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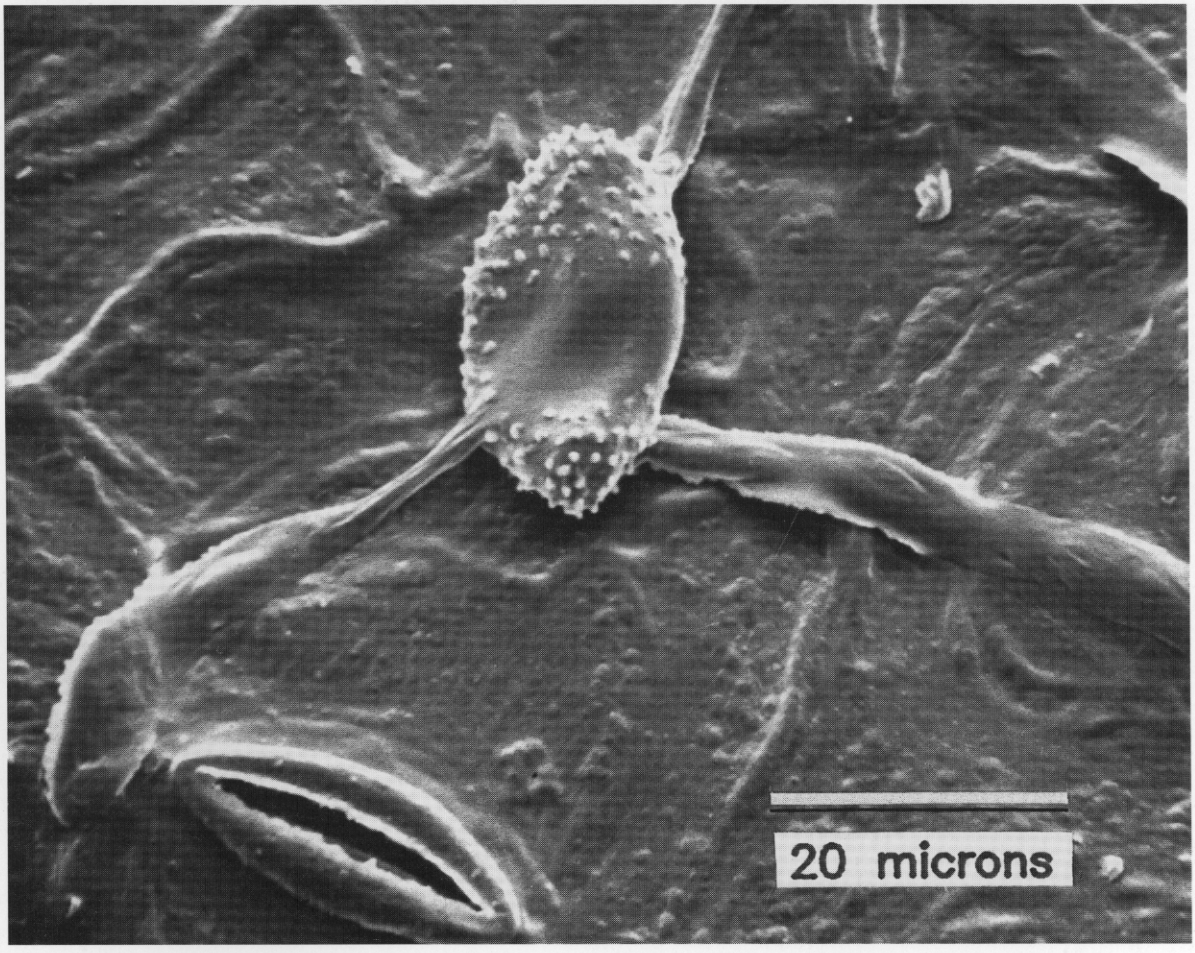
Forest Insect and Disease Conditions in the United States 1990



Forest Insect and Disease Conditions in the United States 1990

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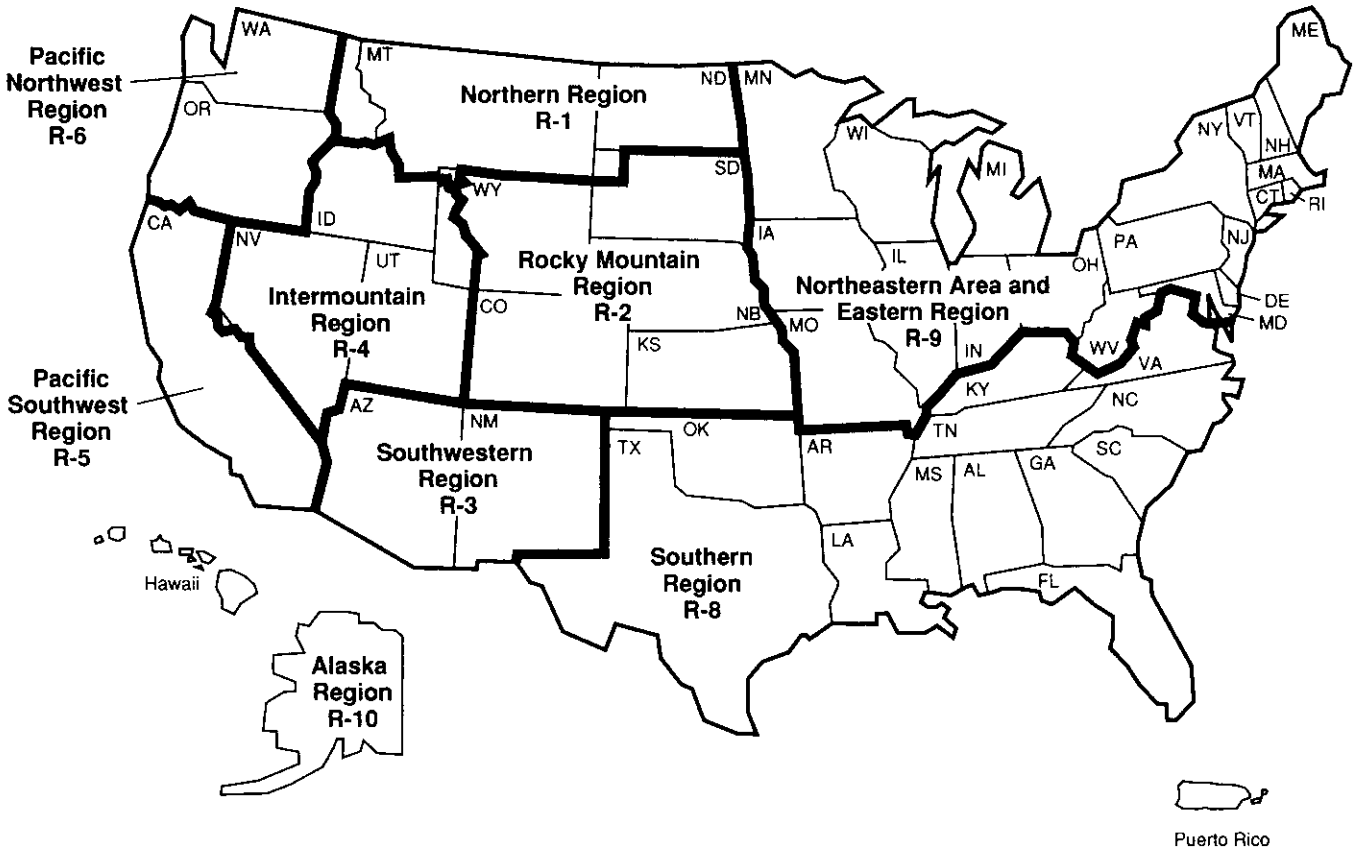

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Cover photo: Germinating spore of cottonwood leaf rust, *Melampsora spp.*

Contents

Introduction

The 1990 report provides an overview of forest insect and disease conditions in the United States.

The report is a three-part publication summarizing the current status of major insect and disease pests in the United States. Part I is a condition summation of 5 major insects and several significant diseases. In Part II, detailed information about pest conditions on all landownerships in the Forest Service Regions is arranged numerically by Region (see map on page ii). The Northern Region (Region 1) is first, and the Alaska Region (Region 10) is last. Each Region has 2 sections, a section on insects followed by a section on diseases. Part III is an index of the common and scientific names of insects and disease-causing organisms found in this report.

Forest Pest Management offices nationwide completed the necessary information for lands of all ownerships.

This is the 40th year that the U.S. Department of Agriculture, Forest Service, Forest Pest Management has published this report. Much of the report is based on special aerial or ground surveys. These surveys record short-term changes in pest activity. The information supplements the tree mortality information gathered in periodic forest resource inventory surveys done by the Forest Service.

We appreciate the assistance of all State, Federal, and private cooperators who provided information for this report.

For additional information about conditions in a particular State, contact one of the following Forest Pest Management staffs:

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P.O. Box 25127
Lakewood, CO 80225

Forest Service, USDA
Southwestern Region (R-3)
Federal Building
517 Gold Avenue, S.W.
Albuquerque, NM 87102

Forest Service, USDA
Intermountain Region (R-4)
Federal Building
324 25th Street
Ogden, UT 84401

Forest Service, USDA
Pacific Southwest Region (R-5)
630 Sansome Street
San Francisco, CA 94111

Forest Service, USDA
Pacific Northwest Region (R-6)
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Portland, OR 97208

Forest Service, USDA
Southern Region (R-8)
1720 Peachtree Road, N.W., Room 925N
Atlanta, GA 30367

Forest Service, USDA
Eastern Region (R-9) and
Northeastern Area
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100 Matsonford Road, Suite 200
Radnor, PA 19087

Forest Service, USDA
Alaska Region (R-10)
201 E. 9th Avenue, Suite 201
Anchorage, AK 95501

Part 1 National Summary

GYPSY MOTH

Almost 7.3 million acres were defoliated by the gypsy moth (*Lymantria dispar*) during 1990. This is more than double the three million acres recorded in 1989 and almost five times the 719,000 acres recorded in 1988.

Before 1971, gypsy moth defoliation in the U.S. only exceeded 1 million acres in one year (1953 with 1.5 million acres). Defoliation never exceeded 2 million acres until 1980. Since then, defoliation in excess of 2 million acres has been recorded 6 times.

Over half (59%) of the 1990 defoliation took place in Pennsylvania. This was the most defoliation ever recorded for the State and exceeded the previous 5-year accumulated State total. New York was the only State that reported a decrease in defoliation between 1989 and 1990.

This year, more than 1.5 million acres of Federal, State and private lands were treated with *Bacillus thuringiensis* and dimilin in efforts to reduce the defoliation.

The gypsy moth continued its south and westward movement. Ohio reported defoliation for the first time. In West Virginia, 12 of 54 counties are regulated under the gypsy moth quarantine. Eighty-four of the 132 independent cities and counties in Virginia are regulated. Two counties in North Carolina, Currituck County and Dare County, are regulated.

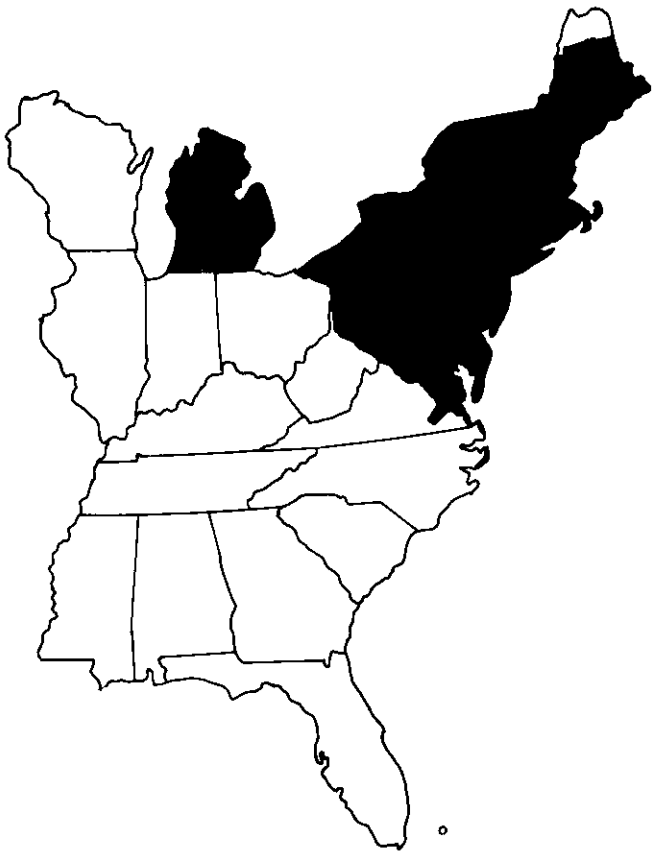
Eradication efforts continued against the large isolated gypsy moth infestation in Salt Lake City, Utah, and nearby areas.

No treatments were carried out against the isolated infestation that once covered 9,000 acres in Clay County, North Carolina. Monitoring will continue in 1991.

An extensive isolated infestation located in Giles County, Virginia, was treated for the first time in 1988. In 1989, a total of 17,862 acres were treated. Monitoring traps caught no moths in Giles County in 1990. However, adjacent to the area, in West Virginia, moths were trapped. This area will be closely monitored in 1991.

Elsewhere, eradication programs were carried out against smaller isolated infestations in Colorado, Illinois, Minnesota, North Carolina, Tennessee, Washington and Wisconsin.

1990 Gypsy Moth Generally Infested Area

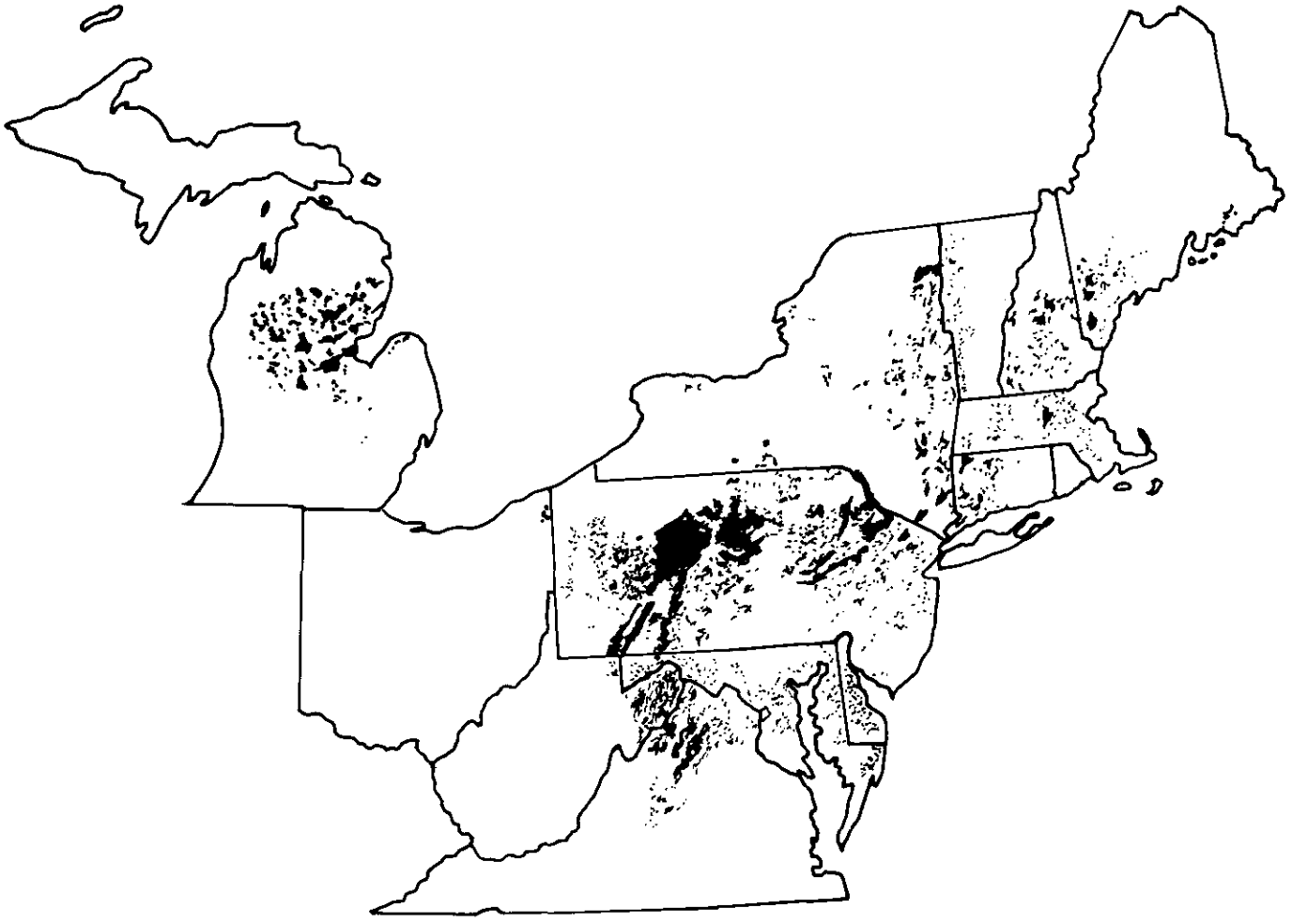


Acres of Aerially Detected Defoliation

State	1989	1990
Connecticut	1,888	3,790
Delaware	78,430	176,576
Maine	35,000	270,433
Maryland	97,911	133,062
Massachusetts	950	83,595
Michigan	294,344	358,338
New Hampshire	18,395	133,200
New Jersey	137,310	431,235
New York	421,138	354,162
Ohio	0	115
Pennsylvania	1,506,790	4,357,700
Rhode Island	0	0
Vermont	237,335	63,000
Virginia	289,332	594,000
Washington, D.C.	0	10
West Virginia	86,736	388,746
Total	**2,995,559**	**7,297,962**

Location of 1990 Gypsy Moth Eradication Treatments

1990 Gypsy Moth Defoliation



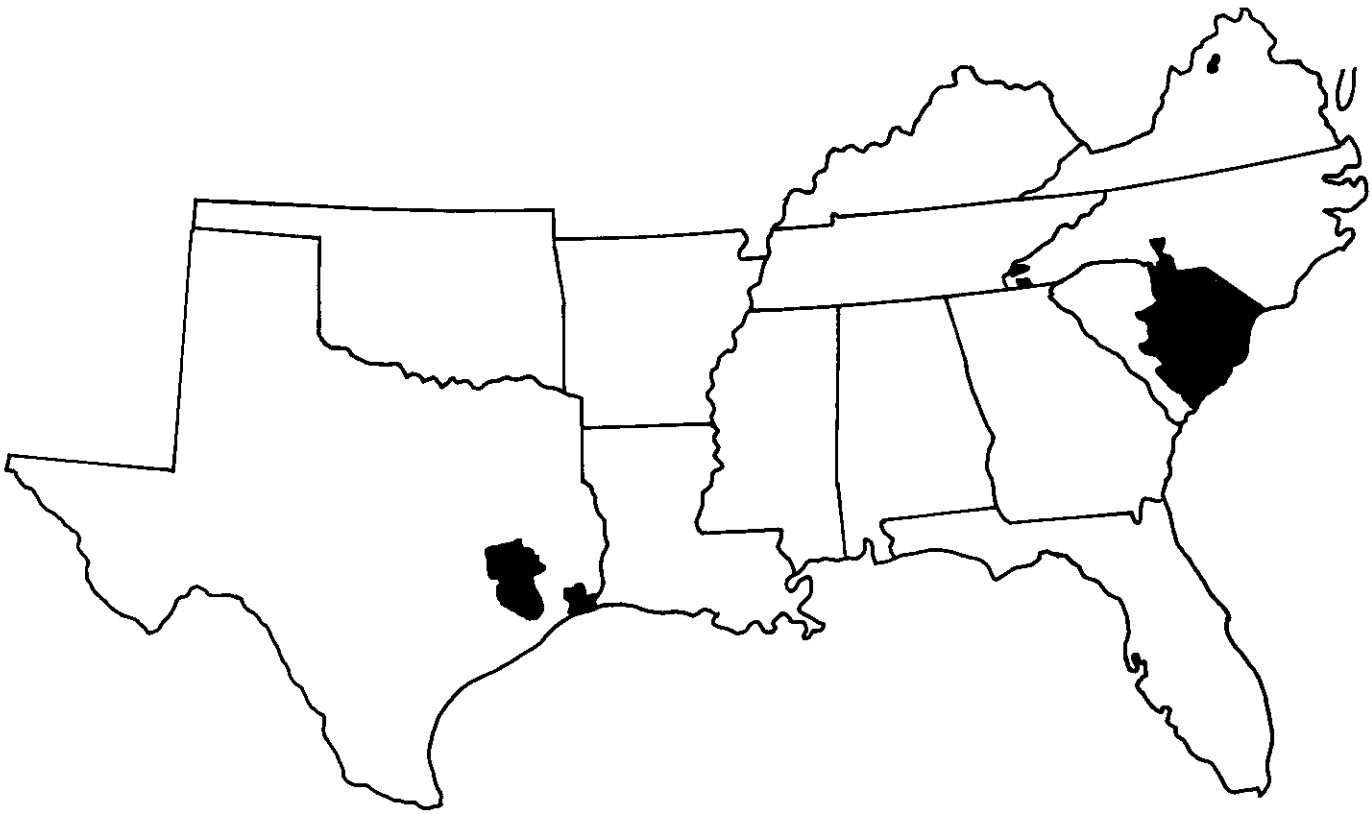
Southern Pine Beetle

Southern pine beetle (*Dendroctonus frontalis*) activity declined significantly in 1990. The most dramatic declines were in the southern Appalachians, where populations were down sharply from last year's record setting losses. Although the overall infestation declined in severity, the number of multiple tree spot infestations increased slightly. Southwide, the number of spots went from 21,140 in 1989 to 26,674 in 1990. The number of "outbreak counties" (counties with 1 or more multiple tree spots per 1,000 acres of host type) decreased from 94 in 1988, to 54 in 1989, to 32 in 1990. The number of outbreak acres also declined, going from 5.3 million acres in 1989 to 4.2 million acres in 1990.

The largest increase in southern pine beetle activity occurred in the areas of South Carolina damaged by Hurricane Hugo. Pine engraver (Ips) beetle populations first began to build up in the downed trees. By mid-June, numerous southern pine beetle spots were detected on the Francis Marion National Forest, with about 10,000 additional spots showing up on nearby state and private land. An estimated 80% of these spots were combinations of Ips and southern pine beetles. This area supports relatively large populations of the endangered red-cockaded woodpecker. This bird requires live trees to maintain a colony, so there is great concern over protecting the standing trees that are still alive.

The most noteworthy infestations of 1990 occurred on National Forest land in Texas. Although these infestations were particularly virulent, they were localized. This is in sharp contrast to the widespread outbreaks characteristic of earlier Texas epidemics. Red-cockaded woodpeckes are also present in this area. Efforts to protect this endangered species lent a sense of urgency to control actions against spots that threatened these colonies.

1990 Southern Pine Beetle Outbreak Counties



Southern Pine Beetle Outbreak Counties

Alabama:	None
Arkansas:	None
Florida:	None
Georgia:	None
Louisana:	None
Mississippi:	None
North Carolina:	Clay, Cabarrus, Graham, Union
Oklahoma:	None
South Carolina:	Berkeley, Calhoun, Charleston, Chesterfield, Clarendon, Colleton, Darlington, Dillon, Dorchester, Florence, Georgetown, Horry, Kershaw, Lancaster, Lee, Marion, Marlboro, Orangeburg, Richland, Sumter, Williamsburg
Tennessee:	None
Texas:	Grimes, Harris, Jefferson, Montgomery, San Jacinto, Walker
Virginia:	Page

Acres In Outbreak†

State	1989	1990
Alabama	724,000	0
Arkansas	0	0
Georgia	850,000	0
Florida	0	0
Kentucky	0	0
Louisiana	17,000	0
Mississippi	319,000	0
North Carolina	342,000	118,358
Oklahoma	0	0
South Carolina	753,000	2,320,664
Tennessee	427,000	0
Texas	1,901,000	1,800,000
Virginia	0	0
Total	**5,333,000**	**4,239,022**

†Acres of outbreak are acres of host type having one or more multiple-tree spots per 1,000 acres.

Spruce Budworm

Spruce budworm (*Choristoneura fumiferana*) caused light to moderate defoliation on about 200,000 acres in 1990. This is a slight increase from the 144,800 acres of defoliation reported in 1989. Over 98 % of this year's defoliation was in Minnesota.

For the first time in this century, no defoliation was reported from the northeastern states, including Maine, New Hampshire, New York and Vermont.

Acres Of Aerially Detected Defoliation

State	1989	1990
Maine	4,800	0
Michigan	0	2,500
Minnesota	140,000	198,000
New Hampshire	0	0
New York	0	0
Vermont	0	0
Wisconsin	0	0
Total	144,800	200,500

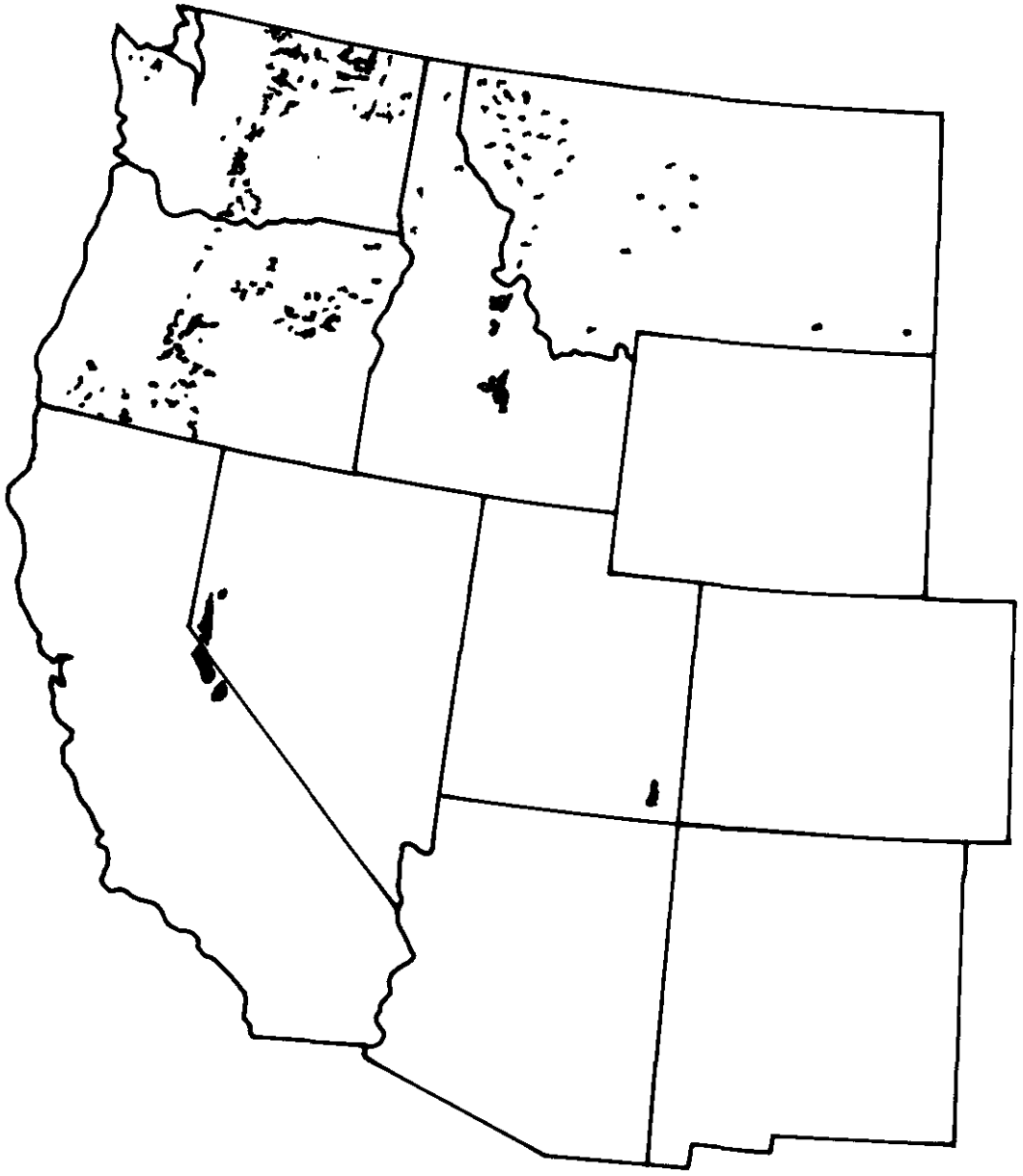
Mountain Pine Beetle

Mountain pine beetle (*Dendroctonus ponderosae*) tree killing decreased by 63 percent from 1989 to 1990. Similar to last year, the decrease was especially large in Oregon and Montana. Only Washington reported a large increase in the number of mountain pine beetle killed trees. The overall downward trend in mountain pine beetle activity was evident in the number of acres affected by this insect, which declined by 42%. The volume of timber killed by mountain pine beetle was at a high level in 1990, but decreased by about 24% over that reported in 1989. The continued high level of volume killed reflects the continuing mountain pine beetle activity in drought stressed forests of California. In fact, many areas of the west have received below normal precipitation for up to five years in a row. The combined effects of drought and attack by bark beetles have resulted in unprecedented levels of tree mortality in these areas. An estimated 6 billion board feet of merchantable sized trees have been killed in California alone. Douglas-fir beetle, western pine beetle, *Ips* species, *Scolytus* species and Jeffrey pine beetle (in California and Nevada) have been the most important mortality agents, with the mountain pine beetle playing a comparatively minor role and sometimes acting in concert with these other insects.

