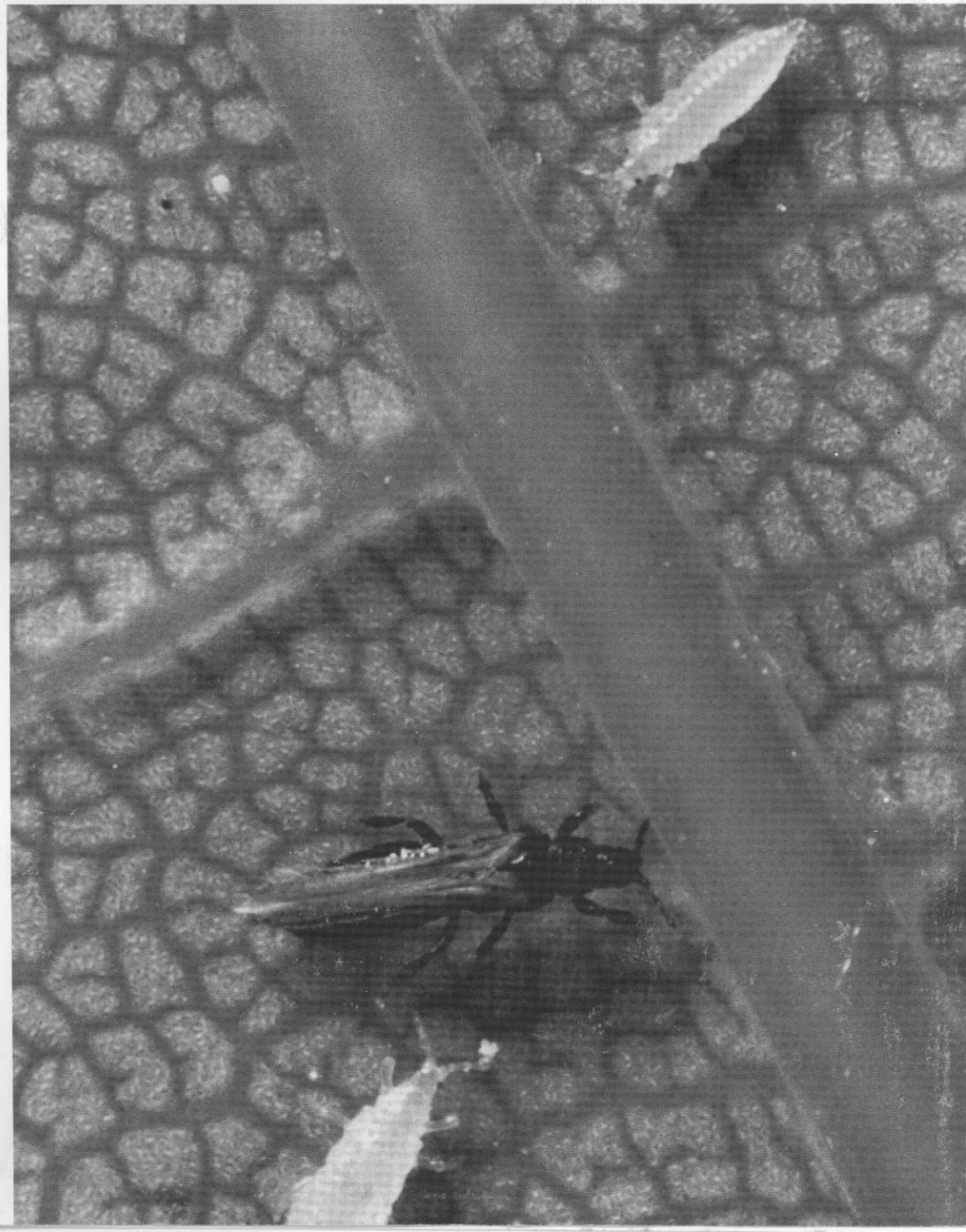
United States
Department of
Agriculture

Forest Service

**Forest Pest
Management**

Washington, DC

Forest Insect and Disease Conditions in the United States 1989



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July 1990

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Technical Coordinators

Thomas H. Hofacker
Robert C. Loomis
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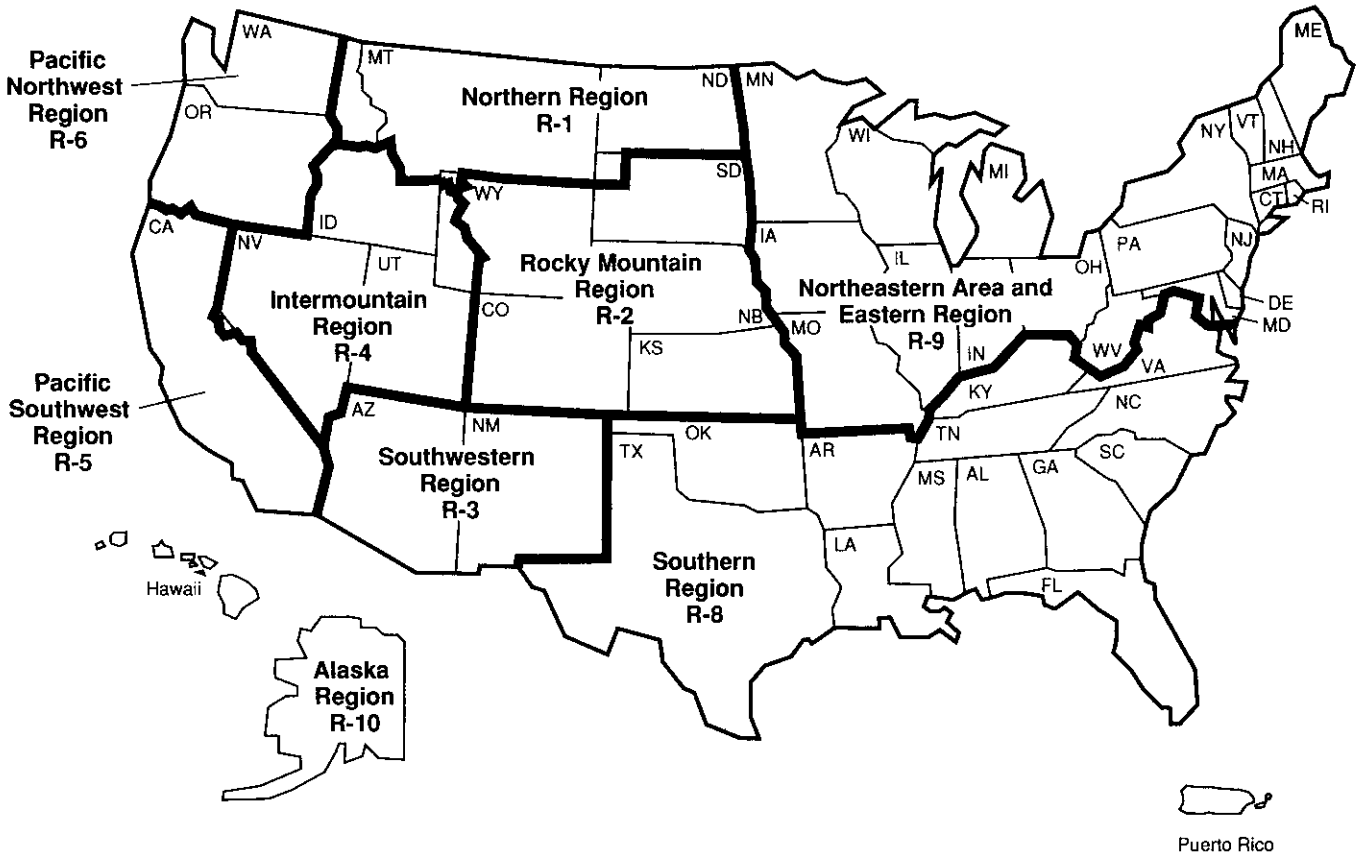
USDA Forest Service Regions and Area



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Cover photo: Adult and larvae pear thrips, *Taeniothrips inconsequens* (Uzel), on a maple leaf. The pear thrips is 1.5 mm to 1.83 mm long. Photo taken by Tony E. Downer Vermont Agricultural experiment Station, University of Vermont, South Burlington, Vermont

Contents

Contents (continued)

Introduction

The 1989 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 39th 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:

Northern Region (R-1)
Federal Building
P.O. Box 7669
Missoula, MT 59807

Rocky Mountain Region (R-2)
P.O. Box 25127
Lakewood, CO 80225

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

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

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

Pacific Northwest Region (R-6)
P.O. Box 3623
Portland, OR 97208

Southern Region (R-8)
1720 Peachtree Road, N.W.
Atlanta, GA 30367

Eastern Region (R-9) and
Northeastern Area
5 Radnor Corporate Center
Suite 200
100 Matsonford Road
Radnor, PA 19087

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

Part 1 National Summary

GYPSY MOTH

In 1989, gypsy moth (*Lymantria dispar*) defoliation increased to 3 million acres from the decadal low of 719,000 acres recorded in 1988. This occurred despite the 818,000 acres of treatment that took place as part of the Forest Service/State cooperative gypsy moth suppression program.

Prior to 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 5 times.

Pennsylvania had the most defoliation of any State, 1.5 million acres. This is the fourth time in this decade that Pennsylvania recorded more than a million acres of defoliation. Rhode Island was the only State that reported a decrease in defoliation in 1989.

The gypsy moth continued to extend its range. All of the counties in the lower peninsula of Michigan are regulated under the Gypsy Moth Quarantine. Only 4 counties in Ohio are regulated, but moths, larvae and egg masses were observed in many other parts of the State. In West Virginia, 12 of 54 counties are regulated. Sixty-one of the 100 counties in Virginia are regulated. Two counties in North Carolina, Currituck County and Dare County, are regulated.

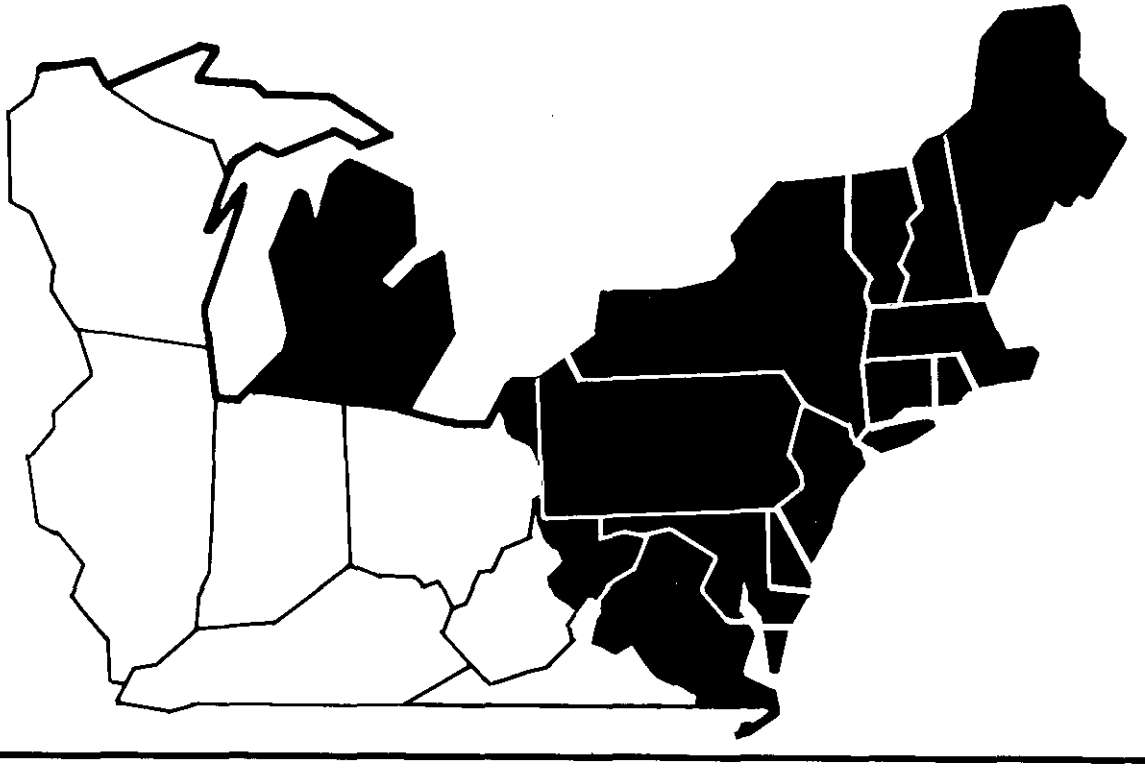
A large isolated infestation was discovered in Salt Lake City, Utah. About 1,200 acres were treated as the first stage of an eradication effort.

The isolated infestation that was discovered in Clay County, North Carolina, in 1987 was treated again in 1988. Only 12 moths were trapped in 1989, none from within the 9,000 acre treatment area. No treatment is planned for this area in 1990.

An extensive isolated infestation located in Giles County, Virginia, was treated for the first time in 1988. A total of 17,862 acres were treated in 1989. Trapping indicated that this infestation is not yet eradicated. Intensive monitoring of the area is planned for 1990.

Eradication of the isolated infestation in Lane County, Oregon was achieved as no moths were trapped in and around the infested area that once covered 227,000 acres.

1989 Area Generally Infested With Gypsy Moth

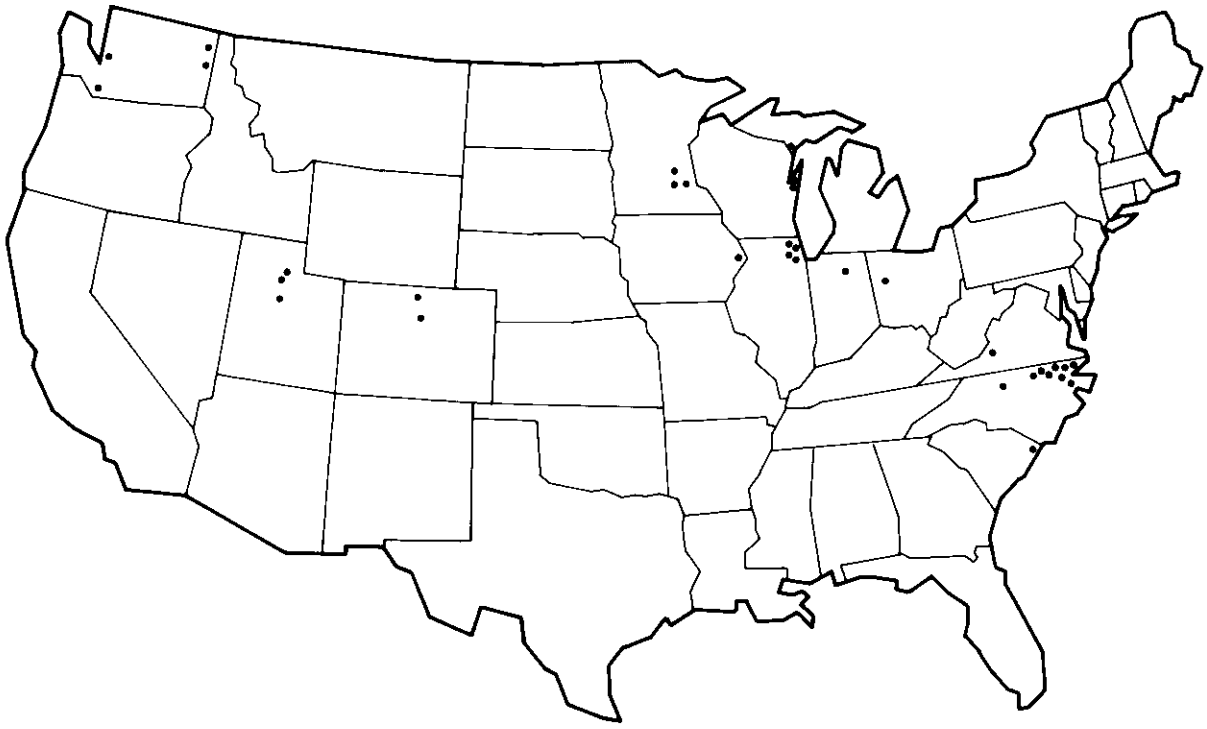


Acres of Aerially Detected Defoliation

State	1988	1989
Connecticut	1,600	78,430
Delaware	800	1,888
Maine	100	35,000
Maryland	58,500	97,911
Massachusetts	0	950
Michigan	70,400	294,344
New Hampshire	1,000	18,395
New Jersey	7,400	137,310
New York	5,700	421,138
Pennsylvania	312,100	1,506,790
Rhode Island	700	0
Vermont	700	27,335
Virginia	191,000	289,332
Washington, D.C.	0	0
West Virginia	59,300	86,736
Total	**709,300**	**2,995,559**

1989 Gypsy Moth Defoliation

Location of 1989 Gypsy Moth Eradication Programs



Southern Pine Beetle

During 1989, the southern pine beetle (*Dendroctonus frontalis*) outbreak continued in the southern Appalachian Mountains and once again flared up in east Texas. However, throughout the South, the number of multiple tree spot infestations decreased by 30 percent from 30,285 to 21,240. The number of "outbreak counties" (counties with 1 or more multiple tree spots per 1,000 acres of host type) decreased by 42 percent from 94 to 54, with a 32 percent decrease in affected acreage (2 million acres).

In the eastern part of the South, losses to southern pine beetle continued high in the mountains of western North and South Carolina, eastern Tennessee and Northern Georgia. The outbreak started in these areas in the summer of 1988 and is now one of the most serious ever recorded. Only a small portion of the killed timber was salvaged. Losses in the Piedmont and coastal plain were light.

Populations in Texas remained at low levels through the spring. However, in late May, the number of infestations increased dramatically, especially on National Forest System lands. Later in the summer, populations also increased on State and private lands. The overall number of spots in Texas increased by 690 percent from 886 in 1988 to 6,125 in 1989. Three years of severe drought followed by unusually wet conditions in the summer of 1989 may explain this sharp increase in beetle activity.

Beetle losses remained low in Louisana and Arkansas and declined sharply in Mississippi and Alabama. There were no outbreak counties in Arkansas, Louisana, or Mississippi. Alabama had 4 counties in outbreak status compared to 41 outbreak counties in 1988.

Acres In Outbreak†

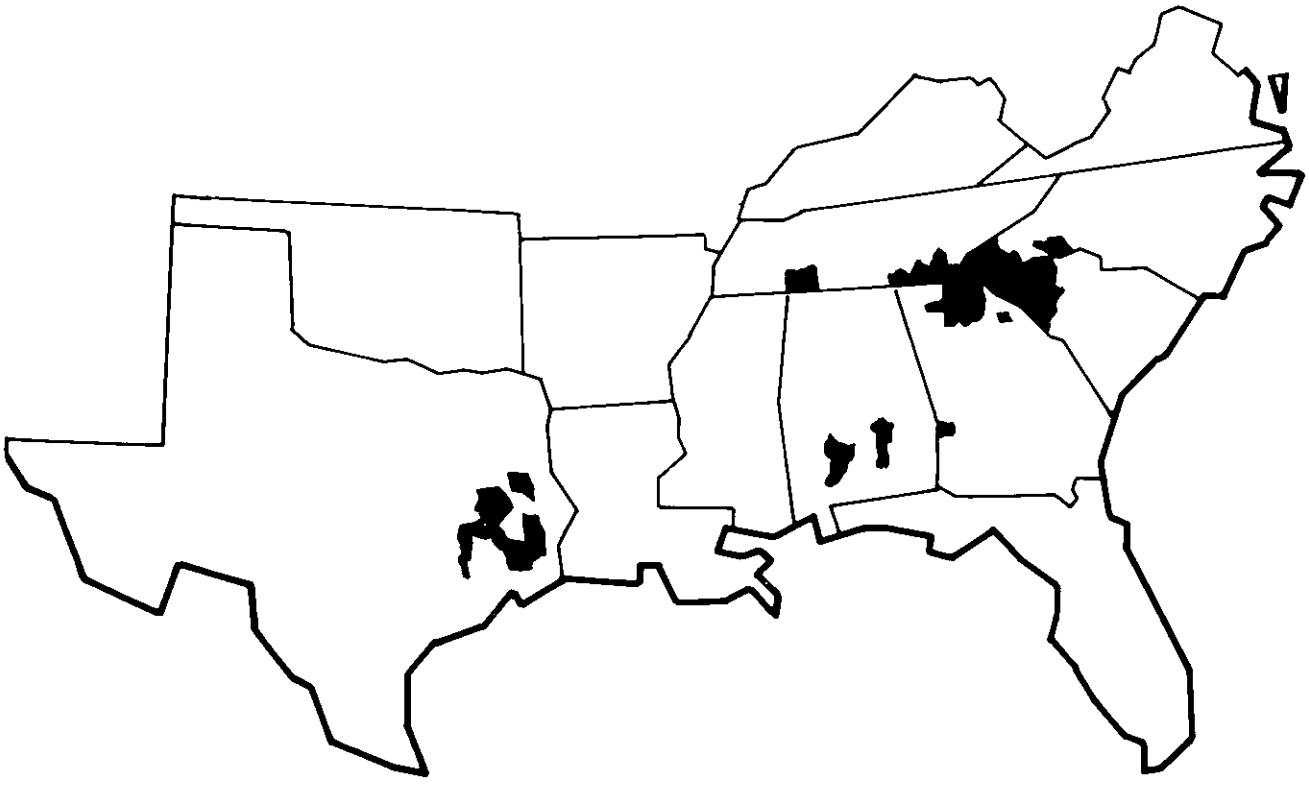
State	1988	1989
Alabama	4,762,400	724,000
Arkansas	0	0
Georgia	1,057,400	850,000
Florida	0	0
Kentucky	0	0
Louisiana	17,000	17,000
Mississippi	715,100	319,000
North Carolina	497,000	342,000
Oklahoma	0	0
South Carolina	609,100	753,000
Tennessee	278,100	427,000
Texas	0	1,901,000
Virginia	0	0
Total	**7,936,100**	**5,333,000**

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

Southern Pine Beetle Outbreak Counties

Alabama:	Crenshaw, Monroe, Montgomery, Wilcox.
Georgia:	Cherokee, Dawson, Fannin, Forsyth, Gilmer, Gordon, Hall, Lumpkin, Madison, Pickens, Rabun, Stewart, Towns, Union, White.
North Carolina:	Cherokee, Clay, Cleveland, Graham, Jackson, Macon, Rutherford, Swain, Transylvania.
South Carolina:	Abbeville, Anderson, Greenville, Greenwood, Laurens, McCormick, Oconee, Pickens, Spartanburg
Tennessee:	Bradley, Hamilton, Hardin, McMinn, Marion, Wayne, Polk.
Texas:	Grimes, Hardin, Houston, Liberty, Nacogdoches, San Jacinto, Trinity, Tyler, Walker, Waller.

