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Forest Thinning to Prevent Wildland Fire

...vigorously contradicted by current Science

There is strong pressure from the timber industry and some well-meaning members of the public to encourage land managers to greatly increase landscape-level logging, ostensibly to prevent high-intensity fire from occurring, based upon widely-held but incorrect perceptions.

Dense, long-unburned forests do not burn mostly at high intensity.

Seemingly counterintuitive, the densest and most long-unburned forests are experiencing mostly low to moderate-intensity fire effects *(Odion et al. 2004, Odion and Hanson 2006, Odion and Hanson 2008, Odion et al. 2010, Miller et al. 2012, van Wagtendonk et al. 2012, Steel et al. 2014)*. The densest, most long-unburned forests have the highest amounts of canopy cover, providing cooling shade to keep coarse woody material and understory vegetation moist. Intact canopy cover leads the forest to self-thin both understory vegetation and lower limbs, further reducing the likelihood of high-intensity fire.

Trees Killed by Drought/Beetles Do Not Increase Fire Intensity or Spread

This issue has been studied very extensively, and the overwhelming weight of scientific evidence from actual field research concludes that bark beetles do not tend to increase fire spread and intensity. The most recent and comprehensive of these, *Hart et al. (2015)*, published last year in the Proceedings of the National Academy of Sciences, investigated whether recent tree mortality from bark beetles increased fire spread, studying forests across the western U.S., including California. They concluded that *"the annual area burned in the western United States has not increased in direct response to bark beetle activity."*

Other studies have investigated whether forests with higher numbers of dead trees from bark beetles burn more intensely, and over and over again they have found no such increase in fire activity. *Bond et al. (2009)* looked at the same question in mixed-conifer forests in the San Bernardino National Forest in southern California. Again, the forests with the highest levels of snags from bark beetles did not burn more intensely. *Simard et al. (2011)* studied both recent and older tree mortality from bark beetles, and found that neither increased the probability of crown fire, and in fact forests with higher levels of dead trees, or "snags", often burned at lower intensities. U.S. government and university ecologists, using satellite imagery and working in conjunction with NASA, have also found that forests with higher levels of snags from beetles tend to burn at lower intensities (http://www.nasa.gov/topics/earth/features/beetles-fire_prt.htm). Once trees die, the combustible oils in the needles of conifers rapidly dissipate, and the needles fall from the trees, making it more difficult for crown fires to occur. After making these discoveries, one of the researchers observed the following:

> "Disturbances like insect outbreaks and fire are recognized to be integral to the health of the forests, and it has taken ecologists most of this century to realize as much. Yet when these disturbances occur, our emotional psyche leads us to say the forests are 'unhealthy.' http://www.nasa.gov/topics/earth/features/beetles-fire_prt.htm)

Thinning is generally ineffective at preventing high-intensity fire patches during extreme fire weather, and can actually increase fire intensity.

Large fires are driven by hot, dry, windy weather conditions, with forest fuel conditions playing a relatively unimportant role in determining fire behavior and intensity *(Johnson et al. 2003 [Frontiers in Ecology and Environment 1: 271-276], Schoennagel et al. 2004 [BioScience 54: 661-676], Reinhardt et al. 2008, Lydersen et al. 2014, DellaSala and Hanson 2015 ["The Ecological Importance of Mixed-Severity Fires: Nature's Phoenix"]).*

The only common denominator that tends to substantially reduce fire intensity and spread is fire itself—and only if it has occurred relatively recently (within 10 years), while thinning alone tends to increase fire intensity. *(Stephens and Moghaddas 2005 [Forest Ecology and Management 215: 21-36, Table 12], Safford et al. 2012 [Forest Ecology and Management 274: 17-28], van Wagtendonk et al. 2012, DellaSala and Hanson 2015).*

Thinning is extremely expensive.

Thinning costs approximately $1,000 per acre to implement, or about $1 million for every 1,000 acres *(e.g., South Shore project EIS, Lake Tahoe Basin Management Unit; Lava project EA, Modoc National Forest.)* Managed wildland fire restores forests heterogeneity for approximately $50 per acre *(Ingalsbee and Raja 2015 [Chapter 12 in "The Ecological Importance of Mixed-Severity Fires"]).*

Currently, any given forest stand experiences high-intensity fire only once every 700 years or so, on average. Given this statistically low rate of mixed-intensity fire, thinning and burning of logging slash piles would have to occur every decade for hundreds of years in any given stand to have even a 50/50 chance of preventing that area from burning at high-intensity—even if we assume (contrary to the evidence) that thinning will effectively reduce fire intensity in high fire weather *(Rhodes and Baker 2008).*

This would result not only in permanent loss of closed-canopy forest, but would also cause massive and chronic watershed damage from frequent creation and reconstruction of roads, logging skid trails, and landings *(Rhodes and Baker 2008).* Moreover, burning logging slash piles creates unnaturally severe localized impacts to soils because they cook and smolder for days, unlike wildland fires, which typically pass over a given patch of ground very quickly.

