United States
Department
of Agriculture

Forest Service

Forest Health Protection

August 2005

Forest Insect and Disease Conditions in the United States 2004

Healthy Forests Make A World of Difference

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PREFACE

This is the 54th annual report prepared by the U.S. Department of Agriculture Forest Service (USDA Forest Service) of the insect and disease conditions of the Nation's forests. This report responds to direction in the Cooperative Forestry Assistance Act of 1978, as amended, to conduct surveys and report annually on insect and disease conditions of major national significance. Insect and disease conditions of local importance are reported in regional and State reports.

The report describes the extent and nature of insect- and disease-caused damage of national significance in 2004. The first section of this report highlights emerging insect and disease issues. Regional and temporal trends in selected insect and disease conditions are highlighted in the second section of the report. Distribution maps are provided for some pests. Graphs depict acreage trends over the last several years for some pests. Tables show acreages affected for selected pests by State by year for the last 5 years.

The third section of the report brings together insect, disease, and abiotic agent damage reports from each affected region under the organism's or agent's name. The organisms and agents are arranged alphabetically in the appropriate section—

- insects—native;
- insects—nonnative;
- diseases—native;
- diseases—nonnative;
- diseases—origin unknown;
- declines and complexes;
- seed orchard insects and diseases;
- nursery insects and diseases; and
- abiotic damage.

These categories are listed in the table of contents; there is no index.

The information in this report is provided by the Forest Health Protection Program of the USDA Forest Service. This program serves all Federal lands, including the National Forest System and the lands administered by the Departments of Defense and the Interior. Service is also provided to tribal lands. The program provides assistance to private landowners through the State foresters. A key part of the program is detecting and reporting insect and disease epidemics and the effects of wind, air pollution, floods, droughts, and other agents. Detection surveys are conducted on a regular basis by State and USDA Forest Service program specialists.

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

The USDA Forest Service also prepared "America's Forests: 2003 Health Update," which highlights major forest health concerns. The report deals with exotic (nonnative) pests, the rural-urban-wildland interface, and the effects of weather and air pollution on forests.

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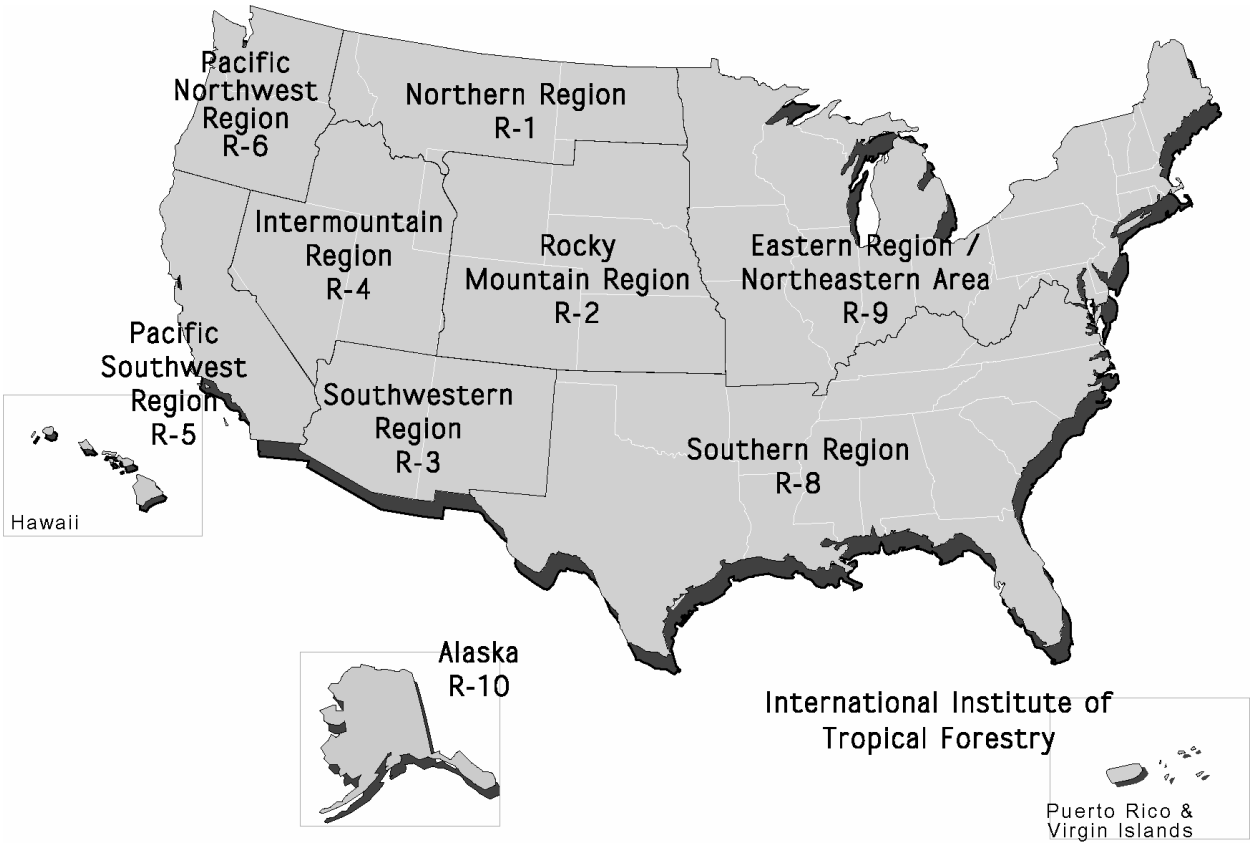
USDA Forest Service Regions and Area



Copies of this report are available from:
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This report is also available on the Internet at:
www.fs.fed.us/foresthealth/current_conditions.shtml

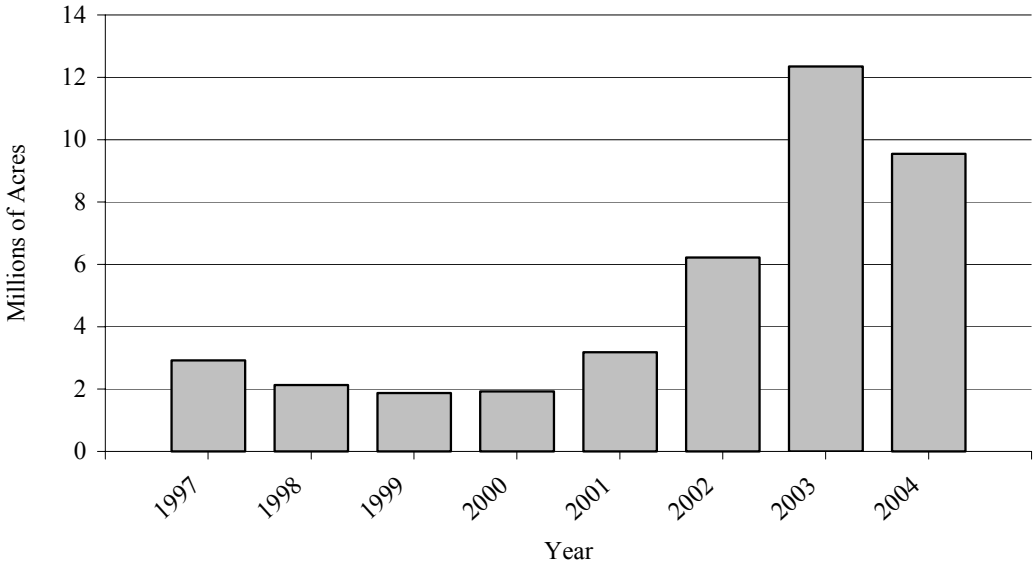
CONTENTS

EXECUTIVE SUMMARY

Introduction

There are approximately 750 million acres of forested land in the United States, about one-third of the total land area (including Alaska and Hawaii). Nationwide, these forests provide numerous economic, social, and environmental benefits to residents of the United States and visitors from abroad.

Native and nonnative (exotic) insects and diseases, as well as abiotic influences, cause significant damages that affect the health and productivity of our forests. The chart below shows how insect- and disease-caused tree mortality has changed over the past 8 years. The recent dramatic rise in mortality is attributed to bark beetle infestations in the West, particularly ips beetles in piñon pine forests.



Highlighted below are some of the major insect pests and diseases of concern in the United States. These pests either are causing serious damage or have the potential to do so.

Insects: Native

Southern pine beetle – The current southern pine beetle outbreak continued to decline after peaking at almost 13.5 million acres in 2001. About 2.7 million acres were affected in 2004, only slightly higher than the 2.4 million acres reported in 2003. Outbreak counties were reported in Alabama and South Carolina.

Mountain pine beetle – Mountain pine beetle outbreaks increased in every State in the West except Oregon. Affected acreage rose from about 2.2 million acres in 2003 to over 3.0 million acres in 2004.

Spruce budworm – Spruce budworm defoliation more than doubled in Michigan, Minnesota, and Wisconsin, from 50,700 acres in 2003 to 135,000 acres in 2004. This remains a historically low level of budworm activity.

Western spruce budworm – Overall, defoliation by western spruce budworm increased somewhat from about about 631,000 acres in 2003 to 734,600. However, New Mexico, Montana, and Washington experienced significant increases.

Spruce beetle – Outbreaks were present in Arizona, Colorado, Montana, Utah, and Wyoming. In Alaska, spruce beetle activity remained at endemic levels.

Insects: Nonnative

Asian longhorned beetle – In Chicago, no new infestations were found in 2004. About 100 infested trees were discovered in Jersey City, which were found to result from a separate introduction. In New York, several new infested locations were discovered, but all these were within the quarantine area.

Gypsy moth (European) – Overall, reported gypsy moth defoliation decreased from about 251,000 acres in 2003 to 179,000 acres in 2004. However, Massachusetts, New York, and Pennsylvania reported significant increases in defoliation.

Common European pine shoot beetle – The beetle continued to spread from its original introduction site in Ohio. Twelve States are currently infested.

Hemlock woolly adelgid – This insect continued its rapid spread in 2004. Rearing and release of biological control agents continues as rapidly as possible to reduce its damage.

Diseases: Native

Fusiform rust – Rust continues to be the most significant disease of loblolly and slash pine in the South. The Resistance Screening Center in Asheville, NC, tests seed lots for fusiform rust resistance against rust collected in the planting vicinity. Rust resistant families have been developed that produce fewer galls, both in screening trials and field plantations.

Dwarf mistletoes – These are native plants that parasitize western conifers and larch. They have increased due to fire suppression, and the witches' brooms they cause provide fuel ladders that increase fire severity. Drought exacerbates the impact of mistletoe on tree growth and survival. An estimated 28.8 million acres have some level of infestation.

Root diseases – Stress from root disease is frequently an underlying cause of mortality attributed to drought, bark beetles, and defoliators. Different pathogens can cause root disease, depending on regional conditions and host types present.

Diseases: Nonnative

Beech bark disease – Introduced in North America about 1890, this disease continues to spread, killing beech trees from Maine to Michigan, and as far south as North Carolina and Tennessee. The disease is caused by an interaction of fungal pathogens and scale insects with sucking mouthparts that pierce the tree bark. The disease is killing trees and spreading faster than predicted, with nine counties in North Carolina and Tennessee affected, and eight counties in Michigan.

White pine blister rust – Introduced about the turn of the 20th century, it now occurs throughout most of the ranges of white pines, and has caused extensive tree mortality. It affects commercially important white pine, as well as ecologically sensitive, high-elevation species. The disease was found this year for the first time on bristlecone pine.

Diseases: Origin Unknown

Butternut canker – The fungus that causes this disease was identified in the late 1970s and can be found throughout most of the natural range of butternut. The pathogen kills large trees, saplings, and regeneration, causing multiple cankers under the bark that merge and kill the tree. This disease is a serious threat to the survival of the species.

Sudden Oak Death – Caused by *Phytophthora ramorum*, this recently recognized disease is killing oaks and other plant species in California and a small portion of southwestern Oregon. First reported in 1995, the disease has been confirmed in 13 coastal counties north and south of San Francisco and in one county in southwestern Oregon. The outbreak in Oregon is under an eradication program. Dissemination via nursery stock is a major concern.

Part 1: Emerging Issues

Part 1 contains information on current emerging insect and disease issues.

Part 2: National Highlights

Part 2 contains more information on selected insects and diseases, including some maps, tables, and graphs.

Part 3: Conditions by Damage Agent by Region

Part 3 provides more detailed information about the insects and diseases discussed here, as well as others. The report also describes abiotic factors, such as wind and drought, that damage forests. Abiotic factors often predispose the trees to insect and disease buildups.

Part 1: Emerging Insect and Disease Issues

Emerald Ash Borer

The emerald ash borer (EAB) (*Agrilus planipennis* Fairmaire) is a nonnative insect originally from Japan, Korea, Taiwan, northeast China, and adjacent parts of Russia. It was unknown on the North American continent until its discovery in the Detroit, Michigan, area in July of 2002. Subsequent surveys showed that a large area of infestation was present covering at least six counties surrounding Detroit. This 'core' area was put under quarantine in the fall of 2002. Infestations were also discovered across the border in Windsor, Ontario, Canada. Following further surveys in 2003, the quarantine was expanded to 13 counties and by fall 2004 the quarantine included 20 Michigan counties and Lucas County in northwest Ohio. A number of scattered isolated infestations outside of the quarantine area occur in the lower peninsula of Michigan and northeastern Indiana. It appears that these sites have been present for several years and probably represent introductions via infested ash firewood, logs, or nursery material.

The EAB infests walnuts and elms in its native habitat. In North America, EAB is found (so far) only on ash (*Fraxinus* spp.), an abundant tree species in urban areas, rural woodlots, and riparian areas.

To contain further spread of EAB in Canada, government officials cut and destroyed all of the ash trees in a zone 30km x 10km extending from Lake St. Clair to Lake Erie. This "ash free" zone in concert with an aggressive regulatory program to prevent the artificial movement of infested ash material out of the infested area is intended to contain the existing infestation so that effective eradication activities can be implemented.

In Michigan and Ohio EAB infestations are too extensive and numerous to contain with the kind of "ash free" zone implemented by the Canadians. Instead management efforts have shifted to containment of EAB in the lower peninsula of Michigan and neighboring Lucas County in northwest Ohio by focusing survey, eradication, and ash reduction efforts in key "Gateway Areas." These gateways include northern Michigan south of the Mackinac straits, St. Clair County just across the river from Canada, and along the borders with Ohio and Indiana.

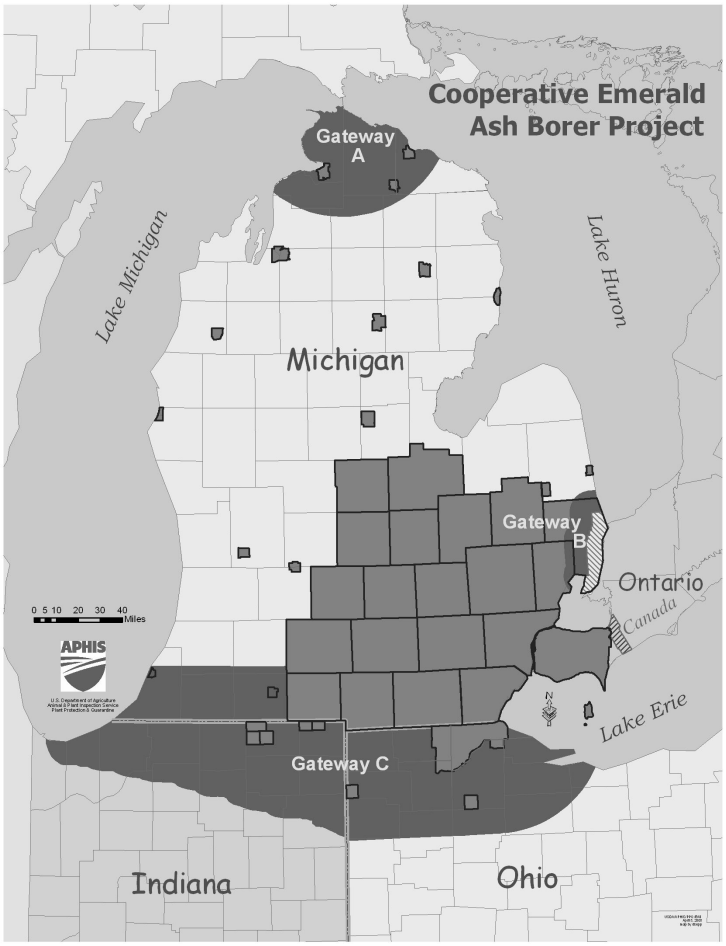
Initially little was known about EAB biology and habits. Studies and evaluations have been underway since 2002 to investigate host range, biology, trap designs and possible attractants, and control options. Our understanding of EAB is improving but still limited. Control options are also limited; wood boring insects are notoriously difficult to kill with insecticides once they bore under the bark or into the wood of trees.

The USDA Forest Service is an integral partner, along with the Animal and Plant Health Inspection Service (APHIS) and State authorities, in the EAB containment and eradication effort, providing scientific and technical expertise, including survey, restoration, and public outreach and communications assistance. In 2004, the USDA Forest Service implemented EAB surveys on Federal and State forest lands in Michigan and on public and private forest lands in nearly 20 Eastern States. Special emphasis was placed on areas of known ash decline, around nurseries, and in areas where firewood introductions were likely. EAB detection surveys will continue and be expanded to other States in 2005. The USDA Forest Service also supports and conducts critical technology development activities with university and research cooperators to advance our understanding of EAB biology and dispersal habits, chemical control tactics, management strategies, survey techniques, and monitoring among others.

Ash trees throughout southern Michigan had exhibited decline and dieback symptoms for years. "Ash yellows," a condition caused by a mycoplasmalike organism (MLO) was prevalent in the area and was one of the presumed causes. Ash yellows and another malady referred to as ash decline were so prevalent that dying ash trees did not draw close scrutiny. EAB has killed millions of ash trees so far and has the potential to decimate the more than 800 million ash trees in Michigan forests. Ash species are common across the Great Lakes region and the Northeastern United States. Ash is also a common roadside, shade, and yard tree. No ash species appear to be resistant to EAB infestation and mortality. EAB appears capable of infesting and killing much of the ash across North America.

Scientists estimate that EAB has been in the United States for perhaps 5-10 years prior to its detection in 2002. EAB was previously unknown outside of Asia and was not on any exotic pest "watch list."

Key “Gateway Areas” for Survey and Treatment of Emerald Ash Borer



Piñon Pine Mortality

Piñon pine mortality reached unprecedented levels in 2003 with more than 3.7 million acres of mortality recorded. Observations in previous years indicated that piñon pines were dying at increasing rates in areas of Arizona, California, Colorado, Nevada, New Mexico, and Utah. Late in the summer of 2002 it became evident that a major bark beetle epidemic was in progress. The extensive, prolonged, and severe drought conditions highly stressed piñon trees and allowed populations of piñon ips bark beetle to reach epidemic levels.

In 2003, special surveys were conducted to document this drastic event. Results of these surveys are summarized below.

Acres (in thousands) of Aerially Detected Piñon Pine Mortality, 2001-2004

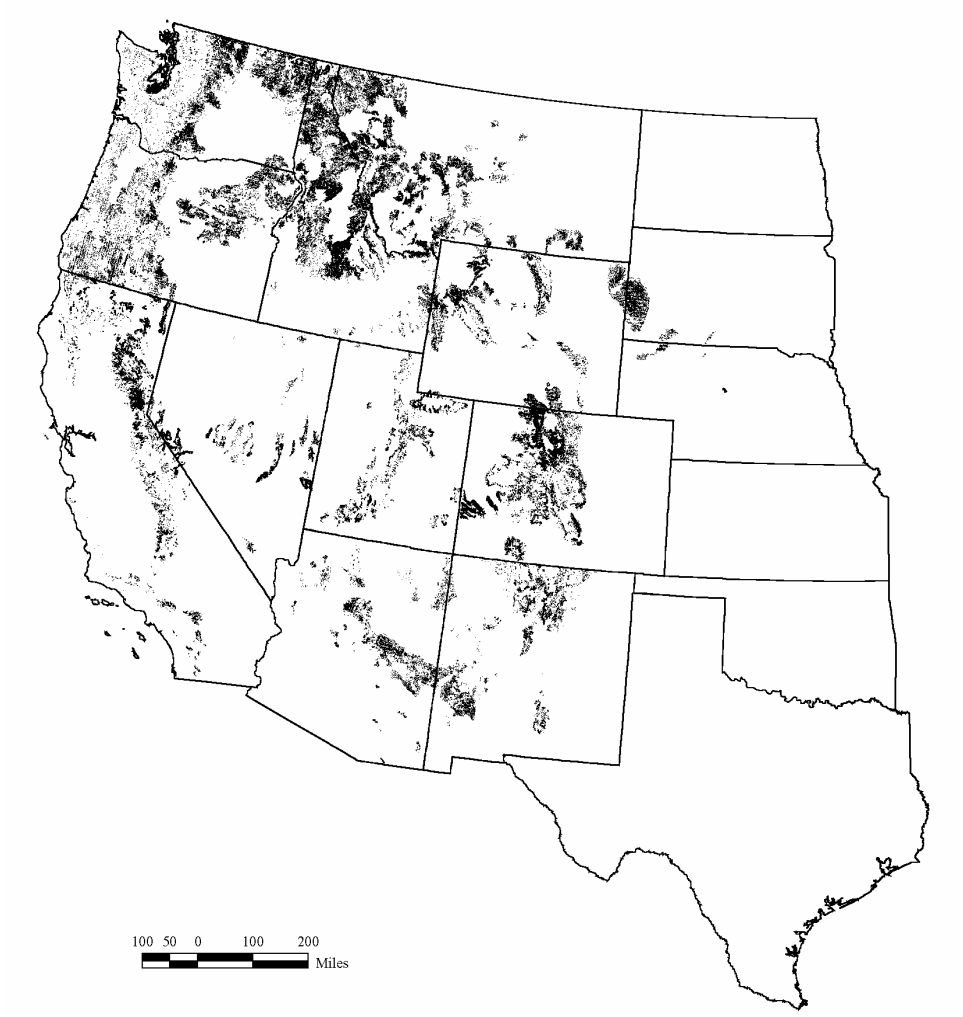
State	2001	2002	2003	2004
Arizona	6.2	60.2	1,031.1	26.3
California		1.0	522.6	116.0
Colorado		63.6	814.3	582.8
Nevada	1.8	64.4	355.7	727.0
New Mexico	11.0	71.2	808.9	122.5
Utah	4.0	6.2	207.0	166.5
Total	23.0	266.6	3,739.6	1,741.1

Aerially Detected Piñon Pine Mortality, 2004

Western Bark Beetles

Tree mortality from bark beetles increased substantially in many parts of the West in 2003, particularly in forests severely stressed by the widespread and prolonged drought and overstocking. Morality in the piñon-juniper woodlands of the Southwest declined in 2004, in part due to a return of more normal weather patterns, but still affected over 1.7 million acres. Mountain pine beetle, Douglas-fir beetle, and spruce beetle were the direct cause of much of the mortality in the West, accounting for almost 3.4 million acres. However, less commonly seen insects such as fir engravers, pine engravers, western pine beetle, Jeffery pine beetle, and western balsam bark beetle caused substantial damage on over 2.7 million acres.

Outbreak Areas of All Bark Beetles in the Western United States, 2004

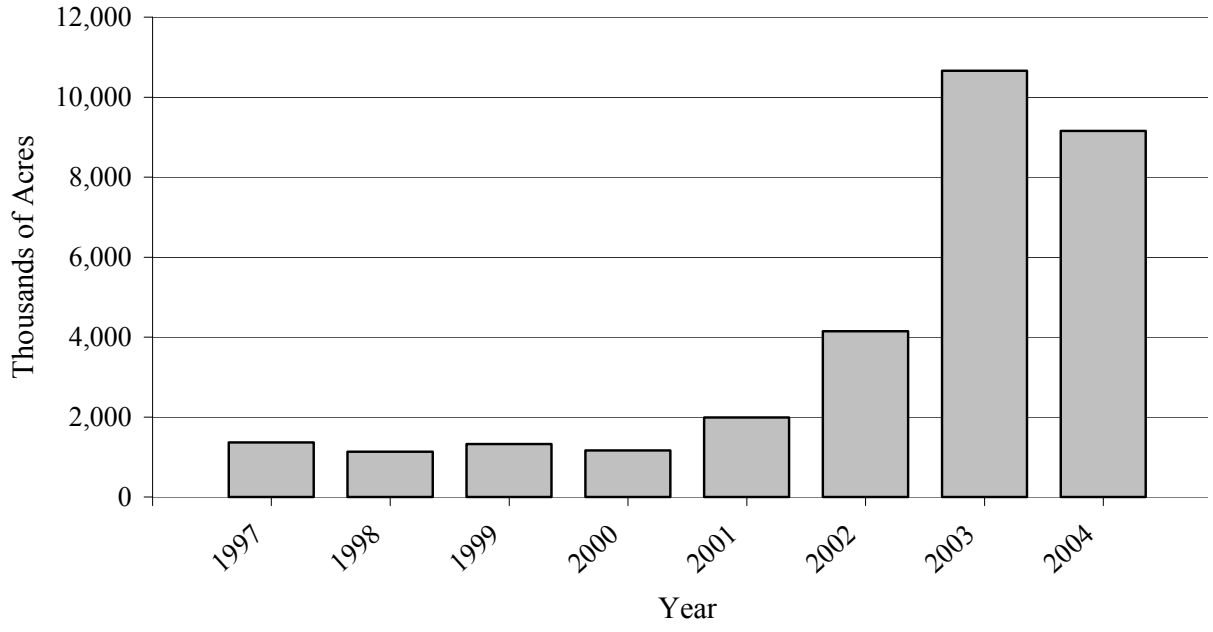


Acres (in thousands) of Aerially Detected Bark Beetle Outbreaks in the Western United States, 1997-2004

Region	1997[1)]	1998	1999	2000	2001	2002	2003	2004
1	259.2	281.1	431.7	395.0	546.4	919.6	910.6	1,278.7
2	53.3	141.2	165.6	206.1	446.8	573.3	2,301.7	1,956.6
3	90.7	40.6	20.2	58.7	154.0	716.0	2,596.8	439.6
4	170.0	118.4	112.6	95.9	206.0	279.3	918.2	2,066.2
5		47.3	29.0	32.9	77.6	846.6	2,560.2	1,717.0
6	214.2	172.4	279.6	255.6	457.3	750.5	1,255.6	1,545.7
10	573.5	334.8	288.3	120.9	104.2	58.5	115.3	157.0
Total	1,360.9	1,135.8	1,327.0	1,165.1	1,992.3	4,143.8	10,658.4	9,160.8

[1)] In 1997, Region 5 mortality data listed causal agent as "Unknown," therefore 1997 does not included data for Region 5.

Acres (in thousands) of Aerially Detected Bark Beetle Mortality in the Western United States, 1997-2004



Sudden Oak Death

Sudden Oak Death is a recently recognized disease that is killing oaks and other plant species in California and a small portion of southwestern Oregon. First reported in 1995, the disease has been confirmed in the coastal areas north and south of San Francisco, and in southwestern Oregon. The pathogen responsible for the disease, a fungus-like organism called *Phytophthora ramorum*, is also found in Europe, where it is causing nursery problems on rhododendron and viburnum, and recently was discovered attacking landscape trees in affected gardens.

On oaks, *P. ramorum* is a bark pathogen; it causes necrotic, often girdling cankers that can lead to mortality on tanoak, coast and canyon live oak, California black oak, and Shreve oak. The pathogen also causes leaf spots and/or twig dieback on California bay laurel, rhododendron, big leaf maple, Pacific madrone, huckleberry, California buckeye, manzanita, toyon, California honeysuckle, wood rose, and California coffeeberry. Under moist conditions, the pathogen sporulates profusely on tanoak, bay, rhododendron, and other species, so these "foliar" hosts serve as important reservoirs of inoculum.

The disease is widespread in coastal California and is found commonly in two forest types: in the understory of coast redwood (*Sequoia sempervirens*) forests on tanoak and in coastal evergreen forests on oaks, madrone, California bay laurel, and other species. In California, Sudden Oak Death has been confirmed in scattered locations along the Pacific coast from Monterey County north into Humboldt County. All confirmations are within 50 miles of the Pacific coast. Marin and Santa Cruz Counties are heavily infested and dead and dying trees are common in the wildland/urban interface in backyards, parks, and open space greenbelts. Special aerial and ground surveys conducted by the USDA Forest Service and Oregon Department of Forestry in July 2001 detected the pathogen on approximately 40 acres in coastal southern Oregon, just north of the California border. A cooperative program involving State and Federal agencies as well as private landowners is underway to eradicate *P. ramorum* from the known infested sites in Oregon. Since Sudden Oak Death is still a rather new forest disease, there remains much to learn about its host preferences and behavior in new environments.

More information on this disease may be found at www.na.fs.fed.us/SOD or www.suddenoakdeath.org.

Counties Where Sudden Oak Death Was Reported, 2004

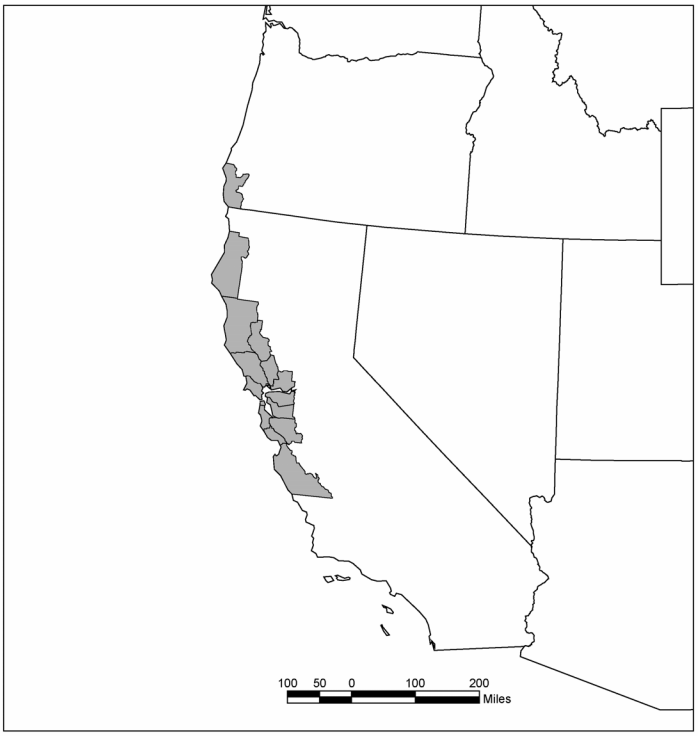


Table of Proven Hosts for *Phytophthora ramorum* in the United States, 2004

Scientific name	Common name
Acer macrophyllum	bigleaf maple
Aesculus californica	California buckeye
Arbutus menziesii	madrone
Arctostaphylos manzanita	manzanita
Calluna vulgaris	Scotch heather
Camellia spp.	camellia - all species, hybrids and cultivars
Hamamelis virginiana	witch hazel
Heteromeles arbutifolia	toyon
Lithocarpus densiflorus	tanoak
Lonicera hispidula	California honeysuckle
Maianthemum racemosa (=Smilacina racemosum)	false Solomon's seal
Photinia fraseri	red tip photinia
Pieris formosa	Himalaya pieris
Pieris formosa x japonica	pieris 'Forest Flame'
Pieris floribunda x japonica	pieris 'Brouwer's Beauty'
Pieris japonica	Japanese pieris
Pseudotsuga menziesii var. menziesii	Douglas-fir
Quercus agrifolia	coast live oak
Quercus chrysolepis	canyon live oak
Quercus kelloggii	California black oak
Quercus parvula v. shrevei	Shreve's oak
Rhamnus californica	California coffeeberry
Rhododendron spp	rhododendron (including azalea)
Rosa gymnocarpa	wood rose
Sequoia sempervirens	coast redwood
Trientalis latifolia	western starflower
Umbellularia californica	California bay laurel, pepperwood, Oregon myrtle
Vaccinium ovatum	evergreen huckleberry
Viburnum x bodnantense	bodnant Viburnum
Viburnum plicatum var. tomentosum	doublefile Viburnum
Viburnum tinus	laurustinus

Table of Plants Associated with *Phytophthora ramorum* in the United States, 2004

Scientific name	Common name, date, and source of report
Abies grandis	grand fir – June 03 (1)
Aesculus hippocastanum	horse-chestnut – Dec 03 (3)
Arbutus unedo	strawberry tree – Dec 02 (7)
Castanea sativa	sweet chestnut – Feb 04 (3)
Clintonia andrewsiana	Andrew's clintonia bead lily – May 04 (5)
Corylus cornuta	California hazelnut – Dec 02 (5)
Drimys winteri	Winter's bark – July 04 (3)
Dryopteris arguta	California wood fern – May 04 (5)
Fagus sylvatica	European beech – Dec 03 (3)
Fraxinus excelsior	European ash – Dec 04 (3)
Kalmia latifolia	mountain laurel – Fall 02 (3)
Laurus nobilis	Bay laurel – July 04 (3)
Leucothoe fontanesiana	drooping leucothoe - Oct 03 (3)
Nothofagus obliqua	Roble beech – Dec 04 (3)
Pieris formosa var. forrestii	Chinese pieris – Oct 03 (3)
Pieris formosa var. forrestii x Pieris japonica	pieris – Oct 03 (3)
Pittosporum undulatum	victorian box – Dec 02 (6)
Pyracantha koidzumii	Formosa firethorn – Apr 04 (9)
Quercus cerris	European turkey oak - Feb 04 (3)
Quercus falcata	southern red oak – Nov 03 (3)
Quercus ilex	Holm oak – Dec 03 (3)
Quercus rubra	northern red oak – Nov 03 (8)
Rhamnus purshiana	cascara – Dec 02 (4)
Rubus spectabilis	salmonberry – Dec 02 (4)
Salix caprea	Goat willow – July 04 (3)
Syringa vulgaris	lilac – 2003 (3) updated Oct 03
Taxus baccata	European yew – Aug 03 (3)
Taxus brevifolia	Pacific yew – May 03 (5)
Toxicodendron diversilobum	poison oak – Dec 02 (4)
Viburnum davidii	David viburnum - Oct 03 (3)
Viburnum farreri (=V. fragrans)	fragrant viburnum – Oct 03 (3)
Viburnum lantana	wayfaringtree viburnum – Oct 03 (3)
Viburnum opulus	European cranberrybush viburnum – Oct 03 (3)
Viburnum x burkwoodii	burkwood viburnum – Oct 03 (3)
Viburnum x carlcephalum x V. utile	viburnum – Oct 03 (3)
Viburnum x pragense	Prague viburnum – Oct 03 (3)
Viburnum x rhytidophylloides	Alleghany or Willowood Viburnum – Sept 04 (2)

[1] California Department of Food and Agriculture
[2] Oregon Department of Agriculture
[3] Department for Environment, Food, and Rural Affairs, UK
[4] Everett Hanson, Oregon State University
[5] David Rizzo, University of California – Davis
[6] Mateo Garbelotto, University of California - Berkeley
[7] Eduardo Moralejo, Instituto Mediterráneo de Estudios Avanzados, IMEDEA (CSIC-UIB) - Balearic Islands, Spain
[8] Plant Protection Service, Wageningen, Netherlands
[9] Canadian Food Inspection Agency, Canada
[10] Daniel Hüberli, University of California – Berkeley
[11] Adam Zych, Plant Protection and Seed Service – Poland

Part 2: Historical Highlights

Insect Conditions Highlights

Gypsy moth

Lymantria dispar was intentionally brought into the Boston, Massachusetts, area from France in 1869 to start a silk industry. The moth escaped and continues to spread south and west. In 2002, all or parts of 15 States and the District of Columbia were considered infested. The infested States extend from Maine to Virginia, West Virginia, Ohio, and Michigan.

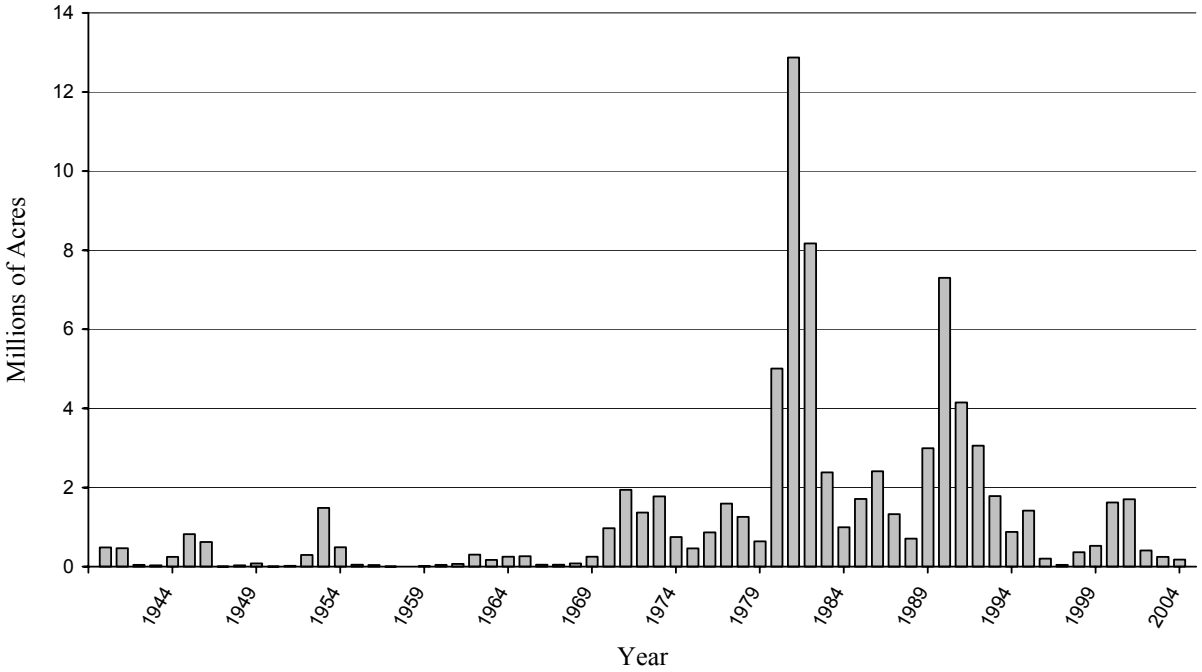
Defoliation in the East decreased from 250,900 acres in 2003 to 176,800 acres in 2004. Slow The Spread and other suppression/eradication projects appear to be successful in 12 Eastern and Southern States. Delaware, Maine, Maryland, Rhode Island, Vermont, Virginia, and West Virginia reported no defoliation. However, Massachusetts, New York, and Pennsylvania experienced significant increases in defoliation. Massachusetts and New Hampshire reported 34,800 acres and 5,000 acres of defoliation in 2004 after having no defoliation in 2003. The outbreak in Wisconsin declined significantly from 99,000 acres in 2003 to 500 acres in 2004, while in Michigan defoliation declined only slightly, from 46,800 acres in 2003 to 45,200 acres in 2004.

Eastern Counties Where Gypsy Moth (European) Defoliation Was Reported, 2004

Acres of Aerially Detected Gypsy Moth (European) Defoliation, 2000-2004

State	2000	2001	2002	2003	2004
Connecticut	200	400	0	0	600
Delaware	0	0	0	0	0
Maine	2,500	29,500	51,500	0	0
Maryland	23,200	46,200	14,000	100	0
Massachusetts	64,100	48,000	4,700	0	34,800
Michigan	106,300	0	0	46,800	45,200
New Hampshire	100	8,500	11,800	0	5,000
New Jersey	133,300	140,800	41,900	5,100	8,000
New York	27,500	50,900	7,100	200	60,000
Ohio	23,600	42,500	2,500	4,100	5,900
Pennsylvania	843,000	283,700	55,800	1,800	16,800
Rhode Island	5,500	8,000	0	0	0
Vermont	0	100	0	0	0
Virginia	71,000	440,000	51,900	79,900	0
Washington, DC	0	0	0	0	0
West Virginia	323,100	603,800	132,100	13,900	0
Wisconsin	100	3,700	37,400	99,000	500
Total	1,623,500	1,706,100	410,700	250,900	176,800

Gypsy Moth (European) Defoliation, 1940-2004



Southern pine beetle

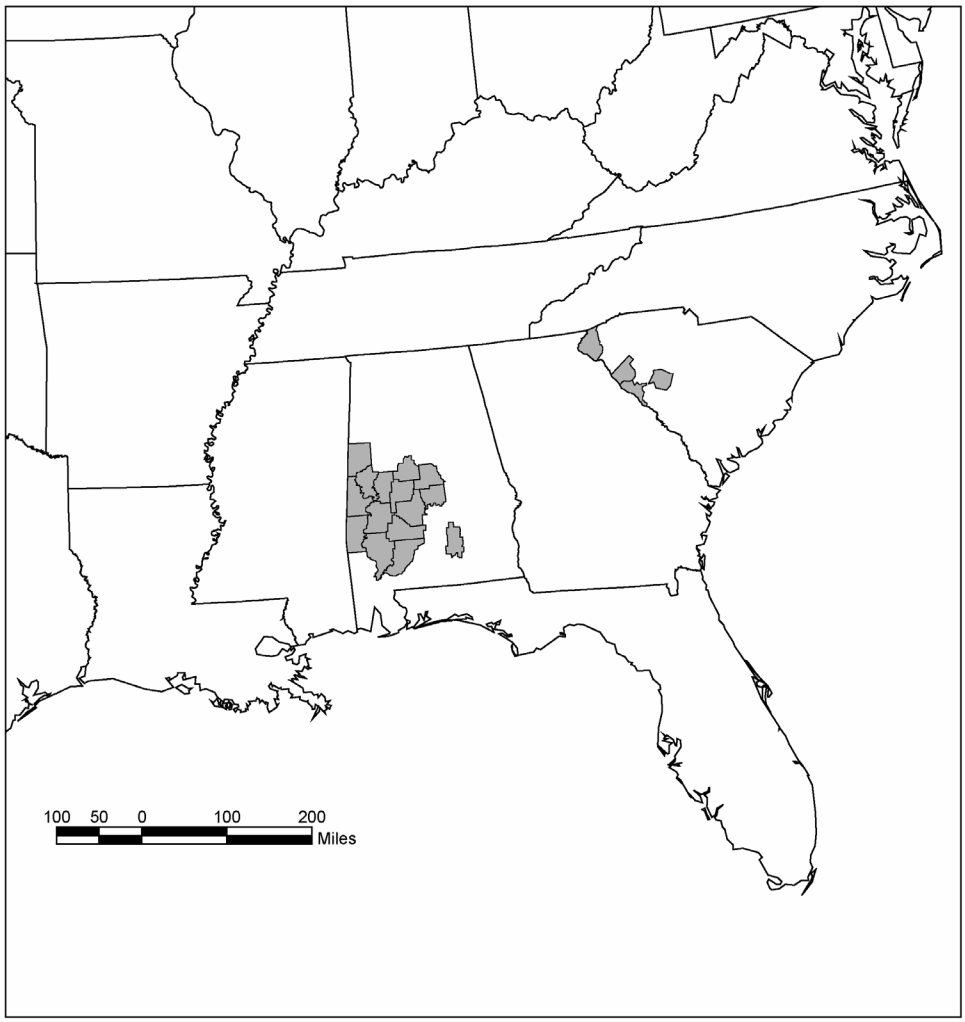
Dendroctonus frontalis, a native insect, is the most destructive of the eastern species of bark beetles. Southern pine beetle populations are epidemic in some parts of the South almost every year. Infestations usually start in trees weakened by disease, lightning strikes, excessive age, storm damage, or other stress factors. Populations can build quickly as there are three to seven generations per year. Shortleaf, loblolly, Virginia, and pitch pines are preferred hosts.