1989 Southern Pine Beetle Outbreak Counties



Spruce Budworm

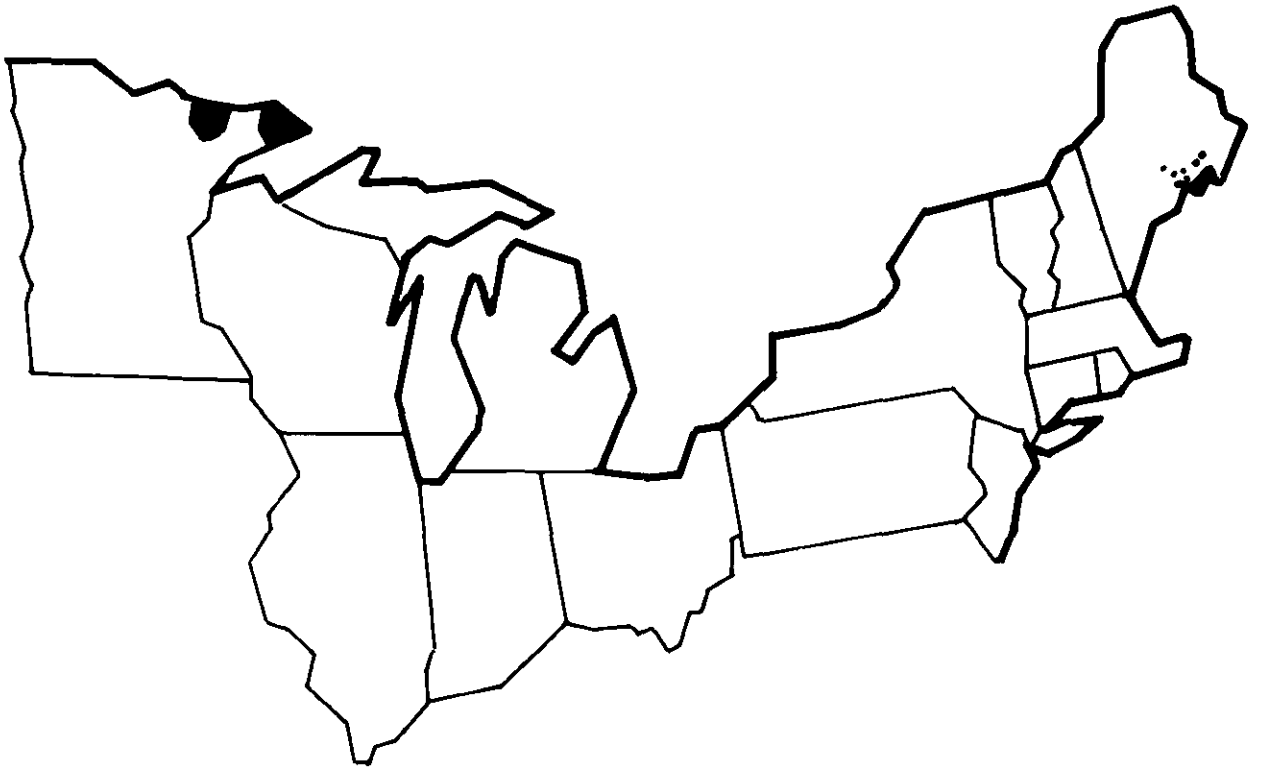
Spruce budworm (*Choristoneura fumiferana*) populations continued their downward spiral in Maine and Minnesota. Nationwide, only 144,800 acres of defoliation were detected in 1989. This is nearly half of last year's defoliation acreage and is the lowest level of the decade.

In Minnesota, defoliation appeared to intensify in the extreme northeastern part of the State. Mortality resulting from this defoliation continues in Cook County, Minnesota.

Acres Of Aerially Detected Defoliation

State	1988	1989
Maine	65,000	4,800
Michigan	0	0
Minnesota	200,000	140,000
New Hampshire	0	0
New York	0	0
Vermont	0	0
Wisconsin	0	0
Total	265,000	144,800

1989 Spruce Budworm Defoliation



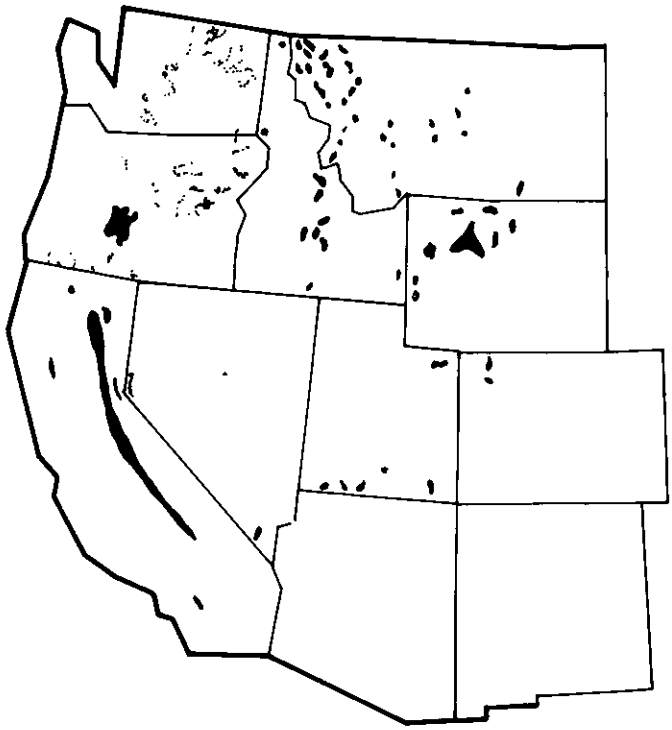
Mountain Pine Beetle

Mountain pine beetle (*Dendroctonus ponderosae*) tree killing decreased by 40 percent from 1988 to 1989. The decrease was especially large in Oregon and Montana. Even though the number of trees killed decreased, the volume killed increased by 66 percent. This increase was mostly due to the large number of sugar pine killed by mountain pine beetle in California.

State	1988 Acres Affected	1989 Acres Affected	1989 Volume† Killed	1989 Number Of Trees Killed
Arizona	600	900	60	2,000
California	0	NA	55,200	681,000
Colorado	13,000	12,000	352	235,000
Idaho	42,300	41,600	874	48,500
Montana	546,700	421,500	26,650	1,332,500
New Mexico	1,000	1,000	68,500	2,000
Oregon	1,311,400	887,926	11,015	703,079
South Dakota	2,600	2,400	103	6,900
Utah	12,500	4,500	80	5,000
Washington	220,300	231,375	5,334	288,592
Wyoming	55,600	11,400	308	150,600
Total	**2,206,000**	**1,614,601**	**168,476**	**3,455,171**

†Volume in thousand cubic feet of timber

1989 Mountain Pine Beetle Outbreak



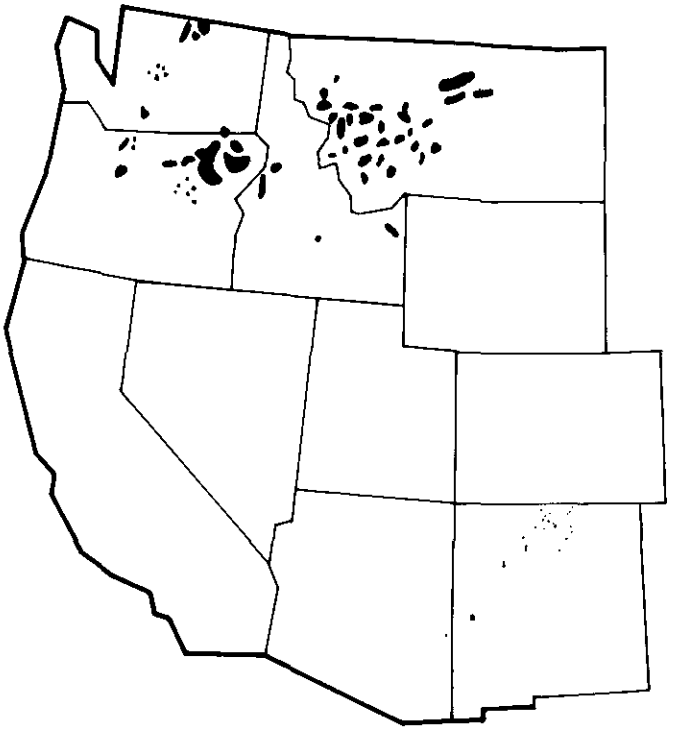
Western Spruce Budworm

Western spruce budworm (*Choristoneura occidentalis*) defoliation continued to decline from the record 13.2 million acres reported in 1986. This year, 3,139,632 acres of defoliation were mapped, a 50 percent decrease from the 6,063,300 acres of defoliation in 1988. Only the State of Washington experienced an increase in the amount and intensity of defoliation from this insect.

Acres Of Aerially Detected Defoliation

State	1988	1989
Arizona	5,800	720
California	0	0
Colorado	427,000	52,000
Idaho	61,000	26,600
Montana	2,064,000	1,191,300
New Mexico	477,700	90,080
Oregon	2,740,400	1,416,681
Utah	0	0
Washington	231,600	362,251
Wyoming	55,800	0
Total	6,063,300	3,139,632

1989 Western Spruce Budworm Defoliation



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 timber tree species for which damage can be prevented or reduced through forest management. In addition, a number of interacting biotic and abiotic factors caused tree declines of several eastern tree species. These included ash, birch, dogwood, fir, maple, oak, and spruce.

Root diseases were particularly damaging in California, Idaho, Montana, Oregon, Washington, and on high hazard sites in the South.

Stem decays were a problem nationwide.

White pine blister rust caused extensive tree mortality to western white and sugar pines in California, Idaho, Montana, Oregon, and Washington. Damage was much less severe in the East.

Dwarf mistletoes infected conifers on 22 million acres of western forest land.

Fusiform rust was the most damaging disease of southern pines, particularly loblolly and slash pine. Fusiform rust damage estimates were based on Forest Service 1988 Forest Inventory and Analysis (FIA) data. No new FIA data were available in 1989. The annual economics loss from fusiform rust has 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, 1989.†

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.

Dogwood anthracnose was of particular concern because of its rapid spread and because its ultimate distribution and severity remain uncertain.

Distribution of Dogwood Anthracnose in the Eastern United States - January, 1990

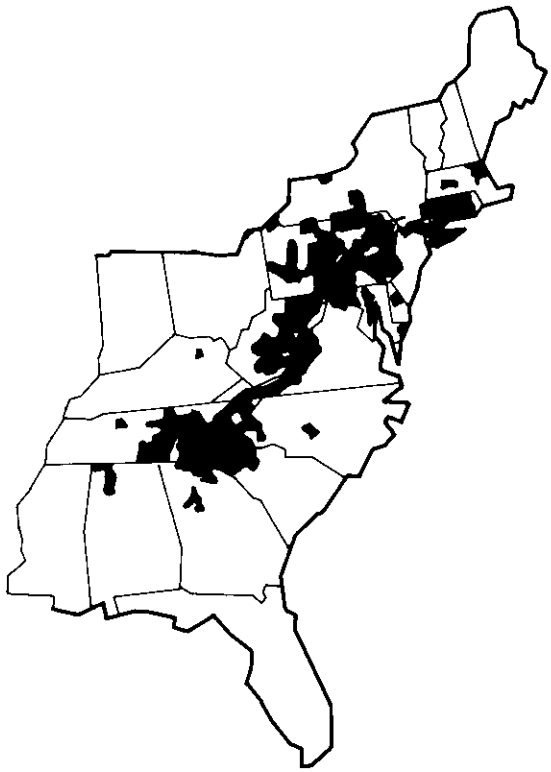


Table 2. Acres of oak forest type, acres damaged and volume of mortality due to oak decline in the Virginia mountains and northern Piedmont.†

Ownership	Acres in Oak Forest Types	Acres Damaged by Decline	Annual Decline-Caused Mortality (cubic feet/ac.)
National Forests	1,342,637	323,554	19.9
Other Public	199,838	31,178	0
Private	5,165,774	748,939	9.6
All Ownerships	6,708,249	1,103,671	12.3

†Updated 1989 data of impact and distribution of diseases, such as oak decline,were not available. Previous Forest Inventory and Analysis data were used to estimate lossses for some pests. An inventory in Virginia showed that 15 percent of susceptible oak forests were damaged and of the annual oak sawtimber harvested in the state 35 percent was lost.

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 infestation detected in Idaho in 1983 continued to expand and intensify. A 1989 survey found the pest throughout much of the Nez Perce, Clearwater, and Idaho Panhandle National Forests and nearby State and private lands. It was discovered in 1989 in Montana for the first time on the Lolo National Forest. An aerial survey showed adelgid-caused tree mortality on 40,500 acres in Idaho. Tree mortality was limited primarily to subalpine fir, but grand fir showed gouting, flagging, and other evidence of injury.
Boxelder defoliator *Archips negundanus*	Boxelder	Montana	This defoliator persisted at about the same intensity since it was first discovered in 1987. Defoliation was confined to ornamental trees in and around Missoula, Montana.
Cranberry girdler moth *Chrysoteuchia topiaria*	Douglas-fir, Western larch	Idaho	No significant activity was reported in 1989.
California tortoiseshell *Nymphalis californica*	Snowbrush, Serviceberry	Idaho, Montana	No significant activity was reported in 1989.
Douglas-fir beetle *Dendroctonus pseudotsugae*	Douglas-fir	Idaho, Montana	A marked decline in Douglas-fir beetle activity was noted. The decline was probably attributable to unusually heavy mortality of the overwintering population, in addition to trees recovering vigor as moisture conditions returned to normal. Still, over 64,000 mature, newly faded Douglas-fir were detected on 17,000 acres in Idaho. An additional 8,400 trees were killed on 6,300 acres in Montana.

Northern Region--Status of insects in Montana, northern Idaho, North Dakota, and National Park Service Lands in northwestern Wyoming

Insect	Host	Location	Remarks
Douglas-fir tussock moth *Orgyia pseudotsugata*	Douglas-fir, Spruce, True firs	Idaho, Montana	Once again, no tussock moth-defoliated stands were detected in the Region. Individual ornamental trees were defoliated in Coeur d'Alene and Post Falls, Idaho, as well as Big Fork, Montana. Pheromone trap catches were at or near an all-time low.
Fir engraver beetle *Scolytus ventralis*	Grand fir, Subalpine fir	Idaho	The fir engraver infestation of 1988 (33,600 acres) expanded to more than 97,000 acres in 1989. This accounted for the death of more than 140,000 grand firs. The greatest damage occurred on State and private lands of northern Idaho.
Forest tent caterpillar *Malacosoma disstria*	Hardwoods	Idaho, Montana	It appeared that 1989 was the last year of the forest tent caterpillar outbreak that began in the Region in 1985. Local spots of heavy defoliation occurred in northern Idaho and western Montana. However, observations throughout the season revealed extensive larval mortality from parasites and pathogens. Few eggs were found during fall surveys.
Gouty pitch midge *Cecidomyia piniinopis*	Ponderosa pine	Idaho	No significant activity was reported in 1989.
Gypsy moth *Lymantria dispar*	Conifers, Hardwoods	Idaho, Montana, Wyoming	In Coeur d'Alene and Sandpoint, Idaho, 380 acres were sprayed with *Bacillus thuringiensis* (*B.t.*) as part of an eradication effort. Mass trapping was conducted on an additional 820 acres. Moths were trapped in and around these communities in 1989: 28 in Coeur d'Alene; 22 in Sandpoint. The eradication effort will continue in 1990. A single male moth was captured in Yellowstone National Park in 1989 during the routine detection survey.
Larch casebearer *Coleophora laricella*	Western larch	Idaho, Montana	Although casebearer populations remained low throughout most of the Region, 1,200 acres of defoliation were detected during the aerial survey. Defoliation occurred primarily on State and private lands in northern Idaho.

Insect	Host	Location	Remarks
Lodgepole terminal weevil *Pissodes terminalis*	Lodgepole pine	Idaho, Montana	No significant activity was reported in 1989.
Mountain pine beetle *Dendroctonus ponderosae*	Lodgepole pine, Other pines	Idaho, Montana	Mountain pine beetle infestations occurred on about 421,500 acres in Montana. This was a decline of 127,000 acres from 1988. Mortality occurred to all pine species, but the specie most affected was lodgepole pine: 1-1/3 million trees were killed. Greatest losses occurred on and around the Kootenai, Flathead, and Lolo National Forests. The number of trees killed in Idaho declined from 22,000 in 1988 to less than 19,000 in 1989 despite a small increase in acres infested.
Pine engraver beetle *Ips pini*	Lodgepole pine, Ponderosa pine	Idaho, Montana	*Ips* outbreaks did not change dramatically. In Idaho, 6,600 trees were killed on more than 3,300 acres; 1,800 trees were killed on 500 acres in Montana.
Spruce beetle *Dendroctonus rufipennis*	Engelmann spruce	Idaho, Montana	Spruce beetle-caused tree mortality remained at a low level. An average of 1 newly killed tree per acre occurred on 300 acres in the Region. Nearly all the dead trees were found on northern Idaho forests.
Western balsam bark beetle *Dryocoetes confusus*	Subalpine fir	Idaho, Montana	A modest increase in the number of trees killed by this beetle was noted during the 1989 aerial survey. On 2,000 acres, 3,200 dead trees were detected. Most damage occurred in western Montana.
Western pine beetle *Dendroctonus brevicomis*	Ponderosa pine	Idaho	The number of ponderosa pine killed by this beetle, as determined by aerial survey, increased substantially. In northern Idaho, 19,400 acres were infested, and 31,000 trees were killed. Losses were highest on the Nez Perce National Forest, Mica State Forest, and in the Craig Mountains. Ground surveys projected a decline in damage levels for 1990.

Insect	Host	Location	Remarks
Western pineshoot borer *Eucosma sonomana*	Ponderosa pine, Lodgepole pine	Idaho, Montana	No significant activity was reported in 1989.
Western spruce budworm *Choristoneura occidentalis*	Douglas-fir, Engelmann spruce, True firs, Western larch	Idaho, Montana, Wyoming	Aerially visible budworm-caused defoliation declined to 1,191,300 acres in Montana. Another 15,900 acres of defoliation occurred on the Nez Perce National Forest in Idaho. In addition to the decline in the area defoliated, there was a decline in the intensity of defoliation. Most defoliation was classed as light or moderate. Largest areas of defoliation were on the Deerlodge, Beaverhead, and Lolo National Forests.

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 saw timber and caused defect, topkill, and tree mortality.
Comandra blister rust *Cronartium comandrae*	Lodgepole pine, Ponderosa pine	Idaho, Montana	Comandra rust was present on Montana lodgepole and ponderosa pine in many parts of Idaho and Montana. It was especially severe on Montana forests east of the Continental Divide.
Diplodia blight *Sphaeropsis sapinea* *(=Diplodia pinea)*	Ponderosa pine	Idaho, Montana	This pathogen was again 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 4 years.
Dwarf mistletoes			Dwarf mistletoes were present on 3 million acres and continued to be a 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. The pathogens have been routinely eliminated from managed stands at the time of regeneration.
Arceuthobium americanum	Lodgepole pine	Idaho, Montana	Lodgepole pine dwarf mistletoe infested 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 infested 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 occured on 0.8 million acres (38 percent) of western larch and caused over 15 million cubic feet of loss.

