EC 1413
November 1992
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# Forest health in eastern Oregon

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Forests in eastern Oregon are experiencing catastrophic health problems. Bark-boring and needle-eating insects in mixed-conifer and pine forests are turning vast green landscapes red, brown, and shades of grey.

Insects that feed on conifer foliage currently are causing most of the visible damage. Chief among these needle eaters are the western spruce budworm and the Douglas-fir tussock moth. Figure 1 shows how fir defoliators can cause extensive damage, especially to small trees underneath the main forest canopy.

Bark beetles are also at epidemic levels in some locations. These beetles bore through the bark and lay eggs, where they introduce a fungus that clogs the tree's water conducting system. This combination kills the tree. Root diseases and parasites such as dwarf mistletoes exacerbate forest health problems.

Unhealthy forests dramatically alter the scenery and wildlife habitat, greatly diminish property values, especially forested homesites, render campsites and other forest recreation unattractive, cut off big game and livestock access, reduce the long-term timber supply, and potentially change timber-dependent community economics, work forces, and social structure.

Tourists visiting Oregon for its breathtaking vistas will see red and dead forests instead. Easily the worst consequence is the increased risk of catastrophic wildfire.

While most changes associated with dying forests are obviously negative, there are a few positive aspects.

For example, alternative wildlife species may benefit, snow containment may increase in some areas, forage and water yield could improve, and large quantities of wood for chipping become available.

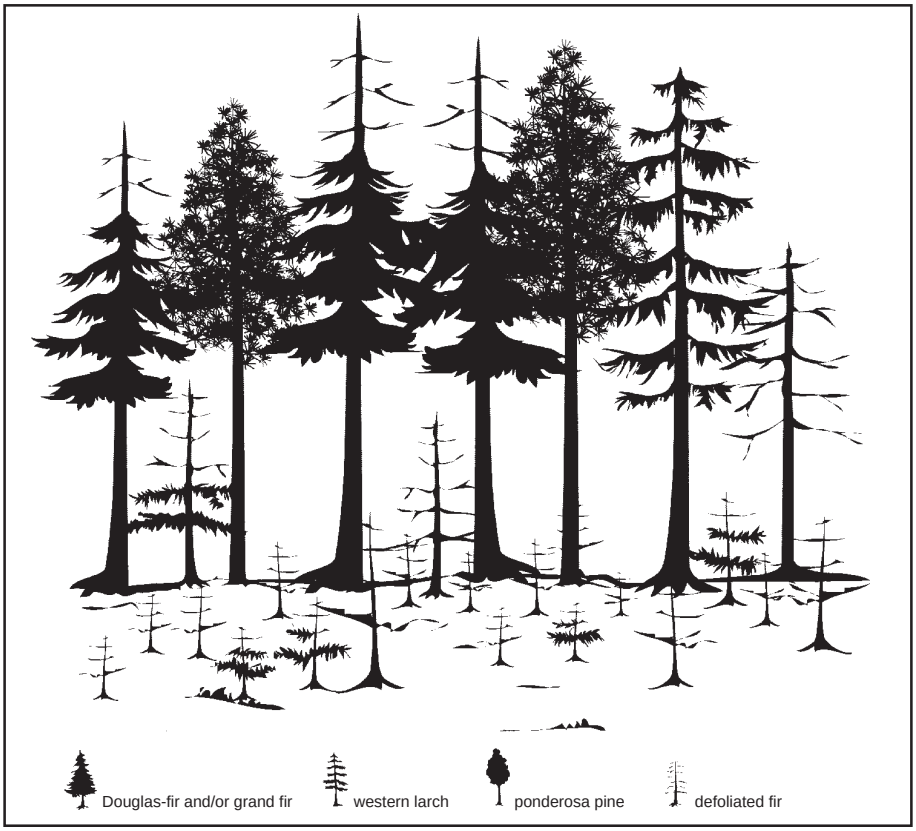


Figure 1.—*Following a severe budworm attack, a mixed conifer stand has many trees with dead tops and the understory trees are dead. Douglas-fir and white or grand fir are heavily damaged and even large trees die. Notice that the pine and larch are still healthy.*

In the long run, a new forest equilibrium is reached. Table 1 on page 2 summarizes the short- and long-run adverse and beneficial impacts.

