keeping CRB off islands where it currently does not occur and where coconuts are a primary human food source is paramount. The Forest Service, in cooperation with the University of Guam, is supporting CRB detection efforts on Saipan, Tinian, and Rota. Detection traps were placed on the three islands at airports and seaports, and at the American Memorial Park on Saipan. No CRB were detected on these islands in 2014. Efforts are being made to expand detection to the Republic of the Marshall Islands in 2015. New detection traps have been developed by University of Guam entomologists; these new low-cost and low-maintenance traps will facilitate an increase in detection efforts across many other Micronesian islands.

The first detection of CRB in Hawaii occurred on Joint Base Pearl Harbor–Hickam on Oahu in December 2013 (fig.3). A nearby breeding population in a large mulch pile was discovered shortly thereafter at a golf course near the main runway of Honolulu International Airport. The amount and location of the infested mulch made destruction of the breeding population extremely challenging and required developing new tools. Currently, infested material is being treated through composting or incineration in air-curtain burners.

In cooperation with the U.S. Navy and the University of Hawaii, the project is using pheromone-detection traps around the island to delineate the infestation and detect new satellite populations (fig 4). Crews also survey coconut palms for signs of CRB damage and mulch piles for breeding sites. So far, the main infestation is located in and

Figure 1. Boring hole by the coconut rhinoceros beetle.
Photo by Alison Nelson, USDA Forest Service.

Figure 2. Coconut rhinoceros beetle killing the crown.
Photo by USDA Forest Service.

around the military base, with one outlying population on the leeward coast of Oahu. No beetles have been detected on other islands in the archipelago, and eradication on Oahu is still the goal.

Figure 3. Damage symptoms caused by the coconut rhinoceros beetle.
Photo by USDA Forest Service.

Figure 4. Crown damage caused by the coconut rhinoceros beetle.
Photo by USDA Forest Service.