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 white pine, Whitebark pine	Idaho, Northwestern Montana	White pine blister rust caused extensive tree mortality throughout the range of western white pine and prevented management of susceptible western white pine on high-hazard sites. Increased acreage has been successfully regenerated each year with rust-resistant white pine. Whitebark pine, an important food source for grizzly bears, was severely damaged in and around Glacier National Park. This damage was minor in the Yellowstone Park ecosystem.
Root Diseases			
			Root diseases were among the most damaging pests in the Region. Annually, root diseases have caused tree mortality on 2 million acres in northern Idaho and 1 million acres in Montana (approximately 15 percent of the Region's commercial forest land). Damage has increased 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 on ponderosa pine on the Flathead Indian Reservation and on Douglas-fir and true firs on the Clearwater and the Nez Perce National Forests. The disease increased in infected stands through freshly cut stump surfaces.
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 was attributed, in part, to the increase in number of susceptible Douglas-fir and true firs resulting from fire control and selective harvesting of high-value pine and western larch.

Disease	Host	Location	Remarks
Black stain root disease *Ophiostoma wageneri* (=*Ceratocystis wageneri*)	Douglas-fir, Lodgepole pine, Ponderosa pine	Idaho, Montana	Black stain root disease continued to be much less common than other root pathogens. Its importance is unknown.
Laminated root rot *Phellinus weirii*	Douglas-fir, Grand fir, Western redcedar, Other conifers	Idaho, Montana	Laminated root rot was very severe in parts of the Lolo, Kootenai, and Idaho Panhandle National Forests. The increase in damage was attributed to the loss of disease-tolerant western white pine to blister rust, and other factors that have increased the abundance of susceptible Douglas-fir and grand fir.
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 due mainly 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	Though commonly found throughout the Region, foliage disease levels were low. Dothistroma needle blight occurs regularly in the Lochsa River drainage on the Clearwater National Forest. Elytroderma was chronic at certain locations, including the Bitterroot Valley, the Flathead Indian Reservation, and around Flathead Lake in Montana. Other foliage diseases were noted but no outbreaks were reported.
Douglas-fir needle cast *Rhabdocline pseudotsugae* *Rhabdocline weirii*	Douglas-fir	Idaho, Montana	
Elytroderma disease *Elytroderma deformans*	Ponderosa pine	Idaho, Montana	
Larch needle blight *Hypodermella laricis*	Western larch	Idaho, Montana	
Larch needle cast *Meria laricis*	Western larch	Idaho, Montana	
Swiss needle cast *Phaeocryptopus gaeumannii*	Douglas-fir	Idaho, Montana	

Disease	Host	Location	Remarks
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.
Nursery Diseases			
Fusarium root disease *Fusarium* spp.	Douglas-fir, Other conifers	Idaho, Montana	The usual nursery diseases were found in Federal, State, and private nurseries in 1989. An unidentified species of *Phytophthora* was isolated from bareroot spruce seedlings at a central Idaho nursery. Damaged seedlings were concentrated in low, poorly drained portions of the seed bed. A young plantation of transplanted western larch, at the USDA Forest Service Nursery at Coeur d'Alene, Idaho, sustained unusual damage groups of mortality. Root collar tissues were dead, and isolations yielded *Phytophthora cactorum.* Winter injury was also found on white pine seedlings at that nursery. Trees lost needles, but they produced new growth.
Gray mold *Botrytis cinerea*	Engelmann spruce, Lodgepole pine, Western larch	Idaho, Montana	
Phoma blight *Phoma* spp.	Most conifers	Idaho	
Sirococcus tip blight *Sirococcus strobilinus*	Engelmann spruce, Ponderosa pine	Idaho, Montana	
Winter injury	Western white pine	Idaho	
Abiotic			
Winter injury and contributing diseases	All conifers	Idaho, Montana	During January and February, episodes of extremely cold weather followed periods of unseasonably warm temperatures, primarily in Montana. The abnormal conditions caused extensive damage to many conifers. The most significant damage occurred on the Helena, Deerlodge, and Lewis & Clark National Forests. Lesser and more widely scattered damage occurred elsewhere. A total of 433,000 acres showed aerially visible injury, with 111,000 acres of mainly lodgepole pine classified as heavily injured. A survey was initiated, that will be continued in 1990, to determine the permanent effects of this injury.

Rocky Mountain Region Insects

Prepared by Judith E. Pasek

Insect	Host	Location	Remarks
A willow sawfly *Nematus* sp.	Willow	Wyoming	Severe defoliation was evident in localized areas on the Bighorn National Forest where plants had been frost-damaged earlier in the year.
Ash plant bug *Tropidosteptes amoenus*	Green ash	South Dakota	Damaging populations were reported throughout the eastern half of the State.
Bagworm *Thyridopteryx ephemeraeformis*	Rocky Mountain juniper	Kansas	No significant activity was reported in 1989.
Balsam twig aphid *Mindarus abietinus*	Balsam fir	South Dakota	Considerable branch and tree mortality was detected in Union and Beadle Counties.
Bronze birch borer *Agrilus anxius*	Paper birch	South Dakota	This pest continued to be a major problem on ornamentals statewide. Many nurseries are no longer selling paper birch.
Cankerworms *Alsophila pometaria* *Paleacrita vernata*	Boxelder, Hackberry, Honeylocust, Siberian elm	Kansas, South Dakota	Damage was low in most areas. Extensive defoliation occurred in southeastern Kansas on hackberry and elm trees. Some windbreaks, especially those containing Siberian elm, in central South Dakota were completely defoliated.
Common falsepit scale *Lecanodiaspis prosopidis*	Green ash, Hackberry, Red mulberry	Colorado	In southeastern Colorado, the scale was heavy on dead branches of street trees, but branch mortality may have resulted from a combination of environmental stress and the presence of several scale species.
Cottonwood borer *Plectrodera scalator*	Cottonwood	South Dakota	Populations increased statewide. Serious damage occurred in some windbreaks.

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* *Dioryctria tumicolella*	Austrian pine, Pinyon pine, Ponderosa pine, Scotch pine	Colorado, Nebraska, South Dakota	This pest continued to be a serious problem throughout most of Nebraska and South Dakota. Damage was especially severe in southeastern South Dakota. A windbreak near Yellow Jacket, Colorado, was heavily infested. Tip dieback was evident in pinyon pines near Canon City.
Douglas-fir beetle *Dendroctonus pseudotsugae*	Douglas-fir	Colorado, Wyoming	Populations, that gained a foothold in areas of recent heavy defoliation by western spruce budworm, expanded into undefoliated areas. Populations were high at Boulder Mountain Parks, Big Thompson Canyon, Ute Pass, and on the Pike National Forest, and U.S. Air Force Academy lands near Colorado Springs. Populations increased on 5,000 acres in the Soap Creek drainage north of Blue Mesa Reservoir in Colorado. Tree mortality declined along most of the rest of the front range. On the Shoshone National Forest in Wyoming, high populations developed in trees blackened by the Clover Mist Fire of 1988.
Douglas-fir tussock moth *Orgyia pseudotsugata*	Douglas-fir, Engelmann spruce	Colorado	No significant activity was reported in 1989.
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. Scotch pine in Christmas tree plantations was hit especially hard, and most growers applied chemical controls. The insect moved west, but damage was still light in western Kansas.
Forest tent caterpillar *Malacosoma disstria*	Hardwoods	South Dakota	No significant activity was reported in 1989.

Insect	Host	Location	Remarks
Gypsy moth *Lymantria dispar*	Hardwoods	Colorado, Wyoming, South Dakota	In Colorado, eradication programs were conducted in Lakewood, Boulder, and Fort Collins (East and West). No moths were caught in traps in Lakewood, Boulder, and Fort Collins West. Five moths were caught in eastern Fort Collins, and 2 moths were caught outside Fort Collins. Detection surveys were conducted throughout the five-state Region. In Colorado, one moth was caught in Limon and two were caught in Colorado Springs. A shipment of household goods containing gypsy moths was discovered near Rosita. In South Dakota, 3 moths were caught near Mt. Rushmore National Memorial in Keystone and at the Mt. Rushmore campground. In Wyoming, 2 moths were trapped in Thermopolis and one was caught near Cody. Gypsy moths were introduced on infested, transplanted nursery stock around Omaha, Nebraska.
Hackberry galls *Pachypsylla celtidismamma* *P. celtidisversicula*	Hackberry	South Dakota	Blister galls and nipple galls were numerous on the foliage of trees in the southeastern quarter of the State and may have contributed to the poor health of these trees.
Honeysuckle aphid *Hyadaphis tataricae*	Honeysuckle	South Dakota	Damage continued statewide.
Jack pine budworm *Choristoneura pinus*	Jack pine	Nebraska	No significant activity was reported in 1989.
Juniper sawfly *Monoctenus fulvus*	Juniper	Kansas	No significant activity was reported in 1989.
Large aspen tortrix *Choristoneura conflictana*	Aspen	Colorado	No significant activity was reported in 1989.
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. Incidence increased in South Dakota.

Insect	Host	Location	Remarks
Mountain pine beetle *Dendroctonus ponderosae*	Limber pine, Lodgepole pine, Ponderosa pine	Colorado, South Dakota, Wyoming	Populations in South Dakota were low and concentrated between Bear Mountain and Deerfield Lake in the Black Hills. In Wyoming, populations continued at epidemic levels on 9,750 acres in the Laramie Peaks area of the Medicine Bow National Forest. Salvage was continuing. Populations were at endemic levels throughout most of Colorado. The outbreak on the Uncompahgre Plateau continued in ponderosa pine. An outbreak was detected on 30 acres southwest of Ute Pass on the White River National Forest. Pheromone baits effectively contained a few small outbreak pockets in lodgepole pine at Vail and Beaver Creek ski areas. Populations in Estes Valley increased to early epidemic proportions.
Pandora moth *Coloradia pandora*	Ponderosa pine	South Dakota	A small outbreak was detected in the southern Black Hills. Second-year larvae caused noticeable defoliation.
Pine budworm *Choristoneura lambertiana*	Limber pine, Ponderosa pine	Colorado	No significant activity was reported in 1989.
Pine engraver beetle *Ips pini*	Jack pine, Ponderosa pine	Colorado, Nebraska, South Dakota, Wyoming	Infestations were abundant in ponderosa pine throughout most of the Black Hills in South Dakota and Wyoming, particularly near thinning operations and in highly stressed trees. Large pockets were present near Pactola Reservoir, Sheridan Lake, Lead, and the Bear Lodge Mountains. Some activity was present in Summit and Eagle Counties in Colorado. In Nebraska, beetles predominated in jack pine log decks and in ponderosa pine that was either highly stressed or near thinning operations.
Pine needle sheathminer *Zelleria haimbachi*	Ponderosa pine	Nebraska	No significant activity was reported in 1989.

Insect	Host	Location	Remarks
Pine tip moths *Rhyacionia bushnelli* *Rhyacionia frustrana*	Austrian pine, Pinyon pine, Ponderosa pine, Scotch pine	Colorado, Kansas, Nebraska, South Dakota	Damage was light in Christmas tree plantations and nurseries where chemical control is often used. Throughout the plains and in metro areas of Colorado, young pines in windbreaks and landscape plantings were damaged. Increased populations of Nantucket pine tip moth were reported in southcentral Kansas. Western pine tip moth was reported for the first time near Paoli, Colorado. In the southern Black Hills of South Dakota, pine regeneration was heavily damaged.
Spider mites *Oligonychus ununquis*	Juniper	Kansas	No significant activity was reported in 1989.
Spruce beetle *Dendroctonus rufipennis*	Engelmann spruce	Colorado, Wyoming	Populations were at endemic levels in scattered windthrown spruce and logging slash. Active infestations were detected west of Denver in areas subjected to high water during spring runoff. Damage occurred at the U.S. Air Force Academy near Colorado Springs and on the Bear Ears Ranger District of the Routt National Forest; commercial thinning or salvage sales were planned for these areas.
Tent caterpillars *Malacosoma americanum* *M. californicum* *M. disstria*	American plum, Chokecherry, Hardwoods	Colorado, South Dakota	Defoliation by western tent caterpillar continued in the Chama Basin on the southern end of the Rio Grande National Forest. Eastern tent caterpillars caused nearly complete defoliation of American plum and chokecherry in northeastern South Dakota and in counties along the Missouri River. An outbreak of forest tent caterpillar reported in northeastern South Dakota in 1988 collapsed in 1989.
Terminal weevils *Pissodes terminalis* *Pissodes engelmanni*	Lodgepole pine, Engelmann spruce, Blue spruce	Colorado, Wyoming	No significant activity was reported in 1989.
Twig beetle *Pityophthorus* sp.	Ponderosa pine	Colorado	Flagging of branches was detected in the Black Forest.

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

Insect	Host	Location	Remarks
Uglynest caterpillar *Archips cerasivorana*	Chokecherry	South Dakota	Nearly complete defoliation occurred in many windbreaks along the Missouri River in central South Dakota. Pupal parasitism was high, so the outbreak was not expected to last long.
Walnut caterpillar *Datana integerrima*	Pecan, Walnut	Kansas	Damage increased, especially in southeastern Kansas. Complete defoliation occurred in some areas.
Western balsam bark beetle *Dryocoetes confusus*	Subalpine fir	Colorado	No significant activity was reported in 1989.
Western pine beetle *Dendroctonus brevicomis*	Ponderosa pine	Colorado	Populations were detected in conjunction with mountain pine beetle and roundheaded pine beetle on the Uncompahgre Plateau.
Western spruce budworm *Choristoneura occidentalis*	Douglas-fir, Engelmann spruce, Subalpine fir, White fir	Colorado, Wyoming	Severe defoliation occurred at several locations in Colorado: Spruce Basin at Cotopaxi, the southern end of South Park near Salida/Buena Vista, and on the Pike National Forest west of the U.S. Air Force Academy near Colorado Springs. Aerial application of *Bacillus Thuringiensis* (*B.t.*) to 140 acres at Lake Purgatory development north of Durango provided satisfactory control. About 50,000 acres were infested in Colorado.
White pine weevil *Pissodes strobi*	Colorado blue spruce	Colorado	Typical top-kill and leader deformity was detected in 12 percent of trees examined in the Upper Bear Creek Valley near Kittredge. Most damage was in sapling and pole-size trees.

Rocky Mountain Region Diseases

Prepared by Peter A. Angwin

Disease	Host	Location	Remarks
Stem and Branch Diseases			
Comandra blister rust *Cronartium comandrae*	Lodgepole pine	Colorado, Wyoming	Comandra blister rust continued as the most serious disease of lodgepole pine on the Wind River Ranger District, Shoshone National Forest, in Wyoming where more than half of the mature trees were infected and 85 percent of infected trees had dead tops. The disease was present but not a management problem in northern Colorado.
Dwarf mistletoes *Arceuthobium americanum*	Lodgepole pine	Colorado, Wyoming	Dwarf mistletoes remained the most important disease on Federal lands in the Region. The disease was found on 518,000 acres in Colorado and 361,000 acres in Wyoming. Mortality and growth loss equaled 10 million cubic feet.
Arceuthobium douglasii	Douglas-fir	Colorado	There were reports of many trees killed in recreational areas and homesites in the mountains west of Colorado Springs. Scattered occurrences were reported at the U.S. Air Force Academy. The disease adversely affected timber management on the Southern Ute Reservation in southern Colorado
Arceuthobium vaginatum subsp. *cryptopodum*	Ponderosa pine	Colorado	Twenty percent of the host type was infected. Annual losses amounted to 885,000 cubic feet. The disease was reported as adversely affecting management on the southern Ute Reservation and at the U.S. Air Force Academy.
Arceuthobium divaricatum	Pinyon pine	Colorado	Pinyon pine dwarf mistletoe continued to be a minor problem in western Colorado.
Western gall rust *Endocronartium harknessii*	Lodgepole pine, Ponderosa pine	Colorado, South Dakota	Western gall rust was reported damaging lodgepole pine on the White River National Forest in Colorado, in ponderosa pine in the Black Hills, and at Mount Rushmore National Monument in South Dakota.

Disease	Host	Location	Remarks
Canker Diseases			
Botryodiplodia spp.	Juniper	Kansas	This continued to be a problem in windbreaks.
Botryosphaeria stevensii	Eastern redcedar, Rocky Mountain juniper	Nebraska, Kansas	This was a serious problem in scattered areas of Kansas and eastern and central Nebraska.
Cytospora canker *Cytospora* spp.	Colorado blue spruce	Colorado	No significant activity was reported in 1989.
Phomopsis sp. or *Tubercularia* sp.	Russian olive	Kansas, South Dakota	This disease continued to cause serious decline and mortality in windbreaks in eastern Kansas.
Siberian elm canker *Botryodiplodia hypodermia*	Siberian elm	Colorado, South Dakota	Cankers were associated with flagging and decline in eastern Colorado. Elm decline continued throughout South Dakota. Herbicide damage was suspected as a predisposing factor to infection by this fungus.
Thyronectria canker *Thyronectria austro-americana*	Honeylocust	Colorado, Kansas	This was a major disease problem in urban plantings along the Colorado Front Range and continued to be a problem in Kansas windbreaks.
Root Diseases			
Annosus root disease *Heterobasidion annosum*	White fir	Colorado	This disease adversely affected management of mixed conifer stands on the Southern Ute Reservation.
Armillaria root disease *Armillaria* spp.	Engelmann spruce, Lodgepole pine, Subalpine fir, White fir	Colorado	Armillaria root disease was the most common root disease in the State. The disease adversely affected management of mixed conifer stands on the Southern Ute Reservation.
Black stain root disease *Ophiostoma wageneri* (=*Ceratocystis wageneri*)	Pinyon pine	Colorado	Black stain root disease caused widespread scattered mortality in southwest Colorado.

Disease	Host	Location	Remarks
Foliage Diseases			
Anthracnose *Gnomonia leptostyla*	Walnut	Kansas	This disease was not a problem in 1989 due to dry weather.
Apiognomonia veneta (=*Gnomonia platani*)	Sycamore	Kansas	No significant activity was reported in 1989.
Brown spot needle blight *Scirrhia acicola*	Scots pine	Kansas	Reports were less numerous than usual, but the disease was quite severe in several windbreaks in southeast Kansas.
Cedar apple rust *Gymnosporangium juniperi-virginianae*	Eastern redcedar	Colorado, South Dakota	Galls on cedar were extremely heavy in southern and central South Dakota and in one area of northeastern Colorado.
Diplodia blight *Sphaeropsis sapinea* (=*Diplodia pinea*)	Austrian pine, Ponderosa pine	Kansas, Nebraska, South Dakota	Branch dieback and tree mortality were common in windbreaks and urban plantings. This disease was becoming active again in the Black Hills. Late infections were observed in western Kansas following a severe hailstorm in July.
Fire blight *Erwinia amylovora*	Apple, Crabapple	Colorado	Fire blight killed several hundred trees at the U.S. Air Force Academy.
Ink spot *Ciborinia whetzelii* **Marssonina blight** *Marssonina populi*	Aspen	Colorado, South Dakota	Ink spot and marssonina blight created great aesthetic concern. Fewer incidents were reported this year than last year.
Ash rust *Puccinia sparganioides*	Green ash	South Dakota	Reports were numerous, but less than during the outbreak of 1987. Most trees were expected to recover.
Needle casts *Lophodermella concolor* *Lophodermella montivaga*	Lodgepole pine	Colorado	No significant activity was reported in 1989.
Cercospora blight of juniper *Cercospora sequoiae*	Juniper	Nebraska	This continued to be a problem in windbreaks.
Dothistroma needle blight *Scirrhia pini*	Austrian pine	Nebraska	This disease was a problem on young trees in scattered areas.

Disease	Host	Location	Remarks
Vascular Wilts and Declines			
Dutch elm disease *Ceratocystis ulmi*	Elm species	Colorado, Nebraska, South Dakota	There was a statewide decline in incidence in Colorado. However, dutch elm disease remained top priority for control in Colorado's urban forests. In South Dakota, the disease annually continued to kill 6 to 10 percent of the American elms in communities without management programs. In Nebraska, the disease continued to be a problem.
Oak wilt *Ceratocystis fagacearum*	Oak species	Kansas	No new areas of infection were reported, but the number of infected trees increased.
Pine wood nematode *Bursaphelenchus xylophilus*	Scots pine	Kansas	No infected trees were confirmed in 1989. Sanitation was still the only recommended control measure.
Nursery Diseases			
Leaf shothole *Cylindrosporium* sp.	Black cherry	Nebraska	No significant activity was reported in 1989.
Undetermined	Ponderosa pine	Colorado	A general recovery of pine from the mid 1980's was noted in the San Juan Basin in southwestern Colorado.
Abiotic			
Chemical damage	Many tree species	Colorado	Herbicide damage to windbreaks in eastern Colorado and western Kansas was much greater than usual. Dry conditions through the winter and spring led to delayed wheat development and heavy weed growth, which led to special applications of 2,4-D/Ally®. Widespread drift problems damaged many windbreaks. The full extent of the damage will not be known for several years.