## The problem is staggering

As an example, in northeast Oregon between 1986 and 1991, 655 million board feet of timber were lost to bark beetles. This is about 131,000 truck loads of logs—enough to keep a medium-sized mill operating for 16 years. In 1991 alone, an estimated 4 million acres were defoliated by the western spruce budworm. That is equivalent to an area with a border running from Portland to Corvallis on one side and Portland to The Dalles on the other. This infestation is seriously reducing tree growth and stand vigor, and killing millions of trees.

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## Causes are complex

Historically, fire came through many eastern Oregon forests about every 8 to 20 years in lower elevation ponderosa pine and every 20 to 40 years in mixed-conifer forests. These ground fires removed accumulated debris and thinned out seedlings and saplings.

In mixed-conifer forests, periodic fires left the fire-tolerant ponderosa pine and western larch but eliminated most of the fire-sensitive fir species. Beginning in the early 1900s, humans, seeing only the destructive side of fires, aggressively suppressed them. Inadvertently, this absence of fire over an 80- to 100-year period allowed Douglas-fir and grand or white fir to take over the forest, slowly replacing the pine and larch.

Another factor encouraging the buildup of fir species was selective logging of the economically more preferable pine and larch. The firs that dominate today's forests are less drought tolerant and more susceptible to defoliating insects, root diseases, and stem decays.

Without fire to thin out the small trees, tree density increases so much that individual trees must compete intensely for water and nutrients. Under this stress, all trees become more vulnerable to insect attack. In recent years, *drought*, which is particularly stressful to the more moisture-dependent firs, has *aggravated* this already critical situation.

Table 1.—*Forest pest outbreaks*

**Short-term effects**

| Negative | Positive |
|---|---|
| • Catastrophic fire risk increases.<br>• Air quality declines due to fire.<br>• Dead, unsalvageable timber and growing stock.<br>• Riparian quality declines. Value of timber resources declines.<br>• Regeneration difficulties.<br>• Access by livestock and big game restricted.<br>• Premature logging or panic decisions.<br>• Loss of hiding and thermal cover for wildlife.<br>• Reduced aesthetic and recreational enjoyment.<br>• Loss of management options for landowners. | • Alternative wildlife species increase.<br>• In some situations, increased snow containment contributes to water storage supply and increases total water run off.<br>• Forage for livestock and big game increases.<br>• Firewood availability and logs for chips increase. |

**Long-term effects**

- loss of future timber supply
- change in tree species mix
- altered wildlife species mix and population densities
- transformed landscape aesthetics
- changed opportunities for recreation (camping, hunting, fishing, hiking, etc.), grazing, and timber

# Solutions

Short-term actions that incorporate long-term forest health restoration strategies can lessen future impacts. Some of the options include monitoring, doing nothing, spraying, and sanitation and restoration. These are explained in more detail in the following sections. It's also going to be important to implement forest practices and policies that consider a healthy forest ecosystem for the future.

## Monitoring

Eastern Oregon forests are monitored annually to locate and assess the damage from insects and disease. Results accumulated through 1991 are shown in Figure 2 on page 3. Your local Oregon Department of Forestry or U.S. Forest Service office also has maps.

## Doing nothing

Landowners must not overreact when defoliation occurs but should seek professional forestry advice. Doing nothing may sometimes be the best option. This depends on a number of factors including the intensity and duration of the insect outbreak, the number of susceptible trees, and the age of the trees. Doing nothing is probably best if tree damage is light to moderate, the forest has a good mix of species, trees are well spaced, the economic value of affected trees is low, or if landowner objectives are not timber oriented.

## Spraying

Insecticide application for defoliators is a short-term strategy designed to save tree foliage. Spraying is a short-term approach because it does not solve the problem of fir-dominated forests and competition from too many trees.

Some insect outbreaks are recurring and long lasting. For example, western spruce budworm epidemics have lasted 8 to 10 years or even more. As a result, multiple, carefully-timed sprays may be needed, but they are costly.

