United States
Department of Agriculture

Forest Service
Pacific Northwest Region

Oregon
Department of Forestry

Forest Insect and Disease Highlights in Oregon, 2001

Jerald E.Dewey

June 2002

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Joint publication of:
Oregon Department of Forestry
USDA Forest Service, Pacific Northwest Region

R6-NR-FID-TP-04-02
Portland, Oregon
June 2002

Front cover: Western tent caterpillar; Jerald E. Dewey (USDA Forest Service) photo provided by www.ForestryImages.com.

Introduction

Insects and disease pathogens cause significant tree mortality, growth loss, and damage to large volumes of potential wood products each year. They reduce management options for landowners and contribute to hazardous forest fire conditions. However, these disturbance agents are a natural and necessary part of forest ecosystems. They support ecological processes such as decomposition and nutrient cycling. They create openings, enhance tree species diversity, and provide food and habitat that many animals depend on. A healthy forest is not free of insects, diseases, disturbances, and tree defects.

This report serves to inform readers about major insect and disease activity levels in Oregon in 2001. For additional information to locate or identify specific damage or to obtain information on management techniques to reduce impacts from forest insects and diseases, contact the Oregon Department of Forestry's Forest Health Program (see back cover).

Aerial Survey

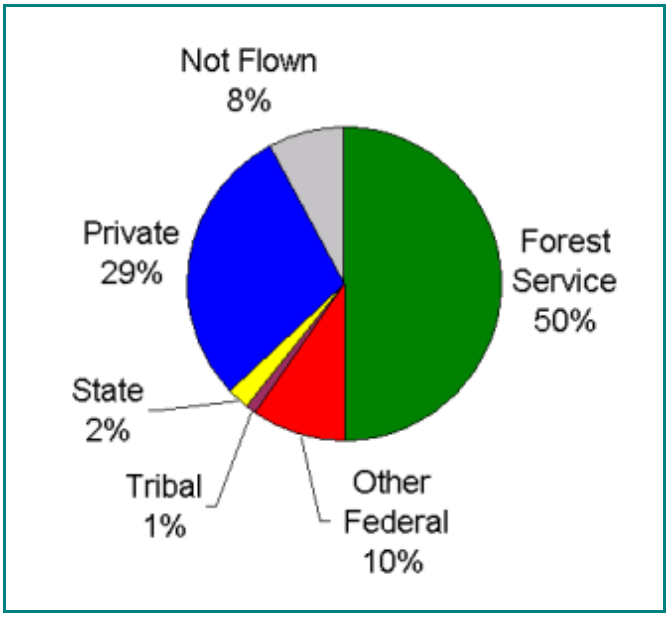
Oregon and USDA Forest Service cooperators have conducted an aerial sketchmapping program for more than fifty years. Prior to the 2001 season, the methodology had changed very little. Observers looked out the aircraft window and recorded the location of damage on a paper map.

In 2001, we implemented a digitally assisted sketchmapping system in much of western Oregon. Observers now record damage locations on a touch-sensitive computer screen displaying the airplane's current position on user-defined electronic background maps. This system utilizes real-time global positioning and eliminates problems associated with observer disorientation.

Digital mapping equipment used during aerial surveys; photo by Keith Sprengel, USDA Forest Service

For more information about our aerial survey program, please visit: www.fs.fed.us/r6/nr/fid/health.shtml. This site is updated annually with the latest information on exotic pest problems, insect and disease outbreaks, and Oregon and Washington forest health trends. Color photos of pests and their resulting damage are included.

Aerial Survey data is available from this Forest Service's Pacific Northwest Region website: www.fs.fed.us/r6/nr/fid/data.shtml.



Forested acres in Oregon surveyed by air in 2001, by land ownership category.

Drought Effects in Western Oregon

In 2001 a very significant drought event occurred in Oregon. Dry conditions that started in the summer of 2000 continued into the fall of 2001. The result was visible tree damage, particularly in low elevation areas of western Oregon.

Young Douglas-fir with dying branches, tops, and even entire trees were a common site in the Willamette and Rogue Valleys in 2001. The cause of this widespread damage was one of the most significant drought episodes in several decades. Damage symptoms were most prevalent where young Douglas-fir were growing on sites that may have supported hardwood stands rather than conifer forests in the past. Often the affected trees were growing in shallow, rocky, or droughty soils. In some cases trees with dieback showed signs of infection by opportunistic organisms such as canker fungi or insects, but in other cases these agents were absent (Figure 1).

Figure 1. Trees that died during the intense drought of 2000-2001; photo by Oregon Department of Forestry.

Figure 2. Overstocked stand with trees killed during the intense drought of 2000-2001; photo by Oregon Department of Forestry.

By the late summer of 2001, red foliage was visible in many overstocked conifer stands in the lower elevations of the Rogue River Valley. Sugar pine, ponderosa pine, and Douglas-fir were affected by drought and insect attack (Figure 2). Because the foliage symptoms of this damage showed up in the late summer and fall, this tree mortality was missed by the 2001 aerial survey.

An unusual situation, partially related to the effects of drought, developed in Pacific madrone growing in the Medford and Grants Pass areas. In the spring of 2001 many trees on harsher sites produced stunted leaves (<2" in length) instead of the normal leaves which are >4" long (Figure 3).

Figure 3. Stunted new leaves produced in 2001 on Pacific madrone trees affected by drought; photo by Oregon Department of Forestry.

The production of these stunted leaves followed several years when madrone was weakened by successive berry crops and defoliation from disease and fall webworm outbreaks. In some cases madrone leaves were so small that trees looked dead (Figure 4). The weakened condition of these trees may increase susceptibility to madrone canker and result in additional crown dieback or mortality.

Figure 4 (right). Pacific madrones with stunted leaves affected by drought in 2001; photo by Oregon Department of Forestry.

Insects

The 2001 aerial survey detected significant Douglas-fir tussock moth, Douglas-fir beetle and mountain pine beetle activity in eastern Oregon. In western Oregon, a Douglas-fir beetle outbreak along the west slope of the Cascades appeared to be subsiding and a relatively large area of tent caterpillar defoliation was detected in Clatsop County.

More detailed information on these and other forest insects can be found at the Oregon Department of Forestry website (www.odf.state.or.us/forasst/fh/bugpub.htm).