Disease	Host	Location	Remarks
Drought, other unknown agents	Black walnut, Blue spruce, Buffaloberry, Dogwood, Pear, Ponderosa pine, Russian olive, Siberian elm, Silver maple	Nebraska, South Dakota	Drought and abnormally high temperatures affected trees in many counties.
High water	Ponderosa pine	Colorado	Pockets of mortality were north of Mancos, Colorado.
Winter drying injury	Douglas-fir, Juniper, Lodgepole pine, Pinyon pine, Ponderosa pine, Siberian elm, Weeping willow	Colorado, Nebraska, South Dakota, Wyoming	A sudden drop from balmy conditions in late January to -30 F (-34 C)(or colder) led to widespread winter drying (redbelt) on 20,190 acres in Jefferson, Clear Creek, Gilpin, Boulder, El Paso, Park, Heurfano, Teller, and Larimer in Colorado. Winter drying was prevalent in the Pine Ridge of Nebraska, Black Hills of South Dakota, and Bighorn Mountains in Wyoming. Very little, if any, mortality was expected. Frost damage to new buds in Siberian elm and weeping willows throughout South Dakota and western Nebraska resulted in a loss of 50 percent or more of the crowns of many affected trees.
Other			
Sprout dieback	Aspen	Colorado	Mortality of few- to several-year-old sprouts occurred infrequently after harvest of aspen stands. Snow damage, dry sites, wet sites, herbivore pressure, competing understory, soil evolution, and disease may be involved.
Porcupine feeding	Lodgepole pine, Ponderosa pine	Colorado, South Dakota	Locally common damage was reported at the Vail and Beaver Creek ski areas in Colorado and at Mount Rushmore National Memorial in South Dakota.

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 from 3,360 acres in 1988 to 3,248 acres. Tree mortality occurred on the Apache-Sitgreaves, Coronado, Kaibab, and Tonto National Forests in Arizona, the Carson National Forest, the Taos Pueblo Indian Reservation, and nearby State and private lands in New Mexico. Estimated volume losses were 205,000 cubic feet.
Large aspen tortrix *Choristoneura conflictana*	Aspen	Arizona, New Mexico	No significant activity was reported in 1989.
Mountain pine beetle *Dendroctonus ponderosae*	Ponderosa pine	Arizona, New Mexico	Acres where tree mortality occurred decreased from 1,555 acres in 1988 to 913 acres. Tree mortality occurred on the Kaibab National Forest and Grand Canyon National Park in Arizona and on the Carson and Santa Fe National Forests in New Mexico. Volume losses were 68,500 cubic feet.
Pandora moth *Coloradia pandora*	Ponderosa pine	Arizona	Larvae of the pandora moth lightly defoliated 729 acres of the ponderosa pine forest cover type on the Grand Canyon National Park in Arizona. Defoliation was not expected to occur again until the summer of 1991.
Pine engraver beetles *Ips* spp.	Ponderosa pine	Arizona, New Mexico	*Ips* beetle-caused tree mortality increased from 4,985 acres in 1988 to 11,050 acres. Most of the mortality occurred on the Fort Apache (7,880 acres) Indian Reservation in Arizona. Tree mortality was detected on the Apache-Sitgreaves, Coconino, Kaibab, and Tonto National Forests and the San Carlos Indian Reservation in Arizona. Mortality was detected on the Carson, Cibola, Gila, and Santa Fe National Forests and Isleta, Mescalero-Apache, and Taos Pueblo Indian Reservations in New Mexico. *Ips*-related volume losses were 666,360 cubic feet.

Insect	Host	Location	Remarks
Prescott scale *Matsucoccus vexillorum*	Ponderosa pine	Arizona	Twig and branch dieback increased on the Chevelon Ranger District, Apache-Sitgreaves National Forests. Damaged to seedlings, saplings, and pole-sized ponderosa pines were found across 74,000 acres.
Spruce aphids *Elatobium* sp.	Spruce	Arizona	No significant activity was reported in 1989.
Spruce beetle *Dendroctonus rufipennis*	Engelmann spruce	Arizona, New Mexico	The spruce beetle caused low levels of tree mortality. Spruce beetle infestations increased to 780 acres from 55 acres in 1988. Most tree mortality occurred in northern New Mexico on the Carson National Forest (684 acres). Some scattered individual and small group tree mortality occurred on the Apache-Sitgreaves and Kaibab National Forests and the Grand Canyon National Park in Arizona and on the Santa Fe National Forest in New Mexico. Volume losses were 46,750 cubic feet.
True fir bark beetles *Scolytus* spp. *Dryocoetes confusus*	True firs	Arizona, New Mexico	No significant activity was reported in 1989.
Western pine beetle *Dendroctonus brevicomis*	Ponderosa pine	Arizona, New Mexico	Activity increased to 3,685 acres from 2,590 acres. Most of the tree mortality occurred on the Tonto (1,665 acres) and Prescott (325 acres) National Forests and the Fort Apache (978 acres) Indian Reservation in Arizona. Individual and small group tree mortality occurred on the Coconino and Coronado National Forests in Arizona and the Gila and Lincoln National Forests in New Mexico. Volume losses were 267,250 cubic feet.

Insect	Host	Location	Remarks
Western spruce budworm *Choristoneura occidentalis*	Douglas-fir, Spruce, White fir	Arizona, New Mexico	Western spruce budworm defoliation decreased from 483,389 acres to 90,800 acres. The most extensive areas of defoliation occurred in northern New Mexico on the Carson (33,800 acres) and Santa Fe (14,400 acres) National Forests and adjacent and nearby State and private lands (39,520 acres). Less extensive areas of defoliation occurred on the Apache-Sitgreaves (720 acres) National Forests in Arizona, the Cibola (200 acres) and Gila (1,560 acres) National Forests, and Mescalero-Apache (600 acres) Indian Reservation in New Mexico. Radial growth loss was conservatively estimated at 638,657 cubic feet.
White fir needleminer *Epinotia meritana*	White fir	Arizona	This insect caused minor levels of defoliation to white fir across the northern portions of the Kaibab National Forest for the third consecutive year. Approximately 1,960 acres of host type were defoliated compared to 1,675 acres in 1988 and 1,120 acres in 1987.

Southwestern Region Diseases

Prepared by Mary Lou Fairweather and Jill Wilson

Disease	Host	Location	Remarks
Stem and Branch Diseases			
Aspen trunk rot *Phellinus tremulae*	Aspen	Arizona, New Mexico	Aspen trunk rot was widespread. It was the most common cause of cull and defect in mature stands.
Comandra blister rust *Cronartium comandrae*	Mondell pine, Ponderosa pine	Arizona	Comandra blister rust was observed on ponderosa and exotic mondell pines in and around Payson, Sedona, and Prescott. Individual trees in landscape areas and Christmas tree plantations were damaged. This disease has been found on the alternate host, bastard toadflax (*Comandra umbelata*), in southeastern Arizona, but infection on pines needs to be confirmed.
Dwarf mistletoes *Arceuthobium* spp.	Douglas-fir, Engelmann spruce, Pines	Arizona, New Mexico	Dwarf mistletoes, the most widespread and frequently observed pests in the Region, infected 46 percent (2.2 million acres) of the total commercial acreage (4.8 million acres), accounting for 25 million cubic feet of volume loss. Aesthetic value and longevity of trees in campgrounds was also impacted. Surveys were conducted in some areas to quantify the loss.
Fir broom rust *Melampsorella caryophyllacearum*	True firs	Arizona, New Mexico	Fir broom rust was widely distributed throughout the subalpine, corkbark, and white fir habitat types in the Southwest. Top breakage was typical.
Limb rust *Cronartium arzonicum* *Peridermium filamentosum*	Ponderosa pine	Arizona	Small group (2 to 3 trees) infections were detected on the Apache-Sitgreaves National Forests and the Fort Apache Indian Reservation.
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. Its distribution is scattered. Losses and damage were minimal in most stands. The disease was found in suppressed, immature pine and mixed conifers.

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

Disease	Host	Location	Remarks
Red rot *Dichomitus squalens*	Ponderosa pine	Arizona,	Red rot decay was the most common cause of decay in living ponderosa pine in the Southwest.
Rust-red stringy rot *Echinodontium tinctorium*	Spruce	Arizona	This fungus was scattered in mature and overmature stands of mixed conifers but caused insignificant losses.
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* (=*Cenangium singulare*) *Ceratocystis fimbriata* *Cryptosphaeria populina* *Hypoxylon mammatum*	Aspen	Arizona, New Mexico	Canker fungi caused significant reductions in value in timber stands and recreation sites. Many timber stands were 30 percent infected with one or more of these fungi. In campgrounds, the damage was often more severe.
Root Diseases			
Annosus root disease *Heterobasidion annosum*	Douglas-fir, Ponderosa pine, Spruce, True firs	Arizona, New Mexico	In Arizona and New Mexico, root and butt rot pathogens were responsible for a 10 percent reduction in volume of infected stands. Infection in some mixed conifer stands was greater than 25 percent. *Armillaria* spp. accounted for 80 percent of the root disease damage in conifers; other 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* spp.	Douglas-fir, Ponderosa pine, Spruce, True firs	Arizona, New Mexico	
Black stain root disease *Ophiostoma wageneri* (=*Ceratocystis wageneri*)	Pinyon pine	Arizona, New Mexico	
Schweinitzii butt rot *Phaeolus schweinitzii*	Douglas-fir, True firs	Arizona, New Mexico	
Tomentosus root rot *Inonotus tomentosus*	Ponderosa pine, Spruce	Arizona, New Mexico	
White mottled rot *Ganoderma applanatum*	Aspen	Arizona, New Mexico	

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

Disease	Host	Location	Remarks
Foliage Diseases			
Elytroderma disease *Elytroderma deformans*	Pinyon pine, Ponderosa pine	Arizona, New Mexico	Elytroderma disease was widely distributed but at low levels.
Lophodermella needle cast *Lophodermella cerina*	Ponderosa pine	Arizona, New Mexico	Ponderosa pine of all ages were infected with this needle cast disease on the Apache-Sitgreaves, Coconino, and Coronado National Forests in Arizona and on the Carson, Cibola, and Santa Fe National Forests in New Mexico. Needle discoloration occurred on 71,584 acres of the ponderosa pine forest cover type.
Marssonina blight *Marssonina populi*	Aspen	Arizona, New Mexico	See discussion under "Other."
White pine needle cast *Hypodermella arcuata*	Southwest white pine	Arizona	No significant activity was reported in 1989.
Abiotic			
Drought	Chihuahua pine	Arizona	Extensive mortality of chihuahua pine occurred in the Chiricahua Mountains of the Coronado National Forest. Mortality was in large clumps in many drainages and was associated with heavy dwarf mistletoe infestation. The same situation was observed in the neighboring Chiricahua National Monument.
Hail damage	Douglas-fir, Juniper, Pinyon pine, Ponderosa pine, Oak	New Mexico	Extensive hail damage occurred on the Pecos Ranger District, Santa Fe National Forest. Although the trees were heavily defoliated by the hail, no permanent damages were expected to occur.

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

Disease	Host	Location	Remarks
Other			
Aspen defoliation Large aspen tortrix *Choristoneura conflictana* Marssonina blight *Marssonina populi*	Aspen	Arizona, New Mexico	Aspen defoliation resulting from this insect and disease complex decreased from 65,075 acres to 19,060 acres. Pockets of defoliation occurred on the Apache-Sitgreaves and Kaibab National Forests and Grand Canyon National Park in Arizona and on the Gila and Santa Fe National Forests and Santa Clara and Taos Pueblo Indian Reservations in New Mexico.
True fir pest complex *Scolytus ventralis* (in white fir); *Dryocetes confusus* (in subalpine fir) *Armillaria* spp. *Heterobasidion annosum*	White fir, Subalpine fir	Arizona, New Mexico	True fir mortality was observed throughout much of the mixed conifer and spruce-fir types. Trees on 690 acres were affected; 260 of these acres were National Forest lands; 330 acres were Federal lands; and 100 acres were private lands.
Looper, Abiotic complex *Galenara consimilis*	Douglas-fir, White fir	New Mexico	No significant activity was reported in 1989.
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

Insect	Host	Location	Remarks
Alder flea beetle *Altica ambiens*	Alder	Idaho	Defoliation of alder was noted in the Mann Creek drainage on the Payette National Forest.
Cooley spruce gall adelgid *Adelges cooleyi*	Spruce	Idaho	Infestations occurred in forested areas and on ornamental hosts throughout southern Idaho.
Douglas-fir pole beetle *Pseudohylesinus nebulosus*	Douglas-fir	Idaho	Tops and branches of large trees were killed along with poletimber and saplings throughout southern Idaho.
Douglas-fir beetle *Dendroctonus pseudotsugae*	Douglas-fir	Idaho, Utah, Wyoming	Increases in beetle activity occurred on the Boise, Caribou, Challis, Payette, Salmon, Sawtooth, and Targhee National Forests in Idaho; on the Bridger-Teton National Forest in Wyoming; and on the Wasatch-Cache National Forest in Utah. The Douglas-fir beetle killed 190,200 trees.
Douglas-fir tussock moth *Orgyia pseudotsugata*	Douglas-fir	Idaho	No defoliation was observed, but moths were detected in pheromone-baited traps in southern Idaho.
Fir engraver beetle *Scolytus ventralis*	Grand fir, White fir	Idaho, Utah, Nevada	Extensive areas of grand fir were killed on the Boise and Payette National Forests in Idaho. White fir was killed on the Toiyabe National Forest, Nevada. In Utah, mortality was located on the Wasatch-Cache National Forest.
Gypsy moth *Lymantria dispar*	Hardwoods	Idaho, Utah, Wyoming	Seven moths were captured in pheromone-baited traps in Idaho Falls, Idaho, and a single moth was captured in Pocatello, Idaho. In Salt Lake City, Utah, 1,200 acres were treated with three applications of *Bacillus thuringiensis* (*B.t.*). In Wyoming, pheromone-baited traps caught 4 moths with a multiple catch in Thermopolis.

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

Insect	Host	Location	Remarks
Jeffrey pine beetle *Dendroctonus jeffreyi*	Jeffrey pine	Nevada	Jeffrey pine mortality increased. On the Toiyabe National Forest in Nevada, 14,700 trees were killed.
Large aspen tortrix *Choristoneura conflictana*	Aspen	Utah	Defoliation occurred infrequently throughout Utah.
Locust borer *Megacyllene robiniae*	Black locust	Idaho	Locust borer continued to kill black locust trees in Boise, Idaho.
Mountain pine beetle *Dendroctonus ponderosae*	Lodgepole pine, Ponderosa pine, Other pines	Idaho, Utah, Wyoming	Tree mortality decreased from 63,000 trees in 1988 to 40,000 trees in 1989. Significant infestations occurred on the Boise, Challis, Salmon, and Sawtooth National Forests in Idaho and on the Manti-LaSal National Forest in Utah.
Pine butterfly *Neophasia menapia*	Ponderosa pine	Idaho	Defoliation was not noted, but small numbers of adults were observed in ponderosa pine stands.
Pine engraver beetle *Ips pini*	Pines	Idaho, Nevada	Mortality, often associated with western pine beetle activity, was noted throughout southern Idaho. In Nevada, mortality was often associated with Jeffrey pine beetle activity.
Pine needle sheathminer *Zelleria haimbachi*	Lodgepole pine	Idaho	Defoliation decreased in 1989. Scattered infestations persisted on the Boise, Payette, Sawtooth, and Targhee National Forests in Idaho.
Spruce beetle *Dendroctonus rufipennis*	Engelmann spruce	Idaho, Utah, Wyoming	Two new large infestations, totaling 12,200 trees were detected on the Manti-LaSal National Forest in Utah. Approximately 32,100 infested trees were killed on the Payette National Forest in Idaho. Smaller infestations occurred on the Bridger-Teton National Forest in Wyoming and on the Dixie and Fishlake National Forests in Utah.
Spruce bud scale *Physokermes piceae*	Spruces	Idaho	Infestations of spruce bud scales were detected on ornamental spruces scattered throughout southern Idaho.
Sugar pine tortrix *Choristoneura lambertiana*	Pines	Idaho	This insect, often associated with pine needle sheathminer, caused scattered defoliation of lodgepole and ponderosa pines.

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

Insect	Host	Location	Remarks
Western balsam bark beetle *Dryocoetes confusus*	Subalpine fir	Idaho, Utah, Wyoming	During 1989, 37,200 trees were killed. Mortality was located on the Bridger-Teton National Forest and Grand Teton National Park in Wyoming, on the Wasatch-Cache National Forest in Utah, and on the Caribou, Sawtooth, and Targhee National Forests in Idaho.
Western pine beetle *Dendroctonus brevicomis*	Ponderosa pine	Idaho	Significant western pine beetle activity, often associated with pine engraver beetle, increased throughout southern Idaho. These two species killed 53,200 trees. Infestations occurred on the Boise, Payette, and Salmon National Forests in Idaho.
Western pineshoot borer *Eucosma sonomana*	Ponderosa pine	Idaho	Scattered infestations were noted in ponderosa pine plantations on the Boise and Payette National Forests.
Western spruce budworm *Choristoneura occidentalis*	Douglas-fir, Spruce, True firs	Idaho	Defoliation decreased to 10,700 acres from 42,300 acres in 1988. Infestations were located on the Boise, Salmon, and Targhee National Forests in Idaho.

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 abietis*	Subalpine fir, Grand fir	Idaho, Utah	Widespread branch flagging was noted, often preceeding attack by western balsam bark beetle.
Dwarf mistletoes *Arceuthobium* spp.	Douglas-fir, Lodgepole pine, Ponderosa pine, Western larch, Jeffrey pine	Idaho, Nevada, Utah, Wyoming	These continued to be the most widespread and frequently observed pests in southern Idaho. Suppression projects removed infected overstory trees from 3,643 acres.
Limb rust *Peridermium filamentosum*	Ponderosa pine	Utah	Infection was detected in stands on the Dixie National Forest.
Red ring rot *Phellinus pini*	Western larch, True firs, Spruce, Douglas-fir, Pines	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, White fir, Subalpine 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 host types. Infection levels were variable.

Root Diseases

Annosus root disease *Heterobasidion annosum*	Douglas-fir, Lodgepole pine, Ponderosa pine, True firs, Engelmann spruce	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, 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 of pole-size Douglas-fir and spruce and occasionally subalpine fir in southern Idaho.

Disease	Host	Location	Remarks
Foliage Diseases			
Ash yellows	Velvet ash	Nevada, Utah	Infection centers were located in Las Vegas Nevada and Zion National Park.
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	Moderate levels of infection were noted in stands on Little Donner Summit, Cascade, Idaho, and around Idaho City, Idaho.
Fir broom rust *Melampsorella caryophyllacearum*	Subalpine fir	Idaho, 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.	Subalpine fir, Grand 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 1989.
Lodgepole pine needle cast *Lophodermella concolor*	Lodgepole pine	Wyoming	Scattered incidence of light intensity was noted in southwestern Idaho.
Marssonina blight *Marssonina populi*	Aspen	Idaho, Utah, Wyoming	Scattered incidence of light to heavy intensity was noted throughout most of the host range.

Disease	Host	Location	Remarks
Shepherd's crook *Venturia macularis*	Aspen	Idaho	Scattered incidence of light intensity was noted in southwestern 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 4 consecutive years of below normal precipitation. Damage was most acute in southern Idaho.
Winter injury	All vegetation	Regionwide	Tree mortality occurred in all age and size classes due to record-breaking cold temperatures and high winds in eastern Idaho, western Wyoming, and northern Utah.

Pacific Southwest Region Insects

Prepared by John Dale

Insect	Host	Location	Remarks
A Caroline short-nosed weevil *Lophothetes* sp.	Avocado, Banana, Citrus, Beach Naupaka, Tropical almond, Others	Palau	This pest was serious on the many host plants that it attacks.
A coconut palm weevil *Rhobdoscelus asperipennis*	Coconut palm	Northern Mariana Islands	No significant activity was reported in 1989.
A coneworm *Dioryctria* sp.	Sugar pine	Northern California	Larvae were common in cones shipped to the Placerville Nursery.
A cutworm *Euxoa excellens*	Jeffrey pine, Red fir, White fir	Central California	Ten to twenty percent of replacement planting stock was killed on a 47-acre revegetation project for a hydroelectric site on the Sierra National Forest.
A pine needle weevil *Scythropus* sp.	Jeffrey pine, Ponderosa pine, Sugar pine	Central and northern California	Light damage was observed on small pines throughout the Tule River Ranger District, Sequoia National Forest. Sugar pines were damaged at the Badgerhill Seed Orchard, Eldorado National Forest.
A pyralid moth *Thliptoceras octoquttale*	*Mussaenda frondosa*	Palau	This moth bores into the apical buds and is a serious pest.
A rose beetle *Adoretus versutus*	Cocoa, Loquat, Ramutan	American Samoa	No significant activity was reported in 1989.
A scarab beetle *Dichelonyx backi* *Polyphylla decemlineata*	Ponderosa pine	Northern California	Seedlings planted in 1988 after the Lost Fire (Lassen National Forest) were severely defoliated.
A short-horned grasshopper *Valanga nigricornis*	Banana, Coconut palm, *Citrus* spp.	Palau	Damage was common on host plants.
A stick insect *Graeffea crovanii*	Coconut palm	American Samoa	Damage can be serious in some locations.
A thrips *Rhiyiphorothrips pulchellus*	Mountain apple	Hawaii (Oahu)	No report of activity after the initial discovery in 1988.

