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Common Myths about Forests and Fire

Does Logging in Forests Distant from Homes Protect Communities? No. Defensible space work within 100 feet or less from homes, along with making homes themselves more fire-safe, is very effective in protecting homes from wildland fire, but vegetation management activities beyond 100 feet from homes has no additional influence on whether or not a home survives a wildland fire (Syphard et al. 2014, DellaSala and Hanson 2015).

Do "Thinning" Logging Operations Stop or Slow Wildland Fires? No. "Thinning" is just a euphemism for intensive commercial logging, which kills and removes most of the trees in a stand, including many mature and old-growth trees. With fewer trees, winds, and fire, can spread faster through the forest. In fact, extensive research shows that commercial logging, conducted under the guise of "thinning", often makes wildland fires spread *faster*, and in most cases also *increases* fire intensity, in terms of the percentage of trees killed (Cruz et al. 2008, 2014).

Does Reducing Environmental Protections, and Increasing Logging, Curb Forest Fires? No, based on the largest analysis ever conducted, this approach increases fire intensity (Bradley et al. 2016). Logging reduces the cooling shade of the forest canopy, creating hotter and drier conditions, leaves behind kindling-like "slash" debris, and spreads combustible invasive weeds such as cheatgrass.

Do "Thinning" Logging Operations Improve Forest Carbon Storage? No. In fact, this type of logging results in a large overall net *reduction* in forest carbon storage, and an *increase* in carbon emissions, relative to wildland fire alone (no logging), while protecting forests from logging maximizes carbon storage and removes more CO_2 from the atmosphere (Campbell et al. 2012, Law et al. 2018). To mitigate climate change, we must protect forests.

Are Our Forests Unnaturally Dense and "Overgrown", and Do Denser Forests Necessarily Burn More Intensely? No. We currently have a similar number of trees per acre compared to historical forests (Williams and Baker 2012, Baker 2014, Baker and Hanson 2007), but we have fewer medium/large trees, and less overall biomass—and therefore less carbon (McIntyre et al. 2015). Our forests actually have a carbon deficit, due to decades of logging. Historical forests were variable in density, with both open and very dense forests (Baker et al. 2018). Recent studies by U.S. Forest Service scientists, regarding historical tree density, omitted historical data on small tree density, and density of non-conifer trees. When these missing data were included, it was revealed that *historical tree density was 7 times higher than previously reported in ponderosa pine forests, and 17 times higher than previously reported in mixed-conifer forests* (Baker et al. 2018). Wildland fire is driven mostly by weather, while forest density is a "poor predictor" of future fire behavior (Zald and Dunn 2018).

Do Forests with More Dead Trees Burn More Intensely? Small-scale studies are mixed within 1-2 years after trees die, *i.e.,* the "red phase" (Bond et al. 2009, Stephens et al. 2018), but the largest analysis, spanning the entire western U.S., found no effect (Hart et al. 2015). Later, after needles and twigs fall and quickly decay into soil, and after many snags have fallen, such areas have similar or *lower* fire intensity than areas with fewer dead trees (Hart et al. 2015, Meigs et al. 2016).

Do We Currently Have an Unnatural Excess of Fire in our Forests? No. The is a broad consensus among fire ecologists that we currently have far less fire in western US forests than we did historically, prior to fire suppression (Hanson et al. 2015). We also have less high-intensity fire now then we had historically (Mallek et al. 2013, DellaSala and Hanson 2015, Baker et al. 2018).

Do Current Fires Burn Mostly at High-Intensity Due to Fire Suppression? Current fires burn mostly at low/moderate-intensity in western US forests, including the largest fires (Mallek et al. 2013, Baker et al. 2018). For example, over 70% of the Rim Fire burned at low and moderate intensity. The most long-unburned forests experience mostly low/moderate-intensity fire (Odion and Hanson 2008, Miller et al. 2012, van Wagtendonk et al. 2012).