Thinning seeks to create a homogeneous forest that never existed historically.

Historically, the average fire rotation interval (how often fires occurred in a given stand) in mixed-conifer and ponderosa pine forests of the Sierra Nevada was approximately 17 to 43 years, depending upon slope aspect *(Beaty and Taylor 2001, Bekker and Taylor 2001).* Fire-free intervals of 50 to 100 years also occurred naturally in these forests (*Stephens and Collins 2004 [Northwest Science 78: 12-23]*). Therefore, there were historically always many areas in which fires were largely unaffected by previous fire, and which were likely to experience moderate/high-intensity fire.

Thinning disproportionately harms the most imperiled wildlife species.

Forest thinning is an understory clear-cut. This practice highly degrades and eliminates habitat for numerous rare and imperiled wildlife species. This has been found with regard to spotted owls *(Gallagher 2010, Stephens et al. 2014)*, Pacific fishers *(Garner 2013),* Black-backed Woodpeckers *(Hutto 2008*), and Olive-sided Flycatchers *(Robertson and Hutto 2007)* among many others species. Furthermore, most thinning activities occur while animals are raising young. Thinning also increases visibility, making it very difficult for prey animals to hide or escape from predators and humans.

There is not an uncharacteristic excess of high-intensity fire in our conifer forests.

High-intensity fire patches were a substantial component of historical fire regimes in ponderosa and mixed-conifer forests of the Sierra Nevada *(Beaty and Taylor 2001, Bekker and Taylor 2001, Beaty and Taylor 2008, Bekker and Taylor 2010, Baker 2014, Odion et al. 2014, Hanson and Odion in press).* Science tells us that we currently have a deficit of high-intensity fire in Sierra Nevada forests relative to natural, historic levels. *(Baker 2014, Odion et al. 2014, Hanson and Odion 2015, Baker 2015, Picotte et al, 2016).*

High-intensity fire patches are natural and ecologically beneficial.

We now understand that patches of high-intensity fire occurring in dense, mature/old conifer forest create "complex early seral forest, or "snag forest habitat," which is comparable to old-growth forest in species richness and wildlife abundance. This rare and critical habitat is highly deficient across our landscape and must be spared from extremely harmful post-fire salvage logging practices *(Noss et al. 2006, Donato et al. 2009, Fontaine et al. 2009, Burnett et al. 2010, DellaSala et al. 2014, Hanson 2014).*

Thinning causes a net loss of carbon from forest ecosystems.

Thinning and slash burning must be conducted repeatedly across the forested landscape if the goal is to prevent high-intensity fire occurrence. Thus, the amount of biomass removed generally results in a large net loss of forest carbon storage. *(Campbell et al. 2011)* In contrast, only a very small percentage of tree biomass is actually consumed in fires, even crown fires. Furthermore, forests rapidly and dramatically sequester (absorb) carbon from the atmosphere after fire, incorporating CO_2 into the abundant plant regeneration that begins to occur almost immediately. *(Meigs et al. 2009, Mitchell et al. 2009).*

The timber industry drives the research on forest thinning

Research generated to support thinning is funded largely by timber companies. This research is faulty and compromised – based mainly upon theoretical computer modeling, not actual observation. Timber backed research frames thinning as a comprehensive solution to forest health; the reasoning is that, if a forest is managed through thinning to create an open park-like landscape, the remaining trees will be healthier since they receive more nutrients and sun. But forests are not simple units of trees. Research continually shows that forest health is based on <u>cooperation</u>, not competition.

Trickle down funds for private land owners are misleading.

Individual land owners are being encouraged by the Forest Service to thin their lands with available grant monies under the guise of "fire mitigation" and "forest restoration." Grant money filters down to the Forest Service from federal legislation that allows industry to get into our treasured, and last remaining, intact forests.

Unless otherwise noted, full citations for scientific studies can be found in the Science Synthesis, and the "Myth of Catastrophic Wildfire" on the John Muir Project website.
www.johnmuirproject.org