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

Insect	Host	Location	Remarks
A thrips *Scirtothrips dorsalis*	False heather	Hawaii (Maui)	No significant activity was reported in 1989.
A wax scale *Ceroplastes* sp.	*Antidesma bunius*, *Eugenia aquea*, *Mussaenda frondosa*, *Spondias pinnata*	Palau	Shrubs of Mussaenda frondosa were heavily covered with the scale which was less serious on other hosts.
Agamemnon butterfly *Papilio agamemnon*	*Annona* spp.	Palau	Newly developed leaves were chewed by this butterfly.
An hesperiid moth *Hasora choromus*	*Pongamia pinnata*	Palau	Defoliation was observed on individual trees and was serious.
Ash whitefly *Siphoninus phillyreae*	Ornamental trees and shrubs	Southern California	This is a recently introduced insect that is rapidly spreading in Southern California.
Balsam twig aphid *Mindarus abietinus*	White fir	Northern California	This aphid remained a problem at the Placerville Nursery, and studies of suppression techniques continued.
Black citrus swallowtail butterfly *Papilio polytes*	*Citrus* spp.	Palau	Complete defoliation occurred on citrus seedlings.
Black cutworm *Agrotis ipsilon*	Douglas-fir, Jeffrey pine	Arcata, CA	Larvae killed 1-0 seedlings in 4 beds at the Humboldt Nursery.
Black vine weevil *Otiorhynchus sulcatus*	Douglas-fir, Red fir	Northern California	Feeding damage occurred on 1-0 and 2-0 seedlings at the Humboldt Nursery.
California flatheaded borer *Melanophila californica*	Jeffrey pine, Ponderosa pine	California	This borer occurred in conjunction with the western pine beetle. Specifically, this borer killed Jeffrey pine weakened by drought and human activity near Wrightwood in San Bernardino County.
California oakworm *Phryganidia californica*	Live oak	Santa Cruz County, CA	A large population and extensive defoliation were noted in Henry Cowell Campground.
Caroline fruitfly *Dacus frauenfeldi*	Guava, Mango, Mountain apple, Water apple	Palau	This destructive fruitfly was reared from the fruits of hosts plants.

Insect	Host	Location	Remarks
Cedar bark beetles *Phleosinus* sp.	Incense-cedar, Port-Orford-cedar, Redwood	Northern California	Incense-cedar mortality was widespread and much higher than normal in northern California and throughout the Sierra Nevada Mountains. A cedar bark beetle was associated with several spots of Port-Orford-cedar mortality in Shasta and Siskiyou Counties. Root disease was not involved in these spots.
Chinese rose beetle *Adoretus sinicus*	Avocado, Banana, Polynesian chestnut, Tropical almond	Palau	Damage was common and serious on seedlings and young plants. Damage has not been reported in the Northern Mariana Islands since 1986.
Citrus flower moth *Prays citri*	*Citrus* spp.	Palau	This moth caused galls on fruits; damage was observed on flowers also.
Citrus leafminer *Phyllocnistic citrella*	*Citrus* spp.	American Samoa, Palau	This was a serious pest on young citrus trees in American Samoa. Leaf deformation and defoliation were common in Palau.
Citrus snow scale *Unaspis citri*	*Citrus* spp.	American Samoa	This was an occasional pest.
Clover root curculio *Sitona hispidula*	Cover crops	Northern California	This weevil was common in fallow blocks at the Humboldt Nursery. The status as a seedling pest was unknown.
Coconut hispid beetle *Brontispa longissima*	Coconut palm	American Samoa	There were occasional outbreaks; bi-yearly application of *Metarhizium anisopliae* assists in control.
Coconut long-horned grasshopper *Segestes unicolor*	Coconut and other palms	Palau	It was serious on coconut fronds.
Coconut red scale *Furcaspis oceanica*	Coconut palm, *Pandanus* sp.	Palau	Heavy infestations resulted in yellowing and dropping of leaves. One medium-size coconut palm was heavily covered with the scale; the tree died.
Coconut rhinoceros beetle *Oryctes rhinoceros*	Coconut palm	American Samoa, Palau	Adults bred in compost piles and dead coconut palms in Samoa. Monitoring occurred for the presence of *Baculovirus oryctes*, a virus that, along with a wasp, provided economic control on Palau.

Insect	Host	Location	Remarks
Coconut scale *Aspidiotus destructor*	Avocado, Coconut and other palms, Papaya, Soursop, Other fruit trees	American Samoa, Guam, Northern Mariana Islands	Occasional outbreaks on Samoa are controlled by the ladybird beetle, *Chilocorus* sp. No control measures have been initiated on Guam. Palms on Saipan, Tinian, and Rota were damaged. Defoliation occurred on host plants in Palau.
Coconut trunk weevil *Rhabdoscelus asperipennis*	Coconut palm	Northern Mariana Islands, Palau	Older palms on Rota were attacked. The weevil remained serious on the trunk of coconut palms in Peleliu State.
Coneworms *Dioryctria cambiicola* *Diorcytria baumhoferi*	Ponderosa pine	Chico, CA	These coneworms caused cone and bud damage at the Chico Tree Improvement Center.
Conifer aphids *Cinara* spp.	Ponderosa pine, White fir	Northern and central California	Very heavy honeydew deposits occurred on white fir at some locations. Pines at the Chico Tree Improvement Center were infested.
Crab spider *Gasteracantha* sp.	Pollinators, Other insects	Hawaii	Discovered in 1985, this introduced spider is a threat to pollinators and native insects.
Douglas-fir beetle *Dendroctonus pseudotsugae*	Douglas-fir	Northwestern California	Individual and small groups of trees were killed in Mendocino, Lake, and Humboldt Counties. Populations were noted in downed material in Santa Cruz County.
Douglas-fir engraver *Scolytus unispinosus*	Douglas-fir	Northern California	Scattered pole-size Douglas-firs were killed or top-killed on drier sites in Mendocino, Lake, Humboldt, Del Norte, and southwestern Trinity Counties. Mortality levels were lower than in 1988.
Douglas-fir tussock moth *Orgyia pseudotsugata*	White fir	Northern California	The outbreak in Plumas, Lassen, Tehama, and Sierra Counties increased to 105,000 acres, of which 84,000 were treated with *B.t.* in June 1989. Populations were reduced by an average of 90 percent, and severe defoliation was prevented.
Douglas-fir twig weevil *Cylindrocopturus furnissi*	Douglas-fir	Northern California	After 2 successive years of increasing injury, branch flagging seemed to be less in 1989 than preceeding years.

Insect	Host	Location	Remarks
Egyptian fluted scale *Icerya aegyptiaca*	Beefwood, Citrus, Others	Palau	Yellowing and defoliation were common.
Eucalyptus borer *Phoracantha semipunctata*	Eucalyptus	Southern California	Originally discovered in the San Francisco Bay Area, this Australian native was reported in all counties in southern California.
Fir coneworm *Dioryctria abietivorella*	Douglas-fir	Chico, CA	This destructive moth was reared for the first time from collections at the Chico Tree Improvement Center.
Fir engraver beetle *Scolytus ventralis*	Red fir, White fir	California	Mortality of red and white fir was substantial in the northern part of the State. Other *Scolytus* species were sometimes involved, but the fir engraver was responsible for substantial mortality of overstocked, drought-stressed white fir in eastside pine stands. Mixed conifer stands had scattered mortality slightly higher than normal. Above-normal mortality occurred in mixed conifer and true fir stands throughout the Sierra Nevada Mountains. Particularly hard hit were stands on the Stanislaus, Tahoe, and Eldorado National Forests and the Kings River District of the Sierra National Forest.
Fir flatheaded borer *Melanophila drummondi*	Douglas-fir	Northern California	Evidence of fir flatheaded borer was extremely abundant in northern California because of several consecutive dry winters, trees damaged in the fires of 1987, and extensive blowdown caused by a storm in December of 1988 in Humboldt, Trinity, Mendocino, and Siskiyou Counties. This borer was often associated with the fir engraver in the extensive mortality of true firs found on eastside sites from southern Lassen County to Lake Tahoe.
Fruit-piercing moth *Othreis fullonia*	Cerambola, Citrus, Coral tree, Guava, Papaya	American Samoa, Guam, Northern Mariana Islands	This was a serious pest of fruits and vegetables in Samoa. It was not common on Mangoes during the ripening stage in Guam. Trapping programs were initiated on Rota, Tinian, and Saipan.
Gouty pitch midge *Cecidomyia piniinopis*	Ponderosa pine	Northern California	No reports were received, but this midge has always been present somewhere in the State on young pine under stress from drought, competition, environmental pollution, or other factors.

Insect	Host	Location	Remarks
Gypsy moth *Lymantria dispar*	Hardwoods, Ornamentals	California	Approximately 21,000 traps captured 56 moths in 14 counties, with the greatest number coming from Marin (25) and San Diego (8) Counties. Egg masses were found at single sites in Marin and Placer Counties. No treatments occurred in 1989.
Hemispherical scale *Saissetia coffeae*	*Citrus* spp.	American Samoa	This was an occasional pest.
Hibiscus mealybug *Nipaecoccus vastator*	Coconut palm, *Leucaena* spp., *Serianthes nelsonii*	Northern Mariana Islands	Seedlings of *Serianthes nelsonii* planted at Kagman Agriculture Station and Rota Nursery were severely damaged.
Hibiscus psyllid *Mesohomotoma hibisci*	*Hibiscus tiliaceus*	Palau	Several plants were seen covered with the psyllid and its cottony material.
Hollyhock thrips *Liothrips varicornis*	*Abutilon menziesii*, *Hibiscadelphus* sp., *Hibiscus* sp., *Kokia dryanarioides*,	Hawaii	This insect was first discovered in June 1989 and has become a potential pest of the many native and introduced Malvaceae.
Hulodes cranea	*Serianthes kanehirae*	Palau	Damage was common; the pest could become serious.
Jeffrey pine beetle *Dendroctonus jeffreyi*	Jeffrey pine	California	Above normal levels of activity, mostly to individual or small groups of trees, were reported from Alpine, Placer, Nevada, Sierra, northern Mono, and eastern El Dorado. Mortality occurred in southern California near Big Bear in San Bernardino.
Leucaena psyllid *Heteropsylla cubana*	*Samanea saman*, Tangantangan, Other *Leucaena* spp.	Guam, Hawaii, Northern Mariana Islands	Severe attacks resulted in loss of leaves, death of terminals, and low pod production. This native of the Caribbean zone has rapidly spread in the Pacific Region. In previous reports, it has been referred to as the Tangantangan psyllid.
Lodgepole needleminer *Coleotechnites milleri*	Lodgepole pine	Yosemite National Park	Populations in Yosemite National Park remained at endemic levels.

Insect	Host	Location	Remarks
Mango shoot caterpillar *Penicillaria jocosatrix*	Mango	Guam	The larvae consumed new leaves, tender shoots, flowers, and occasionally the very young fruits. This caterpillar was the primary reason for poor mango production in Guam.
Melon fly *Dacus cucurbirtae*	Avocado, Citrus, Figs, Mango	Northern Mariana Islands	An experimental eradication program by the Agricultural Research Service on Rota produced 80 percent control but was not considered successful.
Modoc budworm *Choristoneura retiniana*	White fir	Northern California	Populations in Modoc County remained at endemic levels.
Mountain apple psyllid *Trioza vitiensis*	*Eugenia malaccensis*	Palau	This psyllid causes numerous galls on the leaves of host plants which, in turn, can cause defoliation on young plants.
Mountain pine beetle *Dendroctonus ponderosae*	Lodgepole pine, Ponderosa pine, Sugar pine	Central and northern California	Scattered old-growth sugar pine were killed throughout northern California by a combination of drought stress and beetle attacks. High levels of mortality occurred in drought-stressed sugar pines throughout the central and southern Sierra Nevada Mountains. Some lodgepole pine mortality was reported from the Truckee-Lake Tahoe area, Alpine, Amador, and eastern El Dorado Counties, and parts of Mono County. Scattered ponderosa and sugar pines were attacked in Mendocino County, and group kills occurred in southern Lake County. Coulter pine was attacked along the urban-rural interface and on marginal timber sites in San Bernardino County.
Nantucket pine tip moth *Rhyacionia frustrana*	Monterey pine	Central and southern California	The range of this insect remained unchanged: Alameda, Fresno, and Santa Cruz Counties in the north and Kern, Orange, San Bernardino, and San Diego Counties in the south.
New Guinea sugarcane weevil *Rhabdoscelus obscurus*	Betel nut, Coconut, Sugarcane, (purple var.)	Palau	This weevil was serious on sugar canes.
Pacific tent caterpillar *Malacosoma constrictum*	*Quercus* spp., particularly blue oak	Northern California	Populations collapsed in 1989; egg parasites appeared largely responsible.
Palau coconut beetle *Brontispa palauensis*	Coconut palm	Palau	Damage was noticeable on newly opened leaves.

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

Insect	Host	Location	Remarks
Pandanus beetle *Oxycephala pandani*	*Pandanus* spp.	Palau	Damaged leaves were common.
Pine engraver beetles *Ips* spp.	Pines	California	Damage was higher than normal, but widely scattered in northern California. Above normal activity continued for the third consecutive year in pine and mixed-conifer stands in the central and southern Sierra Nevada Mountains from Placer to Madera Counties. *Ips* were often associated with western and mountain pine beetles. *Ips* alone killed more than 50 percent of the crown or caused the death of ponderosa pines, particularly in stands below 4,000 feet elevation. Pine engravers were very destructive near Idyllwild, San Bernardino County, and areas of San Diego County, especially in the vicinity of Mt. Palomar.
Pine reproduction weevil *Cylindrocopturus furnissi*	Ponderosa pine	Northern California	Although the State's forests were under drought stress, infestations of this insect were not reported.
Poinciana looper *Pericyma cruegeri*	Flame tree, Young Albizia, Other leguminous species	Guam, Northern Mariana Islands	Defoliation has resulted in smaller leaves upon refoliation, death of small branches, loss of vigor, and a poor, desynchronized flowering.
Redbanded thrips *Selenothrips rubrocinctus*	Avocado, Cacao, Cashew, Mango, Tropical almond	Guam, Northern Mariana Islands	This insect was widely distributed throughout the tropics and the entire Marianas. Control was not practical for large trees.
Red turpentine beetle *Dendroctonus valens*	Pines	California	This beetle was partly responsible for the scattered mortality of old-growth ponderosa and sugar pines in northern California, particularly Mendocino and Lake Counties. The number of trees attacked increased throughout the central and southern Sierra Nevada Mountains. Attacks on Monterey pine were widespread in Santa Cruz, Santa Clara, Alameda, Lake, Napa, and Monterey Counties. Scattered mortality occurred in Monterey and ponderosa pine located in Sonoma, Marin, and Solano Counties.

Insect	Host	Location	Remarks
Roundheaded fir borer *Tetropium abietis*	Red fir, White fir	California	This beetle was associated with fir engraver in the extensive mortality on eastside sites from southern Lassen County to Lake Tahoe. It was the most abundant borer in salvage.
Spaeth pandanus *Oxycephala spaethi*	*Pandanus* spp.	Palau	Damaged leaves were common.
Spiraling whitefly *Aleurodicus dispersus*	Cassava, Coconut palms, Fruit, Ornamental, and Shade trees	Guam	Occasional outbreaks occurred in Samoa. It has spread to almost all the islands in the Northern Mariana Group. Two natural enemies were introduced to Guam: a ladybird beetle (*Nephaspis amnicola*) and a wasp (*Encarsia haitiensis*).
Steatococcus scale *Steatococcus samaraius*	Beefwood, Citrus, *Erythrina* sp.	Palau	Yellowing of leaves and defoliation occurred on the host plants.
Strawberry root weevil *Otiorhyhchus ovatus*	Douglas-fir, Red fir	Northern California	Damage occurred to seedlings at Humboldt Nursery.
Striped (white-tailed) mealybug *Ferrisia virgata*	*Citrus* spp.	American Samoa	No significant activity was reported in 1989.
Sugar pine tortrix *Choristoneura lambertiana*	Lodgepole pine	Northern California	Populations remained at endemic levels in Modoc County.
Tent caterpillar *Malacosoma* sp.	Antelope bitterbrush	Eastern California	Populations in Inyo and Mono Counties remained at low levels since collapsing in 1988.
Twig beetles *Pityophthorus* spp.	Douglas-fir, Ponderosa pine, White fir	Northern California	Numerous pines were attacked in Santa Clara, Santa Cruz, Sonoma, and Mendocino Counties.
Vegetable weevil *Listroderes costriorostris obliquus*	Red fir	Northern California	This agricultural weevil caused damage to seedlings at Humboldt Nursery.

Insect	Host	Location	Remarks
Western pine beetle *Dendroctonus brevicomis*	Coulter pine, Ponderosa pine	California	There was a slight increase in mortality in northwestern California; only McCloud Flats had concentrations. Activity increased relative to 1988 levels in mid- to lower-elevation pine and mixed-conifer stands in the central and southern Sierra Nevada Mountains. Mortality extended from Placer to Tulare Counties and was heavy on the Eldorado and Stanislaus National Forests. Extensive mortality to Coulter and ponderosa pine occurred at locations in Santa Barbara, San Bernardino, and San Diego Counties.
Western pineshoot borer *Eucosma sonomana*	Ponderosa pine	Northern California	No significant activity was reported in 1989.
Western yellowjacket *Vespula pensylvanica*	Native insects and animals, Man	Hawaii	This introduced insect remained a public health concern.
White fir needleminer *Epinotia meritana*	White fir	Northern California	Severe defoliation occurred at three locations on or near the Kings River Ranger District, Sierra National Forest.

Pacific Southwest Region Diseases

Prepared by Susan Frankel

Disease	Host	Location	Remarks
Stem and Branch Diseases			
Botryosphaeria canker *Botryosphaeria ribis*	Ceanothus, Chamise, Manzanita	Southern California	Air pollution and moisture stress predisposed chapparal to dieback in many low elevation areas of southern California. High fire hazard and widespread dieback continued.
Cassytha *Cassytha filiformis*	All afforestation species	Guam	This leafless, vine-like, epi-parasitic plant with no natural enemies was widespread on Guam.
Citrus canker *Xanthomonas citri*	*Citrus* spp.	Guam, Northern Mariana Islands	This bacterial disease was prevalent on Guam and Rota. Symptoms included brown lesions on leaves, stem, bark, and fruit.
Dodder *Cuscuta* sp.	Native vegetation	Guam	No significant activity was reported in 1989.
Dwarf mistletoes *Arceuthobium* spp.	Douglas-fir, Pine, True firs	California	Dwarf mistletoes infected conifers on 2.3 million acres of commercial forest land and contributed to 100 million cubic feet of mortality. The parasite was associated with branch flagging in red fir and white fir throughout the Sierra Nevada. Drought stress, bark beetles, and cytospora canker were contributing factors in this decline.
Fusicoccum canker *Fusicoccum* sp.	Pacific madrone	Northern California	The canker continued to cause branch and tree mortality throughout much of the north coastal region.
Pitch canker *Fusarium subglutinans* (= *F. moniliforme* var. *subglutinans*)	Aleppo pine, Bishop pine, Italian pine, Stone pine, Monterey pines	Central coastal California and three locations in southern California	Over 1,000 Monterey pine were affected in Santa Cruz County with a lesser number affected in Alameda County. In Santa Cruz County, the California Department of Transportation removed dead and dying Monterey pine. Many were infested with pine engraver, red turpentine beetles, or both.

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

Disease	Host	Location	Remarks
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. Symptoms abated greatly in 1989.
True mistletoe *Phoradendron* spp.	Cottonwoods, Oaks, Sycamores, Other hardwoods	California	Infections were common on many native and exotic hardwoods in California.
Western gall rust *Peridermium harknessii*	Lodgepole pine, Monterey pine	Northern California	This rust caused branch flagging in Monterey pine from the San Francisco Bay area through Humboldt County.
White fir mistletoe *Phoradendron bolleanum* subsp. *pauciflorum*	White fir	Central and southern California	Incidence was severe in some stands in southern Sierra Nevada and in southern California.
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. Planting of non-resistant sugar pine was curtailed because of the rust. Efforts to identify rust-resistant pines increased.
Root Diseases			
Annosus root disease *Heterobasidion annosum*	Conifers, Some Hardwoods	California	About 1.4 million acres of pine and 0.6 million acres of true fir were infected with this disease. This disease has been associated with tree failures that have caused property damage and personal injury in recreation forests.
Armillaria root disease *Armillaria* sp.	Conifers, Hardwoods	California	This disease was widespread in ornamental plantings and caused windthrow of Douglas-fir and white fir in Humboldt County.

Disease	Host	Location	Remarks
Black stain root disease *Ophiostoma wageneri* (=*Ceratocystis wageneri*)	Douglas-fir, Ponderosa pine, Singleleaf pinyon pine	California	Black stain root disease was associated with thinning and regeneration problems in many Douglas-fir plantations in Mendocino, Humboldt, and Del Norte Counties. Black stain killed pockets of pinyon pine in southern California.
Flame tree root disease *Phellinus noxious*	Flame tree	American Samoa, Guam, Northern Mariana Islands	New infection centers caused mortality of flame trees in several of the major parks Saipan.
Port-Orford-cedar root disease *Phytophthora lateralis*	Port-Orford-cedar	Northern California	Except for a few small infestations on the Siskiyou National Forest (Siskiyou County), this disease remained limited to the Smith River drainage (Del Norte County).
Foliage Diseases			
Elytroderma needle disease *Elytroderma deformans*	Jeffrey pine, Ponderosa pine	California	Signs and symptoms decreased from 1988 levels.
Mango scab *Elsinoe mangiferae*	Mango	Guam	This fungus attacks young leaves, flower heads, twigs, and fruits. It causes a wrinkling distortion and dropping of leaves and fruit.
Vascular Wilts and Declines			
Dutch elm disease *Ceratocystis ulmi*	Elm	San Francisco Bay Area	Dutch elm disease in California remained confined to the San Francisco Bay area. Disease incidence decreased in 1989 with the fewest detections since 1984. Infection was confirmed on 207 elm trees.
Joga decline Cause unknown	Joga	Rota	This disease caused defoliation in the high limestone forests on the island.
Norfolk Island pine decline Cause unknown	Norfolk Island pine	Hawaii	The cause was unknown; symptoms included branch dieback and a general unthrifty appearance.
Pingelap disease Cause unknown	Breadfruit	Guam	This disease is often associated with droughts. Dieback begins at the top and proceeds downward until the tree dies. However, new sprouts often arise from the root system. Usually trees of bearing age are attacked, but all ages can be attacked.