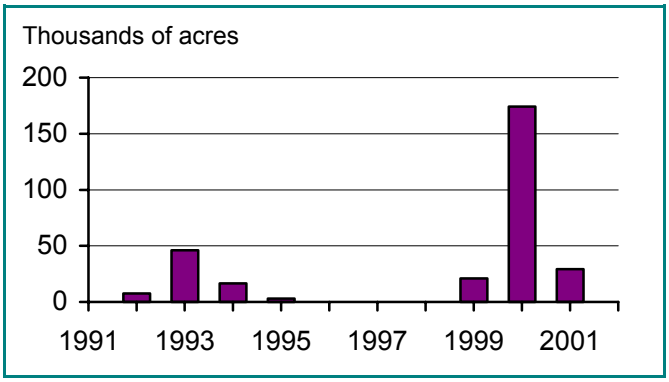


Figure 5. Acres infested with Douglas-fir tussock moth in Oregon, as detected during annual aerial surveys.

Douglas-fir Tussock Moth

The Douglas-fir tussock moth is a native defoliator of Douglas-fir and true firs. Past outbreaks have caused significant defoliation and tree mortality. Outbreaks typically last four years.

This year marked the third year or declining phase of the current northeast Oregon outbreak. The total area where defoliation was detected dropped from 174,197 acres in 2000 to 29,171 acres in 2001 (Figure 5). Some new areas of defoliation appeared in the western end of the Umatilla National Forest and adjacent private lands (Figure 6). The defoliation in these new areas is intense and significant tree mortality is expected (Figure 7).

Tussock moth defoliation in northeast Oregon should decline further in 2002, but bark beetle-caused mortality in trees weakened during this outbreak may persist for several years. Results of the 2001 tussock moth early warning trap survey in Klamath and Lake Counties indicate increasing tussock moth populations in this part of the state.

Figure 7 (right). Trees defoliated by Douglas-fir tussock moth; photo by Oregon Department of Forestry.

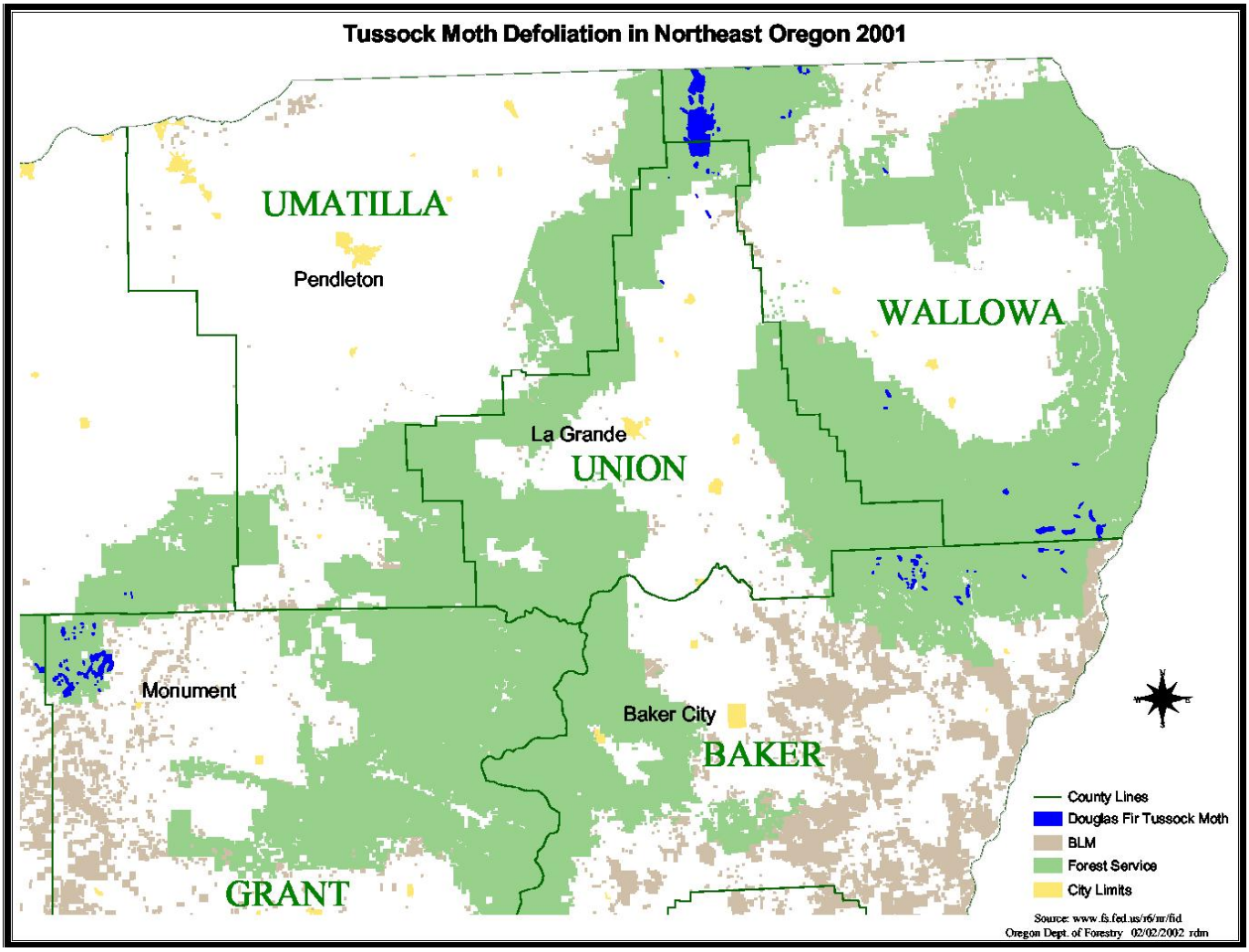


Figure 6. Distribution of Douglas-fir tussock moth in northeastern Oregon in 2001, as detected during annual aerial surveys.

Mountain Pine Beetle

Lodgepole pine mortality from mountain pine beetle infestations have increased after several relatively low years (figure 8). The two hot spots in Oregon are located near the Century Drive area west of Bend and the Winter Rim area in Lake Co. (Figures 9 &10). These outbreaks are located on federal land and are associated with overstocked conditions in older lodgepole pine stands. Typically mountain pine beetle outbreaks persist until most of the lodgepole pine with a stem diameter larger than 6" are killed.

