United States
Department of
Agriculture

Forest Service

FS-952

July 2010

Major Forest Insect and Disease Conditions in the United States: 2009 Update

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Compiled by Gary Man,
Forest Health Protection

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Cover photo: *Kawuneeche Valley Mountain Pine beetle mortality at Farview Curve, Rocky Mountain National Park, CO. Photo by Michael Menefee, Colorado Natural Heritage Program.*
Back cover photo: *Aerial view of mountain pine beetle damage. Photo by Jerald E. Dewey, USDA Forest Service.*

Preface

This report represents the 59th annual report prepared by the Forest Service, U.S. Department of Agriculture. The report of the major insect and disease conditions of the Nation's forests focuses on the 20 major insects and diseases that annually cause defoliation and mortality in forests of the United States. 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 information on the 20 insects and diseases described in this report and should be referenced if more detailed information is desired. This 2009 update provides a national summary of the major changes and status of these 20 forest pests with updated charts, tables, and maps. We are in the process of developing a database and linking it to other data sets so that interested users will have access to more information and will be able to do their own analyses, especially over time.

The information in this report is provided by the Forest Health Protection program of the Forest Service (USDA) and its State partners. This program serves all Federal lands, including the National Forest System, the lands administered by the U.S. Departments of Defense and the Interior, and tribal lands. The program also provides assistance to private landowners through the State foresters and other State agencies. A key element of the program is 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.

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Forest Service
Forest Health Protection Offices

Forest Service, Washington Office
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Missoula, MT 59807
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Denver, CO 80225
303–275–5026

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Forest Service
International Institute of Tropical Forestry
UPR Experiment Station Grounds
P.O. Box 25000
Rio Piedras, PR 00928–5000
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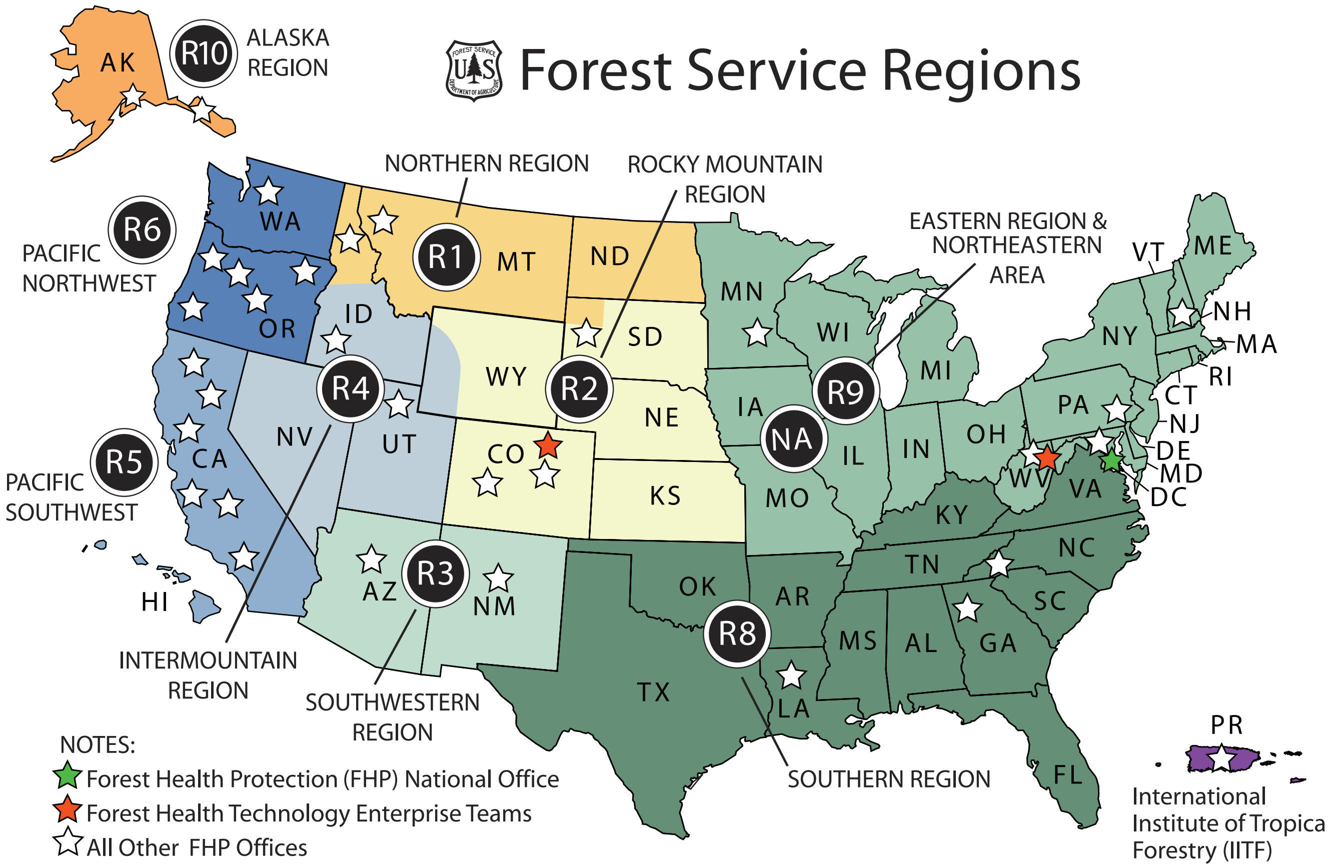
Forest Service Regions and Area



Copies of this report are available from:

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This report is also available on the Internet at http://www.fs.fed.us/foresthealth/current_conditions.shtml and at http://www.fs.fed.us/foresthealth/publications.shtml#reports.

Contents

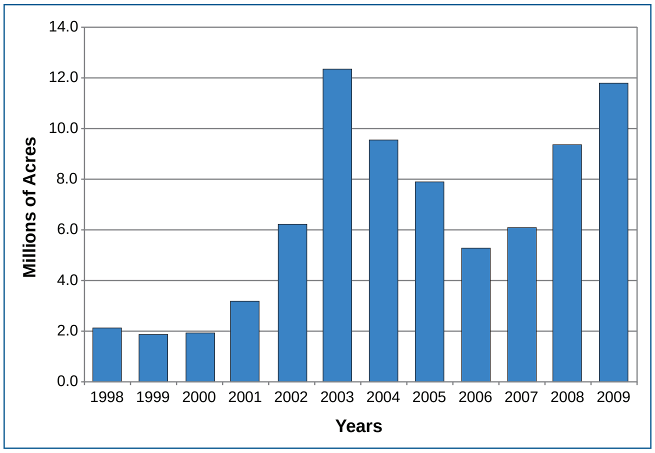
Executive Summary/Introduction

America's forests play an important role in advancing and sustaining the ecological, social, and economic conditions of this country. The United States is fortunate to possess a rich and abundant forest resource to provide for the needs of its citizens. Today, our Nation's approximately 750 million acres classified as forest land continue to provide a wide array of services and commodities such as timber and other forest products, recreation, wildlife, clean water, and carbon sequestration. Healthy forests, regardless of ownership, are important to providing these goods and services on a sustainable basis. One aspect of maintaining and even enhancing a healthy forest is to protect and restore forests from native and nonnative insects and diseases, which can cause significant damage. Surveys describing the forest insect and disease conditions are important tools to help prioritize actions by Federal agencies, States, and other stakeholders. As with most biological systems, the overall mortality that insects and diseases cause varies from year to year and pest to pest. The following chart (fig. 1) illustrates how mortality has varied over the past 12 years.

Acres of Tree Mortality Caused by Insects and Diseases

In 2009, nearly 11.8 million acres of mortality caused by insects and diseases were reported nationally, a 2.8-million-acre increase from 2008, when 9.0 million acres of mortality were reported. Nearly 75 percent of the mortality was caused by one pest, the mountain pine beetle, a native insect found in western U.S. forests. Although only mortality is represented in the chart, defoliation can have significant effects on our forests. The western spruce budworm caused more than 5.1 million acres of defoliation damage in 2009. Reports of European gypsy moth defoliation were reduced by more than 70 percent from last year, but the moth still defoliated more than 450,000 acres. A single defoliation event usually does not cause tree mortality; however, taken together with continued attacks or

Figure 1.—*Surveyed acres of mortality from 1998 to 2009.*



severe abiotic factors such as weather and drought, trees can succumb to these insects.

Caution should be used in interpreting these maps, because maps included in this report are at the county scale. If damage was reported at just one location in the county, the whole county is noted as affected. The reason for this protocol is that for some pests, data are collected only at the county level. Also, if damage was reported at a finer pixel level, many areas would not show up at the scale used in this publication. For instance, many counties reported southern pine beetle mortality in 2009, but most spots are small and, when added together, affect less than 1,440 acres of mortality. In addition, the maps represent only what is reported as mortality or defoliation and not necessarily the total infestation of a pest. In any given year, some areas are not surveyed because of physical limitations, such as forest fires or weather events, or limited resources.

Every year, hundreds of native and nonnative insects and diseases damage our Nation's forests. The following pages describe 20 of the major insects and diseases that annually contribute to mortality and defoliation. In addition, we have added a section for recently identified pests that have the potential to become major threats and are being monitored.