State	1989 Acres Affected	1990 Acres Affected	1990 Volume† Killed	1990 Number Of Trees Killed
Arizona	900	600	53	2,000
California	NA	NA	102,389	1,265
Colorado	12,000	9,800	128	8,000
Idaho	41,600	15,200	189	12,000
Montana	421,500	195,200	12,402	620,000
New Mexico	1,000	800	80	4,000
Oregon	887,926	245,100	2,742	143,000
South Dakota	2,400	6,800	201	12,000
Utah	4,500	2,000	34	4,000
Washington	231,375	431,700	8,959	433,000
Wyoming	11,400	28,300	540	37,000
Total	**1,614,601**	**935,300**	**127,144**	**1,275,000**

†Volume in thousand cubic feet of timber

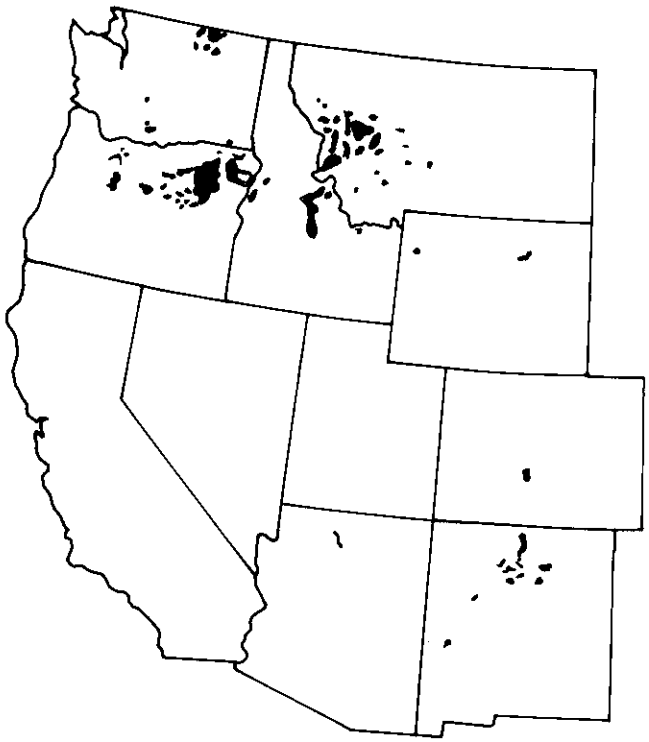
1990 Mountain Pine Beetle



Western Spruce Budworm

Western spruce budworm (*Choristoneura occidentalis*) defoliation increased by about 1.5 million acres after declining for the previous four years. The 1990 defoliation totaled 4.6 million acres compared with 3.1 million acres reported in 1989. Dispite this substantial increase in defoliation, the 1990 total is still far below the 13.2 million acres of defoliation reported in 1986. Most of the increase in defoliation took place in Oregon where 1990's defoliation was almost a million acres more than 1989's.

1990 Western Spruce Budworm



Acres Of Aerially Detected Defoliation

State	1989	1990
Arizona	720	25,600
California	0	0
Colorado	52,000	52,100
Idaho	26,600	48,000
Montana	1,191,300	1,482,400
New Mexico	90,080	310,500
Oregon	1,416,681	2,344,300
Utah	0	0
Washington	362,251	351,000
Wyoming	0	8,100
Total	3,139,632	4,622,000

Overview of Disease Conditions

Root diseases, stem decays, white pine blister rust, dwarf mistletoes, and fusiform rust continued to be the most damaging diseases of commercially important tree species. In addition, a number of interacting biotic and abiotic factors caused both local and regional tree declines of several eastern tree species. These included ash, beech, birch, dogwood, elm, fir, maple, oak, and spruce. Widespread oak decline appeared to be related to a combination of site, weather, tree age, and pest damage factors. Dogwood anthracnose continued its spread and is of concern because the ultimate distribution and effects of this disease are uncertain.

Root diseases of conifers were particularly damaging to forests in California, Idaho, Montana, Oregon, Washington, and on high hazard sites in the South. Hardwood root diseases were an important contributing factor to tree decline in the East. Both conifer and hardwood root diseases caused tree hazards in a number of recreation areas.

Stem decays were a problem nationwide on both conifer and hardwood tree species. These diseases greatly reduced commercial value of trees harvested for wood products as well as caused tree hazards in recreation areas.

White pine blister rust caused extensive tree mortality to western white and sugar pines in California and Oregon, and to western white pine in Idaho, Montana, and Washington. Damage was more localized and much less severe to eastern white pine in the north central and eastern United States.

Dwarf mistletoes, which are parasitic plants, infected conifers on 22 million acres of western forest land. Most damage was caused by 7 of the 16 dwarf mistletoe species -- those on lodgepole pine, Douglas-fir, western larch, true firs, western hemlock, and the 2 species on ponderosa pine.

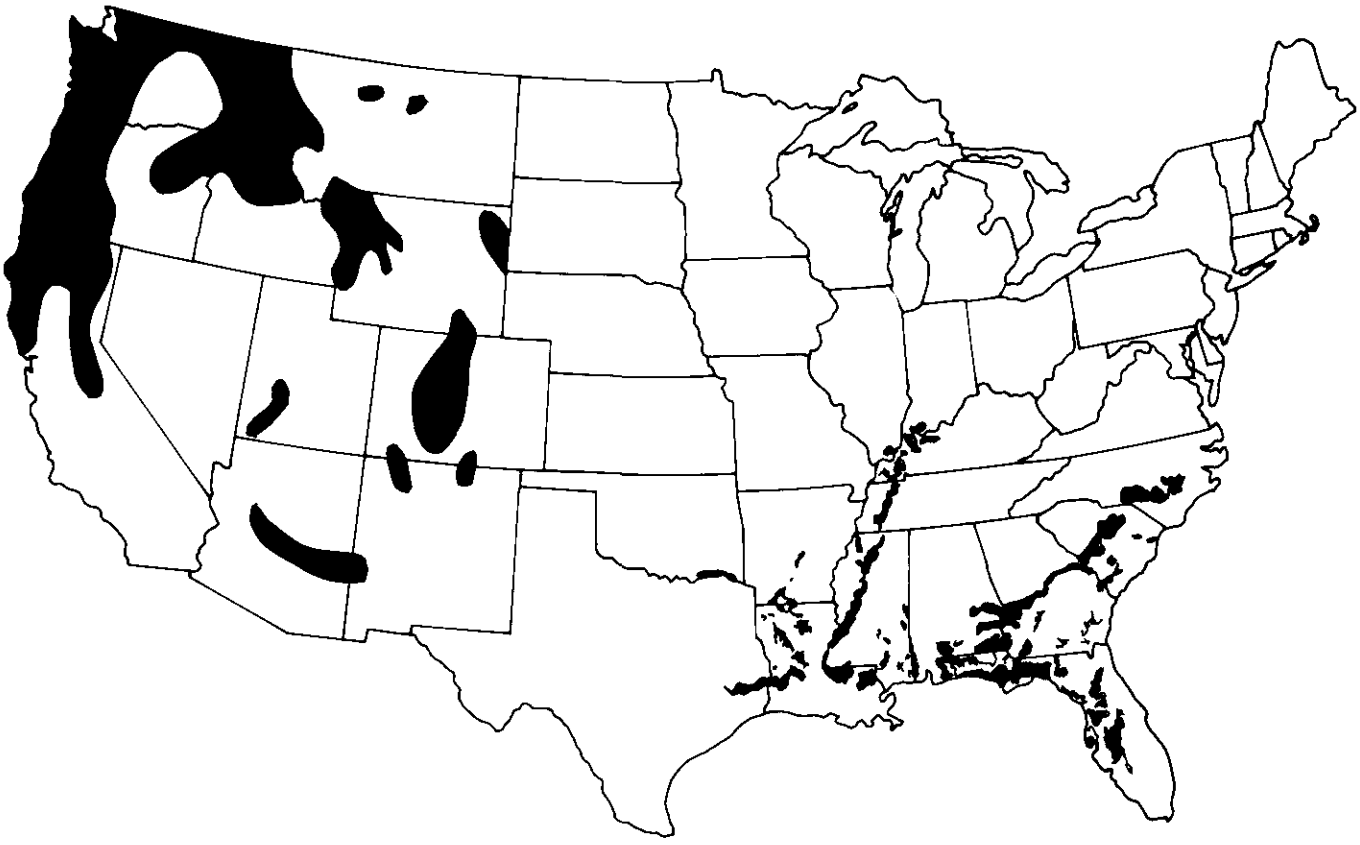
Fusiform rust was the most damaging disease of southern pines, particularly loblolly and slash pine. Annual economic losses from fusiform rust have been estimated at $53 million in slash and loblolly pines. Sawtimber losses accounted for about 65 percent of the total losses.

Table 1. Estimated annual losses to fusiform rust in the South by product, 1990.†

Estimated loss at harvest for slash and loblolly pines Values rounded to nearest thousand			
State (survey yr.)	Cordwood ($)	Sawtimber ($)	Total ($)
Alabama (82)	395,000	7,159,000	7,555,000
Arkansas (88)	18,000	553,000	553,000
Florida (87)	1,034,000	2,168,000	3,202,000
Georgia (82)	12,506,000	11,200,000	23,686,000
Louisiana (84)	773,000	3,488,000	4,261,000
Mississippi (87)	215,000	4,055,000	4,270,000
North Carolina (84)	1,173,000	1,336,000	2,509,000
Oklahoma (86)	1,000	0	1,000
South Carolina (86)	2,156,000	4,328,000	6,484,000
Texas (86)	174,000	489,000	663,000
Virginia (86)	16,000	334,000	350,000
Total	18,461,000	35,110,000	53,534,000

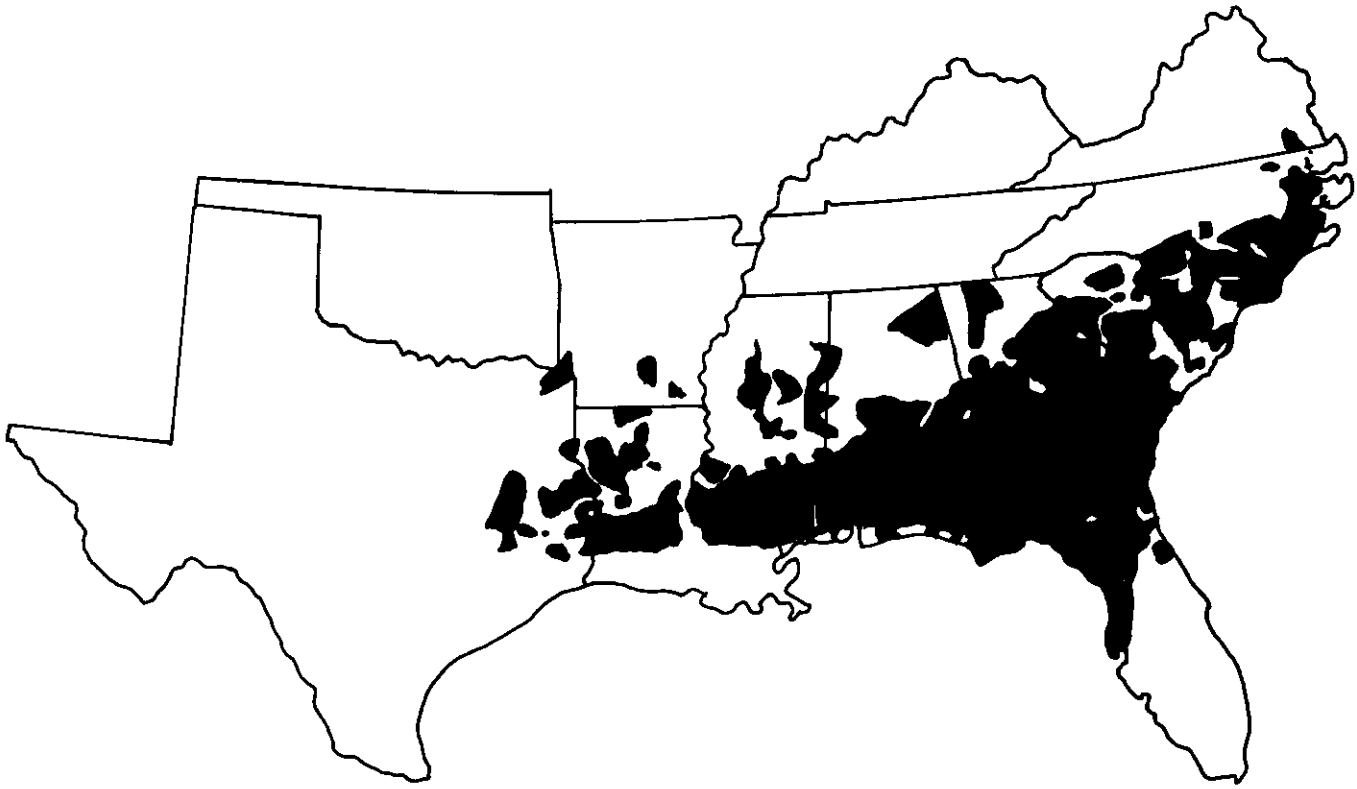
†Anderson, R.L; McClure, J.P; Cost, N.D. and Uhler, R.J. 1986. Estimating fusiform rust losses in five Southeastern States. South. Jour. Appl. For. 10:237-240. 1990 estimates based on Forest Service 1988 forest inventory and analysis data.

1990 Geographical Distribution of *Heterobasidion Annosum* in Commercially Important Tree Species in the Western and Southeastern United States

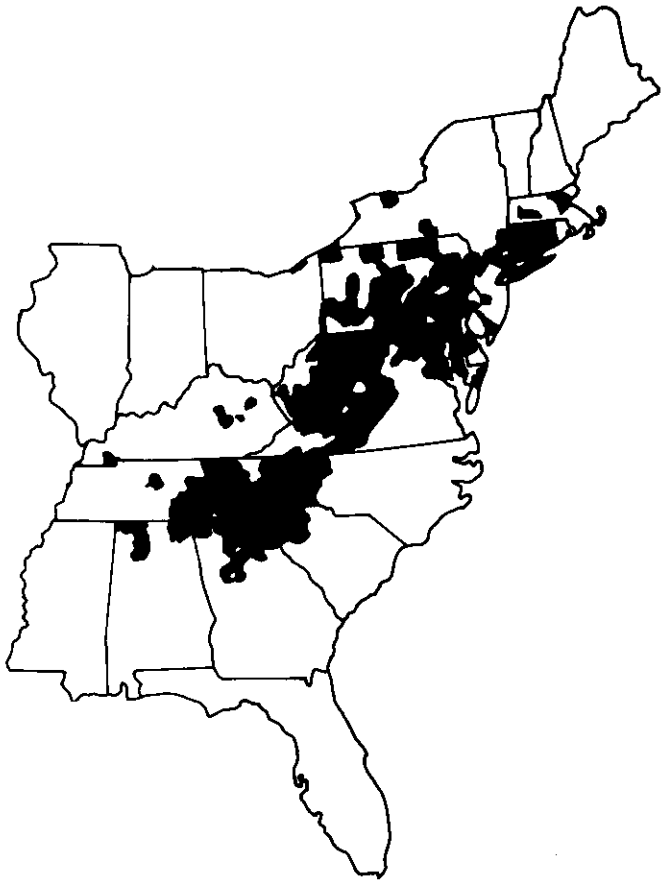


Geographical distribution of *Heterobasidion annosum* in the northeastern United States was not available.

1990 Fusiform Rust Occurrence



Distribution of Dogwood Anthracnose in the Eastern United States
December 1990



Part 2 Regional Conditions

Northern Region Insects

Prepared by Jed Dewey

Insect	Host	Location	Remarks
Balsam woolly adelgid *Adelges piceae*	Grand fir, Subalpine fir	Idaho, Montana	The balsam woolly adelgid continues to pose a threat to true firs throughout northern Idaho. Aerial surveys detected over 24,000 acres with adelgid-caused subalpine fir mortality. Numerous other acres are infested with trees that are not yet showing symptoms. Most of the damage is occurring on the Clearwater and Nez Perce National Forests and adjacent State and private lands. Tree mortality continues to be confined to subalpine fir. Bole infections are now occurring on mature grand fir, and gouting is prevalent on grand fir regeneration located adjacent to infested subalpine fir.
Boxelder defoliator *Archips negundanus*	Boxelder	Montana	Defoliation continued on boxelder ornamental trees in and around Missoula in 1990. Areas of heavy defoliation shifted to trees that were not seriously affected in previous years. Pest populations declined from 1989 levels due to parasitism and other factors.
California tortoiseshell *Nymphalis californica*	Serviceberry, Snowbrush	Idaho, Montana	No significant activity was reported in 1990.
Cranberry girdler moth *Chrysoteuchia topiaria*	Douglas-fir, Western larch	Idaho	No significant activity was reported in 1990.

Insect	Host	Location	Remarks
Douglas-fir beetle *Dendroctonus pseudotsugae*	Douglas-fir	Idaho, Montana	For the third consecutive year, the total area affected by the Douglas-fir beetle declined. This was due to an improvement in precipitation and an increase in sanitation and salvage efforts. In Idaho, slightly more than 8,000 acres remained infested. Nearly 17,000 acres had been infested in 1989. Approximately 34,000 faded trees (those killed the previous year), representing 10 million board feed of volume, were observed in 1990. In Montana, the infested area increased to 9,000 acres, up from 6,300 acres in 1989. Douglas-fir mortality on those acres remained at about the same level, however. Approximately 8,700 dead trees were recorded, fewer than one tree per infested acre.
Douglas-fir tussock moth *Orgyia pseudotsugata*	Douglas-fir, Spruce, True firs	Idaho, Montana	During the past few years, pheromone monitoring trap counts have slowly declined, reaching an all-time low in 1989. Trapping results for 1990 show a modest increase, but remain well below outbreak levels. Visible defoliation was not reported in any forested areas in the Region. Pheromone monitoring efforts will be increased in 1991.
Fir engraver beetle *Scolytus ventralis*	Grand fir, Subalpine fir	Idaho, Montana	Though both acres infested by fir engraver and corresponding tree mortality remained high in 1990, the affected area decreased by nearly two-thirds from 1989 levels. In northern Idaho, more than 36,000 acres still contained some level of grand fir mortality attributable to the beetle. Approximately 53,000 faded trees (trees killed the previous year) were observed. In Montana, fir engraver populations were essentially endemic. Less than 200 faded trees, on 650 acres, were recorded.
Forest tent caterpillar *Malacosoma disstria*	Hardwoods	Idaho, Montana	The forest tent caterpillar population appears to have collapsed throughout the Region. Very little defoliation and few larvae were found in ground surveys.

Insect	Host	Location	Remarks
Gouty pitch midge *Cecidomyia pinilinopis*	Ponderosa pine	Idaho	No significant activity was reported in 1990.
Gypsy moth *Lymantria dispar*	Conifers, Hardwoods	Idaho, Montana, North Dakota, Wyoming	The eradication project continued in Coeur d' Alene and Sandpoint, Idaho, with 1,060 acres treated in 1990. Treatments consisted of an aerial application of *Bacillus thuringiensis* (*B.t.*) applied 3 times, along with mass trapping. No moths were caught in the treated areas in 1990. Three moths were caught in a detection trap in the community of Dover, Idaho, although no egg masses were found in a follow-up survey. One male gypsy moth was discovered in the Madison Junction Campground of Yellowstone National Park, Wyoming, and another gypsy moth was found in the Cottonwood Campground of Theodore Roosevelt National Park, North Dakota. A single male was also caught in a grid detection trap located in Great Falls, Montana. This moth was discovered approximately 3 or 4 blocks from where a gypsy moth was found in 1989. Areas in which gypsy moths were caught will have additional traps placed in them during the 1991 flight season.
Larch casebearer *Coleophora laricella*	Western larch	Idaho, Montana	Nine acres of casebearer defoliation were detected during aerial surveys. Defoliation was common on larch saplings and poles along roadsides throughout northern Idaho.
Larch looper (genus and species unknown)	Western larch	Idaho	Defoliation by an unidentified larch looper was detected on more than 6,400 acres in northern Idaho. Ground examinations revealed many mature larch trees completely defoliated by this insect.
Lodgepole terminal weevil *Pissodes terminalis*	Lodgepole pine	Idaho, Montana	No significant activity was reported in 1990.

Insect	Host	Location	Remarks
Mountain pine beetle *Dendroctonus ponderosae*	Lodgepole pine, Ponderosa pine, Other pines	Idaho, Montana	Although the mountain pine beetle is still the primary killer of coniferous tree species in the Northern Region, the infested area continued to show a marked decline which began in 1982. Acres of land of all ownerships on which beetle-caused mortality occurred to all species declined by more than 50 percent in 1990 to just over 200,000 acres. In Idaho, only 1,200 acres were infested. On those acres, 2,100 faded trees (trees killed in the previous year), mostly lodgepole pine, were noted. In Montana, the infested area was slightly more than 199,000 acres. An estimated 620,000 trees were faded trees. Of those, nearly 610,000 were lodgepole pine on the Kootenai, Lolo, and Flathead National Forests. A few areas of active beetle populations remain.
Pine engraver beetle *Ips pini*	Lodgepole pine, Ponderosa pine	Idaho, Montana	Tree mortality due to populations of pine engraver beetle declined in Idaho in 1990. Only 550 ponderosa pines were killed on slightly more than 300 acres. In Montana, ponderosa pine mortality increased significantly. Dry conditions continued and contributed to this mortality. On the Northern Cheyenne Indian Reservation, nearly 400 acres were infested. Another 570 acres on the Helena National Forest contained beetle-killed trees. In total, nearly 2,400 trees, on 1,140 acres, were killed.
Spruce beetle *Dendroctonus rufipennis*	Engelmann spruce	Idaho, Montana	Spruce beetle activity in the Region remained endemic, except for one small outbreak on the southern portion of the Nez Perce National Forest in northern Idaho. That infestation involved 585 acres and had just fewer than 800 dead trees. This is likely an expansion of the serious spruce beetle infestation on the Payette National Forest (Intermountain Region) to the south. Elsewhere, very little spruce beetle activity was recorded.

Insect	Host	Location	Remarks
Western balsam bark beetle *Dryocoetes confusus*	Subalpine fir	Idaho, Montana	A Regional increase in subalpine fir mortality, attributable to western balsam bark beetle, was recorded in 1990. Most increase occured on the Beaverhead National Forest in southwestern Montana where approximately 3,200 trees were killed on 5,200 acres. Throughout the remainder of the Region, only light and scattered mortality was observed. For years, subalpine fir mortality was attributed to the western balsam bark beetle. Now this mortality is thought to be caused by a complex of pests, including root disease.
Western pine beetle *Dendroctonus brevicomis*	Ponderosa pine	Idaho, Montana	The area on which ponderosa pines were killed by western pine beetles in northern Idaho declined markedly in 1990 to fewer than 8,900 infested acres, compared to more than 19,000 acres in 1989. Approximately 46,000 faders (trees killed in previous year) were noted. Much of the infestation was on State and private lands in the Craig Mountain and Maggie Creek reporting areas. In western Montana, populations also declined significantly. Just over 350 dead trees were recorded on 600 acres.
Western pine shoot borer *Eucosma sonomana*	Ponderosa pine, Lodgepole pine	Idaho, Montana	No significant activity was reported in 1990.
Western spruce budworm *Choristoneura occidentalis*	Douglas-fir, Engelmann spruce, True firs, Western larch	Idaho, Montana, Wyoming	Budworm-caused defoliation occurred on about 1.5 million acres in 1990. This represents a small increase over 1989. In northern Idaho, the infestation on the Nez Perce National Forest declined for 2 years in a row. This outbreak, of about 5,000 acres, is not expected to change much over the next few years. In Montana, cold temperatures in early 1989 caused major tree damage in many areas along the Continental Divide. As a result, budworm populations in most of the damage areas declined in 1989. These populations recovered somewhat during 1990, but not to their predamage level.

Northern Region Diseases

Prepared by Jim Byler

Disease	Host	Location	Remarks
Stem and Branch Diseases			
Atropellis canker *Atropellis piniphila*	Lodgepole pine	Idaho, Montana	Atropellis canker was common in poles and sawtimber and caused defect, top kill, and tree mortality.
Comandra blister rust *Cronartium comandrae*	Lodgepole pine, Ponderosa pine	Idaho, Montana	Comandra rust was present on lodgepole and ponderosa pine in many parts of Idaho and Montana. The disease was especially severe in Montana forests east of the Continental Divide.
Diplodia blight *Sphaeropsis sapinea* *(=Diplodia pinea)*	Ponderosa pine	Idaho, Montana	This pathogen was associated with branch dieback at many locations in Idaho and Montana. Damage was severe at a number of locations in Montana where tree mortality occurred during the past 5 years. Branch mortality increased in northern Idaho.
Dwarf mistletoes			Dwarf mistletoes were present on about 3 million acres and continued to be one of the major cause of forest damage. Damage changes little from year-to-year. But, over the decades, significant increases have occurred in unmanaged stands as these pathogens slowly spread and intensify. Leaving infected residuals at the time of regeneration complicates dwarf mistletoe management.
Arceuthobium americanum	Lodgepole pine	Idaho, Montana	Lodgepole pine dwarf mistletoe infected 2 million acres (28 percent) of the lodgepole type and caused 18 million cubic feet of growth loss.
Arceuthobium douglasii	Douglas-fir	Idaho, Montana	Douglas-fir dwarf mistletoe infected 0.6 million acres (13 percent) of Douglas-fir and caused 13 million cubic feet of loss.
Arceuthobium laricis	Western larch	Idaho, Montana	Western larch dwarf mistletoe occurred on 0.8 million acres (38 percent) of western larch and caused over 15 million cubic feet of loss.

Northern Region--Status of diseases in Montana, northern Idaho, North Dakota, and National Park Service lands in northwestern Wyoming.

