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Salvage Logging, Replanting Increased Biscuit Fire Severity

Science Daily — The Biscuit Fire of 2002 burned more severely in areas that had been salvage logged and replanted, compared to similar areas that were also burned in a 1987 fire but had been left to regenerate naturally, a new Oregon State University Study concludes.

The analysis, one of the first to ever quantify the effect of salvage logging and replanting on future fire severity, is being published this week in Proceedings of the National Academy of Sciences, a professional journal.

It found that fire severity was 16 to 61 percent higher in logged and planted areas, compared to those that had burned severely and were left alone in a fire 15 years earlier. The study was done in areas that had burned twice -- once in the 1987 Silver Fire, and again in the massive 2002 Biscuit Fire, one of the largest forest fires in modern U.S. history.

"Many forest managers in the past have assumed that salvage logging after a severe forest fire, along with replanting new trees, will reduce future fire severity," said Jonathan Thompson, a doctoral student at OSU in the Department of Forest Science, and lead author on the study. "This is based on the assumption that removing dead trees reduces fuel loads and planting conifers hastens the return of fire resistant forests."

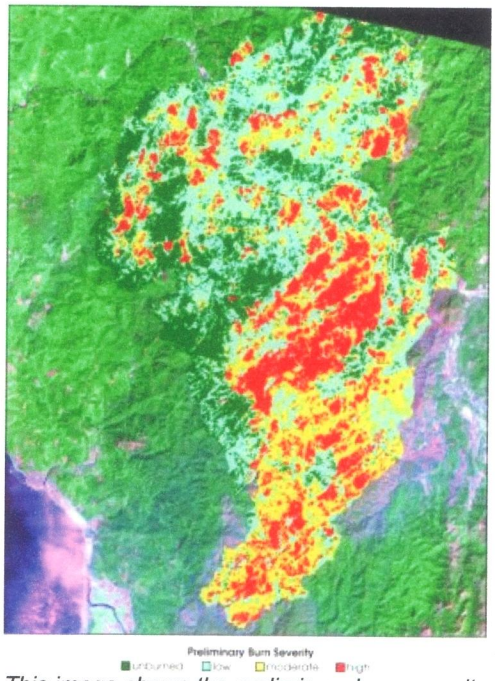
"However, those assumptions have never really been tested," Thompson said. "This analysis showed that, after accounting for the effects of topography, Silver Fire severity and other environmental variables, the Biscuit Fire severity was higher where they had done salvage logging and planting."

It's not completely clear from these data, Thompson said, what the causative mechanism is -- the tree removal, the addition of more fine fuels to the forest floor during the logging operation, or the growth of new trees that for several decades may be very vulnerable to new fires.

The study is not, researchers said, an indictment of salvage logging -- it may still have value for economic purposes or to assure the establishment of desired tree species. However, "the hypothesis that salvage-logging, then planting, reduces re-burn severity is not supported by these data," the scientists said in their report.

"Young forests in this region are susceptible to recurring severe fires," Thompson said. "Compared to an older forest with branches high above the forest floor, young trees are very vulnerable, whether they are planted or naturally regenerated."

However, in the aftermath of a wildfire, removal of large dead trees followed by planting conifer seedlings does not appear to lessen the risk of severe fires in the first 10-20 years, Thompson said. This may be because the logging process leaves more available fuel on the forest floor; the dense, homogenous replantation of young trees provides a good setting for fire; or some combination of these factors over time. "Dead woody fuel . . . is only part of the fire risk story, and it may not be the most important after a few years," the study noted.



This image shows the preliminary burn severity classification of the roughly half-million-acre Biscuit Fire that burned in southwest Oregon in July and August 2002. The southern portion of the fire shows greater amounts of moderate (yellow) and high (red) severity burned areas, while the northern part of the fire has more isolated patches of high severity mingled with low severity (light green) and even unburned areas (dark green). (Credit: Image courtesy Keith Lannom, Remote Sensing Applications Center, USDA Forest Service)

By contrast, natural regeneration of forests, he said, appears to result in at least slightly, and sometimes significantly less risk of severe future fires. This could be because the regenerating trees are more patchy, have open gaps, more species diversity, or other factors. But the study showed that total consumption of tree crowns in a recurring fire situation is more severe in the managed stands than the natural ones, at least when there are one to two decades between fires.

This research was done with satellite data, government agency records and aerial photography, in the mixed-conifer, mixed-evergreen hardwood zones of the Siskiyou Mountains. It analyzed burn severity patterns with a commonly used metric of fire

damage on almost 45,000 acres of the Biscuit Fire that had also burned 15 years earlier.

Among its conclusions:

- Areas that burned severely in 1987 tended to re-burn at high severity in 2002.
- Areas unaffected by the initial fire tended to burn at the lowest severities in 2002.
- The findings are consistent with studies that show site history influences fire severity, and that conifer plantations are associated with high severity fire.

There are some potential environmental and management implications of the research, Thompson said.

"If we do have a warmer climate that leads to increasing frequencies of wildfire in this region," he said, "a positive feedback of high severity re-burns may favor plant species more able to deal with that regime -- manzanita, ceanothus or tan oak -- that could displace conifer forests."

Managers may have few options to reduce the risk of future high severity fire within areas that have experienced recent severe burns.

Typical fuel treatments such as thinning do not have much effect on fire risk in young forests, Thompson said. There are ongoing experiments within the Biscuit Fire region to test the effectiveness of fuel breaks for slowing the spread of severe fires.

Co-authors on this study were Thomas Spies, a forest ecologist with the Pacific Northwest Research Station of the USDA Forest Service, and Lisa Ganio, an associate professor with the OSU Department of Forest Science.

The study was funded by the Joint Fire Science Program, a partnership of six federal wildland, fire and research organizations, established in 1998 to provide scientific information and support for fuel and fire management programs.

Note: This story has been adapted from a news release issued by Oregon State University.