Southern pine beetle activity continued to decline over much of the South in 2004 with the affected acreage increasing only slightly from 2,403,000 in 2003 to 2,683,500 acres in 2004. Beetle activity continued in western South Carolina and Alabama. South Carolina reported five counties still in outbreak status, a decline of 42 percent from 2003. Alabama reported 15 counties in outbreak status in 2004 after reporting no counties in the category in 2003.

Maryland and Ohio reported no beetle activity in 2004. New Jersey reported continued but declining activity in three counties.

*Outbreak level is defined as having one or more multitree infestations per 1,000 acres of host type.

Counties Where Southern Pine Beetle Outbreaks Were Reported, 2004

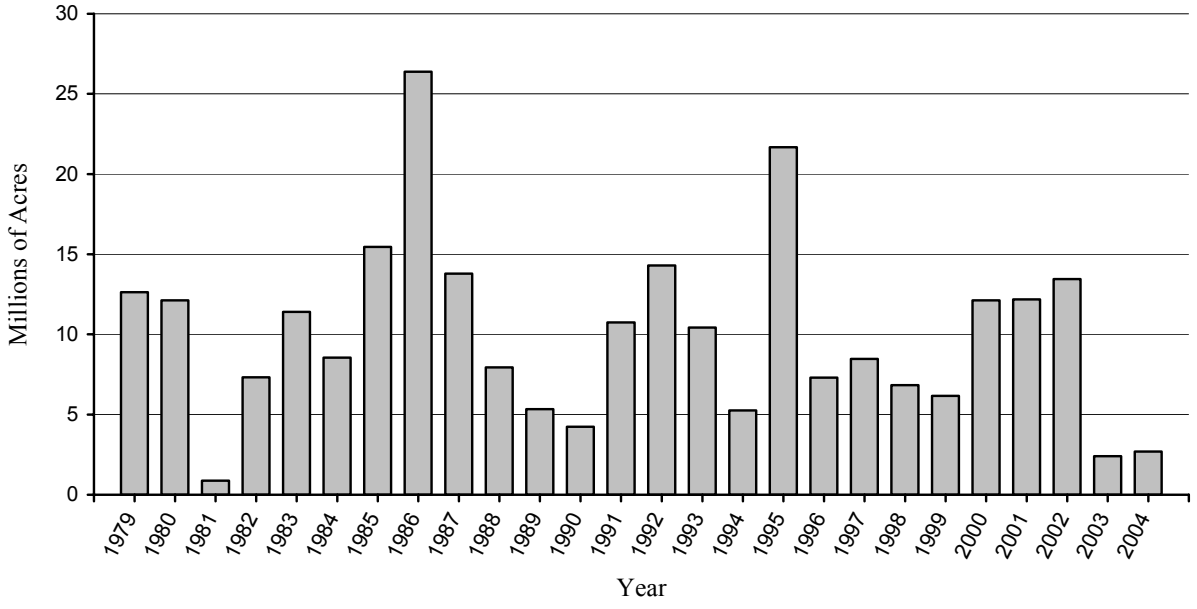


Acres (in thousands) of Southern Pine Beetle Outbreaks, 2000-2004*

State	2000	2001	2002	2003	2004
Alabama	6,936.1	4,876.0	5,077.0	0.0	2,182.9
Arizona	11.6	0.0	0.0	0.0	0.0
Arkansas	0.0	0.0	0.0	0.0	0.0
Florida	321.3	916.0	916.0	0.0	0.0
Georgia	1,067.0	1,407.0	2,424.0	85.8	0.0
Kentucky	220.6	767.0	0.0	0.0	0.0
Louisiana	0.0	0.0	0.0	0.0	0.0
Mississippi	210.6	0.0	265.0	0.0	0.0
New Jersey	0.0	0.0	1.9	2.5	0.0
North Carolina	437.9	797.0	935.0	9.2	0.0
Oklahoma	0.0	0.0	0.0	0.0	0.0
South Carolina	1,218.3	1,727.0	2,574.0	1,789.0	500.6
Tennessee	1,441.0	1,425.0	1,197.0	516.9	0.0
Texas	0.0	0.0	0.0	0.0	0.0
Virginia	268.0	276.0	66.0	0.0	0.0
Total	12,132.4	12,191.0	13,455.9	2,403.4	2,683.5

* Acres of outbreak are acres of host type having one or more multitree spots per 1,000 acres.

Southern Pine Beetle Outbreaks, 1979-2004

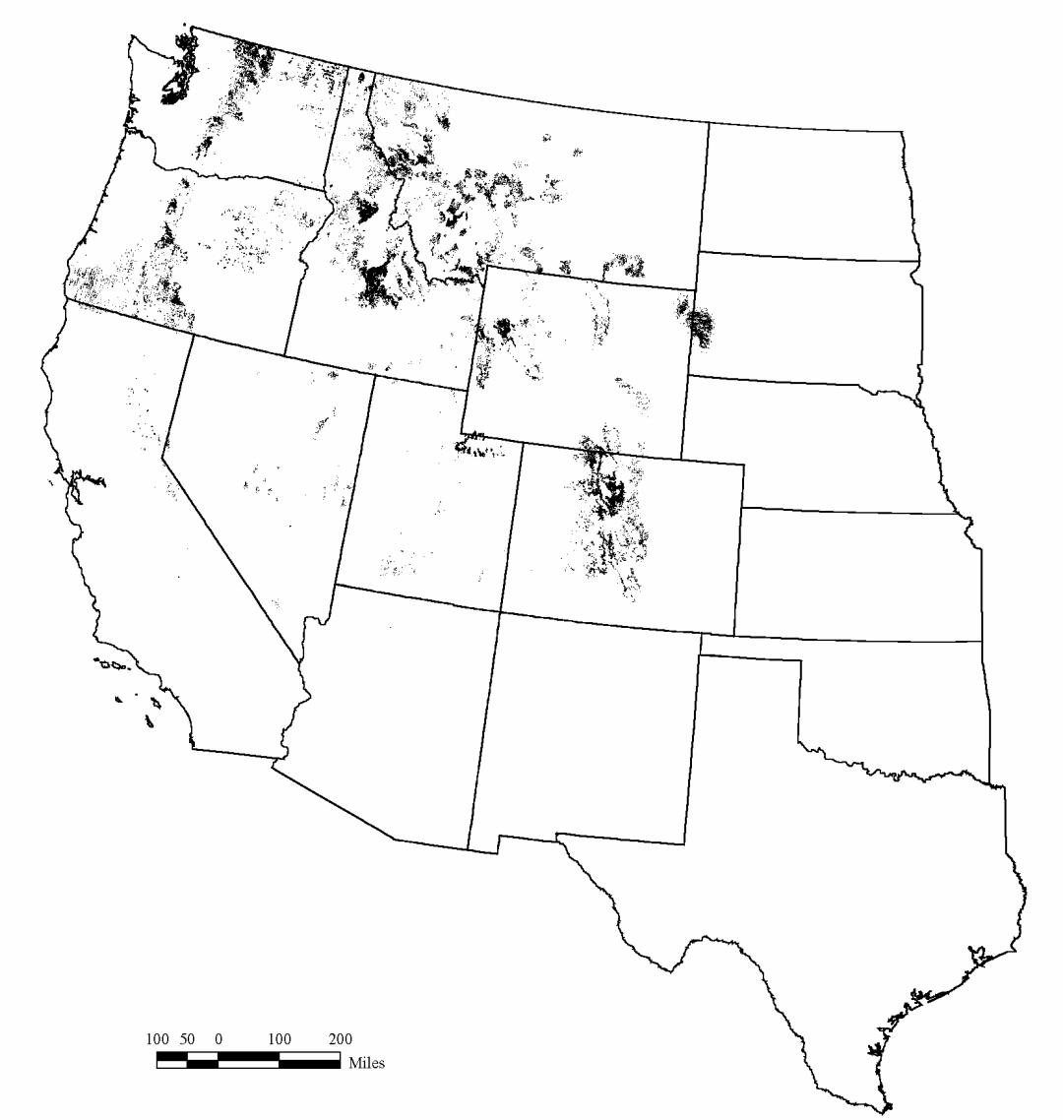


Mountain pine beetle

Dendroctonus ponderosae is a native bark beetle that attacks lodgepole, ponderosa, sugar, western white, whitebark, and limber pines. The beetle ranges throughout western pine forests from Canada into Mexico. Beetles infest mature, dense stands of pines.

Mountain pine beetle populations increased in every State throughout the West with the exception of California and South Dakota. Westwide, affected acreage increased from 2,219,100 acres in 2003 to 3,012,200 acres in 2004. Several areas with large mountain pine beetle outbreaks and epidemics are California, Colorado, Idaho, Montana, Oregon, Washington, and Wyoming.

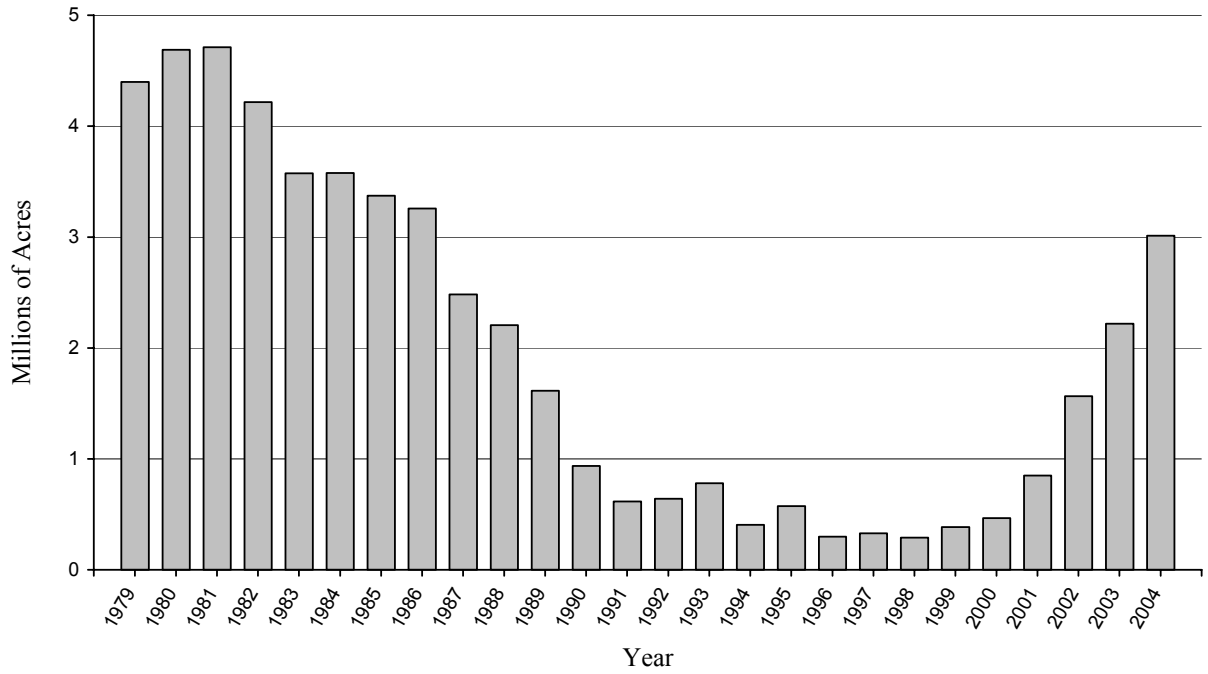
Mountain Pine Beetle Outbreak Areas, 2004



Acres (in thousands) of Mountain Pine Beetle Outbreak, 2000-2004

State	2000	2001	2002	2003	2004
Arizona	0.0	0.0	0.0	0.0	0.0
California	30.4	29.6	186.8	614.8	438.4
Colorado	139.5	151.2	209.6	227.1	438.4
Idaho	122.3	170.0	339.3	341.9	553.1
Montana	40.6	111.7	249.5	291.2	453.2
Nevada	0.8	1.2	2.6	2.4	4.0
New Mexico	0.0	0.0	3.8	0.0	0.0
Oregon	43.6	76.3	182.3	186.0	244.5
South Dakota	13.9	102.2	102.9	189.6	57.6
Utah	2.2	17.3	26.7	53.4	143.9
Washington	63.1	134.8	173.1	223.8	289.9
Wyoming	9.5	55.0	88.0	88.9	389.2
Total	465.9	849.3	1,564.6	2,219.1	3,012.2

Mountain Pine Beetle Outbreaks, 1979-2004



Spruce budworm

Choristoneura fumiferana is a native insect found in northern New England, New York, Pennsylvania, the Great Lakes Region, and Alaska. Balsam fir is the preferred host, but the insect also feeds on white, red, and black spruce. Topkill and tree mortality may result from budworm feeding. Outbreaks generally begin in extensive and continuous areas of mature and overmature balsam fir.

Populations of spruce budworm in 2004 were low in the Eastern States. However, defoliation was noticeable and increasing in portions of Minnesota, Michigan, and on national forest land in Wisconsin. Damage by this insect increased in Minnesota from 34,900 acres in 2003 to 83,000 acres in 2004, in Michigan, from 11,800 acres in 2003 to 26,000 in 2004, and in Wisconsin, from 4,000 acres in 2003 to 26,000 acres in 2004.

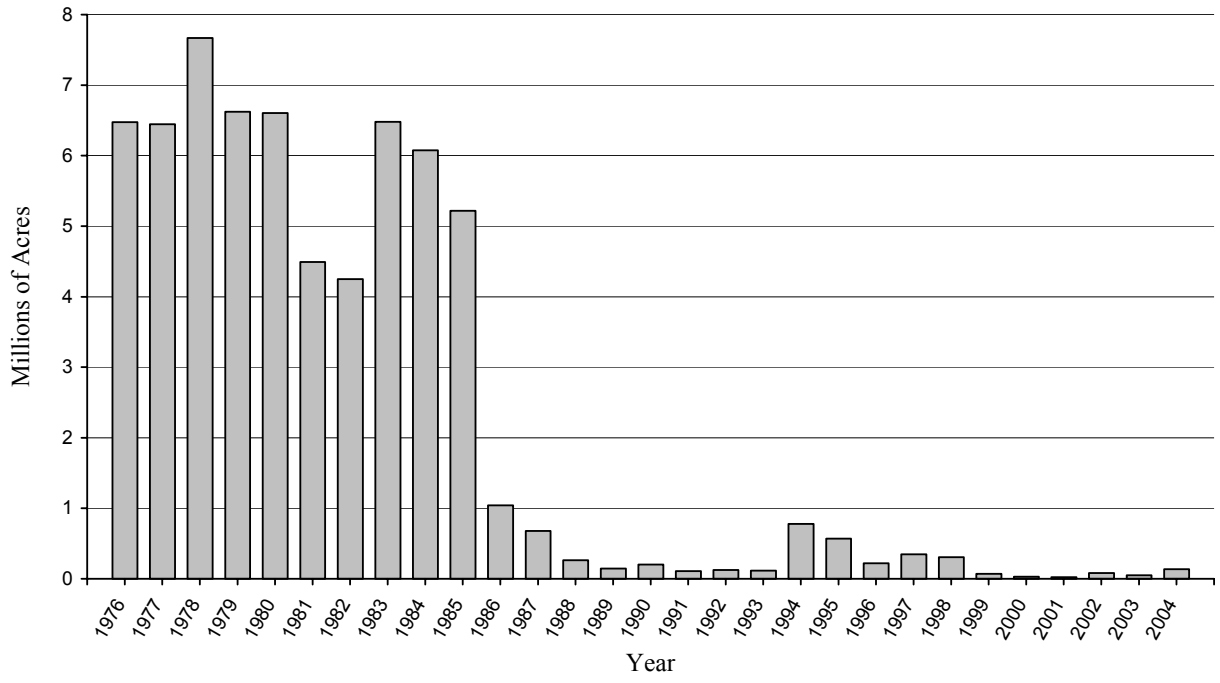
No noticable defoliation was found in Alaska for the fifth straight year.

Eastern Counties Where Spruce Budworm Defoliation Was Reported, 2004

Acres (in thousands) of Aerially Detected Spruce Budworm Defoliation in the Eastern United States, 2000-2004

State	2000	2001	2002	2003	2004
Maine	0.0	0.0	0.0	0.0	0.0
Michigan	0.0	3.3	0.5	11.8	26.0
Minnesota	28.5	18.9	80.3	34.9	83.0
New Hampshire	0.0	0.0	0.0	0.0	0.0
New York	0.0	0.0	0.0	0.0	0.0
Pennsylvania	0.0	0.0	0.0	0.0	0.0
Vermont	0.0	0.0	0.0	0.0	0.0
Wisconsin	0.0	0.8	0.4	4.0	26.0
Total	28.5	23.0	81.2	50.7	135.0

Spruce Budworm Defoliation in the Eastern United States, 1976-2004



Western spruce budworm

Choristoneura occidentalis is a native insect occurring in the Rocky Mountains from Arizona and New Mexico north to Idaho and Montana and also in Washington and Oregon. The insect causes topkill, growth loss, and some tree mortality. The budworm feeds primarily on Douglas-fir and true firs.

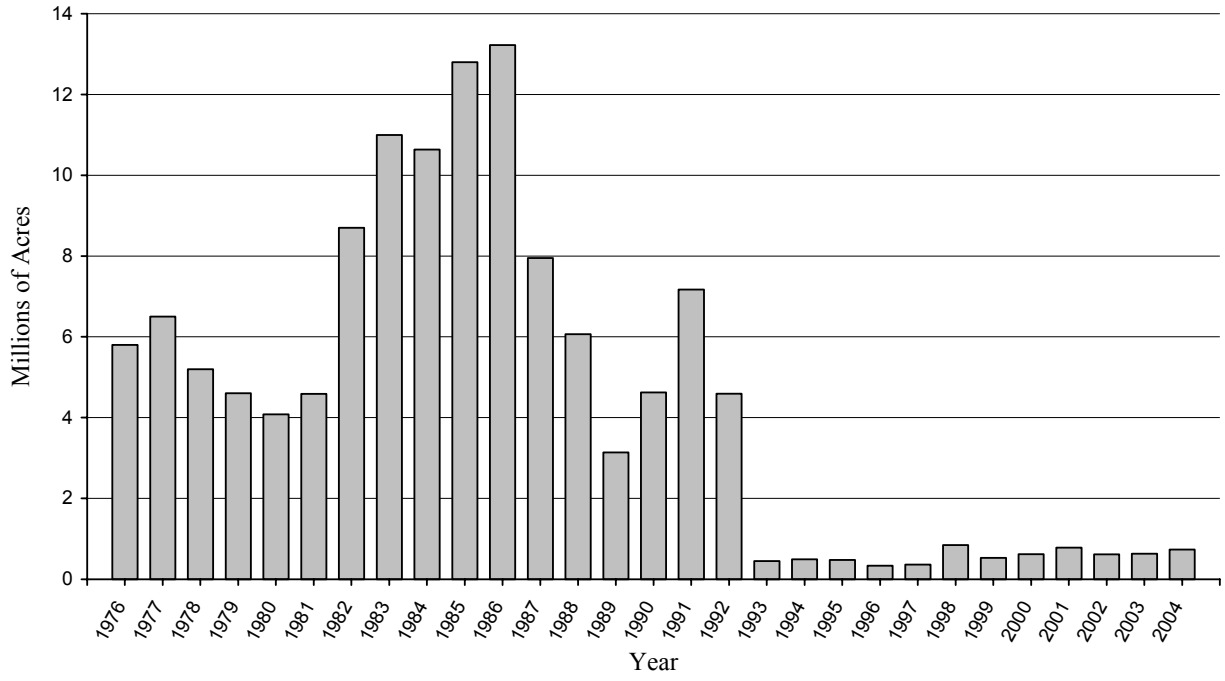
Many of the Western States had minimal impacts from low population levels of western spruce budworm. Overall, acres of defoliation increased from 630,700 acres in 2003 to 734,600 acres in 2004. Arizona and Wyoming saw decreases in budworm defoliation. Defoliation in Idaho decreased significantly from 204,100 acres in 2003 to 64,100 acres in 2004. However, Washington, Montana, and New Mexico reported seeing significant increases in acres with budworm defoliation. With much of the West experiencing warm and drier weather conditions, western spruce budworm populations are expected to continue to increase.

Western Spruce Budworm Defoliation Areas, 2004

Acres (in thousands) of Aerially Detected Western Spruce Budworm Defoliation, 2000-2004

State	2000	2001	2002	2003	2004
Arizona	25.8	14.1	11.3	24.0	10.7
California	0.0	0.0	0.0	0.0	0.0
Colorado	20.6	35.8	131.1	20.0	20.0
Idaho	4.4	4.2	22.6	204.1	64.1
Montana	0.4	1.2	52.4	66.0	177.3
New Mexico	165.0	445.3	198.8	143.2	238.2
Oregon	0.9	0.2	1.9	5.5	6.6
Utah	16.7	10.2	7.0	14.7	20.0
Washington	383.7	271.9	57.5	139.9	193.2
Wyoming	0.8	0.8	134.6	13.3	4.5
Total	618.3	783.7	617.2	630.7	734.6

Aerially Detected Western Spruce Budworm Defoliation, 1976-2004



Hemlock woolly adelgid

Adelges tsugae was introduced into the east coast near Richmond, Virginia, in 1950. The adelgid poses a serious threat to eastern hemlock and Carolina hemlock; tree mortality usually occurs 3 to 5 years after attack. By the early 1990s, the adelgid had spread into 11 States from North Carolina to Massachusetts, causing extensive hemlock decline and tree mortality. The adelgid continues to spread in the North and South with new townships and counties added every year to the list of those with infested hemlock. In 2004, the adelgid was found in a total of 25 new counties in the States of Georgia, North Carolina, South Carolina, Tennessee, and West Virgina. The influence of northward-migrating songbirds helps in the spread of this insect to new sites in the Southeast. Shipments of infested hemlocks can be linked to other infestations in the Northeastern States.

The adelgid was introduced into the west coast from Asia in 1924 and is now found in British Columbia, Washington, Oregon, and California. The adelgid appears to be innocuous in the West as little damage is reported.

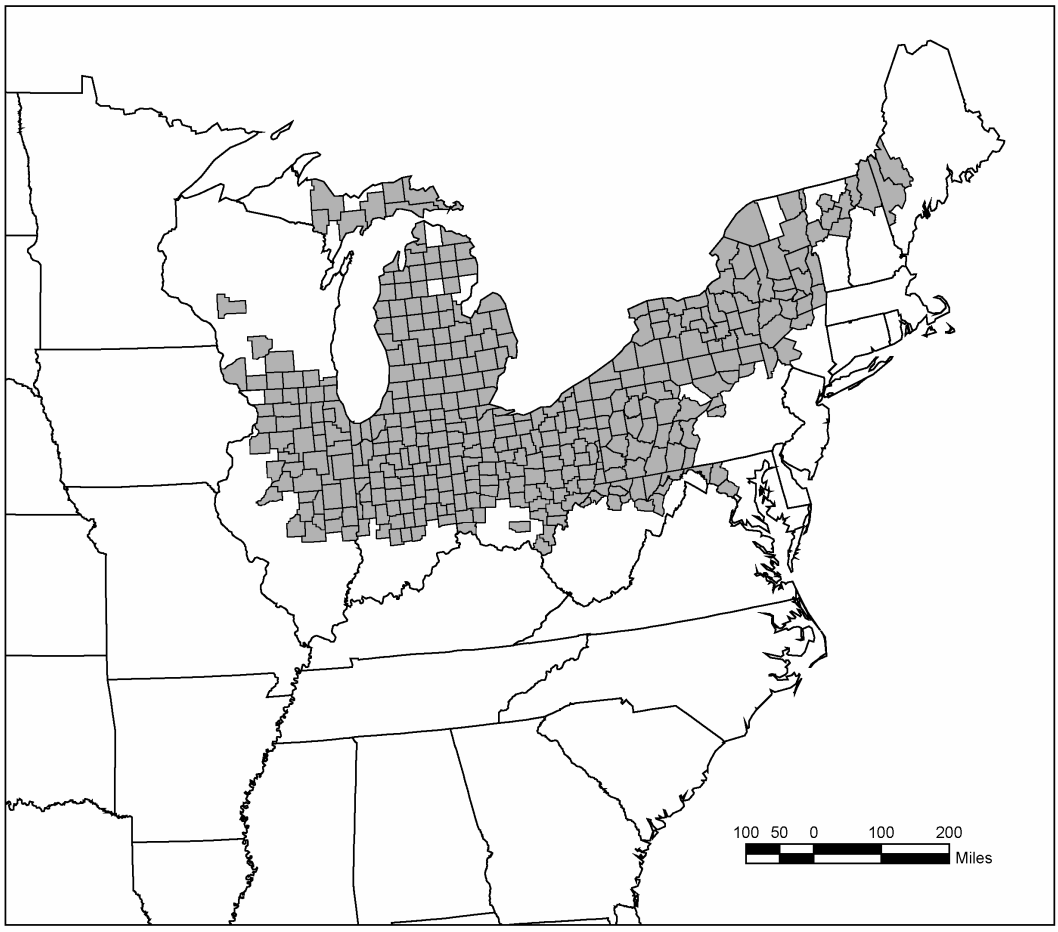
Eastern Counties Where Hemlock Woolly Adelgid Was Reported, 2004

Common European pine shoot beetle

Tomicus piniperda is an introduced insect discovered in a Christmas tree plantation near Cleveland, Ohio, in 1992. The beetle prefers Scotch pine, but feeds on other pines as well. The beetle damages weak and dying trees and feeds in the new growth (shoots) of healthy trees. Thus far, the beetle is a problem mainly to Christmas tree growers. In its native Europe and Siberia, the beetle causes serious damage to trees in burned sites and areas experiencing severe drought.

State and Federal quarantines have been imposed to reduce the movement of this beetle, which was found in 12 States during 2004.

Eastern Counties Where Common European Pine Shoot Beetle Was Reported, 2004



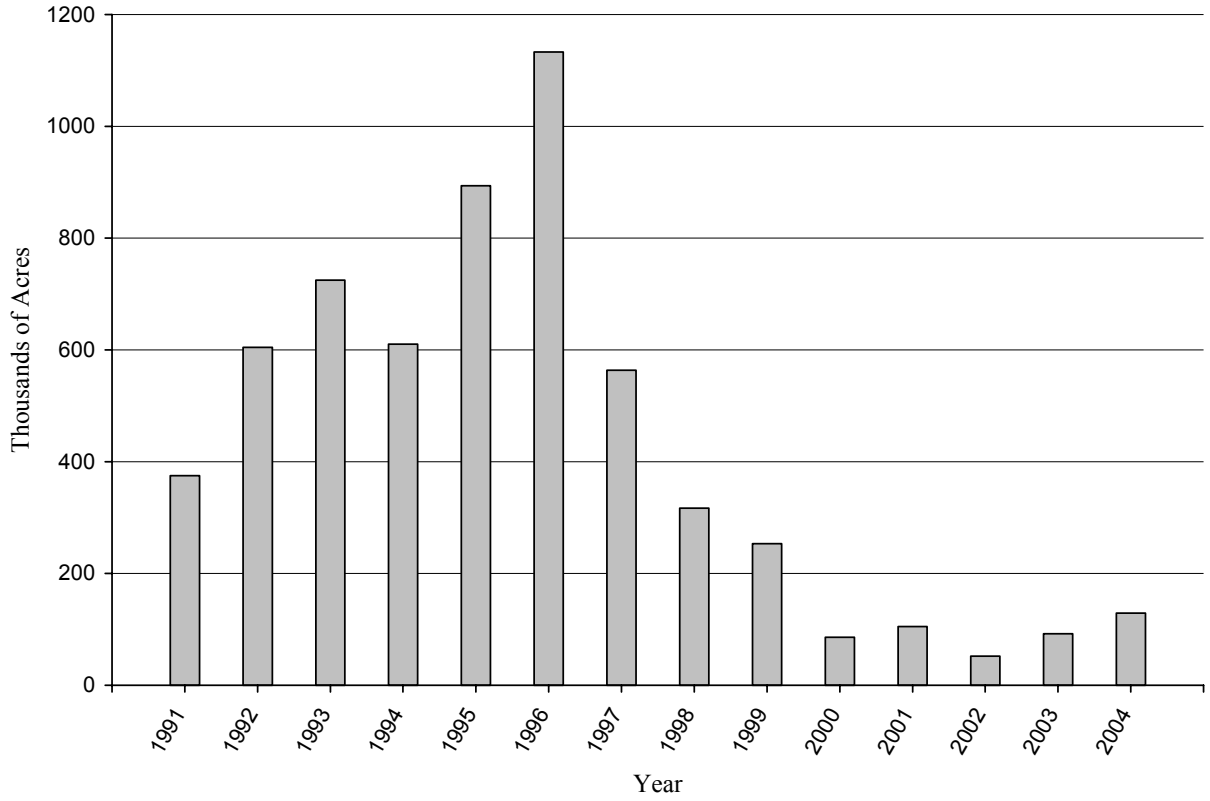
Spruce beetle

Dendroctonus rufipennis is a native insect that occurs across North America from Maine to Alaska and south in the Rocky Mountains to Arizona. Spruce beetle is the most significant mortality agent of mature spruce. Populations usually build up in windthrown trees. Besides killing merchantable trees, infestations affect habitat quality for wildlife and fish, reduce scenic quality, and increase fire hazard.

Spruce beetle activity has decreased in Alaska to normal, endemic population levels. In the 1990s, Alaska's spruce beetle epidemic saw rapid acceleration from an endemic level (approx. 150,000 acres) of active beetle caused mortality to a peak of 1.1 million acres in 1996 and then rapidly declined due to lack of suitable host material. This intensive epidemic resulted in mortality exceeding 90 percent of all trees in many drainages and the resulting fuel hazard and fire risk is requiring continued efforts to mitigate.

Outbreaks continue in a few forests in Arizona, Colorado, Montana, Utah, and Wyoming. Throughout much of the West, weather conditions were conducive to increases in spruce beetle. Mild winters and warm dry summers have created a situation that has allowed the various populations to significantly increase.

Acres (in thousands) of Aerially Detected Spruce Beetle Active and Newly Infested Areas in Alaska, 1991-2004



Disease Conditions Highlights

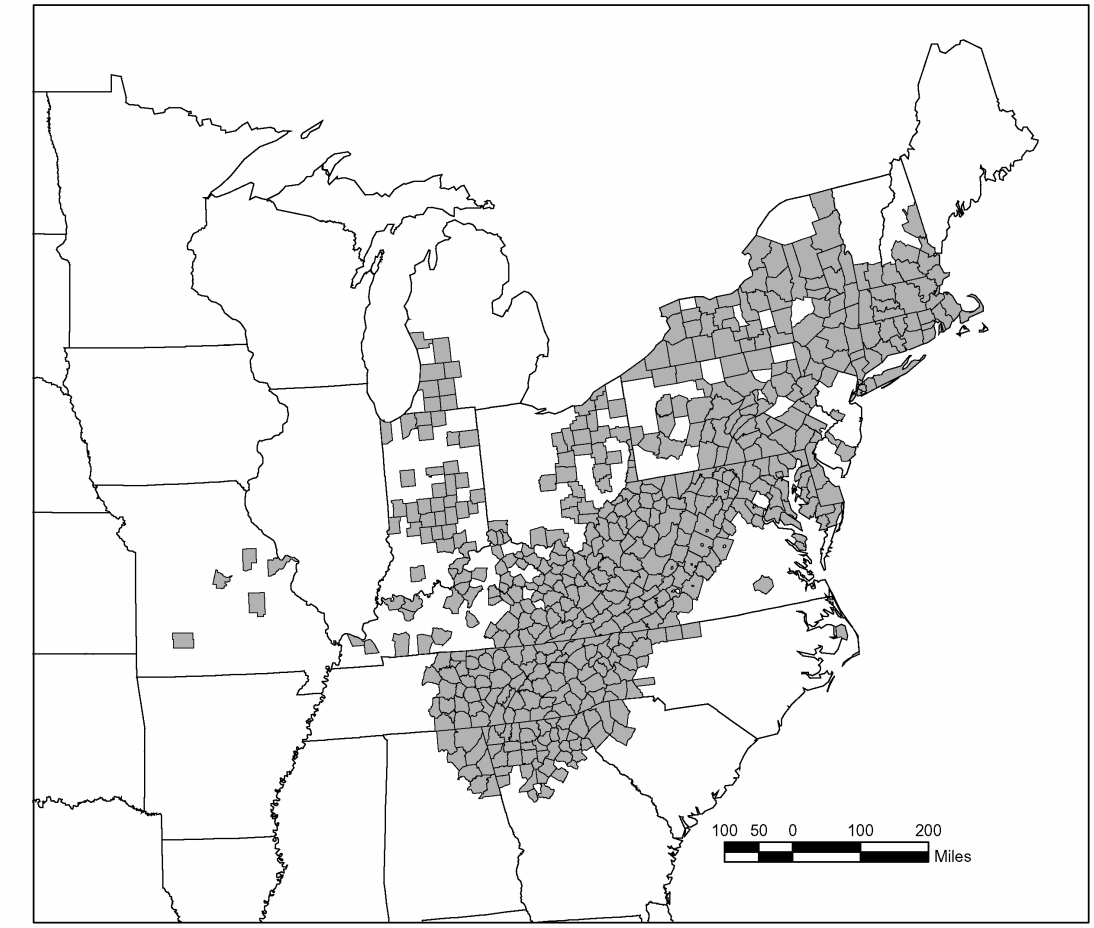
Dogwood anthracnose

Discula destructiva, the fungus that causes dogwood anthracnose, is of unknown origin. First discovered in the Pacific Northwest in 1976, the disease is confirmed in Idaho, Oregon, and Washington. Although the Pacific dogwood is more susceptible to the fungus than the eastern dogwood, drier summers in the West reduce the number of infection cycles. Significant mortality has occurred, but the problem is not as severe as it is in the East.

In the East, the fungus was first found in southeastern New York in 1978. By 1994, this disease was found in 22 States from Maine to Georgia and west to Indiana and Missouri. The range of dogwood extends from southern Maine to Florida and west to Michigan and eastern Texas.

Dogwood anthracnose continues to intensify at the disease front within the infested counties in the South, although in areas long infested, mortality has declined with the decrease in susceptible host. In the Northeast, diseased dogwoods have been found in every county in Connecticut, Delaware, Maryland, Massachusetts, Rhode Island, and West Virginia. No new counties were found to be infested in 2004.

Eastern Counties Where Dogwood Anthracnose Was Reported, 2004



Beech bark disease

Beech bark disease is caused by the interaction of the beech scale, *Cryptococcus fagisuga*, and one or more fungi in the genus *Neonectria*. The scale insect creates wounds in the tree that are colonized by fungi, such as *Neonectria coccinea* var. *faginata*. The scale, and probably the fungus, were accidentally brought to Nova Scotia, Canada, in about 1890. Native fungi, *Neonectria galligena* and *Neonectria ochroleuca,* can also invade wounds caused by the scale, inciting the disease. By 1932, the disease was killing trees in Maine. It continued to advance south and west into northeastern Pennsylvania.

In 1981, a large area of infested American beech was found in West Virginia, well ahead of the advancing front of the disease. In 1994, the disease was found affecting approximately 100 acres in three counties on the North Carolina-Tennessee border (within the Great Smoky Mountains National Park). This infestation was about 300 miles southwest of its previously known distribution. In 2003, mortality continued to intensify, and was spreading downslope toward the Cherokee and Pisgah National Forests at a rate faster than predicted. In 2000, the scale was found in Michigan, more than 200 miles from its nearest previously known location in northeastern Ohio. Both *Neonectria galligena* and *Neonectria coccinea* var. *faginata* have been found in Michigan, causing disease and killing an estimated 7.5 million beech trees. Although the scale has been present in Ohio for some time, the disease, which requires both the scale and the presence of the canker-causing *Neonectria* fungi, has not yet been identified in Ohio.

Tree mortality continues within affected areas, and at a greater rate than predicted. The range of American beech extends from Maine to northwest Florida, and west to eastern parts of Wisconsin and Texas.

Eastern Counties Where Beech Bark Disease Was Reported, 2004

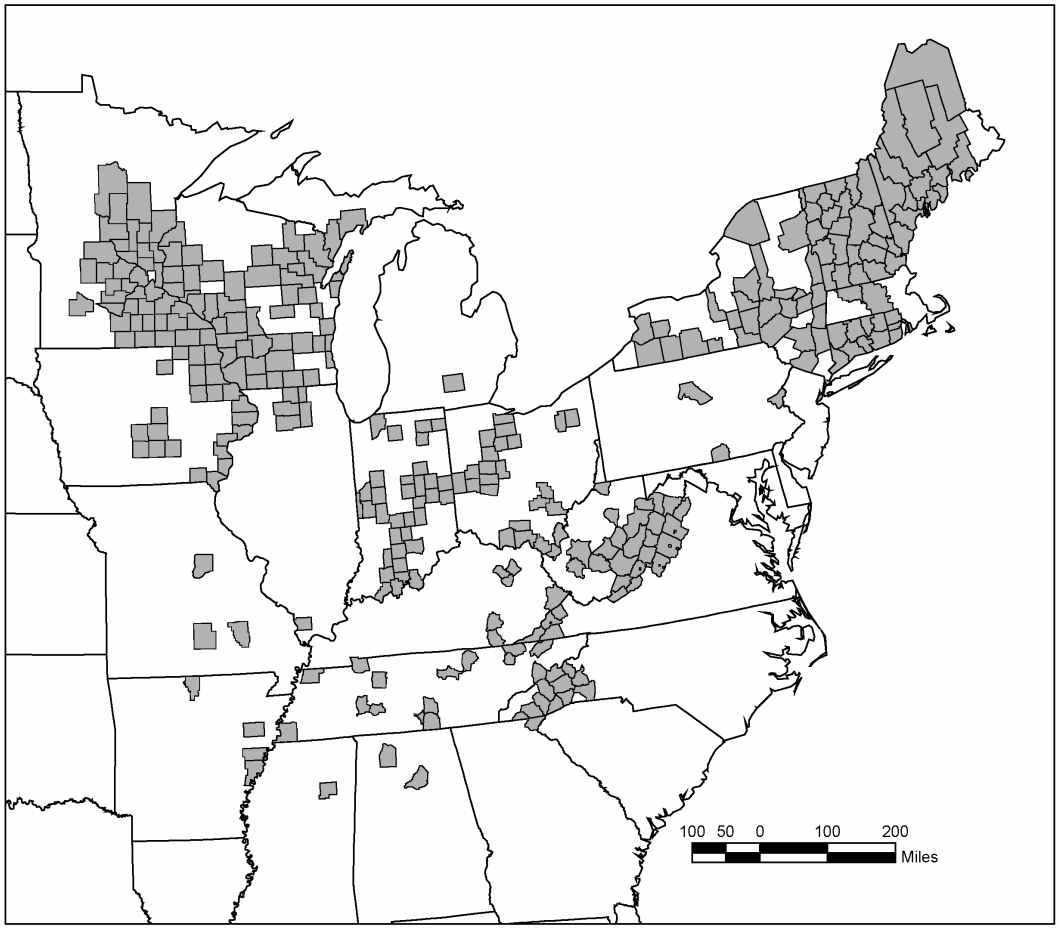
Butternut canker

Butternut canker is caused by the fungal pathogen *Sirococcus clavigignenti-juglandacearum.* The origin of the pathogen is unknown, but because of its severe impact on butternut, it is likely that it was introduced into North America. Symptoms of the disease were recognized and reported in 1967 in Wisconsin, but the causal fungus was not identified until the late 1970s. The native range of butternut extends from Maine to Georgia and west to Minnesota and Arkansas. Butternut is usually found scattered in a variety of cover types and is not abundant in any part of its range.