Disease	Host	Location	Remarks
Stem decays *Phellinus pini* *Echinodontium tinctorium*	Various conifers	Idaho, Montana	Stem decay fungi destroyed large volumes of wood, particularly in old-growth stands. *Phellinus pini* was most damaging to lodgepole pine and western larch, and *Echinodontium tinctorium* caused major losses in grand fir and hemlock stands.
Western gall rust *Endocronartium harknessii*	Lodgepole pine, Ponderosa pine, Scotch pine	Idaho, Montana, North Dakota	Common on hard pines, this disease caused stem infections resulting in locally severe tree mortality and top kill. Damage was most significant in young stands.
White pine blister rust *Cronartium ribicola*	Western Whitebark pine, White pine	Northern Idaho, Northwestern Montana	White pine blister rust caused extensive tree mortality throughout the range of western white pine, and prevented management of wild, unimproved western white pine on high-hazard sites. Increasing numbers of acres are successfully regenerated each year with rust-tolerant white pine. Whitebark pine, an important food source for grizzly bears, was severely damaged in and around Glacier National Park.
Root Diseases			
			Root diseases were among the most damaging pests in the Region. Annually, root diseases cause tree mortality on about 2 million acres in northern Idaho and over 1 million acres in western Montana. Damage has increased greatly since 1900, due to changing forest conditions.
Annosus root disease *Heterobasidion annosum*	Douglas-fir, Grand fir, Ponderosa pine, Subalpine fir, Western hemlock	Idaho, Western Montana	Annosus root disease was common in ponderosa pine stands on the Flathead Indian Reservation and in other western Montana locations. This disease was widespread on Douglas-fir and true firs on the Clearwater and the Nezperce National Forests.

Northern Region--Status of diseases in Montana, northern Idaho, North Dakota, and National Park Service lands in northwestern Wyoming.

Disease	Host	Location	Remarks
Armillaria root disease *Armillaria* spp.	Douglas-fir, Other conifers	Idaho, Montana	Armillaria root disease was widely distributed in northern Idaho and western Montana. Increased root disease is attributed, in part, to the increase in Douglas-fir and true firs resulting from fire control and selective harvesting of high-value ponderosa pine and western larch early in the 20th Century.
Black stain root disease *Ophiostoma wageneri* (=*Ceratocystis wageneri*)	Douglas-fir, Lodgepole pine, Ponderosa pine	Idaho, Montana	Black stain root disease was less common than other root pathogens, and its overall importance is unknown.
Laminated root rot *Phellinus weirii*	Douglas-fir, Grand fir, Western redcedar, Other conifers	Idaho, Montana	Laminated root rot was very severe on parts of the Lolo, Kootenai, and Idaho Panhandle National Forests. The increase in damage is attributed to the loss of disease-tolerant western white pine to blister rust, and other factors that have increased the abundance of Douglas-fir and grand fir during the present century.
Schweinitzii butt rot *Phaeolus schweinitzii*	Douglas-fir, Other conifers	Idaho, Montana	Schweinitzii root and butt rot was common on Douglas-fir, throughout its range. Damage was mainly due to defect, rather than mortality.
Foliage Diseases			
Dothistroma needle blight *Mycosphaerella pini* [*Dothistroma septospora* (=*Dothistroma pini*)]	Austrian pine, Lodgepole pine, Ponderosa pine, Western white pine	Idaho Montana	Dothistroma needle blight occurred, as usual, in the Lochsa River Drainage on the Clearwater National Forest.
Douglas-fir needle cast *Rhabdocline pseudotsugae* *Rhabdocline weirii*	Douglas-fir	Idaho, Montana	Needle diseases of Douglas-fir were at endemic levels.
Elytroderma disease *Elytroderma deformans*	Ponderosa pine	Idaho, Montana	Elytroderma was chronic at certain locations, including the Bitterroot Valley, the Flathead Indian Reservation, and around Flathead Lake in Montana.

Northern Region--Status of diseases in Montana, northern Idaho, North Dakota, and National Park Service lands in northwestern Wyoming.

Disease	Host	Location	Remarks
Larch needle blight *Hypodermella laricis*	Western larch	Idaho, Montana	Larch needle diseases were severe in local areas of northern Idaho and western Montana.
Larch needle cast *Meria laricis*	Western larch	Idaho, Montana	Larch needle diseases were severe in local areas of northern Idaho and western Montana.
Lodgepole pine needle cast *Lophodermella concolor*	Lodgepole pine	Idaho, Montana	Lodgepole pine needle cast was widespread and severe throughout western Montana and northern Idaho. Nearly 100 percent mortality of year-old needles was common. Evaluations were made in several Tree Improvement plantations.
Swiss needle cast *Phaeocryptopus gaeumannii*	Douglas-fir	Idaho, Montana	Swiss needle cast occurred at endemic levels.
Vascular Wilts and Declines			
Dutch elm disease *Ceratocystis ulmi*	American elm, Siberian elm	Montana, North Dakota	Dutch elm disease continued to spread in urban areas in North Dakota and Montana. Montana's highest losses occurred in Billings and Great Falls.
Nursery Diseases			
Cylindrocarpon root rot *Cylindrocarpon distructions*	White bark pine	Idaho	The usual nursery diseases were found in Federal, State, and private nurseries in 1990. Cylindrocarpon root rot killed 80 percent of the white bark pine container crop.
Fusarium root rot *Fusarim* spp.	Douglas-fir, Other conifers	Idaho, Montana	Endemic disease levels reported.

Northern Region--Status of diseases in Montana, northern Idaho, North Dakota, and National Park Service lands in northwestern Wyoming.

Disease	Host	Location	Remarks
Gray mold *Botrytis cinerea*	Engelmann spruce, Lodgepole pine Western larch	Idaho, Montana	Gray mold was most damaging to containerized western larch.
Larch Needle Cast *Meria laricis*	Western larch	Idaho, Montana	Larch needle cast defoliation was extensive in 2-0 seedling western larch nursery beds.
Phoma blight *Phoma* spp.	Most conifers	Idaho	Endemic disease levels reported.
Phytophthora root rot *Phytophthora* sp. *Phytophthora cactorium*	Engelmann spruce, Western larch	Idaho,	Endemic disease levels reported.
Sirococcus tip blight *Sirococcus strobilinus*	Engelmann spruce, Ponderosa pine	Idaho, Montana	Endemic disease levels reported.
Abiotic			
Winter injury and contributing diseases	All conifers	Idaho, Montana	During January and February 1989, episodes of extremely cold weather followed periods of unseasonably warm temperatures. Resulting damage was greatest east of the Continental Divide in Montana. A total of 433,000 acres showed aerially visible injury. A survey was initiated in 1989 and continued in 1990, to determine the permanent effects of this injury. Lodgepole pine was the tree most severely affected. A high percentage of trees in severely damaged stands were dead by the end of 1989. Many more died in 1990, and others are expected to die from lingering effects in subsequent years.

Northern Region--Status of diseases in Montana, northern Idaho, North Dakota, and National Park Service lands in northwestern Wyoming.

Rocky Mountain Region Insects

Prepared by Ken Lister

Insect	Host	Location	Remarks
A willow sawfly *Nematus* sp.	Willow	Wyoming	No significant activity was reported.
Ash plant bug *Tropidosteptes amoenus*	Green ash	South Dakota	Populations significantly decreased.
Aspen leaf beetle *Chrysomela crotchi*	Aspen	South Dakota	Defoliation was abundant in the central and southern Black Hills.
Balsam twig aphid *Mindarus abietinus*	Balsam fir	South Dakota	Top and branch kill resulted from the 1989 and 1990 infestation. An aerial suppression project was conducted in 1990 to control this pest.
Birch skeletonizer *Bucculatrix canadensisella*	Birch	South Dakota	Defoliation was heavy in the central and southern Black Hills.
Blackheaded ash sawfly *Tethida cordiger*	Green ash	South Dakota	Light to moderate defoliation occurred in the northeast portion of South Dakota.
Bronze birch borer *Agrilus anxius*	Paper birch	South Dakota	This pest continued to be a major problem on ornamentals throughout the State. Many nurseries no longer sell paper birch.
Cankerworms *Alsophila pometaria* *Paleacrita vernata*	Boxelder, Hackberry, Honeylocust, Siberian elm	Kansas, South Dakota	Extensive damage occurred in southeastern Kansas on hackberry and elm trees. Elsewhere, damage was low. The fall cankerworm caused 80 percent defoliation on 80 acres in Dewey County, South Dakota.
Common falsepit scale *Lecanodiaspis prosopidis*	Green ash, Hackberry, Red mulberry	Colorado	No significant activity was reported.
Cottonwood borer *Plectrodera scalator*	Cottonwood	South Dakota	Serious damage occurred in some windbreaks following another State-wide increase.

Rocky Mountain Region--Status of insects in Colorado, Kansas, Nebraska, South Dakota, and central and eastern Wyoming

Insect	Host	Location	Remarks
Dioryctria moths *Dioryctria ponderosae* *D. tumicolella* *Dioryctria* sp.	Austrian pine, Pinyon pine, Ponderosa pine, Scots pine	Colorado, Nebraska, South Dakota	This pest continued to be a serious problem throughout most of Nebraska and South Dakota. *Dioryctria* sp. associated with twig bettles caused pinyon mortality and branch dieback in southern Colorado.
Douglas-fir beetle *Dendroctonus pseudotsugae*	Douglas-fir	Colorado, Wyoming	On the Shoshone National Forest in Wyoming, beetles spread from trees blackened by the 1988 Clover Mist Fire to nearby scorched and green trees. About 2,000 trees were infested in 1990 at Sugarloaf Mountain, Camp Creek, Upper-Reef Creek, Cathedral Cliffs, Squaw Creek, Russell Peak, and Pahaska Tepee. The epidemic is expected to increase in 1991. Douglas-fir beetle populations are generally decreasing in Colorado, but scattered infestation spots still occur along the Colorado Front Range.
Elm calligrapha *Calligrapha scalaris*	Siberian elm	South Dakota	Heavy defoliation occurred in the southern third of the State, primarily in windbreaks.
Elm leaf beetle *Pyrrhalta luteola*	American elm, Siberian elm	Kansas, Nebraska, South Dakota	Several windbreaks in western Kansas were severely damaged, but populations were normal throughout the rest of the State. Moderate defoliation occurred throughout most of Nebraska and South Dakota. Severe defoliation occurred in Yankton, South Dakota.
European pine sawfly *Neodiprion sertifer*	Pine	Kansas	Damage increased considerably in eastern Kansas. Scots pine in Christmas tree plantations was hit especially hard and most growers conducted suppression activities. The insect moved west, but damage was light in western Kansas.

Rocky Mountain Region--Status of insects in Colorado, Kansas, Nebraska, South Dakota, and central and eastern Wyoming

Insect	Host	Location	Remarks
Gypsy moth *Lymantria dispar*	Hardwoods	Colorado, Nebraska, South Dakota, Wyoming	In Colorado, the gypsy moth was first caught in 1984 in traps. This pest is now considered to be eradicated in the following areas: Limon, Colorado Springs, Rosita, Boulder, Fort Collins, Lakewood, and Rocky Mountain National Park. No moths were caught in traps in 1990 for the first time since 1984. In Nebraska, gypsy moth populations appeared to have reduced substantially. Only 1 moth was caught at a nursery in Douglas County. This may be the result of egg searches and mass trapping that were conducted in 1989 following the discovery of egg masses on nursery stock believed to have been shipped from Pennsylvania. In South Dakota, 1 moth was caught in a survey trap at the Beaverlake Campground near Custer and 2 moths were detected in delimitation traps in Keystone. No moths were detected in the delimitation survey block around a Mountain Rushmore Campground.
Hackberry galls *Pachypsylla celtidismamma* *P. celtidisversicula*	Hackberry	South Dakota	Damage from blister and nipple galls was virtually unnoticeable.
Honeysuckle aphid *Hyadaphis tataricae*	Honeysuckle	South Dakota	Damage continued throughout the State.
Lilac borer *Podosesia syringae*	Green ash, Lilac	Nebraska, South Dakota	This pest continued to be a problem in young ash trees and lilac in windbreaks and ornamental plantings.
Mountain pine beetle *Dendroctonus ponderosae*	Limber pine, Lodgepole pine, Ponderosa pine	Colorado, South Dakota, Wyoming	The mountain pine beetle continued to be a severe problem in ponderosa pine. In lodgepole pine, the mountain pine beetle is endemic. In Colorado, an outbreak on the Uncompahgre Plateau decreased, but remains a problem. Populations in South Dakota were low except for an epidemic in the area between Bear Mountain and Green Mountain in the Black Hills. In Wyoming an outbreak continued to kill trees in the northern portion of the Medicine Bow National Forest at Laramie Peak. The infested area is estimated to be 11,000 acres.

Insect	Host	Location	Remarks
Pandora moth *Coloradia pandora*	Ponderosa pine	South Dakota	A small outbreak was detected in the southern Black Hills. Second-year larva populations that caused noticeable defoliation in 1989 decreased.
Pine engraver beetle *Ips pini*	Jack pine, Ponderosa pine	Colorado, Nebraska, South Dakota, Wyoming	Infestations continued in ponderosa pine throughout most of the Black Hills in South Dakota and Wyoming. Pheromone traps effectively reduced outbreaks at recreation sites near Pactola Reservoir and Sheridan Lake.
Pine sawfly *Neodiprion autumnalis*	Ponderosa pine	South Dakota, Wyoming	Heavy defoliation was detected between Spearfish and Belle Fourche at Fort Meade and in Wind Cave National Park along the eastern edge of the Black Hills in South Dakota. Approximately 4,000 acres were defoliated. About 85,000 acres east of Gillette, Wyoming, were severely defoliated. Trees growing on open and/or poor sites were most affected.
Pine tip moths *Rhyacionia bushnelli* *Rhyacionia frustrana*	Austrian pine, Pinyon pine, Ponderosa pine, Scotch pine	Colorado, Kansas, Nebraska, South Dakota	Damage was light on Christmas tree plantations and nurseries where pesticide was used for control. Young pines in windbreak and landscape plantings continued to be damaged throughout the plains and in metro areas of Colorado. Low populations of Nantucket pine tip moth were reported in south central Kansas. Pine regeneration in the southern Black Hills of South Dakota was heavily damaged.
Pinyon pitch-nodule moth *Retinia arizonensis*	Pinyon pine	Colorado	No significant activity was reported.
Roundheaded pine beetle *Dendroctonus approximatus*	Ponderosa pine	Colorado	Populations were still present on the Ucompahgre Plateau in conjunction with mountain pine beetle and western pine beetle.
Spruce beetle *Dendroctonus rufipennis*	Engelmann spruce	Colorado, Wyoming	In Wyoming on the Shoshone National Forest, beetles were abundant in windthrown trees and posed a threat to adjacent green spruce. In Jefferson County, Colorado, the spruce beetle infested spruce associated with suburban development activities.

Rocky Mountain Region--Status of insects in Colorado, Kansas, Nebraska, South Dakota, and central and eastern Wyoming

Insect	Host	Location	Remarks
Tent caterpillars *Malacosoma americanum* *M. californicum* *M. disstria*	American plum, Chokecherry, Hardwoods	Colorado, South Dakota	The Eastern tent caterpillar almost completely defoliated fruit trees and some shelterbelts in South Dakota. The Western tent caterpillar was not a problem in Colorado in 1990.
Twig beetles *Pityophthorus* sp.	Pinyon pine	Colorado	Twig beetles, in association with dioryctria moths, caused mortality and branch dieback in southern Colorado.
Uglynest caterpillar *Archips cerasivorana*	Chokecherry	South Dakota	Populations were down, but this pest continues to be a problem in shelterbelts along the Missouri River in central South Dakota.
Walnut caterpillar *Datana integerrima*	Pecan, Walnut	Kansas	Defoliation damage was greater than anyone can remember in the eastern part of the State.
Western pine beetle *Dendroctonus brevicomis*	Ponderosa pine	Colorado	Some populations of western pine beetle were associated with the roundheaded pine beetle and the mountain pine outbreak on the Uncompahgre Plateau.
Western spruce budworm *Choristoneura occidentalis*	Douglas-fir, Engelmann spruce, Subalpine fir, White fir	Colorado, Wyoming	Western spruce budworm populations continued to be low in Colorado, except for a small infestation of 52,000 acres at Kauffman Ridge on the San Isabel National Forest. Here, defoliation was again heavy in 1990. In Wyoming, defoliation was heavy southwest of Buffalo, Wyoming. The 8,100 acre infestation was on Bureau of Land Management Lands.
White pine weevil *Pissodes strobi*	Colorado blue spruce	Colorado	White pine weevil damage to spruce leaders continued at a static level in south and central Colorado.

Rocky Mountain Region Diseases

Prepared by John E. Lundquist

Disease	Host	Location	Remarks
Stem and Branch Diseases			
Comandra blister rust *Cronartium comandrae*	Lodgepole pine	Colorado, Wyoming	The most heavily infested areas were Wind River Ranger District, Shoshone National Forest, Wyoming, and Laramie Ranger District, Medicine Bow National Forest, Wyoming. At Wind River Ranger District, incidence of disease varied from 40 percent at the forest edge to 5 percent 12 kilometers from the edge. At Laramie Ranger District, disease incidence varied from 27 to 35 percent. The disease was present in northern Colorado and western South Dakota, but caused no significant damage.
Dwarf mistletoes *Arceuthobium americanum*	Lodgepole pine	Colorado, Wyoming	Dwarf mistletoes caused substantial losses. Annual losses have been about 10 million cubic feet. In Colorado, 50 percent of the lodgepole pine was infected. Presuppression surveys were implemented on 18,184 acres, including 5 national forests. Presuppression activities were conducted on 2,647 acres on 7 national forests.
Arceuthobium douglasii	Douglas-fir	Colorado	This disease occurs primarily in the southern two-thirds of the State.
Arceuthobium vaginatum subsp. *cryptopodum*	Ponderosa pine	Colorado	Annual losses are 885,000 cubic feet. In 1990, suppression projects were conducted on 344 acres on 2 national forests. This mistletoe caused light to severe problems in the Southern Ute Indian Reservation.
Arceuthobium divaricatum	Pinyon pine	Colorado	No significant activity was reported.
Western gall rust *Endocronartium harknessii*	Lodgepole pine, Ponderosa pine	Colorado, Nebraska, South Dakota, Wyoming	Although widespread, disease incidence was mostly low to moderate. Heavy incidence was reported infrequently. During 1990, this disease was noted on Arapaho and Roosevelt National Forests, Bighorn National Forest, Blackhills National Forest, Nebraska National Forest, Medicine Bow National Forest, and White River National Forest.

Disease	Host	Location	Remarks
White pine blister rust *Cronartium ribicola*	Limber pine	Wyoming	A moderately severe outbreak occurred at Tensleep Ranger District, Bighorn National Forest.

Canker Diseases

Botryodiplodia sp.	Juniper	Kansas	Incidence of this disease increased in the eastern part of the State and appeared to be spreading west. Two hundred acres were involved.
Botryosphaeria stevensii	Eastern redcedar, Rocky Mountain juniper	Kansas, Nebraska	This disease is common in windbreaks and landscape plantings, but was less severe in 1990 than in 1988 or 1989.
Cytospora canker *Cytospora* spp.	Birch, Cherry, Colorado blue spruce, Cotoneaster, Lilac, Mountain ash, Poplar, Rose, Russian olive, Willow	Colorado, Kansas, Nebraska, South Dakota, Wyoming	Occasionally this disease was reported on blue spruce in windbreaks and landscape plantings in each State. In Wyoming during the past year, hardwoods were hit particularly hard. This disease caused some damage in Nebraska.
Phomopsis sp. or *Tubercularia* sp.	Russian olive	Kansas, Nebraska, South Dakota, Wyoming	This disease was especially severe in South Dakota and eastern Kansas during 1990. In other States, however, its status was not noted to be different than previous years.
Siberian elm canker *Botryodiplodia hypodermia*	Siberian elm	Colorado, Nebraska, South Dakota, Wyoming	Elm decline continued to be severe in eastern Wyoming; north, west, and southeast Nebraska; and south and west South Dakota.
Thyronectria canker *Thyronectria austro-americana*	Honeylocust	Colorado, Kansas, Nebraska, South Dakota, Wyoming	This disease was widespread in windbreaks and landscape trees. In South Dakota, the disease was especially severe in Hot Springs. In Kansas, about 100 acres of windbreaks were affected in the western part of the State. In Nebraska, the disease occurred throughout the State, but was not considered threatening.

Disease	Host	Location	Remarks
Root Diseases			
Annosus root disease *Heterobasidion annosum*	Ponderosa pine, White fir	Colorado, Nebraska	Aerial and ground surveys for Annosus and Armillaria root diseases were conducted on 3,300 acres in mixed conifer stands on the Southern Ute Indian Reservation.
Armillaria root disease *Armillaria* spp.	Engelmann spruce, Lodgepole pine, Ponderosa pine, Subalpine fir, White fir	Colorado, South Dakota, Wyoming	In Wyoming, this disease was reported in lodgepole pine regeneration on the Medicine Bow National National Forest. In South Dakota, several new disease sites were found on the Black Hills National Forest. In southeast Colorado, an additional 500 affected acres were reported during 1990 at the Southern Ute Indian Reservation. Between 15 and 20 percent of lodgepole pines were reported showing symptoms on a 71-acre plantation near Gunnison.
Black stain root disease *Ophiostoma wageneri* (=*Ceratocystis wageneri*)	Pinyon pine, Ponderosa pine	Colorado	This disease continues to occur on ponderosa pine in interior portions of Colorado and on pinyon pine in the southwestern corner of the State.
Foliage Diseases			
Anthracnose *Gnomonia leptostyla*	Walnut	Kansas, South Dakota	This disease was reported in the southeast corner of South Dakota and eastern Nebraska. Incidenced in Nebraska was less severe in 1990 than in previous years.
Apiognomonia veneta (=*Gnomonia platani*)	Sycamore	Colorado, Kansas, Wyoming	In Kansas, 100 acres were affected in the northearn part of the State. The disease was widespread in Nebraska, but not unusually severe. In Colorado, the disease was reported at locations in the southeast and southwest parts of the State.
Brown spot needle blight *Mycosphaerella dearnessii* (=*Scirrhia acicola*)	Scots pine	Kansas, Nebraska	No significant activity was reported.

Disease	Host	Location	Remarks
Cedar apple rust *Gymnosporangium juniperi-virginianae*	Apple species, Eastern redcedar	Colorado, Kansas, Nebraska, South Dakota, Wyoming	This disease occurred sporadically in Kansas and Wyoming. In Nebraska, the disease was widespread, especially in the eastern part of the State, but the intensity during 1990 was lower than usual. In South Dakota, apple leaves were severly spotted, but the incidence of galls on cedar was much less than 1989.
Diplodia blight *Sphaeropsis sapinea (=Diplodia pinea)*	Austrian pine, Ponderosa pine	Kansas, Nebraska, South Dakota, Wyoming	Damage from this disease increased in Kansas, especially in urban and recreation plantings where 300 acres were affected. In Nebraska and South Dakota, however, blight was less severe than usual. In Wyoming, one unverified report was noted.
Fire blight *Erwinia amylovora*	Apple species, Crabapple, Cotoneaster	Colorado, South Dakota, Wyoming	This disease occurred throughout South Dakota, especially on cotoneaster, but intensity of the disease was not as severe as in previous years. In Wyoming, where there had been an unusually wet spring, fire blight was widespread and caused considerable damage. In Colorado, the disease was severe near Colorado, Springs.
Ink spot *Ciborinia whetzelii* **Marssonina blight** *Marssonina populi*	Aspen	Colorado, South Dakota, Wyoming	In shelterbelts and nurseries in South Dakota, incidence of the disease was extremely heavy on susceptible varieties. In Wyoming and Colorado, few occurrences were reported.
Ash rust *Puccinia sparganioides*	Green ash	Kansas, Nebraska, South Dakota	The disease was present, but it caused no severe problems.
Needle casts *Lophodermella concolor* *Lophodermella montivaga*	Lodgepole pine	Colorado	No significant activity was reported.

Disease	Host	Location	Remarks
Cercospora blight of juniper *Cercospora sequoiae*	Eastern redcedar, Rocky Mountain juniper	Nebraska, South Dakota	In Nebraska, this disease was a serious concern on Rocky Mountain juniper and eastern redcedar in the eastern part of the State. The disease was less serious in 1990 than in previous years. However, the disease continued to be a major disease concern in windbreaks. In South Dakota, the disease was occasionally found in windbreaks, but it was not unusually severe.
Dothistroma needle blight *Scirrhia pini*	Austrian pine	Nebraska	This disease continued to theaten Christmas tree plantations and windbreaks.
Leaf shothole *Cylindrosporium* sp.	Black cherry, Chokecherry	Nebraska, South Dakota	This disease was severe in Bessey Nursery in Nebraska and Big Sioux Nursery in South Dakota.
Vascular Wilts and Declines			
Dutch elm disease *Ceratocystis ulmi*	Elm species	Colorado, Nebraska, Kansas, South Dakota, Wyoming	In Kansas and Nebraska, the disease continued to be a problem. In South Dakota, the disease continued to kill the remaining elm population at a rate of 10 percent per year. The disease was most severe in the southeast part of the State. In Wyoming, the disease was widespread and remained a problem in urban areas, especially around Casper and Wheatland. In Colorado, the disease was a significant problem in cities that have no active Dutch elm disease management program.
Oak wilt *Ceratocystis fagacearum*	Oak species	Kansas, Nebraska	In Kansas, this disease continued to slowly spread eastward. Fifty acres of newly infected stands were reported. In Nebraska, the disease was reported in the southern and eastern counties near the Missouri River, but the incidence or spread of the disease does not seem to be increasing.
Pine wood nematode *Bursaphelenchus xylophilus*	Scots pine	Kansas, Nebraska	In Kansas, damage was limited to 2 counties along the eastern border. Fifty acres were affected. In Nebraska, no new occurrences have been noted since 1989, when a single infected tree was found east of Omaha on a Christmas tree plantation.

Disease	Host	Location	Remarks
Ash decline	Green ash	Colorado	This disease occurs primarily in urban areas. The disease was first recognized 3 years ago. Its cause is unknown.
Abiotic			
Chemical damage	*Many tree species*	*Colorado, Kansas, Nebraska, South Dakota, Wyoming*	*In South Dakota and Wyoming, herbicide damage was the most commonly reported tree disorder. In Colorado, this has been a continuing problem. In Kansas, however, incidence of herbicide damage was much less than in previous years.*
Unknown decline	Ponderosa pine	Colorado	No significant activity was reported.
Drought, other unknown agents	Black walnut, Blue spruce, Buffaloberry, Dogwood, Green ash, Pear, Ponderosa pine, Poplar, Russian olive, Siberian elm, Silver maple	Colorado, Nebraska, South Dakota, Wyoming,	Long-term and secondary effects of previous dry years were noticable in trees. The increased incidence of some stree-related diseases, like Cytospora canker in Wyoming and Siberian elm canker, is probably related to preceding drought conditions.
Winter drying injury	Aspen, Douglas-fir, Juniper, Lodgepole pine, Maple, Pinyon pine, Ponderosa pine, Siberian elm, Weeping willow	Colorado, Nebraska, South Dakota, Wyoming	In Wyoming, this condition was especially severe in the southeastern part of the State. In Colorado, this was the most conspicuous cause of forest tree problems thrughout the mountainous portions of San Carlos Ranger District of the San Isabel National Forest. In Nebraska, the condition was no more severe than usual. In South Dakota, winter drying was less severe in 1990 than in previous years.

Disease	Host	Location	Remarks
Other			
Sprout dieback	Aspen	Colorado	No significant change in activity was reported.
Porcupine feeding	Lodgepole pine, Ponderosa pine	Colorado, South Dakota	Reported heavy in the Black Hills National Forest.
Squirrel damage	Ponderosa pine	South Dakota	Reported heavy in the Black Hill National Forest.
Honeylocust collar rot	Honeylocust	Colorado	This problem was widespread in urban areas of Colorado. The problem is associated with overwatering, but its causal agent is unknown.