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

Disease	Host	Location	Remarks
Nursery Diseases			
Cedar leaf blight *Didymascella thujina*	Western red cedar	Northern California	Seventy-five percent of the 2-0 western red cedar crop was severely defoliated by this fungus.
Fusarium hypocotyl rot *Fusarium oxysporum*	Douglas-fir, Ponderosa pine	California	Heat stress followed by *Fusarium oxysporum* infection resulted in damage and mortality to 1-0 size seedlings in the Humboldt Nursery.
Phoma blight *Phoma* spp.	Douglas-fir, Red fir, White fir	Northern California	This disease caused loss of lower needles and mortality in overwintering 1-0 Douglas-fir. True fir were also killed.
Phomopsis canker *Phomopsis occulta*	Douglas-fir	California	Minor damage to 2-0 size Douglas-fir was reported at the Humboldt Nursery.
Septoria leaf spot *Septoria alnifolia*	Red alder, White alder	Northern California	Damage was significant in white alder; red alder sustained only slight damage.
Abiotic			
Air pollution effects Ozone	Jeffrey pine, Ponderosa pine	Central and southern California	In October, an evaluation of 26 ozone injury trend plots in the central Sierra Nevada showed 5 had increased injury, 15 had decreased injury, and 6 were unchanged. The overall injury level remained in the light-to-moderate range. Plots in the southern Sierra Nevada showed improved crown conditions, possibly as a result of improved air quality in Southern California.
Salt damage	Conifers, Shrubs	Northern California	Dieback and mortality due to road de-icing salt was apparent along highways in the Lake Tahoe area and along portions of highways in other parts of northern California.
Drought and heat injury	Pine, Fir species, Redwood	California	Drought stress caused mortality of 833 million board feet on central and northwestern California National Forest lands. Additional damage occurred in Southern California and on the Modoc and Lassen National Forests.

Disease	Host	Location	Remarks
Other			
Bud rot *Phytophthora palmivora*	Coconut palm, Ifil, Joga, Breadfruit, Cocoa fruit	American Samoa, Guam, Northern Mariana Islands	Bud rot, wilt, and leaf drop of ifil and joga trees continued on Rota. Breadfruit and cocoa fruit rotted and dropped prematurely.
Cadang-cadang yellow mottle virus	Coconut palm	Guam	The disease caused a serious decline in copra production.
Rhizopus rot *Rhizopus artocarpi*	Jackfruit	Guam	No significant activity was reported in 1989.

Pacific Northwest Region Insects

Prepared by Tim McConnell

Insect	Host	Location	Remarks
Douglas-fir beetle *Dendroctonus pseudotsugae*	Douglas-fir	Oregon, Washington	Douglas-fir beetle damage increased significantly east of the Cascade Range. Losses in Douglas-fir occurred on 324,258 acres (19 million cubic feet). The greatest damage in 1989 was on the Umatilla, Wallowa-Whitman, and Malheur National Forests.
Fir engraver beetle *Scolytus ventralis*	True firs	Oregon, Washington	Fir engraver activity increased in Oregon and Washington. Some of the fir engraver damage occurred on sites infected with either laminated root rot, armillaria root disease, or annosus root disease. All of these diseases weaken true firs and make them susceptible to beetle attack. However, much of the loss in 1989 was the result of 4 years of less-than-normal precipitation. Total losses occurred on 833,743 acres (23.6 million cubic feet) as compared to 267,620 acres (5.7 million cubic feet) in 1988.
Gypsy moth *Lymantria dispar*	Conifers, Hardwoods	Oregon, Washington	Eradication was conducted around two private residences in Lake Oswego near Portland, Oregon. Populations near northeast Vancouver were monitored, and eradication projects were planned for 1990.
Modoc budworm *Choristoneura retiniana*	Douglas-fir, True firs	Southern Oregon	No Modoc budworm defoliation was detected from the air in 1989.
Mountain pine beetle *Dendroctonus ponderosae*	Lodgepole pine, Ponderosa pine, Western white pine, Other pines	Oregon, Washington	In Washington, losses were slightly higher than 1988 and increased only on the Okanogan National Forest. In south-central Oregon, losses decreased slightly on the Deschutes and Winema National Forests. Losses on the Fremont National Forest increased as the outbreak continued to move south. Losses increased in north-central Washington. In 1989, Oregon had 888,000 infested acres; Washington had 231,000.

Pacific Northwest Region--Status of insects in Oregon and Washington

Insect	Host	Location	Remarks
Pine engraver beetles *Ips* spp.	Ponderosa pine	Oregon, Washington	Pine engraver activity increased to 27,450 acres from 27,300.
Spruce beetle *Dendroctonus rufipennis*	Engelmann spruce	Oregon, Washington	Spruce beetle killed 5.4 million cubic feet of timber; a return to 1987 levels. The outbreak on the Wallowa-Whitman National Forest decreased from 68,000 acres to 62,000 acres.
Western pine beetle *Dendroctonus brevicomis*	Ponderosa pine	Oregon, Washington	Tree mortality increased significantly in Oregon and Washington to 8.2 million cubic feet from 2.3 million cubic feet.
Western spruce budworm *Choristoneura occidentalis*	Douglas-fir, Engelmann spruce, True firs, Western larch	Oregon, Washington	Visible defoliation decreased to 1.8 million acres from 3.0 million acres. In Oregon, budworm defoliation decreased on the Mt. Hood, Willamette, Deschutes, Ochoco, Wallowa-Whitman, and Umatilla National Forests, on the Warm Springs Indian Reservation, and on intermingled State and private lands. In Washington, the size and intensity of the budworm infestation increased on the Okanogan and Wenatchee National Forests and the Yakima Indian Reservation.

Pacific Northwest Region Diseases

Prepared by Ellen Michaels Goheen

Disease	Host	Location	Remarks
Stem and Branch Diseases			
Dwarf mistletoes *Arceuthobium* spp.	Various conifers	Oregon, Washington	The impact from dwarf mistletoes in Washington and Oregon remained unchanged from 1988. Dwarf mistletoes were present on 9.5 million acres and caused an estimated loss of 131 million cubic feet of timber in 1989. 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.
Branch cankers *Phomopsis* spp. *Sclerophoma* spp. *Dermea* spp. *Cytospora* spp.	Douglas-fir	Oregon, Washington	Top, branch, and whole tree mortality, associated primarily with drought and secondarily with complexes of canker fungi, were found in plantations and pole-size stands. This damage was reported at a slightly lower level than in 1988.
Stem decay *Phellinus pini* *Echinodontium tinctorium* and other Basidiomycetes	Various conifers	Oregon, Washington	Stem decay fungi destroyed enormous volumes of wood. Most losses occurred in young and intermediate-age stands of thin-bark species, such as true firs and hemlocks. Thin-bark species are more susceptible to wounding during stand entries. Wounding of residual trees activated dormant infections and made trees susceptible to new infections.
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 have been estimated at 15 million cubic feet. Rust-resistant planting stock was available for regenerating stands. Interest in pruning white pine stands continued to increase.

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

Disease	Host	Location	Remarks
Root Diseases			
Root diseases	Various conifers	Oregon, Washington	Root diseases were among the most serious pest problems in Oregon and Washington forests because of the magnitude of losses and difficulty of treatment. They occurred on 3 million acres. Annual losses due to root diseases on land of all ownerships has been estimated at over 180 million cubic feet. Tolerant, resistant, and immune tree species have been planted on 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 losses in many partially cut white and grand fir stands in eastern Washington and Oregon. Most losses were due to tree mortality. Evidence pointed to extensive infection in mixed-conifer stands throughout eastern Washington and Oregon. In white and grand fir stands, severity was expected to increase with time. Annosus root disease was observed with increasing frequency in ponderosa pine stands on very dry sites in southeastern Oregon. Losses were severe in some high-value seed orchards. Attempts were underway to characterize site and stand conditions for seed orchards and ponderosa pine stands. There was greater concern about the potential adverse impacts of annosus root disease on mountain hemlock and Pacific silver fir in high elevation stands in the Cascades. Over the entire Region, use of borax was increasing as a stump protectant to prevent annosus root disease.
Armillaria root disease *Armillaria ostoyae*	Various conifers	Oregon, Washington	The most serious losses due to this disease occurred east of the Cascades in mixed-conifer stands. In localized areas, ponderosa pine was seriously damaged. Losses west of the Cascades were confined to stressed stands, such as off-site plantings. Tolerant or resistant species were being planted as a control measure.

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

Disease	Host	Location	Remarks
Black stain root disease *Ophiostoma wageneri* (=*Ceratocystis wageneri*)	Douglas-fir	Oregon, Washington	In southeastern Oregon, black stain root disease was the most commonly encountered disease in Douglas-fir plantations. The disease was particularly damaging where disturbances, such as road building or soil compaction, had occurred and especially in roadside Douglas-fir cut by mechanical choppers. Losses were greater on tractor-logged sites, which have greater soil compaction, than on cable-yarded sites.
Laminated root rot *Phellinus weirii*	Douglas-fir, Grand fir, White fir	Oregon, Washington	Laminated root rot was the most serious forest tree disease of Douglas-fir and true fir stands west of the Cascades. Where the disease occurred, Douglas-fir and true fir productivity has been reduced 50 percent. West of the Cascade Mountains, an estimated 8 percent of Douglas-fir and true firs have been 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 disease *Phytophthora lateralis*	Port-Orford-cedar	Southwestern Oregon	Port-Orford-cedar root disease continued to cause mortality in southwestern Oregon.
Foliage Diseases			
Dothistroma needle blight *Mycosphaerella pini* [*Dothistroma septospora* (=*Dothistroma pini*)]	Douglas-fir, Lodgepole pine, Ponderosa pine	Oregon, Washington	In 1989, conditions were wetter than in the previous 5 years, and more foliage diseases, particularly larch needle cast, were observed.
Douglas-fir needle cast *Rhabdocline pseudotsugae*			
Elytroderma disease *Elytroderma deformans*			
Larch needle cast *Meria laricis*			

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 has been low (less than 1 percent of crop affected) due to applications of preventative fungicide and regulation of seedbed densities.
Fusarium root and hypocotyl rots *Fusarium oxysporum*	Various conifers	Oregon, Washington	Scattered losses were reported 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 Russell McKinney and Donna Leonard

Insect	Host	Location	Remarks
Bark lice (Psocidae)	Oak	Florida	Psocid infestations prompted 60 public inquiries in Escambia, Santa Rosa, Bay, Leon, and Marion Counties in Florida. Infestations of oaks by these insects were relatively insignificant.
Black-headed pine sawfly *Neodiprion excitans*	Southern pines	Texas	There were several localized areas of defoliation in Polk and Tyler Counties with limited mortality expected.
Black turpentine beetle *Dendroctonus terebrans*	Southern pines	Regionwide	Damage was moderate throughout the Region. Construction damage resulted in beetle damage on longleaf and slash pines in Florida.
Buck moth *Hemileucia maia*	Oaks	Arkansas, Louisiana	Defoliation was light in central Arkansas. Moderate to severe defoliation of live and water oaks occurred in the City of New Orleans and 4 parishes in Louisiana.
Coneworms *Dioryctria amatella* *Dioryctria clarioralis* *Dioryctria disclusa* *Dioryctria merkeli*	Southern pines	Regionwide	Pheromone trap catches indicated moderate population levels of all species. *D. disclusa* populations shifted towards the western part of the Region. Some orchards sustained significant losses. The Arkansas Forestry Commission reported losses of 50 to 75 percent of the second-year conelets between April and July.
Eastern tent caterpillar *Malacosoma americanum*	Black cherry, Hardwoods	Arkansas, North Carolina, Tennessee, Virginia	Heavy infestations occurred in middle and western Tennessee and throughout Arkansas. Scattered, heavy defoliation occurred in western North Carolina and Virginia.
Fall cankerworm *Alsophila pometaria*	Hardwoods	Virginia	Exceptionally heavy populations occurred in southwest Virginia on the Forest Service Clinch Ranger District and on private lands. Wise County was heavily infested.
Fall webworm *Hyphantria cunea*	Bald cypress, Hardwoods	Arkansas, Florida, Georgia, Tennessee	There was severe defoliation of 160,000 acres in Collier and Lee Counties in Florida. New host records were established. Populations were high throughout Arkansas, southern Georgia, and central Tennessee.

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
Forest tent caterpillar *Malacosoma disstria*	Tupelo gum, Black cherry, Other hardwoods	Arkansas, Louisiana, Mississippi, North Carolina, Virginia	Severe defoliation occurred in Arkansas, eastern North Carolina, and on the Pocahontas State Park and Forest in Virginia. Louisiana reported a growth loss of 93,500 cubic feet valued at $467,500 due to severe defoliation of 187,000 acres.
Fruittree leafroller *Archips argyrospila*	Bald cypress	Louisiana	Severe defoliation (>50 percent of crowns turn red) occurred on 50,000 acres in the Atchafalaya Basin. Light defoliation occurred (<50 percent) on 22,000 acres. This resulted in a growth loss of 25,000,000 board feet valued at $2,000,000.
Gypsy moth *Lymantria dispar*	Hardwoods	West Virginia, Virginia	Defoliation occurred on 215,987 acres of host type over a 15-county area in northern Virginia and on 21,318 acres of the George Washington National Forest in West Virginia. The quarantined area now includes 61 of 100 counties.
		Regionwide	Isolated infestations were present in Virginia, Tennessee, South Carolina, and North Carolina. Male moths were trapped in Arkansas, Alabama, Georgia, Kentucky, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia.
Introduced pine sawfly *Diprion similis*	White pine	North Carolina	Significant defoliation of white pine occurred in Macon in North Carolina.
Ips beetle *Ips hoppingi*	Pinyon pine	Texas	No significant activity was reported in 1989.
Larch sawfly *Pristiphora erichsonii*	Larch	North Carolina	No significant activity was reported in 1989.
Larger elm leaf beetle *Monocesta coryli*	Elm	Louisiana	Scattered severe defoliation was reported in 4 parishes with little ecomonic impact.
Loblolly pine sawfly *Neodiprion taedae linearis*	Loblolly pine	Tennessee	Defoliation occurred in Dickson, Williamson, Davidson, Giles, Hickman, Marshall, and Murray Counties in Tennessee.
Locust leafminer *Odontota dorsalis*	Black locust	Tennessee	This perennial pest was active in Cannon, Maury, Robertson, Rutherford, Sumner, and Williamson Counties in Tennessee.

Insect	Host	Location	Remarks
Nantucket pine tip moth *Rhyacionia frustrana*	Loblolly pine, Scotch pine, Shortleaf pine, Virginia pine	Arkansas, North Carolina, Oklahoma, Tennessee	Moderate levels of damage were found throughout Arkansas, Oklahoma, Tennessee, and central North Carolina. Damage continued in Christmas tree plantations in Arkansas and Oklahoma.
Pales weevil *Hylobius pales*	Southern pines	Mississippi, North Carolina	Pales weevil damaged 64 acres of seedlings in Martin in North Carolina. In Mississippi, 104 acres on 2 plantations showed 50 percent mortality.
Periodical cicada *Magicicada septendecim*	Hardwoods	Tennessee	Brood XXIII of the periodical cicada emerged in western Tennessee. Heavy damage was reported in fruit and shade trees throughout the area.
Phoberia moth *Phoberia atomaris*	Oaks	North Carolina	This rare underwing moth defoliated thousands of post and white oaks in central North Carolina.
Pine engraver beetles *Ips avulsus* *Ips grandicollis* *Ips calligraphus*	Southern pines	Regionwide	Hurricane Hugo prompted serious concerns about *Ips* buildup in storm-damaged timber. Activity was minimal due to unusually low December temperatures on the coast. *Ips* activity was building in Texas and Oklahoma (with spots up to 5 acres) due in part to the continued drought. Louisiana and Arkansas reported widespread incidence and moderate damage.
Pine needleminer *Exoteleia pinifoliella*	Loblolly pine, Pond pine, Slash pine	Florida	No significant activity was reported in 1989.
Pine spittlebug *Aphrophora parallela*	Pines	North Carolina, Tennessee, Virginia	Unusually cool, wet weather triggered abnormally high activity. Impact was minimal but prompted many inquiries by homeowners.
Pine webworm *Tetralopha robustella*	Shortleaf pine	Arkansas	No significant activity was reported in 1989.
Psyllidae *Tetragonocephela flava*	Hackberry	Louisiana	Severe defoliation, with widespread dieback and tree mortality, occurred on thousands of hackberry trees in a 10-parish area in southern Louisiana. The economic impact was unknown.

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
Redheaded pine sawfly *Neodiprion lecontei*	Shortleaf pine, Loblolly pine	Arkansas, Georgia, North Carolina, Tennessee	Light defoliation was reported in areas of the northcentral part of Arkansas. There was higher than normal activity in southern Georgia, Davidson and Madison Counties in Tennessee, and Hyde County in North Carolina.
Sand pine cone midge Unknown species	Sand pine	Florida	No significant activity was reported in 1989.
Scale insects *Homoptera*	Southern pines	Regionwide	Localized infestations in various orchards required supplemental sprays.
Seedbugs *Leptoglossus corculus* *Tetyra bipunctata*	Southern pines	Regionwide	There were moderate populations in 1989, and minimal losses were detected.
Slash pine flower thrips *Gnophothrips fuscus*	Slash pine	Florida	No significant activity was reported in 1989.
Slug oak sawfly *Caliroa* sp.	White oak	North Georgia	No significant activity was reported in 1989.
Southern pine beetle *Dendroctonus frontalis*	Southern pines	Regionwide	The areas of heaviest activity remained concentrated in the mountains of Georgia, North Carolina, and Tennessee. In the western Gulf states, populations dropped dramatically in Alabama, Mississippi, and Arkansas. Southern pine beetle populations exploded in Texas in late May and continued at high levels into the winter months. Activity was expected to remain high.

Number of Spot Infestations

State	1988	1989
Alabama	4,164	862
Arkansas	1,544	183
Florida	0	0
Georgia	8,572	3,533
Louisiana	472	519
Mississippi	5,408	2,359
North Carolina	2,127	3,653
Oklahoma	2	0
South Carolina	2,993	727
Tennessee	3,969	3,179
Texas	886	6,125
Virginia	148	0
Total	30,285	21,140

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
Texas leafcutting ant *Atta texana*	Southern pines	Louisiana, Texas	Serious losses continued in pine plantations on deep, sandy soils.
Tuliptree scale *Tourneyella liriodendri*	Yellow poplar	Tennessee	This pest was active in Davidson County.
Variable oak-leaf caterpillar *Heterocampa manteo*	Hardwoods	Oklahoma	In Okmulgee, 1,000 acres were defoliated. There were other reports in Creek, Okfuskee, and Lincoln.
Virginia pine sawfly *Neodiprion pratti pratti*	Virginia pine, Pitch pine, Shortleaf pine	Kentucky, Tennessee, Virginia	Thousands of acres were defoliated for a second straight year in southern Kentucky. Some private land was affected, but most damage was confined to the Daniel Boone National Forest. In Virginia, activity was most pronounced in the central and southern Piedmont. Infestations were light in Lincoln in Tennessee.
Walkingstick *Diapheromera femorata*	Hackberry, Pecan	Oklahoma	North-central Oklahoma reported light defoliation.
Whitefringed beetle *Graphognathus* spp.	Pine	Alabama, Florida, Georgia	In southern Georgia, Alabama, and western Florida, whitefringed beetle activity contributed significantly to severe losses in pine plantations established on agricrop lands.
White pine cone beetle *Conopthorus coniperda*	Eastern white pine	North Carolina	This pest destroyed more than 90 percent of the cone crop of the USDA Forest Service Seed Orchard at Murphy, North Carolina, and the entire crop at the North Carolina Forest Service Edwards Seed Orchard near Morganton, North Carolina.
White pine weevil *Pissodes strobi*	White pine	North Carolina	There was activity in Graham County.
Yellow-poplar weevil *Odontopus calceatus*	Yellow-poplar	Tennessee	There were reports of heavily damaged tuliptrees in Blount, Cocke, McMinn, Greene, Jefferson, Monroe, and Sevier Counties. In some cases, it appeared that fungi invaded the feeding wounds on seedpods, thereby compounding the problem.