The disease is found throughout the range of butternut and is a serious threat to the survival of the species. The pathogen kills large trees, saplings, and regeneration, causing multiple cankers under the bark that merge and girdle the tree. It is estimated that 77 percent of the butternut trees in North Carolina and Virginia have been killed and in the northeastern area most of the monitored trees are infected. Trees that appear to exhibit resistance to the disease have been found in most States where butternut grows. Many of these trees are being propagated for host resistance studies.

Several States have implemented harvesting guidelines or moratoriums in an attempt to preserve genetic variability in the species and to ensure that potentially resistant trees are not removed. There are no viable control measures for this disease.

Eastern Counties Where Butternut Canker Was Reported, 2004



Fusiform rust

Cronartium quercuum f. sp. *fusiforme*, a native fungus, continues to be the most damaging disease agent of loblolly and slash pines in the South. The disease disfigures and kills trees up to pole size and results in much stem breakage. The disease is damaging in both plantations and natural stands.

An estimated 13.9 million acres of pines are affected. Acres are classified as affected if more than 10 percent of the trees have potentially lethal cankers. Georgia has the greatest amount of the disease, with 4.6 million acres (49 percent) of the host type affected. Genetic selection of resistant planting stock is leading to significant improvement in field survival and stand quality.

Acres (in thousands) Affected by Fusiform Rust*

State (survey year)	National Forest System	Other Federal	State and Private	Total
Alabama (90)	7.1	0.0	1,704.2	1,711.3
Arkansas (95)	4.9	0.0	280.5	285.4
Florida (95)	35.3	6.8	1,426.3	1,468.4
Georgia (89)	38.0	102.8	4,452.9	4,593.7
Louisiana (91)	85.0	18.4	1,554.9	1,658.3
Mississippi (94)	118.0	60.0	1,043.0	1,221.0
North Carolina (90)	4.9	7.8	956.2	968.9
Oklahoma (93)	0.0	0.0	33.9	33.9
South Carolina (95)	46.0	59.0	1,332.2	1,437.2
Texas (92)	21.8	0.0	397.3	419.1
Virginia (92)	0.0	0.0	59.3	59.3
Total	361.0	254.8	13,240.7	13,856.5

* Acres with greater than 10 percent infection.

Dwarf mistletoes

Arceuthobium spp. are parasitic plants that infect the aerial portions of host trees. They affect most conifer species in the West and spruces in the Northeast, causing branch distortions, reduced stem growth, and decreased longevity. Infection by these native plants is generally considered to be the most widespread and economically damaging tree disease in the West. Dwarf mistletoe infection does appear to benefit some wildlife species.

Commercial trees most affected include Douglas-fir, lodgepole pine, true fir, western hemlock, western larch, and ponderosa pine. Dwarf mistletoes are usually host-specific and have patchy distributions within stands and across larger landscapes. Over 28 million acres of western forests have some level of infection. Losses are estimated at around 164 million cubic feet of wood annually.

Dwarf mistletoes are amenable to cultural treatments, although infected areas are often more difficult to manage than uninfected areas. The overall incidence and severity of this disease are thought to have increased over the past century due to fire suppression.

Acres (in thousands) in the West Affected by Dwarf Mistletoes

State (survey year)	National Forest System	Other Federal	State and Private	Total
Alaska*	3,060.0	0.0	340.0	3,400.0
Arizona (85-89)	1,040.0	674.0	25.0	1,739.0
California (80-90)	2,283.0	69.0	1,911.0	4,263.0
Colorado (96)	638.0			638.0
Idaho - North (70-80)**	478.0	10.0	244.0	732.0
Idaho - South (94)**	2,600.0			2,600.0
Montana (70-80)	1,694.0	123.0	600.0	2,417.0
New Mexico (97)	1,140.0	348.0	581.0	2,069.0
Nevada (94)	49.0			49.0
Oregon (67)	1,137.0	43.0	2,760.0	3,940.0
Utah (94)	410.0			410.0
Washington (97)	2,703.3	505.0	2,470.0	5,678.3
Wyoming (97)	560.1			560.1
Total	17,792.4	1,772.0	8,931.0	28,495.4

* Commercial acreage only in Alaska.
** Idaho-North is in Region 1, and Idaho-South is in Region 4.

Part 3: Conditions by Damage Agent by Region

Insects: Native

Arborvitae leaf miners,
A complex of four species

Region 9/Northeastern Area: Maine, Vermont

Host(s): Northern white-cedar

Populations of these perennial pests of arborvitae caused varying degrees of damage across the State of Maine. Arborvitae in northwestern Maine and eastern Washington County sustained the heaviest damage again in 2004. Many infested native stands as well as ornamentals showed signs of stress and increased mortality especially on sites affected by past drought. Damage was reported on 1,030 acres in central Vermont.

Aspen leaf miner,
Phyllocnistis populiella

Region 10: Alaska

Host(s): Aspen, balsam poplar, black cottonwood, birch, alder

Aspen leaf miner infested acreage increased significantly for the fourth consecutive year. In 2004, 584,405 acres were mapped by aerial surveys, compared to 351,058 acres in 2003. Leaf miner activity in the extensive interior hardwood stands surrounding Fairbanks was first recorded in 2000; 1,400 acres were mapped that year compared to almost negligible leaf miner activity throughout the previous decade of the 1990s. In 2004, the largest and most severe infestations were also located in interior Alaska, bounded by Ruby to the west, south to the Alaska Range, east along the Tanana drainage and the Yukon Charley Rivers Preserve close to the Alaska Yukon border, and north to the confluence of the Colleen and Porcupine Rivers. Additionally, there was an isolated infestation of 12,129 acres near Hughes, and two small localized infestations in south-central and southeast Alaska, one north of Tyonek and another northwest of Skagway. Defoliation intensity is expected to increase next year in the most recently affected areas.

Bagworm moth,
Thyridopteryx ephemeraeformis

Region 9/Northeastern Area: Illinois, West Virginia

Host(s): Black locust, boxelder, miscellaneous conifers

In West Virginia, light populations were reported statewide on miscellaneous conifers. Scattered moderate to high populations occurred in the southern half of Illinois. It was found most commonly in urban landscapes.

Baldcypress leaf roller,
Archips goyerana

Region 8: Louisiana

Host(s): Baldcypress

In 2004, 310,000 acres of mixed baldcypress stands in southern and southeastern Louisiana were defoliated by the baldcypress leaf roller. (Ascension, Assumption, Iberia, Iberville, LaFourche, St. Charles, St. James, St. John the Baptist, St. Martin, and Terrebonne Parishes). Approximately 147,000 acres were severely defoliated ($\geq$50 percent). The primary impact of this defoliation is loss of radial growth, producing an estimated growth loss of 0.1 MBF per acre. Dieback and scattered mortality occurred in some areas. Permanently flooded areas were most severely impacted.

Balsam gall midge,
Paradiplosis tumifex

Region 9/Northeastern Area: Maine, Vermont

Host(s): Balsam fir

This pest has caused very significant damage to the Christmas tree and wreath industries of Maine in the past, but currently population levels were very low throughout Maine in 2004. No control projects were necessary and no reports of damage in commercial Christmas tree farms or in wild balsam stands used in the wreath industry were received. Population levels of this pest are cyclic in Maine and were expected to begin to show an increase in 2005 or 2006. Vermont reported very little damage from this pest.

Balsam shoot boring sawfly,
Pleroneura brunneicornis

Region 9/Northeastern Area: Maine, Vermont

Host(s): Balsam fir, Fraser fir

In Maine, no survey was conducted on this insect in 2004 and there were no reports of significant damage in Christmas tree plantations. Damage in native stands was spotty and generally light. There was no significant activity reported in Vermont.

Balsam twig aphid,
Mindarus abietinus

Region 9/Northeastern Area: Maine, Vermont

Host(s): Balsam fir

In Maine, statewide population levels of this insect were down with trace to light damage being reported in forest stands. Populations in many Christmas tree farms were controlled due to a low tolerance for damage in competitive tree markets. Damage did not have a significant impact on wreath brush harvest in 2004. There was very light damage reported in Vermont.

Insects: Native

Barklice or psocids,
Archipsocus spp.

Region 8: Texas

Host(s): Hardwoods

During the summer of 2004, higher than normal populations of bark lice in east Texas caused many people to inquire about the cause of webbing covering the trunks and branches of their trees. No permanent harm was caused.

Beech blight aphid,
Grylloprociphilus imbricator

Region 9/Northeastern Area: Ohio, Pennsylvania

Host(s): Balsam fir

In Ohio, this aphid was extremely numerous this year in Geauga County, but the feeding on twigs and small branches was only a nuisance to residents and a curiosity to entomologists. This aphid was also abundant on the Allegheny National Forest in Elk County, Pennsylvania.

Birch leaf roller,
Epinotia solandriana

Region 10: Alaska

Host(s): Paper birch, willow, alder, aspen, black cottonwood

Acres of birch leaf roller defoliation significantly decreased from 185,020 acres in 2003 to 17,848 acres in 2004. Most infestations were only a few hundred acres or less. The largest infestation reported was 11,754 acres 35 miles north of Tyonek, which accounted for 66 percent of the total acreage infested. Although the 2003 outbreak along the Susitna and Yentna Rivers has collapsed, the 2004 activity north of Tyonek is in the same general area but on the opposite side of Mount Susitna. There were 5,165 acres defoliated along the Kantishna River, Muddy and Birch Creeks, from Lake Minchumina to the Denali National Park Boundary along the Kantishna River.

Birch skeletonizer,
Bucculatrix canadensisella

Region 9/Northeastern Area: Maine, New Hampshire, Vermont

Host(s): Birch

Heavy defoliation of birches resulted from feeding by the birch skeletonizer over most of northern and eastern Maine in 2003, but, in 2004, populations had returned to endemic levels throughout the State. No significant damage was reported in New Hampshire. In Vermont, there was only light damage in the central and northern part of the State, a downward trend from the heavy damage reported in 2003.

Black turpentine beetle,
Dendroctonus terebrans

Region 8: Regionwide

Host(s): Loblolly pine, longleaf pine, slash pine, shortleaf pine

Much like pine engraver beetles, the black turpentine beetle (BTB) prefers to attack stressed, weakened trees. Stands stressed by multiple factors such as drought and logging injury, compacted soil, or wildfires are especially vulnerable. BTB are active in the lower 6 to 8 feet of the tree's bole. Although generally present at low population levels, when BTB numbers increase significantly, they are capable of attaining primary pest status, attacking trees with no overt damage or other evidence of susceptibility. Levels of activity increased moderately in 2004, especially in coastal States. Levels of BTB activity were higher than normal in Florida, owing to damage from four major hurricanes; the State is monitoring the affected area for spreading damage. Florida also experienced heavy BTB infestations in stands that had experienced root stress such as prolonged flooding. Georgia reported increasing BTB activity, associated both with commercial thinnings and with annosus root disease. The Georgia Forestry Commission also reported that stands thinned by shearing produced less resin than those thinned by sawing, lowering the effects of BTB in the residual stands. Mississippi reported an increase in BTB activity in longleaf pine stands in the southern part of the State where both prescribed burning and harvest treatments had been carried out. South Carolina reported increases in BTB activity in areas previously thinned to control southern pine beetle. North Carolina noted increased BTB activity in Sandhills longleaf stands being managed for pine straw production. Tennessee reported light BTB activity in loblolly pine stands in the central part of the State.

Bruce spanworm,
Operophtera bruceata

Region 9/Northeastern Area: Maine, New Hampshire, New York, Pennsylvania, Vermont

Host(s): Sugar maple, beech

There were 615 acres of defoliation mapped in Penobscot and Franklin Counties in Maine. This pest was reported to be common in central and northern New Hampshire. New York reported moderate to heavy defoliation associated with this insect in the Adirondack region. In many stands, one or more other defoliators were also active. Moderate to heavy defoliation was scattered in south-central Vermont. Egg traps were placed to monitor the population. Defoliation by this insect was reported on 1,060 acres in Potter County, Pennsylvania.

Buck moth,
Hemileuca maia

Region 8: Louisiana

Host(s): Live oak, other hardwoods

Buck moth defoliation of live oak has been a problem in New Orleans for many years. The moth continues to be locally abundant in the city and of particular concern in the Federal Historic Districts. The insect population in Louisiana was found to be decreasing in 2003, and this trend continued in 2004.

California budworm,
Choristoneura carnana californica

Region 5: California

Host(s): Douglas-fir

Defoliation was not reported on the east side of Trinity Lake, Shasta County, an area where budworm populations have been highly variable over the past 20 years.

California flatheaded borer,
Melanophila californica

Region 5: California

Host(s): Jeffrey pine, ponderosa pine

The California flatheaded borer was involved in much of the Jeffrey pine mortality that occurred in southern California mountains. *Melanophila californica* is particularly important as a mortality agent in areas where the Jeffrey pine beetle does not occur, but also occurs in trees infested with Jeffrey pine beetle. Dying Jeffrey pines infested by these two insects were widespread in southern California, particularly in the San Gabriel and San Bernardino Mountains and in the Peninsular Ranges. Dwarf mistletoe and annosus root disease are often associated with the mortality.

California oakworm,
Phryganidia californica

Region 5: California

Host(s): Coast live oak, tanoak

California oakworm feeding was reported on coast live oaks near the Trinity River and on tanoaks on Horse Linto Creek at the Hoopa Reservation, Humboldt County.

Cankerworms,
family *Geometridae*

Region 8: Texas

Host(s): Oak

Localized activity occurred in Texas in 2004, mostly in the central part of the State. Defoliation occurred primarily in post oak forests immediately to the west of the natural pine range of east Texas. Defoliation by this pest rarely causes serious or permanent damage.

Cedar bark beetles, *Phloeosinus* spp.

Region 3: Arizona, New Mexico

Host(s): Cypress, juniper

Cedar bark beetle mortality in the Southwest was recorded on 3,045 acres in 2004 in New Mexico. Mortality was recorded on the Gila National Forest (2,885 acres), and 160 acres of State and private land.

Region 5: California

Host(s): Incense-cedar

An increase in incense-cedar mortality throughout northeastern California was attributed to drought, frost, and to a lesser extent, *Phloeosinus* bark beetles. The bark beetles were associated with branch dieback and tree mortality.

Common oak moth, *Phoberia atomaris*

Region 9/Northeastern Area: Ohio, West Virginia

Host(s): White oak

Common oak moth and the half-winged geometer again defoliated trees in scattered locations throughout southern Ohio. Some white oak mortality was reported. In West Virginia, approximately 11,000 acres of defoliation were reported in Braxton, Calhoun, Doddridge, Gilmer, Harrison, Jackson, Kanawha, Lewis, Lincoln, Mason, Pleasants, Putnam, Ritchie, Roane, Tyler, Wayne, Wirt, and Wood Counties. This was the second season that common oak moth was recorded as a primary damaging agent in West Virginia. Populations, while widespread, did not seem as severe in 2004. This insect occurred in conjunction with several miscellaneous loopers.

Cooley spruce gall aphid, *Adelges cooleyi*

Region 5: California

Host(s): Brewer's spruce

Galls were collected from Brewer's spruce near Golden Russian Lake, Waterdog Lake, Paynes Lake, Horseshoe Lake, and Little Duck Lake in the Russian Wilderness, Klamath National Forest.

Douglas-fir beetle,
Dendroctonus pseudotsugae

Region 1: Idaho, Montana

Host(s): Douglas-fir

Despite a few local increases, Douglas-fir beetle (DFB) populations once again declined in most parts of northern Idaho. Notable decreases occurred on the Nez Perce and Kaniksu National Forests, while modest increases were mapped on the Coeur d'Alene and Clearwater National Forests. Overall, the infested area in northern Idaho decreased from 12,200 acres in 2003 to slightly less than 9,000 acres in 2004. Few currently infested trees were observed in areas surveyed in northern Idaho. In western Montana, infested stands on the Flathead and Kootenai National Forests showed static or declining populations. In many areas, beetle-killed trees were still common; but we seldom found higher numbers of new attacks in 2004 than in 2003. Stands surveyed in and around areas affected by the 2000 fires on parts of the Bitterroot and Helena National Forests showed still-high populations and increased new attacks in many areas in 2003. Infestations on the Bitterroot National Forest, however, had indications that populations may finally be declining. The infested area recorded on aerial detection surveys declined from more than 34,500 acres in 2003 to slightly less than 31,000 acres in 2004. While that is still the most heavily impacted reporting area in the region, ground surveys showed fewer areas with high amounts of currently infested trees. Surveys conducted on the Deerlodge, Helena, and Lolo National Forests showed significant increases in a few areas in 2004; however, some of those recorded increases occurred because not all infested areas were surveyed in 2003. On the Gallatin National Forest, populations remained high in some stands, and a few observations showed unusually late attacks in some stands. Trapping results also indicated later-than-normal flights in a few infested stands elsewhere. DFBs do not typically overwinter as larvae and survival may be poor in some areas because of late egg deposition. Regionwide, the infested area recorded during aerial surveys increased to more than 101,400 acres; up from 88,780 acres in 2003. More than 235,000 Douglas-fir were killed. In some stands, particularly on the Lolo, Deerlodge, and Gallatin National Forests, populations appear to continually increase.

Region 2: Colorado, Wyoming

Host(s): Douglas-fir

Several thousand acres of Douglas-fir killed by DFB were detected on private and Federal lands in Douglas, Fremont, Grand, and Saguache Counties. Due to the dry conditions in Colorado, DFB killed over 22,000 large trees with diameters greater than 16 inches. Other areas with increasing DFB populations are in Chaffee, El Paso, Gunnison, Jefferson, Montezuma, Routt, and Teller Counties.

DFB populations increased on the Pike-San Isabel, Grand Mesa-Uncompahgre-Gunnison, Rio Grande, and San Juan National Forests, as well as on surrounding lands. Some beetle activity was in direct association to prior prescribed burns while other beetle activity had no association to fire/tree scorch. In several settings on the Rio Grande and San Juan National Forests, DFB activity occurred in areas of chronic defoliation by western spruce budworm. Throughout southern Colorado, DFB activity was intermingled with that of the Douglas-fir pole beetle, *Pseudohylesinus nebulosus.*

Counties in Wyoming experiencing DFB problems are Bighorns, Carbon, Hot Springs, Johnson, Park, and Washakie. On the western side of the Bighorn Mountains, beetle populations have increased in the Shell and Tensleep Canyon areas. Without some sort of management actions, such as sanitation and salvage harvesting, it is likely that up to 70 percent of the Douglas-fir trees in these canyons will be killed.

Approximately 62,300 acres were detected in aerial surveys with tree mortality caused by DFB in Colorado. In Wyoming, areas east of the continental divide, 70,000 acres indicated DFB activity.

Region 3: Arizona, New Mexico

Host(s): Douglas-fir

DFB mortality in the Southwest tripled from 28,955 in 2003 to 87,965 acres in 2004. In Arizona, DFB mortality was recorded on the Apache-Sitgreaves (5,645 acres), Coconino (4,365 acres), Coronado (980 acres), Kaibab (615 acres), Prescott (45 acres), and Tonto (685 acres) National Forests; Grand Canyon National Park (10 acres); Walnut Canyon National Monument (15 acres); 145 acres of Bureau of Land Management (BLM) lands; Fort Apache (90 acres) and Navajo (5 acres) Indian Reservations; and 160 acres of State and private land. In New Mexico, DFB-caused tree mortality was detected on the Carson (15,815 acres), Cibola (3,630 acres), Gila (7,310 acres), Lincoln (1,115 acres), and Santa Fe (23,075 acres) National Forests; Valles Caldera National Preserve (1,060 acres); Bandelier National Monument (1,815 acres); 235 acres of BLM land; Jicarilla Apache (1,795 acres), Mescalero Apache (650 acres), Picuris Pueblo (75 acres), Santa Clara Pueblo (1,445 acres), Taos Pueblo (760 acres), and 30 acres of other tribal lands; and 16,395 acres of State and private lands.

Region 4: Idaho, Utah, Wyoming

Host(s): Douglas-fir

DFB-caused tree mortality increased dramatically in the region for the second consecutive year. In 2003, the region reported 88,700 acres affected compared to approximately 178,100 acres in 2004. Acres affected by State were 99,600acres in southern Idaho, 49,100 acres in Utah, and 29,000 acres in Wyoming. The largest concentrations of mortality were located on the Salmon-Challis (58,400 acres) and the Bridger-Teton (25,000 acres) National Forests. Additional areas with high levels of mortality include the Ashley National Forest with over 12,000 acres affected and the BLM lands with over 10,200 acres affected in Utah and Idaho. Nearly all national forests had some level of DFB-caused tree mortality.

Region 5: California

Host(s): Douglas-fir

Mortality of small diameter Douglas-fir was reported from Sonoma, Mendocino, and Humboldt Counties. In a representative area southwest of Willits (Mendocino County), eight killed trees averaged 5.8 inches in diameter.

Region 6: Oregon, Washington

Host(s): Douglas-fir

The region saw an overall decrease in mortality for the fourth straight year. Mapped acres decreased from 97,598 (1.68 trees per acre) in 2003 to 59,252 (1.39 trees per acre) in 2004. In Washington, on the Colville National Forest, Douglas-fir mortality was mapped on 13,770 acres at approximately 1.7 trees per acre. On private lands within the Colville reporting area, mortality was mapped on 4,549 acres at 1.64 trees per acre. On State lands within the Colville reporting area, mortality was mapped on 1,852 acres at 1.22 trees per acre. The Colville Indian Reservation was mapped at an average mortality of 1.34 trees per acre on 5,564 acres.

In Oregon, the most significant mortality was mapped on the Wallow-Whitman National Forest at 1.53 trees per acre on 2,327 acres and on private lands within the Willamette reporting area (1.13 trees per acre on 1,466 acres).

Douglas-fir engraver beetle,
Scolytus unispinosus

Region 5: California

Host(s): Douglas-fir

No reports were received in 2004.

Douglas-fir pole beetle,
Psuedohylesinus nebulosus

Region 2: Colorado

Host(s): Douglas-fir

Again in 2004, this beetle caused significant mortality to large Douglas-fir trees, especially in Mesa Verde National Park. Undoubtedly, drought conditions allowed this beetle to take advantage of large numbers of susceptible hosts. As the common name indicates, this insect most frequently attacks smaller diameter Douglas-fir, but trees in excess of 12 inches diameter were being killed throughout southern Colorado. Across southern Colorado, Douglas-fir pole beetle activity intermingled with that of the DFB.

Douglas-fir tussock moth,
Orgyia pseudotsugata

Region 1: Idaho, Montana

Host(s): Douglas-fir, true firs

Defoliation from Douglas-fir tussock moth (DFTM) in northern Idaho dropped from 5,400 acres in 2002 to zero in 2003 and 2004. In Montana, defoliation from tussock moth on the Flathead Indian Reservation increased from 52 acres in 2002 to 5,800 acres in 2004. Ground observations found severely to completely defoliated trees in some areas. Tree mortality was not assessed. Since most populations of tussock moth are closely synchronized in Montana, a quick egg mass survey in November found only a few current egg masses, indicating that populations have already peaked and are now declining.

Region 2: Colorado

Host(s): Douglas-fir

In Jefferson County, an outbreak of DFTM occurred in Douglas-fir on private forested lands. This is the third outbreak of this insect in Douglas-fir. Historically, this insect had only been a problem in ornamental Colorado blue spruces along the Front Range. Unless prescribed burning or other forest management practices reduce the off-site Douglas-fir, we can expect to see more outbreaks of DFTM in Colorado's forests.

Region 3: Arizona, New Mexico

Host(s): Douglas-fir, true firs

In 2004, DFTM defoliation was recorded on 295 acres of the Cibola National Forest in New Mexico.

Region 4: Idaho, Nevada, Utah

Host(s): Douglas-fir, true firs

Total acreage defoliated by DFTM in 2004 decreased by 27 percent from 2003. In 2004, only 8,800 acres of defoliation were reported compared to over 12,000 acres defoliated in 2003. The majority of the defoliation (5,800 acres) occurred on the Humboldt-Toiyabe National Forest in Elko County, Nevada. In Idaho, DFTM defoliation continued at a reduced level on approximately 2,500 acres of the Sawtooth National Forest and BLM lands in the Owyhee Mountains.

Region 5: California

Host(s): White fir

Monitoring trap catches decreased slightly from 2003 catches for most plots on private land in Lassen, Modoc, and Shasta Counties. Only one plot (Burney Mountain) showed a significant increase from an average catch of 13 moths per trap in 2003 to 31 in 2004. During the field season of 2004 Forest Health Protection staff monitored other life stages in these areas to determine if populations were increasing to outbreak levels. Sampling of the early larval stages in each of these plots indicated no increase in population levels.

Increasing DFTM populations were detected over a broad area in the central and southern Sierra Nevada from the Eldorado National Forest (El Dorado County) south to the Sequoia National Forest (Kern County). Low level larval activity and very light feeding injury, restricted to the current year foliage, was observed in the following locations: Placerville and Amador Districts (Eldorado National Forest); Calaveras, Miwok, and Summit Districts (Stanislaus National Forest); Yosemite National Park; Bass Lake District (Sierra National Forest); Sequoia and Kings Canyon National Parks; and the Hume Lake, Tule River, Hot Springs, and Greenhorn Districts (Sequoia National Forest). Limited egg mass sampling on the Stanislaus National Forest, Yosemite National Park, and the Sierra National Forest indicate that if egg and larval survival are good, increased defoliation can be expected in 2005-2006.

An increase in the population of DFTM has been noted in the southern Sierra Nevada, particularly in Fresno and Tulare Counties. Although no serious defoliation has yet occurred, there is concern that the populations are increasing and heading towards an outbreak. Next year may be of particular concern with the defoliator.

Region 6: Oregon, Washington

Host(s): Douglas-fir, true firs

There were no areas of visible defoliation caused by DFTM recorded in 2004. This marks the fifth straight year in declines.

Douglas-fir twig weevil, *Cylindrocopturus furnissi*

Region 5: California

Host(s): Douglas-fir

Many reports of damage on pole- or sapling-sized Douglas-fir were received from Sonoma, Mendocino, and Humboldt Counties. Severe damage was observed in Robinson Creek drainage in Mendocino County. Moderate damage was noted in Cherry Creek drainage in Mendocino County.

Eastern larch beetle,
Dendroctonus simplex

Region 9/Northeastern Area: Maine, Michigan, Minnesota, Vermont

Host(s): Eastern larch

Pockets of dead and dying larch infested with this species have been common since the mid 1970s and continued to be a common sight throughout the range of larch in Maine. Stands of larch in southern and central portions of the State exhibited the highest mortality rates. Most tree mortality was generally in association with other stress factors, particularly extremes in water availability. In Vermont, the insect occurred statewide, especially in the northeastern part of the State, and was found associated with larch decline. In Minnesota, nearly 10,000 acres of mortality occurred in 2003, and in 2004 an additional 6,000 acres of trees were killed. Over 29,000 acres of larch mortality occurred in Michigan.

Eastern tent caterpillar,
Malacosoma americanum

Region 9/Northeastern Area: Illinois, Maine, Massachusetts, New Hampshire, New York, Pennsylvania, Vermont, West Virginia

Host(s): Black cherry, crabapple

In Massachusetts, minimal damage was observed in Essex, Middlesex, Norfolk, Bristol, and Berkshire Counties. There was heavy defoliation throughout New Hampshire. While not a significant forest pest in Maine, the eastern tent caterpillar is easily seen and reports received from the general public were up in 2004. In New York, moderate to heavy defoliation associated with this insect occurred at scattered locations across the State. In many stands, one or more other defoliators were also active. There was heavy defoliation reported statewide in Vermont, an increase from 2003.

In Pennsylvania, eastern tent caterpillar damaged foliage on 500 acres in Tioga County. Surveys also revealed that it was present but not causing damage on approximately 35,000 acres of black cherry in Lycoming County. In West Virginia, light to moderate defoliation was observed over most of the State. Nucleopolyhedrosis virus was reported primarily in the eastern panhandle counties.

In Illinois, populations were very high in the southern third of the State, completely defoliating black cherry trees in the region.

Fall cankerworm,
Alsophila pometaria

Region 8: Kentucky, Tennessee, Virginia

Host(s): Various oaks species

Kentucky reported unusually intense cankerworm activity in 2004, especially in northern portions of the State. Northeastern Tennessee saw light cankerworm activity, while in Virginia damage was limited to a few patches of heavy defoliation in northern counties. South Carolina reported cankerworm activity mixed with defoliation by forest tent caterpillars.

Region 9/Northeastern Area: Maryland, Massachusetts, New York, Pennsylvania, Vermont, West Virginia

Host(s): Maples, oaks, other hardwoods

In Massachusetts, observations during peak defoliation indicated that in the counties of Plymouth, Norfolk, and Bristol were experiencing a complex of both the fall cankerworm and winter moth. New York reported moderate to heavy defoliation associated with this insect occurred in the Catskill region. In many stands, one or more other defoliators were also active. Vermont reported 60 acres of defoliation in Chittenden County, and larvae were observed throughout the western and southern part of the State.

Surveys in Maryland detected defoliation on 179 acres in Carroll County and 21 acres in Anne Arundell County. Aerial surveys in Pennsylvania found 58 acres of defoliation in Dauphin County. Aerial surveys in Grant, Hampshire, Hardy, and Mineral Counties, West Virginia, mapped approximately 39,000 acres of defoliation (33,973 light and 5,034 heavy) from a complex of spring inchworms associated with the fall cankerworm.

Fall webworm,
Hyphantria cunea

Region 5: California

Host(s): Pacific madrone

Defoliation of Pacific madrone by the fall webworm occurred again this year at various locations on the Foresthill Divide, Placer County. Scattered light to moderate defoliation of madrone due to fall webworm feeding was also present in localized areas in Calaveras County.

Region 9/Northeastern Area: Illinois, New York, Vermont, West Virginia

Host(s): Maple, beech, birch, walnut, apple, ash, black cherry, cherry, elm, other hardwoods

No significant activity was reported in New York. There was scattered, light defoliation statewide in Vermont. Light to moderate defoliation occurred over most of West Virginia in 2004. Very high populations in the northern third of Illinois in 2003 shifted to the west-central counties in 2004.

Fir engraver beetle,
Scolytus ventralis

Region 1: Idaho, Montana

Host(s): Grand fir

Fir engraver-caused mortality in grand fir stands nearly doubled in acres infested and the number of red trees visible across the landscape in 2004 from already high 2003 levels, according to aerial surveys conducted in northern Idaho and western Montana in 2004. We believe the continued increase in the number of acres with fir engraver-caused tree mortality is related to the on-going droughty conditions found in much of the region. Total infested area exceeded 298,000 acres, up from 164,000 acres in 2003. Of those infested acres, nearly 250,000 trees were killed in 2004 (recorded as faders in 2003). Most of the current mortality occurred in northern Idaho, on lands of all ownerships, but concentrated in areas on and adjacent to the Clearwater, Nez Perce, and Idaho Panhandle National Forests. In western Montana, most stands with a significant grand fir component showed high amounts of beetle-caused mortality. Especially noticeable were stands on and adjacent to the Flathead National Forest. Moisture deficits continued throughout the region in 2004. Fir engraver populations will likely remain high until moisture conditions

return to normal. Northern Idaho also has a high amount of root disease in many grand fir stands, which increases susceptibility to fir engraver attack.

Region 2: Colorado, Wyoming

Host(s): Douglas-fir, white fir

These beetles caused extensive mortality in white firs and Douglas-firs in the Colorado Wet Mountains; in drainages between Denver, Colorado Springs, and Cañon City; and near Durango. Mortality of almost 500,000 trees is causing concern in numerous wildland-urban interface settings.

Region 3: Arizona, New Mexico

Host(s): White fir, subalpine fir

Tree mortality in the region due to fir engraver beetles more than doubled in 2004 to 25,700 acres versus 11,715 acres in 2003. In Arizona, fir mortality was recorded on the Apache-Sitgreaves (2,450 acres), Coconino (1,715 acres), and Kaibab (1,065 acres) National Forests; Grand Canyon National Park (140 acres); BLM lands (45 acres); Fort Apache (25 acres) and Navajo (60 acres) Indian Reservations; and State and private lands (5 acres). In New Mexico, fir mortality was reported on the Carson (165 acres), Cibola (6,440 acres), Gila (85 acres), Lincoln (9,315 acres), and Santa Fe (90 acres) National Forests; Jicarilla Apache (10 acres), Mescalero Apache (3,360 acres), and Santa Clara Pueblo (15 acres) tribal lands; and State and private lands (715 acres).

Region 4: California, Idaho, Nevada, Utah

Host(s): Grand fir, red fir, subalpine fir, white fir

Fir engraver beetle-caused tree mortality continued to increase regionwide due to lingering drought conditions. Aerial survey recorded approximately 199,300 acres with mortality in 2004; a significant increase over the 26,000 acres reported in 2003. Areas most affected by this insect include the Humboldt-Toiyabe National Forest (37,000 acres) in Nevada; the Dixie (34,200 acres), Uinta (18,600 acres), and Manti-La Sal (13,400 acres) National Forests in Utah; and the Boise (10,000 acres) and Payette (8,600 acres) National Forests in Idaho. Additional tree mortality caused by this insect was also observed on State and private land: about 23,900 acres in Utah and approximately 1,500 acres in Idaho.

Region 5: California

Host(s): White fir, red fir

The fir engraver, along with the fir roundheaded borer, red fir dwarf mistletoe, Cytospora canker, and drought stress, has caused extensive red fir mortality in northwestern California. Scattered individual and small groups of white and red fir killed by the fir engraver beetle were apparent in Latour State Forest, Shasta County. Fir engraver-related mortality increased dramatically in northeastern California during 2004, a result of 2003 attacks. There are areas of heavy white fir mortality over thousands of acres throughout the Warner Mountain range. Mortality in white fir was apparent in many locations throughout the east side and transition zones of the Lassen and Plumas National Forests. Fir mortality is continuing due to dry conditions, overstocked stands, and the low tolerance of white fir to droughty sites.

High levels of red fir (associated with dwarf mistletoe, Cytospora canker, and fir engraver beetle) and white fir (associated mainly with fir engraver beetle) mortality are occurring throughout many areas of the Tahoe National Forest. Fir engraver beetle is the primary tree killer of the disease-stressed trees. Outbreaks of the bark beetle have also been reported in the Lake Tahoe Basin.

Increased white and red fir mortality and top kill occurred in scattered small to moderate pockets above about 5,500 ft over a large area from the Eldorado National Forest south through the Stanislaus National

Forest. Individuals and groups of white firs are continuing to die throughout the southern Sierra. White fir top-kill and mortality continued to be scattered throughout the Tule River/Hot Springs and Greenhorn Ranger Districts and in the Piute Mountains, Greenhorn Ranger District, Sequoia National Forest.

True fir mortality continued to be high in much of southern California. In many, if not most, cases mortality was caused by insect-disease complexes, including annosus root disease, leafy mistletoe, fir roundheaded borer, along with the fir engraver. In some cases, trees were on such droughty sites that fir engraver beetle was the major pest involved in mortality. An outbreak of fir engraver has been observed in parts of the Tehachapi Mountains, resulting in approximately 10 percent of the trees being killed.

Region 6: Oregon, Washington

Host(s): True firs

Acres with mortality and overall numbers of trees killed by fir engraver increased for the fifth straight year killing an estimated 931,000 trees on approximately 672,378 acres in the Pacific Northwest Region in 2004.

The following reporting areas are listed in order of highest levels of mortality: Colville—111,107 acres, 2.63 trees per acre; Wenatchee—55,646 acres, 2.02 trees per acre; Wallow-Whitman—71,203 acres, 1.00 trees per acre; Yakama Indian Reservation—28,238 acres, 2.04 trees per acre; Colville Indian Reservation—26,540 acres, 2.06 trees per acre; Malheur—60,381 acres, 0.88 trees per acre; Umatilla—58,745 acres, 0.79 trees per acre; and Ochoco—40,921 acres, 0.97 trees per acre.

Flatheaded fir borer,
Melanophila drummondi

Region 5: California

Host(s): Douglas-fir

Several Douglas-firs were killed southwest and east of Willits, Mendocino County. East of Willits, a group of four trees averaging 14.7 inches dbh was killed; and southwest of Willits, 11 trees averaging 10.3 inches dbh (5.0 to 20.6 inches) were killed. Two of the trees east of Willits were also infected with *Leptographium wageneri*, the cause of black stain root disease.

Flatheaded wood borer,
Agrilus spp.
Chrysobothris texanus

Region 2: Colorado

Host(s): Gambel oak, English oak, eastern redcedar

Drought, in combination with late frosts, along with increased flatheaded wood borer activity has killed Gambel oaks along the southern Front Range, and to a lesser extent the Durango-Cortez area. This has led to attacks and losses of English oaks and other ornamental oaks in Denver and Colorado Springs. Some mortality from this insect was associated with Cytospora canker on native and ornamental oaks in Front Range communities.

A large number of eastern redcedars in western Kansas windbreaks were attacked by *Chrysobothris texanus*. Trees planted close together coupled with the drought conditions made the cedars more susceptible to attack.

Forest tent caterpillar,
Malacosoma disstria

Region 1: North Dakota

Host(s): Basswood, aspen, hardwoods

The Turtle Mountains were not aerial surveyed in 2004 because of the forest tent caterpillar (FTC) population collapse. In 2003, a substantial increase in FTC occurred (17,720 acres defoliated compared to 4,350 in 2002), which prompted State personnel to conduct egg mass surveys during October in order to predict populations and impacts for 2004. Several late-spring frosts in 2004 caused high larvae mortality, resulting in a collapse of the infestation.

Region 4: California, Idaho, Nevada, Utah, and Wyoming

Host(s): Aspen, Cottonwood

In 2004, FTC defoliation in Utah affected approximately 12,300 acres of aspen, maple and oak, an acreage similar to that for the entire region in 2003. In 2004, defoliation on private lands in Utah accounted for over 7,000 acres. Over 1,500 acres were affected on the Wasatch-Cache National Forest.

In Nevada, acres of suspected FTC defoliation in 2003 and 2002 were ground checked in 2004. Forest tent caterpillar was not found in any of the areas; however, Cytospora canker was prevalent in many of the areas mapped. Most of the reported FTC damage for 2003 and 2002 should be attributed to a combination of Cytospora canker, borers, and drought.

Region 8: Louisiana, South Carolina, Texas

Host(s): Tupelo gum, upland hardwoods

Defoliation of tupelo gum occurred on 275,000 acres of forested wetlands in Ascension, Livingston, St. James, and St. John Parishes in southeasern Louisiana in 2004. This defoliation was severe (greater than 50 percent) on 156,000 acres, an increase from the previous year. South Carolina reported severe defoliation on 433,000 acres in Beaufort, Berkeley, Charleston, Colleton, Darlington, Dillon, Dorchester, Florence, Georgetown, Horry, Jasper, Marion, Orangeburg, and Williamsburg Counties, sometimes in concert with cankerworms and other secondary defoliators. In Texas, the earlier outbreak along the lower Trinity River in Liberty County had largely disappeared in 2004.

Region 9/Northeastern Area: Illinois, Indiana, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New York, Pennsylvania, Rhode Island, Vermont, West Virginia

Host(s): Aspen, basswood, pin oak, red oak, white oak, sweetgum, other hardwoods

Massachusetts aerial survey documented 44,787 acres of heavy defoliation from this insect. This was approximately double the defoliation reported in 2003. Widespread defoliation was observed in Plymouth, Bristol, and Norfolk Counties with small patches of defoliation observed in Berkshire County. In Maine, light defoliation caused by FTC was noted around the Bagaduce River in Penobscot in 2004. The areas are predominantly forested with a mix of aspen and red oak, and were heavily defoliated in 2003. Populations elsewhere in the State remained at endemic levels. There was an increase in populations in New Hampshire where there was 30,000 acres of scattered defoliation reported throughout Cheshire, Grafton, Merrimack, and Sullivan Counties. There was also an additional 2,628 acres of defoliation mapped in Carroll and Coos Counties in the White Mountain National Forest. There were moderate numbers of moths caught in pheromone traps for the first time in over a decade. New York reported moderate to heavy defoliation associated with this insect in St. Lawrence County and scattered other locations throughout the eastern and central parts of the State. There was also 49 acres of defoliation, discoloration, and dieback mapped on the Seneca Nation of Indians lands in Erie County and 166 acres of defoliation on Mohawk Nation lands. In

many stands, one or more other defoliators were also active, so it was difficult to precisely quantify how much of the damage was caused by this particular pest. However, FTC was probably the single most significant defoliator in New York in 2004. In Rhode Island, a small, but healthy, infestation became established in the towns of East Providence, Warwick, and East Greenwich. Damage was minimal but this population was poised to expand in 2005. In Vermont, defoliation was mapped on 90,300 acres, mostly in the southern and western part of the State, a large increase from the previous year. Many defoliated trees failed to refoliate and some trees refoliated in early fall. The numbers of moths caught in pheromone traps was up slightly.

FTC defoliated 35,000 acres in Lycoming County, Pennsylvania. There was no significant defoliation reported in West Virginia in 2004. Populations remained very low in Illinois, down from an outbreak that occurred in the southeastern counties in 2002. This was the second consecutive year of defoliation in the southeastern Indiana counties of Jefferson and Switzerland. About 100,000 acres were defoliated in an area north of the Ohio River, west to the town of Madison, and east to the town of Patriot. Populations finally collapsed in the Lake States in 2004. At its peak in 2002, forest tent caterpillar defoliated over 7 million acres in Minnesota alone. In 2004, only 10,500 acres were defoliated in Minnesota. Four years of defoliation resulted in aspen mortality on over 27,500 acres, and declining aspen occurred over an additional 22,900 acres. About 3,200 acres of paper birch mortality and 200 acres of decline also occurred.