Southwestern Region Insects

Prepared by Terrence J. Rogers

Insect	Host	Location	Remarks
Douglas-fir beetle *Dendroctonus pseudotsugae*	Douglas-fir	Arizona, New Mexico	Douglas-fir beetle activity decreased significantly from 3,248 acres in 1989 to 700 acres in 1990. Individual- and small-group tree mortality (2 to 10 trees) occurred on the Apache-Sitgreaves and Coconino National Forests and Fort Apache and Navajo Indian Reservation lands, Arizona, and Carson National Forest and Taos Pueblo Indian Reservation, New Mexico. On State and private lands, 138 pockets of killed trees were found scattered throughout northern New Mexico. Most of this mortality occurred in Colfax County. Losses resulting from Douglas-fir beetle attacks approximated 76,500 cubic feet of volume.
Mountain pine beetle *Dendroctonus ponderosae*	Ponderosa pine	Arizona, New Mexico	The acres of ponderosa pine mortality decreased slightly from 900 acres in 1989 to 800 acres in 1990. Individual and scattered small-group tree mortality (2 to 10 trees) were observed on the Kaibab National Forest, Grand Canyon National Park, and Navajo Indian Reservation, Arizona, and Carson National Forest and Taos Pueblo Indian Reservation, New Mexico. Volume losses resulting from these bark beetles were estimated at 80,500 cubic feet in the Southwest.
Pandora moth *Coloradia pandora*	Ponderosa pine	Arizona, New Mexico	Larvae of the pandora moth caused light defoliation on 720 acres of ponderosa pine forest on the Grand Canyon National Park, Arizona, in 1989. Because this insect has a 2-year life cycle, defoliation was not expected to occur again until the spring and summer of 1991.

Insect	Host	Location	Remarks
Pine engraver beetles *Ips* spp.	Pinyon pine, Ponderosa pine	Arizona, New Mexico	This pest caused ponderosa pine mortality to increase almost three-fold, from 11,050 acres in 1989 to 31,400 acres in 1990. Much of the ponderosa pine mortality appeared to be drought related. Individual, small-group tree mortality (2 to 10 trees) and occasional large-group tree mortality (25 or more trees) occurred on the Apache-Sitgreaves, Coconino, Kaibab, Prescott, and Tonto National Forests, Arizona; Navajo, Fort Apache, and San Carlos Apache Indian Reservations, Arizona; Cibola, Gila, Lincoln, and Santa Fe National Forests, New Mexico; and Acoma, Mescalero Apache, and Santa Clara Indian Reservations, New Mexico. Trees killed by the *Ips* engraver beetle on State and private lands were negligible. In Arizona, extensive areas of pinyon pine were killed by *Ips* spp. throughout the pinyon-juniper forest on the Apache-Sitgreaves National Forests (22,800 acres), Arizona. Pinyon pines may have been predisposed to attack by *Ips* because of below average levels of precipitation during 1989 and 1990. Losses amounted to approximately 1,001,800 cubic feet of ponderosa pine and 1,140,000 cubic feet of pinyon pine.
Prescott scale *Matsucoccus vexillorum*	Ponderosa pine	Arizona, New Mexico	Branch dieback, caused by Prescott scale, was scattered through the State. Approximately 74,000 acres were still infested on the Apache-Sitgreaves National Forests in Arizona. Minor branch dieback was reported on the Gila National Forest and Jicarilla Apache Indian Reservation, New Mexico.
Spruce beetle *Dendroctonus rufipennis*	Spruce	Arizona, New Mexico	Tree mortality decreased substantially from 780 acres in 1989 to 150 acres in 1990. Some minor individual and scattered small-group tree mortality (2 to 5 trees) were scattered on the Coconino, Coronado, Kaibab, and Prescott National Forests, Arizona, and Navajo and Fort Apache Indian Reservations, Arizona. No spruce beetle activity was detected in New Mexico. Volume losses from spruce beetle attacks approximated 11,500 cubic feet.

Insect	Host	Location	Remarks
Western pine beetle *Dendroctonus brevicomis*	Ponderosa pine	Arizona, New Mexico	Mortality from western pine beetle attacks increased over two-fold from 3,700 acres in 1989 to 9,000 acres in 1990. Most of these trees were predisposed to attack by below average precipitation levels experienced during 1989 and 1990. The majority of the mortality observed occurred on the Apache-Sitgreaves National Forests (4,850 acres), Arizona, and Gila National Forest (1,300 acres), New Mexico. Less extensive mortality occurred on the Coconino, Kaibab, and Tonto National Forests, Arizona; Navajo, Fort Apache, and San Carlos Indian Reservations, Arizona; and Gila National Forest, New Mexico. Volume losses on National Forests and other Federal lands were estimated at 376,950 cubic feet.
Western spruce budworm *Choristoneura occidentalis*	Douglas-fir, Spruce, White fir	Arizona, New Mexico	Defoliation caused by the larvae of the western spruce budworm increased significantly from 90,000 acres in 1989 to over 310,580 acres in 1990. The large majority of this defoliation occurred on the Kaibab National Forest (21,680 acres), and Grand Canyon National Park (4000 acres), Arizona, and the Carson (131,280 acres) and Santa Fe (95,600 acres) National Forests, New Mexico. Less extensive defoliation was observed on the Cibola (3,800 acres) and Gila (840 acres) National Forests, Picuris (200 acres), and Santa Clara Pueblo (880 acres) Indian Reservations, New Mexico. Defoliation on State and private lands in New Mexico totaled 52,300 acres. Growth loss attributed to this defoliator was conservatively estimated at 2,184,516 cubic feet of volume.
White fir needleminer *Epinotia meritana*	White fir	Arizona	No significant activity was reported.
Unknown Spruce Aphid	Spruce	Arizona	Some unidentified aphid-caused defoliation of older foliage of spruce trees occurred on approximately 100,000 acres on the Fort Apache Indian Reservation during the winter of 1990.

Southwestern Region Diseases

Prepared by David A. Conklin

Disease	Host	Location	Remarks
Stem and Branch Diseases			
Aspen trunk rot *Phellinus tremulae*	Aspen	Arizona, New Mexico	Aspen trunk rot was widespread. It continues to be the most common cause of cull and defect in mature stands.
Atropellis canker *Atropellis sp.*	Ponderosa pine, Southwestern white pine	New Mexico	Atropellis canker was observed on white pine at several locations on the Lincoln National Forest. This may be the first report of this disease on *P. strobiformis*. It caused branch flagging that can sometimes be confused with white pine blister rust. Damage appeared minimal.
Comandra blister rust *Cronartium comandrae*	Mondell pine, Ponderosa pine	Arizona	Comandra blister rust was observed on exotic mondell and native ponderosa pine in the Payson, Sedona, and Prescott areas. Damage was limited to individual trees in landscape areas and on Christmas tree plantations. It has been found on the alternate host, bastard toadflax (*Comandra umbelata*), in southeastern Arizona, but infection on pine there has not been confirmed.
Dwarf mistletoes *Arceuthobium* spp.	Douglas-fir, Engelmann spruce, Pines	Arizona, New Mexico	Dwarf mistletoes continue to be the most widespread and most damaging pest. Approximately 46 percent (2.2 million acres) of the total commercial acreage (4.8 million acres) was infected. This accounted for greater than 25 million cubic feet of volume loss. The aesthetic value and longevity of trees in recreation areas and in visual corridors were also affected.
Fir broom rust *Melampsorella caryophyllacearum*	True firs	Arizona, New Mexico	Fir broom rust was distributed throughout subalpine, corkbark, and white fir in the Southwest. Damages typically consisted of stem and branch swellings, dead tops, and stem breakage.

Southwestern Region--Status of diseases in Arizona and New Mexico.

Disease	Host	Location	Remarks
Limb rust *Cronartium arzonicum* *Peridermium filamentosum*	Ponderosa pine	Arizona	Small group (2 to 3 trees) infections were detected throughout the ponderosa pine forests of the Southwest.
Red ring rot *Phellinus pini*	Douglas-fir, Ponderosa pine, Spruce, True firs	Arizona, New Mexico	*Phellinus pini* is indigenous to mature and overmature stands of pine and mixed conifers. Distribution was scattered and losses and damage were minimal in most stands. The disease has also been found in immature pine and mixed conifers in suppressed conditions.
Red rot *Dichomitus squalens*	Ponderosa pine	Arizona, New Mexico	Red rot decay was distributed throughout Arizona and New Mexico and was the most common cause of decay in living ponderosa pine in the Southwest.
Rust-red stringy rot *Echinodontium tinctorium*	White fir	Arizona, New Mexico	This fungus was scattered in mature and overmature stands of mixed conifers but losses were insignificant.
Spruce broom rust *Chrysomyxa arctostaphyli*	Spruce	Arizona, New Mexico	Spruce broom rust was scattered throughout the host type but was of little commercial significance.
Stem cankers *Encoelia pruinosa* *Ceratocystis fimbriata* *Cryptosphaeria populina* *Hypoxylon mammatum* *Cytospora chrysosperma*	Aspen	Arizona, New Mexico	Canker fungi caused significant reductions in value in timber stands and recreation sites. Many timber stands had over 30 percent infected with one or more of these fungi. In campgrounds, the damage was often more severe as these fungi readily infect trees wounded by recreationists.
Western gall rust *Endocronartium harknessii*	Ponderosa pine	Arizona, New Mexico	This disease occurred at low levels throughout much of Arizona and New Mexico. Losses were insignificant.
White pine blister rust *Cronartium ribicola*	Southwestern white pine	New Mexico	Blister rust was detected for the first time near Cloudcroft, New Mexico. Surveys indicated that the disease was widespread throughout an 80 square mile area on the Lincoln National Forest and adjacent Mescalero Apache Indian Reservation. Some mortality of young trees occurred. The disease appeared to be very damaging to this new host.

Southwestern Region--Status of diseases in Arizona and New Mexico.

Disease	Host	Location	Remarks
Root Diseases			
Annosus root disease *Heterobasidion annosum*	Douglas-fir, Ponderosa pine, Spruce, True firs	Arizona, New Mexico	All root and butt rot pathogens were responsible for approximately 10 percent reduction in volume. Infection in some mixed conifer stands was greater than 25 percent. *Armillaria sp.* accounted for 80 percent of the root disease damage in conifers; other root and butt disease pathogens were responsible for the remaining 20 percent. The southwest loses an estimated 4.8 million cubic feet annually to root rot.
Armillaria root disease *Armillaria* sp.			
Black stain root disease *Ophiostoma wageneri* *(=ceratocystis wageneri)*	Pinyon pine		
Schweinitzii butt rot *Phaeolus schweinitzii*	Douglas-fir, True firs		
Tomentosus root rot *Inonotus tomentosus*	Ponderosa pine, Spruce		
White mottled rot *Ganoderma applanatum*	Aspen		
Foliage Diseases			
Elytroderma disease *Elytroderma deformans*	Pinyon pine, Ponderosa pine	Arizona, New Mexico	Elytroderma disease was widely distributed but was not severe.
Lophodermella needle cast *Lophodermella cerina*	Ponderosa pine	Arizona, New Mexico	Extensive areas of ponderosa pine were affected by this disease, particularly in the National Forests in New Mexico. Approximately 270,000 acres exhibited some degree of needle discoloration caused by this disease.
Abiotic			
Drought	Juniper, Pinyon, Ponderosa pine	Arizona, New Mexico	Drought related tree damage was widespread. The National Forests in Arizona were most affected. Damage appeared as branch dieback and mortality to scattered individual trees and small groups of trees (2 to 10). Damage was often associated with other pests, including mistletoes and *Ips* beetles.
Hail damage	Pinyon Juniper,	New Mexico	Several hundred acres of defoliation occurred near Mountainair.
Salt damage	Ponderosa pine	New Mexico	Needle discoloration and some tree mortality occurred along high elevation highways in New Mexico. Damage was especially noticeable near Los Alamos.

Southwestern Region--Status of diseases in Arizona and New Mexico.

Disease	Host	Location	Remarks
Other			
Aspen defoliation **Large aspen tortrix** *Choristoneura conflictana* **Western tent caterpillar** *Malacosoma californicum* **Marssonia leaf blight** *Marssonina populi*	Aspen	Arizona, New Mexico	Defoliation of aspen stands by this insect and disease complex decreased significantly from 19,075 acres in 1989 to 3,670 acres in 1990. Small pockets of aspen defoliation occurred on the Kaibab National Forest and Grand Canyon National Park, Arizona, and Carson, Gila, and Santa Fe National Forests, and Taos Pueblo Indian Reservation, New Mexico.
True fir mortality Scolytus ventralis (in white fir); Dryocetes confusus (in subalpine fir) *Armillaria spp.* *Heterobasidion annosum*	White fir, Subalpine fir	Arizona, New Mexico	True fir mortality resulting from this insect and disease complex increased (in white fir) from 1,250 acres in 1989 to 1,400 acres in 1990. Mortality (in subalpine fir) was limited to individual and small-tree groups (2 to 10 trees) on the Apache-Sitgreaves, Coconino, Coronado, Kaibab, and Tonto National Forests and Navajo Indian Reservation, Arizona, and the Carson and Gila National Forests, and Taos Pueblo Indian Reservation, New Mexico, Volume losses attributed to this insect and disease complex were estimated at 101,900 cubic feet.
Looper, abiotic complex *Galenara consimilis*	Douglas-fir, White fir	New Mexico	No significant activity was reported in 1990.
Nursery Diseases			
Sirococcus tip blight *Sirococcus strobilinus*	Ponderosa pine	Arizona	Ponderosa pine seedlings were infected with *S. strobilinus* at the Fort Apache Indian Reservation Nursery.

Southwestern Region--Status of diseases in Arizona and New Mexico.

Intermountain Region Insects

Prepared by Julie Weatherby and Andy Knapp

Insect	Host	Location	Remarks
Alder flea beetle *Altica ambiens*	Alder	Idaho	No significant activity was reported in 1990.
Boxelder leafroller *Caloptilla negundella*	Boxelder	Idaho	Boxelder along the Salmon River in the vicinity of Salmon, Idaho, were heavily infested with this leafroller.
Cooley spruce gall adelgid *Adelges cooleyi*	Spruce	Idaho, Utah, Wyoming	No significant activity was reported in 1990.
Douglas-fir beetle *Dendroctonus pseudotsugae*	Douglas-fir	Idaho, Utah, Wyoming	Mortality remained static with 178,400 trees killed by Douglas-fir beetle. In Idaho, mortality decreased on the Boise, Sawtooth, and Targhee National Forests; remained static on the Payette National Forest; and increased on the Caribou, Challis, and Salmon National Forests. Mortality decreased on the Wasatch-Cache National Forest in Utah and remained static on the Bridger-Teton National Forest in Wyoming.
Douglas-fir pole beetle *Pseudohylesinus nebulosus*	Douglas-fir	Idaho	No significant activity was reported in 1990.
Douglas-fir tussock moth *Orgyia pseudotsugata*	Douglas-fir	Idaho, Utah	Areas on the Boise, Sawtooth, and Payette National Forests in Idaho and the Wasatch-Cache National Forest in Utah were defoliated. Defoliation levels were mostly moderate to heavy.
Fir engraver beetle *Scolytus ventralis*	Grand fir, White fir	Idaho, Utah, Nevada	Activity increased Regionwide. Large infestations occurred on the Boise National Forest in Idaho, the Bridger-Teton National Forest in Wyoming, and the Toiyabe National Forest in Nevada.

Intermountain Region--Status of insects in southern Idaho, Nevada, Utah, and western Wyoming

Insect	Host	Location	Remarks
Gypsy moth *Lymantria dispar*	Hardwoods	Idaho, Nevada, Utah, Wyoming	Three, 20,000-acre aerial applications of *Bacillus thuringiensis* (B.t.) were applied near Salt Lake City, Utah, in a continuing eradication program. Within the treatment blocks, only 249 moths were captured in pheromone-baited traps compared to 2,239 positive catches in 1989. A total of 3 moths were captured in Idaho Falls, Idaho. A single moth was caught outside Las Vegas, Nevada. No moth catches were reported in Wyoming in 1990.
Ips pilifrons	Spruce	Utah	Moderate infestations of this insect were found on the Pine Valley Ranger District, and heavy infestations were found in Peterson Grove on the Teasdale Ranger District, Dixie National Forest.
Jeffrey pine beetle *Dendroctonus jeffreyi*	Jeffrey pine	Nevada	Jeffrey pine mortality increased with 85,500 trees killed on the Toiyabe National Forest in Nevada. Virtually all susceptible host type on the Forest was infested.
Large aspen tortrix *Choristoneura conflictana*	Aspen	Utah	No significant activity was reported in 1990.
Locust borer *Megacyllene robiniae*	Black locust	Idaho	No significant activity was reported in 1990.
Mountain mahogany looper *Anacamptodes clivinaria profanata*	Mountain mahogany	Nevada	Mountain mahogany were defoliated by this looper in the McDonald Creek drainage of the Mountain City Ranger District, Humboldt National Forest.
Mountain pine beetle *Dendroctonus ponderosae*	Lodgepole pine, Ponderosa pine, Other pines	Idaho, Utah, Wyoming	Mountain pine beetle activity decreased Regionwide to the lowest levels recorded. During 1990, 11,900 trees were killed. The largest infestation was located on the Sawtooth National Recreation Area in Idaho. Smaller infestations occurred on the Manti-LaSal and Dixie National Forests in Utah and on the Challis, Salmon, and Boise National Forests in Idaho.

Insect	Host	Location	Remarks
Oyster shell scale *Lepidosaphis ulmi*	Poplars	Utah	Poplar trees were heavily infested with oystershell scale in Ranch Canyon located in the Bureau of Land Management Beaver Resource Area.
Pine butterfly *Neophasia menapia*	Ponderosa pine	Idaho	No significant activity was reported in 1990.
Pine engraver beetle *Ips pini*	Pines	Idaho, Nevada	Mortality occurred throughout southern Idaho and western Nevada and was often associated with western pine beetle and Jeffrey pine beetle activity.
Pine needle sheathminer *Zelleria haimbachi*	Lodgepole pine	Idaho	No significant activity was reported in 1990.
Ponderosa pine needleminer *Coleotechnites moreonela*	Ponderosa pine	Idaho	Mining of older needles on ponderosa pines near Featherville, Idaho, were detected during aerial surveys.
Silver fir beetle *Pseudohylesinus sericeus*	Grand fir	Idaho	Unusually large populations of silver fir beetle, in conjunction with fir root bark beetle, were detected overwintering in grand firs from Smith's Ferry to McCall, Idaho.
Spotted aspen leafroller *Siaphila duplex*	Aspen	Wyoming	Damage was observed on aspen in the town of Big Piney, Wyoming.
Spruce beetle *Dendroctonus rufipennis*	Engelmann spruce	Idaho, Utah, Wyoming	Approximately 194,000 trees were killed in three large infestations. The largest infestation on the Payette National Forest in Idaho expanded considerably from 1989 levels. Mortality levels on 2 infestations on the Manti-LaSal National Forest decreased moderately.

Insect	Host	Location	Remarks
Spruce bud scale *Physokermes piceae*	Spruces	Idaho	No significant activity was reported in 1990.
Sugar pine tortrix *Choristoneura lambertiana*	Pines	Idaho	No significant activity was reported in 1990.
Western balsam bark beetle *Dryocoetes confusus*	Subalpine fir	Idaho, Utah, Wyoming	Increases in mortality occurred on the Targhee and Caribou National Forests in Idaho. In Utah, large increases in mortality were observed on the Wasatch-Cache National Forest.
Western pine beetle *Dendroctonus brevicomis*	Ponderosa pine	Idaho	Decreases in tree mortality occurred on the Boise and Payette National Forests in Idaho. Mortality occurred most frequently in second-growth ponderosa pine.
Western pine shoot borer *Eucosma sonomana*	Ponderosa pine	Idaho	No significant activity was reported in 1990.
Western spruce budworm *Choristoneura occidentalis*	Douglas-fir, Spruce, True firs	Idaho	Defoliation increased from the low levels of recent years. Approximately 42,900 acres were defoliated on the Salmon and Challis National Forests in Idaho. Most defoliation was classified as light to moderate.
Western tent caterpillar *Malacosoma californicum*	Cottonwoods	Utah	Heavy defoliation on cottonwoods at Otter Creek State Park resulted in topkill and branch mortality of many trees within the park.
Willow leaf beetle *Altica bimarginatana*	Willow	Nevada	Stands of willow were defoliated by this leaf beetle north of Merritt Mountain on the Mountain City Ranger District.

Intermountain Region Diseases

Prepared by James T. Hoffman

Disease	Host	Location	Remarks
Stem and Branch Diseases			
Aspen trunk rot *Phellinus tremulae*	Aspen	Idaho, Nevada, Utah, Wyoming	Decay occurred in most aspen stands in the Region.
Comandra blister rust *Cronartium comandrae*	Lodgepole pine, Ponderosa pine	Idaho, Utah, Wyoming	Infection occurred infrequently throughout Idaho, Utah, and Wyoming.
Cytospora canker of true firs *Cytospora* sp.	True firs	Idaho, Nevada, Utah	Localized branch flagging, topkilling, and mortality of young trees were noted. This damage often preceded attack by the western balsam bark beetle.
Dwarf mistletoes *Arceuthobium* spp.	Douglas-fir, Lodgepole pine, Jeffrey pine, Ponderosa pine, Western larch	Idaho, Nevada, Utah, Wyoming	These continued to be the most widespread and frequently observed pests in the Intermountain Region. Suppression projects removed infected overstory trees from 5,233 acres.
Limb rust *Peridermium filamentosum*	Ponderosa pine	Utah	Infection occurred in stands on the Dixie National Forest.
Red ring rot *Phellinus pini*	Douglas-fir, Pines, Spruce, True firs, Western larch	Idaho, Utah, Wyoming	This fungus occurred throughout the Region in stands of mature conifers. Infection intensity was variable.
Rust-red stringy rot *Echinodontium tinctorium*	Grand fir, Subalpine fir, White fir	Idaho, Nevada	Decay caused by this fungus was common in mature and overmature stands of true firs.

Intermountain Region–Status of diseases in southern Idaho, Nevada, Utah, and western Wyoming

Disease	Host	Location	Remarks
Stalactiform blister rust *Cronartium coleosporioides*	Lodgepole pine	Idaho, Utah, Wyoming	This rust occurred in localized areas across the Region. Heavy infection was noted on the Salmon, Sawtooth, and Targhee National Forests in Idaho.
Western gall rust *Endocronartium harknessii*	Lodgepole pine, Ponderosa pine	Idaho, Utah, Wyoming	Gall rust occurred throughout the host types. Infection levels were variable, but only locally severe.
Root Diseases			
Annosus root disease *Heterobasidion annosum*	Douglas-fir, Engelmann, Lodgepole pine, Ponderosa pine, Spruce, True firs	Idaho, Nevada, Utah, Wyoming	This fungus caused root and butt rot of true firs and root rot of young ponderosa pines. Infection frequently resulted in outright death of young ponderosa pines and predisposition to beetle attack in true firs. Infrequent root infection was noted on Douglas-fir.
Armillaria root disease *Armillaria* sp.	Douglas-fir, Grand fir, Pines, Spruce	Idaho, Nevada, Utah, Wyoming	While evidence of *Armillaria* was found throughout the Region, in most instances it functioned as a weak pathogen or saprophyte.
Black stain root disease *Ophiostoma wageneri* (=*Ceratocystis wageneri*)	Pinyon pine	Idaho, Nevada, Utah	This disease infected pinyon pine on the Bureau of Land Management Burley District in Idaho, on the Humboldt and Toiyabe National Forests in Nevada, and on the Manti-LaSal National Forest in Utah.
Schweinitzii butt rot *Phaeolus schweinitzii*	Douglas-fir, Ponderosa pine	Idaho	Decay was common in mature and overmature forests, especially those having a recent fire or logging history. The fungus was found associated with other root diseases and bark beetles.
Tomentosus root disease *Inonotus tomentosus*	Douglas-fir, Spruce, Subalpine fir	Idaho, Utah	The fungus was found with *P. schweinitzii* which caused root and butt rot in trees with 5" to 8" diameters. Douglas-fir, spruce, and occasionally subalpine fir were reported affected in southern Idaho.

Disease	Host	Location	Remarks
Foliage Diseases			
Ash yellows	Velvet ash	Nevada, Utah	No significant activity was reported in 1990.
Douglas-fir needle cast *Rhabdocline* spp.	Douglas-fir	Idaho	Infrequent occurrence was observed with light to moderate defoliation noted throughout the range of Douglas-fir in southern and eastern Idaho.
Elytroderma disease *Elytroderma deformans*	Ponderosa pine	Idaho	Systemic infection occurred throughout the host type. Infection was especially evident in stands on Little Donner Summit, Cascade, Idaho, and around Idaho City, Idaho.
Fir broom rust *Melampsorella caryophyllacearum*	Subalpine fir	Idaho, Nevada, Utah, Wyoming	Infection occurred throughout the host type. High infection levels were noted in forested areas south of Twin Falls and Burley, Idaho.
Fir needle cast *Lirula* spp.	Grand fir, Subalpine fir	Idaho	Infected stands were found on the Council and Weiser Ranger Districts of the Payette National Forest.
Fir needle rust *Pucciniastrum* sp.	Subalpine fir	Idaho	Seedling or sapling size trees at higher elevations around McCall, Idaho, were heavily infected.
Larch needle cast *Meria laricis*	Western larch	Idaho	Incidence and severity of infection in west central Idaho were very low.
Limber pine needle cast *Lophodermella arcuata*	Limber pine	Wyoming	The disease, previously observed on the Bridger-Teton National Forest, was not observed in 1990.
Lodgepole pine needle cast *Lophodermella concolor*	Lodgepole pine	Idaho	Scattered incidence of light intensity was noted in southern Idaho.
Marssonina blight *Marssonina populi*	Aspen	Idaho, Utah, Wyoming	Scattered incidence of moderate to heavy intensity was noted throughout most of the host range in northern Utah and western Wyoming.

Disease	Host	Location	Remarks
Shepherd's crook *Venturia macularis*	Aspen	Idaho	Scattered incidence of light intensity was noted in southern Idaho.
Spruce broom rust *Chrysomyxa arctostaphyli*	Engelmann spruce	Idaho, Utah, Wyoming	Scattered infections occurred throughout the host type, especially in eastern Idaho.
Nursery Diseases			
Fusarium root disease *Fusarium oxysporum*	Nursery grown conifer seedlings	Idaho	Minor mortality of 1-0 and 2-0 conifer seedlings occurred at the Lucky Peak Nursery, Boise National Forest, Idaho.
Fusarium cortical stem rot *Fusarium avenaceum*	Nursery grown conifer seedlings	Idaho	Mortality of 1-0 and 2-0 conifer seedlings occurred at the Lucky Peak Nursery, Boise National Forest, Idaho.
Phytophthora/ Pythium root rot *Phytophthora* spp. *Pythium* spp.	Spruce	Idaho	These fungi were identified on seedlings and soil isolations at the Lucky Peak Nursery, Boise National Forest, Idaho.
Abiotic			
Drought effects	All vegetation	Regionwide	Premature needle drop, leaf scorch, and seedling mortality were observed due to 5 consecutive years of below normal precipitation. Damage was most acute in southern Idaho.
Frost	Gambel oak	Utah	A severe spring frost caused twig and branch dieback on Gambel oak along the Wasatch front on the Wasatch-Cache National Forest in Utah.

Pacific Southwest Region Insects

Prepared by John W. Dale

Insect	Host	Location	Remarks
A bark borer (unidentified)	*Tristiropsis acutangular*	Guam	This newly discovered insect has been forwarded to taxonomists for identification. It may become an important pest because of effects on host vigor and the dwindling host population brought about by typhoons.
A California spruce budworm *Choristoneura carnana californica*	Douglas-fir	Northern California	This defoliator has remained at endemic levels since the end of the Trinity County outbreak in 1985.
A Caroline short-nosed weevil *Lophothetes* sp.	Avocado, Banana, Citrus spp. Tropical almond, and others	Palau	This weevil continued to be a problem.
A coneworm *Dioryctria* sp.	Red fir	California	Larvae were common in cones shipped to the Placerville Nursery.
A cutworm *Euxoa (perexcellens?)*	Jeffrey pine, Red fir, White fir	Central California	No significant activity was reported in 1990.
A cutworm *Spondoptera litara*	Cruciferous crops	Federated States of Micronesia	This has been a frequent pest in agro-forestry gardens.
A Gelechiid leaf skeletonizer *Chionodes trichostola*	Blue oak	Northern California	Larvae caused widespread defoliation of blue oak located around the Scaramento Valley, especially Shasta and Tehama Counties.
A long-horned grasshopper *Oxyahyla intricata*	Cassava, Vegetable crops	Federated States of Micronesia	This pest damaged crops in agro-forestry. Birds and ground lizards provide good biological control.
A long-horned grasshopper *Segestes unicolor*	Coconut and other plams	Palau	Populations have not declined and damage was common throughout Palau, mainly on coconut palm.