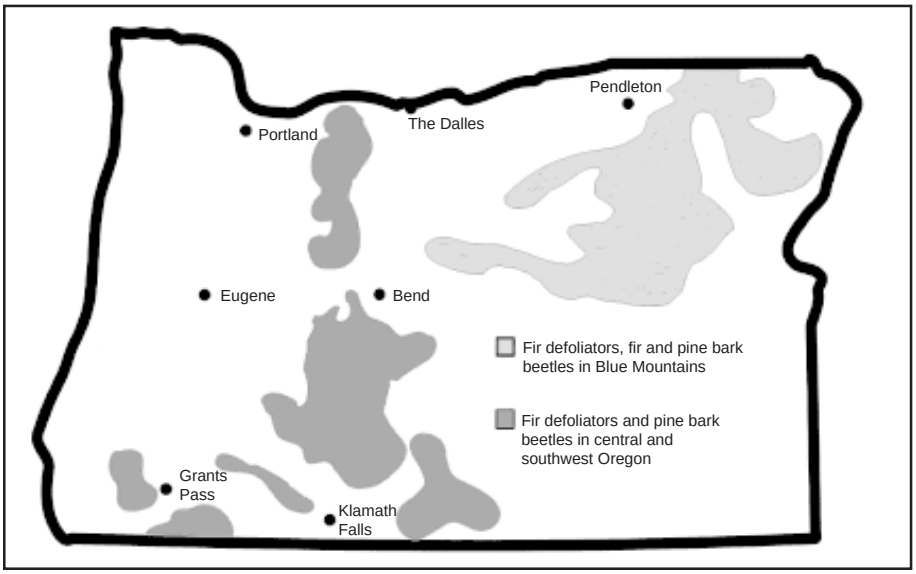


Figure 2.—*Insect damage through 1991*

Controversy surrounds several effective insecticides because they can also harm nontarget species. One of these, a synthetic compound called Sevin, with the active ingredient Carbaryl, effectively kills larvae by contact and by larvae ingestion of treated foliage. It is of relatively low hazard to all nontarget species except honey bees and certain wasps and ants.

A less controversial insecticide, Bacillus thuringiensis (Bt), is a "natural" biological material that poisons larvae by bacterial action after they've eaten it. Bt is more selective, killing only caterpillars of moths and butterflies, and is of low hazard to aquatic ecosystems. It's probably the most common pesticide used to control the defoliators affecting these forests.

Aerial spraying of Carbaryl, Bt, or any other insecticide is not effective against bark beetles that bore. About the only spray that works on these pests is a ground application laid down annually *before* the beetle attacks.

This method is used mostly to protect individual high-value trees around homes and campgrounds.

Whether to spray or not depends, among other things, on land ownership objectives, stand economic value, and level of damage.

## Sanitation and restoration

Removal of dead and dying trees in the short-term lowers the risk of destructive fire and, with some pests, helps reduce the source of infestation, protecting the remaining trees. For example, timely removal of infested, beetle-killed trees reduces the beetle population on the site.

Removing excess trees improves the residual trees' vigor, which increases resistance to insects and disease. One goal of this practice is to restore long-term health and vigor.

Correctly performed sanitation and restoration treatments, enhanced by natural seeding or planting, can regenerate a forest with a higher component of insect- and disease-resistant tree species. However, even with these efforts, root disease and mistletoe problems can remain.

Table 2 summarizes these alternatives and their consequences.

Table 2.—*Summary of alternatives, impacts and considerations in dealing with forest pest outbreaks*

| Alternative | Impacts | Considerations |
|---|---|---|
| Do Nothing | • Small growth loss to a positive effect from natural thinning and freeing up nutrients or...<br>• Top kill and mortality or ...<br>• Significant tree death. | • Impact depends on outbreak intensity and duration, species composition, and forest structure.<br>• Not a long-term solution but may be acceptable in the short-term. |
| Spraying | • Limits defoliation for short period (1 to 3 years). | • Not an option for bark beetles, except for high value trees.<br>• Effectiveness depends on size of ownership, whether adjacent landowners are spraying, and level of damage.<br>• Not a long-term solution because it doesn't change species composition or tree spacing. |
| Sanitation & Restoration | • Reduces fire hazard.<br>• Can regenerate stand to more healthy condition.<br>• Sanitizes stand — removes infested and high risk trees.<br>• Recovers economic loss of dead and dying trees. | • Root disease and dwarf mistletoe problems may remain.<br>• Often one of the best long-term solutions when dealing with heavily damaged stands.<br>• Regeneration may be difficult to achieve because of advanced competing vegetation. |