Mountain Pine Beetle

Dendroctonus ponderosae Hopkins

Aerial and ground surveys detected about 8.8 million acres where mountain pine beetles were actively killing trees in 2009, the largest area affected in more than 30 years (figs. 1 and 2). Hundreds of thousands of acres were affected in California, Colorado, Idaho, Montana, Nevada, Oregon, South Dakota, Utah, Washington, and Wyoming (fig. 3). Mountain pine beetle was confirmed for the first time in Nebraska from the Wildcat Hills in the south to the western edge of Pine Ridge near Harrison in the north. The mountain pine beetle epidemic in the central Rocky Mountains continues to expand east of the Continental Divide and across the northern Front Range in Colorado. The expansion of mountain pine beetle that caused mortality in lodgepole pine west of the Continental Divide is beginning to subside in certain areas because of host depletion and is moving into ponderosa pine at lower elevations (fig. 4). Dramatic increases of limber pine mortality are being observed

Figure 1.—*Mountain pine beetle activity has risen dramatically since 2000 in much of the Western United States.*

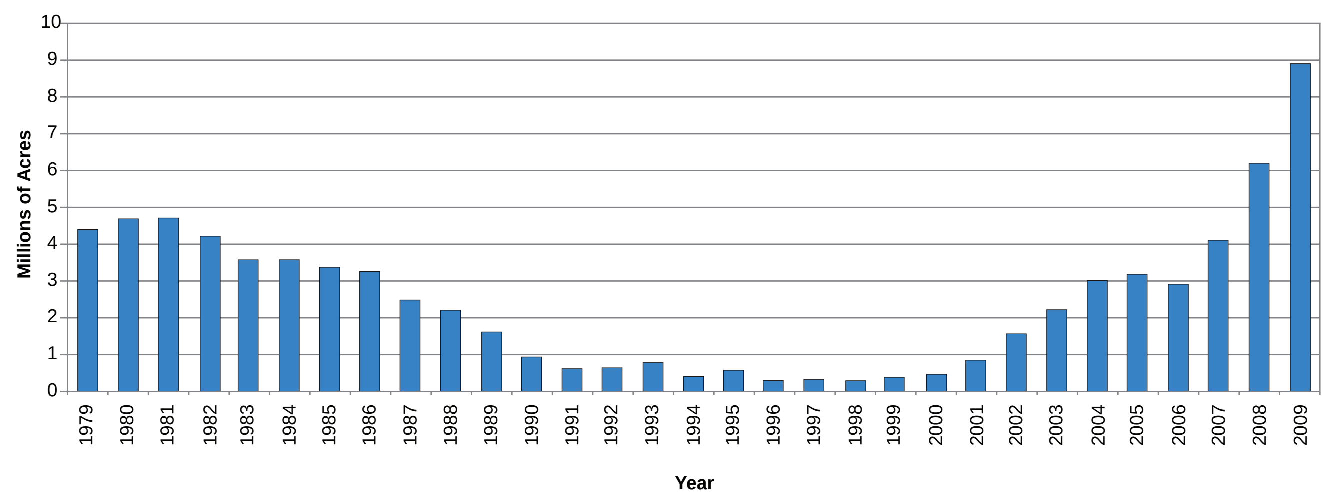
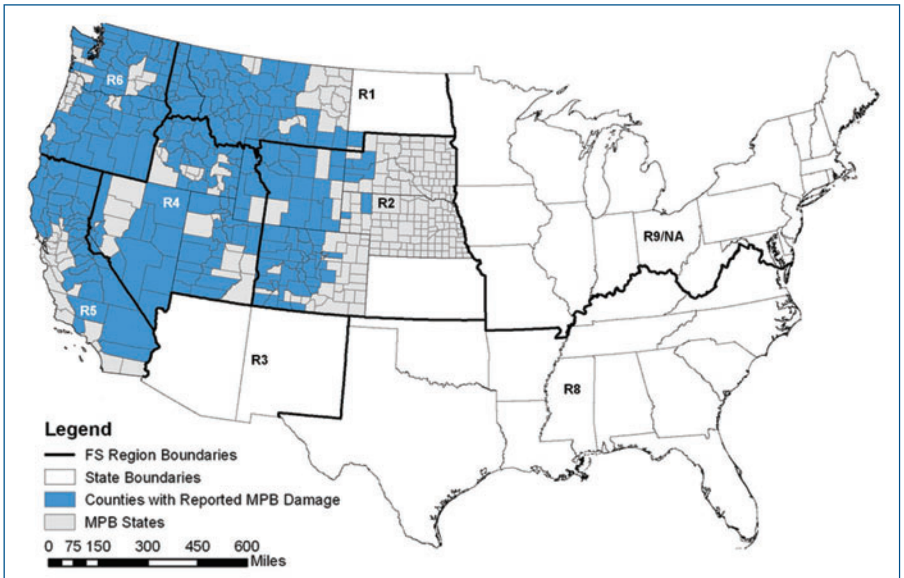


Figure 2.—*Counties where mountain pine beetle was reported in 2009.*



in the higher elevations, especially in the Wind River and Absaroka Ranges of Colorado. Montana reported significantly more mountain pine beetle mortality in 2009 as compared with 2008, especially on the Beaverhead, Deerlodge, Gallatin, Helena, Lewis and Clark, and Lolo National Forests. The intensity of mortality in Montana is beginning to decrease primarily as a result of host depletion. Outbreaks continue in northern Utah on the Ashley and Wasatch-Cache National Forests, in the Black Hills of South Dakota, and throughout Oregon and Wyoming (fig. 5). Outbreaks also continue in the Inyo National Forest, Klamath National Forest, Tahoe Basin, and Warner Mountains in California.

In northeastern Washington, the number of acres mapped with mountain pine beetle activity and the estimated number of trees killed more than doubled from 2008 to 2009. In Okanogan County, WA, the number of acres nearly tripled from that of 2008. Acres with mountain pine beetle activity in the rest of the State were static from 2008 to 2009.

Figure 3.—*Mountain pine beetle mortality in 2009 by State.*

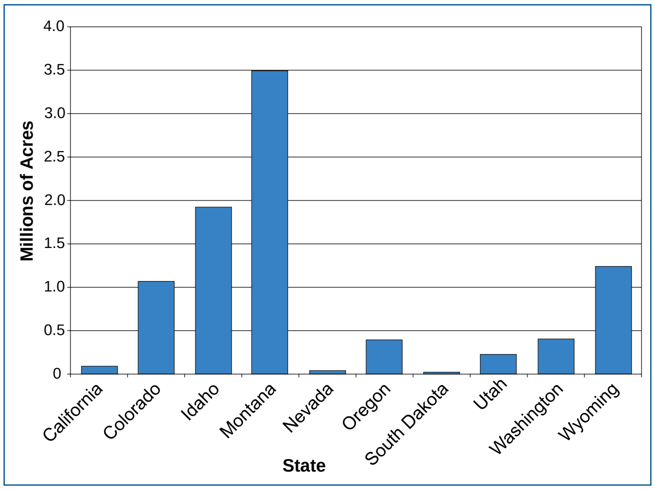


Figure 4.—*Recently killed and fading lodgepole pine, Rabbit Ears' Pass, Routt County, CO. Photo by Whitney Cranshaw, Colorado State University.*

Figure 5.—*Granite Creek area showing pine killed by mountain pine beetle, Baker Ranger District, Wallowa-Whitman National Forest, OR. Photo by Dave Powell, Forest Service.*

Gypsy Moth

Lymantria dispar Linnaeus

Since its introduction to the United States, the gypsy moth has become established in all or parts of 19 Eastern States and the District of Columbia. In 2009, new defoliation was detected in 13 States (fig. 1 and table 1). Defoliation by gypsy moth was drastically reduced from more than 1.5 million acres in 2008 to only 450,250 acres in 2009 (fig. 2). Where defoliation occurred, damage was usually light (figs. 3 and 4). The reduction may be because of the cool, wet spring weather that facilitated the effective parasitism by the pathogenic fungus, *Entomophaga maimaiga*. Some mortality around Poor Mountain in Roanoke and Montgomery Counties and parts of the Jefferson and George Washington National Forests in Virginia has occurred as a result of repeated defoliation. Gypsy moth defoliation was identified in three new counties in Ohio (Huron, Mahoning, and Wyandot).