Pacific Southwest Region--Status of insects in California, Hawaii, American Samoa, the Commonwealth of the Northern Mariana Islands, the Commonwealth of Guam, the Federated States of Micronesia, and the Trust Territory of Palau.

Insect	Host	Location	Remarks
A pine needle weevil *Scythropus* sp.	Jeffrey pine, Ponderosa pine	California	Light damage occurred in plantations in Placer and Riverside Counties.
A pyralid moth *Thliptoceras octoquttale*	*Mussaenda frondosa*	Palau	No significant activity was reported in 1990.
A rose beetle *Adoretus versutus*	Cocoa, Loquat, Ramutan, Grapes	American Samoa	This beetle has been an occasional pest that delays the growth of young trees.
A scarab beetle *Dichelonyx (backi?)*	Ponderosa pine	Northern California	No significant activity was reported in 1990.
A scarab beetle *Serica anthracina*	Douglas-fir, Ponderosa pine	Northern California	No significant activity was reported in 1990.
A short-horned grasshopper *Conocephaleus longipennis*	Vegetable crops	Federated States of Micronesia	This pest damaged crops in agro-forestry. Birds and ground lizards provide good biological control.
A short-horned grasshopper *Valanga nigricornis*	Banana, *Citrus* spp.	Palau	Damage from this insect was common.
A short-nosed weevil *Lophothetes* sp.	Banana, Mango, many forest and ornamental trees	Palau	The weevil continues to be a problem.
A stick insect *Graeffea crovanii*	Coconut palm	American Samoa	No significant activity was reported in 1990.
A sulfur butterfly *Eurema hecabe*	*Albizia* sp.	Northern Mariana Islands	No significant activity was reported in 1990.
A thrips *Pseudanapho-thrips* sp.	Norfolk Island pine	Hawaii (Oahu and Hawaiian Islands)	No significant activity was reported in 1990.
A thrips *Rhiyiphorothrips pulchellus*	Mountain apple	Hawaii (Oahu)	No significant activity was reported in 1990.
A thrips *Scirtothrips dorsalis*	False heather	Hawaii (Maui)	No significant activity was reported in 1990.

Pacific Southwest Region--Status of insects in California, Hawaii, American Samoa, the Commonwealth of the Northern Mariana Islands, the Commonwealth of Guam, the Federated States of Micronesia, and the Trust Territory of Palau.

Insect	Host	Location	Remarks
A thrips (unknown)	Mango, *Phaleria nisidai*	Palau	The scarifying of leaves caused defoliation.
A tip borer (unknown)	Mahogany	Federated States of Micronesia	No significant activity was reported in 1990.
A wax scale *Ceroplastes* sp.	*Antidesma bunius*, *Eugenia aquea*, *Mussaenda frondosa*, *Spondias pinnata*	Palau	No significant activity was reported in 1990.
Agamemnon butterfly *Papilio agamemnon*	*Annona* spp.	Palau	No significant activity was reported in 1990.
An hesperiid moth *Hasora choromus*	*Pongamia pinnata*	Palau	No significant activity was reported in 1990.
Ash whitefly *Siphoninus phillyreae*	Ornamental trees and shrubs	California	Also known as the pomegranate, pear, or peach whitefly, this exotic has now spread to 35 of California's 58 counties, since it was first found in July, 1988.
Balsam twig aphid *Mindarus abietinus*	White fir	Northern California	This aphid was probably responsible for damage to white fir seedlings planted on 200 acres in Placer County. Research continues on the population at Placerville Nursery.
Banana aphid *Pentalonia nigronervosa*	Banana	Federated States of Micronesia	Insecticides have been widely recommended and used for control of this destructive scale.
Banana root borer *Cosmopolites sordidus*	Banana	Federated States of Micronesia	Adults of this small weevil often escape detection.
Black citrus swallowtail butterfly *Papilio polytes*	*Citrus* spp.	Palau	Damage has declined and has become minor.
Black cutworm *Agrotis ipsilon*	Douglas-fir, Jeffrey pine	California	Damage at Humboldt Nursery was minor.

Insect	Host	Location	Remarks
Black garden fleahopper *Helticus tibialis*	Cassava, Vegetable crops	Federated States of Micronesia	This insect was found on crops grown in agro-forestry.
Black pineleaf scale *Nuculaspis californica*	Bishop pine	Southern California	This insect was associated with tree mortality on Vandenburg Air Force Base.
Black vine weevil *Otiorhynchus sulcatus*	Douglas-fir, Red fir	Northern California	Damage at Humboldt Nursery declined.
California flatheaded borer *Melanophila californica*	Jeffrey pine, Ponderosa pine	California	This borer was a primary pest in the drought-stressed forests of southern California.
California oakmoth *Phryganidia californica*	Live oak	Northern California	Larvae caused defoliation of coastal live oak in Santa Cruz County.
Caroline fruitfly *Dacus frauenfeldi*	Breadfruit, Citrus spp., Guava, Mango, Mountain apple, Papaya, Water apple	Federated States of Micronesia, Palau	This was a common fruit pest in Micronesia. No significant activity was reported from Palau.
Cedar bark beetles *Phleosinus* sp.	Incense-cedar, Port-Orford-cedar, Redwood	Northern California	Populations remained high because of 4 years of drought-related stress to the hosts.
Chinese rose beetle *Adoretus sinicus*	Avocado, Banana, Polynesian chestnut, Tropical almond	Palau	No significant activity was reported in 1990.
Citrus flower moth *Prays citri*	*Citrus* spp.	Palau	No significant activity was reported in 1990.
Citrus leafminer *Phyllocnistic citrella*	*Citrus* spp.	American Samoa, Palau	This serious pest on young citrus caused leaf deformation in American Samoa. Leaf deformation and defoliation were common in Palau.
Citrus mealybug *Planococcus citri*	Banana, Citrus spp., Pandanus, Soursop	Federated States of Micronesia	Leaves, stems, and fruits were attacked.

Pacific Southwest Region--Status of insects in California, Hawaii, American Samoa, the Commonwealth of the Northern Mariana Islands, the Commonwealth of Guam, the Federated States of Micronesia, and the Trust Territory of Palau.

Insect	Host	Location	Remarks
Citrus snow scale *Unaspis citri*	Citrus spp.	American Samoa	This continues to be an occasional pest.
Clover root curculio *Sitona hispidulus*	Cover crops	Northern California	No significant activity was reported in 1990.
Coconut beetle *Brontispa* sp.	Coconut palm	Guam	No significant activity was reported in 1990.
Coconut hispid beetle *Brontispa longissima*	Coconut palm	American Samoa	Spores of *Metarhizium anisopliae* applied 2 to 3 times a year provided control of seasonal outbreaks.
Coconut leaf beetle *Brontispa chalybeipennis*	Coconut palm	Hawaii	No significant activity was reported in 1990.
Coconut red scale *Furcaspis oceanica*	Coconut palm, Nipa palm, Pandanus	Federated States of Micronesia, Palau	No significant activity was reported in 1990.
Coconut rhinoceros beetle *Oryctes rhinoceros*	Coconut palm	American Samoa, Palau	*Baculovirus oryctesis* was used as a biological control. This beetle was especially threatening after the destruction caused by Typhoon Ofa. On Palau, the beetle continued to be a problem.
Coconut scale *Aspidiotus destructor*	Avocado, Coconut and other palms, Papaya, Soursop, Other fruit trees	American Samoa, Guam, Northern Mariana Islands	Occasional outbreaks in American Samoa were controlled by predatory beetles, mites, and parasitic wasps.
"Coconut shot-hole borer" (unknown)	Betelnut, Breadfruit	Federated States of Micronesia	Adults caused damage to young shoots.
Coconut trunk weevil *Rhabdoscelus asperipennis*	Coconut palm	Northern Mariana Islands, Palau	This beetle damaged the base of trees on Peleliu, Territory of Palau. No significant activity was reported from the Northern Mariana Islands.

Pacific Southwest Region--Status of insects in California, Hawaii, American Samoa, the Commonwealth of the Northern Mariana Islands, the Commonwealth of Guam, the Federated States of Micronesia, and the Trust Territory of Palau.

Insect	Host	Location	Remarks
Coneworms *Dioryctria cambiicola* *Diorcytria baumhoferi*	Ponderosa pine	Northern California	These coneworms continued to cause damage at the Chico Tree Improvement Center. A similar species infested Christmas trees in Butte County.
Conifer aphids *Cinara* spp.	White fir, Ponderosa pine	Northern and central California	Aphids continued to be abundant, but not at 1989 levels.
Cowpea aphid *Aphis caraccivora*	Breadfruit, Citrus spp., Mango	Federated States of Micronesia	This was a common species for which chemical contol was used.
Crab spider *Gasteracantha* sp.	Pollinators and other insects	Hawaii	No significant activity was reported in 1990.
Douglas-fir beetle *Dendroctonus pseudotsugae*	Douglas-fir	Northwestern California	This beetle reproduced in scattered windthrow at several locations in the Costal Range. However, resulting tree mortality was minor.
Douglas-fir engraver *Scolytus unispinosus*	Douglas-fir	Northern California	No significant activity was reported in 1990.
Douglas-fir tussock moth *Orgyia pseudotsugata*	White fir	Northern California	Populations on the Plumas and Lassen National Forest remained at endemic levels.
Douglas-fir twig weevil *Cylindrocopturus furnissi*	Douglas-fir	Northern California	Counties reported forest regeneration and Christmas tree mortality.
Durbid plant hopper *Lamenia caliginea*	Banana, Mango, Sugar cane	Federated States of Micronesia	Damage appeared as speckling or motling on the leaf.
Egyptian fluted scale *Icerya aegyptiaca*	Beefwood, Citrus spp., and others	Palau	No significant activity was reported in 1990.

Pacific Southwest Region--Status of insects in California, Hawaii, American Samoa, the Commonwealth of the Northern Mariana Islands, the Commonwealth of Guam, the Federated States of Micronesia, and the Trust Territory of Palau.

Insect	Host	Location	Remarks
Eucalyptus borer *Phoracantha semipunctata*	Eucalyptus	San Francisco Bay Area, Southern California	The application of traditional forest management principles have reduced problems from this pest in urban stands in Southern California. The pest was not detected in any new counties in the Bay Area.
Eugenia psyllid *Trioza eugeniae*	*Eugenia* spp., Mountain apple	California, Federated States of Micronesia	This insect continues to cause galls on leaves. It was first reported in California in May 1988.
Fall webworm *Hyphantria cunea*	Pacific madrone	Northern California	Webbing and associated defoliation were noted in several areas of Santa Cruz and Mendocino Counties.
Fir coneworm *Dioryctria abietivorella*	Douglas-fir	Chico, California	This coneworm continued to damage the small cone crop at the Chico Tree Improvement Center.
Fir engraver beetle *Scolytus ventralis*	White fir, Red fir	California	Because of the drought, levels of tree mortality were high. Red and white fir at the lower evaluations suffered the highest concentrations of mortality. Activity in and around Lake Tahoe was particularly noteworthy. Some trees were so stressed that they no longer exhibited pitch streaming when attacked. An estimated 800,000 trees have been lost in the Tahoe Basin from the fir engraver and other insects.
Fir flatheaded borer *Melanophila drummondi*	Douglas-fir	Northern California	Douglas-firs, injured by fires in 1987 and 1988 in northwestern California, were beginning to die from infestations of this borer. Several consecutive years of drought have undoubtedly been a major factor in this mortality.
Fruit-piercing moth *Othreis fullonia*	Banana, Carambola, *Citrus* supp., Coral tree, Guava, Mango, Papaya	American Samoa, Guam, Federated States of Micronesia, Northern Mariana Islands	The moth was an occasional pest in American Samoa, and was responsible for damaged citrus fruit in the Federated States. No significant activity was reported from other locations.

Pacific Southwest Region--Status of insects in California, Hawaii, American Samoa, the Commonwealth of the Northern Mariana Islands, the Commonwealth of Guam, the Federated States of Micronesia, and the Trust Territory of Palau.

Insect	Host	Location	Remarks
Fruittree leafroller *Archips argyrospila*	California black oak, Other hardwoods	Southern California	No significant activity was reported. This defoliator has not been a problem since 1986.
Grasshoppers Acrididae	Jeffrey pine, Ponderosa pine, White fir	Northern California	Low levels of injury from grasshopper feeding were found in 7-year old plantations on the Calaveras Ranger District, Stanislaus National Forest. The potential for significant grasshopper damage exists in the large, often contiguous areas, that need to be regenerated following recent fires.
Green scale *Coccus viridus*	Banana *Citrus* spp., Mango, Plumeria, Soursop	Federated States of Micronesia	High populations of this pest produce a sticky substance that results in the growth of sooty mold.
Greenhouse thrips *Heliothrips haemorrhoidalis*	Monterey pine	Hawaii	Prevalent on Maui Island, this pest produced unsightly needles and has been a recurring problem for commerical Christmas tree planters through the years.
Gouty pitch midge *Cecidomyia piniinopis*	Ponderosa pine	Northern California	No reports were received, but this midge is always present somewhere in the State on young pine under stress from drought, competition, environmental pollution, or other factors.
Gypsy moth *Lymantria dispar*	Hardwoods, Ornamentals	California	Approximately 21,000 traps captured 24 moths in 8 counties. The California Department of Food and Agriculture applied a ground treatment of dimilin at a Bay-front apartment complex in Tiburon, Marin County, in the spring.
Hemispherical scale *Saissetia coffeae*	*Citrus* spp.	American Samoa	This continues to be an occasional pest.
Hibiscus mealybug *Nipaecoccus vastator*	Coconut, *Leucaena* spp. *Serianthes nelsonii*	Northern Mariana Islands	No significant activity was reported in 1990.

Pacific Southwest Region--Status of insects in California, Hawaii, American Samoa, the Commonwealth of the Northern Mariana Islands, the Commonwealth of Guam, the Federated States of Micronesia, and the Trust Territory of Palau.

Insect	Host	Location	Remarks
Hibiscus psyllid *Mesohomotoma hibisci*	*Hibiscus tiliaceus*	Palau	No significant activity was reported in 1990.
Hollyhock thrips *Liothrips varicornis*	*Abutilon menziesii*, *Hibiscus* sp., *Kokia dryanarioides*, *Hibiscadelphus* sp.	Hawaii	No significant activity was reported ub 1990.
Hulodes cranea	*Serianthes kanehirae*	Palau	No significant activity was reported in 1990.
Inornate scale *Aonidiella inorata*	Banana, Breadfruit, Citrus, Coconut	Federated States of Micronesia	This was one of the major pests of the island fruit crop.
Jeffrey pine beetle *Dendroctonus jeffreyi*	Jeffrey pine	California	Jeffrey pine beetle mortality was reported to be slightly above normal on the Mammoth and Mono Lake Districts, Inyo National Forest.
Jeffrey pine needleminer *Coleotechnites* sp.	Jeffrey pine	California	No significant activity was reported in 1990.
Latania scale *Hemiberlesia lataniae*	Banana, Breadfruit, *Citrus* spp., Mango, Pandanus	Federated States of Micronesia	This scale was common on host plants.
Leucaena psyllid *Heteropsylla cubana*	*Leucaena* spp., *Samanea saman*, Tangantangan	American Guam, Hawaii, Northern Mariana Islands, Samoa	This new world insect has become a serious pest in some plantations in Asia and the Pacific. Guam plans to introduce the ladybird beetle, *Curinuss coeruleus*, as a control measure.
Lodgepole needleminer *Coleotechnites milleri*	Lodgepole pine	Yosemite National Park	No significant activity was reported in 1990.

Pacific Southwest Region--Status of insects in California, Hawaii, American Samoa, the Commonwealth of the Northern Mariana Islands, the Commonwealth of Guam, the Federated States of Micronesia, and the Trust Territory of Palau.

Insect	Host	Location	Remarks
Mango shoot caterpillar *Bombotelia jocosatrix*	Mango	Guam	Feeding can seriously reduce flower production and cause poor fruit crops.
Mariana coconut leaf beetle *Brontispa mariana*	Coconut	Federated States of Micronesia	Adults scour new leaflets and chew tissues in narrow leaves; larvae feed on the surface of leaflets and cause browning and death.
Melon aphid/ cotton aphid *Aphis gossypii*	Banana, Breadfruit, Cocoa, Mango, Mountain apple, Papaya, Plumeria	Federated States of Micronesia	This continues to be a pest of many agro-forestry crops.
Melon fly *Dacus cucurbirtae*	Avocado, *Citrus* supp., Figs, Mango	Northern Mariana Islands	No significant activity was reported in 1990.
Modoc budworm *Choristoneura retiniana*	White fir	Northern California	Visible defoliation occurred on the Warner Mountain Ranger District, Modoc National Forest, from Benton Meadow to Lake City Canyon.
Mountain apple psyllid *Trioza vitiensis*	*Eugenia malaccensis*	Palau	No significant activity was reported in 1990.
Mountain pine beetle *Dendroctonus ponderosae*	Lodgepole, Ponderosa, and Sugar pines	California	Attacks by the mountain pine beetle caused mortality of drought-stressed mature and old-growth sugar pine in many parts of the North Coastal Range. The Cascade and Sierra areas were similarly affected. Several sugar planes, resistant to white pine blister rust, were treated with carbaryl insecticide in order to prevent attacks. Unfortunately, some trees were much too tall to be adequately protected.
Myrobalana butterfly *Badamia exclamationis*	*Terminalia catappa*	Palau	Defoliation of serveral trees occurred on Koror, Republic of Palau.

Pacific Southwest Region--Status of insects in California, Hawaii, American Samoa, the Commonwealth of the Northern Mariana Islands, the Commonwealth of Guam, the Federated States of Micronesia, and the Trust Territory of Palau.

Insect	Host	Location	Remarks
Nantucket pine tip moth *Rhyacionia frustrana*	Monterey pine	Central and southern California	No significant activity was reported in 1990.
New Guinea sugarcane weevil *Rhabdoscelus obscurus*	Betelnut, Coconut, Sugarcane (purple var.)	Palau	No significant activity was reported in 1990.
Oak pit scale *Asterolecanium minus*	Coast live oak	Northern California	Most samples of branch decline of coast live oak from *Diplodia* sp. also had twig damage from oak pit scales.
Orange spiny whitefly *Aleurocanthus spiniferus*	Breadfruit, *Citrus* spp.	Federated States of Micronesia	This whitefly has been a major pest in the State of Kosrae, Federated States of Micronesia.
Pacific tent caterpillar *Malacosoma constrictum*	*Quercus* spp., particularly blue oak	Northern California	No significant activity was reported in 1990.
Palau coconut beetle *Brontispa palauensis*	Coconut palm	Palau	No significant activity was reported in 1990.
Palm Scale *Hemiberlesia palmae*	Betelnut, Breadfruit, *Citrus* spp.	Federated States of Micronesia	Attacks on leaves resulted in plants that did not grow well or produce much fruit.
Pandanus beetle *Oxycephala pandani*	*Pandanus* spp.	Palau	No significant activity was reported in 1990.
Pine engraver beetles *Ips* spp.	Pines	California	Pine engravers, along with other beetles, caused the loss of 0.6 million cubic feet on the San Bernardino National Forest in southern California. Engraver activity was associated with continued high levels of pine mortality in pine- and mixed-conifer habitat of northern California.
Pine reproduction weevil *Cylindrocopturus eatoni*	Ponderosa pine	California	Reports of mortality came from Butte and Trinity Counties. Young forest and Christmas trees were involved.

Insect	Host	Location	Remarks
Pink sugarcane mealybug *Saccharicoccus sacchari*	Sugarcane	Federated States of Micronesia	This pest was a problem only in agro-forestry.
Poinciana looper *Pericyma cruegeri*	Flame tree, Young Albizia, and other leguminous species	Guam, Northern Mariana Islands	This was the most serious pest of the flame tree. The only control method applied was to spray *Bacillus thuringensis* (B.t.) during dry periods.
Protens scale *Parlatoria protens*	Betelnut, *Citrus* spp., Coconut, Mango, Pandanus	Federated States of Micronesia	Adults and nymphs caused yellowing of leaves.
Redbanded thrips *Selenothrips rubrocinctus*	Avocado, Cacao, Cashew, Mango, Tropical almond	Guam, Northern Mariana Islands	This insect was widely distributed in the Marianas, and was commonly found on mango.
Red turpentine beetle *Dendroctonus valens*	Pines	California	Evidence of attack by the red turpentine beetle on ponderosa, sugar, and Jeffrey pine was widespread. Both the number of attacks per tree and the height of the attacks on the boles indicated that this scolytid was an important mortality factor this year. Prolonged drought was the underlying factor responsible.
Roundheaded fir borer *Tetropium abietis*	White fir, Red fir	California	This borer has been common in red fir during the drought. It is common to find red fir with either green or slightly off-color foliage with exit holes of the fir borer and white boring dust lodged in bark crevices.
Sequoia pitch moth *Vespamina sequoiae*	Monterey and other pines	Northern California	This insect continued to be a pest of ornamental Monterey pine throughout the North Coast area.
Silverspotted tiger moth *Halisodota argentata*	White fir	Northern California	Scattered occurrences were reported from Tehama and Trinity Counties.

Insect	Host	Location	Remarks
Spaeth pandanus beetle *Oxycephala spaethi*	*Pandanus* spp.	Palau	No significant activity was reported.
Spider mites *Tetranychus* sp.	Cassava, Papaya	Palau	Serious yellowing and defoliation occurread during the dry seasons.
Spiraling whitefly *Aleurodicus dispersus*	Cassava, Coconut palms, Papaya, Plumeria	American Samoa, Guam	There were occasional outbreaks in American Samoa, especially after Typhoon Ofa. The insect gained entry to Guam from Hawaii and spread over most of Micronesia.
Spruce aphid *Elatobium abietinum*	Sitka spruce	Northwestern California (coastal)	Spruce foliage planted on roadsides south of Eureka, Humboldt County, had sparse foliage as a result of continued attacks from this pest.
Steatococcus scale *Steatococcus samaraius*	Beefwood, Citrus spp., *Erythrina* sp.	Palau	No significant activity was reported in 1990.
Stellate scale *Vinsonia stellifera*	Breadfruit, *Citrus* spp., Mango, Mountain apple, Soursop	Federated States of Micronesia	High stellate scale populations resulted in the growth of sooty mold on the upper leaf surface.
Strawberry root weevil *Otiorhynchus ovatus*	Douglas-fir, Red fir	Northern California	Damage at Humboldt Nursery appeared to to decline.
Striped (white-tailed) mealybug *Ferrisia virgata*	*Citrus* spp.	American Samoa	No significant activity was reported in 1990.
Sugar pine tortrix *Choristoneura lambertiana*	Lodgepole pine	Northern California	No significant activity was reported in 1990.
Tent caterpillar *Malacosoma* sp.	Antelope bitterbrush	Eastern California	Low to moderate levels of defoliation were reported along Highway 89 between Truckee and Sierraville (Nevada and Sierra Counties). Activity remained low in the Mammoth-Mono Lake area (Mono County).

Pacific Southwest Region--Status of insects in California, Hawaii, American Samoa, the Commonwealth of the Northern Mariana Islands, the Commonwealth of Guam, the Federated States of Micronesia, and the Trust Territory of Palau.

Insect	Host	Location	Remarks
Tessellated scale *Encalymnatus tessellatus*	Banana, Betelnut, Mango, Soursop	Federated States of Micronesia	Pesticides were used to control this pest.
Twig beetles *Pityophthorus* spp.	Ponderosa pine, Douglas-fir, White fir	Northern California	No significant activity was reported in 1990.
Vegetable weevil *Listroderes obliquus*	Red fir	Northern California	No significant activity was reported Humboldt Nursery.
Western pine beetle *Dendroctonus brevicomis*	Coulter pine, Ponderosa pine	California	This bark beetle, along with the fir engraver beetle, accounted for much of the 0.4 million cubic feet of commercial timber that has died on National Forests in California during the current drought (as of June 30, 1990). Mortality was scattered and occurred in relatively small groups of 3 to 10 trees, as well as large centers of more than 100 trees over several acres. In southern California, heavy mortality (more than 2000 trees) continued in the vicinity of Mt. Palomar and Julian, San Diego County. Entire Coulter pine stands have been lost. It appears that mortality will continue until a break occurs in the drought.
Western pine shoot borer *Eucosma sonomana*	Ponderosa pine	Northern California	No significant activity was reported in 1990.
Western yellowjacket *Vespula pensylvanica*	Native insects and animals, Man	Hawaii	This is an introduced insect that remained a public health concern. No significant activy was reported.
White fir needleminer *Epinotia meritana*	White fir	Northern California	No significant activity was reported in 1990.
Woolly whitefly *Aleurothrizus floccosus*	*Citrus* spp.,	Guam	No significant activity was reported in 1990.

Pacific Southwest Region--Status of insects in California, Hawaii, American Samoa, the Commonwealth of the Northern Mariana Islands, the Commonwealth of Guam, the Federated States of Micronesia, and the Trust Territory of Palau.

Pacific Southwest Region Diseases

Prepared by Susan J. Frankel

Disease	Host	Location	Remarks
Stem and Branch Diseases			
Botryosphaeria canker *Botryosphaeria ribis*	Ceanothus, Chamise, Manzanita	Southern California	The fungus was associated with dieback of chapparal species in Riverside and San Diego Counties. The plants were predisposed to fungal infection by drought and air pollution. The dead brush plants posed a severe fire hazard.
Cassytha *Cassytha filiformis*	All afforestation species	Guam	Mayagas is the local name of this leafless parasitic vine. It strangles host plants and is very difficult to control with herbicides.
Citrus canker *Xanthomonas citri*	Citrus species	Guam, Northern Mariana Islands	Symptoms of citrus canker include brown blotches on leaves, stem, bark, and fruit. The disease was widespread throughout the Mariana Islands and resulted in stunting, dieback, and plant mortality.
Dodder *Cuscuta* sp.	Native vegetation	Guam, Hawaii, Yap	Dodder is a parasitic vine with slender stems that criss-cross over other vegetation to form dense patches. It takes nutrients from host plants and kills them.
Dwarf mistletoes *Arceuthobium* spp.	Douglas-fir, Pine, True firs	California	The abundance and distribution of dwarf mistletoes changes only gradually over time. Mistletoes infected conifers on 2.3 million acres of commercial land and contributed to an estimated 100 million cubic feet of mortality. Dwarf mistletoes were associated with branch flagging in red fir and white fir throughout the central and southern Sierra Nevadas. Drought stress, bark beetles and cytospora canker were contributory factors in this decline.
Fusicoccum canker *Fusicoccum* sp.	Pacific madrone	Santa Cruz, Mendocino, and Lake Counties, California	The fungus caused branch dieback and cankers in madrone throughout northern California.

Pacific Southwest Region--Status of diseases in California, Hawaii, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, the Commonwealth of Guam, the Federated States of Micronesia and the Republic of Palau.