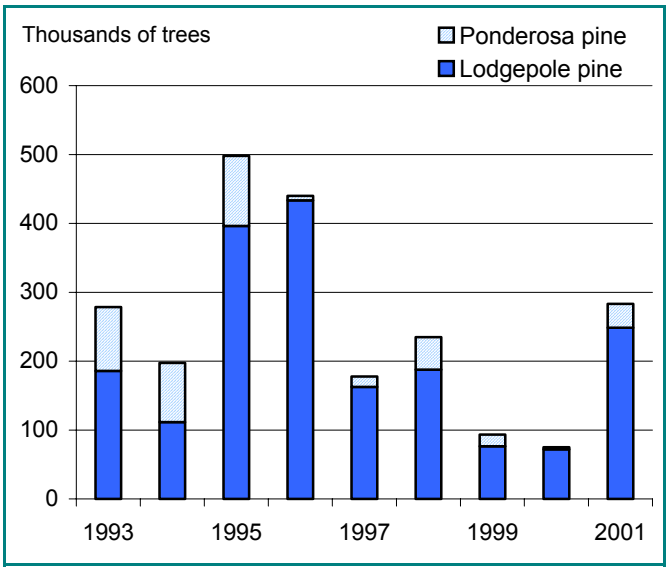


Figure 8 (right). Number of trees killed by mountain pine beetle as detected during annual aerial surveys.

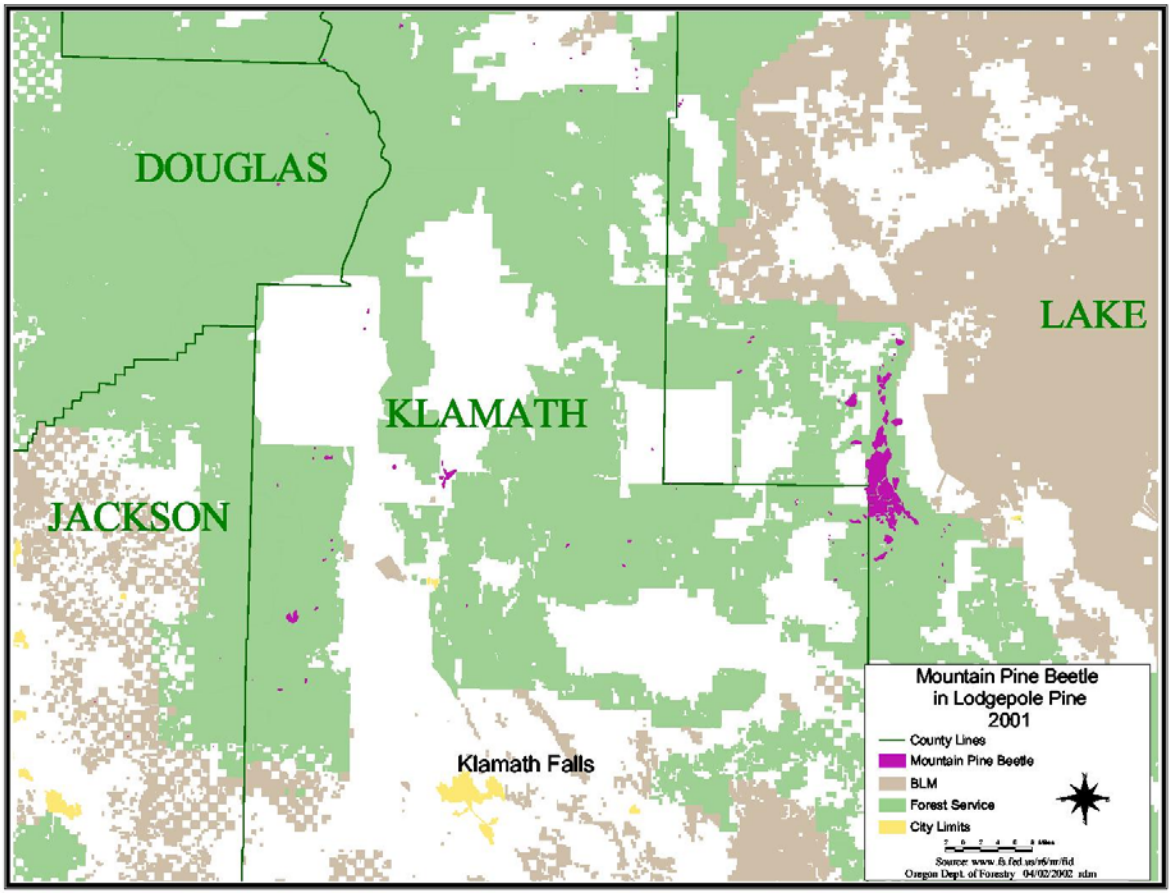


Figure 9. Distribution of mountain pine beetle activity in southcentral Oregon in 2001, as detected during annual aerial surveys.