Fruittree leaf roller,
Archips argyrospilus

Region 5: California

Host(s): California black oak

The fruittree leaf roller outbreak continued into the sixth year on the San Bernardino National Forest. Moderate levels of defoliation also occurred on Palomar Mountain in San Diego County.

Grasshoppers,
Various species

Region 8: Oklahoma

Host(s): Oaks, other hardwoods

Damage by grasshoppers in post and blackjack oak stands in central Oklahoma declined sharply in 2004, and no large areas of defoliation were reported.

Hemlock looper (fall flying),
Lambdina fiscellaria

Region 9/Northeastern Area: Maine, Massachusetts, New York, Pennsylvania, Vermont

Host(s): Eastern hemlock, balsam fir, white spruce

No damage or moth flight was observed in Massachusetts. Maine reported that no significant hemlock looper populations were found in 2004. No activity was reported in New York in 2004. Populations remained low in Vermont and no damage was observed. There was 25,000 acres of defoliation in Tioga County, Pennsylvania.

Jack pine budworm,
Choristoneura pinus

Region 9/Northeastern Area: Michigan, Minnesota, Wisconsin

Host(s): Jack pine

In Michigan, 314,164 acres of defoliation occurred and activity was expected to decline in coming years. About 47,000 acres were defoliated in Minnesota, up from 18,500 in 2003. About 36,000 acres were defoliated in northern Wisconsin, and populations were expected to increase over the next couple of years.

Jeffrey pine beetle,
Dendroctonus jeffreyi

Region 4: California, Nevada

Host(s): Jeffrey pine

Jeffrey pine beetle activity increased dramatically along the Nevada/California border. In 2004, over 11,700 trees were killed affecting 5,600 acres compared to 600 trees killed within 400 acres in 2003. The Humboldt-Toiyabe National Forest experienced the greatest amount of Jeffrey pine beetle activity affecting 11,500 trees over 5,400 acres.

Region 5: California

Host(s): Jeffrey pine

In northeastern California, Jeffrey pine beetle activity and related mortality continued near 2003 levels. Mortality associated with this beetle has not increased much despite several years of below normal precipitation. Scattered large tree mortality could be found throughout northeastern California as well as a few groups of smaller diameter trees.

In the southern Sierra, Jeffrey pine beetle-related mortality increased somewhat in 2004. Scattered mortality of older Jeffrey pine continued in the vicinity of Clarks Fork east to Kennedy Meadows, Summit Ranger District, Stanislaus National Forest. Jeffrey pine beetle continued to be active in the Piute Mountains, Greenhorn Ranger District, Sequoia National Forest.

Numbers of Jeffrey pines infested and killed by Jeffrey pine beetle increased over 2003 in southern California. Beetles were observed throughout the San Bernardino Mountains and at Crystal Lake and higher elevations on the north slopes of the San Gabriel Mountains.

A current, active outbreak is killing large numbers of trees in the Tehachapi Mountains. Approximately 10 percent of the trees are impacted. A continuing drought in the area along with overstocking of the stands should maintain the outbreak.

Jeffrey pine needleminer,
Coleotechnites sp., near *milleri*

Region 5: California

Host(s): Jefrey pine

A needleminer similar in appearance to the lodgepole needleminer was again detected in Jeffrey pine in a residential area north of the town Truckee and at the junction of Interstate 80 and State Highway 89 south,

in 2004. The same areas experienced an outbreak of this insect in 1996. Approximately 600 acres were affected in 2004. Tree mortality is not expected unless Jeffrey pine beetle activity increases in the area.

Jumping oak gall wasp,
Neuroterus saltatorius

Region 9/Northeastern Area: Ohio, Missouri
Host(s): Bur oak, white oak

This insect did not cause significant damage in Ohio in 2004. Jumping oak gall damage was very minimal in Missouri in 2004. Other common gall-forming insects were quite noticeable in recent years, especially the gouty oak gall wasp and the horned oak gall wasp.

Lace bugs,
***Corythucha* spp.**

Region 9/Northeastern Area: Connecticut, West Virginia
Host(s): Black cherry, sycamore, oaks

No significant activity was reported in Connecticut in 2004. In West Virginia, moderate discoloration was observed statewide on oak, black cherry, and sycamore.

Larch sawfly,
Pristiphora erichsonii

Region 10: Alaska
Host(s): Eastern larch (Tamarack), ornamental Siberian larch

Larch sawfly activity increased significantly from less than 600 acres in 2003 to 14,215 acres in 2004, reversing a decline that began after 1999 when sawfly populations impacted nearly 450,000 acres. Infestations were concentrated in two areas: the Yukon Flats National Wildlife Refuge where 4,363 acres were reported infested and 9,136 acres 15 miles north of McGrath. A biological evaluation conducted in August 2000 within the Innoko National Wildlife Refuge by Forest Health Protection staff found that within the areas studied, 70 percent of the live larch were severely defoliated, while 27 percent of the total component of larch had died. A 2003 follow-up evaluation indicated that 80 percent of the larch defoliated in 2000 had died. In south-central Alaska, the larch sawfly has continued its advance southward affecting ornamental Siberian larch plantings from Sterling to Homer on the Kenai Peninsula. While larch is not native south of the Alaska Range, it is a popular landscape tree. The ornamental (Siberian) larch plantings appear to be less susceptible to stress from repeated defoliation by the sawfly and are responding better to nonchemical control measures. However, larch sawfly continues to expand into the south-central Alaska urban areas.

Large aspen tortrix,
Choristoneura conflictana

Region 9/Northeastern Area: Michigan, Vermont, Wisconsin
Host(s): Bigtooth aspen, aspen

There was an increase in defoliation that was associated with satin moth in southeastern Vermont. There were 1,187 acres of defoliation in Michigan. Tens of thousands of acres of defoliation occurred in pockets ranging in size from 100 to 2,000 acres scattered across the northern part of Wisconsin. The same areas were in the process of recovering from several years of forest tent caterpillar defoliation. Growth loss was expected.

Loblolly pine sawfly,
Neodiprion taedae linearis

Region 9/Northeastern Area: Missouri
Host(s): Shortleaf pine, loblolly pine

Widely scattered pockets of severe defoliation of shortleaf pine and planted loblolly pines occurred across southern Missouri in May of 2004.

Locust leaf miner,
Odontota dorsalis

Region 8: Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia
Host(s): Black locust

Locust leaf miner activity was heavy in Tennessee and Virginia in 2004. In the Carolinas, damage was light to moderate.

Region 9/Northeastern Area: Maine, Massachusetts, New Hampshire, New York, Ohio, Pennsylvania, Vermont
Host(s): Black locust

Massachusetts reported spotty defoliation in black locust, mostly along the interstate highways. Populations and the resultant defoliation caused by this species remained very high throughout the range of the host in Maine in 2004. Mortality of black locust on stressed sites continued around the State. In New Hampshire, defoliation was limited, a decline from 2003. This insect caused severe defoliation on black locust over large portions of eastern New York. Some damage and noticeable population increases were also noted in the western parts of the State, but the worst damage was located in the Hudson River Valley. There was occasional, moderate defoliation and discoloration in Vermont. Some mortality occurred in stands defoliated in previous years.

Aerial surveys in Ohio and Pennsylvania did not detect any significant damage in 2004. In West Virginia, this beetle caused noticeable damage on the Monongahela National Forest in Grant and Pendleton Counties.

Lodgepole pine needleminer,
Coleotechnites milleri

Region 5: California
Host(s): Lodgepole pine

The lodgepole pine needleminer outbreak in Yosemite National Park that began with the 1992 to 1994 generation continued with low to high levels of defoliation and low mortality in 2004. Aerial surveys delimited a total of 34,500 acres of defoliation. High levels of defoliation occurred over an estimated 25,800 acres, with low levels over about 8,700 acres. Defoliation expanded to the east in the Unicorn and Fletcher Creek watersheds and to a new area of defoliation in Rodgers Canyon. Several dozen lodgepole pines died due to the effects of needleminer defoliation and related factors in the Sunrise High Sierra Camp and the adjacent Backpacker's Camp.

Looper complex – Linden looper and half-winged geometer,
Erannis tiliaria
Phigalia titea

Region 9/Northeastern Area: Indiana
Host(s): Various oak species

The looper complex defoliated approximately 150,000 acres in Indiana. The areas most affected were the Jackson-Washington State Forest, Yellowwood State Forest, Brown County State Park, and the northeastern part of the Hoosier National Forest. For 2005, no defoliation was expected in the southern areas of the epidemic, and similar defoliation was expected in the northern part of the epidemic. Tree mortality was expected to occur and increase in 2005 because of the defoliation and the late summer drought.

Maple leafcutter,
Paraclemensia acerifoliella

Region 9/Northeastern Area: Vermont
Host(s): Sugar maple

There was moderate defoliation and discoloration reported in central Vermont; approximately 330 acres of damage was mapped.

Maple trumpet skeletonizer,
Epinotia aceriella

Region 9/Northeastern Area: Pennsylvania, Vermont
Host(s): Sugar maple, red maple

A trace amount of defoliation was reported in Vermont. Scattered, light defoliation was observed in McKean County, Pennsylvania.

Mountain pine beetle,
Dendroctonus ponderosae

Region 1: Idaho, Montana

Host(s): Lodgepole pine, ponderosa pine, other pines

The mountain pine beetle-infested area mapped in 2004 increased significantly in many parts of the region, despite several of the more heavily infested areas not being surveyed this year. With the exception of the Saint Joe National Forest reporting area, most areas in northern Idaho reported increases. The largest outbreak in Idaho still exists on the Nez Perce National Forest, where an estimated 160,000 acres of lodgepole pine stands are still infested. Near the Canadian border, on the Idaho Panhandle National Forest, thousands of acres of lodgepole and whitebark pines continue to harbor mountain pine beetle outbreaks. In western Montana, most areas also showed an increase in infested areas. One exception was the Lolo National Forest reporting area; however, some of the most heavily impacted areas—Plains/Thompson Falls and Superior Ranger Districts—were not surveyed. On the Deerlodge and Flathead National Forests, where most affected areas were surveyed, the infested area increased once again. Acres on which beetle-caused mortality was recorded—in all species and on all ownerships—increased considerably, to more than 675,300 acres in 2004. Slightly more than 496,200 acres had been recorded in 2003. The figure recorded this year is the highest total infested area in the region since 1988. Had all infested acres been mapped, we would have easily exceeded 700,000 acres. On those infested acres, more than 3 million trees were killed in 2003—recorded as faders in 2004. Nearly 90 percent of those were lodgepole pine. Although beginning to decline in some stands because of host depletion, beetle populations are still expanding in many areas. As many as 80 new attacks per acre (in lodgepole pine) were found in one area surveyed. A significant increase in beetle-caused mortality was also noted in whitebark pine stands—especially on the Gallatin and Beaverhead National Forests and in Yellowstone National Park. While parts of the Beaverhead National Forest and Yellowstone National Park were not surveyed, we know from ground observations that infestations increased substantially in those areas. One surveyed stand in Yellowstone National Park showed an average 95 whitebark pines per acre had been killed within the past 3 years. In those stands, only 25 whitebark pine per acre remain alive. In eastern Montana, more than 14,000 acres of second-growth ponderosa pine stands on the Lewis and Clark National Forest showed varying amounts of beetle-caused mortality. Many susceptible lodgepole, whitebark, and ponderosa pine stands remain in the region. Unless weather patterns change to ones more favorable to their host and less conducive to beetle survival and population expansion, or management activities reduce the availability of susceptible hosts, mountain pine beetle (MPB) populations and resultant tree mortality will continue until few susceptible hosts remain.

Region 2: Colorado, South Dakota, Wyoming

Host(s): Bristlecone pine, limber pine, lodgepole pine, ponderosa pine, piñon pine, whitebark pine

MPB populations were at outbreak and epidemic levels throughout the region and able to respond rapidly to large expanses of susceptible hosts. Aerial survey indicated that 433,500 acres in Colorado, 57,500 acres in South Dakota, and 177,250 acres in eastern Wyoming contained trees killed by MPB.

On the Colorado Front Range, there were notable MPB infestations in ponderosa pine of the Poudre Canyon. In the southern portion of the State, there are two major outbreaks of MPB that have been occurring for the past several years. In Chaffee County, MPB has killed large numbers of ponderosa pine. This outbreak originated in the upper Arkansas River valley, and spread into South Park, the Wet Mountains, the Sangre de Cristo Mountains, and Cañon City.

Another large outbreak area in Colorado occurred in the Vail Valley along the Interstate 70 corridor. Here, MPB has killed large numbers of lodgepole pine. Beetle populations remain at high levels in Grand, Routt, Larimer, Summit, and Eagles Counties and the northern San Luis Valley. Summit and Grand Counties are high visibility resort areas and the increasing beetle populations in lodgepole pine frustrate forest management. Also, increased beetle activity was noted in bristlecone and limber pine at higher elevations of the central mountains. Local entomologists think that the recent warmer summers may be pushing up the reported elevation ranges for greater mortality.

MPB caused extensive ponderosa pine mortality throughout the Black Hills of South Dakota and Wyoming during the past 6 years. Surveys detected large and expanding MPB infestations in the Beaver Park and Deerfield areas of the Black Hills. Pine mortality was widespread in the Northern Hills and Central Hills, and a number of areas with very large, concentrated beetle pockets had fused. In the Bearlodge Mountains of Eastern Wyoming, heavy MPB impact is seen despite a decrease in beetle activity here in 2003.

A multistand, landscape-level episode of MPB-caused mortality is in progress and intensifying. Entire slopes appeared to be fading in unison, in some cases with just a few green survivors. Although these areas have the highest concentration of beetle-caused mortality, MPB activity appeared to be elevated across most of the Black Hills.

Outbreak population levels of MPB resulted in large-scale losses of pines near Cody, Sheridan, Lovell, Ten Sleep, Sundance, and Laramie. In some areas, the beetle built up high populations in Wyoming's five-needle pines of whitebark and limber and then moved onto other pine host species of lodgepole and ponderosa.

Over 14,000 ponderosa, lodgepole, and limber pines were killed by MPB in central Wyoming. The eastern edge of the southern Bighorn Mountains and along the Johnson County/Washakie County boundary had large areas of beetle-caused tree mortality in ponderosa pine.

Limber pine mortality was prevalent in the southern Bighorn Mountains. Over 8,000 trees on 1,000 acres were killed. Lodgepole pine mortality observed in the southern Bighorn Mountains was not as numerous as limber and ponderosa pine mortality.

The lower elevation lodgepole pine areas on the Medicine Bow National Forest saw significant expansion of MPB activity in the Sierra Madre and Snowy Mountain Ranges.

Region 3: Arizona, New Mexico

Host(s): Ponderosa pine

MPB-caused ponderosa pine mortality decreased from 190 acres in 2003 to 5 acres in 2004. In Arizona, 5 acres of MPB-caused mortality occurred on Grand Canyon National Park. In New Mexico no MPB-caused mortality was recorded.

Region 4: California, Idaho, Nevada, Utah, Wyoming

Host(s): Limber pine, lodgepole pine, Jeffrey pine, ponderosa pine, western white pine, whitebark pine

MPB-caused tree mortality increased regionwide for the second consecutive year. Approximately 3,554,800 trees were killed over 691,500 acres in 2004. This represents an acreage increase of 63 percent compared to 1,806,800 trees killed over 258,800 acres in 2003. Three distinct areas comprise the majority of the tree mortality. The first is on the Salmon-Challis National Forest, including the Sawtooth National Recreation Area, in central Idaho. In this area, a total of 1,199,800 lodgepole and whitebark pine trees were killed over 289,300 acres. Mortality in this area began in 1998 and is currently the largest MPB outbreak area in the region. The second area is in northern Utah on the Wasatch-Cache and Ashley National Forests. Here, the outbreak (in its second consecutive year) expanded by 63 percent from 297,000 trees killed across 50,800 acres in 2003 to 1,267,700 trees killed across 136,700 acres in 2004. The third area, located on the Bridger-Teton National Forest in Wyoming, increased dramatically for the third consecutive year. In this area, tree mortality increased 82 percent from approximately 240,000 trees over 37,000 acres in 2003 to 982,700 trees across 212,000 acres in 2004. Lodgepole and five-needle pines were the most affected tree species in all three areas.

Region 5: California

Host(s): Foxtail pine, limber pine, lodgepole pine, piñon pine, ponderosa pine, sugar pine, western white pine, whitebark pine

Insects: Native

MPB infested several large foxtail pines struck by lightning on China Mountain, and South China Mountain in the Scott Mountains. In northeastern California, MPB activity was similar to the higher levels of mortality during 2003. Most mortality associated with MPB attacks was found in sugar pine, although higher levels of lodgepole pine mortality were detected in some areas. In many areas the attacked sugar pines were stressed due to white pine blister rust (*Cronartium ribicola*) infection and moisture stress. Several conifer stands on the Lassen National Forest, particularly on the Almanor and Eagle Lake Ranger Districts, had substantial amounts of blowdown during the 2002-2003 winter. During 2004, several of the residual ponderosa pine trees around these blowdown areas were attacked and killed by MPB. The small group kills were very numerous and affected around 3 to 5 trees each.

There are several areas on the Tahoe National Forest where some level of lodgepole pine mortality due to MPB is always detected. These are typically monoculture stands characterized by trees over 80 years of age and greater than 8 inches dbh. High levels of MPB-caused mortality of lodgepole pine were also detected along Interstate 80 between Donner Lake and Cisco Grove. Most of this mortality occurred as individual trees as opposed to group kills.

The 2001 Star Fire on Foresthill Ranger District, Tahoe National Forest, continued to have a large number of dead and dying sugar pine from fire injuries and bark beetle attacks. Mortality associated with the MPB continued on the Sequoia National Forest along the Divide Highway from Quaking Aspen south through the Greenhorn Mountains and on Breckenridge Mountain.

Mountain pine beetle populations, particularly in the San Bernardino and San Jacinto Mountains, have been at moderate levels during the multiyear drought and mortality event. There are no data on whether numbers have fallen in 2004 as they have for the western pine beetle. Mountain pine beetle-infested piñon pine (*Pinus monophylla*), probably infected with black stain root disease (caused by *Leptographium wageneri*), are dying north of Big Bear Lake, San Bernardino County. There are no other MPB hosts in the immediate vicinity of the infested piñons.

Region 6: Oregon, Washington

Host(s): Jeffrey pine, lodgepole pine, ponderosa pine, sugar pine, western white pine, whitebark pine

In 2004, 534,631 acres were affected, with an average of 6.44 trees per acre killed, compared to 409,596 acres affected with an average of 4.03 trees per acre in 2003. Overall increases in mortality were reported in whitebark, lodgepole, and sugar pine host types. Decreases in mortality from 2003 levels were reported in ponderosa and western white pine.

Tree mortality in lodgepole pine increased in both acres and intensity. Total reported affected acres increased from 240,915 acres, 5.92 trees per acre, in 2003 to 380,306 acres, 8.22 trees per acre, in 2004. Most heavily affected areas include lands administered by the Forest Service on the Fremont (14,936 acres with 0.98 trees per acre), the Deschutes (13,933 acres with 1.37 trees per acre), the Malheur (9,545 acres with 0.70 trees per acre), the Okanogan (7,150 acres with 2.28 trees per acre), and the Wenatchee National Forests (5,207 acres with 2.66 trees per acre). Additionally, the Warm Springs Indian Reservation reported 9,438 acres with mortality averaging 1.71 trees per acre.

Activity in sugar pine was reported on more acres in 2004 than in 2003, but at similar intensities. Due to the ecological importance of this rapidly disappearing species, observers attempt to record individual tree mortality to better assist land managers. Over 83 percent of the recorded sugar pine mortality was mapped within the Siskiyou reporting area.

Activity in western white pine decreased, from 13,650 acres (1.15 trees per acre) in 2003 to 7,245 acres (0.88 trees per acre) in 2004. Highest levels of mortality were reported on lands administered by the Forest Service on the Idaho Panhandle National Forest within the State of Washington (our reporting area) with 2,234 acres mapped with an average of 1.33 trees per acre. Other significant areas of mapped mortality included private lands of the Colville reporting area (1,758 acres with 0.87 trees per acre), and lands administered by the Forest Service on the Colville (1,091 acres with 0.63 trees per acre) and the Gifford-Pinchot National Forests (1,225 acres with 0.25 trees per acre).

Aerial detection of western white pine mortality is difficult because it is often found as a minor component in mixed-conifer stands and has a color signature very similar to that of Douglas-fir.

Acres affected in the whitebark pine type increased from 25,550 acres, 2.41 trees per acre, in 2003 to 41,036 acres, 4.63 trees per acre, in 2004. Highest levels of mortality were reported on lands administered by the Forest Service on the Okanogan National Forest, with over 13,000 acres reported with mortality averaging 6.54 trees per acre killed. Approximately 11,300 acres were reported on the Wenatchee National Forest, with 4.94 trees per acre killed. On the Yakama Indian Reservation, 3,600 acres were mapped, with an average of 2.58 trees per acre killed. In Oregon, the most significant reported mortality was mapped on lands administered by the Forest Service within the Wallow-Whitman reporting area (4,046 acres with 0.97 trees per acre).

Nantucket pine tip moth,
Rhyacionia frustrana

Region 8: Regionwide

Host(s): Loblolly pine, shortleaf pine

Mississippi reported scattered light infestations of tip moth in 2004. In Louisiana, damage was found in association with outbreaks of pitch canker in loblolly pine plantations. Tennessee reported three generations of tip moths in 2004, producing scattered light to moderate defoliation. North Carolina experienced low to moderate tip moth activity statewide, while South Carolina reported generally declining activity. Texas reported only low levels of tip moth activity in 2004.

Oak leaf roller,
Archips semiferana

Region 8: Texas

Host(s): Oaks

During the spring of 2004, heavy populations of oak leaf rollers occurred over much of central Texas. This resulted in many homeowner inquiries to the Texas Forest Service, but damage was not significant.

Oak leaftier,
Croesia semipurpurana

Region 8: Tennessee

Host(s): Oaks

Scattered moderate defoliation was reported in middle Tennessee in combination with spring and fall cankerworms. No other significant occurrences were reported.

Region 9/Northeastern Area: Maine, West Virginia

Host(s): Black oak, northern red oak, scarlet oak

In Maine, no defoliation resulting from this pest was recorded in 2004. Surveys for oak leaftier eggs were conducted again in West Virginia in Barbour, Pendleton, Pocahontas, Randolph, and Tucker Counties in

late winter, but no eggs were observed and follow-up summer larval surveys reported very light populations only in Randolph, Tucker, and Pocahontas Counties.

Orange-striped oakworm, ***Anisota senatoria*** **Spiny oakworm,** ***Anisota stigma*** **Pinkstriped oakworm,** ***Anisota virginiensis*** **Yellownecked caterpillar,** ***Datana ministra***

Region 8: North Carolina, Tennessee, Texas

Host(s): Oaks

Defoliation of up to 80 percent by orange-striped oakworms was reported from park stands in northeastern Tennessee. North Carolina reported scattered defoliation of shade trees. In east Texas, oakworm infestations were seen in numerous localized areas in September and October.

Region 9/Northeastern Area: Connecticut, Maryland, New Jersey, New York, Pennsylvania, Rhode Island, West Virginia

Host(s): Black oak, red oak

In Connecticut, there was defoliation detected by aerial survey on 261 acres in the town of Canterbury in Windham County, a decline from 2003. New York reported that the populations on Long Island were significantly lower than the previous several years and that the worst of the outbreak was likely over. Insect populations were low in Rhode Island in 2004. In Maryland, New Jersey, Pennsylvania, and West Virginia, this insect did not cause any significant defoliation in 2004.

Oystershell scale, ***Lepidosaphes ulmi***

Region 9/Northeastern Area: Maine, Vermont

Host(s): Beech

In Maine, oystershell scale remained in the townships of T12 R12 and T3 R13 along the southwest side of Caribou Lake. Regeneration, as well as codominant trees, exhibited damage. Scattered light dieback and occasionally heavy populations were reported in Vermont, an increase in damage from 2003.

Pandora moth,
Coloradia pandora

Region 5: California

Host(s): Jeffrey pine, lodgepole pine

The pandora moth outbreak, first detected in June 2002, continued on the Mammoth and Mono Lake Ranger Districts, Inyo National Forest in 2004. Light larval feeding and defoliation on Jeffrey and lodgepole pines was observed over about 5,000 to 10,000 acres. Moderate feeding was very localized and occurred on less than 1,000 acres in the vicinity of Lookout Mountain and south and east of Dry Creek.

Region 6: Oregon

Host(s): Ponderosa pine, Jeffrey pine, lodgepole pine

Special surveys were conducted in 2002 and 2004 to map defoliation caused by the Pandora moth. In 2004, 87,532 acres were mapped within the Winema reporting area, compared to 24,431 acres in 2002.

Peach bark beetle,
Phloetribus liminaris

Region 9/Northeastern Area: New York

Host(s): Black cherry

Populations of this bark beetle remained spotty but detectable throughout much of the range of cherry in New York. The most severe damage was associated with buildup of downed slash from storms or logging operations.

Periodical cicada,
Magicicada septendecim

Region 9/Northeastern Area: West Virginia

Host(s): Hardwoods

Despite media hype, very few Brood X cicadas were seen in New York. In Hunterdon, Mercer, and Somerset Counties, New Jersey, hordes of the periodical cicada brood X emerged, annoyed residents with their singing, and damaged deciduous trees. A large emergence of the periodical cicada also occurred in the southwestern part of Ohio in 2004. In Pennsylvania, there were nearly 37,000 acres affected by the periodical cicada in Adams, Bedford, Cumberland, Dauphin, Franklin, and Fulton Counties. In West Virginia, emergence of brood X was reported causing damage to branches in the six Eastern Panhandle counties of Berkeley, Grant, Jefferson, Hampshire, Mineral, and Morgan. There also was a small, light emergence at Beech Fork Lake in Wayne and Cabell Counties in the western part of the State.

Pine colaspis beetle, *Colaspis pini*

Region 8: Louisiana, Virginia

Host(s): Southern pines, ornamental cypress

As in previous years, this beetle caused localized defoliation of pine plantations in eastern and central Louisiana, particularly in eastern Rapides Parish and the southeastern-most parishes. No significant damage occurred, but the defoliation is unsightly and causes landowner concerns. Some mortality of ornamental cypress was noted during droughty periods.

Pine engraver beetles, *Ips* spp.

Region 1: Idaho, Montana

Host(s): Ponderosa pine, lodgepole pine, other pines

Pine engraver beetle populations, and associated tree mortality, increased substantially in ponderosa pine stands in the region; however, most of those increases were noted on the Flathead Indian Reservation in western Montana. There, the infested area increased from 1,800 acres in 2003 to more than 14,000 acres in 2004. Elsewhere in the region, populations were static or declined slightly—the next highest total infested area was found on the Custer National Forest in eastern Montana. There, slightly less than 1,000 acres were infested. Still, faders were recorded on just over 17,100 acres this year; compared to slightly more than 6,100 acres in 2003. An estimated 35,500 trees—mostly ponderosa pines—were killed.

Region 2: Colorado, Nebraska, South Dakota, Wyoming

Host(s): Colorado blue spruce, Englemann spruce, jack pine, lodgepole pine, piñon pine, ponderosa pine

Aerial survey estimates from 2003 and 2004 indicate that 6,333,000 piñon trees have died on approximately 1,332,000 acres in Colorado. The rains of 2004 greatly slowed the ips beetle epidemic on the southern Front Range and extreme southwestern Colorado and the snowpack of winter 2004 -2005 may help continue this trend. In other piñon areas, such as near Grand Junction and south of Montrose, the beetle populations were probably peaking in 2004.

Ips pini killed mature lodgepole pine trees in Forest Service campgrounds on the Grand Mesa, Uncompahgre, Gunnison National Forest and in Montrose and San Miguel Counties of Colorado.

Mortality of ornamental Colorado blue spruce along the Front Range of Colorado by *Ips hunteri* greatly declined in 2004 to only a few hundred trees killed. Nonetheless, this insect is still considered important due to the high value of this species in urban settings.

In contrast to MPB, ips activity was concentrated in the southern Black Hills, in and around burned areas, and around the perimeter of the Black Hills. Pine engraver beetle was causing significant ponderosa pine mortality in the Black Hills in 2004. The beetle population increased exponentially around the Black Hills in the last 4 years. These recent, unprecedented levels of pine engraver beetles were a consequence of wildfires, MPB, and weather events, such as hail and snow-breakage that has resulted in a tremendous build up of dead, weakened, and damaged tree material. With a nearly unlimited supply of food, the beetle populations increased significantly.

It appeared that more ips activity in white or Black Hills spruce, is taking place, as compared in 2003. This, too, may be a drought-related response by opportunistic insects attacking drought-stressed trees. Top-kill and outright mortality were both noted in several northern Black Hills locations.

Region 3: Arizona, New Mexico

Host(s): Ponderosa pine, piñon pine

Ponderosa pine mortality caused by ips beetles decreased significantly from 695,130 in 2003 to 84,595 acres in 2004. In Arizona, ponderosa pine mortality due to ips beetles was reported on the Apache-Sitgreaves (11,445 acres), Coconino (11,050 acres), Coronado (630 acres), Kaibab (29,805 acres), Prescott (8,850 acres), and Tonto (6,365 acres) National Forests; Grand Canyon National Park (3,195 acres), Saguaro National Monument (10 acres), Walnut Canyon National Monument (15 acres), and BLM lands (2,835 acres); Fort Apache (7,450 acres), Haulapai (195 acres), Navajo (420 acres), and San Carlos (55 acres) Indian Reservations; and State and private lands (2,250 acres). Piñon ips caused tree mortality was recorded on the Apache-Sitgreaves (2,975 acres), Coconino (750 acres), Coronado (65 acres), Kaibab (6,920 acres), and Tonto (25 acres) National Forests; BLM land (160 acres); and Fort Apache (70 acres), Haulapai (180 acres), Hopi (15 acres), Navajo (10,280 acres), Navajo-Hopi (5 acres), and San Carlos (30 acres) Indian Reservations; and State and private land (2,295 acres). In New Mexico, ips caused ponderosa pine mortality was detected on the Gila National Forest (25 acres). Piñon ips caused tree mortality was recorded on the Carson (33,265 acres), Cibola (8,120 acres), Gila (975 acres), and Santa Fe (21,165 acres) National Forests; BLM lands (19,910 acres); Isleta Pueblo (265 acres), Jemez Pueblo (35 acres), Jicarilla Apache (20 acres), Mescalero Apache (1,240 acres), Nambe Pueblo (2,540 acres), Picuris Pueblo (30 acres), Sandia Pueblo (20 acres), Santa Clara Pueblo (1,785 acres), Taos Pueblo (2,140 acres), Tesuque Pueblo (50 acres), Zuni Pueblo (725 acres), and other (5 acres) tribal lands; and State and private lands (30,085 acres).

Region 4: California, Idaho, Nevada, Utah

Host(s): Lodgepole pine, piñon pine, ponderosa pine

Mortality due to *Ips pini* remained at endemic levels (approximately 600 trees over 300 acres) throughout the region. Beetles killed scattered groups of young ponderosa pine, mostly on the Bridger-Teton National Forest in Wyoming.

In 2004, aerial surveys continued in areas of previously unsurveyed piñon pine with recent and older tree mortality recorded without differentiation. In 2004, approximately 6,184,300 piñon pine trees were killed by piñon ips (*Ips confusus*) over 942,800 acres in Utah, Nevada, and eastern California. Most of the mortality occurred on national forest and other Federal lands in Nevada. In Nevada, approximately 2,540,200 trees were killed across 413,100 acres on the Humboldt-Toiyabe National Forest. Another 1,538,700 trees were killed across 266,000 acres of BLM and Department of Defense lands. Tree mortality on private lands in Nevada accounted for 285,500 trees killed on 30,100 acres. In Utah, most of the piñon pine mortality affected the Dixie, Ashley, and Manti-La Sal National Forests, where 476,100 trees died over 63,800 acres. Additional mortality (412,700 trees, 71,700 acres) occurred on tribal, BLM, and national park lands. Tree mortality on private lands in Utah was 82,900 trees within 12,500 acres. Historically, piñon-juniper forests have not been aerially surveyed. However, the dramatic increase in piñon mortality in 2001 and 2002 as a result of the extended drought and increased piñon ips populations necessitated documenting this widespread mortality.

Region 5: California

Host(s): Coulter pine, knobcone pine, lodgepole pine, piñon pine, ponderosa pine

Ips pini continues to be associated with Jeffrey pine mortality in the Piute Mountains (Sequoia National Forest) in 2004. The California five-spined ips, *Ips paraconfusus,* is associated with ponderosa pine mortality on Breckenridge Mountain (Sequoia National Forest) and on the Bass Lake Ranger District, Sierra National Forest, in 20- to 40-year-old ponderosa pine plantations in the Miami Peak-Miami Basin area north and east of Oakhurst. The western pine beetle was often found with the pine engravers in both areas.

Pine engravers in southern California, including *I*ps *confusus*, *I*ps *paraconfusus,* and *I*ps *pini,* were epidemic in the San Bernardino Mountains and the Peninsular Ranges.

Insects: Native

Monterey pine ips (*I*ps *mexicanus*), combined with red turpentine beetle, drought, snow breakage and advancing age, was involved in mortality of knobcone pine in northwestern California. Some specific locations include Whiskeytown National Recreation Area, Lakehead, and Bonanza King.

Mortality of single leaf piñon throughout the eastside of the Sierra Nevada from the Humbolt-Toiyabe National Forest south throughout the range continued at lower levels in 2004, in the same areas where high mortality was reported in 2003. Populations of the *Ips confusus* have dropped off dramatically compared to levels in 2003. An assessment of piñon mortality in 2003 was conducted as part of a westwide assessment throughout the piñon type. In California, piñon mortality was highest on the Toiyabe National Forest (27 percent) and lowest on the Inyo National Forest (1 percent). Piñon mortality on the San Bernardino National Forest was 12 percent in the sampled plots.

Region 6: Oregon, Washington

Host(s): Ponderosa pine

Mortality increased from 7,835 acres (1.54 trees per acre) in 2003 to 27,601 acres (2.25 trees per acre) in 2004. Mortality was scattered throughout the region, with the following reporting areas listed in order of the highest levels of tree mortality: Colville Indian Reservation—9,227 acres (2.46 trees per acre), Okanogan—2,816 acres (5.33 trees per acre), Glenwood—3,607 acres (2.59 trees per acre), Wallow-Whitman—1,318 acres (1.97 trees per acre), and Siskiyou—4,981 acres (0.51 trees per acre).

Region 8: Regionwide

Host(s): Loblolly pine, shortleaf pine, slash pine

Engraver beetle activity was intense in Georgia in 2004, especially in the upper Coastal Plain and lower Piedmont; it was most often associated with thinning activities and annosus root disease. Florida reported up to 35 percent of hurricane-damaged pines to be infested with engraver beetles, although Mississippi experienced little activity in hurricane-damaged host material. South Carolina reported continuing problems in dense, unthinned stands in drought-affected areas; while Oklahoma reported scattered small engraver beetle spots.

Pine reproduction weevil, *Cylindrocopturus eatoni*

Region 5: California

Host(s): Ponderosa pine

Young ponderosa pines were killed by the pine reproduction weevil on a small parcel in Paynes Creek, Tehama County. The parcel was harvested approximately 5 years ago and subsequently planted. Pine mortality was higher in open areas versus areas that received partial shade from residual oaks. Drought during the past 5 years likely contributed to the mortality.

Pine sawflies,
Neodiprion spp.
Diprion spp.

Region 2: Colorado

Host(s): Ponderosa pine

Much of the southern Black Forest area of the eastern plains northeast of Colorado Springs in Kiowa County experienced heavy defoliation of native ponderosa pine in 2004 by pine sawflies. Heaviest defoliation tended to be on open-grown trees or those around the edge of dense stands. An area of less than 100 acres was aerially sprayed by a private landowner in late July just as larval feeding was nearly complete. Mortality is not expected, as in past outbreaks in this area, and it will be monitored in summer 2005.

Region 8: Florida, Louisiana, North Carolina, Tennessee, Texas, Virginia

Host(s): Southern pines

Infestations of red-headed pine sawflies were widespread throughout the Georgia Coastal Plain in 2004, with 1- and 2-year-old plantations hardest hit. An increase in planting of longleaf pines in the area is a likely contributing factor. Scattered sawfly damage was reported in Louisiana. North Carolina reported scattered black-headed pine sawfly infestations on loblolly and longleaf pine. South Carolina experienced scattered sawfly activity throughout the State. Tennessee reported reduced activity, although localized defoliation of loblolly pine plantations continued to be significant in the central part of the State. Redheaded pine sawfly damage was reported for the first time in several years in east Texas. Virginia reported only light, scattered defoliation.

Pine tussock moth,
Dasychira grisefacta

Region 2: Nebraska

Host(s): Ponderosa pine

Defoliation of ponderosa pines by pine tussock moth on an area of a few hundred acres on private land near Kimball, Nebraska, has been ongoing for 2 years now. Heavy defoliation of old needles occurred locally and control actions are contemplated by some landowners. Only light, local mortality is expected if drought and ips beetles do not cause increased tree stress. Monitoring is planned for spring/summer 2005.

Piñon needle scale,
Matsucoccus acalyptus

Region 5: California

Host(s): Singleleaf piñon pine

No reports were received in 2004.

Ponderosa pine twig scale,
Matsucoccus bisetosus

Region 5: California

Host(s): Ponderosa pine

An infestation of twig scale is impacting ponderosa pines west of Shingletown, Shasta County. Symptoms include twig and branch dieback, roughened bark, and shortened needles.

Red oak borer,
Enaphalodes rufulus

Region 8: Arkansas, Oklahoma, Virginia

Host(s): Northern red oak, black oak

The red oak borer epidemic declined in 2004 in north-central Arkansas and northeastern Oklahoma in association with oak decline and drought. The cumulative effects of drought, insects, pathogens, and advanced age in these forests has produced levels of decline from which most trees will not be able to recover. The return of normal precipitation has to put downward pressure on the red oak borer population, but mortality and degrade of lumber quality among oaks is already severe. (See also Oak decline, abiotic and biotic influences under Declines/Complexes).

Red turpentine beetle,
Dendroctonus valens

Region 5: California

Host(s): Coulter pine, Jeffrey pine, ponderosa pine, singleleaf piñon pine, sugar pine

Attacks of red turpentine beetle were often in association with western pine beetle attacks of ponderosa pine on Boggs Mountain Demonstration State Forest and across northeastern California (Siskiyou, Modoc, and Lassen Counties). Endemic levels of red turpentine beetles have been noted throughout the southern and central Sierra Nevada and the Coastal Range. The beetle has often been found in conjunction with other bark beetle activity. Individual trees with severe red turpentine beetle attack have been found in the Lake Tahoe area.

The red turpentine beetle has developed very high populations in the Transverse Ranges, particularly the San Bernardino and San Gabriel Mountains. Elsewhere in southern California, populations are also high. Red turpentine beetle was common on fire damaged Coulter pine in the vicinity of Pine Hills near Julian and on Jeffrey pine in the Kitchen Valley area, San Diego County. Five Coulter pine near Big Pine Pool in the Lost Valley area, San Diego County were heavily attacked by the beetle. Jeffrey pine and fire damaged Coulter pine on Cuyamaca Peak, San Diego County, had numerous red turpentine beetle attacks.

Reproduction weevils,
Hylobius pales
Pachylobius picivorus

Region 8: Regionwide

Host(s): Southern pines

Tennessee reported moderate to heavy reproduction weevil damage in the Cumberland Plateau, with scattered activity in other parts of the State. North Carolina and South Carolina reported only scattered activity.

Roundheaded pine beetle,
Dendroctonus adjunctus

Region 3: Arizona, New Mexico

Host(s): Ponderosa pine

Roundheaded pine beetle-caused tree mortality in the region decreased significantly to 525 acres in 2004 compared to 4,530 acres in 2003. In Arizona, roundheaded pine beetle mortality was recorded on 315 acres of the Coronado National Forest and 210 acres of the Chiricahua National Monument. In New Mexico, no mortality was detected due to roundheaded pine beetle.

Scarlet oak sawfly,
Caliroa quercuscoccineae

Region 9/Northeastern Area: Pennsylvania, West Virginia

Host(s): Black oak, pin oak, red oak

In Pennsylvania, this sawfly together with a related sawfly, *Periclista* spp., caused noticeable defoliation on 100 acres in Perry County and 100 acres in Tioga County. Although this sawfly was present on about 100,000 acres in Clinton and Lycoming Counties, no noticeable damage occurred. In West Virginia, this insect did not cause any significant damage in 2004.

Sequoia pitch moth,
Vespamima sequoiae

Region 5: California

Host(s): Monterey pine

The moth remains a constant nuisance to ornamental Monterey pines throughout areas where the host is planted.

Southern pine beetle,
Dendroctonus frontalis

Region 8: Regionwide

Host(s): Loblolly pine, shortleaf pine, slash pine, longleaf pine, Virginia pine, eastern white pine

Southern pine beetle (SPB) activity continued to decline across the region in 2004, with a total of only 5,681 spots reported regionwide. Alabama and South Carolina reported the only significant activity, with 1,503 spots reported in Alabama and 4,178 in South Carolina. Five South Carolina counties were in outbreak status, although even this represented a 42 percent decline from 2003. On national forest land, Mississippi and Alabama experienced moderate activity.