Are Forest Fires Causing Forests to Become a Carbon Source? No. Recent unpublished reports from the Forest Service, and some state agencies, regarding wildfire carbon emissions are based on a discredited model (FOFEM) that has repeatedly been shown to exaggerate carbon emissions by nearly threefold (French et al. 2011). Further, the FOFEM model falsely assumes that nothing grows back after a fire to pull CO2 out of the atmosphere. Field studies of large fires find only about 11% of forest carbon is consumed, and only 3% of the carbon in trees (Campbell et al. 2007), and vigorous post-fire forest regrowth absorbs huge amounts of CO2 from the atmosphere; within a decade after fire, post-fire growth absorbs more carbon from the atmosphere than the fire emitted (Meigs et al. 2009).[1]

Would Landscape-Scale Prescribed Burning Reduce Smoke Particulates? No, it's the opposite. Any short-term reduction in potential fire behavior following prescribed fire lasts only 10-20 years, so using low-intensity prescribed fires ostensibly as a means to prevent mixed-intensity wildland fires would require burning a given area of forest every 10-20 years (Rhodes and Baker 2008). This would represent a tenfold increase, or more, over current rates of burning occurring from wildland fire (Parks et al. 2015). Contrary to popular assumption, high-intensity fire patches produce relatively lower particulate smoke emissions (due to high efficiency of flaming combustion) while low-intensity prescribed fires produce high particulate smoke emissions, due to the inefficiency of smoldering combustion. Therefore, even though high-intensity fire patches consume about three times more biomass per acre than low-intensity fire (Campbell et al. 2007), low-intensity fires produce 3-4 times more particulate smoke than high-intensity fire, for an equal tonnage of biomass consumed (Ward and Hardy 1991, Reid et al. 2005). As a result, a landscape-level program of prescribed burning would cause at least a ten-fold ***increase*** in smoke emissions relative to current fire levels, and it would not stop wildland fires when they occur (Stephens et al. 2009).

Are Recent Large Fires Unprecedented? No. Fires similar in size to the Rim fire and Rough fire, or larger, occurred in the 1800s, such as in 1829, 1864, and 1889 (Bekker and Taylor 2010, Caprio 2016). Forest fires hundreds of thousands of acres in size are not unprecedented.

Do Large High-Intensity Fire Patches Destroy Wildlife Habitat or Prevent Forest Regeneration? No. Hundreds of peer-reviewed scientific studies find that patches of high-intensity fire create "snag forest habitat", which is comparable to old-growth forest in terms of native biodiversity and wildlife abundance (summarized in DellaSala and Hanson 2015). In fact, more plant, animal, and insect species are associated with mature forests that burn at high-intensity, where most or all of the trees are killed, than any other habitat type in the forest (Swanson et al. 2014). Forests naturally regenerate in heterogeneous, ecologically beneficial ways in large high-intensity fire patches (DellaSala and Hanson 2015, Hanson 2018).

Do Occasional Cycles of Drought and Native Bark Beetles Make Forests "Unhealthy"? Actually, it's the opposite. During droughts, native bark beetles selectively kill the weakest and least climate-adapted trees, leaving the stronger and more climate-resilient trees to survive and reproduce (Six et al. 2018). In areas with many new snags from drought and native bark beetles, most bird and small mammal species *increase* in numbers in such areas, because snags provide such excellent wildlife habitat (Stone 1995).

Is Climate Change a Factor in Recent Large Fires? Yes. Human-caused climate change increases temperatures, which influences wildland fire. Some mistakenly assume this means we must have too much fire but, due to fire suppression, we still have a substantial fire deficit in our forests.

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[1] For example, Campbell et al. (2007) found that the Biscuit fire of 2002 emitted an average of 19 tons of carbon per hectare, and Campbell et al. (2016) found that decay of fire-killed trees in the Biscuit fire emitted an average of about 0.75 tons of carbon per hectare per year over the first 10 years post-fire (there were lower emissions from decay in subsequent decades). Therefore, for the first 10 years post-fire, the total carbon emissions from the Biscuit fire (carbon emissions from the fire itself, plus subsequent emissions from decay) were approximately 26 tons of carbon per hectare. Meigs et al. (2009) (Table 5) report that, by only five years after fire, regrowth was pulling 3.1 tons of carbon per hectare per year out of the atmosphere. Therefore, by 10 years post-fire, this equates to approximately 31 tons of carbon pulled out of the atmosphere by regrowth—i.e., an overall net increase in carbon of 5 tons per hectare relative to pre-fire levels.

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