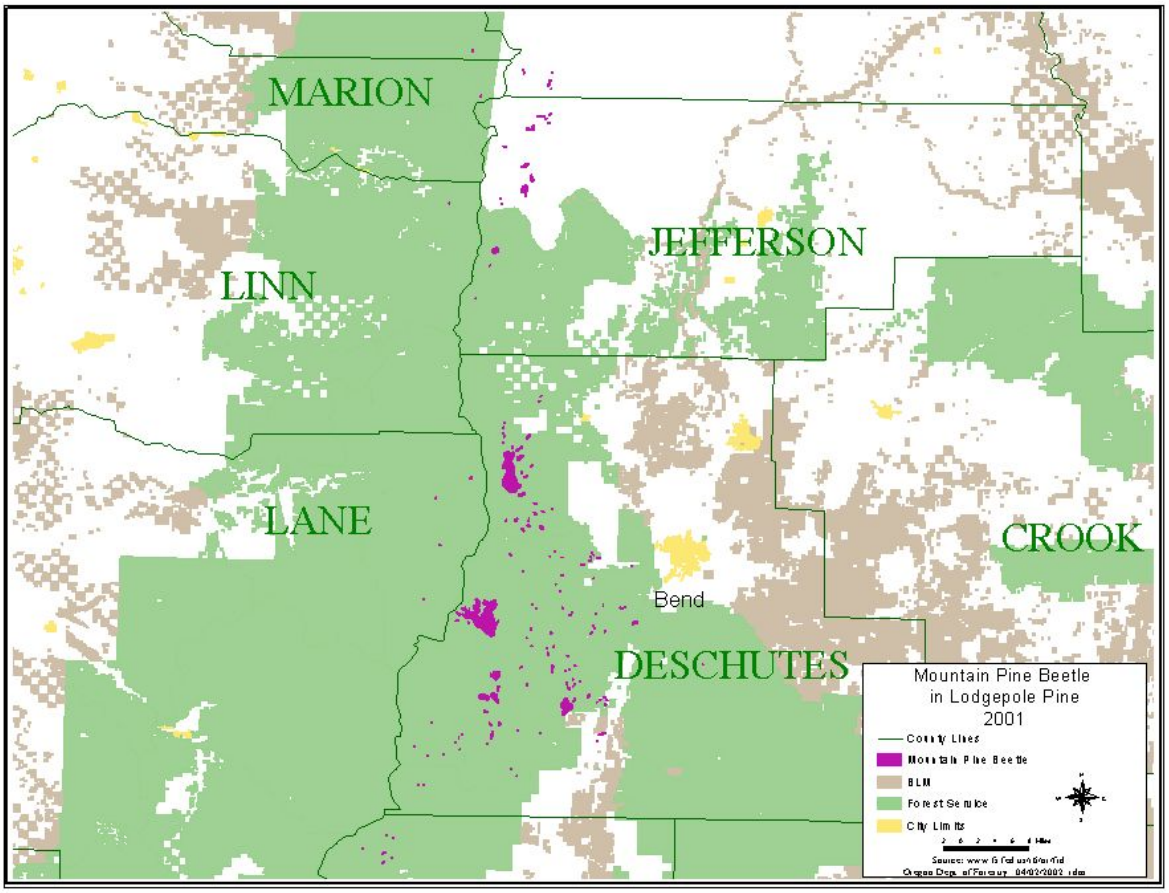


Figure 10. Distribution of mountain pine beetle activity in central Oregon in 2001, as detected during annual aerial surveys.

Douglas-fir Beetle

Douglas-fir beetle outbreaks start when large trees (DBH>14") are damaged by major disturbance events such as fires, windthrow, snow breakage, and defoliation.

The current Douglas-fir beetle outbreak started when trees were blown down by storms or damaged by fires in 1996. The outbreak reached its peak in 1999 and started to decline in 2000 (Figures 11 and 12). The decline in Douglas-fir mortality in 2001 was particularly apparent in western Oregon (Figure 13). Another Douglas-fir beetle outbreak in western Oregon could develop in 2004 as a result of recent storm damage.

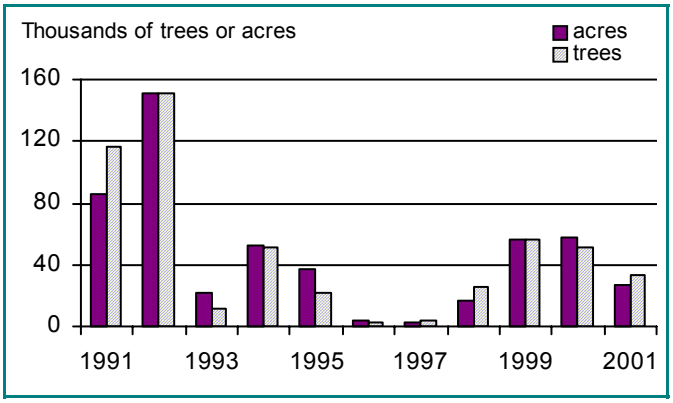


Figure 11. Trees killed and acres infested by Douglas-fir beetle in Oregon, as detected during annual aerial surveys.

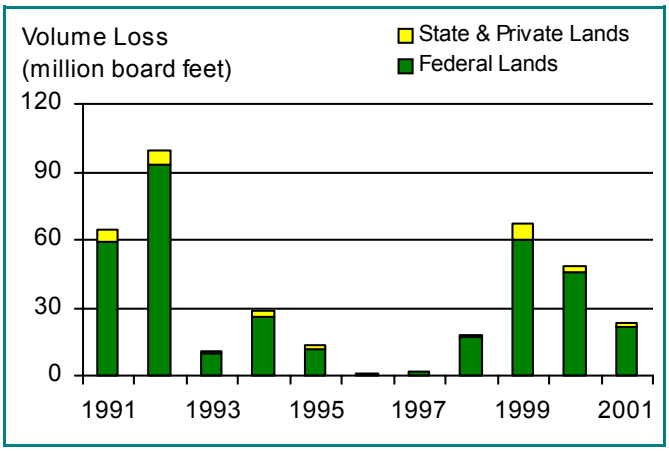
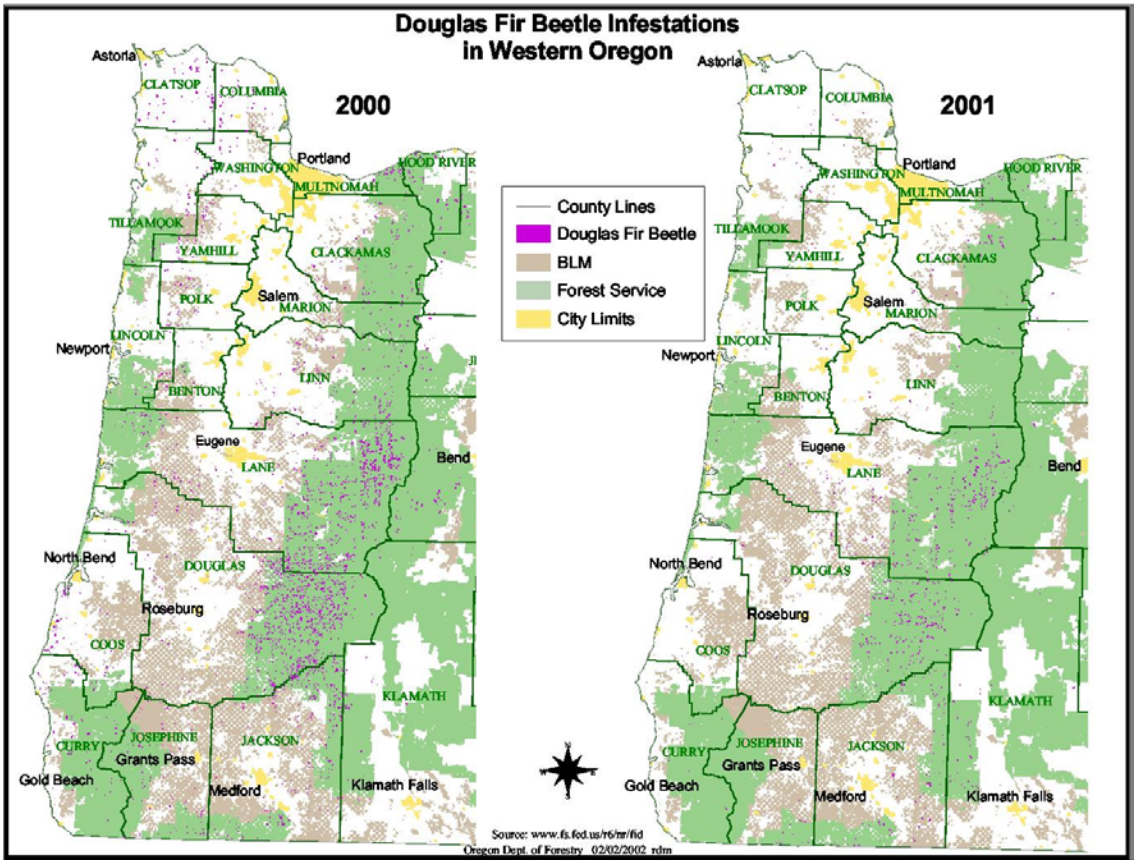