## Fire may help solve the problem

Fire, prescribed to mimic the natural fire cycle in a forest, could be introduced as a tool to stop the invasion of fir and open up the forest more. However, over the years of fire suppression, highly combustible material has built-up on the forest floor. This, combined with "fuel ladders" in the form of brush and standing dead, dying, and even live trees, allows fire to climb easily to the crowns and kill the remaining trees, including ponderosa pines and larch. Therefore, before controlled burning can be used, fuel ladders must be cut and removed.

Use of fire by private landowners carries risk. Landowners are liable for fires that escape, both for the cost of suppression and damage on their neighbors' property. Thus, most private owners are reluctant to use controlled fire.

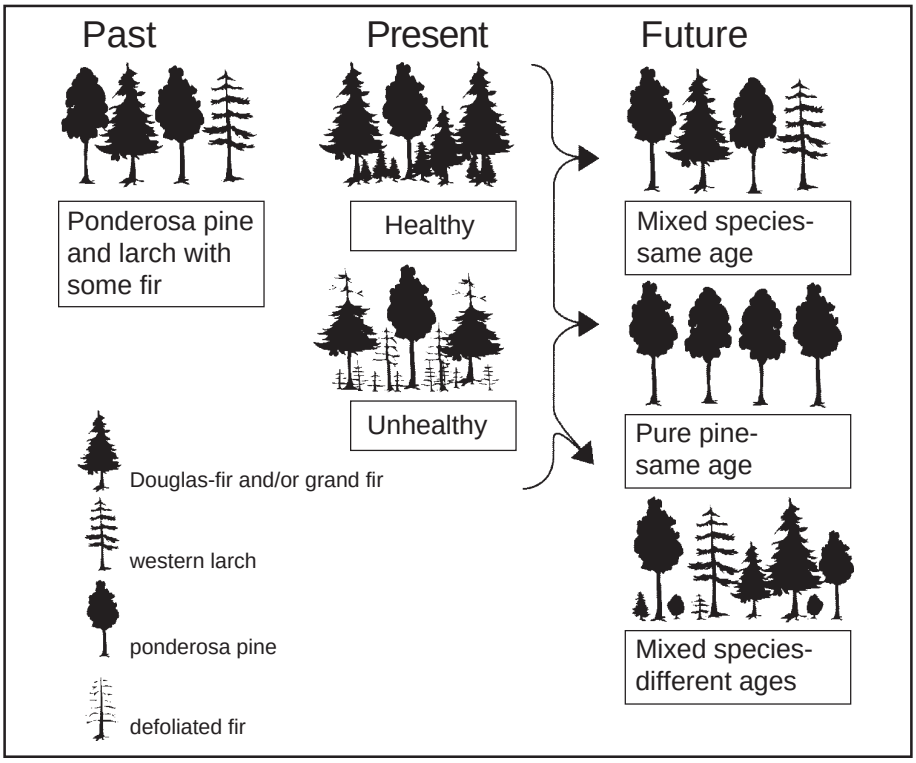


Figure 3.—*Mixed conifer forests of the past were more open and dominated by large ponderosa pine with some larch and fir. Presently, forests are denser, multi-aged, and dominated by fir—some are healthy, some are not. Even currently healthy fir forests can be susceptible to infestations of aggressive insects and diseases. Drought aggravates the situation. In the future, management can help by promoting more pine and larch, and spacing trees out.*

# Use of dead trees

There are many uses for "dead wood," but there are a number of factors besides its usefulness to consider:

- The wood of various species deteriorates at different rates. Grand fir deteriorates fastest, followed by ponderosa pine, and then Douglas-fir. At some point, usually when less than 50 percent of the wood is sound, the wood becomes unusable.
- Salvage must occur before deterioration is excessive. This takes time, which may be complicated by many factors.