Figure 1.—*Counties where gypsy moth damage was reported in 2009.*

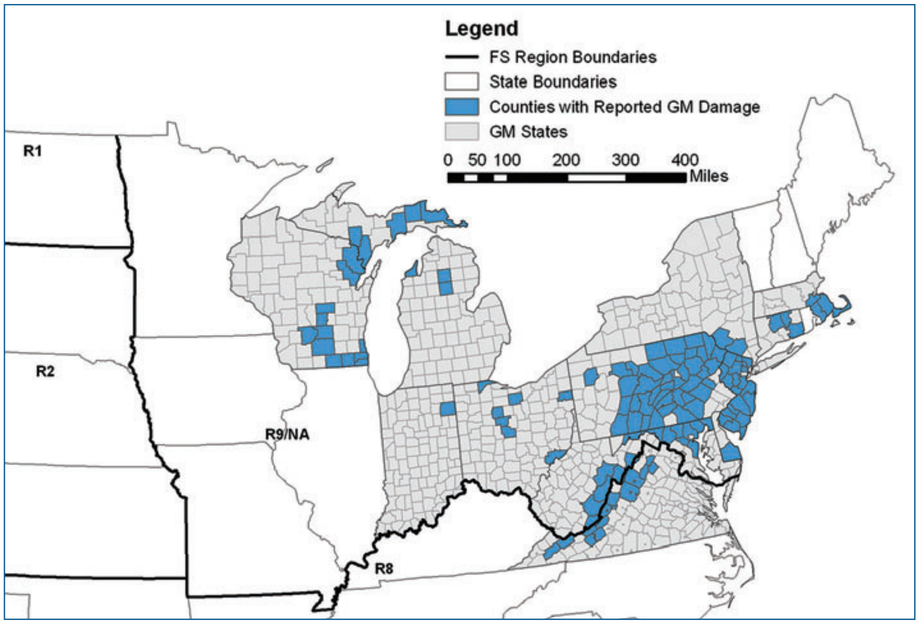


Table 1.—*Gypsy moth defoliation by State in 2009.*

State	Acres Infested 2009
Connecticut	6,708
Delaware	447
Indiana	71
Maryland	295
Massachusetts	1,128
Michigan	7,971
New Jersey	92,554
New York	17,794
Ohio	548
Pennsylvania	239,823
Virginia	29,394
West Virginia	49,865
Wisconsin	3,651
Total	**450,249**

Figure 2.—*Gypsy moth defoliation from 1924 through 2009.*

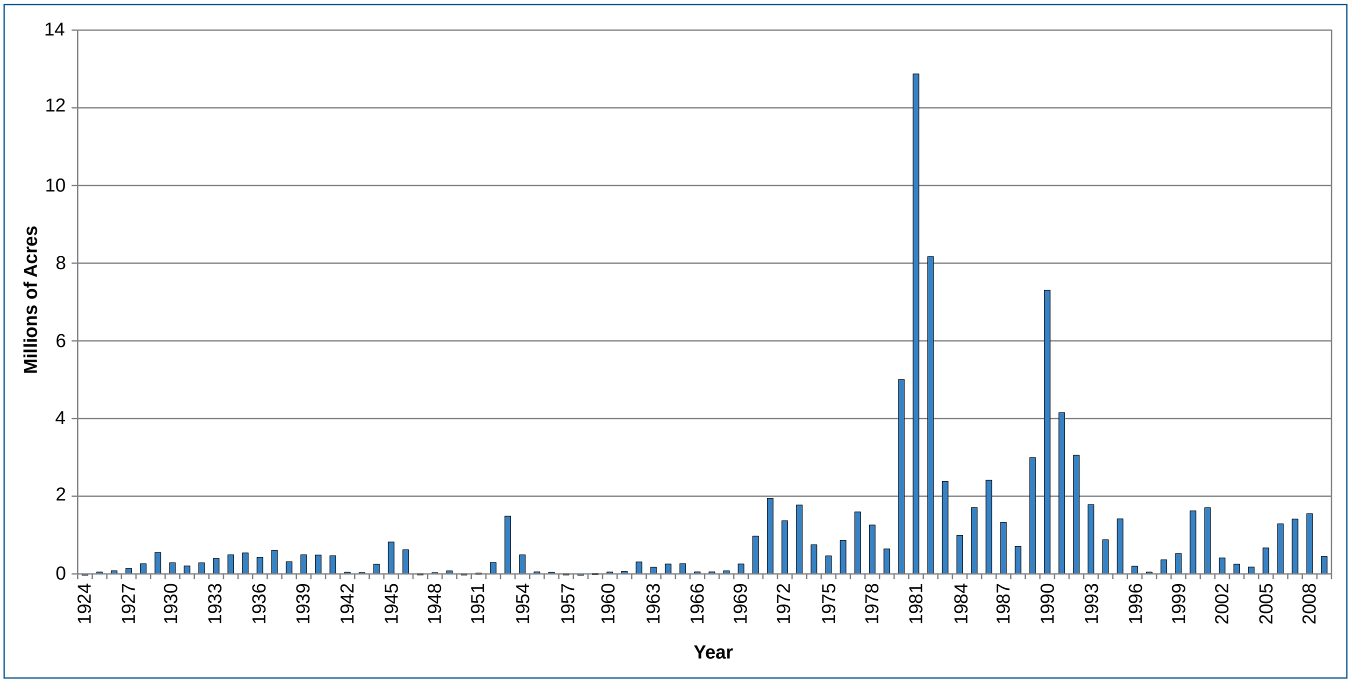
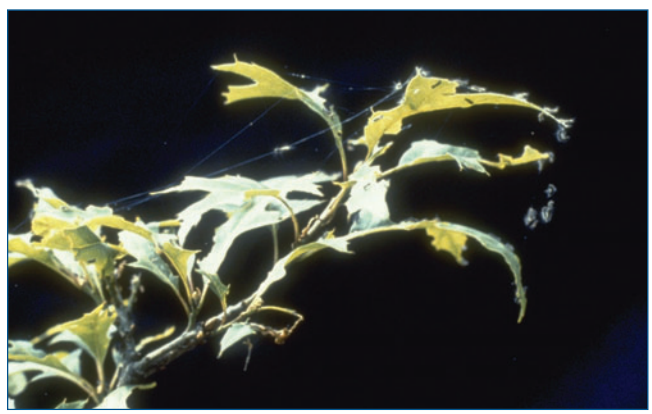


Figure 3.—*Gypsy moth defoliation. Photo by Forest Service.*

Figure 4.—*Gypsy moth damage to oak foliage. Photo by Forest Service.*



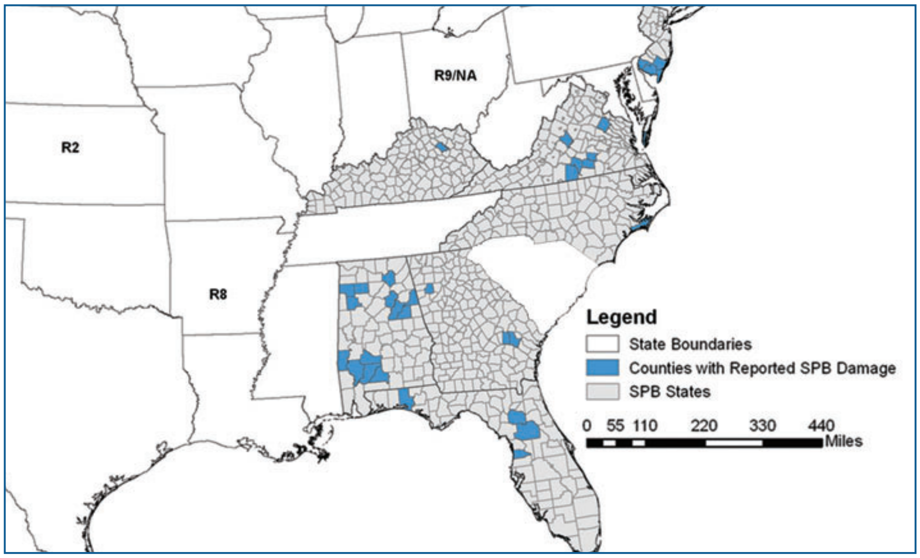
Southern Pine Beetle

Dendroctonus frontalis Zimmermann

Southern pine beetle populations were at historically low levels across the South in 2009, reduced even from the low levels of 2008. Across the South, only 101 spots were reported, affecting about 230 acres (table 1 and figs. 1 and 2). No counties met the definition for an outbreak (one or more multiple-tree spots per thousand acres of host type). Most spots occurred on nonindustrial private forest land (fig. 3).

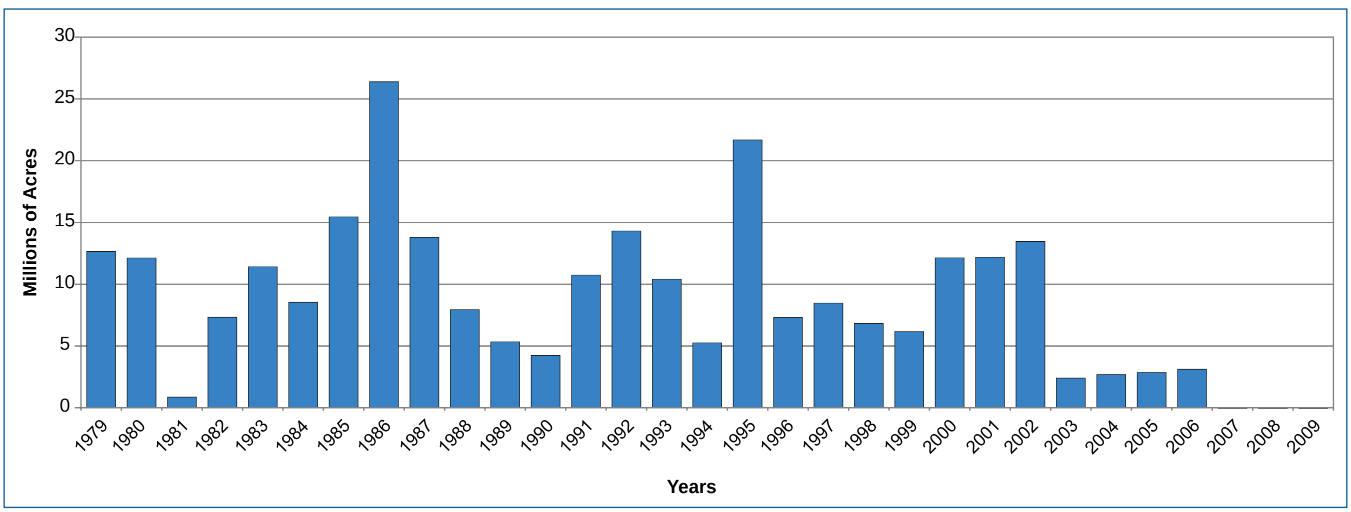
In New Jersey, a pheromone-based survey in 2009 indicated that populations were present and moving northwest, particularly along the coast in Atlantic County. Mortality is reported to be lightly scattered over 1,210 acres. The predominant tree species affected was pitch pine, representing 85 percent of all species affected.

