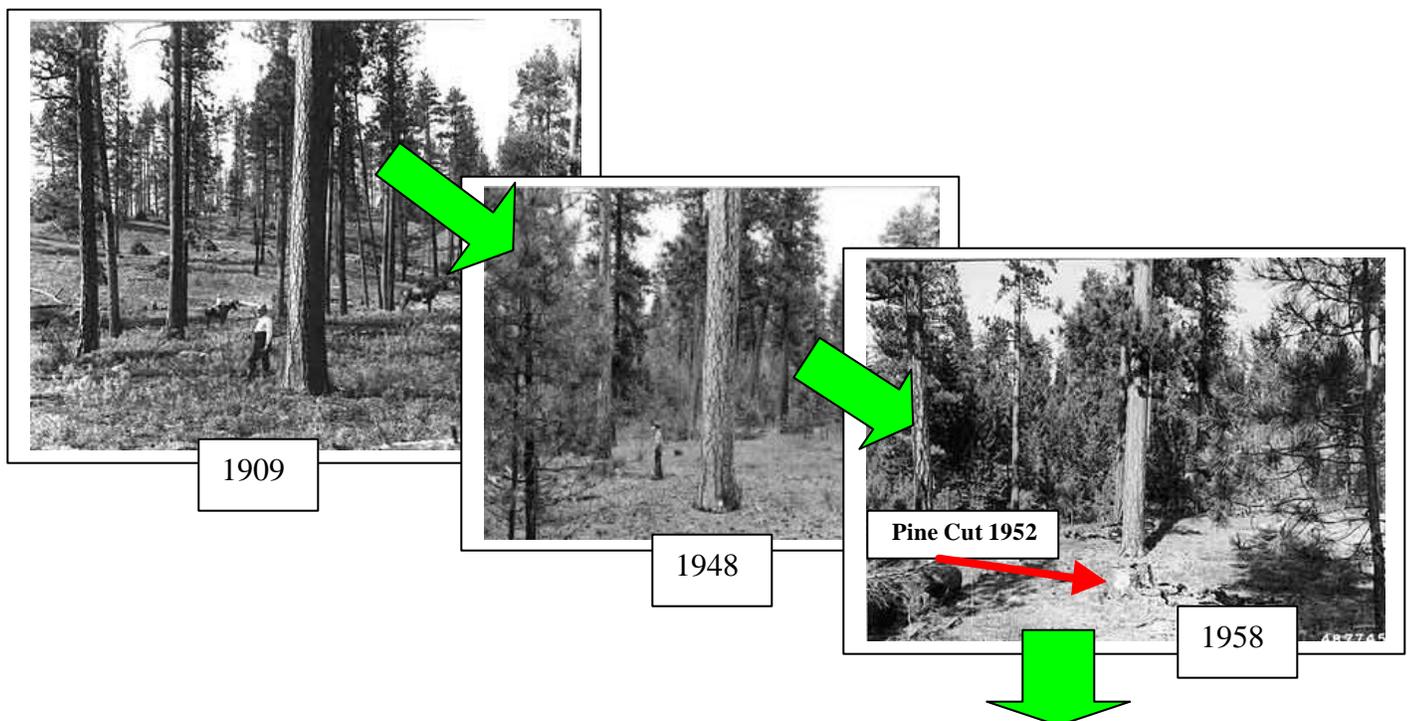


Forest Health Aspects of Using Forest Biomass To Power Hydrogen Fuel Cells

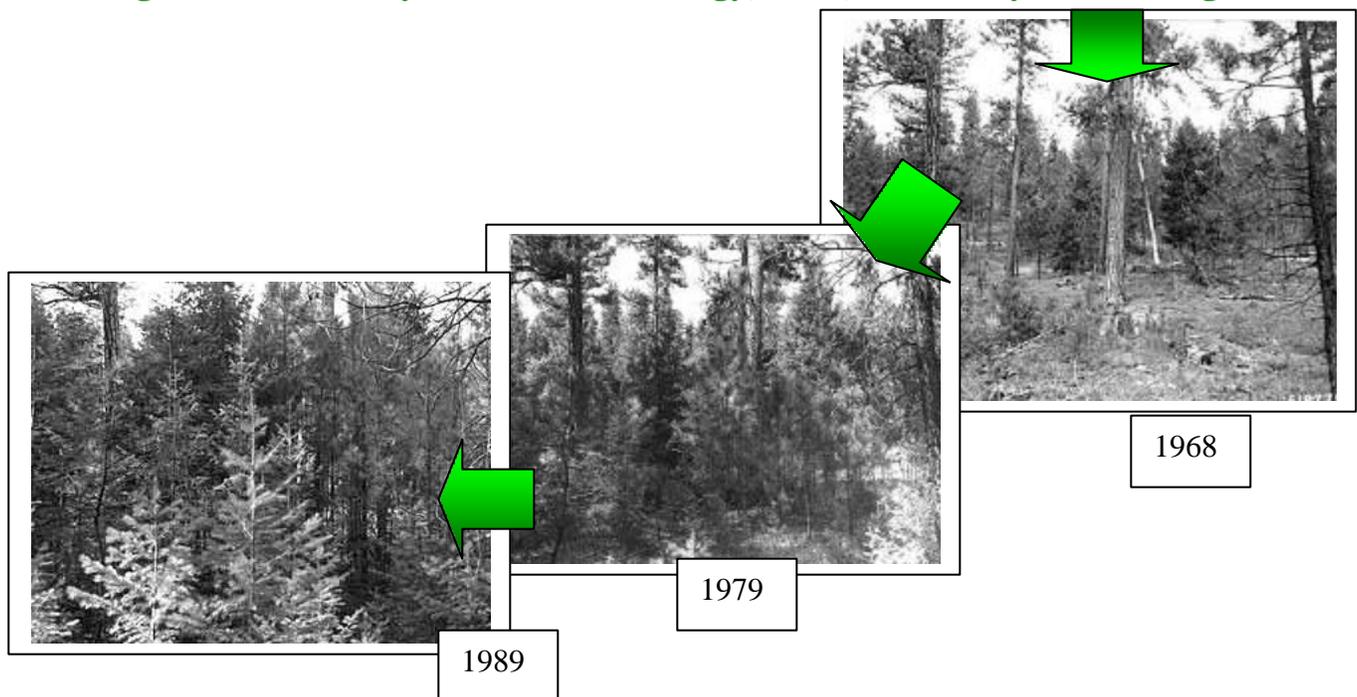
The dry forests in the interior western U.S. have a forest health problem resulting from fire suppression practices over the last century. Selective harvesting of these forests has also contributed to the problem. Ironically, it was thought that putting fires out was a good thing for these forests, protecting the timber resource. It was easy to put out fires in these ecosystems because the natural fire regime in these forests consisted of frequent, slow-moving low intensity fires with low flame heights. We now better understand the fire ecology of these forests. Natural low-intensity fires removed underbrush and dead growth while healthy, mature trees survived. Fire suppression and selective harvesting have resulted in changes in species composition, high stem densities of small trees with accompanying moisture stress and high incidence of bark beetles, defoliators, root diseases and dwarf mistletoes. Excessive mortality and high fuel loadings have resulted. Thus these forests are now prone to high intensity, stand replacing fires not at all natural in this area. Such fires threaten the continued productivity of these forests. To add to the problem the number of people living or having vacation homes in these forests has increased dramatically in the last few decades and high intensity fires threaten the lives of residents and fire fighters. Even towns in these areas can be threatened. Increased air pollution, disruption of local economies, reduced tourism, damage to municipal watersheds, and environmental damage, including increased soil erosion, reduced wildlife populations and increases in invasive species also results.

Federal lands are increasingly vulnerable to catastrophic fires

Active land management that minimizes the risk of severe fires is needed to protect forest and rangeland ecosystems. About 190 million acres of federal forests and rangelands in the lower 48 states face high risks of catastrophic fire due to deteriorating ecosystem health and drought. For instance, many ponderosa pine forests are 15 times more dense than they were a century ago (see US FS photo time series of same site showing changes in pine forest conditions below). Where 25 to 35 trees once grew on each acre of forest, now more than 500 trees are crowded together in unhealthy conditions. Drought conditions coupled with years of fuel buildup from fire suppression and reduced thinning make these lands vulnerable to intense and environmentally destructive fire.