Region 9/Northeastern Area: Delaware, Maryland, New Jersey, Ohio, West Virginia

Host(s): Austrian pine, loblolly pine, pitch pine, Scotch pine, Virginia pine

In Delaware, the southern pine beetle was at a low or declining level statewide. In Maryland and Ohio, no activity was reported. In New Jersey, southern pine beetle infestations continued to decline and only scattered spots were seen in Cumberland, Atlantic, and Cape May Counties. In West Virginia, baited Lindgren funnel traps were placed in Jackson, Wayne, Mingo, and Mason Counties. Although 373 adults were trapped, predatory clerid beetles were numerous and indicated populations were static or declining.

Spruce beetle,
Dendroctonus rufipennis

Region 1: Idaho, Montana

Host(s): Englemann spruce

Spruce beetle (SB) populations remained at endemic levels throughout northern Idaho and Montana in 2004. In no reporting area were more than 100 infested acres recorded. In 2003, the Gallatin (Montana) and Kanisku (Idaho) National Forests had reported outbreaks totaling several hundred acres each. In each area, few currently infested trees were noted in 2004. We know the outbreak recorded east of Yellowstone Lake in Yellowstone National Park, mapped at more than 8,700 acres in 2003 still exists; however, the park was not flown in 2004. We are, therefore, unsure of its current extent. It likely continued at least at its previous level. Through 2003, more than 20,000 Engelmann spruce had been killed in that outbreak. Total mortality likely increased significantly.

Region 2: Colorado, Wyoming

Host(s): Colorado blue spruce, Engelmann spruce

Over all of Colorado, aerial survey estimates for spruce tree mortality caused by SB were 155,500 trees killed on 63,000 acres. SB was more prevalent throughout Colorado and still at epidemic levels in the Routt County blowdown area. In the 1997 big blowdown area on the Routt National Forest, the beetle was infesting a few thousand standing trees. Various species of Ips in spruce and other secondary bark beetles of spruce were also common.

Throughout southern Colorado, the majority of SB activity occurred in scattered pockets of less than 100 acres, but there were a number of sites where large numbers of mature spruce were killed. In terms of the scattered activity, there were about 30 known SB sites on the White River, Grand Mesa, Gunnison, Uncompahgre, San Juan, and Rio Grande National Forests. Areas of significant expansion in 2004 include Baylor Park, White River National Forest, and County Line, Rio Grande National Forest.

The Forest Service and Telluride Ski Resort have been successful in minimizing SB impacts to the ski area by using aggressive sanitation and a trap tree program.

SB killed hundreds of thousands of Engelmann spruce in Wyoming in 2004. Approximately, 34,000 trees were killed on 14,000 acres of forest lands near Cody, Dubois, the western Bighorn Mountains, Sierra Madre, and Snowy Mountain Ranges.

Region 3: Arizona, New Mexico

Host(s): Spruce

SB-caused tree mortality decreased slightly from 24,435 acres in 2003 to 21,205 acres in 2004. In Arizona, SB mortality occurred on the Apache-Sitgreaves (3,895 acres) and Coconino (265 acres) National Forests and Fort Apache (2,255 acres) and Navajo (120 acres) Indian Reservations. In New Mexico, SB-related tree mortality occurred on the Carson (3,905 acres), Cibola (225 acres), Lincoln (35 acres), and Santa Fe (1,620 acres) National Forests; Mescalero Apache (65 acres) and Taos Pueblo (435 acres) tribal lands; and State and private lands (8,345 acres).

Region 4: Idaho, Utah, Wyoming

Host(s): Spruce

SB-caused tree mortality remained relatively static in 2004. SB killed approximately 124,400 trees over 38,300 acres in 2004, a 23-percent acreage increase compared to 149,900 trees over 29,600 acres in 2003. Utah continues to have the largest outbreak affecting 123,100 trees killed on 37,100 acres in 2004. Most of the SB-caused tree mortality occurred on the Dixie (40,300 trees, 9,200 acres), Manti-La Sal (33,100 trees, 8,300 acres), Ashley (15,600 trees, 8,100 acres), and Wasatch-Cache (15,500 trees, 4,900 acres) National Forests. Because of the narrow window associated with fading spruce, no spruce mortality was aerially mapped on the Bridger-Teton National Forest in 2004. However, spruce beetle activity was noted in 2003 and in all likelihood continued to kill additional spruce in 2004.

Region 6: Oregon, Washington

Host(s): Engelmann spruce

All reported mortality in Oregon and Washington in 2004 was in Engelmann spruce. Reported acres affected increased from 19,106 acres, 7.51 trees per acre in 2003 to 23,444 acres, 9.24 trees per acre in 2004. The majority of mortality occurred on lands administered by the Forest Service, within the Okanogan reporting area. On the Okanogan reporting area, 18,285 acres were mapped with spruce mortality averaging 10.56 trees per acre. The Wenatchee reporting area reported 2,448 acres with 6.63 trees per acre.

Region 9/Northeastern Area: Maine, Vermont

Host(s): White spruce, red spruce

There were no reports for SB in Maine in 2004. Populations decreased in Vermont and no damage was reported, probably due to the declining impact of the previous year's drought.

Region 10: Alaska

Host(s): Black spruce, Lutz spruce, Sitka spruce, white spruce

Total area of new SB activity mapped across Alaska increased 40 percent from 2003 levels to 129,063 acres. Although SB populations have maintained endemic levels in most areas of the State since the

epidemic of the 1990s, active infestations were observed in several areas that have received beetle pressure since the SB outbreak peaked in 1996. Many areas of the State have been rendered unsuitable for further, large-scale beetle activity due to changes in stand structure and composition. These same areas, however, remain at moderate to high risk for potential catastrophic wildfire due to the large volume of beetle-killed spruce. Much of the Copper River Valley, Kenai Peninsula, and the west side of Cook Inlet fall in this category.

The infestation at Lake Iliamna, which had remained static for the past 2 years at 25,000 acres, declined by 87 percent in 2004. SB activity in this area will probably persist at low levels for 1 or 2 more years until the remaining susceptible spruce are killed by the beetle. SB activity has also declined within Katmai National Park by 28 percent in 2004. However, not all the areas flown in 2003 were reflown in 2004 due to logistical constraints. SB activity along the Kuskokwim River, between McGrath and the Yukon Delta, has increased significantly for the second year in a row with 13,042 acres of current activity mapped.

New SB activity was mapped on 4,924 acres of Kenai Peninsula stands in 2004, a 72 percent decrease. SB activity continues, however, in discrete pockets along the Kenai River lowlands and tributaries from Soldotna to Skilak Lake (773 acres), the south side of Kachemak Bay (213 acres), the Chugach National Forest (1,444 acres), and portions of the Kenai National Wildlife Refuge (2,330 acres). Most of this new SB activity is likely a result of forest disturbance (harvest, land, and right-of-way clearing) that occurred or continues to occur near previously undisturbed stands. SB activity is greatest in stands that are increasing in susceptibility to SB attack (average diameter approaching 10 inches or larger; 70 percent or higher composition of spruce) and that have experienced some type of disturbance that favors a buildup of beetle populations. In 2004, 2,854 acres of ongoing light to moderate SB activity were mapped in the Copper River Valley, an 18 percent decline. Further decline of SB activity is expected in this area. SB activity appears to be building again within the forested valleys along upper Turnagain Arm. Moderate to heavy SB activity was mapped above Indian (680 acres) and Bird (488 acres) Valleys this year. This outbreak has been building for 2-3 years. Fire hazard created from stands killed in the 1990s outbreak in the inhabited mid- to upper-hillside areas within the municipality of Anchorage continues to put this area at risk of a potential catastrophic fire.

New SB activity encountered near Fairbanks was minimal, although occasional SB pockets were observed along the fringes of active fires west to the Tanana River lowlands and as far north as the Yukon River. Extensive wildfires covered much of the interior forests and the fire fringe areas will be included in future surveys for any bark beetle (spruce beetle, ips engraver) and wood boring insect activity.

Spruce budworm,
Choristoneura fumiferana

Region 9/Northeastern Area: Maine, Michigan, Minnesota, New Hampshire, New York, Vermont, Wisconsin

Host(s): Balsam fir, white spruce, red spruce, black spruce, hemlock

Monitoring of low level spruce budworm (SBW) populations continued in Maine in 2004. Monitoring included field observations, a statewide light trap network, and pheromone baited traps that were highly attractive to budworm moths. Field observations showed no larvae were found and no defoliation was detected. Light traps were operated through the budworm flight period at 25 locations statewide. Moths caught in the network of light traps were of no consequence and indicated a continuation of endemic levels in 2005. Pheromone traps were placed in the same locations utilized in 2003. Catches continued to average less than 10 moths per trap with many traps catching no budworm. Data suggested the budworm population will remain at endemic levels in 2005. No defoliation was detected in New Hampshire, but there was an increase in insects caught in pheromone traps. In New York, no significant defoliation by spruce budworm was observed in 2004, and trap counts were generally low to moderate. There was no damage observed in Vermont.

Michigan had nearly 26,000 acres defoliated. About 83,000 acres were defoliated in Minnesota in 2004, up from 35,000 in 2003. This was the 51st consecutive year of detectable SBW defoliation in the State. More

than 26,000 acres were defoliated in Wisconsin, about 3,800 acres of decline and mortality occurred in areas previously defoliated. Also observed in these same areas was spruce needle drop associated with a previously unknown fungus, *Setomeloanomma holmii*.

Region 10: Alaska

Host(s): Sitka spruce, white spruce, Lutz spruce

SBW is one of the most destructive insect pests of white spruce in North America. In 2004, 83,989 acres of spruce in interior Alaska were defoliated by the SBW indicating that a new outbreak may have begun. Near Fairbanks, 25,873 acres were infested, mostly in the hills and ridges around Fairbanks (Nenana Ridge, Parks Ridge, Chena Ridge) and along the Tanana River from Fairbanks west to Manley Hot Springs. Additionally, 44,081 acres were infested along the Yukon River in the Lower Birch Creek area.

Texas leaf-cutting ant,
Atta texana

Region 8: Louisiana, Texas

Host(s): Southern pines, hardwoods

Localized defoliation of pine plantations occurs annually in east Texas and west central Louisiana on sites with deep, sandy soil. Populations of these ants remain relatively stable from year to year.

The obtuse sawyer,
Monochamus obtusus

Region 5: California

Host(s): Douglas-fir

The obtuse sawyer was found infesting dying Douglas-fir in a Christmas tree plantation near Camino, El Dorado County.

Walnut caterpillar,
Datana integerrima

Region 8: Texas

Host(s): Pecan

Localized activity from this pest was reported in late summer in east Texas. Without control, these caterpillars often reduce nut production.

Insects: Native

Western balsam bark beetle,
Dryocoetes confuses

See subalpine fir mortality complex.

Western black-headed budworm,
Acleris gloverana

Region 6: Oregon, Washington

Host(s): Western hemlock, Sitka spruce, white spruce, true firs, Douglas-fir, mountain hemlock

Acres of defoliation decreased from 2,390 acres in 2002 to 2,247 acres in 2003. There were no reported areas of black-headed budworm defoliation in 2004.

Region 10: Alaska

Host(s): Western hemlock, mountain hemlock, Lutz spruce, Sitka spruce, white spruce

The western black-headed budworm is native to the forests of coastal and southwestern Alaska. Budworm populations in Alaska have been cyclic, appearing quickly, affecting extensive areas, and then decreasing just as dramatically in a few years. It occurs primarily in southeast Alaska and has been documented there since the early 1900s. More recently, black-headed budworm populations followed a general increasing trend during the early 1990s but have been declining since that time. In 2004, there were 1,483 acres compared to 3,283 in 2003. There were 950 acres of defoliation on the islands surrounding Davidson Inlet and 265 acres were near Howard Cove, Kuiu Island.

Western hemlock looper,
Lambdina fiscellaria lugubrosa

Region 6: Washington

Host(s): Western hemlock, conifers

Acres defoliated in Washington State decreased significantly from over 35,200 acres in 2002 to 1,411 acres in 2003. In 2004, 2,189 acres were mapped in the vicinity of Baker Lake, Washington.

Western oak bark beetle,
Pseudopityophthorus pubipennis

Region 5: California

Host(s): Tanoak, white oak

Galleries of the beetle were noted in *Armillaria*-killed tanoaks in the Cazadero and Annopolis areas of Sonoma County and in dead white oaks in Ukiah, Mendocino County.

Western pine beetle,
Dendroctonus brevicomis

Region 1: Idaho, Montana

Host(s): Ponderosa pine

Ponderosa pine mortality attributed to western pine beetle declined from 12,800 acres in 2003 to about 10,340 acres in 2004. About 30,000 trees have been killed in the past 2 years. Most mortality was observed on the Kaniksu reporting area, Idaho Panhandle National Forests. Other areas with high mortality include the Nez Perce Indian Reservation and Clearwater National Forest reporting area in northern Idaho. Isolated affected stands were scattered in western Montana mainly on the Kootenai and Lolo National Forests. As moisture levels approach normal or above normal conditions, western pine beetle populations are expected to further decline in 2005.

A pheromone trap-out project was conducted in northern Idaho in an area where a wildfire partially burned ponderosa pine trees. These trees were subsequently infested with western pine beetles and could not be removed prior to beetle flight. The traps proved successful in removing beetles from the area, protecting adjacent old growth.

Region 2: Colorado

Host(s): Lodgepole pine, piñon pine, ponderosa pine

This beetle has been killing large ponderosa pines in several locations on the San Juan National Forest. It is most frequently found in combination ("mixed broods") with *Ips pini* (pine engraver) and *Dendroctonus adjunctus* (the round headed pine beetle); these beetles have killed several hundred large mature ponderosa pine. Population levels of western pine beetle were higher in 2004 than they have been for at least 30 years.

Region 3: Arizona, New Mexico

Host(s): Ponderosa pine

Tree mortality attributed to this insect decreased slightly to 58,160 acres in 2004 vs. 63,315 acres in 2003. In Arizona, western pine beetle mortality was detected on the Apache-Sitgreaves (230 acres), Coconino (305 acres), Coronado (5 acres), and Kaibab (5 acres) National Forests; Fort Apache (145 acres), Navajo (110 acres), and San Carlos (60 acres) Indian Reservations; and State and private lands (5 acres). In New Mexico, significant activity was detected on the Carson (1,345 acres), Cibola (1,180 acres), Gila (35,375 acres), Lincoln (6,160 acres), and Santa Fe (3,735 acres) National Forests; Valles Caldera National Preserve (15 acres), Bandelier National Monument (160 acres); BLM lands (130 acres); Acoma Pueblo (20 acres), Isleta Pueblo (260 acres), Mescalero Apache (1,595 acres), Taos Pueblo (55 acres), and other (170 acres) tribal lands; and State and private lands (7,095 acres).

Region 4: Idaho

Host(s): Ponderosa pine

In 2004, the number of ponderosa pine trees killed decreased by 50 percent from 12,800 trees over 8,100 acres in 2003 to 6,400 trees over 7,200 acres. Most of the mortality occurred on the Payette (2,100 trees, 2,100 acres) and the Boise (1,700 trees, 1,900 acres) National Forests. An additional 1,100 trees were also killed over 1,300 acres of private land in Idaho.

Insects: Native

Region 5: California

Host(s): Coulter pine, ponderosa pine

Following two winters with low water content in the snowpack, mortality caused by the western pine beetle has increased in northwestern California. There are single trees and small groups scattered from Clear Lake, Lake County, northward to Oregon. Some of the older pine plantations are beginning to experience small group kills. A combination of drought, high stocking levels, black stain root disease, and western pine beetle have caused large group kills of ponderosa pine at McCloud Flats, Shasta County.

Western pine beetle activity continued at 2003 levels throughout most of northeastern California. Individual dead trees, as well as small and large groups of dead ponderosa pines, are widely scattered across the northeastern counties. The most notable areas on the Modoc National Forest were on the Warner Mountain Ranger District in the area of Cedar Pass and near Adin Pass on the Big Valley Ranger District. Groups of ponderosa pine mortality were apparent on some of the drier east side sites on the Plumas and Lassen National Forests. Continued activity was evident in the vicinity of Bass Lake, on the east side of Goat Mountain, and in the Miami Creek Basin on the Bass Lake District, Sierra National Forest.

Activity also continued in the southern Sierra Nevada in 2004. The largest increase in western pine beetle-caused mortality was concentrated in the southern Sierra Nevada on the Sequoia National Forest—on Breckenridge Mountain, in the Greenhorn Mountains south of Alta Sierra on the Greenhorn Ranger District, and along the Divide Highway on the Tule River and Hot Springs Ranger Districts.

Numbers of trees killed by western pine beetles in the San Bernardino and San Jacinto Mountains dropped dramatically in 2004. Monitoring traps caught numerous beetles in early May and early June, but subsequent catches were low. There were numerous host trees available and the drought had continued through the winter of 2003 and 2004. In April and May, several hundred pines in developed recreation sites on the San Bernardino National Forest were sprayed with carbaryl to protect them against this and other bark beetle species. Recent western pine beetle activity was noted on Coulter pine in the group camp areas, Heise County Park, and on fire damaged Coulter pine on Cuyamaca Peak, San Diego County.

Region 6: Oregon, Washington

Host(s): Ponderosa pine

Acres affected by western pine beetle activity increased from 129,877 acres, 1.11 trees per acre in 2003 to 195,775 acres, 1.06 trees per acre in 2004. Activity in large ponderosa pine was reported on 62,941 acres at 0.78 trees per acre and activity in pole-sized trees was reported on 132,834 acres at 1.19 trees per acre.

Highest levels of mortality occurred on the following reporting areas: Spokane Indian Reservation—27,630 acres (1.86 trees per acre), Colville Indian Reservation—43,674 acres (1.08 trees per acre), Ochoco —41,858 acres (0.70 trees per acre), Colville—22,235 acres (1.03 trees per acre), Yakama Indian Reservation—15,931 acres (1.00 trees per acre), and Malheur—11,039 acres (1.11 trees per acre).

Western pineshoot borer, *Eucosma sonomana*

Region 5: California

Host(s): Ponderosa pine

The western pineshoot borer continues to damage plantation ponderosa pine near Pondosa, Siskiyou, and Shasta Counties and north of Lookout, Modoc County. Damage, in the form of stunted terminals, varies widely across the plantations, but exceeds 50 percent in some areas.

Western spruce budworm,
Choristoneura occidentalis

Region 1: Idaho, Montana

Host(s): Douglas-fir, Engelmann spruce, true firs

Due to unpredictable and inclement weather conditions during peak survey times this year, actual total acreage with defoliator damage is underestimated. Ground surveys conducted in a majority of 'no fly' areas were moderately to heavily infested with western spruce budworm (WSB)—typically the most prevalent defoliator in the region. Acres that were flown and mapped with defoliation is about 187,000 acres, of which 177,000 was solely WSB. Unfortunately, those sections that were not flown are historical 'hot spots' of WSB when populations are high. In the Gallatin National Forest and surrounding areas, WSB defoliated roughly 73,000 acres – a considerable increase from 56,000 acres in the same forest since last year and currently the highest concentrations in Montana.

Yellowstone National Park was not flown this year, but severe defoliation by budworm and widespread mortality due to Douglas-fir beetle were detected in adjacent forest lands (the Gallatin National Forest in Montana and the Targhee National Forest in Idaho). Based on observation, land managers of the park estimated 3,000 acres were damaged solely by WSB.

In Montana, over 177,000 acres of Douglas-fir trees were mapped with WSB defoliation, nearly twice the amount recorded for 2003 (124,000 acres) and over three times as much recorded for 2002 (53,000). The most heavily impacted reporting areas were Beaverhead (36,800 acres), Gallatin (73,000 acres), Deerlodge (29,432 acres), and Helena (31,173 acres) National Forests. Most other areas in Montana retain small, endemic WSB populations. In the Kanisku National Forest and nearby areas of northern Idaho, WSB has been continually feeding on western hemlock for the past 2 years. About 56,000 acres were mapped this year—a three-fold increase since last year. These locations with sequential defoliation are experiencing moderate to heavy needle loss in the overstory, with heavy to complete loss on understory hosts. Surprisingly, trapping efforts on permanent plots around the region for WSB showed higher moth counts last year. Despite considerable high defoliation occurring in specific areas of the region, overall budworm population levels are considered moderate. Monitoring will continue in 2005.

Region 2: Colorado, Wyoming

Host(s): Douglas-fir, Engelmann spruce, white fir

Aerial survey estimates of infested acres for 2004 were 20,000 in Colorado and almost 4,000 in Wyoming's Shoshone and Medicine Bow National Forests.

The southern portion of Colorado's Uncompahgre Plateau had significant levels of WSB defoliation in Engelmann spruce and subalpine fir. Some of the smaller trees were decimated due to several consecutive years of defoliation. Budworm activity was noted in other high elevation spruce-fir forests, including developed recreation sites on the Rio Grande National Forest.

Region 3: Arizona, New Mexico

Host(s): Douglas-fir, true firs, spruce

WSB defoliation increased from 167,325 acres in 2003 to 248,895 acres in 2004. In Arizona, WSB defoliation was recorded on the Apache-Sitgreaves (10 acres) National Forest and the Navajo Indian Reservation (10,700 acres). In New Mexico, WSB defoliation was detected on the Carson (114,990 acres), Cibola (300 acres), Gila (695 acres), Lincoln (770 acres), and Santa Fe (68,720 acres) National Forests; Valles Caldera National Preserve (5,390 acres); Jicarilla Apache (1,760 acres) and Taos Pueblo (3,640 acres) tribal lands; and on approximately 41,920 acres of State and private lands.

Insects: Native

Region 4: Idaho, Utah, Wyoming

Host(s): Douglas-fir, true firs

WSB-caused tree defoliation decreased significantly. In 2003, over 203,500 acres were defoliated compared to 33,100 acres in 2004. WSB-attributed defoliation was reported on most of the national forests in southern Idaho, Utah, and western Wyoming. Most of the defoliation in 2004 occurred on the Dixie National Forest (14,900 acres) in southern Utah. Elevated levels of defoliation also occurred on the Caribou-Targhee (3,000 acres), the Payette (2,600 acres), and the Sawtooth (2,400 acres) National Forests in Idaho and the Fishlake National Forest (2,500 acres) in Utah. WSB also affected 1,800 acres of private lands in the region.

Region 6: Oregon, Washington

Host(s): Douglas fir, true firs, Engelmann spruce, western larch

Areas of visible defoliation increased from approximately 143,412 acres in 2003 to 199,684 acres in 2004. The most notable increase in WSB defoliation occurred within the Wenatchee reporting area for the third straight year, where acres of visible defoliation increased from 125,010 acres in 2003 to 157,489 acres in 2004. Other reporting areas showing an increase in acres defoliated by WSB include: Okanogan (1,756 acres in 2003 to 20,088 acres in 2004), Malheur (3,435 acres in 2003 to 5,343 acres in 2004), Idaho Panhandle (955 acres in 2003 to 4,143 acres in 2004) reporting areas; Yakama Indian Reservation (6,010 acres in 2003 to 6,573 acres in 2004); and North Cascades National Park (1,581 acres in 2003 to 3,594 acres in 2004).

The most notable decrease occurred once again on the Gifford-Pinchot reporting area, where no detectable defoliation was reported by aerial surveys.

White pine weevil,
Pissodes strobi

Region 9/Northeastern Area: Connecticut, Maine, New Hampshire, New York, Vermont

Host(s): Eastern white pine, spruce

In Connecticut, extensive damage on white pine and spruce continued for the second consecutive year. This perennial problem continued to limit the growth of white pine as well as Colorado blue and Norway spruce in Maine. Stem deformities, resulting from the loss of the terminal leader, were very common on white pine and caused heavy economic losses to landowners. This pest occurred statewide in New Hampshire. This insect remained endemic to New York statewide. Populations decreased in Vermont but shoot mortality was common statewide. There was less noticeable wilting due to adequate rainfall.

Zimmerman pine moth,
Dioryctria spp.

Region 2: Kansas, Nebraska, South Dakota

Host(s): Austrian pine, Scots pine, ponderosa pine, Colorado blue spruce

Zimmerman pine moths continue to kill branches and entire trees in pine windbreaks, plantations, and landscape plantings in Kansas and Nebraska. In South Dakota, Zimmerman pine moth infestations are increasing. The two species most affected are Austrian and ponderosa pines, with many Austrian pine windbreaks in the southeastern part of the State showing almost 100 percent of the trees infested. In addition, there have been a number of blue spruces that have become infested with a *Dioryctria* insect.

Insects: Nonnative

Alder woolly sawfly,
Eriocampa ovata

Region 10: Alaska

Host(s): Sitka alder, red alder, thinleaf alder

Defoliation by alder wooly sawfly remained consistently moderate to heavy on thin-leaf alder (*Alnus tenuifolia*) in many areas of south-central Alaska from Palmer to Seward. Severe damage continued in the Anchorage Bowl, however, damage was most severe in riparian areas along the Seward Highway on the Kenai Peninsula. Sitka alder (*A. sinuata*) was seldom defoliated. This sawfly is a European species now established throughout the Northern United States, Canada, and recently (less than 10 years) into Alaska.

Ambermarked birch leaf miner,
Profenusa thomsoni

Region 10: Alaska

Host(s): Birch

Birch defoliation was very noticeable in the Anchorage Bowl, Eagle River, and the Mat-Su Valley from late-July through August. More than 138,000 acres of defoliated birch were mapped during aerial surveys, a significant increase from last year. This increase is attributed to the record warm, dry 2004 summer, which favored leaf miner reproduction and dispersal. Although these hardwoods have been defoliated for several consecutive years, as yet there doesn't appear to be any lasting damage. Leaf miner populations have spread approximately 30 miles south of Anchorage with ground surveys indicating low levels of leaf miner defoliation as far south as Soldotna on the Kenai Peninsula. Leaf miners have spread as far north as Talkeetna (Parks Highway) and Pinnacle Mtn. (Glenn Highway). Populations have also been identified in southeast Alaska near Haines and Skagway. This insect has recently been introduced into the Fairbanks area, probably through repeated introductions via nursery/landscape birch stock from Anchorage. On Eielson Air Force Base, evidence was discovered that proved that the amber-marked birch leaf miner could complete development within the much smaller leaves of dwarf birch (probably *Betula glandulosa*). A cooperative biological control program (USDA Forest Service and Animal and Plant Health Inspection Service (APHIS), State of Alaska/Division of Forestry, Canadian Forestry Service, and the University of Alberta) was initiated in 2002. The parasitic wasp, *L. luteolator*, was released in Anchorage during the summer of 2004. In the absence of an efficient biological control agent, birch leaf miner populations will continue to spread unchecked throughout many parts of south-central and interior Alaska's birch forests.

Ambrosia beetle,
Xyleborus similis
Xylosandrus mutilatus

Region 8: Tennessee

Host(s): Pines, hardwoods

A south-wide trapping effort to detect the recently discovered *Xylosandrus mutilatus* was implemented in 2003 and continued in 2004. In Mississippi, this species was reported to infest the live hosts flowering

dogwood (*Cornus florida*), Japanese maple (*Acer palmatum*), muscadine (*Vitis rotundifolia* Michx.); and the dead hosts red maple (*Acer rubrum*), muscadine, sweetgum (*Liquidambar styraciflua* L.), flowering plum (*Prunus cerasifera* Ehrl.), winged elm (*Ulmus alata* Michx.), mockernut hickory (*Carya tomentosa* Nutt.), chinaberry (*Melia azedarach* L.), and yellow poplar (*Liriodendron tulipifera*). Oak seedlings were also reported to be infested in nurseries in Alabama; Tennessee reported ambrosia beetles on golden raintree, persimmon, and ornamental cherry.

Asian cycad scale,
Aulacaspis yasumatsui

Region 5: Guam

Host(s): *Cycas circinalis*

The Asian cycad scale was discovered in 2004 on planted King sago palms on Guam. The concern is that Guam's native forest cycad, the fadang, will become infested. The endemic cycad is a dominant member of the island's forests and is known to be susceptible to the scale.

Asian longhorned beetle,
Anoplophora glabripennis

Region 9/Northeastern Area: Illinois, New Jersey, New York

Host(s): Ash, birch, black locust, elm, horse chestnut, maple, poplar, willow

In New York, new finds of infested trees were located in Queens, Brooklyn, and Manhattan in 2004. The number of new finds was down from 2003. An example of the difficulty of surveying for this beetle in New York City was that one of the finds, a willow, had been a suspected infestation (and in fact had been infested) for several years, but access to the tree was only gained this past year. In New Jersey, there were two known infestations. The first one was discovered in 2002 in Jersey City, Hudson County, and the second was discovered in 2004 in Carteret, Union County. No new infested trees were found in Chicago, Illinois, in 2004.

Asian woolly hackberry aphid,
Shivaphis celti

Region 8: Texas

Host(s): Hackberry, sugarberry

Outbreak levels of this pest were reported in late summer in east Texas and the middle Texas coast. Populations were so heavy that many trees shed their leaves prematurely. Dieback and mortality from this aphid have thus far not been reported.

Balsam woolly adelgid,
Adelges piceae

Region 1: Idaho

Host(s): Grand fir, subalpine fir

Aerial detection estimated 50,000 acres infested by the balsam woolly adelgid (BWA) in northern Idaho in 2004. This more than doubled the 24,500 acres detected in 2003, but still lower than the 85,400 acres recorded in 2002. The yearly fluctuation of acres infested by BWA is likely an artifact of aerial survey methodology and the visibility of BWA symptoms from year to year, and not to a decline in BWA population or distribution in the region. In actuality, the number of acres infested likely exceeds the recent "high" level of 85,000 acres mapped in 2002, as some infested areas may not yet be displaying crown symptoms. Areas with the heaviest infestations occurred on the Saint Joe, Clearwater, and Nez Perce National Forests, along with adjacent State, private, and BLM lands. Subalpine fir mortality occurred in all ages and size classes. Extensive gouting and bole infestations occur on grand fir, but to date no grand fir over 5 inches in diameter has been documented as being killed by BWA. Regeneration mortality of both subalpine and grand fir is high, resulting in forest type conversions in some areas. Continued surveys to delimit the distribution of BWA and damage assessment surveys are planned in the near future.

Region 4: Idaho

Host(s): Grand fir, subalpine fir

This introduced aphid attacks trees of all size classes and is easily identified by the presence of masses of white "woolly" females on the stem bark and branches. Tree mortality can occur within 2-3 years after the initial infestation. North of the Salmon River the insect is now a common forest pest causing substantial mortality in subalpine fir stands. In southern Idaho, the insect is presently found only in isolated cases on residential firs in McCall, Idaho, extending as far south as Cascade Reservoir.

Region 6: Oregon, Washington

Host(s): True firs

Acres affected by BWA decreased from 142,052 in 2003 to 83,325 in 2004, the first decrease in the past 5 years. BWA was mapped throughout the region in high elevation stands dominated by subalpine fir. In Oregon, 34,438 acres were mapped within the Wallowa-Whitman reporting area, 10,831 acres on the Umatilla, and 3,591 acres on the Mount Hood reporting area. In Washington, 8,961 acres were mapped within the Gifford-Pinchot reporting area, 4,781 acres on the Olympic National Park, and 4,145 within the Wenatchee reporting area.

Region 8: North Carolina, Tennessee, Virginia

Host(s): Fraser fir

Fraser fir has a very limited range in the southern Appalachian Mountains and appears almost exclusively in pure stands on the highest mountain peaks or in combination with red spruce at somewhat lower elevations. Since the introduction of BWA, approximately 64,700 acres of Fraser fir have been affected. The insect attacks all age classes, but prefers older trees. The summer of 2003 witnessed high adelgid populations in all infested areas, and scattered mortality was observed in 2004. It is expected that most wild fir populations will undergo another mortality and regeneration cycle within the next 5 to 10 years.

Insects: Nonnative

Region 9/Northeastern Area: Connecticut, Maine, New Hampshire, Vermont, West Virginia

Host(s): Balsam fir

This insect was seen on an occasional landscape fir in Connecticut, but did not seem to threaten managed Fraser fir Christmas trees. In Maine, BWA populations continued to be at very low levels in 2004 apparently as a result of winter mortality. While mortality from past years was striking, the consistent rainfall of 2004 coupled with low population levels of the adelgid allowed a number of the light to moderately damaged trees to recover. Mortality of heavily damaged fir continued to occur, but it became less obvious as old stands were salvaged or fell to the ground. Patches of dead fir, 2 to 10 acres in size, were expected to remain a common sight in eastern Maine for several more years. In New Hampshire, this insect caused damage and mortality throughout the range of balsam fir, except in the most northern part of the State. Stands inspected below 2,000 feet were infested but no infestation was found above that elevation. In Vermont, no live adelgids were observed following the cold winter of 2003–2004, but mortality increased from the previous years' infestation, especially in southern part of the State. Approximately 10,800 acres were mapped. In West Virginia, this insect was still present and causing mortality in Randolph, Pocahontas, and Tucker Counties.

Banded elm bark beetle,
Scolytus schevyrewi

Region 2: Colorado, Kansas, Nebraska, South Dakota, Wyoming

Host(s): American elm, rock elm, Siberian Elm

Banded elm bark beetle was initially discovered in the region during 2003. In the town of Newcastle, Wyoming, 334 Siberian elms were found to be infested with this beetle and were removed in spring 2004. Overall throughout the region, incidence of this beetle in 2004 seemed much reduced from 2003.

A recent study was done to determine if banded elm bark beetles carried the fungal pathogen of Dutch elm disease. Beetles emerging from bolts of American elm infected with Dutch elm disease were determined to carry the fungal pathogen at rates of 4-96 percent of emerging beetles.

Region 9/Northeastern Area: Illinois, Maryland, Michigan, New Jersey

Host(s): Elm

This Asian bark beetle was discovered in Maryland for the first time in 2004 in Laurel, Prince George's County, and Ijamsville, Frederick County, respectively, as part of the USDA APHIS Cooperative Agricultural Pest Survey program. This beetle also was found in 2004 for the first time in Detroit, Michigan, and Carteret, New Jersey, during the USDA Forest Service Rapid Detection of Exotic Bark Beetles Pilot Project.

This exotic beetle of was found in many counties in central Illinois.

Birch leaf miner,
Fenusa pusilla

Region 9/Northeastern Area: New Jersey, Pennsylvania, Vermont

Host(s): Gray birch

In New Hampshire, defoliation was light and scattered in Carroll, Grafton, and Sullivan Counties. There were also about 12,900 acres of defoliation and mortality mapped in Grafton County in the White Mountain

National Forest. No significant activity was reported in Vermont. In Pennsylvania, this pest caused no significant damage in 2004.

Black twig borer,
Xylosandrus compactus

Region 5: Hawaii

Host(s): Numerous, both native and exotic

The introduced black twig borer and its associated pathogens continue to be a serious pest of native and nonnative shrubs and trees, affecting more than 200 species. The borer was first reported in 1961. Several species affected by this ambrosia beetle are rare and/or endangered and the black twig borer continues to hinder forestry plantings, especially koa, as well as native ecosystem restoration in the State.

Region 8: South Carolina

Host(s): Red bay, dogwood, eastern redcedar, others

South Carolina reported twig borer infestations in urban areas in 2004, primarily in coastal areas.

Browntail moth,
Euproctis chrysorrhoea

Region 9/Northeastern Area: Maine, Massachusetts

Host(s): Red oak

In Maine, the Casco Bay region northeast to the Penobscot River continued to support moderate to high population levels of browntail moth in 2004. Low winter temperatures slowed expansion to inland areas but coastal lands remained heavily infested. Webs collected to assess winter mortality showed that webs located 5 miles or more from the coast line exhibited 88 percent larval mortality while webs adjacent to the ocean had little if any winter losses. Aerial control projects against the browntail moth were not conducted by municipalities in 2004 due to mixed landowner acceptance in prior projects. Many lots were treated with ground-based applications using various pyrethroids in private projects. A survey of overwintering webs in the fall of 2004 indicated a continued problem with this pest in 2005. Initial data indicated the 2005 infestation will be similar in acreage to 2004, but will not be as intense in many coastal communities. In Massachusetts, defoliation continued to be limited to the area of Provincetown and Truro on Cape Cod. There was 77 acres of defoliation detected by aerial survey.

Common European pine shoot beetle,
Tomicus piniperda

Region 9/Northeastern Area: Delaware, Illinois, Indiana, Maine, Maryland, Michigan, New Hampshire, New York, Ohio, Pennsylvania, Vermont, West Virginia, Wisconsin

Host(s): Scotch pine, white pine, pines

Pine shoot beetle was collected in Maine in Oxford and Franklin Counties during trapping surveys performed between 2000 and 2003 by the Maine Forest Service. There was both a State and Federal quarantine; Oxford and Franklin Counties were designated regulated counties. During 2004 trapping was

done at nine mill yards and bark processing plants operating under compliance in the unregulated zone. The USDA APHIS, Plant Protection and Quarantine (PPQ) trapped for pine shoot beetle at seven trap sites with red pine in Somerset and Penobscot Counties. No adults were trapped in Maine in 2004. There were 598 insects trapped in Coos County in northern New Hampshire. In New York, this insect was trapped in five new counties in 2004 (Clinton, Essex, Rensselaer, Warren, and Washington), but no significant damage was observed.

In Delaware and New Jersey, this beetle was not detected. In Maryland, pine shoot beetle continued to be present in Allegany, Frederick, Garrett, Montgomery, and Washington Counties. In Ohio, pine shoot beetle presence was established in 2004, in Lawrence and Meigs Counties, which brought the total number of counties to 80. In Pennsylvania, this beetle was detected for the first time in 2004 in Sullivan, Snyder, Union, and Wayne Counties, which brought the total to 39 counties statewide. In West Virginia, no new counties in 2004 were added to the 18 counties known to harbor this beetle. A Federal quarantine remained in effect for this insect.

This exotic beetle was found in many counties in central Illinois.

Elongate hemlock scale,
Fiorinia externa

Region 9/Northeastern Area: Connecticut, New York, Pennsylvania

Host(s): Eastern hemlock

Infestations continued to be heavy throughout Connecticut on both landscape hemlock and plantation grown fir. There was no significant activity reported in New York. This exotic scale insect damaged foliage and shoots in isolated eastern hemlocks in Berks and Pike Counties, Pennsylvania, in 2004. Hemlocks on 10 acres in Berks County experienced extensive dieback.

Emerald ash borer,
Agrilus planipennis

Region 8: Virginia

Host(s): Ash

A consortium of State and Federal agencies implemented an eradication program to control emerald ash borer infestations discovered in Fairfax County, Virginia. The aggressive eradication program took place from early February through early April. Entomologists are continuing to carefully monitor the situation and will respond appropriately if additional infestations are discovered.

Region 9/Northeastern Area: Indiana, Maryland, Michigan, Ohio

Host(s): Ash

State detection surveys were conducted in Connecticut, Massachusetts, New Hampshire, and Vermont, along with surveys of declining ash on Federal lands in Connecticut, Massachusetts, New Hampshire, and New York, with all negative results.

In Prince George's County, Maryland, infested nursery trees imported from Michigan that were destroyed in 2003 were the only threat in the State. In Ohio, intensive emerald ash borer surveys with trap trees in northwestern counties discovered this beetle in Fulton and Henry Counties for the first time in 2004, joining Lucas, Defiance, Wood, Franklin, and Paulding Counties. In an effort to prevent further spread, the Ohio Department of Agriculture quarantined Defiance, Fulton, Lucas, and Henry Counties for the

movement of ash trees, logs, lumber, bark, chips, and firewood from infested areas. Eradication of earlier infestations in Lucas, Defiance, Wood, and Franklin Counties were successful.

This insect was considered established in the six southeast Michigan counties of Livingston, Macomb, Monroe, Oakland, Washtenaw, and Wayne. Eradication was being attempted in 10 counties in southern Michigan, from Ottawa and Kent Counties to the west, and a ring of counties surrounding where the insect was established. The beetle infested over 2 million acres in 2004. Plans include a statewide detection survey in 2004. Trap trees will be used in high-risk areas throughout the State in an effort to detect below-damage threshold populations and to help define the advancing front. In Ohio, emerald ash borer surveys found 336 trees within survey sites to be infested in Lucas, Defiance, Wood, Franklin, and Paulding Counties. In an effort to prevent further spread, the Ohio Department of Agriculture imposed quarantine on ash trees, logs, lumber, bark, chips, and firewood from infested areas. In addition, the agency enacted an external quarantine on all such products from Michigan.

Emerald ash borer was detected on April 19, 2004, in a campground (Jellystone) in Jamestown Township, Steuben County, Indiana. By the end of May 2004, the ash within a one-quarter mile radius of the initial tree were removed and destroyed. The remaining outer one-quarter mile radius to complete the one-half mile eradication area was left for completion by the spring of 2005. Approximately 1,100 ash trees were removed and destroyed at a cost of $87,000. While conducting the eradication in Steuben County, a landowner in LaGrange County near Shipshewana reported emerald ash borer in his ash tree. Investigation of this report and subsequent surveys found the insect in Clay and Van Buren Townships of LaGrange County. This infestation was believed to have entered Indiana through logs and may have occupied the location for 3 to 5 years.

While completing the trap tree survey in the five northeastern counties, an infested tree was found at a second campground (Manapogo) in Mill Grove Township, Steuben County. Subsequent surveys found eight infested trees. The township has been quarantined and was undergoing the process to be included in the eradication project. Plans are to mark the trees in January 2005 and remove them by spring. This area was expected to increase as more trees may be found during the marking project.