Figure 12 (right). Estimated volume loss caused by Douglas-fir beetle in Oregon, as detected during annual aerial surveys.

Figure 13 (below). Distribution of Douglas-fir beetle in western Oregon in 2000 and 2001, as detected during annual aerial surveys.



Western Balsam Bark Beetle

Western balsam bark beetle increased from approximately 700 acres affected in 2000 to 8,500 acres in 2001 (figure 14). Mortality attributed to this insect was mapped exclusively in subalpine fir stands. The vast majority of the mapped damage was recorded on the Umatilla and Wallowa-Whitman National Forests.

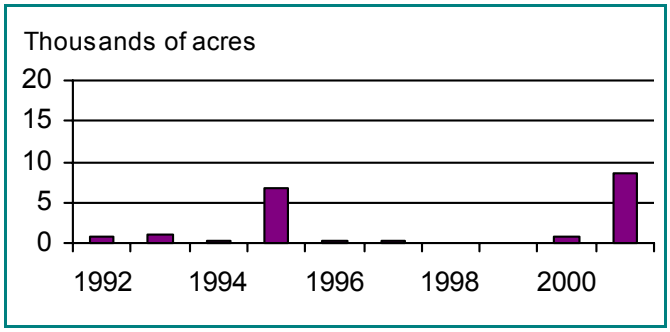


Figure 14. Acres infested with western balsam bark beetles, as detected during annual aerial surveys.

Balsam Woolly Adelgid

The balsam woolly adelgid (BWA) is an introduced insect that has had significant impact on grand fir, silver fir and subalpine fir in the State of Oregon. It can kill trees slowly by infesting the twigs or branches, or quickly by infesting the bole. BWA also causes gouting of branch nodes. During the 1950's and 1960's it caused extensive mortality primarily along the Cascade Range. Since that initial mortality, BWA damage has been chronic and subtle and is not often visible from the air.

Balsam woolly adelgid activity was observed on 16,700 acres in 2001 (figure 15), a significant increase compared to 4,500 acres in 2000. Favorable environmental conditions during the winter and spring of 2001 supported increased levels of activity. Areas with significant acreage of mapped activity included the Wallowa-Whitman, Umatilla and Malheur National Forests. Statewide, the vast majority of BWA activity occurred in subalpine fir stands of federally owned lands.

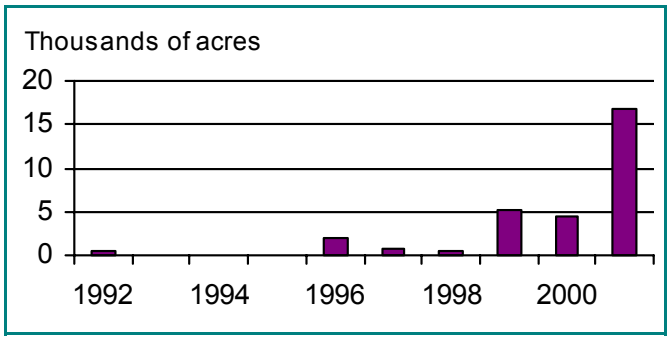


Figure 15. Acres infested with balsam woolly adelgid, as detected during annual aerial surveys.

In 1998, a Forest Health Monitoring ground survey was initiated to confirm BWA occurrence and distribution in the host type throughout WA and OR; and determine effects on host species and changes in local ecosystems. A set of permanent plots indicate that environment plays a significant role in the fluctuations of BWA populations, and that BWA can result in significant ecological impacts on some sites over time by eliminating host species. The BWA survey has been completed in Oregon.

Western Tent Caterpillar

Approximately 1,034 acres of red alder growing along Highway 26 in Clatsop County were defoliated by the western tent caterpillar. This sudden outbreak was unusually severe and in many cases trees were almost completely stripped of foliage (Figure 16). There was no sign of tent caterpillar larvae infected by virus, usually a sign of a collapsing population, so there is a possibility that this outbreak may continue for another year.

Figure 16. Red alders defoliated by western tent caterpillar; photo by Oregon Department of Forestry.

Diseases

Sudden Oak Death

Sudden Oak Death (SOD), caused by the non-native pathogen *Phytophthora ramorum*, is a new disease that has caused considerable mortality of tanoak, coast live oak, California black oak, and numerous other plant species in California since 1995. The pathogen infects leaves and stems, and kills trees by causing lesions on the main stem (Figures 17 & 18). The origin of the *P. ramorum* is unknown.

Figure 17. Aerial view of tanoak killed by Phytophthora ramorum in southwestern Oregon; photo by Oregon Department of Forestry.

SOD was first discovered in southwest Oregon by an aerial survey in July 2001. The disease occurs at nine sites near the town of Brookings (figure 19). The sites range in size from 0.5 to 10 acres, and encompass a total area of 40 acres. The primary plant species being killed is tanoak, but rhododendron and evergreen huckleberry also are infected in Oregon.