Southern Region Diseases

Prepared by Dale Starkey and Steven Oak

Disease	Host	Location	Remarks
Stem and Branch Diseases			
Butternut canker *Sirococcus clavigignenti-juglandacearum*	Butternut	Throughout range of butternut	This disease has eliminated much of the butternut in the Southern Region.
Canker rot *Inonotus hispidus* *Strumella coryneoidea*	Oaks	Alabama, Georgia, Mississippi, North Carolina, Tennessee, Virginia	Canker rot is a stem problem. This disease results in degrade and defect and creates hazardous trees in recreation and urban areas.
Chestnut blight *Cryphonectria parasitica* (=*Endothia parasitica*)	Native chestnuts, Exotic chestnuts, Scarlet oak	Throughout host ranges	Large trees have been killed. Damage to sprouts continued. Butt swell and rot resulted on scarlet oak in some areas.
Comandra blister rust *Cronartium comandrae*	Shortleaf pine	Arkansas	Several stands were affected in northern Arkansas. Some progeny tests were affected.
Fusiform rust *Cronartium quercuum* f. sp. *fusiforme*	Loblolly pine, Slash pine	Regionwide, except Kentucky, Puerto Rico, Tennessee, U.S. Virgin Islands	This continued as the most serious disease of southern pines. Over 17 million acres were estimated to be affected at a 10 percent or greater infection level. Annual losses over the South have been estimated at $53 million.
Hypoxylon canker *Hypoxylon atropunctatum*	Hickory, Oak	Regionwide	This disease was common on dead and dying trees weakened by drought or other adverse agents in forest and urban environments. Droughts in the 1980's increased the 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	The canker continued to be a problem in South Carolina seed orchard trees, rooted cuttings, and field plantings. Trees commonly have shoot dieback and frequently die.
Pitch canker *Fusarium subglutinans* (=*Fusarium moniliforme* var. *subglutinans*)	Southern pines, especially Loblolly and Slash pines	Alabama, Arkansas, Florida, Louisiana, Mississippi, North Carolina	Pitch canker was widespread in slash, loblolly, and shortleaf pine plantations and seed orchards. This disease caused sporadic, severe damage in slash and loblolly plantations. Damage to urban trees was occasionally reported. (See also Seed Orchard diseases.)
Slime flux *Erwinia* spp. and other bacteria	Cottonwood, Oak, Other spp.	Regionwide	Severe damage occurred on overmature trees that were previously storm-damaged or pruned. Crown dieback of white oaks was reported in North Carolina.
Stem canker *Fusarium* spp.	Mahoe	Puerto Rico	No significant activity was reported in 1989.
Stem decay Basidiomycetes	All species, especially Hardwoods	Regionwide	Stem decay continued to be a serious problem. This disease is common in fire- and storm- damaged stands and stands damaged by logging.
Phellinus pini	Virginia pine, Eastern white pine, Shortleaf pine	Georgia, North Carolina, South Carolina, Tennessee, Virginia	No significant activity was reported in 1989.
Phellinus weirianus	Black walnut	Oklahoma	No significant activity was reported in 1989.
Twig canker *Sphaeropsis sapinea* (= *Diplodia pinea*)	Austrian pine, Spruce pine, Ponderosa pine	Florida, Oklahoma	Twig canker often caused severe damage in urban areas in Oklahoma and in windbreaks.
White pine blister rust *Cronartium ribicola*	Eastern white pine	North Carolina, Virginia	Found above 3,000 feet, this disease was serious only in localized areas.

Disease	Host	Location	Remarks
Root Diseases			
Annosus root disease *Heterobasidion annosum*	Southern pines, Eastern white pine	Regionwide	Annosus continued to be the most serious root disease in the South. Damage was reported in thinned stands in Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, northeast Texas, and Virginia.
Littleleaf disease *Phytophthora cinnamomi* and *Pythium* spp.	Loblolly pine, Shortleaf pine	Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee	High incidence occurred in Piedmont in natural and planted stands growing on poorly-drained, eroded, heavy clay soils. Low incidence occurred elsewhere throughout the South.
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. Damage was reported on drought stressed oaks in Florida and loblolly pine in North Carolina.
Root decline *Verticicladiella procera*	Eastern white pine, Loblolly pine	Georgia, North Carolina, Tennessee, Virginia	This was a serious problem in Christmas tree plantations and may be insect-vectored. Root decline was often associated with other root diseases.
Foliage Diseases			
Anthracnose *Gnomonia* sp. *Kabatiella* sp. (= *Gloeosporium* sp.) *Apiognomonia* sp. (=*Gnomonia* sp.)	Hardwoods, especially Ash, Dogwood, Maple, Sycamore, Walnut	Regionwide	Unusually wet spring weather caused a higher incidence in Tennessee, North Carolina, and Virginia. Reports included ash anthracnose (*Discula umbrinella*), maple anthracnose (*Kabatiella apocrypta*), buckeye leaf blotch (*Guignardia aesculi*) and venturia leaf blight (*Venturia acerina*) in Tennessee; *Gnomonia* sp. on white and post oak in North Carolina. (Also see dogwood anthracnose.)
Brown spot *Mycosphaerella dearnessii* (=*Scirrhia acicola*)	Longleaf pine	Throughout longleaf range	This was locally severe in regeneration areas, but can be controlled by using prescribed fire and fungicidal root dips or by planting genetically resistant stock.

Disease	Host	Location	Remarks
Dogwood anthracnose *Discula* sp.	Flowering dogwood	Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia	A disease of flowering dogwood and new to the South, dogwood anthracnose was found in 91 counties on an estimated 2,250,000 acres in the mountains and Piedmont. The disease caused premature defoliation and tree death in much of the affected area.
Needle casts of pine *Lophodermium* spp. *Ploioderma* spp.	Pines	Regionwide	Five counties in North Carolina reported some incidence.
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, especially Loblolly	Regionwide	No significant activity was reported in 1989.
Powdery mildew *Uncinula macrospora* *Microsphaera* sp.	Elm, Oak	Regionwide	Cool, wet conditions in Arkansas during the early summer precipitated outbreaks.
Vascular Wilts and Declines			
Dutch elm disease *Ceratocystis ulmi*	Elms	Throughout host range	This disease was reported in 9 northern Louisiana parishes and 2 northeastern Texas counties. The disease was also reported in scattered counties in Arkansas, Georgia, North Carolina, South Carolina, Tennessee, and Virginia. In central and western Oklahoma, Dutch elm disease killed trees along water courses which seriously limits elms for shelterbelt use.
Mimosa wilt *Fusarium oxysporum* f. sp. *perniciosum*	Mimosa	Throughout host range	No significant activity was reported in 1989.

Disease	Host	Location	Remarks
Oak decline/mortality	Oak species, especially 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. Drought was a major contributing factor. Central Tennessee was severely affected. Disease incidence may increase drastically in Virginia as the gypsy moth moves South. New estimates of damage are available for Virginia.
Oak wilt *Ceratocystis fagacearum*	Oaks	Arkansas, Kentucky, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia	Live and red oaks in 39 counties were affected in central Texas. Severe losses occurred in rural and urban areas. The Texas Forest Service began suppression efforts in 3 counties and the City of Austin in 1988. Over 40 infection centers were treated. Mountain states maintained low-level survey efforts.
Spruce-fir decline and mortality	Fraser fir, Red spruce	North Carolina, Tennessee, Virginia	The balsam woolly adelgid has been killing Fraser fir since being introduced into spruce-fir areas more than 25 years ago. Atmospheric deposition was suggested as a contributing factor.
Nursery Diseases			
Anthracnose *Colletotrichum* sp.	Russian olive	Texas	One nursery lost 20,000 seedlings by October (97 percent of the crop). Seed contamination was being investigated.
Damping-off *Cylindrocladium* spp. *Fusarium* spp. *Phytophthora* spp. *Pythium* spp. *Rhizoctonia* spp.	Many conifers and Hardwoods	Regionwide	Chronic losses were typified by reduced and irregular density in the seedbeds. This disease was retarded by pre- and post-plant fungicide drenches.
Fusarium root rot *Fusarium* spp.	Eastern white pine, Virginia pine, Loblolly pine, Slash pine	Regionwide	The disease continued to be a persistent problem in poorly drained beds.

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
Fusiform rust *Cronartium quercuum* f. sp. *fusiforme*	Loblolly pine, Longleaf pine, Slash pine	Eastern Texas to eastern Virginia	Excellent control was achieved with applications of systemic fungicides to seed and foliage.
Pitch canker *Fusarium moniliforme* var. *subglutinans*	Slash pine	Mississippi	There were minor losses to containerized, second-generation seed orchard planting stock.
Rhizoctonia needle blight *Rhizoctonia* spp.	Longleaf pine	Alabama, Louisiana, Mississippi	Three large forest nurseries in Alabama suffered a loss of 3/4 million seedlings. Preliminary tests with a preventive fungicide reduced the infection by 50 percent. Future tests were planned.
Tip blight *Phoma* sp.	Loblolly pine	Regionwide	Reduced incidence over years may be related to mulching and insect control. One Alabama nursery had 1/4 crop of loblolly and slash pine infected (about 38 thousand seedlings).

Seed Orchard Diseases

Cone damage *Lasiodiplodia* sp.	Eastern white white pine	North Carolina	No significant activity was reported in 1989.
Pitch canker *Fusarium moniliforme* var. *subglutinans*	Southern pines, especially slash pine and loblolly pine	Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Texas	Orchards sustained sporadic damage, sometimes severe. This disease caused branch, flower, conelet, and cone mortality, in addition to contaminating seed extracted from infected cones. Damage was clonal.
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 1989.

Disease	Host	Location	Remarks
Abiotic			
Animal	Pines	North Carolina, Tennessee	Voles (often called water rats) damaged white pine, and mice damaged loblolly pine in North Carolina. Voles also damaged loblolly pine in Tennessee. Roosting birds damaged succulent loblolly pine leaders in 4 Tennessee counties.
Atmospheric deposition symptoms	Bioindicators such as Ash, Blackberry, Sweetgum, Yellow-poplar	Georgia, North Carolina, South Carolina, Virginia	No significant activity was reported in 1989.
Drought	Mixed hardwoods, Loblolly pine, Slash pine, Eastern white pine, Rhododendron	Arkansas, North Carolina, Virginia	No significant activity was reported in 1989.
Frost	Various	North Carolina, Tennessee	A wet spring followed by late cold temperatures caused damage to various species in several counties in two states.
Ozone	Eastern white pine	North Carolina	No significant activity was reported in 1989.
Wind	Various	North Carolina, Puerto Rico, Texas, Virginia	In September, Hurricane Hugo devastated the natural resources in Puerto Rico, South Carolina, North Carolina, and Virginia. A tornado on the Davy Crockett National Forest in Texas damaged 4,000 acres. High winds and a tornado caused massive damage to all tree species over 20,000 acres in Forsyth County, North Carolina.

Eastern Region / Northeastern Area Insects

Prepared by Barbara A. Levesque and Margaret Miller-Weeks

Insect	Host	Location	Remarks
Aphids *Periphyllus americanus* *Periphyllus lyropictus* *Periphyllus testudinacea*	Sugar maple	Vermont	No significant activity was reported in 1989.
Balsam gall midge *Paradiplosis tumifex*	Balsam fir	Maine, Vermont	Moderate to severe damage was reported on Christmas tree plantations throughout the State. Many growers treated for this pest in 1989. Populations were expected to increase in 1990.
Balsam shootboring sawfly *Pleroneura brunneicornis*	Balsam fir, Fraser fir	Maine	Local infestations were reported in Christmas tree plantations in southern Maine.
Balsam twig aphid *Mindarus abietinus*	Balsam fir	Maine	Localized infestations reduced Christmas tree grades statewide.
		Vermont	Populations appeared to be increasing, but only light damage was reported.
Balsam woolly adelgid *Adelges piceae*	Balsam fir	Maine	In Penobscot County, Maine, 200 acres of tree boles were whitened by the "crawler stage" of this insect, for the first time in many years.
Basswood thrips *Thrips calcaratus*	Basswood	Iowa, Minnesota, Wisconsin	Thrips damage was found at low levels throughout Wisconsin. The insect was present in the northeast and southeast counties of Minnesota and was expected to increase in intensity in Iowa.
Birch casebearer *Coleophora serratella*	White birch	Maine	Scattered areas of noticeable defoliation occurred in Aroostook County.
Birch leaf miner *Fenusa pusilla*	Gray birch, Paper birch, Yellow birch	Maine, Vermont	Populations decreased from 1988 levels in Maine and Vermont.
Browntail moth *Euproctis chrysorrhoea*	Cherry, Oaks, Roses, *Rubus*, Willow	Maine	Infestations increased, particularly on the Casco Bay Islands.

Insect	Host	Location	Remarks
Bruce spanworm *Operophtera bruceata*	Sugar maple		No significant activity was reported in 1989.
Conifer swift moth *Korscheltellus gracilis*	Balsam fir, Red spruce		No significant activity was reported in 1989.
Eastern tent caterpillar *Malacosoma americanum*	Apple, Ash, Black cherry, Maple, Oak, Poplar	Indiana, Maryland, Missouri, Vermont	Populations increased throughout the Mid-Atlantic Region, particularly in Maryland. Populations increased in Missouri and Indiana. This pest was widespread on hedgerows in Vermont.
Elm leaf beetle *Pyrrhalta luteola*	Elm	Iowa, Indiana	An estimated 40,000 acres of defoliation occurred in Iowa. Severe defoliation was reported in several Indiana counties. Elm leaf beetle has not been reported in Indiana for several years.
Evergreen bagworm *Thyridopteryx ephemeraeformis*	Evergreens, Locust, Maple, White pine	Indiana, Ohio	No significant activity was reported in 1989.
European pine sawfly *Neodiprion sertifer*	Red pine, Pitch pine, Scotch pine, Shortleaf pine	Iowa, Indiana, New Jersey, Ohio, Wisconsin	Significant defoliation was reported from Christmas tree plantations in Iowa, Indiana, and Ohio. Scattered pockets of defoliation occurred in Wisconsin and New Jersey.
Fall cankerworm *Alsophila pometaria*	Ash, Beech, Cherry, Hickory, Maple, Oak, Yellow birch	Massachusetts, New Jersey	In Union County, New Jersey, 1,000 acres of defoliation were reported. Pockets of heavy defoliation in Massachusetts resulted in a total of no more than 2,000 acres. Both states expected increases in 1990.
Fall hardwood defoliator complex (Hardwood defoliating species)	Beech, Birch, Maple, Various hardwoods	Maine	Moderate to heavy defoliation of 29,500 acres was scattered throughout the central portions of the State. Populations were down from 1988.
		Indiana	Defoliation decreased in 1989. The areas affected included LaGrange, Steuben, and Whitley Counties (180 acres of defoliation total).

Insect	Host	Location	Remarks
Fall webworm *Hyphantria cunea*	Various hardwood species	Indiana	The epidemic that collapsed in 1985 in north central counties has not reappeared. No significant defoliation was reported.
		Maine	Defoliation occurred statewide but was heaviest in central and southwestern Maine. Damage was considered aesthetic.
		Missouri	Extensive defoliation (1,300,000 acres) was reported statewide and was expected to continue in 1990.
		Vermont	No significant defoliation was reported in 1989.
Forest tent caterpillar *Malacosoma disstria*	Aspen, Basswood, Maple, Oak, Poplar, White birch	Delaware	500 acres of light defoliation were reported in Delaware.
		Illinois	The Shawnee National Forest reported 750 acres of defoliation.
		Michigan	Populations continued to increase in Michigan's Lower Peninsula. The outbreak in the Upper Peninsula was expected to collapse.
		Minnesota	A 12-year outbreak continued in Brookston, Minnesota. Statewide, 4 million acres were defoliated. In Voyaguers National Park, 25,000 acres were defoliated.
		Vermont	Tent caterpillar populations increased on the Green Mountain National Forest, and further increases were expected in 1990.
		Wisconsin	Wisconsin had pockets of light to moderate defoliation, some of which occurred on the Chequamegon and Nicolet National Forests. To protect high quality oak timber, 27,500 acres were treated on the Menominee Indian Reservation. The Menominee estimated 1,043,000 board feet of oak timber lost within the past 3 years.

Insect	Host	Location	Remarks
Gypsy moth *Lymantria dispar*	Oak, Other hardwoods	Areawide	Generally, populations increased areawide. In Vermont, New Hampshire, Maine, and Massachusetts, defoliation dramatically increased over 1988 levels. In Connecticut, New Jersey, and New York, populations exploded. New York reported increased defoliated acreage. Population levels increased in Maryland, Pennsylvania, West Virginia, and Virginia. Ohio, although not reporting defoliation, did have an increase in population levels in the northeast portion of the State. Ohio expected to have defoliated areas in 1990. In Michigan, defoliation jumped from 70,400 acres in 1988 to nearly 300,000 acres in 1989. The Huron-Manistee National Forest observed 2,099 acres of defoliation, a first-time occurrence for this Forest.
Hemlock looper *Lambdina fiscellaria lugubrosa*	Various softwoods and hardwoods	Maine	Populations increased dramatically. In the southern part of Maine, 200 acres of severe defoliation were reported.
Hemlock woolly adelgid *Adelges tsugae*	Hemlock	New Jersey, New York, Pennsylvania, Rhode Island	This pest was found throughout the northern two-thirds of New Jersey with the exception of Sussex County. In New York, mortality of hemlocks was reported in Westchester and Rockland Counties. The insect continued to spread northward in New York, primarily on shade trees. Pennsylvania reported infested trees in the southeastern portion of the State. Massachusetts reported a 1-acre infestation near Springfield. Rhode Island reported 5 acres infested in Kent and Washington Counties.
Jack pine budworm *Choristoneura pinus pinus*	Jack pine	Michigan, Wisconsin	Scattered light to moderate defoliation continued in Baraga and Luce Counties, Michigan. In Wisconsin, a small outbreak collapsed in Vilas County, and no visible defoliation was detected.

Insect	Host	Location	Remarks
Larch sawfly *Pristiphora erichsonii*	Eastern larch		No significant activity was reported in 1989.
Lecanium scale *Lecanium sp.*	Black locust, Maple, Oak		No significant activity was reported in 1989.
Locust leafminer *Odontata dorsalis*	Locust	Indiana, West Virginia	Leaf-mining damage was observed in southeastern Indiana along the Ohio River. In West Virginia, populations increased.
Maple leafroller *Sparganothis acersvorana*	Red maple	Maine	Defoliation was detected on 23,000 acres in Hancock County, Maine.
Maple trumpet skeletonizer *Epinotia aceriella*	Sugar maple		No significant activity was reported in 1989.
Nantucket pine tip moth *Rhyacionia frustrana*	Pines	Indiana	This pest has not been a problem in Christmas tree plantations for many years. Reports of damage in 1988 and 1989 indicated the population may be increasing.
		Missouri	Scattered light infestations occurred throughout the State.
Oak leaftier *Croesia semipurpurana*	Oak	Massachusetts	Light to moderate defoliation occurred in Bristol, Norfolk, and Worcester Counties. The insect continued to move west and east.
		New Jersey	About 1,000 acres of light defoliation occurred in Somerset County. The population appeared to decrease from 1988 levels.
		Rhode Island	About 100 acres of light defoliation occurred in Providence and Kent Counties.
Orange-striped oakworm *Anisota senatoria*	Various oaks	Rhode Island	This was the second year the population decreased. Defoliation was down to 100 acres from 11,000 acres.
Oystershell scale *Lepidosaphes ulmi*	Beech, Maple, Poplar	Indiana, Maine, Vermont	Damage occurred in townships across Maine's central sections. Light branch and twig mortality occurred in some previously infested areas. Vermont and Indiana reported incidence of this pest, but damage was light.

Insect	Host	Location	Remarks
Pales weevil *Hylobius pales*	Red pine		No significant activity was reported in 1989.
Pear thrips *Taeniothrips inconsequens*	Sugar maple	Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Wisconsin	Both Massachusetts and Vermont reported dramatic decreases of this pest. Both states attributed the decrease to a warm spring causing rapid leaf-out ahead of the insect's development. No visible signs of the insect's damage were detected in Vermont, Maine, or New Hampshire. Moderate damage was reported across 2,000 acres in New Jersey. Pennsylvania detected damage across 500,000 acres, most in the northern tier of counties. Scattered infestations were reported in Maryland and New Jersey; however, no significant damage was reported. Incidence of the pest has been reported in Grant County, Wisconsin.
Pine false webworm *Acantholyda erythrocephala*	Various pines		No significant activity was reported in 1989.
Pine needleminer *Exoteleia pinifoliella*	Pitch pine		No significant activity was reported in 1989.
Red pine adelgid *Pineus borneri*	Red pine		No significant activity was reported in 1989.
Red pine scale *Matsucoccus resinosae*	Red pine	New York, Rhode Island	Mortality was extensive on 60 acres in southern Rhode Island. In New York, the scale occurred primarily in young pine plantations in the southeastern part of the State. Some tree mortality occurred.
Saddled prominent *Heterocampa guttivitta*	Sugar maple	Massachusetts	About 10,000 acres of defoliation occurred in northern Berkshire County. This was the first year this outbreak was detected.
		New York	Populations rose and collapsed in one season. The collapse appeared to be due to a fungal disease.
		Vermont	Populations increased with 280 acres of defoliation observed.
Spearmarked black moth *Rheumaptera hastata*	Birch	Maine	Defoliation declined. The infestation was widespread throughout northern Maine. No mortality was observed in defoliated areas.