Gypsy moth (European),
Lymantria dispar

Region 1: Idaho, Montana, North Dakota, Wyoming

Host(s): Hardwoods

Cooperative detection monitoring continued for the gypsy moth in the region with APHIS and State Departments of Agriculture, Forestry, and Lands in 2004. A network of strategically located pheromone-baited traps was placed throughout all States. No moths were captured on Federal lands, including campgrounds in Yellowstone National Park that were implementing delimitation surveys for the past 2 years. However on State lands, a single Asian gypsy moth was caught in Idaho. This would be the farthest inland an Asian gypsy moth has been captured. Delimitation surveys around the target area will therefore be included in Idaho's regular trapping regime. No moths were caught on State lands in Montana, including the town of Browning where a delimiting grid has been implemented. Otherwise, the trapping program will continue as usual next year.

Region 2: Colorado, Kansas, Nebraska, South Dakota, Wyoming

Host(s): Hardwoods

Thousands of traps were used for early gypsy moth detection throughout the region. Moths were found in Kansas and South Dakota during 2004. Kansas reported two moths trapped: one in a nursery in metropolitan Kansas City and the other in a residential neighborhood in Topeka. Five gypsy moth adults were captured in five traps across South Dakota. Four of the adults were collected from traps in campgrounds and a single catch at a wholesale nursery.

Region 3: Arizona, New Mexico

Host(s): Hardwoods

No male gypsy moths were trapped in Arizona or New Mexico.

Region 4: Idaho, Nevada, Utah

Host(s): Hardwoods

The gypsy moth was first detected in Utah in 1988. Since then, male moths have been captured in various locations nearly every year. In 2004, one male gypsy moth was captured in Wyoming and three were captured in Utah. The Wyoming adult male moth was captured in Jackson Hole. The Utah captures occurred in either residential or campground areas with one adult male moth each in Salt Lake, Summit, and Duchesne Counties. Delimitation trapping in 2005 will occur at the Salt Lake and Summit County sites in Utah and at the Wyoming site. The Duschene County site will not be delimited because the high elevation at which the adult moth was caught is not conducive to gypsy moth development.

Region 5: California

Host(s): Hardwoods

The California Department of Food and Agriculture trapped three male moths as of September 30, 2004. The catches by county were: Marin 1, Nevada 1, San Diego 1. This is three less than captured in 2003 and the same number as captured in 2002. None of the counties reported in 2003 had a capture at the increased Delta/gypsy moth trap density of 25 traps per square mile in a 4-square-mile area around a find.

Region 8: Arkansas, Georgia, North Carolina, Tennessee, Virginia

Host(s): Hardwoods, especially oak species

No gypsy moth defoliation was reported in Virginia in 2005. Although Slow-The-Spread (STS) activities were carried out in North Carolina and Virginia along the leading edge of the gypsy moth population, moth activity was negligible. Mating disruption continues to be the most widely used tactic in the STS program. Surveys showed no high-density populations that might cause problems in 2005. In the Southern Region, rates of spread of gypsy moth are now averaging less than 5 km per year, a reduction of more than 75 percent over pre-STS levels.

Gypsy moth eradication projects were carried out in North Carolina (2,072 acres) and Campbell County, Tennessee (8,400 acres), using the biological insecticide *Bacillus thuringiensis (B.t.)*.

Region 9/Northeastern Area: Connecticut, Delaware, Illinois, Indiana, Iowa, Maine, Massachusetts, Maryland, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, Wisconsin

Host(s): Apple, aspen, basswood, black walnut, northern red oak, pin oak, red oak, white oak

In Connecticut, larger than usual numbers of egg masses were found in statewide surveys, but there was no corresponding increases in defoliation, which was reported on 626 acres. No defoliation of hardwoods resulting from gypsy moth larval feeding was recorded in Maine in 2004. *Entomophaga maimaiga* virus and parasites continued to keep the population at low levels throughout the southern part of the State. The 2004 fall egg mass survey indicated that the population will remain at endemic levels in most locations in 2005. In Massachusetts, there was heavy defoliation on approximately 34,760 acres in Plymouth, Bristol, and Norfolk Counties. There was approximately 5,000 acres of defoliation throughout the southern counties in New Hampshire. New York reported that moderate to heavy defoliation associated with this insect occurred in scattered locations, mostly in the southeastern and central parts of the State. In many stands,

one or more other defoliators were also active, so it was difficult to precisely quantify how much of the damage was caused by this particular pest. Insect populations were low in Rhode Island in 2004. In Vermont, no damage was reported. There was some larval mortality attributed to the fungus *E. maimaiga*. Egg mass counts indicated that populations would remain low in 2005.

There was no defoliation reported in Delaware or Maryland in 2004. In New Jersey, there was 7,966 acres of defoliation reported. In Ohio, there were 5,731 acres with defoliation on State lands and 239 acres in the Wayne National Forest. Pennsylvania reported 16,843 acres affected by gypsy moth. There was no significant activity in West Virginia.

Populations were established in the northeast counties of Illinois, but no discernable defoliation occurred. There were 6,616 acres treated with *B.t.*, and 18,500 acres were treated with pheromone flakes. The gypsy moth population was down in 2004 in Indiana: 9,014 moths were trapped versus 23,090 in 2003 and 15,569 in 2002, respectively. There were 39 sites totaling 39,757 acres treated in 2004. Iowa caught only 27 moths in about 5,000 traps, down from 159 in 2003. Michigan sustained over 45,000 acres of defoliation. In Minnesota, moth catches were down in the central and southeastern part of the State, with only 107 trapped. Cook, Lake, and St. Louis counties in northeast Minnesota had 286 moths trapped. Two egg masses were found north of Tower, Minnesota, 1 mile south of the Boundary Waters Canoe Wilderness Area. Wisconsin populations increased steadily since 2000, with heavy defoliation occurring over 65,000 acres in 2003, up from 24,000 acres in 2002. About 51,450 acres were treated successfully in 2004, resulting in only 20 acres of defoliation. Defoliation was expected in 2005 in Marinette and Oconto Counties. In Missouri, 18 moths were trapped, 8 in St. Louis County, on a statewide monitoring network of more than 11,800 traps.

Region 10: Alaska

Host(s):

Since 1986, Forest Health Protection, in conjunction with University of Alaska Fairbanks Cooperative Extension Service, USDA APHIS, and the State of Alaska Division of Agriculture has placed gypsy moth pheromone monitoring traps in 15 Alaska communities. In 2004, one male European gypsy moth was trapped at the Tanana Campground in Fairbanks. Previously, only two European gypsy moths have been trapped in Alaska. No known populations of the gypsy moth have established in Alaska.

Hemlock woolly adelgid,
Adelges tsugae

Region 8: Georgia, North Carolina, South Carolina, Tennessee, Virginia

Host(s): Eastern hemlock, Carolina hemlock

Infestations of the hemlock woolly adelgid (HWA) spread and intensified dramatically in the Southern Appalachians in 2004, with 23 new counties reporting infestations in Georgia, North Carolina, South Carolina and Tennessee. Efforts at chemical control were undertaken in the Great Smoky Mountains National Park, and the rearing and release of adelgid predators was expanded. However, the expanding infestation continues to out pace control efforts and the prognosis for survival of both of the eastern and Carolina hemlock species in the wild is grim.

Region 9/Northeastern Area: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, West Virginia

Host(s): Eastern hemlock

In Connecticut, landscape populations were down and mortality of the insect was high due to predator release. Lower insect populations and favorable weather conditions resulted in widespread recovery of

hemlocks. HWA was found for the first time in native hemlocks in Maine a year ago on Gerrish Island in Kittery Point, where a low-intensity population was confirmed to be established. Delimiting surveys conducted during 2004 detected scattered light spot infestations over an area of 3,500 acres of hemlock stands in Kittery, Kittery Point, and York, and on two abutting trees in a stand in the town of Wells. Detection surveys were performed in every town in York County to determine the insect's presence. No new infestations were found on hemlock nursery stock in Maine in 2004. The Maine Forest Service implemented an integrated Slow-the-Spread management program to reduce the impact of established adelgid populations and reduce the rate of natural and artificial spread. A total of 7,500 *Sasajiscymnus tsugae* (Sasaji and McClure) (formally *Pseudoscymnus tsugae*) were released by the Maine Forest Service on Gerrish Island during the late spring and early summer to establish this predator in a forested part of the island. In October, the Maine Forest Service treated nine sites in Kittery Point, York, and Wells with Talstar® plus horticultural oil to control populations around residential and urban forest areas. In early 2005, the State quarantine will be expanded to include the towns of Kittery, York, and Wells in York County, Maine. This insect continued to be a major concern in Massachusetts. In 2004, there were five new communities with known infestations. A total of 148 acres of decline and mortality were observed during the aerial survey. Monitoring of the predator insect, *Sasajiscymnus tsugae*, continued and a total of 11 release sites and 65,000 beetles were reported. The severe cold experienced during January and February 2004 resulted in adelgid mortality between 86 and 100 percent in most locations. This mortality combined with the increased rainfall during the growing season increased the health of the hemlock substantially.

In New Hampshire, this insect was found in four counties: Cheshire, Hillsborough, Merrimack, and Rockingham. In 2004, three new sites were found: Nashua and Hollis in Hillsborough County and Kensington in Rockingham County. The infestation at these new sites was believed to be spread by birds. Due to the small number of trees infested, eradication attempts were considered successful, and Cheshire, Hillsborough, Merrimack Counties were not added to the quarantined area and Rockingham County remained the only county in quarantine. New York reported continued damage and mortality to native forest and ornamental eastern hemlock trees. Damage was most severe in areas that were infested for several years (the Catskills and the South). In some areas, a majority of the trees were infested and many of those were in declining health or dead. Pockets of hemlock mortality were seen from the air in infested areas; however, no new county occurrences were found in 2004. In Rhode Island, insect populations seem to have diminished in 2004. Damage to hemlocks was readily apparent, however, as the trees continued to decline. It was theorized that the severe cold temperatures of the previous winter adversely affected the adelgid populations in southern New England. In Vermont, the insect was introduced on nursery stock from North Carolina, Pennsylvania, and New Hampshire. All but 14 of the 768 trees in these shipments were located and destroyed, and State quarantine regulations were being modified. Detection surveys were in progress.

HWA continued to spread throughout the generally infested area causing hemlock decline and tree mortality. New infestations in West Virginia included Monongalia and McDowell Counties, bringing the total number of infested counties to 22. Below-normal temperatures during the previous two winters reduced adelgid numbers in many areas of the Mid-Atlantic and New England States. Lower adelgid densities in addition to above-average precipitation benefited hemlock recovery in many areas throughout the region. Biological control activities to establish natural enemies of this pest continued in 2004. Nearly 162,000 of the lady beetle predator, *Sasajiscymnus tsugae*, were released in Maine, Maryland, New Jersey, Pennsylvania, and West Virginia, and 2,400 of the derodontid beetle, *Laricobius nigrinus*, were released in Maryland, Pennsylvania, Massachusetts, and West Virginia.

In 2004, Pennsylvania expanded its efforts to control hemlock woolly adelgid by improving survey techniques, expanding its biological control program, and instituting a statewide chemical suppression program to protect select, high-value trees on State forests and State parks. No new counties were reported infested but adelgid populations remain heavy in many areas currently infested. Maryland's hemlock resource is found primarily in the western portion of the State, including Garrett, Allegheny, and Fredrick Counties. A task force involving Maryland State fisheries, wildlife, forestry, and park agencies was created to identify high value hemlock forests where management efforts would focus. These efforts included increased survey and monitoring efforts, chemical suppression of adelgids, and continuation of efforts to establish natural enemies of the hemlock woolly adelgid. In West Virginia, efforts to survey and further identify hemlock resources were underway. Chemical suppression and establishment of natural enemies

was focused primarily along the leading edge of the infestation on State lands located in the north and central portions of the State.

Larch casebearer,
Coleophora laricella

Region 6: Oregon, Washington

Host(s): Western larch

Approximately 7,877 acres were mapped in 2004, a decrease from 25,176 acres mapped in 2003.

Reporting areas with the greatest number of reported acres affected included: Mt. Hood (2,902); Wallowa-Whitman (1,721); Colville (1,266), and Ochoco (1,148).

Introduced parasites released in the Pacific Northwest in the early 1960s and established years ago, along with needle diseases on larch, helped maintain low levels of casebearer for many years. As casebearer populations declined, so did the introduced parasites. Parasites are expected to respond to the increasing casebearer population, although there may be several more years of defoliation before they increase to effective levels. Refoliation of larch in late summer typically masks most of the defoliation, and because of this, these trees are not as evident to observers late in the season. The ability of larch to refoliate is one of the reasons we do not expect to see tree mortality as a result of this insect.

Region 9/Northeastern Area: Minnesota, Pennsylvania, Vermont

Host(s): Japanese larch

Vermont reported light defoliation in widely scattered locations, a decrease from 2003. In Pennsylvania, plantations totaling 100 acres (50 acres each in Bradford and Tioga Counties) had damaged foliage or shoots from this insect. In Minnesota, 6,700 acres sustained damage, an increase from 1,660 acres in 2003.

Larch sawfly,
Pristiphora erichsonii

Region 9/Northeastern Area: Vermont

Host(s): Eastern larch

Dieback and mortality of tamarack occurred statewide in Vermont, especially in the northeastern part of the State. Damage was mapped on approximately 2,700 acres and was due to both larch sawfly and eastern larch beetle, *Dendroctonus simplex.* The area affected was a decrease from 2003 probably due to decline in the impact of recent drought.

Lobate lac scale,
Paratachardina lobata lobata

Region 8: Florida

Host(s): Melaleuca; over 100 other woody species

This pest, native to India and Sri Lanka, is being controlled biologically by the introduction of natural insect predators. While the damage to *Melaleuca*, itself an invasive nonnative species, is not generally considered to be a problem, concerns remain over spread of the scale to native species.

Mediterranean pine engraver,
Orthotomicus erosus

Region 5: California

Host(s): Pine

In 2004, *O. erosus* was trapped in relatively large numbers in five California counties (Kern, Tulare, Fresno, Madera, and Merced) by personnel from the California Department of Food and Agriculture. The beetles responded to Lindgren funnel traps baited with ethanol, α-pinene, and the aggregation pheromone for the Eurasian spruce engraver, *Ips typographus*. Ground checking in Visalia and Kingsburg (both Tulare County) revealed overwintering populations of larvae, pupae, and adults in cut logs of Italian stone pine, *Pinus pinea*, and Aleppo pine, *Pinus halepensis*, at multiple locations. Old brood galleries were evident in cut logs of Monterey pine, *Pinus radiata*, and in the stumps of *P. radiata* Christmas trees cut in December 2003. The old galleries in some cases suggested extremely large populations of the pest without much evidence of either natural enemies or interspecific competition in these hosts. To date the insect has not been found in standing trees.

Pale bark beetle,
Hylurgops palliatus

Region 9/Northeastern Area: New York, Ohio, Pennsylvania

Host(s): Pine, larch, spruce

This European bark beetle, discovered for the first time in North America in a forest stand of Norway spruce, Scotch pine, and red pine in Erie, Pennsylvania, in 2001, was the subject of delimiting surveys in 2003 and 2004 as part of the USDA Forest Service Rapid Detection for Exotic Bark Beetles project. It was reported to be the third most frequently intercepted exotic bark beetle species at ports in the United States, and was known to breed in log stumps and basal portions of dead and dying host trees in Europe, but its threat to conifers in North America was unknown. This exotic bark beetle was found in 10 western Pennsylvania counties, 11 northeastern Ohio counties, and 2 western New York counties.

Pear thrips,
Taeniothrips inconsequens

Region 9/Northeastern Area: Vermont

Host(s): Red maple, sugar maple

Vermont reported that populations remained low, with light widely scattered defoliation and discoloration.

Pink hibiscus mealybug,
Maconellicoccus hirsutus

Region 8/IITF: Puerto Rico, Virgin Islands, Florida

Host(s): Hibiscus, many other species

The pink hibiscus mealybug is a serious pest of over 200 plant species, and is known to occur on more than 20 Caribbean Islands. It was detected in Puerto Rico in 1997, but to date no infestations have been identified on the Caribbean National Forest. Frequent monitoring surveys are conducted, assisted by the USDA Forest Service. It appears that parasitoids were introduced simultaneously with the mealybug, eliminating serious impacts in Puerto Rico.

An infestation detected in southern Florida in 2002 has also been controlled with parasitoids. Although continued parasitoid releases occurred in 2004, no major problems from this pest were reported.

Red pine scale,
Matsucoccus resinosae

Region 9/Northeastern Area: Connecticut, Massachusetts, Rhode Isalnd

Host(s): Red pine

In Massachusetts, new infestations totaling 100 acres were identified in Hampden and Hampshire Counties. There were no reports of significant activity in Connecticut and Rhode Island in 2004.

Redgum lerp psyllid,
Glycaspis brimblecombei

Region 5: California

Host(s): *Eucalyptus camaldulensis, E. radis, E. globulus, E. diversicolor, E. sideroxylon*

Red gum lerp psyllid continues to contribute to the decline of planted eucalypts at several rest stops along Interstate 5 between Corning and Dunnigan. Various reports of the lerp psyllid affecting red gums have been received from the Central Valley around Sacramento. Individual trees are severely affected and often losing their leaves or outright dying from attack if left uncontrolled. The insect has been primarily a nuisance in shade tree situations from the loss of leaves, dropping of the insect shells and unsightly conditions. The lerp psyllid damage will continue until predators and parasites of the pest insect become well established.

Satin moth,
Leucoma salicis

Region 9/Northeastern Area: Maine, New Hampshire, Vermont

Host(s): Aspen

Maine reported that the outbreak of satin moth that started in the late 1990s in the Millinocket region ended. Branch mortality was apparent but larval populations were at very low levels and no defoliation was observed in 2004. There was no defoliation in New Hampshire in 2004, a decline from the previous year. Vermont reported moderate defoliation of scattered trees in the southeastern part of the State.

Spruce aphid,
Elatobium abietinum

Region 3: Arizona, New Mexico

Host(s): Engelmann spruce, blue spruce

Defoliation by spruce aphid decreased significantly from 121,060 acres in 2003 to 28,730 acres in 2004. In Arizona, spruce aphid defoliation was recorded on the Apache-Sitgreaves National Forest (5,185 acres), Fort Apache (23,515 acres) Indian Reservation, and State and private land (30 acres). No spruce aphid defoliation was recorded in New Mexico.

Region 5: California

Host(s): Sitka spruce

Planted Sitka spruce along Highway 101 from Fortuna northward have chronic dieback from the spruce aphid. Increased levels of feeding and high numbers of aphids collected in samples were noted near Big Lagoon in Humboldt County.

Region 10: Alaska

Host(s): Sitka spruce

The current spruce aphid outbreak in southeast Alaska started in 1998, with severe localized defoliation (30,627 acres) in 2003 resulting in some mortality. In 2004, acres declined to 7,758, still localized and causing mortality. Spruce aphids feed primarily in the lower, innermost portions of tree crowns, but may impact entire crowns during outbreaks, which in southeast Alaska are usually preceded by mild winters. A low temperature event on January 26, 2004, -18 to -15 °C depending on the site, is believed to have caused the aphid population to crash.

Twospotted leafhopper,
Sophonia rufofascia

Region 5: Hawaii

Host(s): Numerous, both native and exotic

Since its first report in 1987 on Oahu, the twospotted leafhopper has been recorded on over 300 host plants on all major Hawaiian islands. Of major concern are its impacts on ohia lehua (*Metrosideros polymorpha*),

a dominant tree in native Hawaiian forests, and uluhe (*Dicranopteris linearis*), a common native fern that provides cover on steep slopes. The leafhopper continues to kill the invasive firetree (*Morella faya*) on the island of Hawaii.

Uglynest caterpillar,
Archips cerasivoranus

Region 10: Alaska

Host(s): Cotoneaster, crabapple, mountain ash

Populations of this introduced pest declined in 2004, as evidenced by significantly fewer inquiries to Anchorage pest specialists and a general lack of defoliation in its various haunts throughout the city. The outbreak in west Anchorage, downtown, and in south Anchorage in 2001 has apparently declined to endemic levels. The species was originally transplanted on ornamental plantings and has confined its damage to cotoneaster, mountain ash, *Prunus*, *Malus* and *Salix* spp., along disturbed roadsides and industrial areas between the downtown port area to south Anchorage.

Winter moth,
Operophtera brumata

Region 9/Northeastern Area: Massachusetts

Host(s): Apple, northern red oak, American elm, red maple, basswood, poplar, willow

For a number of years, coastal Massachusetts was experiencing defoliation by loopers, presumably fall cankerworm or Bruce spanworm. Concern arose about the continued defoliation and an effort was made to confirm the identification of the defoliator. In December 2003, Cornell University positively identified the samples as winter moth. A total of 34,489 acres of defoliation was documented in Plymouth, Barnstable, Norfolk, Suffolk, and Essex Counties in 2004.

Diseases: Native

Alder canker,
Ophiovalsa suffusa

Region 10: Alaska

Host(s): Thin-leaf alder

For the second year individual stems within clusters of thin-leaf alder (*Alnus tenuifolia*) were killed by one or more unidentified canker fungi. One canker-causing fungus was tentatively identified as *Ophiovalsa suffusa* (*Cytospora* group) in 2003, however, the pathogenicity of *O. suffusa* is in question because the fungus is considered ubiquitous on alder branches. In 2004, ground surveys indicated that the infection was intensifying and that Sitka alder (*Alnus crispa*) was also a suitable host. Even though few alder thickets have completely died, the canker continues to spread within clusters, killing individual stems across thousands of acres in south-central and interior Alaska. Although mortality of alder is not typically considered a problem, continued extensive mortality of a specific riparian alder species may have important long-term ecological consequences. Further studies of the biology, ecology, and impacts of this fungus are planned across south-central and interior Alaska. Mortality of thin-leafed alder by the alder canker is expected with continued drought conditions and heavy insect defoliation. The susceptibility of *A. rubra* is not yet known.

Annosus root disease,
Heterobasidion annosum

Region 1: Idaho, Montana

Host(s): Douglas-fir, grand fir, ponderosa pine, subalpine fir, western hemlock

Most damage is concentrated in lower elevations where ponderosa pine is the dominant tree species and past harvesting of large trees has been common. Presence of annosus root disease in ponderosa pine stands greatly decreases the potential for managing ponderosa pine. These sites are usually too dry to effectively grow alternative tree species, so preventing the introduction and subsequent increase of annosus root disease is crucial for managing ponderosa pine. Annosus root disease is widespread at low levels on Douglas-fir and true firs in mixed conifer stands throughout western Montana and northern Idaho. It is frequently found in association with other root diseases, and appears to be involved in a decline of subalpine fir in high elevations.

Region 3: Arizona, New Mexico

Host(s): True firs, ponderosa pine

This root disease fungus is common in the region, functioning as both a pathogen and a saprophyte. It causes scattered mortality in spruce-fir, mixed conifer, and ponderosa pine forests throughout the region. Mortality rates are typically highest in young regeneration.

Region 4: California, Idaho, Nevada, Utah, Wyoming

Host(s): Bitterbrush, chokecherry, Douglas-fir, Jeffrey pine, lodgepole pine, ponderosa pine, spruce, true firs

This disease can be found throughout the region, but mostly as a saprophyte on dead trees, stumps, roots, and cull logs or fallen stems. The fungus occasionally kills young ponderosa pine, especially in plantations on droughty soils.

Region 5: California

Host(s): Conifers, some hardwoods

Annosus root disease remains the major root disease problem in various parts of California. The root disease continues to cause scattered pockets of mortality in ponderosa pine on McCloud Flats on the Shasta-Trinity National Forest. Scattered pockets of mortality are also present on the southern side of Mount Ashland on the Klamath National Forest and near Board Camp on the Mendocino National Forest.

Decay characteristic of *H. annosum* was found on stumps of white fir harvested as part of a salvage operation near Battle Creek Meadows, Tehama County. Trees had been killed by the fir engraver beetle, but drought conditions and infection by *H. annosum* were predisposing factors.

The disease has become a problem in stump culture of true fir Christmas trees in El Dorado County. Landowners practicing stump culture are often unaware of the need for stump treatment and the disease has managed to make a foothold in such situations.

Annosus root disease has been observed in forest situations scattered throughout the southern Sierra, San Bernardino and San Gabriel Mountains. *H. annosum* is especially damaging in the Laguna Mountain area of the Cleveland National Forest and in recreation areas on the San Bernardino National Forest.

Region 6: Oregon, Washington

Host(s): True firs, ponderosa pine, western hemlock

Annosus root disease causes damage primarily in partially harvested white and grand fir stands in southern and eastern Oregon and eastern Washington. Damage from root and stem decay also occurs in subalpine fir, red fir, noble fir, pacific silver fir, and mountain hemlock, especially in partially harvested stands and in wounded trees. Mortality is high where annosus root disease and fir engravers occur together. Despite high infection levels in true fir stumps cut 20-25 years ago, mortality of surrounding conifer regeneration is low in northeastern Oregon, but infection levels are high especially in sapling grand fir, subalpine fir, Engleman spruce, and Douglas-fir. Annosus root disease in low-elevation western hemlock occurs primarily as a butt rot in wounded trees. Efforts are underway to artificially inoculate unwanted western juniper with *H. annosum* to create mortality centers in eastern Oregon.

Region 8: Regionwide

Host(s): Southern pines

In Alabama, hurricane wind throw damage in Cooperative Reserve Program (CRP) pine plantations was exacerbated by the presence of annosus root disease. South Carolina reported that annosus root disease has been increasing for several years. A 2004 survey indicated damage in 31 counties, with an estimated 36,740 acres affected. Total financial losses were estimated at just under $1 million. In Georgia, the incidence of annosus infection is increasing, due in part to the number of CRP plantations that have been thinned and the reluctance of landowners to employ cut stump treatments. North Carolina reported only scattered occurrence of annosus.

Diseases: Native

Region 9/Northeastern Area: Michigan, Wisconsin, Vermont

Host(s): Red pine, white pine

This disease was scattered throughout Vermont and observed occasionally causing significant butt rot in saw timber white pine. In Wisconsin, annosus root rot was first reported in 1993 as a cause of mortality. In 2004, there were 11 counties known to have diseased stands. There were 222 acres of annosus root disease in red pine plantations mapped in Michigan.

Region 10: Alaska

Host(s): Western hemlock, Sitka Spruce

Annosus commonly causes root and butt-rot in old-growth western hemlock and Sitka spruce forests in southeast Alaska. The form present in Alaska is the 'S type,' which causes internal wood decay, but is not typically a tree killer. Elsewhere in the world, spores of the fungus are known to readily infect fresh stump surfaces, such as those found in clearcuts or thinned stands. Studies in managed stands in southeast Alaska, however, indicate limited stump infection and survival of the fungus. Thus, this disease poses minimal threat to young managed stands from stump top infection. Reasons for limited stump infection may be related to climate. High rainfall and low temperatures, common in Alaska's coastal forests, apparently hinder infection by spores.

Anthracnose, *Gnomonia* spp.

Region 9/Northeastern Area: Connecticut, Pennsylvania, Vermont, West Virginia

Host(s): American sycamore, ash, beech, birch, maples, oaks, miscellaneous hardwoods

Anthracnose was present throughout Connecticut on many hardwoods, including sycamore, oak, ash, beech, maple, and hickory. Defoliation caused by the disease was widely scattered in Vermont. In 2004, above average precipitation in most Northeastern Area States starting in the spring and continuing into the fall created optimal for anthracnose development. Pennsylvania ground surveys noted numerous tree species, including American sycamores affected by anthracnose, particularly in Elk County where 4,588 acres were affected. West Virginia aerial surveys found moderately discolored and defoliated hardwoods statewide.

Armillaria root disease, *Armillariella* spp.

Region 1: Idaho, Montana

Host(s): Douglas-fir, other conifers

This pathogen is the most broadly distributed of the root diseases. It frequently occurs in conjunction with annosum root disease, laminated root rot, or brown cubical root and butt rot. Armillaria can kill conifers of all species when they are young, but only Douglas-fir, subalpine fir, and grand fir remain highly susceptible throughout their lives. Consequently, the damage is much greater in the latter species where severe disease often turns formerly forested sites into long-term shrub fields.

Region 2: Colorado, South Dakota, Wyoming

Host(s): Aspen, Colorado blue spruce, Douglas-fir, Engelmann spruce, hardwoods, lodgepole pine, ponderosa pine, subalpine fir, white fir, white spruce

Armillaria root disease, the most common root disease in the region, is found in the mixed conifer and spruce-fir cover types. This root disease was among the key causes of subalpine fir mortality. It is a major problem in vegetation management of developed recreation sites and important in the disturbance regimes and management of spruce-fir forests.

Region 3: Arizona, New Mexico

Host(s): Douglas-fir, ponderosa pine, true firs, spruce, aspen

Armillaria is the most common (and the most easily recognized) root disease in the region, functioning as both a pathogen and a saprophyte. It causes scattered mortality in spruce-fir and mixed conifer forests throughout the region. Some ponderosa pine sites, especially those on volcanic soils, sustain significant mortality. Mortality rates are typically highest in young regeneration. Permanent plots have been established to assess the role of this and other root diseases.

Region 4: Idaho, Nevada, Utah, Wyoming

Host(s): Douglas-fir, grand fir, pine, spruce, subalpine fir

Evidence of armillaria root disease can be found throughout the region but it functions primarily as a weak pathogen or saprophyte causing little direct mortality. In southern Utah, it may act as a primary pathogen, killing mature and immature ponderosa pine and mature fir and spruce on cool sites at high elevation.

Region 5: California

Host(s): Conifers, some hardwoods

Many dead tanoaks were reported in the Cazadero and Annapolis areas of Sonoma County. Elsewhere in the north coastal counties, dead tanoaks along downhill sides of both paved and unpaved roads are frequently found to be killed by armillaria. Such trees usually have fill placed over much of their root systems. Armillaria has been observed attacking numerous incense-cedar stumps in a cut-over area near Shaver Lake in Fresno County. Armillaria appears to be utilizing the incense-cedar stumps as a preferred host.

Region 6: Oregon, Washington

Host(s): Conifers

Armillaria root disease causes serious mortality losses east of the Cascade Range in mixed-conifer stands. It is the most commonly encountered root disease in Oregon and Washington. True firs sustain the most losses; however, in localized areas Douglas-fir and ponderosa pine mortality can be significant. Several large armillaria clones exist throughout the region. Thinning of young conifers has been shown to significantly increase tree growth rates and reduce mortality caused by armillaria root disease in the Cascade Range of Oregon and Washington. Armillaria root disease has been recently shown to significantly affect stand structure, plant species diversity, and fuel loads in central Oregon. Armillaria has been observed fruiting on fire-killed firs following the B&B Fire in central Oregon. Permanent plots on the Winema National Forest will be examined in 2005 to determine 10-year effects of four silvicultural treatments on mortality caused by armillaria. Assessing species resistance on a site-by-site basis and discriminating for the more resistant species during stand management activities are considered the most effective means of reducing disease spread and tree mortality. Infected trees are often attacked by bark beetles.

Diseases: Native

Region 9/Northeastern Area: Massachusetts, Vermont

Host(s): Conifers

In Massachusetts, an increase in armillaria was observed in conifer stands where harvest had previously occurred. A total of 117 acres were documented. In Vermont, there was some dieback and mortality throughout the State but reports of the disease decreased due to the declining impact of the previous year's drought.

Region 10: Alaska

Host(s): Red alder, mixed hardwoods

Several species of Armillaria occur in south-central and interior Alaska where some attack conifers while others attack hardwoods. Most species appear to be weak pathogens invading trees under some form of stress. Research is currently underway to determine the species present and their impacts in the boreal forests.

Black stain root disease,
Leptographium wageneri
Ophiostoma wageneri

Region 1: Idaho, Montana

Host(s): Douglas-fir

Black stain root disease occurs somewhat infrequently in the region. It has been identified most commonly on Douglas-fir, but has also been found on lodgepole pine and ponderosa pine. It is primarily found west of the Continental Divide, but in 2003 it was first identified on Douglas-fir east of the Divide near Bozeman, Montana.

Region 3: New Mexico

Host(s): Piñon pine, Douglas-fir

Both *Leptographium wageneri* var. *wageneri*, affecting piñon, and *L. wageneri* var. *pseudotsugae*, affecting Douglas-fir, occur, but are rare, in the region. The former has been confirmed in two isolated areas in northern New Mexico, while the latter has been observed on a single site in southern New Mexico.

Region 4: Idaho, Nevada, Utah

Host(s): Piñon pine

Aerial detection and follow-up ground surveys have discovered about two-dozen root disease centers in piñon pine stands in the region. Perennial infections caused mortality of individual piñon pine over 50 acres of the BLM Burley District in southern Idaho. In Utah and Nevada, the host is more prevalent. The infected acreage totals 1,150 acres on the Humboldt-Toiyabe National Forest in Nevada and 1,350 acres on the Dixie and Manti-LaSal National Forests in Utah. In many cases the areas with black stain have now been infested with piñon ips.

Region 5: California

Host(s): Douglas-fir, Jeffrey pine, ponderosa pine

Douglas-firs with black stain root disease east of Willits, Mendocino County, were eventually killed by flathead fir borers. A combination of drought, high stocking levels, *Leptographium wageneri*, and western pine beetle have caused large group kills of ponderosa pine at McCloud Flats, Shasta County. Specific areas of high mortality include the Mud Flow Research Natural Area, Elk Flat, Ash Creek Sink, Algoma, and Harris Mountain. Mature ponderosa pine mortality resulting from black stain root disease continues in the Heart Rock area in northern Lassen County.

The site of the first report of black stain root disease on ponderosa pine in California (in 1939 by J. W. Bongberg) was remonumented at Blacks Mountain Experimental Forest in Lassen County. The root pathogen continues to kill ponderosa pine in that area.

Region 6: Oregon, Washington

Host(s): Douglas fir, ponderosa pine

In southwestern Oregon, black stain root disease is the most commonly encountered disease in Douglas-fir plantations. High-risk areas are those where disturbances, such as thinning, road building, or soil compaction, have occurred or where road maintenance equipment injured roadside Douglas-firs. Infected larger individuals are found scattered in previously entered forest stands.

Black stain root disease continues to be observed on ponderosa pine east of the Cascades; it is widespread on the southeastern portion of the Malheur National Forest. Some smaller localized infestations are known in other portions of the Blue Mountains. Black stain root disease is seen infrequently in eastern Washington. Pacific Northwest Research Station scientists are investigating relationships with natural and prescribed fire, vector insects, and management strategies.

Botryosphaeria canker, *Botryosphaeria* spp.

Region 5: California

Host(s): Giant sequoia, Raywood ash, redwood

No reports were received in 2004.

Region 9/Northeastern Area: Connecticut, Pennsylvania, Vermont

Host(s): Beech, dogwood, chestnut oak, leyland cypress, maple, red oak

The disease continued to be prevalent on a wide assortment of drought stressed woody plants in Connecticut, including Leyland cypress, maple, dogwood, beech, and oak. There was scattered dieback on red oak statewide in Vermont. Pennsylvania did not report any significant damage by this disease in 2004.

Brown cubical root and butt rot,
Phaeolus schweinitzii

Region 3: Arizona, New Mexico

Host(s): Douglas-fir, other conifers

This disease is common on old Douglas-fir in many parts of the region. It causes defect and can contribute to windthrow.

Cercospora blight,
***Cercospora* spp.**

Region 8: South Carolina
Host(s): Leyland cypress

Cercospora needle blight was found in two new locations in South Carolina in 2004. Fungicide control has been suggested for growers experiencing problems with this disease. The lack of genetic variation in this species due to asexual propagation is believed to contribute to newly discovered disease problems.

Chinkapin canker,
Cause unknown

Region 5: California
Host(s): Chinkapin

Branch dieback and mortality of chinkapin was observed along a 2-mile segment at the summit of the Bald Hills Road between Orick and Weitchpec, Humboldt County. The disease was widespread and affected all ages of chinkapin. No pathogen or other potential cause has been isolated from affected trees.

Cytospora canker,
***Cytospora* spp.**

Region 2: Colorado, Wyoming

Host(s): Aspen, English oak, Gambel oak, thinleaf alder

This damaging canker disease is found throughout the region. It caused significant branch dieback in oaks in south Denver.

Observers have increasingly noted scattered dieback and mortality of thinleaf alder (*Alnus incana* ssp. *tenuifolia*) in Colorado in recent years. A 2004 survey of alder in northern New Mexico, Colorado, and southern Wyoming found that roughly one-third of 6,503 standing alder stems were dead, one-third had dieback, and one-third were healthy. Dieback and mortality did not vary with geographic area, elevation, distance to stream, or distance to road. Areas with full solar exposure of alder did have significantly more dieback and mortality than areas where the alder was in full shade. Cytospora canker is among the causes being investigated because it associated with damage, but insects, environmental variability, and other factors may be involved as well.

Cytospora canker,
Cytospora abietis

Region 5: California

Host(s): Red fir, white fir

Cytospora canker, along with red fir dwarf mistletoe, the fir engraver beetle, the fir roundheaded borer, and drought stress, is associated with extensive red fir mortality in northwestern California. Specific locations include Etsel Ridge on the Mendocino National Forest, North Yolla Bolly Mountains in the Middle Eel-Yolla Bolly Wilderness, and South Fork Mountain on the Shasta-Trinity National Forest, many of the higher peaks in the Trinity Alps Wilderness, Russian Wilderness, Marble Mountains Wilderness, and the southern side of Mt. Ashland. Branch flagging of red fir moderately to severely infected with dwarf mistletoe was also reported in the northern and central Sierra Nevada.

Cytospora canker,
Cytospora chrysosperma

Region 5: California

Host(s): Poplar, willow

No reports were received in 2004.

Dermea canker,
Dermea pseudotsugae

Region 5: California

Host(s): Douglas-fir

No reports were received in 2004.

Diplodia blight of pines,
***Sphaeropsis sapinea* (*Diplodia pinea*)**

Region 2: Nebraska, South Dakota

Host(s): Austrian pine, ponderosa pine, Scotch pine

Hail impact and the associated diplodia tip blight disease were noticeable in localized areas of southwestern South Dakota and northwestern Nebraska. Aerial surveyors detected aver 2,500 acres affected by this fungus.

Region 5: California

Host(s): Ponderosa pine

Shoot dieback caused by *Sphaeropsis sapinea* was observed in 2004 on ponderosa pines in the Sacramento River Canyon, Shasta County. Repeated infections on some trees are leading to significant crown dieback

and mortality. A combination of western gall rust (*Peridium harknessii*) and diplodia blight continue to cause branch dieback on ponderosa pine in the southwestern portion of McCloud Flats, Shasta County.

Dwarf mistletoes, *Arceuthobium* spp.

Region 1: Idaho, Montana

Host(s): Douglas-fir, lodgepole pine, ponderosa pine, limber pine, whitebark pine, western larch

Lodgepole pine dwarf mistletoe occurs on approximately 2 million acres (28 percent) of the lodgepole pine type in the region and causes about 18 million cubic feet of growth reduction annually. Douglas-fir dwarf mistletoe occurs on about 0.6 million acres (13 percent) of Douglas-fir, reducing growth by approximately 13 million cubic feet annually. Western larch dwarf mistletoe occurs on about 0.8 million acres (38 percent) of western larch stands and reduces annual growth by over 15 million cubic feet. Dwarf mistletoes are locally severe within ponderosa pine stands around Coeur d'Alene, Idaho, and along the Spokane River drainage in northern Idaho. Limber pine and whitebark pine are heavily infected in localized areas in Montana, with higher infection levels east of the Continental Divide.

Region 2: Colorado, Wyoming

Host(s): Douglas-fir, limber pine, lodgepole pine, piñon pine, ponderosa pine

With recent drought conditions, dwarf mistletoes contribute to mortality in many areas of the region. This disease impacts ponderosa pine stands throughout the Colorado Front Range and in Boulder, Clear Creek, Gilpin, Douglas, Park, and El Paso Counties.

Lodgepole pine dwarf mistletoe *(A. americanum)* infects about 50 percent of lodgepole pine stands in Colorado and Wyoming. In some areas there is a danger that, in our haste to reduce fuel loads in lodgepole pine forests at the wildland-urban interface, we may not give adequate consideration of dwarf mistletoe management. Projects planned solely for fuel management can lead to further intensification and damage from dwarf mistletoe, potentially exacerbating fuel problems in the future.

Region 3: Arizona, New Mexico

Host(s): Pines, Douglas-fir, spruce, true firs

Dwarf mistletoes continue to be the most widespread and damaging pathogens in the region. Three species—those affecting ponderosa pine, piñon, and Douglas-fir—occur throughout most of the ranges of their hosts, while five other species have more limited distributions. Roughly 2.2 million acres of commercial ponderosa pine forest are infested, resulting in an estimated loss of 25 million cubic feet annually.

Region 4: Idaho, Nevada, Utah, Wyoming

Host(s): Douglas-fir, pine, true firs, spruce, western larch

These plant parasites remain the most widespread and frequently observed disease within the region. Regional incidence by major host species is estimated as follows: lodgepole pine (50 percent), ponderosa pine (20 percent), and Douglas-fir (20 percent). These percentages by host type represent stands having some level of infection.

