Study suggests there may be multiple paths to fuel reduction in the wildland-urban interface

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This is a photo of treatment unit AP2 after the Wallow Fire. The fire burned down the hill (black area) as it encountered the treatment unit (brown area) and approached residences (green area). The treatment edge is obvious as is the change in fire behavior. Credit: Tim Sexton, U.S. Forest Service

Conservative fuel treatments designed to reduce fire severity while still providing forest cover and wildlife habitat worked equally as well as

more intensive treatments in allowing for the protection of homes during the 2011 Wallow Fire, a study published in the journal *Forest Ecology and Management* has found. The distance into the treated area where fire severity was reduced varied, however, between these different thinning approaches where fuels were reduced. The findings suggest that there may be multiple paths to fuel treatment design around the wildland-urban interface (WUI).

"Fuel reduction treatments are designed to reduce fire behavior and provide firefighters with safer opportunities to spot-protect homes, and qualitative observations during the Wallow Fire suggest previously implemented treatments did just that," said Morris Johnson, a research fire ecologist with the U.S. Forest Service's Pacific Northwest Research Station, and co-lead of the study. "Our study is the first to look quantitatively at how treatments actually performed around the wildland-urban interface during this major wildfire."

The Wallow Fire is the largest in Arizona state history, having burned over 539,000 acres between May and June 2011. Parts of the landscape that burned during the Wallow Fire previously underwent fuel reduction treatments as part of the White Mountain Stewardship Contract following another massive fire, the Rodeo-Chediski Fire, which destroyed 465 homes in 2002. This management history gave researchers an unexpected opportunity to study how effective two alternative fuel treatments were in reducing the fire's severity, particularly in the WUI, a critical area on the landscape where a forest or wildland intersects development.

Johnson and study lead Maureen Kennedy, a University of Washington research scientist, studied three previously treated areas in two WUI communities within the Wallow Fire perimeter—Alpine and Nutrioso—that burned during the fire and were not subject to fire suppression efforts. Two of the forested areas, the ones surrounding the

community of Alpine, were thinned in 2004 with a primary goal of reducing fire severity through the removal of all ladder fuels and snags and the creation of an open canopy with wide, even spacing. In contrast, the forested area adjacent to the neighboring community of Nutrioso was thinned in 2010 with a goal of not only reducing fire severity, but of maintaining pockets of dense forest cover and associated wildlife habitat.

To characterize fire severity, the researchers established linear transects through each of these three study areas a year after the Wallow Fire. The transects ran in the direction of the fire's spread, from untreated to treated areas, and so represented a continuum of fire severity. The researchers then classified trees in each area based on the amount of fire damage they had sustained, using measures like crown scorch and bole char, and then ran statistical analyses that compared the relationship between severity measures and distance along the transect.

The study's findings showed that fire severity was reduced as the fire moved from untreated to treated areas, evidenced by the fire transitioning from a crown fire to a ground fire. But the distance at which the reduction occurred differed, depending on the intensity of the fuel treatment. The Alpine treatment area, which was more intensively thinned, achieved a spatially rapid reduction in severity, while the Nutrioso area required a wider area, although reduction was achieved before the fire reached the adjacent community. This would suggest that the greater a fuel treatment's emphasis on wildlife habitat and aesthetic considerations, the larger the size of treatment area needed to realize a reduction in fire severity. Both thinning prescriptions permitted firefighters to safely access the communities to extinguish fire starts and spot-protect homes.

"Our findings suggest that fuel treatments that promote wildlife habitat and aesthetics are still potentially successful in sufficiently reducing fire

severity to provide opportunities to protect residences in the WUI during a fire," said Kennedy. "Although this case study refers to just these treatments in this particular fire, it does point to the possibility that there are multiple paths to effective fuel treatments."

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