Program in Forest Systems and Bioenergy, CFR, University of Washington



The 2003 fire season was among the worst in modern history.

More than 5.9 million acres burned in 2003, 500,000 acres more than the previous record-setting 2000 fire season, and more than double the acreage of the 10-year average. Hundreds of millions of trees were destroyed by these fires. Major fires burned in Alaska, Arizona, California, Colorado, Georgia, Idaho, Minnesota, Montana, New Mexico, Nevada, Oregon, South Dakota, Utah, Washington, and Wyoming.

Fires are burning with greater speed and intensity than ever before. For example, the 468,000-acre Rodeo Fire in Arizona grew from 800 acres to 46,000 acres in just one day, destroying homes and forests owned by the White Mountain Apache Tribe. The 137,000-acre Hayman Fire was five times bigger than the previous largest fire in Colorado's modern history, and forced evacuations in over 80 communities. The 471,000-acre Biscuit Fire is the largest fire in Oregon's modern history, threatening over 4,000 homes. The 147,000-acre McNally Fire threatened sequoias along the Trail of 100 Giants in California.

A Solution to the problem through bioenergy

One solution to the problem is thinning the forest to remove fuel. On December 3, 2003, President Bush signed into law the Healthy Forests Restoration Act to reduce the threat of destructive wildfires while upholding environmental standards and encouraging early public input during review and planning processes. President Bush will work with Congress on legislation to further accomplish more timely, efficient, and effective implementation of forest health projects. Such legislation should authorize agencies to enter into long-term stewardship contracts with the private sector, non-profit organizations, and local communities. Stewardship contracts allow contractors to keep wood products in exchange for the service of thinning trees and brush and removing dead wood. Long-term contracts provide contractors the incentive to invest in equipment and infrastructure needed to productively use material generated from forest thinning, such as small-diameter logs, to make wood products or to produce energy.

Using forest biomass (bioenergy) to produce methanol to power hydrogen fuel cells is one way to do this (see Fact Sheets #2, 3).

Robert L. Edmonds, Professor, Associate Dean, CFR, UW (bobe@u.washington.edu)