In the past year, the list of native tree and shrub species that are susceptible to SOD has increased from 5 species to nearly 20 species. The growing list of susceptible plants and the broadening geographic distribution of the pathogen have elevated the threat to Oregon's forest ecosystems and the nursery industry. Known hosts of the Sudden Oak Death pathogen extend continuously from California into Oregon, putting Oregon's forest at high risk for this disease. The northern-most occurrence of SOD in California is about 200 miles south of the Oregon border.

State and Federal agencies and private landowners began a cooperative eradication project in fall of 2001. The objective of the project is to cut and burn all host plants within the nine infested sites. As of December 2001, all hosts plants in six of the nine infested sites had been cut, and burning was completed on two sites. Complete treatment of these sites likely will take at least 2 years.

Soon after the causal agent of SOD was identified in California, the Oregon Department of Agriculture (ODA) applied quarantine regulations that prohibited the movement of host plant material and associated soil into Oregon from infested counties in California. Upon discovery of SOD in Oregon, ODA expanded the quarantine to include those properties in Oregon with confirmed SOD. The area currently under quarantine in Oregon is approximately 9 square miles (figure 19).

Figure 18. Stem lesion on tanoak caused by Phytophthora ramorum; photo by Oregon Department of Forestry.

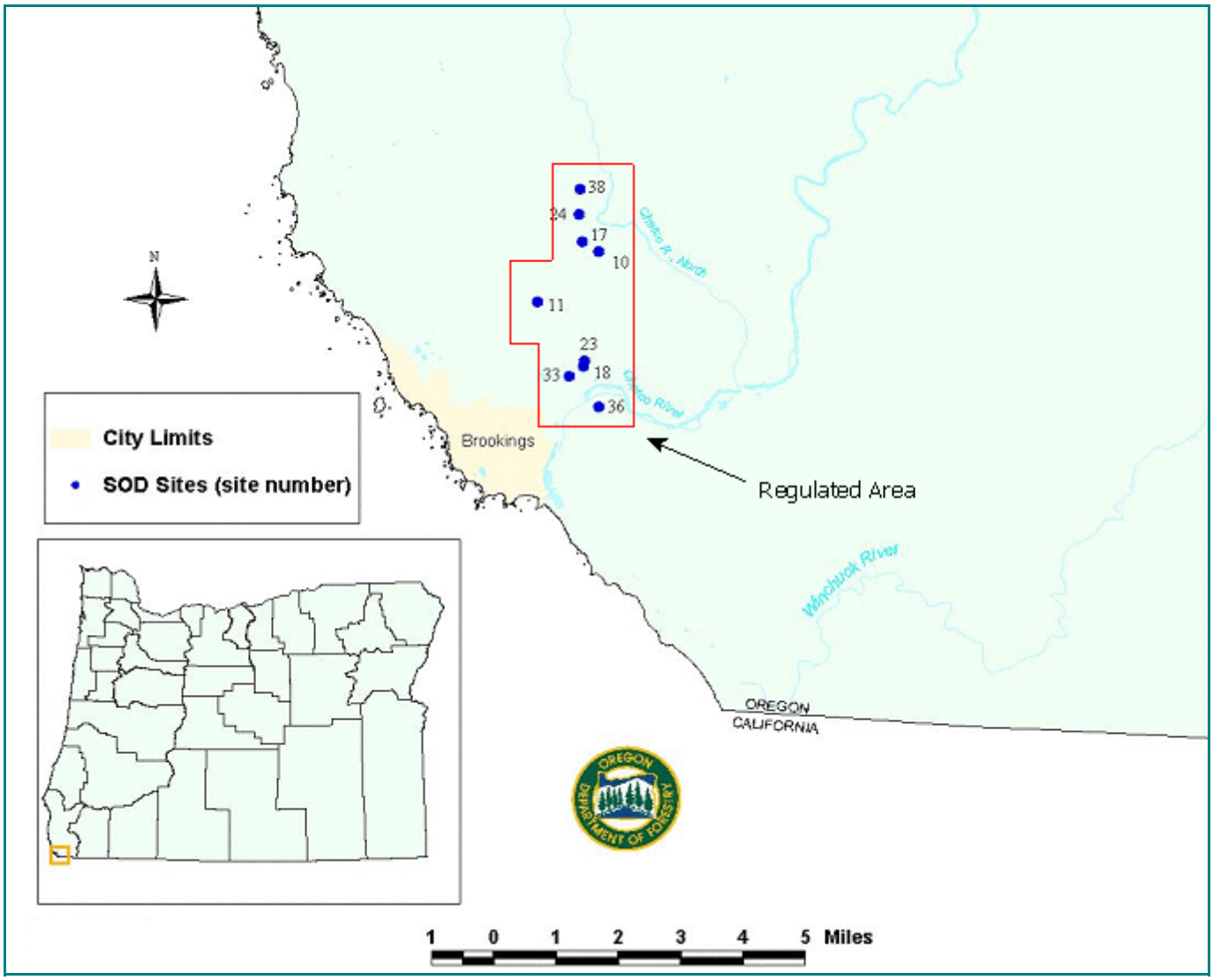


Figure 19. Location of nine sites with Sudden Oak Death in southwestern Oregon in October, 2001.

Swiss Needle Cast

Swiss needle cast is a disease of Douglas-fir foliage caused by the fungus *Phaeocryptopus gaeumannii.* It causes needles to turn yellow and fall prematurely from tree, ultimately reducing tree growth and survival (Figures 20 and 21). Tree mortality is rare, occurring only after many years of defoliation. The pathogen is native to Oregon and infects only Douglas-fir. The disease is called "Swiss" needle cast because it was first described in Switzerland in the 1920's on planted Douglas-fir.

Figure 20. Douglas-fir branch defoliated by Swiss needle cast; photo by Oregon Department of Forestry.

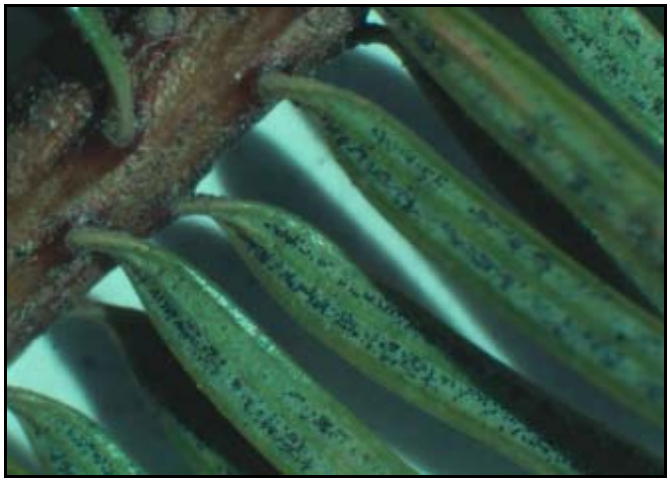


Figure 21. Small black fruiting bodies of the Swiss needle cast pathogen (Phaeocryptopus gaeumannii) on the underside of Douglas-fir needles; photo by Oregon Department of Forestry.