Figure 1.—*Counties with southern pine beetle infestations reported in 2009.*



Outbreak Classes
Very low (≤ 0.1 spots per thousand acres of host type).
Low (> 0.1 to ≤ 1.0 spots per thousand acres of host type).
Moderate (> 1.0 to ≤ 3.0 spots per thousand acres of host type).
High (> 3.0 spots per thousand acres of host type).

Figure 2.—*Southern pine beetle outbreaks, 1979 to 2009.*



Note: The surveys after 2007 counted outbreak acres differently than in previous years. Previously, all acres in the county were counted if a single spot was positive for southern pine beetles. The surveys after 2007 reflect only the estimated actual areas affected by southern pine beetles.

Table 1.—*Southern pine beetle activity by State in 2009.*

State	Acres Infested 2009	Number of Spots 2009[1]
Alabama	0.3	31
Florida	36	15
Georgia	33	24
Kentucky	1	1
New Jersey[2]	1,210	—
North Carolina	91	5
Virginia	70	25
Total	**1,441**	**101**

[1] Spot size and density vary, so the number of spots does not directly correlate to the number of acres infested.

[2] Acres infested include mostly lightly scattered mortality. No spot information is available for New Jersey.

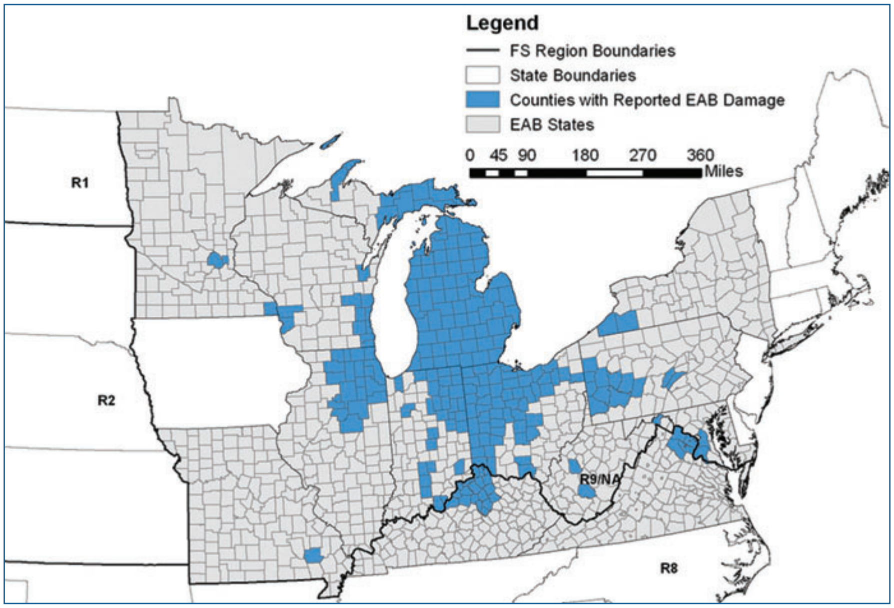
Figure 3.—*Southern pine beetle mortality at different stages. Photo by Andrew J. Boone, South Carolina Forestry Commission.*

Emerald Ash Borer

Agrilus planipennis Fairmaire

In 2009, Emerald ash borer was found in three new States: New York, Kentucky, and Minnesota (fig. 1). An infestation was found for the first time in New York in the town of Randolph in Cattaraugus County. Emerald ash borer was also discovered in Jessamine and Shelby Counties in central Kentucky, and trapping and ground surveys have confirmed the beetle's presence in 11 counties. Infestations in Kentucky appear to be 3 to 5 years old, with tree mortality occurring in both urban and rural areas. Minnesota found emerald ash borer in two counties, Ramsey and Hennepin.

Figure 1.—*Quarantined counties as a result of the emerald ash borer infestation as of 2009.*



Pennsylvania added six new counties to the infestation this year: Armstrong, Indiana, Lawrence, Mifflin, Washington, and Westmoreland. Significant damage to ash trees was observed in localized areas in Allegheny, Butler, and Mifflin Counties.

Emerald ash borer is a serious problem in Ohio, where the beetle has now been found in 48 of 88 counties, with many standing dead trees in urban and rural areas. Infestation by this pest increased in most counties. New counties affected were Ashland, Clark, Green, Marrow, Pickaway, Pike, Richland, Scioto, and Summit.

In Virginia, emerald ash borer is now known to occur in Fairfax and Arlington Counties (fig. 2). Emerald ash borer was detected in new areas within Fairfax County in 2009, and a new infestation was discovered in adjacent Arlington County. Infestations appear several years old, suggesting that other infested locations are probably undetected. Intensive trapping throughout northern Virginia, however, has not detected beetles in other areas.

Figure 2.—*Emerald ash borer damage to ash trees in Fairfax County, VA. Photo by Eric R. Day, Virginia Polytechnic Institute and State University.*

Sudden Oak Death

Phytophthora ramorum Werres et al.

In 2009, *Phytophthora ramorum*, the causal agent of sudden oak death, continued to expand into areas that include tanoak (*Lithocarpus densiflorus*) (fig. 1), California live oak (*Quercus agrifolia*), Shreve oak (*Q. parvula*), and California black oak (*Q. kelloggii*) throughout the same 15 counties in the central and northern coastal areas of California and the extreme southwestern corner of Oregon as in 2008. Aerial surveys indicated that current sudden oak death-caused mortality rates decreased in 2009. More than 9,300 acres of mortality were mapped in Marin, Napa, Sonoma, Lake, and Mendocino Counties and parts of Solano County. Those counties represent about one-half of what was mapped in 2008 and one-tenth of the acreage mapped in 2007 in the same area. Mortality of tanoak and coast live oak was relatively low, and the number of dead trees per acre greatly diminished. The north and central coast aerial surveys, including Del Norte, Humboldt, Mendocino, Monterey, San Mateo, Santa Clara, and Santa Cruz Counties, also detected less mortality than in previous years. Decreased levels of mortality can be attributed to the weather patterns over the past couple of years, which have been relatively dry and not conducive to sporulation by this pathogen. The pathogen has also been confirmed on plant samples from MacKerricher State Park and Orr Hot Springs in Mendocino County and at Humboldt Redwoods State Park in Humboldt County. These finds increased the northern limit of *P. ramorum* in both counties.

In Oregon, detection surveys during 2009 found 102 new infected trees representing 59 new disease patches (20 acres total), a decrease from the previous 2 years. All new infested sites were within the existing quarantine area in Curry County and follow the historic pattern of spread (northward).