Disease	Host	Location	Remarks
Koa tree decline **Unknown**	Koa	Hawaii	This disease was prevalent on Oahu Island. The symptoms included branch dieback.
Mamane tree decline **Unknown**	Mamane chrysophylla	Hawaii	This disease is common on Hawaii Island and causes branch dieback, brooms, and swollen stems.
Norfolk Island Pine decline **Unknown**	Norfolk Island Pine	Hawaii	Norfolk Island pine decline is present on Kauai Island. The syndrome appears as a dieback of some trees within stands.
Phomopsis canker *Phomopsis lokoyae*	Douglas-fir	Northern California	The fungus was involved in branch flagging and top-killing of sapling and pole-size trees in overstocked or brushy areas. Damage appeared to be related to drought stress. Disease was less prevalent than in 1989.
Pitch canker *Fusarium subglutinans*	Aleppo pine, Bishop pine, Italian pine, Monterey pine, Stone pine	Central coastal California and 3 locations in southern California	Pitch canker caused branch dieback in planted trees in Santa Cruz and Alameda Counties. Some of the moderately-to-heavily infected trees were killed by pine engraver beetle and/or red turpentine beetle. The fungus did not damage native stands, only roadside, park, and ornamental trees.
True mistletoe *Phoradendron* spp.	Oaks, Sycamores, and other hardwoods	California	Ture mistletoes reduced host vigor by taking moisture and nutrients from trees' conductive systems. Infections were common throughout the State.
Western gall rust *Peridermium harknessii*	Lodgepole pine, Monterey pine	Northern California	This rust caused branch flagging in Monterey pine from north of the Bay Area through Humboldt County.
White fir mistletoe *Phoradendron bolleanum* ssp. *pauciflorum*	White fir	Central and southern California	The parasitic plant was widespread in forest stands throughout the southern half of the State.
White pine blister rust *Cronartium ribicola*	Sugar pine, Western white pine	Central and northern California	This disease was reported throughout the Sierra Nevada and northern mountains. Resistant sugar pine were sprayed with carbaryl to protect them against red turpentine and mountain pine beetle attack.

Pacific Southwest Region--Status of diseases in California, Hawaii, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, the Commonwealth of Guam, the Federated States of Micronesia and the Republic of Palau.

Disease	Host	Location	Remarks
Root Diseases			
Annosus root disease *Heterobasidion annosum*	Conifers, Hardwoods	California	About 1.5 million acres of pine type and 0.7 million acres of true fir type were infected with this disease. This disease has been associated with tree failures, which have caused property damage and personal injury in recreation areas.
Armillaria root disease *Armillaria* sp.	Conifers, Hardwoods	California	This disease was widespread in ornamental plantings and killed Douglas-fir, tanoak (Santa Cruz County), and sapling sugar pine (Lake County).
Black stain root disease *Ophiostoma wageneri* (=*Ceratocystis wageneri*)	Douglas-fir, Ponderosa pine, Singleleaf pinyon pine	California	Many plantations in northwestern California reported black stain as the cause of thinning and regeneration problems in plantations. Black stain also killed pockets of pinyon pine in southern California.
Flame tree root disease *Phellinus noxious*	Flame tree	Northern Mariana Islands	No significant activity was reported in 1990.
Port-Orford-cedar root disease *Phytophthora lateralis*	Port-Orford-cedar	Northern California	This disease was limited primarily to the Smith River drainage in Del Norte County, California. There were a few small infestions on the Siskiyou National Forest, Siskiyou County, California.
Foliage Diseases			
Elytroderma needle disease *Elytroderma deformans*	Jeffrey pine, Ponderosa pine	California	Signs and symptoms were similar to 1989 levels.
Mango scab *Elsinoe mangiferae*	Mango	Guam	The disease attacks the young rapidly developing leaves, flower heads, twigs and fruit. Severe attacks cause crinkling, distortion, and sudden dropping of leaves.
Pine needle cast *Lophodermium pinastri*	Monterey pine	Hawaii	This disease was especially damaging to Christmas tree plantations on Maui Island.

Pacific Southwest Region--Status of diseases in California, Hawaii, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, the Commonwealth of Guam, the Federated States of Micronesia and the Republic of Palau.

Disease	Host	Location	Remarks
Vascular Wilts			
Dutch elm disease *Ceratocystis ulmi*	Elm	San Francisco Bay Area, Sacramento, Central Valley	Dutch elm disease expanded into the California Central Valley. Four trees in the city of Sacramento, and 5 trees in Isleton, a town 30 miles south of Sacramento, were confirmed with the disease and removed. A quarantine was established in 3 central valley counties.
Nursery Diseases			
Alder leaf spot *Septoria alnifolia*	White alder	Northern California	Fewer white alder were planted. The severity of the disease declined from 1989 levels. Leaf spots or stem lesions were present on more than 30 percent of the crop.
Cedar leaf blight *Didymascella thujina*	Western red cedar	Northern California	Western red cedar were defoliated by this fungus. Damage was less severe than in 1989 and was primarily limited to cosmetic inujury.
Fusarium diseases *Fusarium* spp.	Douglas-fir, Ponderosa pine, Sugar pine	California	Fusarium caused damping-off, root rot and hypocotyl rot of seedlings of various ages. Some seedlings were predisposed to the disease by hot weather and overfertilization.
Phoma blight *Phoma* sp.	Douglas-fir, Red fir	Northern California	The level of Phoma blight infection was low. There was minor damage.
Sirococcus tip blight *Sirococcus strobilinus*	Jeffrey pine	Northern California	Tip blight deformed and killed 1-0 Jeffrey pine. Production of Jeffrey pine was curtailed at one nursery due to this disease.
Air Pollution Effects and Other Misc. Problems			
Bud rot *Phytophthora palmivora*	Breadfruit, Cocoa, Palma	American Samoa, Northern Mariana Islands, Rota	Trees on Rota suffered from bud rot, wilt and leaf drop.

Pacific Southwest Region--Status of diseases in California, Hawaii, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, the Commonwealth of Guam, the Federated States of Micronesia and the Republic of Palau.

Disease	Host	Location	Remarks
Cadang-cadang	Coconut	Guam	This virus stunted the growth and caused yellow-mottled patterns to develop on leaves. The coconut trees died. There is no known control for this virus.
Drought and heat injury	Pine, Fir species, Redwood	California	Over 7 million trees are estimated to be dead due to the drought. In the Tahoe basin, 800,000 trees (or one of five) are dead. Mortality was scattered, but there are patches of over 150 acres.
Ozone *Ozone*	Jeffrey pine, Ponderosa pine	Central and southern California	The amount of visible foliar ozone injury to pines in the southern Sierra Nevada decreased over the last 4 years. This coincided with a period of drought, which presumably caused ponderosa pine and Jeffrey pine to reduce their photosynthetic activity and take up less ozone.
Salt damage	Conifers, Shrubs	Lake Tahoe Basin	Road deicing caused dieback and mortality in the Lake Tahoe area and along many highways in Northern California. Over 7,400 trees in the Lake Tahoe basin were estimated to be dead due to salt damage.
Other			
Joga decline Unknown	Joga	Northern Mariana Islands, Rota	There was dieback on Joga trees on the Sabana at Rota.
Pingelap disease Unknown	Breadfruit	Guam	This disease caused a dieback of the upper branches and then continued down through the crown until the tree is killed. In most cases dieback is associated with severe drought.
Rhizopus rot *Rhizopus artocarpi*	Jackfruit	Guam	This disease starts in the rainy season, when water on the tip of young fruits attracts the fungus. The fungus causes premature fruit drop, reduced fruit quality, and size.

Pacific Northwest Region Insects

Prepared by Tim McConnell

Insect	Host	Location	Remarks
Douglas-fir beetle *Dendroctonus pseudotsugae*	Douglas-fir	Oregon, Washington	Overall Douglas-fir beetle damage increased significantly to 30.6 million cubic feet. In Oregon, the damage occurred on 263,000 acres, down from 324,000 acres in 1989. The greatest damage occured on the Umatilla, Wallowa-Whitman, and Malheur National Forests. In Washington State, Douglas-fir beetle damage almost doubled, from 12,900 trees to 23,200 trees. Acres damaged remained almost static at 29,300 acres.
Douglas-fir tussock moth *Orgyia pseudotsugata*	True firs, Douglas-fir	Eastern Oregon	Pheromone trapping and larval surveys detected widespread population increases in northeastern Oregon. Defoliation was not observed from the air because the tussock moth populations were in the same areas where heavy western spruce budworm defoliation occurred. A suppression project is being considered for 1991 for 170,000 acres on the Wallowa-Whitman National Forest.
Fir engraver beetle *Scolytus ventralis*	True firs	Oregon, Washington	Fir engraver activity decreased in Oregon and Washington. Losses of 17.9 million cubic feet occurred on 524,800 acres compared with losses of 23.6 million cubic feet on 833,700 acres in 1989.
Gypsy moth *Lymantria dispar*	Conifers, Hardwoods	Oregon, Washington	Attempts were made to eradicate this pest using pheromone traps around 2 private residences in Lake Oswego near Portland, Oregon. An eradication project was conducted on 450 acres near northeast Vancouver, Washington.
Modoc budworm *Choristoneura retiniana*	Douglas-fir, True firs	Southern Oregon	No Modoc budworm defoliation was detected from the air in 1990.

Insect	Host	Location	Remarks
Mountain pine beetle *Dendroctonus ponderosae*	Jeffrey pine, Lodgepole pine, Ponderosa pine, Sugar pine, Western white pine	Oregon, Washington	In Washington, losses increased slightly to 6.5 million cubic feet on 186,000 acres. In south central Oregon, losses decreased significantly as the mountain pine beetle outbreak depleted the majority of its lodgepole pine host. In Oregon, losses decreased to 2.5 million cubic feet on 245,500 acres from 11.0 million cubic feet on 888,000 acres in 1989.
Pine engraver beetles *Ips* spp.	Ponderosa pine	Oregon, Washington	Pine engraver activity decreased from 27,450 acres to 8,971 acres in 1990.
Spruce beetle *Dendroctonus rufipennis*	Engelmann spruce	Oregon, Washington	The spruce beetle killed 58,900 trees on 49,400 acres compared to 115,300 trees on 68,200 acres in 1989. Losses decreased to 2.8 million cubic feet from 5.4 million cubic feet in 1989. Most damage occurred in northeast Oregon. The outbreak on the Wallowa-Whitman National Forest decreased from 62,000 acres in 1989 to 41,600 acres in 1990. Most of the susceptible host on this forest was already dead.
Western pine beetle *Dendroctonus brevicomis*	Ponderosa pine	Oregon, Washington	Tree mortality continued to increase in 1990 to 13.1 million cubic feet from 8.2 million cubic feet in 1989. Much of the increase was attributed to the continued drought.
Western spruce budworm *Choristoneura occidentalis*	Douglas-fir, Engelmann spruce, True firs, Western larch Western larch	Oregon, Washington	Regionwide visible defoliation increased. In Oregon, budworm defoliation decreased on Mt. Hood and Willamette National Forests. Budworm activity increased on all other east-side forests and Indian Reservations, except the Winema and Fremont Reservations where defoliation did not occurr. In Washington, budworm defoliation increased on the Wenatchee and Colville National Forests and Colville Indian Reservation. Defoliation decreased on the Okanogan National Forest and Yakima Indian Reservation.

Pacific Northwest Region Diseases

Prepared by Ellen Michaels Goheen

Disease	Host	Location	Remarks
Stem and Branch Diseases			
Branch cankers *Phomopsis* spp. *Sclerophoma* spp. *Dermea* spp. *Cytospora* spp.	Douglas-fir, True firs	Oregon, Washington	Top, branch, and whole tree mortality, associated primarily with drought and secondarily with complexes of canker fungi, decreased in plantations and in sapling stands. Damage was noticeable in drought-stricken southwestern Oregon. Canker fungi were associated with true fir dwarf mistletoe throughout the area.
Dwarf mistletoes *Arceuthobium* spp.	Various conifers	Oregon, Washington	In Washington and Oregon, reported dwarf mistletoe effects remained unchanged from 1989. Dwarf mistletoes were present on 9.5 million acres and caused an estimated loss of 131 million cubic feet of timber. Most of the damage occurred east of the Cascade crest. Douglas-fir dwarf mistletoe was the most damaging forest tree disease in stands east of the Cascades, infecting 42 percent of the host type.
Stem decay *Phellinus pini* *Echinodontium tinctorium* Other Basidiomycetes	Various conifers	Oregon, Washington	Stem decay fungi continued to consume enormous volumes of wood. Most losses occurred in young stands on trees with thin bark, which are susceptible to wounding during stand entries. Wounding of residule trees both activates dormant infections and creates areas where new infections can occur.
White pine blister rust *Cronartium ribicola*	Sugar pine, Western white pine	Oregon, Washington	Annual losses of western white and sugar pines from blister rust in Oregon and Washington were estimated to be 15 million cubic feet. Rust-resistant planting stock was available for regenerating stands. Approximately 1.2 million rust resistant western white pine and 105,000 rust resistant sugar pine, were planted in the area during 1990. Interest in pruning white pine stands to lessen disease effects continued to increase.

Pacific Northwest Region--Status of diseases in Oregon and Washington.

Disease	Host	Location	Remarks
Root diseases			
Root disease	Various conifers	Oregon, Washington	Root diseases were among the most serious pest problems in Oregon and Washington forests. They are difficult to control and treat. Reports of root disease incidence increased as use of stand examinations to detect root disease increased. Annual losses to root disease on land of all ownerships was estimated at over 185 million cubic feet. Tolerant, resistant, and immune tree species were planted on some affected sites to limit future losses.
Annosus root disease *Heterobasidion annosum*	True firs, Western hemlock, Ponderosa pine	Oregon, Washington	Annosus root disease was responsible for extensive loss in many partially cut white and grand fir stands in southern and eastern Oregon and eastern Washington. Mortality was high in drought-stricken areas of northeastern Oregon where annosus root disease and fir engraver beetles operated as a complex. Evidence pointed to extensive infection throughout eastern portions of the area. The severity of infection in these stands was expected to increase with time. Annosus root disease was observed with increasing frequency in ponderosa pine stands on very dry sites in eastern Washington and southeast Oregon. There was increased concern regarding the impacts of annosus root disease on mountain hemlock and Pacific silver fir in high elevation stands in the Cascades. There was increased use of borax to protect stumps from annosus root disease on susceptible conifers.
Armillaria root disease *Armillaria ostoyae*	Various conifers	Oregon, Washington	Serious losses occurred east of the Cascades in mixed-conifer stands. Ponderosa pine was seriously damaged in localized areas. West of the Cascades, losses were confined to stressed stands, such as off-site plantings. Control recommendations include planting or favoring tree species tolerant or resistant to this disease.

Pacific Northwest Region--Status of diseases in Oregon and Washington.

Disease	Host	Location	Remarks
Laminated root rot *Phellinus weirii*	Douglas-fir, Grand fir, White fir	Oregon, Washington	Laminated root rot was the most serious forest tree disease west of the Cascades in Washington and Oregon. Douglas-fir and true fir productivity was reduced 50 percent. West of the Cascade Mountains, an estimated 8 percent of the Douglas-fir and true firs were taken out of production. East of the Cascades, grand and white fir stands experienced severe damage. Tolerant, resistant, and immune species were favored or planted in an effort to suppress this disease.
Port-Orford-cedar root *Phytophthora lateralis*	Port-Orford cedar	Southwestern Oregon	Port-Orford-cedar root disease continued to caused widespread mortality of Port-Orford-cedar in southwestern Oregon.
Vascular Wilts and Declines			
Black stain root disease *Ophiostoma wageneri* (=*Ceratocystis wageneri*)	Douglas-fir	Oregon, Washington	In southwestern Oregon, black stain root disease was the most commonly encountered disease in Douglas-fir plantations. It was particularly damaging where disturbances, such as road building or soil compaction, had occurred or where roadside Douglas-fir was cut by mechanical choppers. Losses were greater on tractor-logged sites, which have greater soil compaction, than on cable-logged sites.
Foliage Diseases			
Dothistroma needle blight *Mycosphaerella pini* [*Dothistroma septospora* (=*Dothistroma pini*)] **Douglas-fir needle cast** *Rhabdocline pseudotsugae* **Elytroderma disease** *Elytroderma deformans* **Larch needle cast** *Meria laricis* **Swiss needle cast** *Phaeocryptopus gaeumannii*	Douglas-fir, Lodgepole pine, Ponderosa pine	Oregon, Washington	The incidence of several foliage diseases increased during 1990 due to favorable microclimatic conditions. Larch needle cast was prevalent throughout northeastern Washington. Swiss needle cast was common in Douglas-fir plantations in northwestern Oregon.

Pacific Northwest Region–Status of diseases in Oregon and Washington.

Disease	Host	Location	Remarks
Nursery Diseases			
Damping-off	Most conifers	Oregon, Washington	Loss of seedlings before and shortly after emergence accounted for the majority of mortality in Pacific Northwest bareroot nurseries. Losses ranged from less than 1 percent to over 20 percent in various lots. Fumigation provided the best control of damping-off.
Douglas-fir canker diseases *Phoma eupyrena* *Fusarium roseum* *Botrytis cinerea* *Phomopsis* spp.	Douglas-fir	Oregon, Washington	Damage was scattered, with less than 1 percent of the crop affected in most nurseries. Fungicide applications were helpful when cankers were above ground and not covered with soil collars.
Gray mold *Botrytis cinerea*	Douglas-fir	Oregon, Washington	Damage by gray mold was low (less than 1 percent of the crop was affected) due to applications of preventative fungicide and regulation of seedbed densities.
Fusarium root and hypocotyl rots *Fusarium oxysporum*	Various conifers	Oregon, Washington	Losses were scattered for most species; mortality was heavy in sugar pine.
Larch needle cast *Meria laricis*	Western larch	Washington	Little infection or defoliation occurred in the nurseries.
Phytophthora root rot *Phytophthora* spp.	Douglas-fir, Other conifers	Oregon, Washington	Seedbed seedling damage was confined primarily to nursery beds with poor drainage or compaction layers in the rooting zone.

Pacific Northwest Region--Status of diseases in Oregon and Washington.

Southern Region Insects

Prepared by Donna Leonard and Russell McKinney

Insect	Host	Location	Remarks
Ambrosia beetle *Xyleborus* spp.	Pines, Hardwoods	South Carolina	There was a substantial increase in activity. Several lumber mills in the Hurricane Hugo damaged area reported that beetle attacks occurred on 8" diameter to 12" diameter trees, which were stripped of bark. (Hurricane Hugo occurred in 1989.)
Balsam woolly adelgid *Adelges piceae*	Fraser fir	North Carolina, Tennessee, Virginia	Populations increased in the past year. Tree mortality continued to occur throughout the range of the Fraser fir in the southern Appalachian Mountains.
Bark lice Psocidae	Various oaks	Florida	No significant activity was reported in 1990.
Black-headed pine sawfly *Neodiprion excitans*	Southern pines	Texas	There were several localized areas of defoliation in Tyler County. Limited tree mortality was expected.
Black turpentine beetle *Dendroctonus terebrans*	Southern pines	Regionwide	Damage was moderate. Some isolated reports of tree mortality occurred in the eastern portions of North Carolina and Tennessee.
Buck moth *Hemileucia maia*	Hardwoods	Louisiana, Virginia	Moderate to severe defoliation of live and water oaks occurred on 15,000 acres in New Orleans and in 4 other parishes in Louisiana. Isolated infestations were reported in Virginia on the Delmarva Peninsula and on Shenandoah National Park.
Coneworms *Dioryctria amatella* *Dioryctria clarioralis* *Dioryctria disclusa* *Dioryctria merkeli*	Southern pines	Regionwide	Attacks that occurred late season caused extensive damage to several orchards across the South. One orchard in Georgia reported losses exceeding 50 percent of the cone crop.
Eastern tent caterpillar *Malacosoma americanum*	Various hardwoods (esp. black cherry)	Alabama, Arkansas, North Carolina, Tennessee, Virginia	Heavy defoliation occurred in western Tennessee and Arkansas. Light damage was reported in Alabama, North Carolina, and Virginia.

Southern Region--Status of insects in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the Virgin Islands

Insect	Host	Location	Remarks
Fall cankerworm *Alsophila pometaria*	Various hardwoods	Virginia	High fall cankerworm populations were reported in Grayson and Wise counties which caused moderate to severe defoliation in several areas.
Fall webworm *Hyphantria cunea*	Hardwoods and shrubs	Arkansas, Florida, North Carolina, Oklahoma, Tennessee, Texas	Light to moderate defoliation occurred in in the central and eastern portions of Tennessee. North Carolina reported scattered defoliation in the eastern and central portions of the State. Florida showed significant population levels on 4,517 acres. High populations were reported throughout Arkansas, Oklahoma, and Texas.
Forest tent caterpillar *Malacosoma disstria*	Various hardwoods	Alabama, Arkansas, Louisiana, Mississippi, North Carolina, Tennessee, Virginia	Widespread outbreaks were reported in most of eastern North Carolina with severe defoliation occurring along the Roanoke River drainage. Light, scattered defoliation was observed in Tennessee and Virginia. Severe defoliation occurred on 385,000 acres in western Mississippi and eastern Louisiana. Growth loss value was estimated at $400,000. Some defoliation was reported in the Mobile river basin in Alabama. A build-up of the forest tent caterpillar population continued in central Arkansas.
Fruittree leafroller *Archips argyrospila*	Baldcypress	Louisiana	Defoliation on 252,000 acres of baldcypress resulted in growth loss and dieback valued at $1.8 million. This damage was limited to the Atchafalaya Basin.
Gypsy moth *Lymantria dispar*	Hardwoods	North Carolina, Virginia	Defoliation occurred on 594,000 acres of host type over a 20-county area in northern Virginia and on portions of the George Washington National Forest. About 60,000 acres of the George Washington National Forest were defoliated for 2 consecutive years (1989 and 1990) which resulted in mortality of approximately 22,000 cubic fleet. The quarantined area now includes 84 of 132 independent cities and counties in Virginia and 2 northeastern counties in North Carolina.
		Regionwide	Isolated infestations were treated in North Carolina and Tennessee. Male moths were trapped in all States in this Region.

Southern Region--Status of insects in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the Virgin Islands

Insect	Host	Location	Remarks
Hemlock woolly adelgid *Adelges tsugae*	Hemlock	Virginia	Isolated severe infestations were located on the Shenandoah National Park and on northern sections of the Blue Ridge Parkway.
Introduced pine sawfly *Diprion similis*	White pine	North Carolina	Severe defoliation of white pine occurred over a large area of Jackson County. The North Carolina Forest Service and USDA Forest Service released parasites into the infested area as a possible method of biological control.
Larch sawfly *Pristiphora erichsonii*	Larch	North Carolina	No significant activity was reported in 1990.
Larger elm leaf beetle *Monocesta coryli*	Elm	Mississippi	Scattered severe defoliation occurred in the southwest counties.
Loblolly pine sawfly *Neodiprion taedae linearis*	Southern pines	Tennessee	No significant activity was reported in 1990.
Locust leafminer *Odontota dorsalis*	Black locust	North Carolina, Tennessee, Virginia	Light damage occurred in Cheatham, Coffee, and Davidson counties in Tennessee. North Carolina reported severe outbreaks in Buncombe, Madison, and Yancey counties. Widespread and unusually severe defoliation occurred in Virginia. In some cases, refoliated trees were defoliated a second time.
Nantucket pine tip moth *Rhyacionia frustrana*	Southern pines, Scotch pine	Regionwide	Moderate levels of damage were found throughout Northeast Texas, Oklahoma, and on Conservation Research Program plantations in Alabama. Damage continued on Christmas tree plantations in Oklahoma.
Oak clearwing borer *Paranthrene simulans*	Oaks	South Carolina	Public inquires and damage reports concerning this pest increased substantially. The majority of damage reports were reviewed from urban areas.
Oak skeletonizer *Bucculatrix ainsliella*	Oak	Georgia	A significant increase in defoliation was observed over a large area in northern Georgia.

Insect	Host	Location	Remarks
Orangestriped oakworm *Anisota senatoria*	Oaks	North Carolina, Tennessee, Virginia	Unusually high levels of activity were reported in the southern Appalachian Mountains. Activity in urban situations prompted many homeowner calls, but no significant damage occurred.
Pales weevil *Hylobius pales*	Pines	North Carolina, Texas, Virginia	There was heavy pine mortality in Robeson County in North Carolina. The Southern Applachian region of Virginia reported an abnormally high increase in eastern white pine mortality. Nursery stock, Christmas trees, and landscape plantings were involved. Mortality was caused by procerum root disease which is associated with high populations of pales weevil. Severe mortality occurred on 120 acres of pine seedlings in Grimes County, Texas.
Periodical cicada *Magicicada septendecim*	Various hardwoods	Tennessee	No significant activity was reported in 1990.
Phoberia moth *Phoberia atomaris*	Oaks	North Carolina	No significant activity was reported in 1990.
Pine engraver beetles *Ips avulsus* *Ips calligraphus* *Ips grandicollis*	Southern pines	Regionwide	This year saw some of the most dramatic increases in Ips (pine engraver beetle) populations on record in South Carolina, Georgia, and Alabama. No doubt Hurricane Hugo triggered many Ips infestations in the South Carolina Coastal Plain, but areas well removed from storm damage also incurred hundreds of infestations. Southern Georgia and the North Carolina Coastal Plain were especially hard hit. In the gulf States, Ips populations varied from average to high. Increased damage was reported throughout Texas, Alabama, and Mississippi. Spots ranged from a few trees to over 10 acres. Mortality was observed on plantations and in sawtimber-sized stands.
Pine needleminer *Exoteleia pinifoliella*	Southern pines	Florida	No significant activity was reported in 1990.
Pine spittlebug *Aphrophora parallela*	Pines	North Carolina, Tennessee, Virginia	A moderate amount of activity was observed throughout these States with no significant effect.

Southern Region--Status of insects in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the Virgin Islands

Insect	Host	Location	Remarks
Pine webworm *Tetralopha robustella*	Shortleaf pine	Arkansas	No significant activity was reported in 1990.
Psyllidae *Tetragonocephela flava*	Hackberry	Louisiana	Defoliation was severe. Dieback and tree mortality affected thousands of hackberry trees in 10 parish areas in southern Louisiana in 1989, and although psyllid populations have since collapsed, the dieback and mortality continued in 1990.
Redheaded pine sawfly *Neodiprion lecontei*	Shortleaf pines	North Carolina, South Carolina, Tennessee, Texas	Scattered infestations were observed in the central and eastern portions of North Carolina, but no significant damage occurred. Davidson County in Tennessee reported an increase in activity in young pine plantations. South Carolina reported an increase in activity and unusual amounts of tree mortality. Light defoliation occurred in Tyler County in east Texas.
Sand pine cone midge Unknown species	Sand pine	Florida	No significant activity was reported in 1990.
Scale insects *Homoptera*	Southern pines	Regionwide	No significant activity was reported from seed orchards during 1990.
Seedbugs *Leptoglossus corculus* *Tetyra bipunctata*	Southern pines	Regionwide	Seedbug populations on slash pines caused extensive damage in several States. On the Florida Division of Forestry orchard near Munson, populations were extremely high.
Slash pine flower thrips *Gnophothrips fuscus*	Slash pine	Florida	No significant activity was reported in 1990.
Slug oak sawfly *Caliroa* sp.	White oak	Georgia	This late season defoliator was active in portions of northern Georgia. Scattered damage occurred over many acres.

Insect	Host	Location	Remarks
Southern pine beetle *Dendroctonus frontalis*	Southern pines	Regionwide	Although southern pine beetle activity decreased dramatically in the mountains of North Carolina, Georgia, and Tennessee, significant infestations occurred in other areas. In Texas, numerous infestations developed on the Sam Houston National Forest. As expected, damage from Hurricane Hugo in 1989 prompted numerous reports of increased beetle activity in the coastal sections of South Carolina.
Texas leafcutting ant *Atta texana*	Southern pines	Louisiana, Texas	Serious losses continued on pine plantations with deep sandy soils.
Tulliptree scale *Toumeyella liriodendri*	Yellow poplar	Tennessee	No significant activity was reported in 1990.
Variable oakleaf caterpillar *Heterocampa manteo*	Various hardwoods	Oklahoma, Texas	This pest completed at least 2 complete life cycles in east Texas. Slight to complete defoliation occurred on 1.1 million acres. Activity levels remained high in eastern Oklahoma.

