Please... help people be more careful!

Remember—Only you can PREVENT FOREST FIRES!

TOP: In the early 1900s, logs were commonly hauled to the mills by rail as on this first log train out of Jaype, Idaho. PHOTOGRAPH COURTESY OF: Potlatch Corporation.
ABOVE: A mistaken view of wildfire as an enemy of forest ecosystems led to one of the most successful ecological/environmental campaigns of a generation. Even lifetime city dwellers recognize the image of Smokey Bear admonishing us to prevent forest fires, as in this 1952 poster. COURTESY OF, USDA Forest Service.

WHITE PINE'S DECLINE

—logging and fire suppression take their tolls

Harvesting alone would not have decimated white pine. In fact, logging can create openings large enough to let direct sunlight reach the forest floor where white pine seedlings can become established and grow. In addition, prescribed fire can be used to clean up logging slash, release nutrients, and further reduce shade to create conditions that give white pines a competitive advantage in regeneration.

In many areas, however, the stands were high-graded. The highest-value white pines were removed, the less valuable, less-vigorous individuals or species were left on-site, and forest succession was dramatically changed. Not only did this type of logging remove the best genetic stock, it gave the more shade-tolerant grand fir and hemlock an overwhelming advantage in regeneration.

Natural wildfires could have provided regeneration opportunities for at least the remaining white pines, but society at large, and even many foresters, did not yet fully understand the role of fire in maintaining these ecosystems. They saw fire as a threat to both forests and humans and began to suppress all wildfires.

IN MANY AREAS THE STANDS WERE HIGH-GRATED.

Fire suppression efforts in the latter half of the 20th century were so successful that the number of acres burning annually in northern Idaho was only a small fraction of the region’s historical average. For example, although the number of acres that burned varied widely from year to year, the Idaho Panhandle National Forests averaged 31,000 acres burned per year between 1542 and 1931. The average number of acres burned per year between 1969 and 1998 was only 665. This drastic decline in fire disturbance closed another pathway for white pine regeneration, and fire, at least temporarily, ceased to be a major force in shaping forest vegetation in the Inland Northwest.

—blister rust brings King Pine to its knees

High-grading and fire suppression clearly diminished white pine in the Inland Northwest’s ecosystems, but it was an exotic disease that, by far, did the most damage. White pine blister rust was inadvertently introduced to North America from Europe as early as 1898 when infected pine seedlings were widely planted in the northeastern United States. In 1910, the rust arrived in Vancouver, British Columbia, on infected seedlings from France, and by 1923, it had begun to infect Idaho’s white pines. By the 1940s blister rust was epidemic, and millions of western white pines were
dying throughout the region.

White pine blister rust is caused by a fungus (*Cronartium ribicola*) that lives part of its life on *Ribes* plants (gooseberries and currants) and the other part on white pine trees. This devastating pathogen needs both hosts to complete its life cycle.

In the fall of the year, when temperatures are low and moisture levels are high, fungal spores are produced on *Ribes* plants and dispersed by the wind. When they land on white pine needles, the spores germinate and enter the needles through their stomata. In susceptible white pine trees, the fungus continues growing down the needles and into branches and the main stem, producing stem-girdling cankers and eventually killing the trees.

**IT WAS AN EXOTIC DISEASE THAT, BY FAR, DID THE MOST DAMAGE.**

Blister rust usually spells rapid death for small trees, but infected large trees may live for many years before they finally succumb. Infections in the crowns of large trees may kill only individual branches or cause top-kill above a girdling infection. Large trees will usually die when they have many crown infections or a stem-girdling infection in the lower bole.

**EARLY EFFORTS TO SAVE WHITE PINE**

- attempts to directly control blister rust fail

The USDA Forest Service and forest industry made valiant efforts to save white pines by attempting to interrupt the life cycle of the rust fungus. Starting in 1909 in the East and later in the West, foresters tried everything, from pulling out every *Ribes* plant in sight to injecting antibiotics into the bark of infected trees.
Approximately $150 million was spent over a period of about 50 years in the effort to control blister rust. But none of the programs worked well enough to rescue white pine. In 1967, efforts to directly control the rust were abandoned. Instead, harvesting was accelerated to extract the valuable timber before the rust killed it.

Unfortunately, these pre-emptive harvests removed white pines that could have served as seed sources for natural selection to increase rust resistance in the next generation.

—turning the corner:
genetics research provides hope for saving white pine

Although the blister rust epidemic seemed to spell certain death for white pine in the Inland Northwest, Richard T. Bingham, a scientist with the Bureau of Entomology and Plant Quarantine in Spokane, Washington, noticed that in stands otherwise decimated by blister rust, an occasional tree appeared to be perfectly healthy. Could these stalwart few harbor a natural resistance to the rust? Bingham thought so.

**THEIR STUDIES DEMONSTRATED GENETIC CONTROL OF BLISTER RUST RESISTANCE.**

**LEFT:** The blister rust-resistance breeding program began in the summer of 1950. A.E. Squillace, J.W. Duffield, and R.T. Bingham climbed 25 field-selected white pines and pollinated female stroboli that were isolated in about 600 pollination bags. When the cones began to mature, they installed cloth bags to protect cones from insects and to catch seed, as in this 1951 photo of tree #19 near fernwood, Idaho. **PHOTOGRAPH COURTESY OF USDA Forest Service.** **NEAR RIGHT:** R.T. Bingham, a forest pathologist in Spokane, Washington, suspected that the occasional rust-free white pines he found in the midst of otherwise heavily infected stands were genetically resistant to blister rust. As part of the genetic improvement program, Bingham grafted cuttings from candidate trees in the testing program. **PHOTOGRAPH COURTESY OF Bureau of Entomology and Plant Quarantine.**