Fuel treatment effectiveness

Memo from the Forest Stewards Guild, Dr. Zander Evans

The scientific consensus highlights the ability of fuel reduction treatments to change fire behavior. Modeling provides one avenue for testing the effectiveness of fuel treatments (Finney et al., 2007; Johnson et al., 2011; Loudermilk et al., 2014; Mason et al., 2007; Mitchell et al., 2009; Moghaddas et al., 2010; Stephens and Moghaddas, 2005; Vaillant et al., 2009). Fuel treatments have also been tested by wildfire and proved to reduce severity (Cochrane et al., 2012; Dailey et al., 2008; Pollet and Omi, 2002; Prichard et al., 2010; Prichard and Kennedy, 2012; Safford et al., 2012; Stevens-Rumann et al., 2013; Wimberly et al., 2009), even under extreme conditions (Prichard and Kennedy, 2013). Fuel breaks, as opposed to thinning, have been shown to be effective when they facilitate access for firefighting (Syphard et al., 2011). Thinning without treating the slash produced by the thinning can result in fire behavior that is more extreme than in untreated areas (Evans and Wright, 2017; Innes et al., 2006; Stephens, 1998). Treatments that include both thinning and surface fuel reduction are the most effective at moderating wildfire behavior (Collins et al., 2013; Evans et al., 2011; Huffman et al., 2009; Martinson and Omi, 2013). A recent meta-analysis of 56 studies of fuel treatment effectiveness in eight states in the western US showed general agreement that thin + burn treatments had positive effects in terms of reducing fire severity, tree mortality, and crown scorch (Kalies and Yocom Kent, 2016).

Research has also begun to focus on the ability of fuel reduction treatments to help protect the WUI (Graham et al., 2004). Modeled fires show the efficacy of thinning (Ager et al., 2010; Evans et al., 2015) and fuel breaks (Bar Massada et al., 2011) in the WUI environment. The Angora Fire of 2007 tested fuel treatments implemented before the wildfire. A detailed analysis showed that these treatments were able to modify fire behavior and protect homes (Safford et al., 2009). Similarly, fuel treatments implemented before the 2011 Wallow Fire were able to reduce fire severity (Waltz et al., 2014). Importantly, fuel treatments in the Wallow Fire area gave firefighters opportunities to protect residences during the fire (Bostwick et al., 2011; Kennedy and Johnson, 2014). Another example from Idaho showed that fuel treatments were effective in the WUI where slash was removed (Hudak et al., 2011).

The frequency, size, and severity of wildfires have increased significantly in recent decades. To meet this growing threat, the pace and scale of fuel treatments need to increase (Haugo et al., 2015; North et al., 2012; Stephens et al., 2016). Prescribed fire is a crucial tool to increase pace and scale (Vaillant and Reinhardt, 2017). Prescribed fire, particularly multiple burns, can reduce the threat of high severity wildfire (Collins and Stephens, 2007; Stephens and Moghaddas, 2005). Prescribed fire is usually the most cost effective tool to reduce surface fuels, particularly over large areas (Cleaves et al., 2000; Hartsough et al., 2008).

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