Number of Infestations

State	1989	1990
Alabama	862	317
Arkansas	183	115
Florida	0	2
Georgia	3,533	363
Kentucky	0	0
Louisiana	519	326
Mississippi	2,359	1,168
North Carolina	3,653	1,199
Oklahoma	0	30
South Carolina	727	18,273
Tennessee	3,179	234
Texas	6,125	4,647
Virginia	0	30
Total	21,140	26,674

Insect	Host	Location	Remarks
Virginia pine sawfly *Neodiprion pratti pratti*	Southern pines	North Carolina, Virginia	In North Carolina, scattered infestations were observed in Buncombe County, although no significant damage occurred. Virginia experienced moderate to severe defoliation from the central area of the State eastward to the coast.
Walkingstick *Diapheromera femorata*	Hackberry, Pecan	Oklahoma	North-central Oklahoma reported light defoliation. The area was 120 miles northwest of where damage historically occurred.
Whitefringed beetle *Graphognathus* spp.	Slash pine, Loblolly pine	Alabama, Florida, Georgia	Damage continued on pine seedlings in Conservation Reserve Program plantations.
White pine cone beetle *Conopthorus coniperda*	White pine	North Carolina, Tennessee	Beetle populations declined on the USDA Forest Service Beech Creek seed orchard. Populations were low on the North Carolina Forest Service orchard near Morganton. In Tennessee, populations increased in some seed orchards.
White pine weevil *Pissodes strobi*	White pine	North Carolina	No significant activity was reported in 1990.
Yellow-poplar weevil *Odontopus calceatus*	Yellow-poplar	Tennessee	No significant activity was reported in 1990.

Southern Region Diseases

Prepared by Steve Oak and Nolan Hess

Disease	Host	Location	Remarks
Stem and Branch Diseases			
Butternut canker *Sirococcus clavigignenti-juglandacearum*	Butternut	Throughout range of butternut	This disease has eliminated most of the butternut in the Southern Region.
Canker rot *Inonotus hispidus*	Oaks	Regionwide	Canker rot is a stem problem. This disease results in degrade and defect and creates hazardous trees in recreation and urban areas.
Cankers *Botryosphaeria ribis*	Redbud	Virginia	Severe and widespread damage was reported in urban and forested areas of Virginia and some tree mortality occurred.
Chestnut blight *Cryphonectria parasitica* (=*Endothia parasitica*)	Exotic chestnuts, Native chestnuts, Scarlet oak	Throughout host ranges	Large chestnuts have been eliminated. Damage to sprouts continued. In some geographic areas, butt swell and rot resulted on scarlet oak.
Comandra blister rust *Cronartium comandrae*	Shortleaf pine	Arkansas	No significant activity was reported in 1990.
Fusiform rust *Cronartium quercuum* f. sp. *fusiforme*	Loblolly pine, Slash pine	Regionwide, except Kentucky, Puerto Rico, Tennessee, U.S. Virgin Islands	This continued to be the most serious disease of southern pines. About 17 million acres were affected at a 10 percent or greater incidence level. Annual economic losses in the South have been estimated at over $53 million.
Hypoxylon canker *Hypoxylon atropunctatum*	Hickory, Oak	Regionwide	This disease has commonly occurred on dead and dying trees weakened by drought or other agents in forest and urban environments. Regional and local droughts in the 1980's have increased incidence of this disease.

Southern Region--Status of diseases in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the Virgin Islands

Disease	Host	Location	Remarks
Leyland cypress canker *Seiridium cardinale*	Leyland cypress	South Carolina	No significant activity was reported in 1990.
Pitch canker *Fusarium subglutinans*	Southern pines, especially Loblolly and Slash pines	Alabama, Arkansas, Florida, Louisiana, Mississippi, North Carolina	Pitch canker was widespread but not severe in slash, loblolly, and shortleaf pine plantations. Damage to urban trees was occasionally reported. (See Seed Orchard Diseases and Nursery Diseases.)
Slime flux *Erwinia* spp. *Clostridium* spp. and other bacteria	Oak, Maple, Other hardwoods	Regionwide	Infections were common in Davidson County, Tennessee, and in urban areas where construction damage had created numerous wounds.
Stem canker *Fusarium* spp.	Mahoe	Puerto Rico	No significant activity was reported in 1990.
Stem decay Basidiomycetes	All species, especially Hardwoods	Regionwide	Stem decay continued to be a serious problem. This disease was common in stands damaged by fire, storms, and logging.
Phellinus pini	Southern pines	Regionwide	This disease is an important heart rot in nesting habitat for the endangered red-cockaded woodpecker. It is more prevalent in older stands.
Twig canker *Sphaeropsis sapinea* (= *Diplodia pinea*)	Austrian pine, Spruce pine, Ponderosa pine	Florida, Oklahoma	No significant activity was reported in 1990.
White pine blister rust *Cronartium ribicola*	Eastern white pine	North Carolina, Virginia	This disease is found above 3,000 feet elevation, but was serious only in localized areas.

Root Diseases

Annosus root disease *Heterobasidion annosum*	Eastern white pine, Southern pines	Regionwide	Annosus root disease continued to be the most serious root disease in the South. Southern pine beetle and black turpentine beetle infestations were frequent in infected white pine plantations in western North Carolina. The disease also resulted in hazardous trees in recreation areas in western North Carolina and northern Georgia.

Disease	Host	Location	Remarks
Littleleaf disease *Phytophthora cinnamomi* and *Pythium* spp.	Loblolly pine, Shortleaf pine	Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee	High incidence occurred in the Piedmont in natural and planted stands growing on poorly-drained, eroded, heavy clay soils.
Procerum root disease *Leptographium procera*	Loblolly pine, Eastern white pine	Alabama, Florida, Georgia, North Carolina, Tennessee, Virginia	This disease reached epidemic levels in Virginia Christmas tree plantations and may be insect vectored by pales weevil.
Root decay *Armillaria* spp. *Inonotus circinatus* *Phaeolus schweinitzii* *Ganoderma lucidum*	Most conifers, Hardwoods	Regionwide	Root decay was common in forest stands and urban environments, especially where stresses were severe, trees overmature, or root systems damaged. Hazardous trees were created in recreation areas in western North Carolina and northern Georgia.
Sand pine root disease *Root pathogen complex*	Sand pine	Florida	Plantations composed of the Choctawhatchee variety in the western panhandle of Florida suffered major mortality losses.

Foliage Diseases

Anthracnose *Gnomonia* sp. *Kabatiella* sp. (= *Gloeosporium* sp.) *Apiognomonia* sp. (=*Gnomonia* sp.)	Hardwoods, especially Ash, Maple, Sycamore, Walnut	Regionwide	Incidence was lower in most areas in 1990 due to a drier spring.
Brown spot *Mycosphaerella dearnessii* (=*Scirrhia acicola*)	Longleaf pine	Throughout longleaf range, esp. Gulf Coast region	This disease was locally severe in regeneration areas. The disease can be controlled by using prescribed fire and fungicidal root dips or by planting genetically resistant stock.
Dogwood anthracnose *Discula* sp.	Flowering dogwood	Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia	This disease has now been found in 120 counties in the mountains and Piedmont, an increase of 33 percent over 1989. The disease caused premature defoliation and tree death and was more severe at higher elevations.

Disease	Host	Location	Remarks
Needle casts of pine *Lophodermium* spp. *Ploioderma* spp.	Pines	Regionwide	Several States reported an increase in needle cast diseases. In Florida, needle casts caused severe damage to Christmas tree plantations. Several counties in North Carolina and Tennessee reported high incidence in young pine plantations.
Oak leaf blister *Taphrina caerulescens*	Red oaks	Alabama, Arkansas, Louisiana, Mississippi, Oklahoma, Texas	The disease was scattered but not severe, and was unsightly on urban trees.
Pine needle rust *Coleosporium* spp.	Pines	Regionwide	No significant activity was reported in 1990.
Powdery mildew *Uncinula macrospora* *Microsphaera* sp.	Elm, Oak	Regionwide	Elm seedlings and saplings were affected in central and western Tennessee.

Vascular Wilts and Declines

Dutch elm disease *Ceratocystis ulmi*	Elms	Throughout host range	This disease continued at endemic levels levels in 1990.
Mimosa wilt *Fusarium oxysporum* f. sp. *perniciosum*	Mimosa	Throughout host range	No significant activity was reported in 1990.
Oak decline/mortality Complex	Oaks, esp. the Red oak group	Regionwide	Decline and mortality were widely reported in the 1980's. Mortality was more frequent on or near ridges with shallow, rocky soils. Monitoring of affected stands during 1990 showed that decline intensified and spread, despite the return of more favorable growing conditions in the late 1980's. Incidence and severity of this disease may increase in stands that have been defoliated by the gypsy moth.

Disease	Host	Location	Remarks
Oak wilt *Ceratocystis fagacearum*	Oaks	Arkansas, Kentucky, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia	Oak wilt continued to cause significant tree mortality in central Texas between San Antonio and Dallas/Fort Worth. In 1990, the number of infested counties in Texas increased to 46. The Texas Forest Service continued a cooperative suppression project to combat the problem in selected counties. Trenching to sever connecting root systems was the most commonly applied control strategy. A therapeutic fungicide injection treatment became available in 1990.
Spruce-fir decline and mortality	Fraser fir, Red spruce	North Carolina, Tennessee, Virginia	The balsam woolly adelgid has been killing Fraser fir since it was introduced into spruce-fir areas more than 25 years ago. Atmospheric deposition has been implicated as a contributing factor to current decline, but this has not yet been proven.
Nursery Diseases			
Anthracnose *Colletotrichum* sp.	Russian olive	Texas	No significant activity was reported in 1990.
Damping-off *Fusarium* spp. *Cylindrocladium* spp. *Phytophthora* spp. *Pythium* spp. *Rhizoctonia* spp.	Many Conifers and Hardwoods	Regionwide	Chronic losses were typified by reduced and irregular density in the seedbeds. Damping-off is retarded by pre- and post- plant fungicide drenches. Mississippi reported losses of Shumard oak to *Pythium* spp. and *Rhizoctonia* spp.
Fusiform rust *Cronartium quercuum* f. sp. *fusiforme*	Loblolly pine, Longleaf pine, Slash pine	Regionwide	In nurseries, excellent control was achieved with applications of systemic fungicides to seed and foliage.
Pitch canker *Fusarium subglutinans*	Shortleaf pine	North Carolina, South Carolina	Damage to seed orchards by Hurricane Hugo and high mortality in containerized progeny test seedlings reduced the genetic material available.
Rhizoctonia needle blight *Rhizoctonia* spp.	Longleaf pine	Alabama, Louisiana, Mississippi	Forest nurseries in Alabama suffered a loss of 850,000 seedlings.

Southern Region--Status of diseases in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the Virgin Islands

Disease	Host	Location	Remarks
Root rot *Fusarium* spp., *Macrophomina phaseolina*, *Phytophthora* spp., *Pythium* spp.	Eastern white pine, Loblolly pine, Slash pine, Virginia pine	Regionwide	Root rots continued to be a chronic problem in environments where seedlings were under stress from excessive or inadequate moisture or because of poor soil conditions. Florida reported occasional planting failures on former agricultural fields due to root rot.
Tip blight *Phoma* sp.	Loblolly pine, Longleaf pine	Regionwide	Nurseries in Mississippi and Alabama were damaged. Fungicide drenches were effective in reducing symptoms.

Seed Orchard Diseases

Canker diseases *Lasiodiplodia* sp. Unidentified fungi	Northern red oak	Tennessee	Branch dieback and some mortality resulted from canker diseases with complex cause. Drought, scale infestation, and ambrosia beetle attack were possible contributing factors.
Cone damage *Lasiodiplodia* sp.	Eastern white pine	North Carolina	No significant activity was reported in 1990.
Pitch canker *Fusarium subglutinans*	Southern pines, esp. Slash and Loblolly pines	Regionwide	Pitch canker was epidemic in a North Carolina shortleaf pine orchard. Hurricane Hugo damage and lack of insect control were factors. Seed-borne pitch canker resulted in the loss of some root stock intended for second generation orchards in South Carolina.
Root diseases *Armillaria* spp. *Armillaria tabescens* (=*Clitocybe tabescens*) *Heterobasidion annosum* *Inonotus circinatus* *Verticicladiella procera*	Eastern white pine, Shortleaf pine	North Carolina, South Carolina	No significant activity was reported in 1990.

Southern Region--Status of diseases in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the Virgin Islands

Disease	Host	Location	Remarks
Seed fungi *Lasiodiplodia* sp. Unidentified fungi	Northern red oak	Tennessee	Several fungi were associated with diseased acorns in one of the first crops from a 20-year-old seedling seed orchard. Insect damage was coincident on some diseased acorns.
Abiotic			
Animal	Pines	North Carolina, Tennessee	No significant activity was reported in 1990.
Atmospheric deposition symptoms	Bioindicators such as Ash, Blackberry, Eastern white pine, Sweetgum, Yellow-poplar	Georgia, North Carolina, South Carolina Virginia	No significant activity was reported in 1990, except tipburn, which was associated with ozone and was observed in some families in an eastern white pine progeny test. Indicator plants were used to assess ozone levels in wilderness areas.
Drought	Oak, Hickory	Tennessee, North Carolina	Marginal leaf scorch was observed on the Cumberland Plateau and in the mountains on shallow soils.
Frost	Various	North Carolina, Tennessee	No significant activity was reported in 1990.
Wind	Various	North Carolina, Puerto Rico, Texas, Virginia	No significant activity was reported in 1990.

Southern Region--Status of diseases in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the Virgin Islands

Eastern Region / Northeastern Area Insects

Prepared by Charles L. Hatch

Insect	Host	Location	Remarks
Aphids *Periphyllus spp.*	Sugar maple	Vermont	The decreasing population trend continued. No aphids were detected in the northern part of the State.
Balsam gall midge *Paradiplosis tumifex*	Balsam fir	Maine, Vermont	In Maine, moderate to heavy defoliation occurred statewide on 3,000 acres. Damage in Vermont was light and scattered on Christmas tree plantations and forest stands throughout the southern region.
Balsam twig aphid *Mindarus abietinus*	Balsam fir	Maine, Vermont	In Maine, moderate to heavy defoliation occurred on 1,000 acres. In Vermont, populations were widespread in the south. Control programs were carried out in both States.
Balsam woolly adelgid *Adelges piceae*	Balsam fir	Maine, Vermont	This insect was found throughout most of central and southern Maine. Populations remained at 1989 levels over 200-500 acres in Penobscot County.
Basswood thrips *Thrips calcaratus*	Basswood	Minnesota, Wisconsin	There was evidence of tree decline and scattered tree mortality in Minnesota. One pocket of heavy defoliation was reported in northwestern Wisconsin. Damage appeared to be declining in both States.
Birch casebearer *Coleophora serratella*	White birch	Maine	Scattered defoliation continued in the northern two-thirds of the State. Populations were stable and endemic.
Birch leafminer *Fenusa pusilla*	Gray birch, Paper birch, Yellow birch	Maine, Vermont	Levels remained low in 1990. Scattered damage was reported throughout southern Vermont. No significant activity was reported in Maine.
Browntail moth *Euproctis chrysorrhoea*	Cherry, Oaks, Roses, *Rubus*, Willow	Maine, Massachusetts	The area of infestation spread to the mainland. More than 40 acres are infested on offshore islands. An unknown number of acres are infested in several coastal Maine towns and in the Cape Cod area of Massachusetts. Severe defoliation was reported on approximately 3 acres of Long Island, Maine. Population levels on the Cape appeared stable. Population levels in Maine intensified.

Eastern Region and Northeastern Area--Status of insects in Connecticut, Delaware, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin

Insect	Host	Location	Remarks
Bruce spanworm *Operophtera bruceata*	Sugar maple	Maine, New Jersey, Pennsylvania, Vermont	Moderate localized defoliation was observed in southern Vermont and none was observed in Maine. Population levels were reported at low endemic levels.
			No significant activity was reported during 1990 in New Jersey and Pennsylvania.
Conifer sawflies *Neodiprion spp.*	Loblolly pine, Scotch pine, White pine	Delaware	Spotty, sporadic infections occurred on 600 acres of loblolly, white and scotch pine in Delaware. Naturally occurring parasites appeared to keep populations in check.
		Maryland	In Maryland, a few loblolly pine stands were noticeably infested with the spotted loblolly pine sawfly and related species.
		New Jersey	The European pine sawfly was on the increase in New Jersey.
		West Virginia	Sawflies, including the white pine sawfly, redheaded pine sawfly, European sawfly, and Virginia pine sawfly were observed, but little or no damage was reported in West Virginia.
Eastern tent caterpillar *Malacosoma americanum*	Apple, Ash, Black cherry, Maple, Oak, Poplar	Delaware	Numerous spot infestations of moderate to heavy defoliation on wild cherry occurred statewide in Delaware.
		Massachusetts, Vermont	Scattered infestations occurred statewide in Massachusetts. The pest had a more noticeable presence in Berkshire and Middlesex Counties. Occurrence was widespread throughout Vermont. Populations continued to decrease from 1988 levels.
		Michigan, Missouri	Over 3 million acres of black cherry were defoliated across southern Missouri. No change was reported from Michigan.
Elm leaf beetle *Pyrrhalta luteola*	Elm	Vermont	Scattered light defoliation was observed in northern Vermont. Adult beetles were found in the Rutland area.

Insect	Host	Location	Remarks
European pine sawfly *Neodiprion sertifer*	Red pine, Pitch pine, Scotch pine, Shortleaf pine	Indiana, Iowa, Vermont, Wisconsin	In southern Vermont, the pine sawfly was present on Christmas tree plantations. In Indiana, moderate to heavy defoliation was reported on approximately 100 acres of Christmas tree plantations. Iowa reported 2,100 infested acres. There was widespread damage to windbreak and ornamental trees in southern Wisconsin.
Evergreen bagworm *Thyridopteryx ephemeraeformis*	Evergreens, Locust, Maple, White pine	Illinois	White pine seed orchard trees on the Shawnee Natinal Forest were moderately infested.
Fall cankerworm *Alsophila pometaria*	Ash, Beech, Cherry, Hickory, Maple, Oak, Yellow birch	Minnesota	Localized outbreaks were found in Minnesota. The city of Moorhead was sprayed with *Bacillus thuringiensis* (B.t.) to control an outbreak.
		Maine, Massachusetts, Vermont	Massachusetts reported a reduction in defoliation levels from 2,000 acres in 1989 to 800 acres in 1990. Populations in Vermont and Maine remained endemic.
Fall hardwood defoliator complex (Hardwood defoliating species)	Beech, Birch, Maple, Other hardwoods	Maine	This complex of more than 25 pest species declined sharply in intensity in 1990. Most damage was attributable to the variable oak leaf caterpillar with 14,000 ares of moderate to heavy defoliation, primarily in eastern areas. Spotty light defoliation on 100,000 acres, mostly on understory beech. Mapleworm populations declined to negligible levels. The birch sawfly and pale tussock moth were abundant. Damage from these 2 species was minimal.
Fall webworm *Hyphantria cunea*	Various hardwoods	Maine, Massachusetts, Missouri, Vermont	Webworm populations in Maine were heavy 3 years in a row. The highest concentrations were in the central and southwestern sections of the State of Maine. Damage was primarily aesthetic. This pest was observed throughout most of Vermont and was more noticeable in the northern areas than in past years. The webworm was prevalent throughout Middlesex and southern Worcester Counties in Massachusetts. Missouri had over 2 million acres defoliated for the second year.

Insect	Host	Location	Remarks
Forest tent caterpillar *Malacosoma disstria*	Aspen, Basswood, Black cherry, Maple, Oak, Poplar, White birch	Maine, New York, Vermont	Low populations were reported in Maine and Vermont. Only scattered individual pests were observed. Levels in Maine were stable and levels in Vermont decreased. Low populations were reported in New York. The 1989 populations were destroyed by disease and pupal parasitism.
		Indiana	Some light defoliation was reported.
		Michigan	The population decreased. About 1.3 million acres were defoliated. In the Upper Peninsula 3 years of heavy defoliation have stressed the aspen.
		Minnesota	Approximately 4.3 million acres were defoliated. Defoliation, plus recent drought, caused large scale oak mortality in the State.
		Wisconsin	The population level decreased. In 1990, 591,332 acres were defoliated. The Menominee Indian Reservation treated 17,000 acres.
Gypsy moth *Lymantria dispar*	Oak, Other hardwoods	Connecticut	Connecticut reported 3,790 acres of defoliation, predominately in the western half of the State.
		Delaware	In Delaware, 176,576 acres of oaks were defoliated, nearly all of which were outside the 57,718 acres sprayed in 1990. Populations showed a resurgence in several areas quiescent for several years. The pests were migrating into southern parts of the State.
		New Hampshire, Vermont	Populations continued to expand in Vermont and New Hampshire with heavy to moderate defoliation. The fungal pathogen, *Entomophaga maimaiga*, caused widespread larval mortality and may be responsible for bringing the outbreak to a premature collapse.
		Illinois, Minnesota, Wisconsin	Illinois, Minnesota, and Wisconsin conducted eradication projects in 1990.
		Iowa, Missouri	Iowa and Missouri reported low level moth catches.

Insect	Host	Location	Remarks
Gypsy moth (continued)			
		Maine	In Maine, defoliation increased from 34,000 acres in 1989 to 270,433 acres in 1990. Defoliation was moderate to severe on 83 percent of the acreage. Tree mortality was light, but loss of regeneration and degradation of hardwood was significant.
		Maryland	In Maryland, 133,062 acres of oak forests were defoliated at moderate and severe intensities and 187,723 acres were sprayed in 1990. A tree mortality survey of acres defoliated in 1988 indicated 56 million board feet of sawtimber and 129 thousand cords of pulpwood existed as standing dead timber. Populations increased in the western and southern counties of the State.
		Massachusetts	The area of defoliation in Massachusetts increased dramatically from 6,600 acres to 83,595 acres.
		Michigan	Rapid expansion was recorded in Michigan where 358,338 acres were defoliated.
		New Jersey	In New Jersey, 56,661 acres were defoliated on State foreest and park system lands. On land of other ownerships, 431,235 acres were defoliated (mostly concentrated in northwestern counties. This represented a three-fold increase since 1989. Populations in the southern counties increased.
		New York	New York reported 354,162 acres defoliated. This was the only State that reported a decrease from 1989.

Insect	Host	Location	Remarks
Gypsy moth (continued)			
		Pennsylvania	In Pennsylvania, defoliation exceeded the previous 5-year total. Moderate to severe defoliation occurred on 4.4 million acres of oak forest. Sustained high winds from early April to late May contributed to a redistribution of larvae in areas of the State that expected to have low population levels. This compromised the effectiveness of *Bacillus thuringiensis* (B.t.) suppression efforts, whereas Dimilin generally was quite effective. The virtually total collapse of outbreaks in many eastern areas of the State was attributed to the fungus *Entomophaga maimaiga*. Nucleopolyhedrosis virus was the apparent cause of population collapse in other eastern areas of the State. No visible defoliation was evident on the Allegheny National Forest lands for the first time since 1984, but populations were increasing in northwestern Pennsylvania.
		Rhode Island	Rhode Island reported continued low level populations statewide.
		West Virginia	About 338,746 acres of State and private forested land were defoliated in West Virginia in 1990. For the first time, moderate to severe defoliation affected 200 forested acres along the northern limits of the Monongahela National Forest lands. Outside of the Appalachian Integrated Pest Management area, 78,675 acres of State and private lands were treated with Dimilin. Inside of Appalachian Integrated Pest Management, there were 212,679 acres treated with Dimilin and 70,623 acres with *Bacillus thuringiensis* (B.t.).
Hemlock looper *Lambdina spp.*	Various softwoods and hardwoods	Maine, Vermont	The infestation in Maine expanded and intensified in 1990 and caused heavy defoliation on 20,000 acres. Light to moderate defoliation was observed on 80,000 acres throughout Maine. Localized defoliation was observed on 5 to 10 acres in southern Vermont.

Insect	Host	Location	Remarks
Hemlock woolly adelgid *Adelges tsugae*	Hemlock	Connecticut, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont	The insect was introduced to Vermont in 1990 on tublings, which were planted in May and July. Some of the seedlings died, and over half were pulled and destroyed. The chance for eradication was good. The 1989 infestation in the Springfield, Massachusetts, area did not spread, but the insect was identified at another location in Waltham. New infestations were located in Kent and Washington Counties in Rhode Island. This is the third year of infestation. No evidence of infestation was found in New Hampshire in 1990. Nursery stock was also checked. In New York, a rapid increase in infested acreage was reported. Heavy mortality occurred in southeastern areas. In the northern two-thirds of New Jersey, 26,000 acres of hemlock were seriously threatened. Monitoring was planned.
Jack pine budworm *Choristoneura pinus pinus*	Jack pine	Michigan	Expanding population centers of approximately 25,000 acres each were reported in both the Upper and Lower Peninsulas of Michigan.
Locust leafminer *Odontata dorsalis*	Locust	West Virginia	This pest was prevalent in northern and eastern parts of the State.
		Maryland	Widespread defoliation occurred in northwestern portions of the State.
Maple leafroller *Sparganothis acersvorana*	Red maple	Maine	Light to moderate defoliation occurred on 20,000 to 30,000 acres of Hancock County. Severity decreased from 1989 levels, but there was some expansion of the infested area.

Insect	Host	Location	Remarks
Maple trumpet skeletonizer *Epinotia aceriella*	Sugar maple	Vermont	Occurrence was heavy in scattered locations indicating an increase in population levels over the last 2 years. This insect contributed to widespread browning of foliage on 3,100 acres in Windsor County.
Nantucket pine tip moth *Rhyacionia frustrana*	Pines	Massachusetts	This insect occurs annually on Cape Cod, where it is particularly destructive to young trees. Population levels remained stable.
Oak leaftier *Croesia semipurpurana*	Oak	Massachusetts, New Hampshire, Vermont	The small outbreak continued in the Massachusetts Counties of Bristol, Norfolk, and Franklin with limited damage and no acceleration in mortality. In New Hampshire, the pest appeared to decline. Damage occurred on 16,160 acres in the southwestern part of the State. Oak leaftier did not cause any damage in Vermont. Minimal numbers of moths were collected in pheromone traps.
Orangestriped oakworm *Anisota senatoria*	Various oaks	Rhode Island	Moderate defoliation occurred on 100 acres in the area of Scituate. Previously heavy populations appear to be declining.
Oystershell scale *Lepidosaphes ulmi*	Beech, Maple, Poplar	Vermont	Noticeable damage was mapped in the area of Wilmington. Pest activity decreased from 1989.
Pales weevil *Hylobius pales*	Red pine, Scots pine	Maine, Vermont	The insect was observed in a localized area in central Maine. Damage was severe on 10 acres. Vermont reported light to moderate damage on 170 acres of Christmas trees in the northern area. Damage levels in 1990 were about the same as 1989. No observations were made in the southern part of the State.

Insect	Host	Location	Remarks
Pear thrips *Taeniothrips inconsequens*	Sugar maple	Iowa, Michigan, Wisconsin	Low level populations were found on sugar maples throughout Wisconsin and neighboring counties in Iowa and Michigan.
		Maryland	Thrips were found in soil samples from Garrett and Allegany Counties, but no damage symptoms were observed on maples.
		Maine, New York, Rhode Island, Vermont	Individual trees were found with moderate numbers of thrips, but very light injury was observed in southwestern Maine. The population remained at low endemic levels. Pear thrips caused increased damage in 1990 in Vermont. The area of defoliation in northern sections was 26,773 acres compared to 3,170 acres in 1989. Damage was moderate and widespread in Windsor County. Some damage occurred in Windham and Rutland Counties. Approximately 50 acres were affected in Rhode Island where infestation grew. In New York, damage was light throughout the State; population declined.
		Pennsylvania	Moderate leaf damage occurred to sugar maple trees on 186,000 acres in northcentral counties. Adult thrip population levels were monitored on the Allegheny National Forest as part of a multi-state survey to see if damage symptoms on sugar maple trees correlated directly with thrips population levels.
		West Virginia	Thrips were found in soil samples in Randolph County, but no damage symptoms were observed on the maples.
Pine false webworm *Acantholyda erythrocephala*	Various pines	New York	The population increased at an accelerating rate. Combined heavy and moderate damage occurred on 4,400 acres in the northwestern Adirondacks.
Pine needleminer *Exoteleia pinifoliella*	Pitch pine	Massachusetts	Heavy defoliation was reported in localized areas in Plymouth and Barnstable Counties. The population was stable and caused varying degrees of defoliation.
Red pine scale *Matsucoccus resinosae*	Red pine	New York, Rhode Island	Red pine scale caused mortality in southeastern New York, although the population declined due to decreasing numbers of red pine. Heavy defoliation occurred on 120 acres in Rhode Island. Populations increased.