  Location of the dead trees may prohibit or limit their harvest. For example, trees may be inaccessible to logging operations or in specially designated areas. Such areas include wilderness or endangered species habitat in which salvage logging is prohibited.

  Also, salvage operations may be too dangerous during the fire season or very difficult during the winter.
- There must be adequate markets for the salvage material. Also, the trees have to be worth at least enough to compensate for logging and hauling costs. If it is not of sawlog quality, can it be sold to chip for paper or other products?
- Equipment and labor must be available to do the job. Competition for labor with farming and other forestry activities may prohibit its use for salvage operations.
- Public and private owners differ in how they respond to damaged timber. Some aggressively pursue salvage operations, while others choose to do nothing—to let nature take its course. Concerted salvage efforts are more effective, but getting ownership groups to pull together may take persuasive efforts.
- Many factors about the site itself must be considered. Would wildlife or fish habitat be disturbed by a harvest? Would the operation compact the soil or boost the potential for soil erosion? Will some woody debris be left on the ground to maintain long-term productivity?

# Future strategies

To solve the problem of fir-dominated forests and competition from too many trees, long-term strategies are needed. Management efforts involve:

1. Changing the forest more to larch and pine on appropriate mixed-conifer sites and thinning dense stands to promote vigor for all species.
2. Using controlled fire to reduce fuels and create seed beds.
3. Planting high-quality, genetically-superior seedlings.
4. Encouraging beneficial natural predators and parasites.

Table 3.—*Options and issues*

| Option | Issues |
|---|---|
| Do Nothing | • Higher threat of catastrophic fire.<br>• Dead and dying timber may rot before it can be salvaged.<br>• Damaged timber will have lower value which will affect landowner revenues, payments to counties, local taxes, and timber-dependent economies.<br>• Loss of recreational opportunities and income.<br>• Lower values will decrease dollars available for restoration investments. |
| Spraying | • Effects on non-target organisms may be a concern of some people.<br>• Does the cost justify the benefits?<br>• Environmental appeals of spray projects could cause delays and lessen spray effectiveness.<br>• Short-term action will not solve the problem in the long-term.<br>• Spraying may require multiple applications, which are costly. |
| Sanitation/Restoration: | • Accelerated logging will occur as forests are treated. Will there be a regional shortage of timber before these new stands are mature?<br>• Will long term forest health be a goal so stable timber supplies, wildlife cover, recreational opportunities, and watersheds are an outcome?<br>• Monitoring of regeneration establishment will be important.<br>• Regeneration will be more difficult on salvage sites because of competing vegetation.<br>• Seedlings will be in high demand yet seedling supply is inadequate.<br>• Once sanitation and restoration activities are completed, what will the impact be on timber dependent manufacturing, work force, and community stability?<br>• Will restoration investments be available to achieve healthy ecosystems? For example, will there be government incentives for private land owners, or special appropriations to restore public lands?<br>• Some groups may be concerned that logging will degrade riparian ecosystems and associated anadromous fish populations.<br>• Environmental appeals on public land could delay restoration action, limiting revenue for restoration work and reducing short-term regional timber supplies.<br>• Restricted timber supply on public land has increased values on private holdings. This, along with damage to stands, has prompted some landowners to harvest prematurely or excessively. |

Implementing these strategies requires public understanding and support, investments in improved practices, and procedures for working through inevitable conflicts. Because of the large areas involved, it will take 20 to 50 years for forest resource managers to nurture mixed-conifer forests toward improved health. Table 2 on page 3 summarizes these alternatives and their consequences.

Figure 3 on page 4 shows how forests have developed over time to their present condition and how forest management practices can improve forests for the future.

## Public policy and forest health

Policy makers will have a significant effect on:

1. how fast damaged timber on public land will be salvaged;
2. available money for long-term forest health restoration projects;
3. whether spraying projects are funded or not and how many acres;
4. availability of extra fire protection; and
5. availability of seedlings.

Table 3 lists several options and their related public policy issues. Many of these are controversial. Hopefully, through cooperation of public agencies, local governments, private landowners, private timber companies, and environmental groups, workable solutions can be achieved soon. The health of eastern Oregon forest ecosystems is at stake.