The 2001 aerial survey for Swiss needle cast in the Coast Range covered ~2.9 million acres of forest. Approximately 221,000 acres of Douglas-fir forest had obvious symptoms of Swiss needle cast: 160,000 acres north of Florence, and 61,000 acres south of Florence. This is a decrease of about 62,000 acres compared to the 2000 survey (figures 22 and 23). The eastern-most area with obvious SNC symptoms was almost 35 miles inland from the coast, slightly more than previous surveys. Most of the areas with symptoms that can be detected from the air were within about 18 miles of the coast.

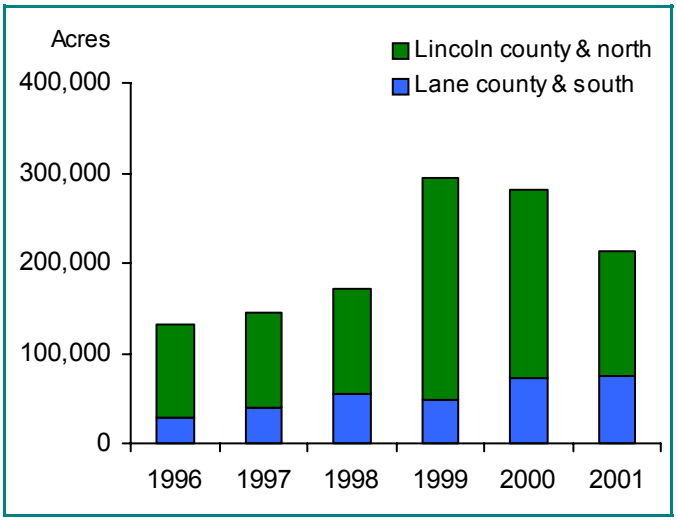


Figure 22. Acres of Douglas-fir forests with Swiss needle cast symptoms detected by aerial surveys over the Coast Range in Oregon.

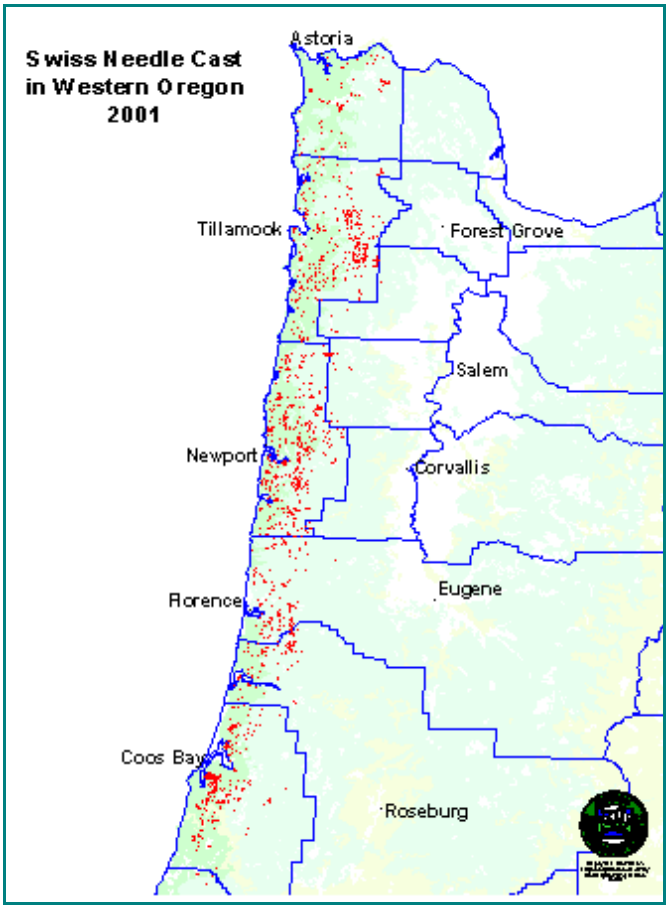


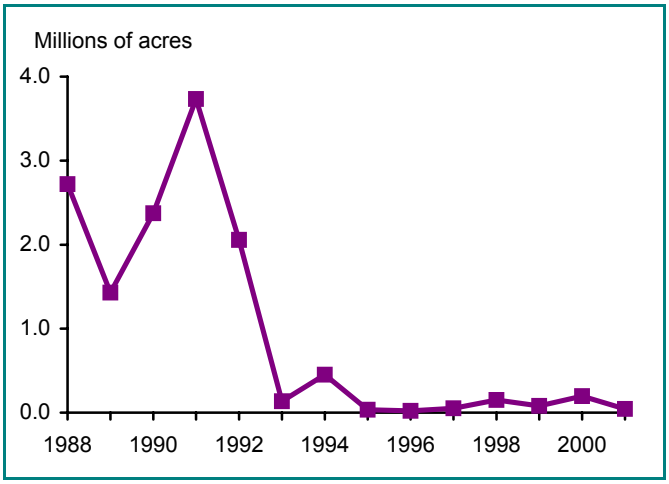
Figure 23. Douglas-fir forests in western Oregon with obvious symptoms of Swiss needle cast as detected by aerial surveys.

No Swiss needle cast damage was mapped in the Cascade Range, although Swiss needle cast does occur at damaging levels in some areas. Thus far the disease appears to be of concern only in a few localized areas in the Cascade Range.