Region 5: California

Host(s): Douglas-fir, pines, true firs

Eight species of dwarf mistletoe were reported in 2004: Douglas-fir (*A. douglasii*), gray pine (*A. occidentale*), mountain hemlock (*A. tsugense* subsp. *mertensianae*), piñon pine (A. *divaricatum*), red fir (A. *abietinum* f. sp. *magnificae*), sugar pine (*A. californicum*), western (*A. campylopodum*), and white fir (*A. abietinum* f. sp. *concoloris*). Mixed conifer stands that are heavily infested with Douglas-fir dwarf mistletoe are common in several areas on the southern side of Mount Ashland. The gray pine dwarf mistletoe remains a problem throughout the range of gray pine; trees have died from infection in Placer, El Dorado, Yolo, Fresno, Madera, and Tulare Counties. Gray pines in the foothills on both sides of the San Joaquin Valley are generally infested. Scattered mountain hemlock heavily infected with dwarf mistletoe were reported in Mount Lassen Volcanic National Park. Piñon dwarf mistletoe was commonly associated with piñons affected by drought throughout much of the host's range. Red fir dwarf mistletoe, along with Cytospora canker, the fir engraver beetle, the fir roundheaded borer, and drought stress has caused extensive red fir mortality in northwestern California. An unusually severe infestation of sugar pine dwarf mistletoe was found along the Trail of 100 Giants in the Giant Sequoia National Monument; overstory sugar pines had Hawksworth ratings of 5 or 6 and some had recently died. The mountain pine beetle was also implicated in the death of these sugar pines. Heavily infested pines had conspicuous dwarf mistletoe witches' brooms in the lower two-thirds of the crown. Several ponderosa pines killed by western pine beetle at Boggs Mountain Demonstration State Forest also had dwarf mistletoe infections. The white fir dwarf mistletoe remains a problem throughout the range of white fir. Smaller trees can become quite stunted and young trees are often killed by infection. Even larger trees have died from attack by the parasitic seed plants. Incidence and impact of white fir dwarf mistletoe continues to be heavy at South Fork Mountain. Particularly high levels of infection have been observed near Shaver Lake in Fresno County and near Lake Arrowhead in San Bernardino County.

Region 6: Oregon, Washington

Host(s): Conifers

Dwarf mistletoes are present on approximately 9.5 million acres of forested lands in the region. Their status changes little from year to year. However, long-term impacts, including reducing growth, mortality, deformity, and top-kill, are significant, particularly in unmanaged stands. Most conifer species are affected to some degree. Douglas-fir dwarf mistletoe is abundant east of the Cascades and in southwestern Oregon. Western larch dwarf mistletoe causes significant effects in northeastern Oregon and eastern Washington. The intensity of dwarf mistletoes in eastern Oregon and Washington and in southwest Oregon is closely related to fire ecology. Lack of frequent, periodic fire in the last century has allowed infection levels to increase on many sites, especially those where mistletoe was not culturally controlled. New management policies including green tree retention requirements and restrictions on silvicultural treatment of certain sensitive areas and large diameter trees will reduce sanitation opportunities, and allow mistletoe intensification in the future. New information about wildlife use of dwarf mistletoe is leading to retention of infected trees in some locations.

Region 9/Northeastern Area: Maine, New Hamphire, New York, Vermont

Host(s): Black spruce, red spruce, white spruce

Severe damage as the result of infection by this parasitic plant continued to occur in stands of white spruce in coastal areas of Maine. Trends for this disease were stable, however, favorable growing conditions, with ample precipitation, reduced mortality from the higher levels observed in recent drought years. There was scattered damage statewide in Vermont.

Diseases: Native

Region 10: Alaska

Host(s): Western hemlock

Hemlock dwarf mistletoe is an important disease of western hemlock in unmanaged, old-growth stands throughout southeast Alaska as far north as Haines. Hemlock dwarf mistletoe continues to cause growth loss, top-kill, and mortality in old-growth forests; its impact in managed stands depends on the abundance of large infected trees remaining on site after harvesting. The incidence of dwarf mistletoe varies in old-growth hemlock stands in southeast Alaska from stands in which every mature western hemlock tree is severely infected to other stands in which the disease is minimal. The dominant small-scale (canopy gap) disturbance pattern in the old forests of coastal Alaska favors the short-range dispersal mechanism of hemlock dwarf mistletoe and may explain the common occurrence of the disease here. The disease is uncommon on any host above elevations of approximately 1,000 feet. We have found the aggressive heart rot fungus *Phellinus hartigii* associated with large mistletoe brooms on western hemlock.

Elytroderma needle blight, *Elytroderma deformans*

Region 1: Idaho, Montana

Host(s): Ponderosa pine, lodgepole pine

Elytroderma needle blight has been heavy in several areas of western Montana for a number of years: Jette Lake area north of Polson and the Bitterroot Valley south of Missoula. This disease has been credited with mortality in mature ponderosa pine and is a threat to the viability of ponderosa pine on several local sites in western Montana. It is widespread but at generally low levels throughout northern Idaho.

Region 5: California

Host(s): Ponderosa pine, Jeffrey pine

Elytroderma disease was noted on many ponderosa pines around the edge of Battle Creek Meadows, Tehama County. The disease is common on Jeffrey pines in the Laguna Mountain area on the Cleveland National Forest, San Diego County.

Fusiform rust, *Cronartium quercuum f.* sp. *fusiforme*

Region 8: Regionwide

Host(s): Southern pines, especially loblolly and slash pines

Fusiform rust continues to be the most significant disease of loblolly and slash pine in the South. In Florida, comparisons of fusiform rust levels in longleaf pine and both "improved" and "rust-resistant" slash pine sold by the Florida Division of Forestry showed that infection levels were significantly lower in "rust-resistant" than in "improved" slash pine, while longleaf pine produced the lowest overall levels of infection. The Resistance Screening Center in Asheville, North Carolina, continues to screen seed lots for fusiform rust resistance.

In 2004, North Carolina reported scattered rust infections, but it continued to be a serious problem across the South Carolina Piedmont. Virginia reported an unusually high infection rate in nursery trees.

Hemlock needle cast,
Fabrella tsugae

Region 9/Northeastern Area: Pennsylvania

Host(s): Eastern hemlock

In Pennsylvania, this fungus damaged foliage and shoots of eastern hemlock in isolated pockets totaling 5 acres in Juniata, Pike, and Union Counties. This fungus also caused defoliation on 156 acres in Bedford, Carbon, Fulton, Huntingdon, Monroe, Pike, Potter, Schuylkill, and Wayne Counties. In Mercer County, 4 acres showed symptoms of dieback and decline.

Hypoxylon canker,
***Hypoxylon* spp.**

Region 8: Regionwide

Host(s): Oaks

In 2004, red oaks in northeastern Tennessee showed declining levels of hypoxylon infection. This disease continues to be a significant component in the general epidemic of oak decline in Arkansas oak forests.

Koa wilt,
Fusarium oxysporum f. sp. koae

Region 5: Hawaii

Host(s): Koa

Koa wilt, first reported in 1980, is being found with increasing frequency in the higher elevation endemic koa forests. Koa wilt is far more virulent in lowland sites (under 3000 feet) where koa are planted in former sugar cane fields for their high value wood. Evidence for genetic resistance to the wilt pathogen is being investigated.

Laminated root rot,
Phellinus weirii

Region 1: Idaho, Montana

Host(s): Douglas-fir, grand fir

This disease is most severe on sites that historically may have supported primarily western white pine and western larch. These tree species have been replaced by highly susceptible Douglas-fir, grand fir and subalpine fir with consequent increases in this pathogen. Like armillaria, and usually in conjunction with armillaria and/or annosum root disease, this pathogen often converts formerly forested sites to long-term shrub fields.

Diseases: Native

Region 6: Oregon, Washington

Host(s): Douglas-fir, mountain hemlock, white, grand, Pacific silver fir

Laminated root rot is the most serious forest tree disease west of the Cascade Mountain crest in Washington and Oregon. Overall, an estimated 8 percent of the area with susceptible host species is affected in this portion of the region. Locally, 15 to 20 percent of an area may be affected. East of the Cascade crest, laminated root rot affects mixed-conifer stands north of the Crooked River in central and northeastern Oregon, and throughout eastern Washington.

Besides the highly susceptible hosts listed above, the other true firs, spruce, larch, and hemlock are intermediately susceptible; lodgepole, sugar, and western white pine are tolerant; cedars, redwood, and ponderosa pine are resistant; and all hardwoods are immune. Effects of the disease include significant changes in species composition, size, and structure. Regeneration of susceptible species in root disease centers may not grow beyond sapling and pole-size trees. Hardwood trees and shrubs often increase their site capacity. Infected conifers are often attacked by bark beetles.

Lodgepole pine needle cast,
Lophodermella concolor

Region 6: Oregon, Washington

Host(s): Lodgepole pine

Appearance of this needle disease on lodgepole pine is sporadic and strongly influenced by weather conditions. Infected trees will shed foliage prematurely, and vigor and growth may be reduced with successive years of infection. Affected lodgepole show severe discoloration of the lower crown. Areas mapped as affected by lodgepole pine needle cast in 2004 totaled 1,385 acres down from the 5,315 acres reported in 2003. The Wenatchee reporting area totaled 957 acres with southwest Washington reporting area totaling 331 acres, mostly in coastal areas.

Madrone decline,
Cause unknown

Region 5: California

Host(s): Pacific madrone

No reports were received in 2004.

Oak wilt,
Ceratocystis fagacearum

Region 8: North Carolina, Tennessee, Texas, Virginia

Host(s): Live oak, red oaks

Oak wilt continues to devastate more than 66 central Texas counties, mostly between Dallas and San Antonio. Urban, suburban, and rural oaks are affected. Live oak, the premier shade tree species in the region and highly valued for aesthetic, shade, and wildlife benefits, was severely impacted by the disease. Trenches dug between healthy and diseased trees sever interconnected root systems and help to halt the spread of the disease. The Texas Forest Service completed the 17th year of cooperative suppression of the

disease. Trenching was conducted around 83 oak wilt centers, while on-site inspections were carried out on 1,198 centers. Integral public information and assistance campaigns continued.

Region 9/Northeastern Area: Michigan, Minnesota, Missouri, Illinois, Indiana, Iowa, West Virginia, Wisconsin

Host(s): Northern red oak

In West Virginia, aerial surveys for oak wilt disease were conducted over four areas with historically high disease incidence in Grant and Hardy Counties. Additionally, aerial surveys were conducted over the four historically uninfested counties of Ohio, Brooke, Tucker, and Webster. No oak wilt was detected in these four counties.

There was 1,235 acres of oak wilt mapped in Michigan.

Oak wilt continued to be the single most important disease in the central States. Despite aggressive control efforts in Minnesota, the number of new centers continued to exceed the number of controlled centers. About 3,000 acres of oak wilt was detected in 2004. A comprehensive survey was undertaken, and an assessment of the management strategy was under review.

Missouri counties with confirmed cases of oak wilt in 2004 included Audrain, Bates, Boone, Callaway, Clay, Green, Harrison, Henry, Johnson, Monroe, Montgomery, St. Charles, and St. Louis.

Phomopsis canker,
Phomopsis lokoyae

Region 5: California

Host(s): Douglas-fir

Increased branch dieback on Douglas-fir was noted in the Cazadero area of Sonoma County.

Pine wilt and pinewood nematode,
Bursaphelenchus xylophilus

Region 2: Kansas, Nebraska, South Dakota

Host(s): Austrian pine, Scotch pine

Scotch and Austrian pines in the southern part of South Dakota showed symptoms of needle browning with the tree dying within the same growing season. These symptoms were associated with pine wilt and sampling indicated that these trees were supporting populations of the pinewood nematode. The number of trees found infected with this disease has increased dramatically during the past 4 years, perhaps related to the continuing drought and mild winters.

Powdery mildew on oaks,
Microsphaera alni and *Sphaerotheca lanestris*

Region 5: California

Host(s): Blue oaks, coast live oak

No reports were received in 2004.

Schweinitzii root disease,
Phaeolus schweinitzii

Region 5: California

Host(s): Douglas-fir

Phaeolus schweinitzii was observed affecting small groups of Douglas-fir at the Mud Flow Research Natural Area at McCloud Flats, Shasta County.

Seiridium canker,
Seiridium cardinale

Region 5: California

Host(s): Incense-cedar

No reports were received in 2004.

Stem decay,
Basidiomycetes **(many)**

Region 10: Alaska

Host(s): All tree species

In southeast Alaska, approximately one-third of the gross volume of spruce/hemlock forests is defective due to heart and butt rot fungi. These extraordinary effects occur where long-lived tree species predominate as in the old-growth forests. The great longevity of individual trees allows ample time for the slow-growing fungi to cause significant amounts of decay. Wood decay fungi play an important role in the structure and function of southeast Alaskan old-growth forests where fire and other forms of catastrophic disturbance are uncommon. By predisposing large old trees to bole breakage, these fungi serve as important disturbance factors that cause small-scale canopy gaps. A completed study investigated how frequently fungi enter wounds of different sizes and the rate of subsequent decay in these wounded trees. Generally, larger, deeper wounds and larger diameter breaks in tops result in a faster rate of decay. Results indicate that heart rot development is much slower in southeast Alaska than the Pacific Northwest.

Stem decay is the most important cause of volume loss and reduced wood quality in boreal Alaskan hardwood species. Stem decay is considered a limitation on the availability and cost of harvesting timber. In south-central and interior Alaska, incidence of stem decay fungi increases as stands age and is generally high in stands over 100 years old. Stem decay fungi will limit harvest rotation age of forests that are managed for wood production purposes. Studies are currently underway in paper birch forests to identify the most important stem decay fungi and assess the relationships among decay, stand age, presence of decay indicators, and site factors.

Sugar pine needle cast,
Lophodermella arcuata

Region 5: California

Host(s): Sugar pine, western white pine

Lophodermella arcuata, cause of sugar pine needle cast, was reported on sugar pine in the vicinity of Silver Lake, north of Whitmore, Shasta County.

Swiss needle cast,
Phaeocryptopus gaumannii

Region 6: Oregon, Washington

Host(s): Douglas-fir

In Oregon, acres with defoliation caused by Swiss needle cast decreased from 266,846 acres reported in 2003 to 176,142 acres in 2004 (Oregon Department Forestry report states 176,594 acres). Acres in the heavy category of defoliation were one-half of 2003 reported levels. (2003 moderate = 229,675; 2004 = 163,862) (2003 heavy – 37,171; 2004 = 12,280).

The 2004 survey was conducted between May 6 and May 17 and covered approximately 2.35 million acres in northwestern Oregon. This represents about 650,000 fewer acres surveyed than last year, due to a lack of discernable signature in the eastern most extent.

Recent research results suggest that precommercial thinning does not have detrimental effects on Douglas-fir plantations affected by Swiss needle cast. The causal fungus in Oregon is divided into two reproductively isolated sympatric lineages; one with a worldwide distribution and the other is restricted to Oregon's coastal forests. Permanent plots established in the north Oregon Cascades are planned to be remeasured in 2006 to determine 5-year effects of Swiss needle cast on Douglas-fir growth and needle retention.

Swiss needle cast defoliation in Washington is not discussed because special surveys have not been conducted since 2000, and results from overview surveys conducted in July are unreliable.

Tomentosus root disease,
Inonotus tomentosus (Fr.) Teng.

Region 10: Alaska

Host(s): Lutz spruce, Sitka spruce, white spruce

Inonotus tomentosus causes root and butt-rot of white, Lutz, Sitka, and black spruce. The fungus may also attack lodgepole pine and tamarack. The disease appears to be widespread across the native range of spruce in south-central and interior Alaska, but has not been found in southeast Alaska. Volume loss in the butt log of older infected trees can be substantial, up to one-third of the gross volume. Spruce trees of all ages are susceptible to infection through contact with infected roots. Infected trees exhibit growth reduction or mortality, depending on age. Younger trees may be killed outright while older trees may persist in a deteriorating condition for many years. Trees with extensive root and butt decay are prone to uprooting and bole breakage. Individual mortality centers (groups of infected trees) are typically small; however, coalescing centers can occupy large areas. In managed stands, root rot fungi are considered long-term site problems because the fungi can remain alive and active in large roots and stumps for decades, impacting the growth and survival of susceptible host species on infected sites.

True mistletoes, *Phoradendron* spp.

Region 3: Arizona, New Mexico

Host(s): Juniper, various hardwoods

These are common in piñon-juniper woodlands throughout the region, and are locally abundant in riparian areas. Heavy infection contributes toward tree mortality, especially during periods of drought.

Western gall rust, *Peridermium harknessii*

Region 5: California

Host(s): Ponderosa pine, Coulter pine

Many ponderosa pines in the southwest portion of Boggs Mountain Demonstration State Forest have high levels of branch mortality from western gall rust infections. Some Coulter pine in the vicinity of Julian, San Diego County, had extensive western gall rust cankers.

Diseases: Nonnative

Beech bark disease,
Neonectria coccinea var. faginata

Region 8: North Carolina, Tennessee, Virginia

Host(s): American beech

Beech bark disease (BBD) continues to intensify and spread in eastern Tennessee, western North Carolina, and extreme west-central Virginia.

Tree mortality is a continuing problem in and around the Great Smoky Mountains National Park. The disease has intensified at a faster rate than predicted, and is moving down-slope into the Cherokee and Pisgah National Forests. Beech is an important species for wildlife, providing both mast and den habitat.

Region 9/Northeastern Area: Connecticut, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia

Host(s): American beech

Connecticut reported the disease continued to be endemic throughout the State. This disease, which was introduced to Maine in the early 1930s, continued to kill or reduce the quality of beech stems statewide. But beech bark disease did not threaten to eliminate beech from the Maine forest because scattered through most stands are a few smooth barked, resistant trees. It was recommended that landowners managing for beech may wish to leave these resistant stems during thinning or selective harvesting operations, while poisoning cut stumps of susceptible trees to prevent root sprouting. Losses attributable to beech bark disease were extensive, but assessment of the damage was complicated by the effects of drought, oystershell scale, late spring frosts, and various hardwood defoliators. Maine Forest Service and University of Maine researchers have initiated a forest health evaluation of the role of beech bark disease and other stress agents/events in elevated levels of beech mortality in northern and eastern Maine. Trends for this disease are static. In Massachusetts, Berkshire and Franklin Counties continued to experience decline and mortality caused by this disease. Damage was recorded on 2,405 acres. The disease continued to be widespread throughout New Hampshire. Beech bark disease can be found readily throughout New York. In Vermont, mortality and dieback was statewide, with approximately 78,000 acres mapped. The epidemic progressed and widespread damage occurred.

In Maryland, a beech scale survey was conducted throughout Garrett County in 2004 after the initial discovery of beech scale in the southern part of that county in 2003. In 2004, extensive surveys in beech stands throughout northeastern Ohio were conducted after the discovery of the exotic beech bark disease fungus, *Neonectria coccinea* var. *faginata*, during 2003 at the Holden Arboretum in Lake County, Ohio. The beech bark disease scale can be found in many northeastern Ohio counties, but the exotic fungus remains restricted to the Lake County site where the native, *Neonectria galligena*, is not present. In Pennsylvania, declining and dead beech trees due to beech bark disease occur over extensive areas of Warren, McKean, Forest, Elk, and Cameron Counties and an isolated pocket of trees with beech bark disease was found in Monroe County. Similarly, in West Virginia, beech bark disease continues to kill American beech throughout several million acres in parts of 14 counties as reported in previous pest conditions reports.

Michigan has over 7 million acres of maple-beech-birch forest type with an estimated 138 million trees in all size classes. Approximately 428,162 acres were affected by the disease, up from about 200,000 in 2003.

Dutch elm disease,
Ophiostoma (=Ceratocystis) ulmi and *Ophiostoma novo-ulmi*

Region 1: Idaho, Montana, North Dakota

Host(s): American elm

Dutch elm disease continues to spread in urban areas in Idaho, North Dakota, and Montana. Montana's highest losses are occurring in the cities of Billings and Great Falls. In North Dakota, heavy losses have occurred in both communities and in naturally occurring American elms in riparian zones and wooded draws of western North Dakota. In southern Idaho, this disease is common in many communities along the Snake River, and it is slowly working its way into northern Idaho communities. It was positively identified in Coeur d'Alene for the first time in 2004 on a large isolated boulevard American elm also colonized by the elm bark beetle. The tree was removed and the few remaining elms will be closely monitored. In the three States, larger cities have had good success with aggressive treatment, but smaller communities do not often have resources available to undertake a successful management program, and as a result may lose the majority of their native elms.

Region 2: Colorado, Kansas, Nebraska, South Dakota

Host(s): American elm

In 2004, the incidence of Dutch elm disease dramatically increased in communities that still have American elms as a dominant street tree. The losses in 2004 were approximately four times the losses many communities experienced in 2003. Communities are increasingly having difficulties removing the infested trees in a timely manner and this inoculum source contributes to the increase in tree losses.

Region 8: Regionwide

Host(s): American elm

Localized mortality continues to occur at a low level in urban and wild populations of elm. In Mississippi, the State champion American elm in Vaiden was found to be infected.

Region 9/Northeastern Area: Areawide

Host(s): American elm

Connecticut reported the disease was endemic throughout the State, with greater than usual incidence and severity. Symptoms of Dutch elm disease were conspicuous throughout Maine during 2004 and generated occasional inquiries. While most elm mortality observed was to ordinary American elms, infection of Liberty elm is now being observed as well. Many old elms that escaped the initial wave of infection have succumbed, at least partially the result of the development of more aggressive strains of the disease organism. While protecting these older specimens is the major concern, calls are occasionally received regarding mortality of younger elm trees (4-8" dbh and 20-30 feet tall). Such trees were frequently numerous in old field areas and along roadsides, the progeny of susceptible old elms now long gone. The trend for this disease is static. In New York, symptoms of this disease were conspicuous statewide. Many of the trees that were now succumbing were mature individuals in urban and suburban settings that survived the initial wave of the disease through the region. Mortality was reported statewide in Vermont.

No major surveys were conducted for this disease in the Mid-Atlantic States in 2004. Symptoms of this disease are still conspicuous throughout this region. Reports from arborists and city managers in Washington, DC, and Wilmington, Delaware, describe the ongoing symptoms of this disease in American elms on numerous city streets and within recreational areas.

The largest concentration of urban elms grows in Minneapolis, Minnesota, which recorded the third worst year of elm mortality in history. Over 8,000 trees were lost, exceeded only by 1977 and 1978 when 20,823 and 13,668 were lost, respectively. A survey of 194 communities in central Minnesota revealed over 18,000 trees killed, nearly double that of 2003.

European larch canker,
Lachnellula willkommii

Region 9/Northeastern Area: Maine

Host(s): Larch

European larch canker was first found on native larch (tamarack) in southeastern Maine in 1981. Information gathered from existing cankers indicated this disease was present in Maine since at least the 1960s and perhaps much longer. Since larch canker has the potential for causing serious damage to both native larch stands and reforestation projects utilizing nonnative larches in Maine and elsewhere, the disease was under State and Federal quarantine. The trend for this disease was static; no evidence of spread from infested areas to noninfested areas was noted in 2004.

Littleleaf disease,
Phytophthora cinnamomi

Region 8: Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia

Host(s): Loblolly pine, shortleaf pine

Littleleaf disease continues to cause growth loss and mortality across the Piedmont areas of the affected States. Shortleaf pine is highly susceptible while loblolly pine is affected, but at a later age. Many of the stands that were converted from shortleaf to loblolly to reduce the impact of this disease are now reaching the age of susceptibility. Bark beetles often attack these stands once they have been weakened by the root infection. Some moderation of littleleaf symptoms over time has been reported. It is believed that root penetration of soil hardpans and gradual increases in soil porosity due to increasing biological activity on severely eroded sites will gradually reduce the impact of this disease over a period of a century or more.

White pine blister rust,
Cronartium ribicola

Region 1: Idaho, Montana

Host(s): Limber pine, western white pine, whitebark pine

Regions 1 and 4 are actively surveying and monitoring white pine blister rust spread and intensification on all 5-needle pines in the regions. Surveys of over 60 F2 western white pine plantations with enhanced natural resistance found infection levels varied widely from less than 5 percent to over 90 percent, but were always lower than infection levels in adjacent naturally regenerated trees. Special technical development projects are being conducted to look for site factors that might be related to infection levels and to determine girdling rates to help predict future loses. Additional projects are monitoring permanent plots to document changes in infection levels and growth rates of individually tagged cankers.

Surveys and studies with entomologists are documenting impacts from MPB in high elevation stands and testing efficacy of a beetle pheromone in protecting potentially rust resistant trees from bark beetle attack.

Diseases: Nonnative

Region 2: Colorado, South Dakota, Wyoming

Host(s): Limber pine, Rocky Mountain bistlecone pine, whitebark pine

White pine blister rust is found on whitebark and limber pines throughout Wyoming, in northern Colorado, and in some isolated limber pine stands of the Black Hills in South Dakota.

In 2003, the disease was newly discovered on limber pine and Rocky Mountain bristlecone pine in the Sangre de Cristo and Wet Mountains of southern Colorado. The implications of rust on bristlecone pine may be very significant both ecologically and culturally. Nearly 100 survey and monitoring plots were established in the Sangre de Cristo and Wet Mountains. Infection levels varied from no infections to moderately high infections, with up to 80 percent of the trees infected in some stands.

During aerial surveys, declining limber pine stands were found to be caused by a combination of white pine blister rust and MPB. Usually, limber pines with orange/red needles were MPB attacks, and trees with flagged branches and dead limbs in the upper crown were caused by white pine blister rust disease. This decline in the limber pines spanned over 17,000 acres central Wyoming. Other surveys in northern Wyoming found another 28,000 acres with declining limber pine. White pine blister rust is causing significant ecological impacts on the Laramie and Pole Mountain Ranges in south-central and southeastern Wyoming.

Region 3: New Mexico

Host(s): Southwestern white pine

Blister rust occurs throughout most of the range of southwestern white pine in the Sacramento Mountains, the adjoining White Mountains, and the nearby Capitan Mountains of southern New Mexico. This area includes two districts of the Lincoln National Forest and the Mescalero Apache Indian Reservation. An estimated 40 percent of the white pines are currently infected within this area, based on a set of representative plots. The disease has been detected more recently on Gallinas Peak, Cibola National Forest, about 80 miles north of the main outbreak area. Blister rust has not yet been detected in northern New Mexico or in Arizona.

Region 4: California, Idaho, Nevada, Wyoming

Host(s): Limber pine, whitebark pine, bristlecone pine, western white pine, sugar pine

This introduced disease is common throughout its hosts range in southern Idaho, western Nevada, eastern California, and western Wyoming. No infection has been found or reported in Utah, but the disease has been identified very close to the Utah border in southern Idaho and to the west in the Jarbidge Mountains of northeastern Nevada. The new observations of white pine blister rust in eastern Nevada are cause for concern because they are close to highly sensitive bristlecone pine populations in Great Basin National Park and elsewhere. Overall, five-needled pine trees occur in low frequency in the region. Often relegated to high alpine areas, these pines grow slowly but provide important ecosystem functions such as providing shade and stabilization of snow retention for watershed integrity, recreation, aesthetics, and wildlife habitat.

Region 5: California

Host(s): Sugar pine, western white pine, whitebark pine

White pine blister rust is present in scattered locations on western white pine and whitebark pine in northwestern California. In western white pine, low levels were found in several locations on the Shasta-Trinity National Forest (between Middle and Lower Deadfall Lake, near Cement Bluff Lake and along the trail to Horseshoe Lake and High Lake, along the Pacific Crest Trail at Chipmunk Lake, and at Paynes Lake), and between Duck Lake and High Lake in the Russian Wilderness. Higher levels of *C. ribicola* were present in western white pine near Upper and Middle Boulder Lakes at the Trinity Alps Wilderness; near Kings Castle in the Marble Mountain Wilderness; at Pettijohn Basin, Black Rock Lake, and North

Yolla Bolly Mountain in the Yolla Bolly Middle Eel Wilderness; and at Reading Peak in Lassen Volcanic National Park.

White pine blister rust was present at low levels in whitebark pine in several locations on the Shasta-Trinity National Forest (between Middle Deadfall Lake and Mount Eddy, on Mount Shasta along the lower part of the Clear Creek Trail, and in the West Parks Lake Basin and China Mountain), between Duck Lake and High Lake and at Bingham Lake in the Russian Wilderness, near Kings Castle in the Marble Mountain Wilderness, on the Klamath National Forest at Goosenest Mountain, and at Lassen National Park at Reading Peak.

Some of the heaviest blister rust infection observed in the State was in the area of Mountain Home State Forest, Tulare County. This appears to be from a strain of the fungus that has overcome resistance in the host sugar pines. Nearly all such resistant pines that were outplanted at Mountain Home are now dead from the disease. Larger trees are also dying in the State forest, a change from the past when mostly smaller trees were infected and killed by the rust pathogen.

Several surveys did not find any evidence of the rust in the Tehachapi Mountains or further south.

Region 6: Oregon, Washington

Host(s): Western white pine, sugar pine, whitebark pine

C. ribicola was introduced to the west coast in 1910. Its impacts include top-kill, branch flagging, and tree mortality. While much of the mortality associated with this disease occurred earlier in the century, its impacts are still great in wild populations of five-needled pines throughout their range. Locally, this disease, in combination with MPB, still kills many host trees. Of particular concern are the effects of blister rust in whitebark pine at high elevations in the Cascades, Blue, and Wallowa Mountains and in sugar pine in southwest Oregon where about 45 percent of stands with host components are affected.

An attempt was made to identify areas symptomatic of blister rust through aerial survey beginning in 1994. Blister rust is known to occur extensively throughout the range of susceptible host type. Observers mapped approximately 3,488 acres in 2004, down from 13,510 acres in mapped in 2003.

With the exception of blister rust in whitebark pine (which grows at higher elevations and in more open conditions), blister rust is very difficult to detect from the air and is often associated with MPB attack. In Washington, 1,246 acres were mapped within the Wenatchee reporting area, 1,070 acres on the Idaho Panhandle National Forest, and 573 acres in the Okanogan reporting area. In Oregon, the most severely affected area mapped was on the Siskiyou National Forest (425 acres).

Region 8: North Carolina

Host(s): Eastern white pine

White pine blister rust continues to be a disease of concern for North Carolina landowners. The northwestern mountains are an area of particularly high hazard. The disease can be especially devastating to growers of ornamentals and Christmas trees, many of whom are centered in this area. The North Carolina Division of Forest Resources continues to review seedling applications for white pine seedlings and to screen or examine areas prior to planting.

Region 9/Northeastern Area: Connecticut, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New York, Vermont, West Virginia, Wisconsin

Host(s): Eastern white pine

Connecticut reported the disease is endemic in several areas but was not particularly active in 2004. In Maine, this disease remained static at moderate levels, but was common throughout the State. Due to personnel reductions and other work priorities, especially surveys for hemlock woolly adelgid and sudden

oak death, no *Ribes sp*. eradication was practiced in 2004 for the first time since 1917. In Massachusetts, isolated infections in white pine regeneration continued to be observed, especially in Berkshire and Worcester Counties. In New Hampshire, it was reported that the average incidence of the disease statewide was still 2.4 percent. In New York, the only blister rust found or reported in 2004 was located at a nursery in Albany County on a few planted pines. Follow-up surveys were planned for 2005. Vermont reported the disease continued to occur statewide.

In West Virginia, this disease continues to be common, but static, at moderate levels in Mercer, Monroe, Pocahontas, and Summers Counties.

For years, managers were reluctant to manage white pine in the Lake States for fear of losses to blister rust. Observations of many disease-free and minimally affected trees prompted surveys that confirmed an increase in the numbers of white pine throughout Lake States forests. Blister rust still had a significant impact in localized areas where conditions were favorable for infection, but management focused on underplanting, sanitation pruning, and planting at higher densities to successfully grow white pine within the blister rust zone. Outside the high hazard zone, blister rust had little impact on eastern white pine.

Region 10: Alaska

Host(s): Eastern white pine

A single ornamental white pine tree was found to be infected by white pine blister rust in Ketchikan in 2004. Later in the summer, infected ornamental gooseberry (*Ribes* sp.) bushes were found in the same area. The fungus is not native to North America and, while causing devastating mortality in native white pine in some areas of the United States and Canada, it does not pose a threat in Alaska because no native trees are susceptible.

Diseases: Origin Unknown

Butternut canker,
Sirococcus clavigignenti-juglandacearum

Region 8: Regionwide

Host(s): Butternut

This disease has been endemic in the South for at least 40 years and is believed to have killed more than 75 percent of the butternut across the region. The fungus kills trees of all ages. Butternut canker is expected to spread and kill most of the resource, including regeneration. The species will be replaced by other species on these sites (e.g., black walnut). It is too early to predict the benefits of selection and breeding for resistance to the disease, but trees exhibiting resistance have been found in Arkansas, North Carolina, Tennessee, Kentucky, and Virginia.

Region 9/Northeastern Area: Areawide

Host(s): Butternut

The disease remained endemic through the range of butternut. No new counties were discovered that harbored the disease and the trend was static. Connecticut reported the disease continued at endemic levels. In New Hampshire, widespread mortality was reported statewide. Butternut canker was common in New York wherever butternut was found. It was reported to be uncommon to see a symptom-free butternut, but the Department of Environmental Conservation began archiving locations of healthy butternut. Mortality and dieback was reported statewide in Vermont, with uninfected trees rarely observed.

Cedar heart rot

Region 8: Kentucky

Host(s): Eastern redcedar

A high incidence of heart rot has been detected in all age classes of eastern redcedar in central and southern Kentucky, adversely impacting lumber values for this species. Kentucky Division of Forestry and pathologists with the University of Kentucky are cooperating in efforts to identify the pathogen responsible for this disease.

Dogwood anthracnose,
Discula destructiva

Region 8: Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia

Host(s): Flowering dogwood

The disease continues to intensify within the generally infested area. North Carolina reports continuing mortality attributable to dogwood anthracnose in mountain counties. In 2004, there were no reports of additional counties being impacted.

Diseases: Origin unknown

Region 9/Northeastern Area: Areawide

Host(s): Flowering dogwood

This disease has spread throughout the range of flowering dogwood in the Northeastern States and has eliminated flowering dogwood in localized areas. The fungus was endemic throughout Connecticut and, in spite of the wet season, did not appear to be worse than usual. In New York, dogwood anthracnose continued to affect understory and ornamental flowering dogwood across the State. This disease was not reported found in any new counties in 2004. In Vermont, the disease occurred throughout the range of the host. Flowering dogwood, an endangered species in the State, was reported to be eliminated from some sites.

Leaf tatters,
Unknown cause

Region 9/Northeastern Area: Illinois, Wisconsin, Minnesota

Host(s): White oaks, hackberry

For about the last 14 years this condition appeared sporadically across the landscape. Symptoms appear in the spring when leaves develop without mid-vein tissue. The second flush of leaves develops normally. The cause was unknown, but herbicide, weather, or insects may have been involved. Very little tatters were reported in Illinois in 2004. No significant activity occurred in Minnesota and Wisconsin.

Phytophthora canker,
Phytophthora nemorosa

Region 5: California

Host(s): California laurel, coast live oak, tanoak

No reports were received in 2004.

Phytophthora canker,
Phytophthora pseudosyringae

Region 5: California

Host(s): California laurel, coast live oak, tanoak

No reports were received in 2004.

Phytophthora root rot,
Phytophthora cinnamomi

Region 5: California

Host(s): Douglas-fir, true firs

Phytophthora root rot continues to be a major problem for Christmas tree growers in the foothills of the central Sierra. Significant losses have occurred to true firs in El Dorado and Nevada Counties. Growers

are switching to disease resistant varieties of true fir and to Douglas fir, which appears to be fairly resistant to the root pathogen.

Pitch canker,
Fusarium circinatum

Region 5: California

Host(s): Bishop pine, Douglas-fir, Monterey pine, Torrey pine

Increased branch and tree mortality was observed along coastal San Mateo County and northward into San Francisco County. The disease is becoming prevalent on Monterey pines in San Francisco and Marin Counties. Observations indicate a decrease in branch and tree mortality in Sonoma County. The disease was not observed in Mendocino County.

In February 2004, *F. circinatum* was confirmed from two Douglas-fir clones at a USDA Forest Service Douglas-fir seed orchard near Camino in El Dorado County; both affected trees were subsequently destroyed. Later that month, three additional Douglas-fir in the orchard were found to carry propagules (possibly spores or mycelium) of the pitch canker fungus upon their foliage; later examinations between March and August 2004, however, revealed no new isolations of the fungus from foliage, branches, or cones. On affected Douglas-fir, disease symptoms were either very slight (one case only) or totally absent, and thus the presence of the pathogen would likely not have been detected unless alerted to the situation by the discovery in New Zealand of the pathogen on Douglas-fir scion wood from the seed orchard (first reported by New Zealand Forest Research in November 2003). Concerns were raised that the pathogen could be coming from outside of the seed orchard. General surveys have been conducted of both pine and Douglas-fir Christmas trees throughout El Dorado and surrounding counties. Special emphasis has been placed on shade tree problems in that part of the State (i.e., planted Monterey pines, Douglas fir, and other susceptible pine species). These shade trees or Christmas trees could harbor the pathogen. These may have provided the pathway for introduction of *F. circinatum*. So far the pathogen has not been detected outside of the seed orchard. None of the shade trees or Christmas trees observed had any symptoms that remotely resembled those of pitch canker.

Torrey Pines State Reserve was surveyed for pitch canker disease. Although not a highly susceptible species, Torrey pine is susceptible in laboratory inoculations. The concern was that seed collection in the reserve could move the disease from an infested part of the State (San Diego County) to an uninfested area (Placer County). No symptoms of the disease were found anywhere within the reserve and the reserve was declared to be disease free. However, infected Monterey pines were found in a golf course on the edge of the reserve, and it was felt that the reserve should be surveyed in the future prior to any cone harvesting to determine whether or not it is still disease free.

Region 8: Regionwide

Host(s): Southern pines

Hundreds of acres of pitch canker infected loblolly pine plantations were reported in west-central Louisiana in 2004. In Mississippi, pitch canker incidence increased, involving some large areas experiencing both top-kill and mortality. North Carolina reported scattered infections of pitch canker on shortleaf pine in the Piedmont, possibly as a result of storm damage. Infections were also reported in loblolly pine stands in Polk County, Texas. Scattered infections were reported from South Carolina and Virginia in 2004.

Port-Orford-cedar root disease,
Phytophthora lateralis

Region 5: California

Host(s): Pacific yew, Port-Orford-cedar

Infected Port-Orford-cedars were noted in Redwood National Park near the west end of the Hiouchi Bridge along U.S. Highway 199. Five active infestation areas were noted along the French Hill Road from Camp Six to Humboldt Flat. Camp Six was the site of an unsuccessful attempt to eradicate *Phytophthora lateralis* in 1991-1992. Living Port-Orford-cedar hosts, with no current mortality, were seen along Patrick Creek and Shelly Creek along the Patrick Creek Road from the Monumental Mine site to the Smith River. Active Port-Orford-cedar root disease had been noted in the area as recently as 5 years ago.

Phytophthora lateralis continues to cause tree mortality in the upper Sacramento River Canyon, Siskiyou, and Shasta Counties. The pathogen continues to spread and intensify along the main fork of the Sacramento River from Dunsmuir to Shotgun Creek, where the disease is well established. This condition is expected to continue for years. Management efforts are aimed at preventing new infestations elsewhere in the Sacramento and Trinity River drainages. Monitoring of the Port-Orford-cedar eradication treatments at Scott Camp Creek in the upper part of the Sacramento River drainage revealed no new infestations of *P. lateralis*.

Region 6: Oregon

Host(s): Port-Orford-cedar

Port-Orford-cedar root disease continues to cause mortality of Port-Orford-cedar on sites with conditions favorable for spread and establishment of the causal pathogen. The annual aerial survey reported evidence of the disease on 9,910 acres (0.54 trees per acre) in 2004, up from 8,701 acres (0.89 trees per acre) in 2003. The vast majority of the reported mortality was mapped on private lands within the Coos-Douglas (4,673 acres) and Siskiyou (4,143 acres) reporting areas.

Hosts growing in riparian areas, swamps, drainage ditches, and low-lying areas downhill from roads suffer by far the greatest impacts. Trees on about 9 percent of the area within the limited range of Port-Orford-cedar are affected. Management activities such as road gating during the wet season, washing vehicles before they enter uninfested areas, and roadside sanitation treatments help slow the spread of the pathogen. Seedlings in flooded areas have been shown to become infected through foliage.

A major cooperative effort between the Forest Service, BLM, and Oregon State University to develop Port-Orford-cedar that is resistant to *P. lateralis* now has results. In fall 2002, the first operational collections of resistant seed from the Dorena containerized seed orchard occurred. Sowing occured in winter 2002-2003. In 2004, 27,600 resistent seedlings were planted.

Sudden Oak Death,
Phytophthora ramorum

Region 5: California

Host(s): California laurel, California black oak, coast live oak, Shreve oak, tanoak

Lake and San Francisco Counties were confirmed with *P. ramorum*-infected trees, bringing the total number of infested California counties to 14. The first detection of *P. ramorum* in Lake County was from California bay laurel trees in a stand primarily composed of tanoak, California bay laurel, Douglas-fir, and poison oak. The infestation is just east of a confirmed *P. ramorum* infestation in Sonoma County. In San Francisco County, two *P. ramorum*-infected coast live oak trees were found in the AIDS Memorial Grove. A map of the distribution of *P. ramorum* in California is available at www.suddenoakdeath.org.

P. ramorum confirmations also increased within the known infested counties. Eleven positives in seven areas were detected via aerial survey in Humboldt County, a few miles from a suppression area near Redway. The infested areas are north and northwest of the Garberville Airport and between Redway and Briceland.

On the Los Padres National Forest, the number of *P. ramorum*-infested areas in the Ventana Wilderness (Monterey County) more than doubled since 2003; the infested area was estimated at over 7,000 acres. A substantial portion of this mortality is tanoak and coast live oak. Damage extends from Plaskett Creek north to the Big and Little Sur rivers. The infestation near Plaskett Creek expanded from a few visible trees in 2003 to over 600 acres.

Recently dead trees with *P. ramorum* symptoms were also prevalent along the Panoramic Highway, Mt. Tamalpais State Park, and Marin Municipal Watershed lands from the turn-off to Muir Woods, north to Alpine lake (Marin County). New outbreaks also occurred at the Stewarts Point Reservation and other areas in western Sonoma County.