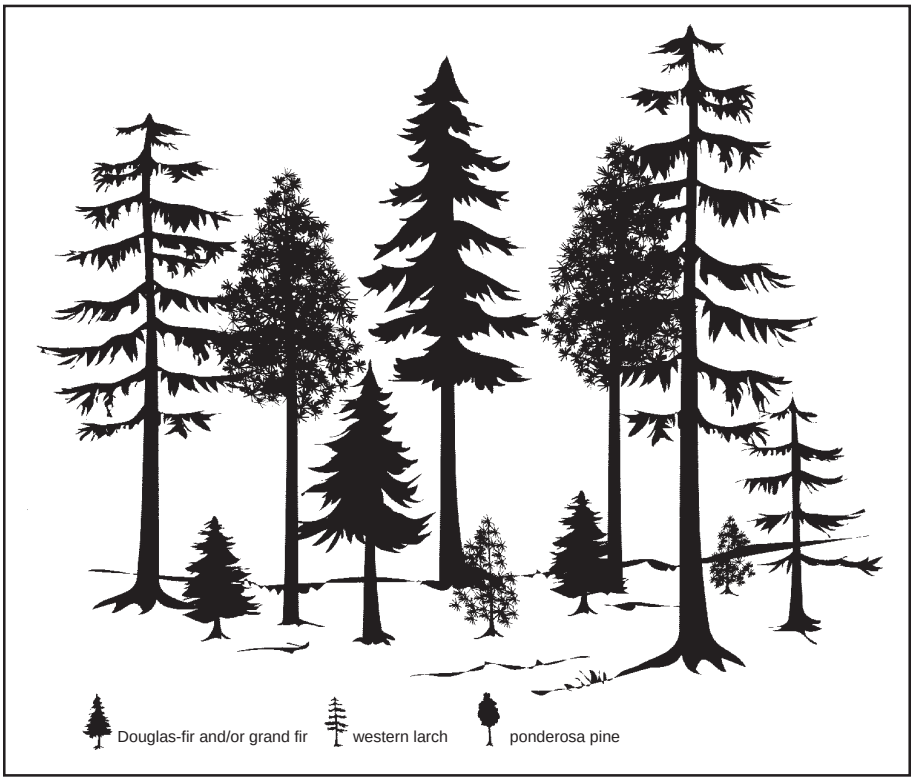


Figure 4.—*Eastern Oregon forests of the future should be healthier with practices that encourage a good balance of species and proper spacing between trees.*

# Summary

This publication has reviewed the forest health situation in eastern Oregon by describing the situation, its causes, potential solutions, and the issues.

Figure 4 provides a look at how management practices will change eastern Oregon mixed conifer forests to a healthier condition.

Forest health in eastern Oregon is wrought with complexities, from understanding its complex causes, to deciding on "best" solutions, to dealing with the multiple controversies and implications surrounding the issue. Decision makers need clear, factual information to make good decisions. At stake is the forest ecosystem, individual people, and a society that benefits economically and recreationally.

## For more information

The following titles are available from OSU Extension offices in Deschutes and Union Counties.

Wickman, B.E., *Forest Health in the Blue Mountains: The Influence of Insects and Disease*, United States Forest Service general technical report PNW-GTR-295 (Portland).

Quigley, T.M., *Forest Health in the Blue Mountains: Social and Economic Perspectives*, U.S. Forest Service general technical report PNW-GTR-296 (Portland).

*Evaluating Defoliated Fir Stands for Management Options*, Oregon State Department of Forestry, 1992.

*Forest Health Action Guide for Forest Land Owners*, Oregon State Department of Forestry and Oregon State University Extension Service handout, 1992.

*Restoring the Forest Ecosystem: Forest Health in eastern Oregon*, U.S. Forest Service (Malheur, Ochoco, Umatilla, and Wallowa-Whitman National Forests, and the Blue Mountains Natural Resources Institute, 1992).

More information about forest pests and alternatives for control is available from the following:

- Oregon State University Extension Service
- Oregon Department of Forestry
- U.S. Department of Agriculture, U.S. Forest Service
- Blue Mountains Natural Resources Institute (La Grande, Or.)

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