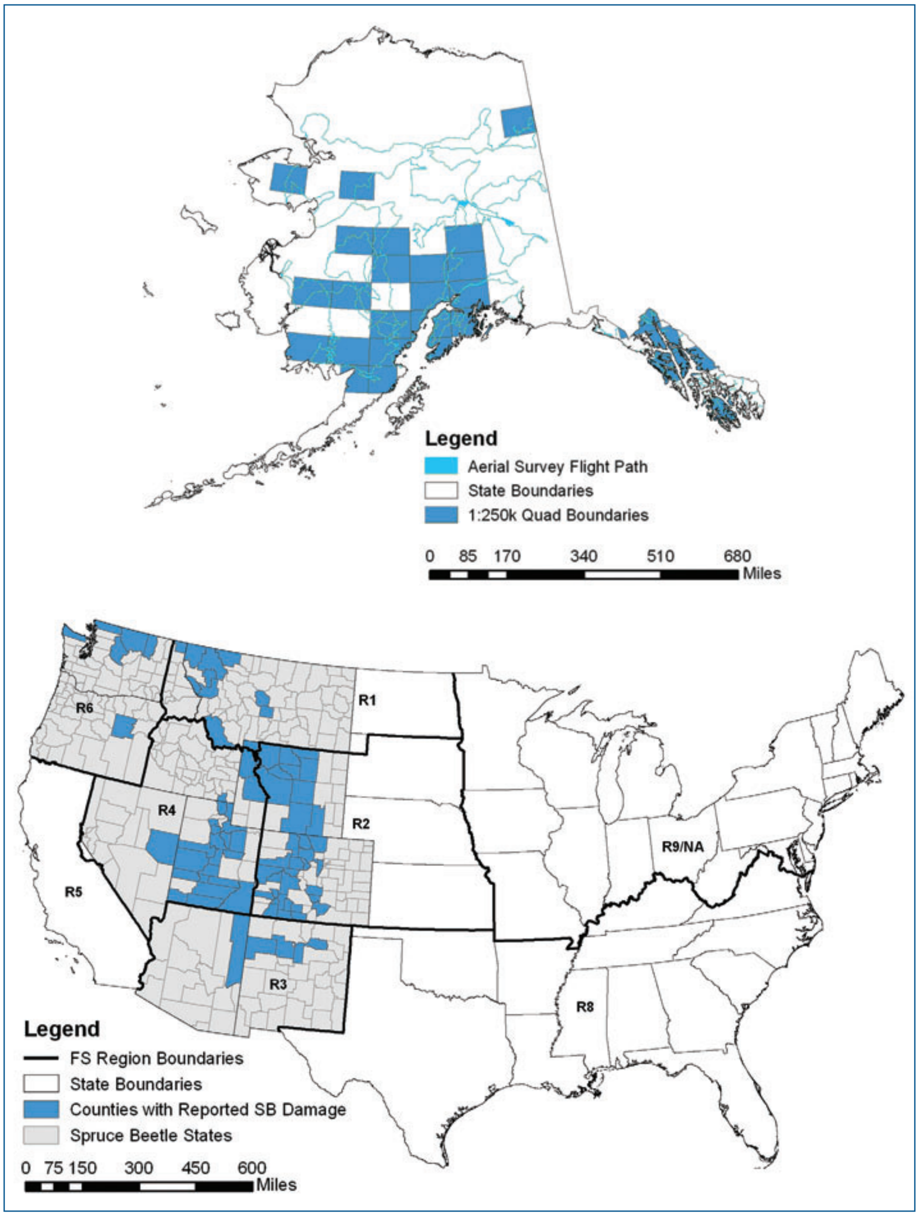
Figure 1.—*Tanoak mortality caused by Phytophthora ramorum, Pfeiffer State Park, CA. Photo by Joseph O'Brien, Forest Service.*

Spruce Beetle

Dendroctonus rufipennis Kirby

Overall, spruce beetle activity increased to 317,000 acres in 2009 compared with 277,500 acres of mortality in 2008 (fig. 1). Spruce beetle continues to kill extensive forests of high-elevation mature Englemann spruce in Colorado and southern Wyoming. The most active epidemics are occurring in southern Colorado (fig. 2). The largest outbreak is spreading from the Weminuche Wilderness on the San Juan National Forest. New spruce mortality from spruce beetle was detected on 91,000 acres in Hinsdale and Mineral Counties. Notable spruce beetle outbreaks are also occurring on the Rio Grande National Forest in Conejos and Rio Grande Counties and on the San Juan National Forest in Archuleta County.

Figure 1.—*Maps of spruce beetle-caused tree mortality detected in 2009 by aerial detection surveys.*



Wyoming counties with increases of spruce beetle damage in 2009 include Albany, Big Horn, Carbon, Hot Springs, and Teton. Spruce mortality was detected at some level on all national forests in Utah. Only scattered and isolated spruce mortality was mapped in Idaho, Montana, and Nevada. Spruce beetle mortality in Alaska remains the most significant mortality agent of white and Lutz spruce in south-central and southwestern Alaska. Historically, spruce beetle has been only partially responsible for spruce mortality in some areas of Alaska, such as the outbreak along the Kuskokwim River between McGrath and Sleetmute. Ips beetles have also contributed substantially to the reported mortality. In 2009, the State of Washington detected increases in spruce beetle-caused mortality, with more than 80 percent of the 56,000 acres affected being in the northeastern county of Okanagan; the number of infested acres has more than doubled from 2008.

Figure 2.—*Spruce beetle mortality. Photo by Steve Munson, Forest Service.*

Western Bark Beetles

Numerous species

Western bark beetle outbreaks have spread throughout the Western United States, from the low-elevation pinyon woodlands of the Southwest to the high-elevation spruce-fir forests. Of particular note is the effect of the mountain pine beetle (fig. 1). In 2009, tree mortality caused by the mountain pine beetle was observed on approximately 8.8 million acres of the total 10.59 million acres affected by all western bark beetle species combined. Still other western bark beetles continue to cause significant tree mortality. The fir engraver showed increased activity in California, particularly in the Sierra Range. In most other States, fir engraver mortality decreased from 2008 but, overall, mortality is still significant, causing nearly 537,700 acres of tree mortality in all States. Western balsam bark beetle continued to decline in 2009, with only 269,500 acres of mortality reported, nearly one-half as much as in 2008. Table 1 shows the 2009 status of selected western bark beetles that have caused significant tree mortality to their respective hosts in recent years (table 1 and fig. 2).

Figure 1.—*Mountain pine beetle mortality on Black Hills National Forest, SD. Photo by Forest Service.*

Figure 2.—*Western bark beetle outbreaks from 1997 to 2009.*

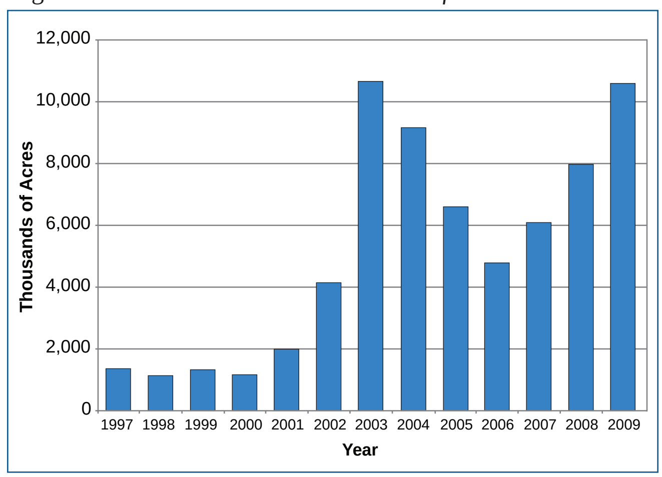


Table 1.—*Trends for selected western bark beetles and infested acres detected in aerial surveys during 2009.*

Bark Beetle(s)	Host(s)	Acres Detected With Bark Beetle Activity in 2009*	Trend
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.*)	8,839,590	Increasing across the West in lodgepole and high-elevation five-needle pines and locally in ponderosa pine forests. Some areas are seeing host depletion.
Spruce beetle, *Dendroctonus rufipennis* (Kirby)	Engelmann spruce (*Picea engelmannii* Parry ex Engelm.), white spruce (*P. glauca* [Moench] Voss), Sitka spruce (*P. sitchensis* [Bong.] Carr.)	317,014 (includes 100,589 in Alaska)	Alaska and Colorado report large, active spruce beetle outbreaks. Some areas are seeing host depletion.
Douglas-fir beetle, *Dendroctonus pseudotsugae* Hopkins	Douglas-fir (*Pseudotsuga menziesii*)	185,078	Overall, the trend is decreasing, especially in the Rockies. Some areas in the Pacific Northwest are increasing after earlier wind events.
Jeffrey pine beetle, *Dendroctonus jeffreyi* Hopkins	Jeffrey pine (*Pinus jeffreyi* Balf.)	21,251	Increasing on the east side of the Sierra Nevada from the Inyo National Forest north to the Lake Tahoe basin and up through the Modoc National Forest.
Western pine beetle, *Dendroctonus brevicomis* LeConte	Ponderosa pine, coulter pine (*Pinus coulteri* D. Don)	103,860	Total acres of mortality leveling off compared with 2008 and decreasing in some areas. The Shasta-Trinity National Forest in California reported significant mortality.
Western balsam bark beetle, *Dryocoetes confusus* Swaine	Subalpine fir (*Abies lasiocarpa* (Hook.) Nutt.)	269,547	Significantly declining in most areas.
Fir engraver beetle, *Scolytus ventralis* LeConte	True firs (*Abies* spp.)	537,680	Significant increase in California, particularly in the Sierra Range.
Pine engraver, *Ips pini* (Say), Arizona five spined ips, *Ips lecontei* Swaine	Ponderosa pine	16,511	Acres affected have declined dramatically since 2003 peak with improved moisture.
Pinyon ips, *Ips confusus* (LeConte)	Pinyon pine (*Pinus edulis* Engelm.), singleleaf pinyon (*Pinus monophylla* Torr. & Fen.)	86,422	Acres affected have declined dramatically since 2003 peak with improved moisture. Significant increases from 2008 are due to expanding the survey area.