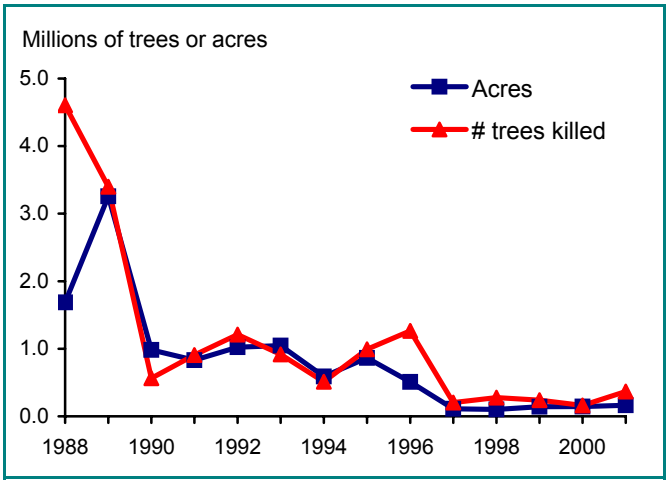
The aerial survey provides a broad picture of the area significantly impacted by Swiss needle cast. From a practical standpoint, it establishes a zone in which forest management should take into account the effects of the disease.

Permanent plots in 10- to 20-year-old plantations in the northern Coast range have been monitored since 1997. Based primarily on needle retention ratings, these plots show little evidence of a significant change in damage from Swiss needle cast since 1997. The overall poor needle retention in the sample population suggests a continuing severe growth reduction from Swiss needle cast.

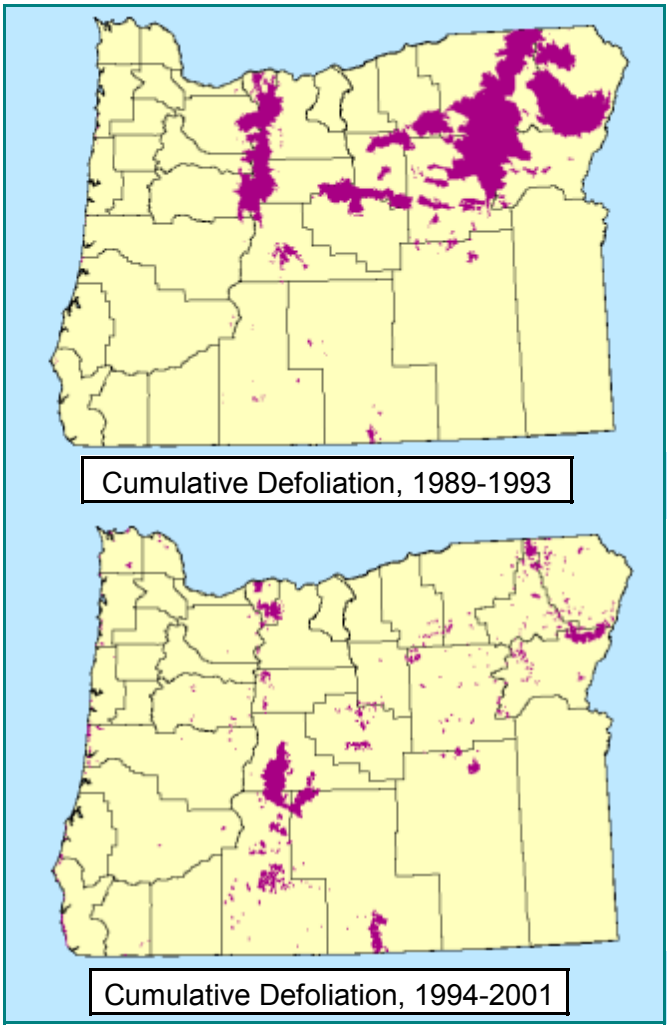
Defoliation and Mortality Trends



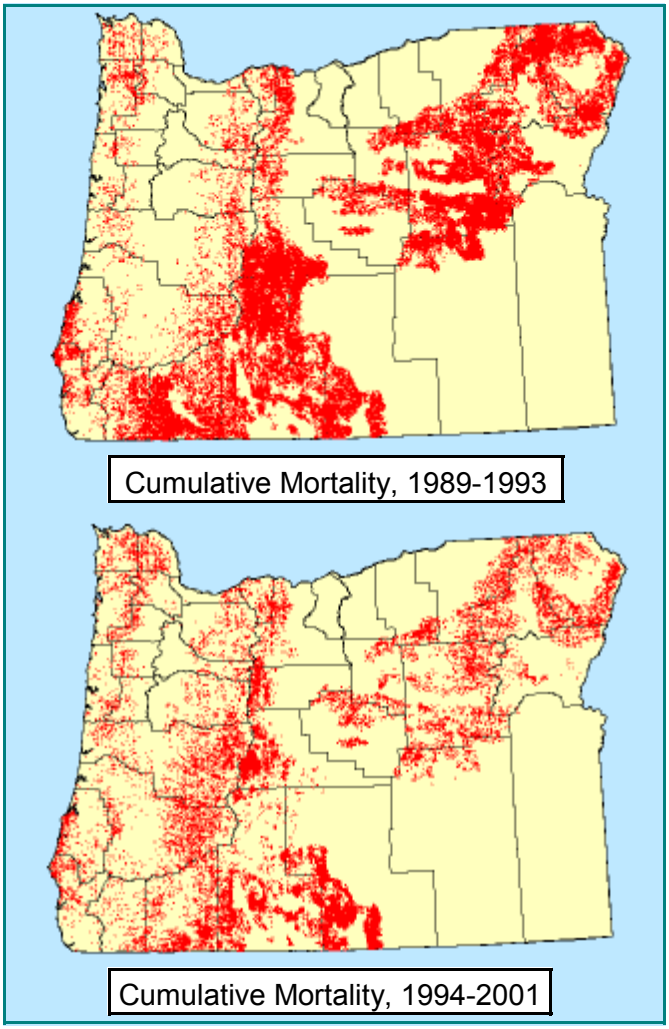
Annual acres defoliated as detected during aerial surveys in Oregon.



Annual acres with mortality and number of trees killed as detected during aerial surveys in Oregon



Cumulative defoliation in Oregon for 1989-1993 (top, 5 years total) and 1994-2001 (bottom, 8 years total), detected during annual aerial surveys.



Cumulative mortality in Oregon for 1989-1993 (top, 5 years total) and 1994-2001 (bottom, 8 years total), detected during annual aerial surveys.

Contacts and Additional Information

If you have questions about forest insect and disease activity in Washington, please contact one of these regional or field offices:

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Email: jmair@odf.state.or.us
http:\\www.odf.state.or.us/fa/FH/id.htm

(left) Douglas-fir beetle larvae in galleries; David McComb (USDA Forest Service) photo provided by www.forestryimages.org.

Forest Service

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