Insect	Host	Location	Remarks
Saddled prominent *Heterocampa guttivitta*	Sugar maple, Other hardwoods	Massachusetts, New York, Vermont	Significant damage was noted in western Massachusetts. The population collapsed before severe defoliation occurred. A fungus is thought to be responsible for the collapse. In New York, moderate damage was reported on 100,000 acres, primarily in Delaware County. Populations showed a decline in 1990 after the explosive buildup and collapse in 1989. Population levels increased in Vermont where 2,800 acres were defoliated. Larval activity was heavy in scattered locations throughout the southern part of the State. Pupal surveys uncovered few insects in the soil indicating decreasing future trends.
Spruce beetle *Dendroctonus rufipennis*	Black spruce, Red spruce, White spruce	Maine	The spruce beetle is now found throughout the northern half of Maine with 9,000 acres of heavy infestation. Mortality occurred in over half of the larger trees. Populations increased in intensity since 1985 and may have peaked in some stands.
Spruce budworm *Choristoneura fumiferana*	Balsam fir, Red spruce, White spruce	Maine, Vermont	In Vermont, populations remained at low levels in 1990, with no visible defoliation. The decline continued in Maine, with the last outbreak in the southeastern area showing a collapse. Populations throughout the State appeared to be at endemic levels.
		Minnesota	In Cook, St. Louis, and Lake Counties, declining population defoliated 198,000 acres in 1990. Tree mortality was heavy in parts of Cook County.
Two-lined chestnut borer *Agrilus bilineatus*	Oaks	Michigan	There was widespread damage across all of Michigan. Damage was heavy in central lower Peninsula, where 28,800 acres of pin oak died that were worth an estimated $4 million. A 10,000 acre area in Menominee County had heavy mortality. These areas suffered severe drought and defoliation in the late 1980's.
		Minnesota	Unprecedented oak mortality occurred across the central portions of the State. Drought and defoliation combined to severly stress oaks.
		Wisconsin	Heavy mortality occurred in northwestern and northeastern portions of the State.

Insect	Host	Location	Remarks
Variable oak leaf caterpillar *Heterocampa manteo*		West Virginia	This pest was extremely abundant during September in Pocahontas County.
Walnut caterpillar *Datana integerrima*	Hickory, Walnut	Missouri	Approximately 1.5 million acres was defoliated in late summer. Damage increased dramatically from 1989.
White pine weevil *Pissodes strobi*	Blue spruce, Jack pine, Norway spruce, Red spruce, Scotch pine, White pine, White spruce	Maine, Vermont	Statewide damage occurred in Maine, with 418,900 acres affected. Reduction in tree growth was significant. The pest occurred at decreased levels in northern Vermont but continued to cause widespread terminal shoot mortality in southern sections of the State.
		Michigan, Wisconsin	Reports of damage to jack pine were common. Damage to white pine was common, especially to open-grown trees.
Yellowheaded spruce sawfly *Pikonema alaskensis*	Spruce	Vermont	An increase in occurrence was reported in northern areas of Vermont. Population levels increased in most locations, except one plantation which showed a decrease in damage from 1988.
		Michigan	Infestations were found in the western portions of the Upper Peninsula. Ornamental spruce and Christmas trees were defoliated, and tree mortality was reported.

Eastern Region / Northeastern Area Diseases

Prepared by Charles L. Hatch

Disease	Host	Location	Remarks
Stem and Branch Diseases			
Annosus Root Rot	Norway spruce, Red pine, White pine	Maine	This disease caused light to moderate damage. The occurrence of infections is gradually increasing.
Beech bark disease *Nectria coccinea* var. *faginata* in association with **Beech scale** *Cryptococcus fagisuga*	American beech	Maine, Vermont	Damage from this disease was statewide in Maine. The frequency of American beech with beech scale and heavy fruiting of *nectria coccinea* increased. In Vermont, this disease appeared to increase in the northern areas. Tree mortality and decline was reported on 1,691 acres. In southern Vermont, damage caused scattered dieback and chlorosis.
		Pennsylvania, West Virginia	Beech scale infections increased. Tree mortality increased. Surveys in the Allegheny National Forest estimated that 80 percent of the beech trees were affected at the leading edge of the infected area.
Caliciopsis canker *Caliciopsis pinea*	White pine	Vermont	This disease occurred throughout southern Vermont on stressed trees in overstocked stands, poor sites, and poor growing conditions.
Cytospora canker *Valsa kunzei* (=*Cytospora kunzei*)	Blue spruce, Norway spruce, Red spruce	Vermont	This disease occurred in southern areas, but reports were fewer than in previous years.
		West Virginia	This disease infected ornamental and red spruce in high elevations.

Disease	Host	Location	Remarks
Diplodia tip blight *Sphaeropsis sapinea* (=*Diplodia pinea*)	Austrian pine, Red pine, Scotch pine	Massachusetts, Vermont	In a localized area in northern Vermont, damage was severe on ornamentals. Damage occurred on a plantation in the South. Overall, occurrence of this disease appeared to decline in the State. For several years, the disease was prevalent on the island of Martha's Vineyard in Massachusetts. High tree mortality was reported.
		Minnesota	On 6 red pine plantations, incidence was light. Drought effects will likely contribute to increased incidence and severity of this disease.
		Wisconsin	One 120-acre red pine plantation in Douglas County had a 62 percent infection rate.
		Indiana, New Jersey, Pennsylvania, West Virginia	The disease mainly infected ornamental and Chirstmas trees.
Dogwood anthracnose *Discula sp.*	Dogwood	Connecticut, Delaware, Massachusetts, Maryland, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, West Virginia	The fungus was confirmed in 128 counties in the northeastern States. In Maryland, the disease was found more frequently on ornamentals than forest trees. Patches of dogwood mortality can be seen in the mountainous areas of Maryland and West Virginia. The incidence of the disease was greater in eastern West Virginia than in the western portion of the State.
European larch canker *Lachnellula willkommii*	Eastern larch	Maine	No increases were reported in 1990. The affected area, approximately 6,500 acres, remained relatively unchanged. Occurrence was light to moderate except for 2 coastal areas with heavy infection.
Hypoxylon canker *Hypoxylon atropunctatum*	Aspen, Oaks	Vermont	Heavy damage was reported in 2 towns in southern Vermont. Occurrence was common throughout the northern areas.

Disease	Host	Location	Remarks
Scleroderris canker *Ascocalyx abietina* (=*Gremmeniella abietina*)	Jack pine, Red pine, Scotch pine	Maine, Vermont	In Vermont, this disease was not found in any new locations for the fourth consecutive year. About 992 acres were infected in the northern part of the State. Static levels were reported in Maine.
		Michigan	There were few scattered pockets of flagging branches in Michigan's Upper Peninsula.
White pine blister rust *Cronartium ribicola*	White pine	Maine, Vermont	The disease occurred statewide in Maine. Annual economic losses continued at about $100,000. Scattered localized mortality was reported in Westminster, Vermont. The disease occurred throughout the southern area.
		Michigan, Minnesota, Wisconsin	This disease continued to be a problem, especially in open-grown plantations established in high hazard zones.

Foliage Diseases

Anthracnose *Gloeosporium spp.* *Discula spp.* *Apiognomonia veneta* *Gnomonia spp.*	Maple, Sycamore, Other Hardwoods	Vermont	Anthracnose affected several hardwood tree species. It was widespread in Vermont in 1990, where about 5,080 acres of sugar maple were infected statewide. This was an increase over 1989 levels. Damage was most extensive in mid-August. In the Connecticut River Valley, the infection occurred on oak in June. Trees exhibited various levels of browning but refoliated by mid-July.
		Massachusetts, Rhode Island	Complete defoliation and scattered shoot mortality were widespread on sycamore, particularly in Massachusetts which reported severe defoliation on sycamore in 1990. Moderate infection of oak and maple occurred statewide in Rhode Island, showing an increase over 1989.
		New York	In New York, infection caused complete defoliation of sycamore. The past 2 years had the highest infection rate in 25 years. This was probably due to the wet spring and summer seasons.

Disease	Host	Location	Remarks
Anthracnose (continued)		Delaware, Indiana, Missouri, New Jersey, Pennsylvania, West Virginia	Sycamore anthracnose was throughout Missouri. Severe bud and shoot infection caused 75 to 95 percent reduction of spring crown foliation. Cool, wet springs proveded favorable conditions for the anthracnose fungi in the east and mid-western States. Defoliation occurred on sycamores, oaks, and other hardwoods.
Ash rust *Puccinia sparganiodes*	Ash	Delaware	About 300 acres of ash had moderate to heavy defoliation as a result of wet spring seasons in the past 2 years.
Oak leaf scorch *Xylemella fastidiosum*	Red oak	Delaware	Some oaks had moderate levels of damage from this bacterium. This disease was first discovered in Delaware in the mid-1980's.
Vascular Wilts and Declines			
Ash yellows (Ash dieback)	Black ash, Blue ash, Brown ash, Green ash, White ash	Maine, Massachusetts, New York, Vermont	Maine reported 1,500 acres affected in Aroostook County, particularly along streams and wet areas. In Vermont, mortality continued at steady levels. Damage in New York ranged from light to complete stand mortality and was expected to continue at high levels. Ash mortality was noticeable in urban and rural forests throughout Massachusetts.
		Illinois, Iowa, Missouri	This disease was found throughout Illinois and Iowa. In Missouri, the disease occurred in white and green ash where 85 percent of the stands had a least one infected tree.
		Indiana, Ohio, Pennsylvania, Wisconsin	This disease was reported in 2 locations in southeastern Wisconsin. Ash yellows was reported in new locations. Indiana had over 300,000 acres of forests where ash were declining and dying; about 10 to 15 percent of these trees had ash yellows. A non-yellows form of ash decline persisted in Pennsylvania. White ash died in some forested areas.

Disease	Host	Location	Remarks
Birch dieback	White birch, Yellow birch	Maine, Vermont	In Maine, dieback continued on 34,300 acres in and around the town of Rangeley and on 49,400 acres in Washington County. Birch decline was noticeable at upper elevations in Windsor County.
		Michigan, Wisconsin	Dieback was reported in white birch across northern Wisconsin and the Upper Peninsula of Michigan, a result of the drought in the late 1990's. Many trees were infested with bronze birch borer.
Dutch elm disease *Ceratocystis ulmi*	American elm	Vermont	The disease was common throughout the State.
		Wisconsin Area wide	Mortality continued to the few street and city trees remaining. The disease continued to kill American elms throughout the northeast.
Larch decline	Eastern larch	Vermont	Decline was observed in stands in which previous mortality had occurred.
Maple decline	Red maple, Sugar maple	Maine, Massachusetts, Vermont	Maple decline was a concern throughout the area. Symptoms were reported on over 2.6 million acres in western Maine. Dieback was less than 10 percent. Losses were insignificant.
		Pennsylvania	Statewide, trees exhibited decline, presumably from previous defoliation and pear thrips feeding damage. Some stands are overmature. Thirty permanent plots were established on the Allegheny National Forest to follow the trends in maple condition.
			Heavy mortality of newly sprouted sugar maple seedlings occurred in some areas of the State. The mortality may have been caused by maple anthracnose infecting leaves damaged by pear thrips. Maple anthracnose also infected leaves on overstory maple.
Oak decline	Oak	Iowa,	In Van Buren County, 300 acres showed oak decline.
		Missouri	There were heavy losses to sawtimber white oak.
		Indiana, Pennsylvania, West Virginia	Oak decline continued in West Virginia. The rate of tree mortality decreased in other areas. The improvement in the health of oaks resulted from increased rainfall in the past 2 growing seasons.

Eastern Region and Northeastern Area--Status of diseases in Connecticut, Delaware, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin

Disease	Host	Location	Remarks
Oak wilt *Ceratocystis fagacearum*	Oak	Iowa Indiana, Ohio, Pennsylvania, West Virginia	The disease was widespread. This disease killed oaks and some ornamental shade trees on State and private lands.
		Michigan	An aggresive eradication program continued in Menominee County in the Upper Peninsula. Vibratory plow lines cut connecting roots of diseased trees to prevent disease spread. These lines were established around all 236 localized areas where the disease had been detected.
		Minnesota	This disease has been a major oak killer for the past several years.
		Wisconsin	This disease killed oak in central and southern Wisconsin.
		Vermont	The disease was not observed in 1990.
Pine wood nematode *Bursaphelenchus xylophilus*	Austria pine, Balsam fir, Black pine, Jack pine, Japanese pine, Scotch pine, White pine	Maine	Although distribution of this pest is regionwide, it had reached levels of significance only in Maine.
Sapstreak *Ceratocystis coerulescens*	Sugar maple	Vermont	Sapstreak staining was observed in association with mortality in stands that had been thinned.
Spruce-fir decline	Balsam fir, Red spruce	Maine, Massachusetts, New Hampshire, New York, Vermont	No new areas of significant decline and mortality were reported.
		West Virginia	Red spruce decline and mortality increased slightly. This increased was probably a result of weather related factors, Cytospora canker, wind stress, and nutrient deficiency.

Disease	Host	Location	Remarks
Abiotic			
Drought	Conifers, Hardwoods	Area wide	Mortality from the late 1980's continued to occur.
		Iowa, Michigan, Minnesota, Missouri, Wisconsin	Hardwoods, especially oaks, were dying at a very high rate. Lingering effects of the drought in the late 1980's have streesed oaks to the point where secondary invaders, such as two lined chestnut borer and Armillaria root rot, have attacked and killed trees. In some areas of Michigan, Minnesota, and northern Wisconsin, oaks died at an unprecedented rate. This high rate of tree mortality was expected to continue until wet weather prevails for 1 or 2 years.
		Vermont	Drought conditions from 1988 continued to cause losses, particularly among landscape trees.
Ozone	Conifers, Hardwoods	New Hampshire, Vermont	Ozone symptom surveys were conducted in Wilderness Areas on the White Mountain and Green Mountain National Forests. No significant damage was detected.
		West Virginia	Ground surveys conducted at 2 Wilderness areas recorded light to moderate ozone symptoms. Scattered white pines within 300,000 acres of the Monongahela National Forest had severe tip burning which probably resulted from chronic exposure to ozone.
Tornadoes	Hardwoods	Indiana	Several tornadoes caused the greatest economic problem. About 35 million board feet (Doyle) of timber was damaged. Only 30 to 50 percent of the timber was salvageable.
Winter Injury	Conifers	Maine, Vermont	Light to moderate damage occurred on most species, but heavy damage occurred on Scots pine. Many Christmas trees were unmerchantable. Vermont reported scattered symptoms. Christmas tree plantations were most affected. Moderate to heavy damage occurred on 234 acres in Vermont. Some damage occurred on 337 acres in Maine. Damage in both States was attributed to the extreme cold temperatures that occurred in December of 1989.

Other

Stillwell's syndrome	Balsam fir	Maine	The disease stabilized at low 1989 levels except in Hancock County, which had a sharp increase. Low levels were reported on 6.5 million acres and increased occurrences on 500,000 acres. Mortality was less than 1 percent in most of Maine and up to 5 percent in Hancock County. All trees examined were found to have *Armillaria mellea* infection. The problem was more common where spruce budworm persisted into the 1980's. The trend was stabilizing in most of the State.

Alaska Region Insects

Prepared by Edward H. Holsten

Insect	Host	Location	Remarks
Alder "scorch"	Alder	Southcentral Alaska	Alder shrubs along the Seward Highway from Anchorage to Portage were affected either by drought or possibly a bacterial infection which resulted in a browning of the leaf margins. This "scorching" was, at times, accompanied by moderate defoliation of the alder sawfly, *Hemichroa crocera.*
Birch borer *Synanthedon culiciformis*	Paper birch	Southcentral and Interior Alaska	Clear-wing moth damage to ornamental birch was widespread throughout the Anchorage area. This insect was first described from Alaska in the late 1800's. Since then, neither a specimen nor damage was observed until 1989. Damage (phloem consumption) results in weakened trees which are susceptible to pathogen entry and subsequent wind breakage.
Birch leafroller *Epinotia solandriana*	Birch	Southcentral Alaska	Birch leafrollers contributed to 13,811 acres of defoliated birch scattered throughout the Kenai National Wildlife Refuge. The spear-marked black moth assisted.
Bud moth *Zeiraphera* sp.	Sitka spruce	Southeast Alaska	The 1990 survey detected approximately 8,600 acres of defoliated Sitka spruce near Yakutat. This is a significant reduction from the 98,000 acres noted in 1989.
Cone and seed insects *Cydia youngana* *Dasineura rachiphaga* *Hylemia* sp.	White spruce	Interior and Southcentral Alaska	Favorable 1989 and 1990 spring and summer weather resulted in large cone crops throughout Alaska's spruce stands. As much as 50 percent of the seed was destroyed.

Insect	Host	Location	Remarks
Cottonwood defoliators *Chrysomela* sp. *Lyonetia* sp.	Black cottonwood	Prince William Sound, Southeast Alaska	Leaf beetles and blotch-miners defoliated approximately 9,000 acres of cottonwood; the majority of the damage occurred in Prince William Sound near Cordova. This was the third consecutive year that both defoliators (leaf beetles and blotch miners) were responsible for widespread, heavy defoliation which may result in limited growth reduction and top kill. Leaf beetles defoliated nearly 800 acres of cottonwood in southeast Alaska. Residents of Juneau reported cottonwood defoliation for 6 consecutive years.
Engraver beetle *Ips perturbatus*	White spruce	Interior Alaska	Interior Alaska *Ips* populations decreased in 1990. This pest now infests fewer than 326 acres.
Giant conifer aphid *Cinara* sp.	Sitka spruce	Southcentral Alaska	On the south side of Kachemak Bay, Sitka spruce hosted large populations of giant conifer aphids. Localized aphid populations caused some yellowing of tree foliage, but the health of the trees was affected very little.
Gypsy moth *Lymantria dispar*		Southcentral Alaska	Ground checks and pheromone trapping did not detect the presence of any gypsy moths.
Hemlock sawfly *Neodiprion tsugae*	Western hemlock	Southeast Alaska	Visible defoliation did not occur in 1990 and larval counts were very low for 4 consecutive years.
Large aspen tortrix *Choristoneura conflictana*	Quaking aspen	Southcentral and Interior Alaska	Tortrix populations increased throughout Alaska's quaking aspen stands. Approximately, 20,000 acres of aspen were moderately defoliated in southcentral Alaska. Interior Alaska's forests sustained an additional 44,000 acres of tortrix defoliation.
Sitka Spruce looper *Geometridae*	Sitka spruce	Southcentral Alaska	An unidentified looper, similar to the green-striped forest looper (*Melanolophia initata*), increased in numbers to epidemic proportions and consumed new and older growth foliage on the Sitka spruce. The area most affected was on the southern portion of the Kenai Peninsula.
Spear-marked black moth *Rheumaptera hastata*	Paper birch	Southcentral and Interior Alaska	Black moth populations remained low in Interior Alaska; only 867 acres of defoliated birch were aerially detected. However, black moth populations increased on the Kenai Peninsula, where 13,818 acres of birch were visibly defoliated.

Spruce beetle *Dendroctonus rufipennis*	Lutz spruce, Sitka spruce, White spruce	Throughout Alaska	Active infestations covered 232,406 acres, 55,000 acres more than in 1989. Unusually warm spring and summer weather in 1989 and 1990 helped increase spruce beetle populations by decreasing beetle developmental times from the normal 2-year to a 1-year life cycle. Infestations continued on 22,759 acres of the Chugach National Forest. Increased activity occurred in the Copper River Area near Chitina, the west side of Cook Inlet near the Skwentna River, and portions of the Kenai River. The Yukon River outbreak decreased by more than half in 1990. In southeast Alaska, an active spruce beetle infestation totalled 6,700 acres within Glacier Bay National Park.
Spruce bud midge *Dasineura swainei*	Black spruce, White spruce	Southcentral Alaska	Bud midge damage was prevalent on widely spaced young trees throughout the Kenai Peninsula. In many midge damaged trees, where one shoot that gives the tree its height would ordinarily grow, many shoots would grow.
Spruce budworm *Choristoneura* sp.	Sitka spruce, White spruce	Interior and and Southeast Alaska	Interior Alaska budworm populations increased in white spruce stands near Fairbanks. Defoliation was not heavy enough to be aerially sketch-mapped. Budworm populations were large enough to cause severe defoliation of young trees. Budworm populations increased near Haines in southeast Alaska's Sitka spruce stands.
Western black-headed budworm *Acleris gloverana*	Sitka spruce, Western hemlock	Prince William Sound and Southeast Alaska	Budworm populations increased in 1990; aerial surveys detected more than 30,000 acres of defoliated hemlock and spruce compared to 19,000 acres in 1989. This pest benefitted from unseasonably warm spring and late summer weather in the past few years. Most budworm activity was limited to forested areas along the shoreline. The Black-headed budworm was noted at endemic levels acress southeast Alaska. Visible defoliation was noted on Revillagigedo Island and near Bradfield Canal.

Insect	Host	Location	Remarks
Willow defoliation Tortricidae Chrysomelidae	Willow	Southcentral and Interior Alaska	1990 aerial surveys detected approximately 30,504 acres of heavily defoliated willow; twice the acreage detected in 1989. The most heavily impacted areas occurred throughout the riparian zones along the Yukon, Mulchatna, and Nushagak Rivers and along the Seward Highway near Moose Pass. Although larval numbers were high and defoliation heavy in these areas, most of the defoliated willows had refoliated by August.

Alaska Region Diseases

Prepared by Paul E. Hennon

Disease	Host	Location	Remarks
Stem and Branch Diseases			
Hemlock dwarf mistletoe *Arceuthobium tsugense*	Western hemlock	Southeast Alaska	This disease is abundant in old-growth stands of western hemlock throughout southeast Alaska from the Dixon Inlet to the Haines area. The disease was not found in northwest Alaska within the remaining range of western hemlock. The disease caused stem deformity, growth loss, and mortality. Several infected Sitka spruce trees, which rarely host hemlock dwarf mistleto, were found this year on Kuiu Island.
Spruce broom rust *Chrysomyxa arctostaphyli*	Black spruce, Lutz spruce, Sitka spruce, White spruce	Interior and Southcentral Alaska	Wherever spruce grows with the alternate host kinnikinnik, perennial infections were common. This disease caused witches' brooms and an undetermined loss of growth on spruce. Sitka spruce in Saginaw Bay were found to be infected.
Stem cankers *Encoelia pruinosa* *Ceratocystis fimbriata* *Cryptosphaeria populina* *Cytospora chrysosperma*	Hardwoods	Throughout Alaska	Stem-infecting fungi caused an undetermined level of tree mortality. On surviving trees, open wounds allowed wood decay (fungi) to initiate heartrot. Canker fungi were particularly damaging on aspen, birch, and mountain ash.
Stem decays Many Basidiomycetes	All tree species	Throughout Alaska	Stem decay fungi caused a large, but unquantified loss of wood volume throughout Alaska. Loss was considerable in unmanaged old-growth stands and may become serious in spruce and hemlock wounded during thinning activities in managed stands in southeast Alaska.
Western gall rust *Endocronartium harknessii*	Shore pine	Southeast Alaska	Every year this disease is common throughout the range of pine in Alaska. Galls were often killed by another fungus, *Nectria macrospora*, which resulted in branch or trunk death.

Disease	Host	Location	Remarks
Root Diseases			
Armillaria root rot *Armillaria* spp.	All tree species	Throughout Alaska	This disease was rarely the primary cause of tree mortality. The disease typically occurred as a secondary invader of previously stressed trees.
Schweinitzii butt rot *Phaeolus schweinitzii*	Lutz spruce, Sitka spruce, White spruce	Southeast and Southcentral Alaska	Decay in roots and butts of large trees caused loss of wood volume and created hazardous trees in recreation and urban areas. This root and butt decay is common in white and Lutz spruce stands in southcentral Alaska. A study is underway to determine the relationship of low level populations of spruce beetles to butt rot outbreaks.
Tomentosus root rot *Inonotus tomentosus*	Lutz spruce, White spruce	Southcentral and Interior Alaska	This disease caused butt rot in spruce. Live roots were colonized.
Yellow stringy rot *Pholiota alnicola*	Lutz spruce	Southcentral Alaska	This disease is a common cause of root and butt rot. Studies on distribution and identity of the fungus continued.
Foliage Diseases			
Shoot blight *Aprostrasseria* sp.	Alaska-yellow cedar	Southeast Alaska	This disease was common on regenerating cedar seedlings and saplings where terminal and lateral shoots were frequently killed.
Spruce needle cast *Lirula macrospora*	Sitka spruce	Coastal Alaska	This disease was common in young-growth stands and on ornamental trees throughout the range of Sitka spruce.
Spruce needle rust *Chrysomyxa ledicola*	Lutz spruce, Sitka spruce, White spruce	Interior, Southcentral, and Southeast Alaska	Spruce needle rust was apparent on 16,583 acres of white spruce in Interior Alaska near the village of Anvik. Needle rust was also apparent on Lutz spruce from Moose Pass to Seward. The disease occurred at moderate levels in southeast Alaska. Although infected trees appeared unsightly, little damage occurred unless the tree was infected for several consecutive years.

Disease	Host	Location	Remarks
Venturia leaf blight *Venturia populina*	Quaking aspen	Southcentral Alaska	Leaf blight was detected on almost 12,000 acres of quaking aspen. Typically, only branch tips were killed.
Vascular Wilts and Declines			
Alaska yellow-cedar decline	Alaska yellow-cedar	Southeast Alaska	Alaska yellow-cedar decline was one of the most significant forest problems in Alaska. Over 400,000 acres of trees in unmanaged stands on moderately and poorly drained sites were dying, already dead, or recently killed. Mortality was distributed along a wide band from northeast Chichagof Island to the Ketchikan area. Mortality was most severe on Kuiu and Chicagof Islands in 1990. Research has indicated that no specific biotic agent is the primary cause of decline.
Other			
Brown bear *Ursus arctos*	Alaska yellow-cedar	Southeast Alaska	Basal wounds were caused by brown bears in the spring. Over 50 percent of the cedar trees on the Baranof and Chicagof Islands had scars. Other tree species were unaffected.
Hemlock fluting	Western hemlock	Southeast Alaska	Fluting resulted in a loss of quality and quantity of wood. Incidence does not fluctuate from year to year. Fluting does not appear to be caused by any insect or pathogen.
Porcupine *Erethizon dorsatum*	Sitka spruce, Western hemlock	Southeast Alaska	Porcupines caused considerable bole damage and mortality in commercially important young-growth stands in southeast Alaska. Damage was severe on Mitkof Island, but scattered porcupine feeding occurred throughout the range of the animal. Basal scarring was common on older trees in many areas. Pines were heavily damaged in the Haines area.

Part 3 Indexes

Index - Insects

(Forest Insect and Disease Conditions in the United States 1990)

The common and scientific names of the insects come from "Common Names of Insects and Related Organisms," published in 1982 by the Entomological Society of America, and two U.S. Department of Agriculture publications: "Western Forest Insects" (Miscellaneous Publication 1339; 1977) and "Insects of Eastern Forests (Miscellaneous Publication 1426; 1985).

Index - Diseases

(Forest Insect and Disease Conditions in the United States 1990)

The common and scientific names of the disease-causing organisms are based on the compendium entitled "Common Names for Tree Diseases in the Western United States and Western Canada" by Hawksworth, Gilbertson, and Wallis (a 1985 supplement to the proceedings of the 32nd annual Western International Forest Disease Work Conference) and "Diseases of Forest and Shade Trees of the United States" by George Hepting (Agriculture Handbook 386; 1971). Based on continuing taxonomic research, many scientific names have been changed.

The Center for Forest Mycology Research at the Forest Service's Forest Products Laboratory in Madison, WI, is the information source for name changes.

Synonyms of recently changed names are in parentheses in the disease sections in Part II; anamorphs are shown in brackets. This differentiation is not made in the index.