** The number of dead trees per acre varies.*

Western Spruce Budworm

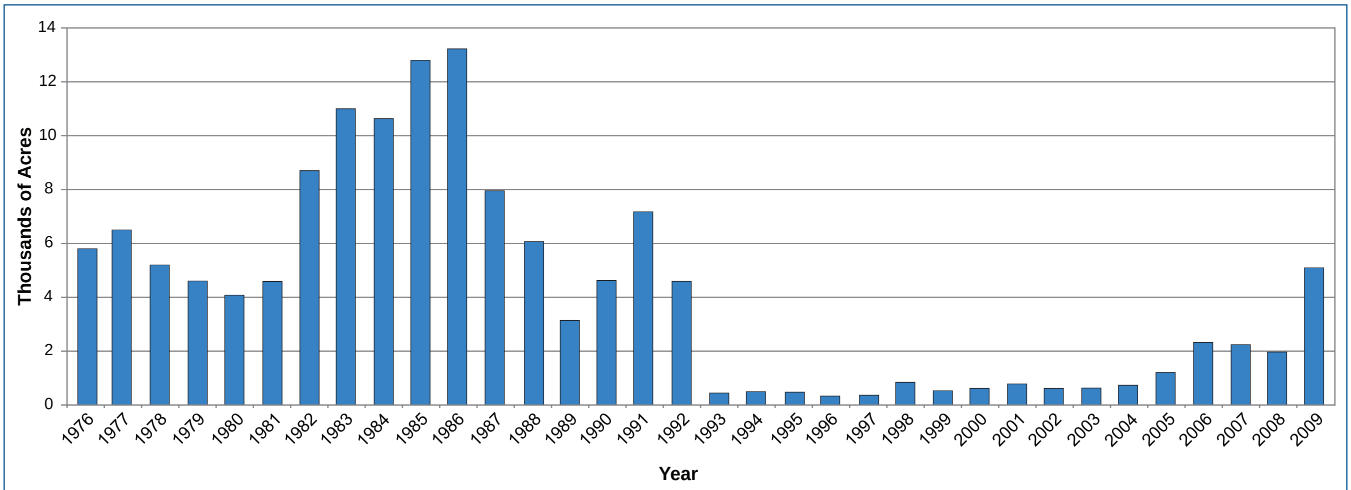
Choristoneura occidentalis Freeman

In 2009, more than 5.1 million acres were defoliated by the western spruce budworm, significantly more than the 1.9 million acres of defoliation in 2008 (table 1). This increase is still relatively low compared with the number of acres defoliated in the 1980s (fig. 1). Montana, Idaho, and Utah reported heavily affected areas on the Gallatin, Helena, Lewis and Clark, Coeur d'Alene, Salmon-Challis, Payette, Boise, and Dixie National Forests. In south-central Idaho, large areas of heavy defoliation were also reported on Bureau of Land Management, State, and private lands. Infestations were detected in portions of the Culebra, Sangre de Cristo, San Juan, Flat Top, and Rampart Ranges in Colorado (fig. 2). Defoliation was significant in New Mexico, especially in the northern part of the State on the Carson and Santa Fe National Forests. Defoliation was also observed on the

Table 1.—*Acres (in thousands) with western spruce budworm defoliation by State, 2002 to 2009.*

State	2002	2003	2004	2005	2006	2007	2008	2009
Arizona	11.30	24.00	10.70	11.20	2.50	4.80	1.70	1.27
California	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Colorado	131.10	20.00	20.00	71.40	93.70	390.20	153.40	382.37
Idaho	22.60	204.10	64.10	75.30	254.30	360.50	366.20	1,030.56
Montana	52.40	66.00	177.30	453.70	1,142.20	497.20	577.80	2,576.15
Nevada	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.00
New Mexico	198.80	143.20	238.20	183.80	142.50	452.20	360.40	559.29
Oregon	1.90	5.50	6.60	0.30	38.00	98.10	10.00	40.80
Utah	7.00	14.70	20.00	40.50	88.60	51.40	7.70	69.71
Washington	57.50	139.90	193.20	363.10	555.70	355.80	455.10	414.50
Wyoming	134.60	13.30	4.50	6.40	4.40	29.00	34.90	30.32
Total	**617.20**	**630.70**	**734.60**	**1,205.70**	**2,321.90**	**2,239.90**	**1,967.20**	**5,104.97**

Figure 1.—*Acres of western spruce budworm defoliation.*



Sacramento Mountains in the southern part of New Mexico. In Arizona, defoliation was much more limited and restricted to the Chuska Mountains on the Arizona-New Mexico border and in the White Mountains on Mt. Baldy. Defoliation continued along the east slopes of the Cascade Mountains in Washington (fig. 3). This outbreak has been ongoing for about 5 years. In eastern Oregon, western spruce budworm-caused defoliation was mapped in the southern Blue Mountains, the fourth year for this relatively small outbreak.

Figure 2.—*Western spruce budworm defoliation on Abies concolor, San Isabel National Forest, CO. Photo by Forest Service.*

Figure 3.—*Western spruce budworm defoliation, Wenatchee National Forest, WA. Photo by David McComb, Forest Service.*

Hemlock Woolly Adelgid

Adelges tsugae Annand

The hemlock woolly adelgid is currently found in 17 Eastern States, from southern Maine to northeastern Georgia and west to eastern Kentucky and Tennessee (fig. 1). Infestations were found in 15 new communities in 2009 but in no new counties in New Hampshire. Hemlock woolly adelgid continued to cause damage and mortality in New York. In 2009, in Rensselaer County, new adelgid populations were verified. Vermont reported detection in two new communities but in no additional counties, although general damage to hemlock declined. In Pennsylvania, hemlock woolly adelgid was observed for the first time in Clearfield, Fayette, and McKean Counties. In general, hemlock woolly adelgid populations decreased dramatically in most of its range within Pennsylvania except in Clearfield, Lycoming, Perry, and Potter Counties. The adelgid was detected for the first time this year in Lincoln County, West Virginia. The hemlock woolly adelgid continues to spread over the native ranges of eastern and Carolina hemlock (fig. 2). Georgia, North Carolina, South Carolina, and Virginia added no new counties for 2009. Much of the host habitat in these States is now infested. In Kentucky, two new counties—Laurel and McCreary—were added.

Figure 1.—*Counties where hemlock wooly adelgid damage was reported in 2009.*

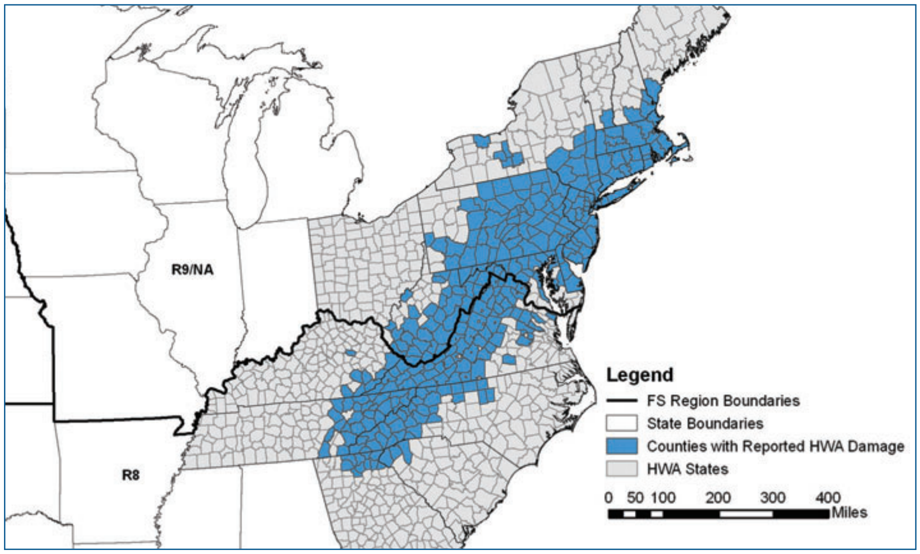


Figure 2.—*Hemlock mortality in Linville Gorge, Pisgah National Forest, NC. Photo by Brian Heath, North Carolina Department of Environment and Natural Resources.*

Laurel Wilt Disease/Redbay Ambrosia Beetle

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

As of 2009, nearly 59 counties in coastal Florida, Georgia, and South Carolina, and now also in Mississippi, were infested with laurel wilt disease and redbay ambrosia beetle (fig. 1). Widespread mortality of redbay continues to be identified in these areas through detection/evaluation surveys and research (fig. 2). In Jackson County, MS, mortality caused by laurel wilt disease and the redbay ambrosia beetle was first reported in 2009, hundreds of miles west of the nearest known infestation in Florida and Georgia. Both the ambrosia beetle and the pathogenic fungus were confirmed present in dead and dying swamp bay trees. Localized spread continues in Florida, Georgia, and South Carolina. Florida added five new counties to the infested list in 2009, including Citrus, Flagler, Martin, St. Lucie, and Suwanee. Georgia added four new counties: Candler, Emanuel, Laurens, and Richmond. South Carolina added four counties: Barnwell, Berkeley, Horry, and Orangeburg.