In 2004, the number of plants proven or suspected to be hosts of *P. ramorum* increased to a total of 64 species in over 40 genera. Many recently recognized hosts are horticultural plants not native to California forests. For a complete list see www.suddenoakdeath.org. Native plants recognized as susceptible to *P. ramorum* in 2004 include California wood fern (*Dryopteris arguta*), False Solomon's seal (*Smilacina racemosa*), and Andrew's clintonia bead lily (*Clintonia andrewsiana*).

In 2004*, P. ramorum* was detected in 55 nurseries throughout California. Nine nurseries were detected as part of the California National *P. ramorum* Nursery Survey, with the remainder detected primarily by trace back and trace forward investigations. As required by the USDA APHIS, *P. ramorum* quarantine, all nursery stock detections are destroyed and the nurseries monitored for 2 years. *P. ramorum* was also recovered from about 170 nurseries in over 20 States and in British Columbia. The detections were primarily from trace forward and trace back investigations triggered by the detection of *P. ramorum* in a large nursery in Azusa (Los Angeles County) and in a few other nurseries in southern California, Oregon, and elsewhere. In the Azusa nursery, over 1 million camellias were destroyed to fulfill quarantine requirements. In response to the shipments of potentially infected nursery stock, 18 States, Canada, and USDA APHIS imposed emergency regulations for *P. ramorum* with several States banning all nursery stock from California. In late April, the USDA APHIS stopped interstate shipments of all host plants in all California nurseries until inspections could be completed to demonstrate the nursery was pathogen-free. For more information, see www.cdfa.ca.gov or www.aphis.usda.gov/ppq/ispm/sod.

P. ramorum was discovered on California bay laurel in a forested rural residential area of Redway in Southern Humboldt County on several homeowners' properties in 2002. Surveys that year in Humboldt County and the North Coast found no further areas of infestation. In an effort to slow the spread of *P. ramorum*, the Humboldt County Department of Agriculture, the California Department of Forestry and Fire Protection, and the University of California Cooperative Extension removed and disposed of 77 California bay laurel trees infected with *P. ramorum* in Humboldt County. The project took place February 19 and 20, 2004, in the county's only known area of infestation on six different properties. Follow-up monitoring of soil, water, and plants in the area indicate the pathogen was still present in the water, soil, and vegetation. *P. ramorum* was recovered from the South Fork of the Eel River, approximately 8 km downstream of known infestation. Aerial survey in 2004 detected 11 positives in 7 areas a few miles from the Redway suppression area (between Redway and Briceland). Suppression projects are planned for these new finds and additional treatments are planned in 2005 for the 2004 Redway suppression area. The *P. ramorum* infections in Redway are approximately 110 miles from the four confirmations in Mendocino County and about 128 miles from the *P. ramorum* infestation under eradication in Brookings, Oregon. The geographic isolation of the Redway site makes re-infestation of Humboldt County via windblown rain from the other known infestations unlikely.

Diseases: Origin unknown

Region 6: Oregon

Host(s): Tanoak, evergreen huckleberry, Pacific rhododendron, Oregon myrtle, cascara buckthorn, poison oak, salmonberry, others

Phytophthora ramorum, the causal agent of Sudden Oak Death (SOD), was first discovered in Oregon by aerial survey in July 2001. Since fall of 2001, State and Federal agencies have been attempting to eradicate *P. ramorum* from infested sites by cutting and burning all infected host plants and adjacent apparently uninfected plants and treating stumps to prevent sprouting. As of the end of 2004, eradication was in progress on approximately 42 sites, totaling 70 acres. As of the end of 2004, the area under Federal and State quarantine remained at 11 mi^2 near Brookings, Curry County, Oregon. The number of new infected trees discovered each year has decreased since the pathogen was first discovered in Oregon. The infested sites occur on Federal, private industrial, and private nonindustrial forest lands.

In Washington, nursery surveys and surveys of the forest environs adjacent to nurseries were surveyed using the national survey protocol. There are no positive findings to date.

Region 8: Not yet known

Host(s): Red and possibly some white oaks, rhododendrons, and other species

Sudden oak death is a disease of concern that has been introduced to California, Oregon, and Washington, with potential to be spread into the Southeast through importation of infected nursery stock. A pilot survey for the disease was initiated in 2003 and was continued in 2004. No Sudden Oak Death-positive specimens were found in native forest vegetation, although infected camellias were identified and the disease eradicated in several suburban landscape sites in Georgia.

Region 9/Northeatestern Area: Connecticut, New York, Maryland

Host(s): Various oak species

The 20 Northeastern and Midwestern States participated in a national survey to determine if infected nursery stock had reached the region from western coastal States. Infected nursery plants, which had been imported from an Oregon nursery, were discovered at three locations in Connecticut. The plants were quarantined and will be destroyed. In New York, a preliminary positive test result for *P. ramorum* was reported from Long Island in June 2004. However, subsequent surveys and samples all indicated that *P. ramorum* was not present on the site, and none of the State's other surveys, which centered mostly on Long Island, found the pathogen. It is the opinion of experts that the initial positive was false, although the APHIS quarantine of the site remained in place as a precaution. The organism was also discovered infesting nursery stock in Maryland, which was quarantined.

Declines and Complexes

Ash decline

Region 9/Northeastern Area: Connecticut, Massachusetts, New York, Vermont

Host(s): White ash

There was no significant activity reported in Connecticut in 2004. Ash yellows was confirmed for the first time in Massachusetts, in Concord (Middlesex County). New York reported that surveys conducted for emerald ash borer resulted in no finds of the insect, but many stands of ash with various symptoms of "decline" were mapped. In Vermont, there was dieback and mortality statewide and decline of trees increased sharply on some sites with variable water availability.

Aspen decline

Region 4: Idaho, Utah, Wyoming

Host(s): Quaking aspen

The acreage of aspen forests has been declining in the Intermountain Region for many years, and aspen clones have died in many areas. According to Bartos and Campbell, in the past 125 years on forested lands, aspen forests in Utah have decreased 59 percent, 61 percent in Idaho, and 53 percent in Wyoming. There are many reasons for the reduction of aspen forests including fire exclusion, old age, insects, disease, drought, and conversion to other ecosystems such as conifer forests.

Aspen defoliator complex

Western tent caterpillar,
Malacosoma californicum
Large aspen tortrix,
Choristoneura conflictana
Black leaf spot,
Marssonina populi
Weather related damages

Region 3: Arizona, New Mexico

Host(s): Aspen

In Arizona, Aspen dieback was recorded on the Apache-Stitgreaves (5,330 acres), Coconino (2,290 acres), Kiabab (5,330 acres), and Tonto (70 acres) National Forests; Grand Canyon National Park (5,740 acres); Fort Apache (4,820 acres) and Navajo (5,090 acres) Indian Reservations; and State and private land (220 acres). In New Mexico, aspen defoliation was observed on the Carson (7,570 acres), Cibola (1,380 acres), Gila (3,555 acres), Lincoln (105 acres), and Santa Fe (2,070 acres) National Forests; Valles Caldera National Preserve (325 acres), Bandelier National Monument (185 acres), and BLM lands (45 acres); Jicarilla Apache (585 acres), Mescalero Apache (110 acres), Santa Clara Pueblo (60 acres), and Taos Pueblo (1,005 acres) Tribal lands; and State and private lands (8,390 acres).

Bacterial leaf scorch, *Xylella fastidiosa*

Region 9/Northeastern Area: Connecticut, Maryland, New Jersey, New York

Host(s): Maple, northern red oak, scarlet oak, pin oak

In Connecticut, there were no official diagnostic samples, but the disease was probably present. New York reported the organism that causes bacterial leaf scorch was found on oaks in a New York City cemetery. It was believed to be the first confirmed detection of the disease in New York State, and follow-up surveys were planned.

In 2004, bacterial leaf scorch surveys continued delineating the infection rate and spread of the disease within select cities in New Jersey and in Rockville, Maryland. Surveys have shown that the disease has increased within several communities in both these States. These surveys complement the New Jersey and Maryland statewide surveys done previously that showed significant and rapid increases in disease intensity and spread throughout these States and within individual communities. City-based increases in disease incidence are measured as the total number of trees infected, newly infected trees, disease spread into new localities, and infection spread on individual trees.

Black ash/brown ash decline

Region 9/Northeastern Area: Maine, Minnesota

Host(s): Black ash (brown ash)

No brown ash plots were measured in Maine in 2004. The plots were not measured in 2003, but some plots were visited to check for drought effects. It was found that brown ash condition was stable with no obvious decline due to drought.

About 27,000 acres of scattered black ash were declining in a swath through northeastern counties of Minnesota. No insects or pathogens appeared to be associated with the decline, although secondary root disease and bark beetles were occasionally present. Moisture relations and lack of snow cover were possible predisposing factors.

Cytospora canker of true firs, *Cytospora abietis*
Dwarf mistletoe, *Arceuthobium* spp.
Sawfly, *Neodiprion* spp.
Fir engraver beetle, *Scolytus ventralis*

Region 6: Oregon, Washington

Host(s): True firs

Aerially detected damage increased from 1,209 acres in 2003 to 5,551 acres in 2004. This was due, in part, to field checks of areas initially mapped as "unknown defoliator." Areas checked revealed a complex of cytospora, silver fir beetle, and fir engraver. Most of the aerially detected damage occurred within the Willamette reporting area (2,994 acres) and the Siskiyou reporting area (1,328 acres).

Aerial observers sometimes mistake the color signature of cytospora with that of balsam woolly adelgid. Incidence was associated with mature noble fir and silver fir stands located near ridge tops and is probably related to drought stress.

Elm yellows

Region 9/Northeastern Area: Connecticut, Maryland, Ohio, Pennsylvania, West Virginia

Host(s): American elm, slippery elm

In Connecticut, there were no official diagnostic samples, but the disease was probably present. No report of this disease was received from Maryland or Ohio in 2004. In Pennsylvania, the elm yellows disease continues to be present in Bradford, Centre, Clinton, Lycoming, Potter, and Union Counties. In West Virginia, the elm yellows disease continues to remain static within the eastern panhandle.

Incense-cedar decline

Region 5: California

Host(s): Incense-cedar

Incense-cedars are continuing to suffer from a decline of unknown origin. Sections of the trees die out. Typically, the symptomatic trees are saplings or small trees. Individual branches may die or the dead area may be an entire zone of the tree. The zone varies from tree to tree, sometimes being the bottom or the top, but usually occurs in the middle of the tree. No pathogens have been noted or isolated and only secondary insects have been found. Drought is suspected as a contributing factor. In the Sierra Nevada, the main areas of incense-cedar decline have been near Foresthill in Placer County and near Bass Lake in Mariposa and Madera Counties.

Larch needle cast, *Meria laricis* Larch needle blight, *Hypodermella laricis*

Region 6: Oregon, Washington

Host(s): Western larch

Larch needle blight and larch needle cast, which are reported as a complex because of their similar signatures as viewed from the air, increased from 1,403 acres in 2003 to 2,117 acres in 2004. This includes 1,660 acres mapped on the Gifford-Pinchot National Forest and 434 acres on the Wenatchee National Forest. Concentrations of infections were quite localized and mainly involved dense thickets of seedlings and saplings. These foliage diseases were most severe in stands of western larch growing in moist grand fir and moist subalpine fir plant associations as well as in riparian areas.

Loblolly pine decline

Region 8: Alabama, Georgia, South Carolina

Host(s): Loblolly pine

Loblolly decline is a complex of interactions of biotic and abiotic stresses. Predisposing factors include site condition and host. The decline sites are predominantly upland sites with history of previous agriculture and not well suited for long term management of loblolly pine. The inciting conditions include fine root deterioration and soil factors. Loblolly decline symptoms are similar to those of littleleaf disease of shortleaf pine; however, these upland sites are not the characteristic eroded clay soils associated with littleleaf disease. The final phase contributing to the decline includes root-feeding insects on the primary roots and the vectoring of *Leptographium* species. As loblolly stands decline with increased stresses and stand age, they also become more susceptible to attacks by southern pine beetle. The dominant forest type on these upland sites was longleaf pine prior to the initial harvesting in the early 1900s and longleaf restoration is recommended for long-term management of these sites.

Oak decline

Region 8: Regionwide

Host(s): Oaks, other hardwoods

The oak resource in the Southern United States is significant. Approximately two-thirds of the hardwood forest is classified as upland hardwood, where a malady known as "oak decline" is prevalent. Oak decline has been reported in the United States for over 130 years. It is a syndrome that involves the interaction of factors such as climate, site quality, and tree age; drought and insect defoliation escalate the condition. Pests such as armillaria root disease and the two-lined chestnut borer, which are ordinarily nonaggressive pests on vigorous trees, successfully attack trees stressed by oak decline. Decline is characterized by a gradual but progressive dieback of the crown. Mortality typically results after several years, with mature overstory trees the most heavily affected.

In South Carolina, oak decline continues to affect substantial acreage of red oak stands. Similar damage was reported from four sites in North Carolina. In north-central Arkansas and northeastern Oklahoma, widespread oak decline mortality is still prevalent, although severe drought stress has abated. Mortality and dieback have continued to increase, with 40 percent of the red oak basal area now dead in severely affected stands.

Region 9/Northeastern Area: Connecticut, Minnesota, Missouri, Vermont, Wisconsin

Host(s): Red oak

There was considerable mortality of oaks in Connecticut. Vermont reported the condition stable with some widely scattered dieback and mortality.

In Minnesota, about 12,500 acres of oak mortality were detected in northern counties in 2003. About 4,300 acres were associated with the two-lined chestnut borer in areas previously affected by drought, and defoliation by the forest tent caterpillar. In 2004, mortality continued but at a much slower pace; only 250 acres were detected. Precipitation was higher than during the previous 2 years, but some areas were still below normal. Cooler temperatures slowed development of two-lined chestnut borer larvae.

Oak decline remained stable in Missouri with no increases in red oak borer activity. Abundant rainfall may have played a role in limiting wood borer activity in previously drought-stressed areas. Oak decline in the Ozarks was a complex phenomenon, involving primarily red oaks of advanced age that were growing on soils that were shallow, rocky, and drought prone. Drought conditions of the past several years accelerated the decline and led to attacks by secondary fungal agents and wood boring insects. Armillaria root rot and

hypoxylon canker were commonly associated with decline and mortality, as were the red oak borer, two-lined chestnut borer, carpenter worms, and a variety of other borers (Cerambycidae, Buprestidae, and Brentidae). It was estimated that over 100,000 acres of Mark Twain National Forest land sustained scattered mortality due to oak decline. In addition, Tubakia leaf spot was very evident in late spring to August.

Tubakia dryina was detected on oak in Wisconsin, and together with drought from previous years and the two-lined chestnut borer, caused top dieback and some scattered mortality of white and bur oak.

Red pine decline

Region 9/Northeastern Area: Wisconsin

Host(s): Red pine

Pockets of dying red pine were expanding in Wisconsin. Mortality was associated with turpentine beetles and a fungus, *Leptographium* sp. About 123 pockets in over 50 stands in the southern part of the State were mapped.

Spruce decline

Region 9/Northeastern Area: Maine, Vermont

Host(s): Spruce

Spruce trees continued to decline on coastal islands in Maine. Decline was scattered statewide in Vermont, with approximately 12,000 acres mapped.

Subalpine fir decline

Region 1: Idaho, Montana

Host(s): Subalpine fir

Much of the mortality occurring on high-elevation sites results from varying combinations of root diseases, bark beetles, and possibly other climate related factors. The most significant factor, however, is thought to be mortality directly or indirectly caused by western balsam bark beetle (*Dryocoetes confusus*). The pathogenic fungus carried by western balsam bark beetle, *Ophiostoma dryocoetidis*, appears to cause tree mortality even when trees are only lightly attacked by the beetles. Subalpine fir mortality increased markedly in 2004 with an estimated 371,000 trees killed on 175,300 acres region wide. This is much higher than the 224,000 trees killed on nearly 143,000 acres in 2003. Many portions of the Beaverhead National Forest, where there have been recent high beetle populations, were not flown in 2004. Most of the current recorded tree mortality occurred on the Gallatin National Forest in western Montana followed by the Idaho Panhandle National Forests in northern Idaho and the Beaverhead and Flathead National Forests in Montana. In many areas, populations are still increasing.

Region 2: Colorado, Wyoming

Host(s): Subalpine fir

Subalpine fir decline—caused by the western balsam bark beetle, *Dryocoetes confuses;* root rotting fungi such as *Armillaria ostoyae;* and windthrow—continues to cause the most forest damages in Colorado and

Wyoming. In Colorado, the problems occurred on 275,000 acres. In Wyoming, east of the Continental Divide, declining subalpine firs were found in 81,000 acres.

Region 4: Idaho, Nevada, Utah, Wyoming

Host(s): Subalpine fir

Decline and die-off of subalpine fir started in the late 1980s in the region with peak mortality periods occurring during mid-1990 when over a million trees were affected by this complex. Although there are a number of pathogens involved in this complex, the primary insect causing subalpine fir mortality is the western balsam bark beetle, *Dryocoetes confusus.* Drought, heat stress, and winter drying, compounded by overstocked and overmature stand conditions, also contribute to subalpine fir mortality. In 2004, approximately 840,500 subalpine fir died over 308,200 acres. The Bridger-Teton National Forest in Wyoming lost 161,200 trees over 74,100 acres. The Humboldt-Toiyabe National Forest in Nevada lost 86,300 trees over 12,900 acres. The Dixie National Forest in Utah lost 76,900 trees across 14,700 acres. Tree mortality on private lands across the region accounted for 73,600 trees on 18,500 acres.

Sugar maple decline

Region 9/Northeastern Area: Connecticut, New York, Pennsylvania, Vermont

Host(s): Sugar maple

There was mortality of sugar maple reported in Connecticut. New York reported a high incidence of Armillaria root disease in declining stands in 2004, and the rate of mortality among declining sugar maple has increased over the previous few years. In Vermont, there were approximately 32,000 acres of scattered mortality and dieback mapped statewide. This was a decrease in acres damaged from 2003, attributed to the declining impact of the previous year's drought.

Since the mid-1980s, the health and decline of sugar maple in northern Pennsylvania has been associated with droughts and several insect defoliations across the unglaciated and glaciated regions of the Allegheny Plateau. Studies across elevation gradients in this region have shown that low soil pH adversely influences tree growth and crown vigor. In recent years, the lack of major insect defoliators and excessive soil moisture reduced the role of defoliation and drought as stressors.

White pine decline

Region 9/Northeastern Area: Connecticut, Maine, New York

Host(s): Eastern white pine

Connecticut reported incidences of declining white pine. This drought-related situation appeared to have stabilized in Maine. Maine Forest Service forest inventory crews continued to monitor pine condition in the core area of the previous outbreak. In New York, declining white pine trees were mapped in eastern parts of the Hudson River Valley, but the relationship of causal factors remained undetermined. Root disease, root weevils, and drought all impacted the site in previous years.

Yellow-cedar decline

Region 10: Alaska

Host(s): Yellow-cedar

Decline and mortality of yellow-cedar persists as one of the most dramatic forest problems in Alaska. Approximately 500,000 acres of decline have been mapped during aerial detection surveys. Extensive mortality occurs in a wide band from western Chichagof and Baranof Islands to the Ketchikan area. In 2004, more than 13,000 acres were mapped as very active, that is, they had high concentrations of dying trees with bright yellow or red crowns. The remainder of the acreage is dominated by concentrations of dead standing trees. We speculate that more yellow-cedar trees died in patches of forest decline because of the historically warm, dry spring and summer in 2004. These trees probably had abundant dead roots before this warm season, but the unseasonably warm conditions sped the rate of crown symptom development. The active areas were found scattered throughout the distribution of dead cedars, but were particularly abundant in Peril Strait (Baranof and Chichagof Islands), the southwestern portion of Baranof Island, north Kupreanof Island, south Kuiu Island, Etolin Island, Kosciusko Island, and Boca de Quadra, southeast of Ketchikan. All research suggests that contagious organisms are not the primary cause of this extensive mortality. Some site factor, probably associated with poorly drained anaerobic soils, appears to be responsible for initiating and continuing cedar decline. The principal hypothesis proposed to explain the primary cause of death in yellow-cedar decline is that the lack of snowpack at lower elevations allows solar radiation to penetrate the open-canopy forests and trigger early loss of cold tolerance in cedars, causing these trees to suffer some form of freezing injury. The primary ecological effect of yellow-cedar decline is to alter stand structure (i.e., addition of numerous snags) and composition (i.e., yellow-cedar diminishing and other tree species becoming more numerous) and eventual succession to other conifer species. Regionwide, this excessive mortality of yellow-cedar may lead to diminishing populations (but not extinction) of yellow-cedar, particularly when the poor regeneration of the species is considered.

Seed Orchard Insects and Diseases

Coneworms,
***Dioryctria* spp.**

Region 8: Regionwide

Host(s): Southern pines

Surveys indicated an average 20-25 percent loss of second-year cones (2003 cone crop) in untreated trees. Damage levels in slash pine orchards were similar to those in loblolly pine seed orchards. This loss does not include first-year flowers and conelets and is, therefore, a low estimate of the total damage caused by coneworms. In eastern Texas, losses in unsprayed orchards declined in 2003 to about 30 percent from about 34 percent in 2002. Losses in treated orchards were considerably less.

Pitch canker,
Fusarium subglutinans* f. sp. *pini

Region 8: Regionwide

Hosts: Southern pines

Pitch canker infections appeared to increase in Texas seed orchards in 2004.

Seed bugs,
Leptoglossus corculus
Tetyra bipunctata

Region 8: Regionwide

Host(s): Southern pines

Both species of seed bug were present in pine seed orchards throughout the South. Samples of conelet ovule damage indicated that seedbugs caused about 20 percent seed loss on loblolly in Louisiana. Large populations of *T. bipunctata* occurred in September and October in orchard trees monitored in Louisiana. These estimates probably reflect those throughout the Gulf Coast States.

Western conifer seed bug,
Leptoglossus occidentalis
Coneworm,
Dioryctria abietivorella
Cone beetle,
Conophthorus ponderosae

Region 1: Idaho, Montana

Host(s): Douglas-fir, western white pine, other conifers

Cone and seed insects can cause considerable damage to the seeds of western conifers, significantly reducing seed crops. Though insects are found feeding on a variety of tree species in wild stands, they are especially of concern in blister rust-resistant western white pine seed orchards. The insects that cause the most damage in western white pine are the western conifer seed bug, *Leptoglossus occidentalis*, cone beetle, *Conophthorus ponderosae*, and coneworm, *Dioryctria abietivorella*. One or more of these insects are often abundant enough in northern Idaho white pine seed orchards to warrant an insecticidal spray treatment to protect cones. To assist in timing of insecticide treatments, cone beetles are monitored with pheromone traps. Sanitation of infested cones is routinely done in the orchards. However, their proximity to wild stands makes immigration of pests a continual problem.

At Grouse Creek seed orchard in northern Idaho, coneworms were found infesting a young larch seed orchard that is just starting to produce cones. Coneworms were also found in whitebark pine cones collected from wild stands.

Tree improvement areas in Montana are now nearing cone-producing age. Monitoring will occur as cones are produced.

Nursery Insects and Diseases

Cutworms

Region 8: Texas

Host(s): Loblolly pine

An unidentified species of cutworm destroyed over a million pine seedlings in an industrial pine seedling nursery in the spring of 2003. Successful control was obtained with an insecticide application.

Cylindrocarpon root disease, *Cylindrocarpon destructans* Fusarium root disease, *Fusarium* spp. Gray mold, *Botrytis cinerea* Pythium root disease, *Pythium spp.*

Region 1: Idaho, Montana

Host(s): Conifers

Diseases seriously affect nursery production of conifer and hardwood seedlings and native plants for reforestation/restoration efforts in the Northern Region. The most important and damaging diseases are caused by soilborne pathogens (*Fusarium, Pythium, Phytophthora, Cylindrocarpon*) in both bare root and container nurseries. Foliar pathogens (primarily *Botrytis*) are common in container nurseries.

Root diseases in bare root nurseries have traditionally been controlled by application of pre-plant soil fumigants, especially methyl bromide. Alternatives to methyl bromide, which is currently being phased out in the United States, are available at some, but not all nurseries. Some nurseries are converting much of their production to container seedlings due to increased demand for such stock, and problems of disease control in bare root stock. Improved disease diagnosis and control is anticipated utilizing new technology that is being developed to identify pathogenic fungal strains using genetic molecular markers. Molecular diagnostics should improve disease detection and accelerated implementation of integrated pest management practices in the future.

Damping-off, *Fusarium* spp. *Pythium* spp. *Phytophthora* spp.

Region 8: Regionwide

Host(s): Pines, hardwoods

Damping-off is the most common disease problem facing southern nurseries. Loss of seedlings to damping-off varies greatly from year to year owing to the interaction of pathogenic fungi and

environmental conditions. Seedling losses can be severe when germination is slow due to cold, wet weather. Damping-off continued to be one of the most significant problems of nurseries in the South in 2003.

Phytophthora root rot,
Phytophthora cinnamomi

Region 8: North Carolina

Host(s): Fraser fir, northern red oak

Low levels of Phytophthora root rot were detected in two North Carolina nurseries. Improvement of drainage, removal of infected plant, and fungicides controlled the limited occurrences of this disease.

Rhizoctonia needle blight,
Rhizoctonia spp.

Region 8: Regionwide

Host(s): Longleaf pine

Approximately 65,000 longleaf pine seedlings were killed at the Taylor Nursery in South Carolina by *Rhizoctonia* in 2003. Although fungicide treatments were made, their efficacy was reduced by rainfall.

Stunt nematode damage,
Tylenchorhynchus ewingi

Region 8: North Carolina

Host(s): Loblolly pine

Stunted 1-0 loblolly pine seedlings were found in several North Carolina fields with an average of 300 stunt nematodes per 100 cc of soil. Fumigation was found to reduce populations but did not eradicate the nematode. The use of nonhost cover crops is being investigated as a strategy to help control this nematode.

Abiotic and Other Damage

Air pollution

Region 5: California

Host(s): Jeffrey pine, ponderosa pine, hardwoods

Ozone damage has been observed on both conifers and hardwoods in the San Bernardino Mountains. Ozone levels as well as general pollution problems appear to be increasing in the greater Los Angeles area. Results of an annual Forest Health Monitoring Program ozone survey are reported periodically by the Forest Inventory and Analysis group at the Pacific Northwest Station, USDA Forest Service, Portland, Oregon.

Region 8: Tennessee

Host(s): All species

Tennessee experienced moderate ozone damage in the central part of the State and on the Cumberland Plateau.

Bear damage

Region 6: Washington

Host(s): Douglas-fir, western hemlock, Port-Orford-cedar

Acres with trees killed by bear as interpreted by aerial observers decreased from 321,600 acres (1.99 trees per acre) in 2003 to 178, 709 acres (1.66 trees per acre) in 2004. The vast majority of recorded damage was mapped in western Oregon and western Washington. The aerial survey only detects trees that have been recently killed by bear feeding. A ground survey on Quinault Indian Reservation lands found that at least 3.5 times as many Douglas-fir trees are damaged as killed.

Noteworthy reporting areas include: southwestern Washington (23,305 acres, 2.08 trees per acre), Gifford-Pinchot, (42,113 acres, 1.62 trees per acre), Mount Baker-Snoqualmie, (23,235 acres, 2.11 trees per acre), Olympic, (34,124 acres, 1.85 trees per acre), northwestern Oregon, (15,332 acres, 0.92 trees per acre), and Quinault Indian Reservation (10,811 acres, 1.77 trees per acre).

Beaver damage

Region 8: South Carolina

Host(s): Hardwoods

All but three South Carolina counties experienced some forest loss to beavers in 2004. The majority of this damage was in hardwood stands and the South Carolina Forestry Commission estimated that 17,255 acres were affected, representing 310,050 cords valued at nearly $5.6 million. New mortality due to beaver impoundments nearly doubled from 2003 levels, due in large part to increased precipitation.

Drought effects

Region 2: Colorado, Kansas, Nebraska, South Dakota, Wyoming

Host(s): All tree species

Moisture conditions improved over much of the region but there are still several drought related tree damages in each State. Extensive Gambel oak dieback set up by recent drought conditions throughout southern Colorado continued in 2004 but did not expand greatly. Some conifer stands in the Colorado Rocky Mountains were exhibiting heavy cone crops due to the drought conditions.

Colorado spruce, cottonwood, green ash, and a number of other species were affected by drought in western South Dakota during 2004. Agro-forestry plantings and urban forests were impacted by drought conditions. The increased environmental stress resulted in tree mortality attributed in part to colonization by wood borers.

In Nebraska, drought conditions in 2004 improved in eastern Nebraska but remained severe in the central and western portions of the State. Decline symptoms such as reduced growth, less foliage, and poor color were seen in many tree species, but especially in Scotch and Austrian pines in windbreaks and other plantings.

Region 3: Arizona, New Mexico

Host(s): Ponderosa pine

Discoloration of ponderosa pine attributed to drought occurred on about 37,830 acres in 2004. In Arizona, this occurred on the Coconino (19,150 acres), Coronado (980 acres), Kaibab (14,560 acres) and Prescott (3,140 acres) National Forests. No discoloration of ponderosa pine due to drought was recorded in New Mexico in 2004.

Region 5: California

Host(s): Oaks, other hardwoods

Drought conditions are continuing in the southern part of the State, particularly in Los Angeles, San Diego, San Bernardino, Riverside, and Orange Counties. Various species of oaks as well as other hardwoods have been especially affected. Individual trees have died without any other apparent primary cause of death. Secondary pests, such as bark beetles, woodborers, Hypoxylon canker, and *Armillaria* sp., associated with annosus root disease are common. Death of individual trees both in the forest and in backyard situations are expected to continue until normal rainfall patterns return and may continue for a period even after that due to the stressed conditions of the trees. Drought conditions are also helping to fuel the bark beetle epidemic in the conifer forests of the area.

Many ponderosa and Jeffrey pines at lower and drier sites throughout northeastern California experienced high levels of drought-induced needle cast this year compared to previous years. Aspen foliage dieback, probably due to drought stress, was reported on the Eagle Lake Ranger District, Lassen National Forest.

Region 8: South Carolina

Host(s): All species

A brief drought produced minor damage (primarily needle-drop) during May and June in South Carolina.

Abiotic Damage

Region 9/Northeastern Area: Connecticut, Massachusetts, Michigan, Pennsylvania, Vermont

Host(s): Black oak, red oak, white oak, hardwoods and softwoods

The after-effects of drought in Connecticut continued to be evident in many woody species, especially hemlock, pine, maple, dogwood, and ash. The effects of the previous season of droughts in Massachusetts continued to be observed although somewhat less than in previous years. A total of 391 acres, mostly in the higher elevations of Berkshire County, were mapped during the annual aerial survey.

In Vermont, some drought damage was scattered statewide but there was a decrease from 2003. Drought-related mortality of stressed trees continued on shallow or disturbed sites, but impact lessened following 2 years of good water availability.

In Pennsylvania, drought caused localized damage to approximately 387 acres of white and chestnut oak in Elk and Potter Counties. Dieback occurred locally on black oak in Montgomery County and red oak in Montour County, Pennsylvania.

Drought stress occurred on over 34,406 acres in Michigan.

Fire

Region 5: California

Host(s): True firs, other conifers

Fire damaged and scorched trees are found throughout the fire areas of southern California. Individual trees continue to die from the damage to their crowns, roots, and cambium. Scorched trees are also more likely to be attacked by bark beetles and are encouraging the bark beetle outbreak in southern California.

Fire-injured red and white fir trees with green crowns, but extensive bole decay, failed this past year in the 1999 Bucks Fire, Plumas National Forest. This condition has also been observed in a few true fir trees on the 2001 Star Fire, Tahoe National Forest, and the 2000 Storrie Fire, Lassen National Forest. Although the trees had green crowns, many of them had been essentially girdled in the fires. Woodborers, especially ambrosia beetles, were present shortly after the fire damage, attacking the dead cambium/phloem areas and working into the sapwood, possibly accelerating the decay.

Region 10: Alaska

Host(s): All species

The summer of 2004 was a record fire season, with over 6.76 million acres burned, mostly in interior Alaska. This represented 33.9 percent more acres burned than during the previous record year of 1957 when 5.05 million acres were consumed by fire. At the time of writing this report, the Alaska Fire Service had recorded 714 fires in which at least 0.1 acres were burned; an additional 55 fire starts (i.e., no burned acreage recorded) were also documented. The 2004 fire season was also unique because a large amount of burned land area was located along major highways, such as the Steese, Elliott, and Taylor Highways. Two monitoring projects related to the 2004 fires are being planned for next year. A monitoring project will be implemented to determine the abundance of wood-boring beetles along the fire perimeters, as well as associated beetle-induced tree mortality. A second monitoring project will be implemented to determine if invasive plant species will become established in burned over areas along the road corridors and in staging areas, fire lines, and camp sites associated with fire fighting activity.

Flooding

Region 9/Northeastern Area: Connecticut, Massachusetts, Minnesota, Vermont

Host(s): Hardwoods, softwoods

In Connecticut, wet conditions in spring 2004 caused limited root damage in many areas and continued root damage from the previous season's wet conditions. A total of 183 acres of flooding caused by beavers was recorded in Massachusetts. In Vermont, approximately 19,000 acres of dieback and mortality due to flooding were mapped statewide. About 4,000 acres in Minnesota sustained damage from floods.

Frost/cold

Region 2: South Dakota

Host(s): Green ash

A late April frost occurred throughout the northeastern part of South Dakota and resulted in widespread defoliation of ash trees. In many areas almost 100 percent of the ash trees were defoliated. The trees leafed out with a second flush by the end of May.

Region 5: California

Host(s): Incense-cedar

There was an increase in incense-cedar mortality throughout northeastern California attributed to drought, frost, and to a lesser extent, *Phloeosinus* sp. bark beetles.

Region 9/Northeastern Area: Vermont

Host(s): Hardwoods and softwoods

Vermont reported that a small amount of shoot mortality occurred on Christmas trees.

Ice/snow damage

Region 8: Regionwide

Host(s): Southern pines, hardwoods

South Carolina experienced a major ice storm in January 2004, producing an estimated $94 million in timber losses. A heavy late-winter snow in southwestern Tennessee uprooted up to 50 percent of the saplings in loblolly pine plantations.

Region 9/Northeastern Area: Connecticut, Maine, Vermont

Host(s): Hardwoods

In Connecticut, there was considerable breakage from ice storms, especially in northern areas of the State. In Maine, most trees damaged by the "Ice Storm of 1998" showed significant recovery of affected crown, and impact assessment work of the 1998 ice storm was largely complete. Survey results showed that (1) there was only minor impact of the ice storm on softwood species; (2) even in the most heavily damaged

areas, trees on average now have 40-75 percent of the crowns they had prior to the ice storm; and, (3) crown recovery was due predominantly to sprouting. Ice and snow was not a significant stressor in Vermont in 2004.

Saltwater intrusion/subsidence/erosion

Region 8: Louisiana

Host(s): Cypress-tupelo

In addition to the detrimental effects of defoliating insects (see forest tent caterpillar and bald cypress leaf roller entries), erosion, subsidence, and lack of sedimentation plague the Louisiana coastal wetlands resulting in widespread mortality, particularly of cypress-tupelo stands. Thousands of acres have been lost and more are being lost annually. National attention is increasingly being focused on this issue and a number of projects are attempting to mitigate and reverse conditions leading to loss of forested wetlands and marshlands.

Voles

Region 8: South Carolina, Tennessee, Virginia

Host(s): Loblolly pine, cherrybark oak

South Carolina reported vole damage in five three- to five-year-old plantations of loblolly pine. In Tennessee, voles killed 100 percent of the oak and pine seedlings on 50 acres in 2004. Virginia reported that voles had girdled large numbers of seven-year-old white pines in Floyd County.

Wind

Region 8: Florida, North Carolina, Tennessee, Virginia

Host(s): Southern pines, hardwoods

Hurricanes Charlie, Frances, Ivan and Jeanne struck Florida in rapid succession, causing tremendous property losses but much less significant damage to the State's timber resources, although timber damage was fairly severe in the Florida panhandle. Damage to citrus groves was the heaviest tree-related cost in Florida. Charlie caused flooding and minor damage in the coastal Carolinas; Ivan impacted the Gulf coasts of Alabama and Mississippi, causing extensive windthrow and stem breakage. Tornadoes spawned by the hurricane also caused forest damage. A twelve-county assessment by the Alabama Forestry Commission identified 188,584 acres of severely damaged timber and 196,376 acres with moderate damage, producing estimated losses of $473,277,304. An additional $136,950,609 was reported outside of the primary impact area. North Carolina reported severe damage from Ivan along the Blue Ridge Parkway near Asheville. Wind damage was also reported in southwestern, central, and northeastern Tennessee and in Amelia and Southampton Counties, Virginia.

Region 10: Alaska

Host(s): All tree species

Slightly over 500 acres of blowdown were mapped in the southeast during the 2004 surveys. This resembles the data collected in 2003 where a little less than 500 acres of blowdown were mapped in

southeast Alaska, however, the acreage was underestimated in 2003 in the interior because wind-thrown patches were not visible during the aerial survey due to the cover of nearby trees. The large blowdown in 2003 occurred due to a bora wind that swept throughout south-central Alaska and it is very likely this storm knocked down many trees scattered across the landscape.

Winter injury

Region 9/Northeastern Area: Connecticut, Vermont

Host(s): Fir, hemlock, spruce

In Connecticut, dramatic and conspicuous damage was observed on eastern red cedar in all age and size classes and locations, including natural stands and managed landscapes. One possible explanation included damage from winter weather conditions that occurred on trees previously stressed by several years of dry conditions and the extremely wet conditions of the 2003 season. Vermont reported only 100 acres of discoloration mapped, a large decrease from 2003.

Appendixes

Appendix A

Forested Areas*

About one-third of the Nation's land area, 736.7 million acres, is forested—380.3 million acres (52 percent) in the East, 227.3 million acres (31 percent) in the continental West, and 129.1 million acres (17 percent) in Alaska. By ownership nationwide, 42 percent of the acreage is in public ownership and 58 percent is in private ownership. Of the public ownership, 20 percent is in the East, 48 percent in the continental West, and 32 percent in Alaska. In contrast, 75 percent of the private ownership is in the East, 18 percent in the continental West, and 7 percent in Alaska.

Eastern hardwood forests make up 74 percent of all the forested acreage in the East. The largest component of the eastern hardwood forest type is oak-hickory, which occupies 130 million acres, or 34 percent, of the eastern forested acreage and is found in the South and the southern half of the North.

The beech-birch-maple forests occur on 51 million acres, or 13 percent, of the eastern forests and are located in the North.

The oak-pine forests occupy 32 million acres, or 8 percent, of the eastern forested acreage and are located in the South, as are the oak-gum-cypress forests, which occur on 29 million acres, or 8 percent, of the eastern forested acreage.

The aspen-birch forests occupy 17 million acres, or 4 percent, of the eastern forested acreage and are located in the North. The elm-ash-cottonwood forests on 15 million acres, or 4 percent, of the forested acreage are bottom land forests in both the North and South. Other forest types occupy 13 million acres, or 3 percent, of the forested acreage in the East.

Eastern softwood forests make up the remaining 26 percent of the eastern forested acreage. The loblolly-shortleaf pine forests occupy 50 million acres, or 13 percent, of the eastern forested acreage and occur in the South. Also in the South are the longleaf-slash pine forests, which cover 14 million acres, or 4 percent, of the forested lands.

The spruce-fir forests are on 20 million acres, or 5 percent, of the forested lands and the white-red-jack pine forest on 15 million acres, or 4 percent, of the forest lands; both are in the North.

Western hardwood forests occupy 49 million acres, or 14 percent, of the western forested acreage, including that in Alaska. The primary species are oaks in California, aspen in the Intermountain Region, and red alder in the Pacific Northwest.

Western softwood forests make up 86 percent of all the western forests. Douglas-fir forests occupy 43 million acres, or 12 percent, of the western forest lands. Douglas-fir is found throughout much of the West, except Alaska.

Ponderosa pine forests occupy 31 million acres, or 9 percent, of the forested acreage; the species is present through much of the West. Lodgepole pine is also found throughout much of the West. It is most abundant in the Intermountain Region, occupying 18 million acres, or 5 percent, of the forested acreage.

Hemlock-Sitka spruce forests are found on the Pacific Slope in Oregon and Washington and along coastal Alaska. These forests occupy 16 million acres, or 5 percent, of the forested lands. The fir-spruce forests occupy 60 million acres, or 17 percent, of the acreage and are mid-to-high elevation forests throughout the West.

The other softwoods group is made up primarily of black spruce stands in interior Alaska and occupies 70 million acres, or 20 percent, of the forested land in the West.

The piñon juniper type occupies 48 million acres, or 14 percent, of the forested acreage.

Other western types (western white pine, larch, redwood, chaparral, and nonstocked areas) occupy 17 million acres, or 5 percent, of the western forested acreage.

* Data may not add to totals because of rounding

From: Powell, Douglas S.; Faulkner, Joanne L.; Darr, David R.; Zhu, Zhiliang; MacCleery, Douglas W. 1993. Forest resources of the United States, 1992. General Technical Report RM-234. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 132 p.+map. [Revised, June 1994]

Appendix B

Reporting Area Definition

Reporting area is defined as an area of land designated by the name of the Federal or tribal land (in most cases) included in the area, but also contains intermingled and adjacent lands of all ownerships. Reporting areas border on each other to include all lands. The name of the reporting area defines its location; for example, the Mount Hood reporting area includes the Mount Hood National Forest and vicinity.