Insect	Host	Location	Remarks
Spruce beetle *Dendroctonus rufipennis*	Black spruce, Red spruce, White spruce	Maine	Spruce beetle-caused mortality throughout the budworm defoliated areas increased in 1989. Mortality was widespread in northwestern and northcentral Maine, predominantly near the Allaquash and St. John Rivers. There are 7,500 acres of confirmed spruce beetle mortality. Many areas were salvage cut.
Spruce budworm *Choristoneura fumiferana*	Balsam fir, White spruce	Maine, Michigan, Minnesota	Infestation increased in northeastern Minnesota. Tree mortality occurred in Cook County. In 1989, 197,850 acres were defoliated. This defoliation included areas on the Chippewa and Superior National Forests. The infestation in Maine remained at low levels. Budworm defoliation occurred only in Hancock and Washington Counties in southeastern Maine.
Twig beetle *Pityophthorus sp.*	White pine	Rhode Island	Northwestern Providence County had a 100-acre infestation which caused twig mortality.
Two-lined chestnut borer *Agrilus bilineatus*	Oaks	Minnesota, Wisconsin	Pockets of oak mortality occurred in Columbia, Marquette, and Green Lake Counties, Wisconsin. More extensive mortality occurred in Menominee, Marinette, Douglas, Washburn, Sawyer, and Burnett Counties. This mortality has been associated with cankerworm or forest tent caterpillar defoliation. In Minnesota, tree mortality occurred sporadically in association with drought-induced stress.
Virginia pine sawfly *Neodiprion pratti pratti*	Shortleaf pine, White pine	Ohio	Several hundred acres of State forest land were affected by moderate to heavy defoliation.
Walnut caterpillar *Datana integerrima*	Walnut	Illinois	No significant activity was reported.
White pine weevil *Pissodes strobi*	Jack Pine, Scotch pine, White pine, Blue spruce, Norway spruce, Red spruce, White spruce	Maine, Michigan, Vermont	This remains one of the most serious insect pests of eastern white pine in Maine. Damage occurred statewide. Private landowners treated over 1,000 acres to control the insect. In Michigan, 4,500 acres were affected.

Insect	Host	Location	Remarks
Yellowheaded spruce sawfly *Pikonema alaskensis*	Spruce		No significant activity was reported in 1989.
Yellownecked caterpillar *Datana ministra*	Oak		No yellownecks were observed in 1989.
Yellow-poplar weevil *Odontopus calceatus*	Elm, Tuliptree, Sassafras, Yellow poplar	Indiana, Ohio	This pest has caused visible but scattered defoliation in southern Indiana since 1985. Scattered defoliation occurred over a large portion of southern Ohio.

Eastern Region / Northeastern Area Diseases

Prepared by Barbara A. Levesque and Margaret Miller-Weeks

Disease	Host	Location	Remarks
Stem and Branch Diseases			
Beech bark disease *Nectria coccinea* var. *faginata* in association with **Beech scale** *Cryptococcus fagisuga*	American beech	Connecticut, Maine, Massachusetts, New Hampshire, New York, Pennsylvania, Rhode Island, Vermont, West Virginia	Tree mortality continued in New England. Most states reported serious losses of beech over a large area. Maine, Massachusetts, and Vermont reported increases in beech bark disease, while New York reported a reduction in the beech scale population. Extensive mortality occurred in western New York, northern Pennsylvania, and parts of West Virginia.
Caliciopsis canker *Caliciopsis pinea*	White pine	Vermont	This disease was particularly noticeable in Orange County.
Cytospora canker *Valsa kunzei* (*Cytospora kunzei*)	Blue Spruce, Norway Spruce, Red spruce	West Virginia	This disease occurred throughout the State and was most common on Norway spruce. The disease also may be contributing to the decline and mortality of native red spruce.
Diplodia tip blight *Sphaeropsis sapinea*	Austrian pine, Red pine, Scotch pine	Indiana, Iowa, Maine, Massachusetts, Minnesota, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, Wisconsin	Light and moderate damage was reported in Indiana. All other states reported areas of heavy infection by diplodia tip blight. Several states reported recommendations that Austrian pine no longer be planted because of mortality from this disease.

Disease	Host	Location	Remarks
Dogwood anthracnose *Discula sp.*	Dogwood	Connecticut, Delaware, Maryland, Massachusetts, Missouri, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, West Virginia	Delaware, Indiana, and Missouri conducted detection surveys for dogwood anthracnose, but the disease was not found. Dogwood anthracnose was found for the first time in northeastern Ohio in Lake County. The other states reported a wide distribution of the disease. Dogwood anthracnose was widely distributed in Maryland, but heavy mortality was confined to localized areas. A moist spring contributed to an increase of dogwood anthracnose in some areas.
European larch canker *Lachnellula willkommii*	Eastern larch	Maine	The disease spread from two epicenters along coastal Maine. Four towns were included in the quarantined area within 6,500 acres. State and Federal regulations continued.
Hypoxylon canker *Hypoxylon atropunctatum*	Oaks	West Virginia	Disease incidence increased because of continued oak decline and mortality caused by drought.
Scleroderris canker *Ascocalyx abietina* (=*Gremmeniella abietina*)	Red pine, Scotch pine, Jack pine	Maine, New York, Vermont	New York reported endemic levels of this disease. The damage was light, and weather conditions were not favorable for the spread and increase of scleroderris canker. Maine reported static conditions and no new infection sites. For the third year, Vermont reported no new locations. The fungus did not appear to be spreading.
		Upper Peninsula of Michigan	Scattered pockets of light mortality of lower branches occurred. Twelve years lapsed since significant tree mortality occurred in young plantations.
Maple canker *Steganosporium spp.*	Sugar maple	Vermont	The disease is associated with branch dieback resulting from previous years of drought and was less common than in 1988.

Disease	Host	Location	Remarks
White pine blister rust *Cronartium ribicola*	White pine	Iowa, Maine, Minnesota, Vermont	Annual losses in southern Maine from blister rust average $100,000. Where ribes was controlled, tree mortality was 3.8 percent over a 10-year period; where ribes was not controlled, tree mortality was 9.1 percent over the same period. Iowa reported moderate severity on 100 acres. Branch and tree mortality continued in northeastern Minnesota. An incidence survey of rust resistant plantations was conducted on Federal lands in Minnesota. Less than 10 percent of the white pine trees examined had blister rust, but the disease may have been masked by extreme deer browse.
Foliage Diseases			
Anthracnose *Gloeosporium spp.* *Discula spp.* *Apiognomonia venta* *Gnomonia spp.*	Maple, Sycamore, Other Hardwoods	Connecticut, Indiana, Maine, Maryland, Missouri, New Jersey, Ohio, Pennsylvania, Vermont, West Virginia	The heavy rainfall during the spring caused ideal conditions for anthracnose fungi to infect many hardwoods which normally do not have the disease. Light to heavy damage occurred over large areas in Indiana, Maine, and Pennsylvania. Vermont had 85,000 acres of sugar maple defoliated by an anthracnose fungus. Sycamore anthracnose was common in 1989. Many areas observed heavy defoliation. Some States reported moderate to heavy dieback in the upper crowns of the sycamores.
Vascular Wilts and Declines			
Ash yellows (Ash dieback)	Green ash, White ash, Blue ash, Black ash, Brown ash	Indiana, Iowa, Maine, Massachusetts, Minnesota, Missouri, New York, Ohio, Pennsylvania, Vermont	Ash yellows, caused by a mycoplasma-like organism, contributed to the decline and death of ash but was not solely responsible for all of the decline and death of ash. Indiana estimated that 10 to 15 percent of the declining ash had ash yellows. Over 300,000 acres in the northeastern portion of Indiana had ash decline. Annual mortality was estimated at 3 percent. Maine reported ash decline with brown ash for the first time in Aroostook County. Missouri reported ash mortality for the first time, but mortality may have been caused by the 1988 drought.

Disease	Host	Location	Remarks
Birch dieback	White birch, Yellow birch	Maine, New York, Vermont, Wisconsin	White birch dieback was widespread in Maine, Vermont, Wisconsin, and New York. In Maine, the 1988 drought appeared to have contributed to increased dieback. The decline was associated with overmature trees, birch leaf miner, and attacks by the bronze birch borer.
Dutch elm disease *Ceratocystis ulmi*	American elm	Regionwide	Dutch elm disease continued to kill American elm throughout the Region.
Larch decline	Eastern larch	Maine, New York, Vermont	Eastern larch in New York (Adirondack region) and Vermont continued to decline. Declining trees were associated with attacks by the eastern larch beetle.
Maple decline	Sugar maple, Red maple	Iowa, Maine, Massachusetts, New York, Pennsylvania, Vermont, Wisconsin	Maple decline was reported over a large area, but the cause was unknown. Drought, pear thrips, insect defoliators, over-mature stands, and poor silvicultural practices may have contributed to the decline and subsequent mortality. In Maine, 95 percent of the sugar maples in sugar bushes and natural stands had less than 10 percent dieback in the crowns. Wisconsin estimated 1.5 to 2.5 dead or declining (greater than 25 percent of the crown dead) sugar maples per acre.
Oak decline	All oak species	Iowa, Michigan, Missouri, New York, Pennsylvania, West Virginia	Iowa, Michigan, West Virginia, and Missouri reported continued mortality of oaks resulting from previous years of drought. Armillaria root rot, hypoxylon canker, and two-lined chestnut borers were associated with dead and declining oaks in many areas. New York and Pennsylvania reported decline and mortality of oaks over large areas. The decline was initiated by gypsy moth defoliation, Armillaria root rot, and boring activity by the two-lined chestnut borer.

Disease	Host	Location	Remarks
Oak wilt *Ceratocystis*	Oak	Indiana, Iowa, Michigan, Minnesota, Missouri, Pennsylvania, West Virginia, Wisconsin	Iowa has an estimated 48,000 acres of oak type with oak wilt. The disease intensity increased following the drought in 1987 and and 1988. Michigan reported 10,500 acres and Minnesota reported 9,021 acres with oak wilt activity. The disease was reported in small areas in West Virginia, Indiana, Missouri, Ohio, and Pennsylvania, and some mortality occurred.
Pine wood nematode *Bursaphelenchus xylophilus*	Austria pine, Jack pine, Japanese pine, Scotch pine, Black pine, White pine, Balsam fir	Maine, Missouri, New York, West Virginia	Scattered infestations were reported in Maine on white pine, red pine, and balsam fir. In Missouri, surveys found reduced levels of activity, apparently due to cooler, wetter weather in 1989. No infections were reported on Christmas tree plantations as in 1988. Scotch and Austrian pine in ornamental and windbreak plantations were the main species affected. No significant activity reported in New York and West Virginia.
Spruce-fir decline	Balsam fir, Red spruce	Maine, Massachusetts, New Hampshire, New York, Vermont, West Virginia	Red spruce and Balsam fir continued to show symptoms of decline and, some mortality occurred. No new areas of significant decline and mortality were reported. Factors that contributed to the decline included spruce beetle, eastern dwarf mistletoe, cytospora canker, and weather.
Sapstreak *Ceratocystis coerulescens*	Sugar maple	Michigan, Vermont, Wisconsin	A survey conducted in Wisconsin reported 5 percent of the wounded sugar maples had sapstreak present. The fungus continued to be found in sugar bushes in Vermont and was found for the first time in the Upper Peninsula of Michigan.

Disease	Host	Location	Remarks
Abiotic			
Ozone	Conifers, Hardwoods	New Hampshire, Vermont, West Virginia	Ozone symptom surveys were conducted in Class I Wilderness areas on the White Mountain, Green Mountain, and Monongahela National Forests. Light to moderate ozone symptoms were seen on black cherry, tulip, poplar, white ash, and common milkweed at two locations in West Virginia.
Drought	Conifers, Hardwoods	Areawide	Drought conditions were not widespread in 1989. Adequate rainfall fell throughout the growing season except in Iowa. Many species continued to die from the previous drought(s), including, oaks, maple, pines, black walnut, and others. Bark beetle activity increased among pines and hemlock due to reduced vigor from the drought.
Other			
Stillwell's syndrome	Balsam fir	Maine	Scattered balsam fir mortality was associated with Armillaria root rot in areas of prior spruce budworm defoliation. The incidence of this disease was the lowest since monitoring began in the middle 1980's.

Alaska Region Insects

Prepared by Edward H. Holsten

Insect	Host	Location	Remarks
Clear-wing moth *Lepidoptera sesiidae*	Paper birch	South-central Alaska	Damage to ornamental birch from this clear-wing moth was widespread throughout the greater Anchorage area. This insect was first identified in the late 1800's. No specimens or damage were observed again until 1989. Damage (phloem consumption) results in weakened trees which are susceptible to pathogen entry and subsequent wind breakage.
Cottonwood defoliators *Chrysomela* sp. *Lyonetia* sp.	Black cottonwood	Prince William Sound, southeast Alaska	Leaf beetle and blotch-miner populations decreased in the Sound. In 1989, defoliation decreased to 6,000 acres near Valdez and Kings Bay from 11,000 acres in 1988. The leaf beetle defoliated 7,000 acres at various locations in northern portions of southeast Alaska.
Engraver beetle *Ips perturbatus*	White spruce	Interior Alaska	*Ips* populations increased in 1989 in interior Alaska and now cover 7,000 acres. Infestations were located near Fairbanks and along the Kuskokwim and Porcupine Rivers in interior Alaska.
Gypsy moth *Lymantria dispar*	Hardwoods	South-central 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, and larval counts were very low for the second consecutive year.
Large aspen tortrix *Choristoneura conflictana*	Quaking aspen	Interior Alaska	Tortrix populations dramatically decreased throughout interior Alaska. Aerial surveys detected 8,000 acres of defoliated aspen compared to 118,391 acres in 1988. Populations increased on the Kenai Peninsula in south-central Alaska, where 4,000 acres of defoliated aspen were detected.

Insect	Host	Location	Remarks
Spearmarked black moth *Rheumaptera hastata*	Paper birch	Interior Alaska	Black-moth populations were once again at low levels in interior Alaska. Only 500 acres of defoliated birch were detected; a slight increase over levels in 1988.
Spruce aphid *Elatobium abietinum*	Sitka spruce	Southeast Alaska	In sharp contrast to severe defoliation in 1987 and 1988, aphid populations and their defoliation diminished greatly in 1989. Near-record cold temperatures during the 1988-1989 winter may have resulted in the population collapse.
Spruce beetle *Dendroctonus rufipennis*	Lutz spruce, Sitka spruce, White spruce	Alaska	Active infestations in 1989 covered 117,250 acres, 270,000 acres less than in 1988. Infestations continued on 10,690 acres of the Chugach National Forest and on 6,913 acres of the Kenai National Wildlife Refuge. Spruce beetle populations were low and fairly stable in southeast Alaska. In Yakutat, 2,000 acres of Sitka spruce were infested near windthrow salvage units, but mortality was low. In Glacier Bay National Park, 15,000 acres were infested, but little mortality occurred in 1989. Along the Yukon River south of Galena, 100,000 acres of white spruce were infested, and 15,000 acres were infested along the Kuskokwim River. Spruce beetle activity was expected to decline further in south-central Alaska and increase in interior Alaska's white spruce stands.
Spruce bud midge *Dasineura swainei*	Black spruce, White spruce	South-central Alaska	Bud midge damage was prevalent on sunny regeneration sites throughout the Kenai Peninsula. In many cases, multiple leaders resulted.
Spruce bud moth *Zeiraphera* sp.	Sitka spruce	Southeast Alaska	Light to moderate defoliation of Sitka spruce occurred on 89,000 acres along coastal areas from Dry Bay to Yakutat.
Spruce budworm *Choristoneura* sp.	Sitka spruce, White spruce	South-central and southeast Alaska	Defoliation was not apparent in Alaska's spruce stands.
Tent caterpillar *Malacosoma* sp.	Mountain ash, Red cherry	South-central Alaska	Introduced (1988) western tent caterpillar populations were successfully eradicated in the Anchorage area. No tent caterpillar populations were observed in 1989 during intensive ground checks.

Insect	Host	Location	Remarks
Western black-headed budworm *Acleris gloverana*	Sitka spruce, Western hemlock	Prince William Sound and southeast Alaska	Budworm populations dramatically decreased in Prince William Sound. In 1989, 19,000 acres of heavily defoliated hemlock and spruce were detected aerially compared to 145,000 acres of defoliation detected in 1988. Some top-kill of hemlock and spruce were apparent this year following 2 years of heavy defoliation. Populations were expected to further decline in 1990. In southeast Alaska, budworm populations remained at low levels.
Willow defoliation Tortricidae	Willow	Interior Alaska	Defoliation of willow was detected along the Nushagak and Yukon Rivers. Acres infested increased from 4,318 acres in 1988 to 17,000 acres in 1989. The causal agent has yet to be identified but is believed to be a Tortricid larva.
Willow leafblotch miner *Lithocolletis* sp.	Willow	Southeast Alaska	No defoliation was noted in 1989.

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	The disease was common throughout southeast Alaska from Dixon Inlet to the Haines area. The disease was prevalent in old-growth western hemlock and caused stem deformity, growth loss, and mortality. Incidence was rarely reported in Sitka spruce and mountain hemlock.
Spruce broom rust *Chrysomyxa arctostaphyli*	White spruce, Sitka spruce, Black spruce, Lutz spruce	Interior and South-central Alaska	This is a perrennial infection that causes undetermined growth loss. The disease is common on spruce where the alternate host, kinnikinnik, is present.
Stem cankers *Encoelia pruinosa* *Ceratocystis fimbriata* *Cryptosphaeria populina* *Cytospora chrysosperma*	Hardwoods	South-central and interior Alaska	Stem-infecting fungi caused an undetermined level of mortality. On surviving trees, open wounds caused by these fungi allowed wood decay fungi to initiate heartrot. Canker fungi were particularly common on aspen and birch.
Stem decays Many Basidiomycetes	All tree species	Throughout Alaska	Stem decay fungi caused a large, but unquantified loss of wood volume in unmanaged, old-growth stands throughout Alaska. This disease 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	Common throughout the range of pine in Alaska, galls were often killed by another infection, *Nectria macrospora*, resulting in branch or bole death.

Disease	Host	Location	Remarks
Root Diseases			
Armillaria root rot *Armillaria* spp.	All tree species	Throughout Alaska	This disease was responsible for some mortality, but typically occurred as a secondary invader of previously stressed trees.
Schweinitzii butt rot *Phaeolus schweinitzii*	Sitka spruce, White spruce, Lutz spruce	Southeast and south-central Alaska	Decay in roots and butts of large trees caused loss of wood volume and created hazardous trees in recreation areas.
Tomentosus root rot *Inonotus tomentosus*	White spruce, Lutz spruce	South-central and interior Alaska	This disease caused butt rot in spruce and colonized live roots. Infection may predispose spruce to attack by bark beetles.
Yellow stringy rot Causal fungus unknown	Lutz spruce	South-central Alaska	This pest caused root and butt rot. Studies on distribution and identity of the fungus continued.
Foliage Diseases			
Shoot blight *Aprostrasseria* sp.	Alaska-yellow cedar	Southeast Alaska	Shoot blight was common on regenerating cedar seedlings and saplings where terminal and lateral shoots were killed. Incidence remains constant from year to year.
Spruce needle cast *Lirula macrospora*	Sitka spruce	Southeast Alaska	Symptoms of infection on 1-year-old needles decreased. A control study was initiated.
Spruce needle rust *Chrysomyxa ledicola*	Sitka spruce, White spruce, Black spruce, Lutz spruce	Throughout Alaska	Incidence and infection levels were low to moderate.
Vascular Wilts and Declines			
Alaska-yellow cedar decline	Alaska-yellow cedar	Southeast Alaska	Decline persisted as one of the most significant forest problems in Alaska. Over 390,000 acres of unmanaged stands on poorly drained sites had dying, recently-killed, and long-dead trees. Concentrated mortality was distributed along a wide band from northeast Chichagof Island to the Ketchikan area. Mortality in 1989 was most severe on Kuiu and Chichagof Islands.

Disease	Host	Location	Remarks
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 in many stands located on Baranof and Chichagof Islands had old or recent scars.
Hemlock fluting	Western hemlock	Southeast Alaska	Fluted hemlock trees had deeply incised grooves and ridges extending vertically on their boles. Fluting caused bark to be buried internally in wood which resulted in loss of quality and quantity of wood.
Porcupine *Erethizon dorsatum*	Sitka spruce, Western hemlock	Southeast Alaska	Porcupines caused considerable bole damage and mortality in commercially important young-growth stands. Damage was severe on Mitkof Island. Basal scarring was common on older trees in many areas.
Winter injury	Sitka spruce, Western hemlock	Southeast Alaska	Mortality or death of the north side of the tree during the 1988-1989 winter occurred over 5,000 acres of Sitka spruce along beach fringes of northern portions of southeast Alaska. Many exposed hemlock trees were defoliated throughout southeast Alaska, but buds remained alive and trees refoliated by late spring. The actual cause of damage (i.e., freezing or desiccation) was unknown.

Part 3 Indexes

Index - Insects

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

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.