Figure 1.—*Counties where laurel wilt disease has been detected, as of 2009.*

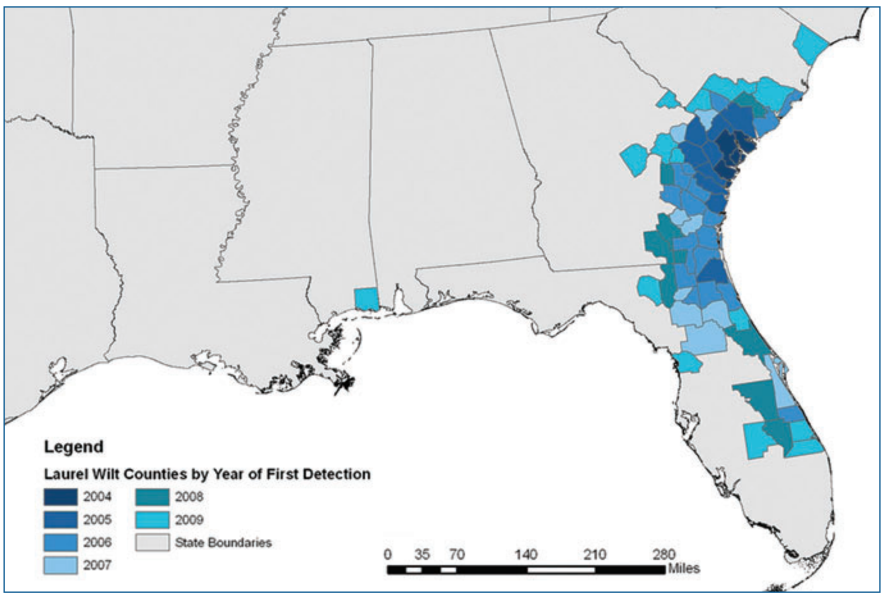


Figure 2.—*Redbay trees dying from laurel wilt disease; center tree responding with epicormic sprouting. Photo by Ronald F. Billings, Texas Forest Service.*

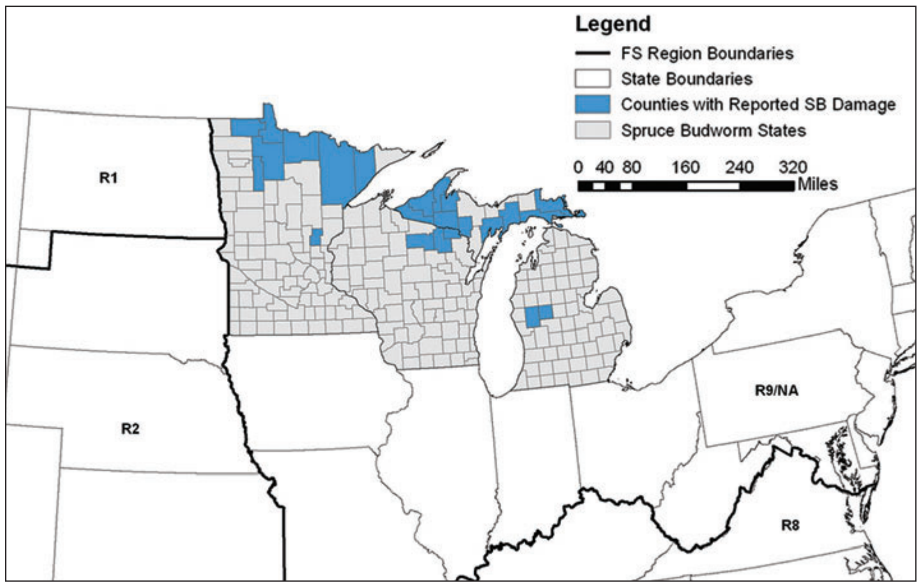
Spruce Budworm

Choristoneura fumiferana Clemens

In 2009, spruce budworm populations remained low in Maine, with low trap catches and no larval activity or defoliation observed. Michigan and Minnesota reported the most activity but at low levels (figs. 1 and 2). No significant defoliation was observed in New York. Alaska did not report any significant defoliation in 2009.

Figure 1.—*Natural regeneration of red spruce (*Picea rubens*) and balsam fir (*Abies balsamea*) stand after spruce budworm mortality. Photo by Doug Maguire, Oregon State University.*

Figure 2.—*Counties where spruce budworm was reported, 2009.*



Sirex Woodwasp

Sirex noctilio Fabricius

The sirex woodwasp has been found in Michigan, New York, Ohio, Pennsylvania, and Vermont (fig. 1). Trap surveys were conducted in these and surrounding States, including Delaware, New Jersey, and Ohio, in 2009. New positive finds in 2009 occurred in two counties: Sullivan County in Pennsylvania and Lake County in Ohio (fig. 2).

Figure 1.—*Counties where the sirex woodwasp has been detected, as of 2009.*

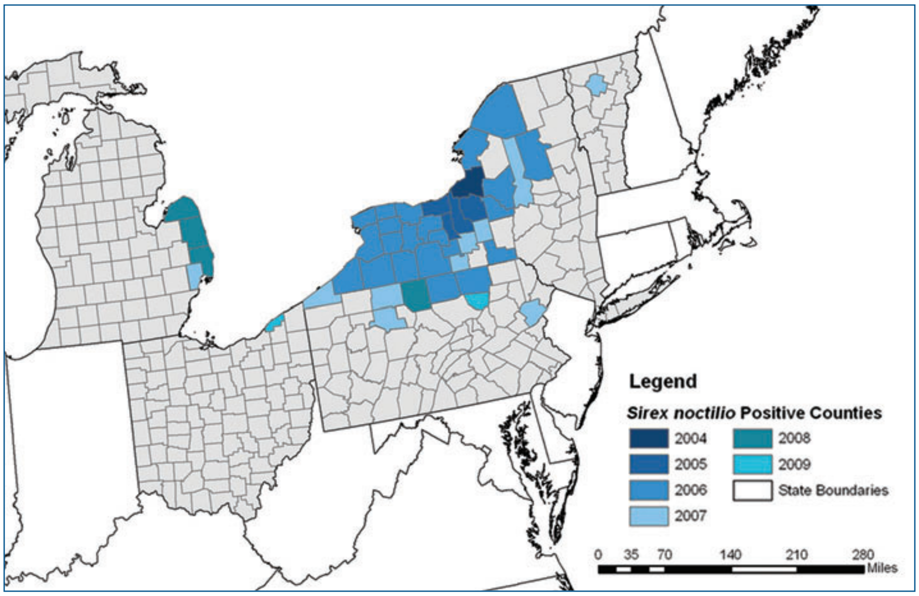


Figure 2.—*Resin beads characteristic of sirex woodwasp attack. Photo by Kevin Dodds, Forest Service.*

Dwarf Mistletoes

Arceuthobium spp.

Although dwarf mistletoe continues to cause tree growth loss and some mortality, no comprehensive dwarf mistletoe surveys have been conducted for more than 25 years, due in part to the slow spread of this pest. Dwarf mistletoe was reported causing significant dieback and mortality in true fir, ponderosa pine, and whitebark pine in several counties in the Sierra range, including Shasta and Siskiyou Counties in California. Western dwarf mistletoe is locally severe within ponderosa pine stands around Coeur d'Alene and along the Spokane River drainage in northern Idaho (fig. 1).

Figure 1.—*Dwarf mistletoe male plant with female plant in background. Photo by Brytten Steed, Forest Service.*

Asian Longhorned Beetle

Anoplophora glabripennis Motschulsky

Since the Asian longhorned beetle was first detected in Massachusetts in August 2008 in the city of Worcester, 16,421 trees have been identified as infested. In 2009, 25,335 infested or high-risk trees were removed (fig. 1).

In New York, cooperative efforts to eradicate the Asian longhorned beetle from the quarantined areas in New York City and Long Island continue. No new infestations were found in 2009.

Figure 1.—*Infested tree with mating Asian longhorned beetles in Worcester, MA. Photo by Mike Bohne, Forest Service.*

White Pine Blister Rust

Cronartium ribicola J.C. Fisch. ex Rabenh

White pine blister rust continues to slowly spread in 39 States across the country, causing substantial damage and mortality, primarily on eight of the nine native white pine species (fig. 1). Ecological concern remains for the high-elevation whitebark pine and bristlecone pines as the disease moves into vulnerable high-elevation sites (fig. 2). In general, the disease has remained static, but locally significant cankering and mortality are occurring. High levels of white pine blister rust were reported in Aroostook, Hancock, and Penobscot Counties in Maine in 2009. Reports from Vermont indicated scattered mortality of mature trees increasing in intensity.

This was the first year white pine blister rust was observed on the White Mountain Apache Reservation near Hawley Lake in Arizona. Most infections were 5 years in age, but the oldest infections were around 18 years. Surveys showed the rust is present in a 40-mile radius in eastern Arizona, where infected trees are mostly located in cool, moist drainage bottoms.

Figure 1.—*White pine blister rust top kill. Photo by Joseph O'Brien, Forest Service.*

Figure 2.—*Stem swelling from white pine blister rust. Photo by Forest Service.*

Oak Wilt

Ceratocystis fagacearum Bretz

Oak wilt is present throughout much of the Central and parts of the Eastern United States (fig. 1). The disease, which is prevalent in both rural and urban environments, causes the greatest economic damage in urban areas, where oaks are considered high-value shade trees. Central Texas continues to experience significant cases of oak wilt, with 65 counties affected compared with only 7 counties in west Texas. A cooperative suppression project continues in its 22nd year.

South Carolina reported a new infestation in Darlington County with an isolation from water oak. Oak wilt was detected in New York for the first time in 2008 in Schenectady County. In April 2009, 73 infested and suspected trees were destroyed as a control measure. The area was monitored, and no new infested trees were found. In addition, no new infested areas were found elsewhere in New York. In Maryland, oak wilt has been detected in isolated areas in Allegany, Garrett, and Washington Counties.

Figure 1.—*Oak wilt in a young group of pin oaks. Photo by Joseph O'Brien, Forest Service.*

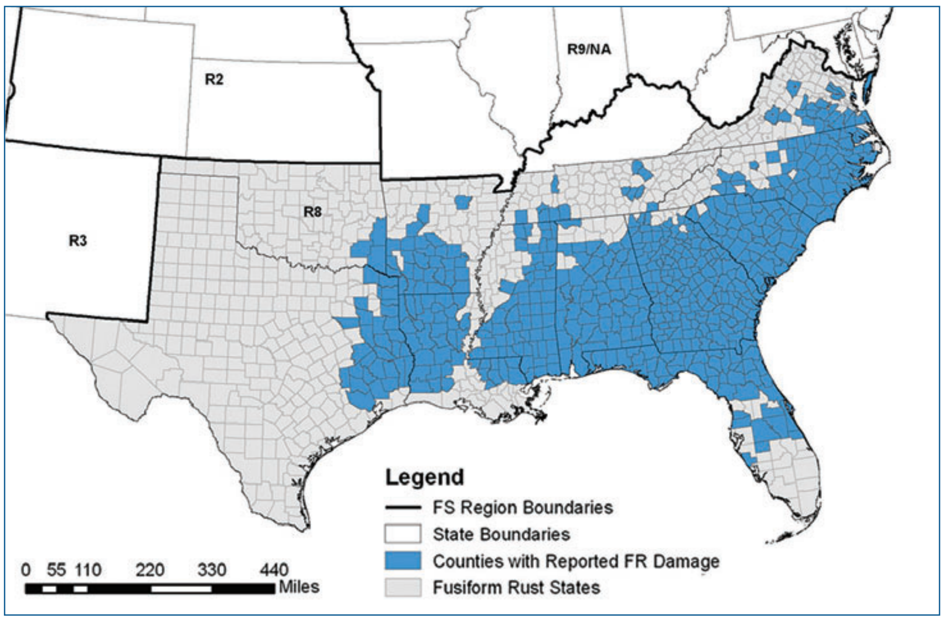
Fusiform Rust

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

Fusiform rust (fig. 1) is sometimes a significant disease problem in loblolly and slash pine plantings throughout the South (fig. 2), primarily in stands less than 5 to 7 years old. Rust infection varies in severity from year to year depending on weather patterns and local site conditions and also on the susceptibility of host genetic sources. Several instances of high rust infection have been documented recently in Florida in longleaf pine plantings, challenging the long-held notion that longleaf pine is resistant to fusiform rust.

Figure 1.—*Fusiform rust stem gall. Photo by Forest Service.*

Figure 2.—*Counties in Southern States, where more than 10-percent rust infection was reported in 2009.*



Dogwood Anthracnose

Discula destructiva Redlin

Dogwood anthracnose is still present in much of the dogwood range, especially in cool, mountainous environments, although damage appears to have stabilized overall (fig. 1). Mortality continues at higher rates in the Piedmont and Coastal Plains of the South.

Figure 1.—*Dogwood anthracnose decline. Photo by Robert L. Anderson, Forest Service.*

Beech Bark Disease

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

Beech bark disease, which extends from Maine to West Virginia and west to Ohio, with discrete outlier areas in Michigan, North Carolina, and Tennessee, continues to infect trees (fig. 1). In most States, the disease remains static, but significant decline and mortality are occurring in localized areas. Vermont reported significant beech decline and mortality from beech bark disease with more than 11,000 acres of mortality. Beech bark disease continues to spread slowly into the southern Appalachian Mountains in eastern Tennessee, western North Carolina, and extreme west-central Virginia. New disease occurrences were detected in four North Carolina counties: Clay, Cherokee, Graham, and Macon. Monroe County in Tennessee reported a new infestation of beech bark disease in 2009. In Maryland, isolated, but increasing, incidences occurred in Garrett County. Moderate infestation in Pennsylvania was observed in Potter County, and sparse outbreaks were reported in Schuylkill County. Ground surveys determined that 6,001 acres were infested in Pennsylvania. In West Virginia, beech scale affected an additional 58,377 acres in 2009.

Figure 1.—*Tree mortality in a stand affected by beech bark disease. Photo by Joseph O'Brien, Forest Service.*

Butternut Canker

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

Butternut canker is present throughout the range of butternut in North America (fig. 1). General observations indicate that the disease continues to cause mortality, but accurate estimates are difficult to obtain because of the scattered nature of butternut.

Figure 1.—*Butternut (*Juglans cinerea*) canker damage. Photo by Forest Service.*

New Pests To Watch

Thousand Cankers Disease

Geosmithia morbida • Pityophthorus juglandis: Blackman

During the last decade, die back and mortality have reportedly become more prevalent on eastern black walnut (*Juglans nigra*) in several Western States. Diseased trees typically show thin, yellowing crowns that rapidly wilt and turn brown, which leads to branch or main stem mortality (fig. 1). Most of this dieback is thought to have occurred in response to drought or other abiotic stress; however, the combination of a tiny beetle and the transmission of a newly identified fungus are now known to cause multiple cankers beneath the bark of infected branches. As the cankers coalesce, death by a thousand infection centers occurs, prompting researchers to coin the common disease name—*thousand cankers disease*.

Figure 1.—*Thinning crown on black walnut caused by thousand cankers disease. Photo by Bruce Moltzan, Forest Service.*

The principal agents involved in this disease are a newly identified fungus (*Geosmithia morbida)* and the walnut twig beetle (*Pityophthorus juglandis*) (fig. 2). Both the fungus and the beetle only occur on walnut species. An infested tree usually dies within 3 years of initial symptoms. Thousand cankers disease has been reported in eight Western States, including Arizona, California, Colorado, Idaho, New Mexico, Oregon, Utah, and Washington (fig. 3). To date, the fungus and the beetle have not been found east of the Great Plains. The possibility that this disease could establish in eastern forests, however, will depend on several factors, such as the widespread distribution of eastern black walnut, the susceptibility of this tree species to the disease, and the capacity of the fungus and beetle to invade new areas and survive under a wide range of climatic conditions. Fungi in the genus *Geosmithia* have not been considered to be important plant pathogens; however *G. morbida* appears to be more virulent than related species. The fungus causes

Figure 2.—*Walnut twig beetle,* Pityophthoris juglandis*. Photo by Jim LaBonte, Oregon Department of Agriculture.*

distinctive circular-to-oblong cankers in the phloem under the bark, which eventually kill the cambium (fig. 4). Culturing on agar media is required to confirm the disease's identity (fig. 5).

Efforts are under way to further characterize the distribution of thousand cankers disease in 2010. Methods to detect and trap the beetle and protocols to isolate the fungus are under way. For now, visually inspecting walnut trees for dieback is currently the best survey tool for the Eastern United States. High-priority areas in the East, such as veneer mills and points where walnut may have been transported, are being targeted for surveys.

Figure 3.—*Current distribution and initial detection(s) of thousand cankers disease. Dark blue area shows distribution of eastern black walnut and light blue areas show where Arizona walnut is known to occur. The years (green) indicate when symptoms were first noted in a State. Map by Andrew Graves, University of California, Davis.*

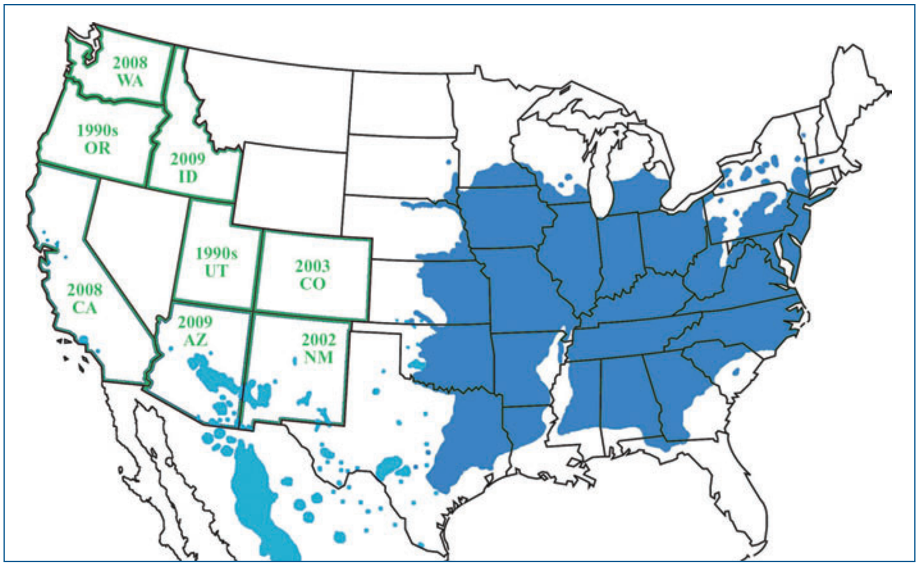


Figure 4.—*Multiple coalescing main-stem cankers introduced by the walnut twig beetle caused by the fungus* Geosmithia morbida. *Photo by Bruce Moltzan, Forest Service.*

Figure 5.—Geosmithia morbida *cultures isolated from black walnut. Photo by Bruce Moltzan, Forest Service.*