



Research Brief for Resource Managers

Release:
February 2015

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Constraints on Mechanical Treatment in the Sierra Nevada

Malcolm North, April Brough, Jonathan Long, Brandon Collins, Phil Bowden, Don Yasuda, Jay Miller, and Neil Sugihara. 2015. *Constraints on Mechanized Treatment Significantly Limit Mechanical Fuels Reduction Extent in the Sierra Nevada*. *Journal of Forestry* 113: 40-48.
<http://www.ingentaconnect.com/content/saf/jof/2015/00000113/00000001/art00007>

Mechanical treatments are an invaluable tool for fuel reduction and forest restoration efforts throughout the western United States. However, a 2015 study by North and others found that a variety of biological, legal, operational, and administrative constraints significantly limits the use of mechanized treatment in the national forests of the Sierra Nevada.

The authors evaluated current USFS standards and guidelines, input from forest management practitioners, and geospatial data to develop a hierarchy of biological (i.e., nonproductive forest), legal (i.e., wilderness), operational (i.e., equipment access), and administrative (i.e., sensitive species and riparian areas) constraints on mechanical treatments. Their analysis included ten national forests in the Sierra Nevada bioregion (10.7 million acres), three of which are considered “early adopters” under the new USFS Forest Planning Rule. The analysis hierarchy allowed the authors to evaluate the degree to which different types of constraints limited the access and availability of mechanized treatments in national forestlands on the Sierra Nevada.

Management Implications

- Only 25% of national forestlands in the Sierra Nevada are available to mechanical treatment, and there is limited ability to affect wildfire activity in many areas.
- Rather than implementing mechanical treatments to contain and suppress wildfire, many treatments could be targeted to facilitate the reintroduction of beneficial fire, including the use of treatment anchors to expand the use of wildland fire.
- Planning efforts that identify locations and weather conditions under which fire is allowed to burn may substantially increase the pace and scale of fuel reduction and forest restoration efforts.



Mechanical treatments in the national forests of the Sierra Nevada are limited by a variety of biological, legal, operational, and administrative constraints.

Image Credit: Malcolm North, PSW.

About 58% of national forestlands in the Sierra Nevada contain productive forest (excludes rock, water, barren, meadow, and shrub) and only 25% is available to mechanical treatment. National forests in the southern Sierra Nevada have higher levels of constraint due to more wilderness and steeper, more remote terrain.

The authors found that increasing road building and operating on steeper slopes had less effect on increasing mechanical access than the removal of economic factors (i.e., accessing sites regardless of timber volume). Constraints due to sensitive species habitat and riparian areas only reduced productive forest access by 8%. In addition, of 710 subwatersheds (mean size of 22,800 acres) with >25% Forest Service ownership in the Sierra Nevada, only 20% of these subwatersheds or “firesheds” had enough unconstrained area to effectively contain or suppress wildfire with mechanical treatment alone.

The authors suggest that mechanical treatment at the subwatershed scale could be more effective if it established a fuel-reduced “anchor” from which

prescribed fire and managed wildfire could be strategically expanded to promote resource objectives. This approach would significantly increase the effectiveness of mechanized treatments by leveraging and enhancing the use of wildland fire in Sierra Nevada forest landscapes.

Additional references for this topic:

Collins, B.M., S.L. Stephens, J.J. Moghaddas, and J. Battles. 2010. Challenges and approaches in planning fuel treatments across fire-excluded forested landscapes. *J. For.* 108:24–31.

North, M., B. Collins, and S. Stephens. 2012. Using fire to increase the scale, benefits, and future maintenance of fuels treatments. *J. For.* 110:392–401.

Sneeuwjagt, R.J., T.S. Kline, and S.L. Stephens. 2013. Opportunities for improved fire use and management in California: Lessons from western Australia. *Fire Ecol.* 9(2):14 –25.

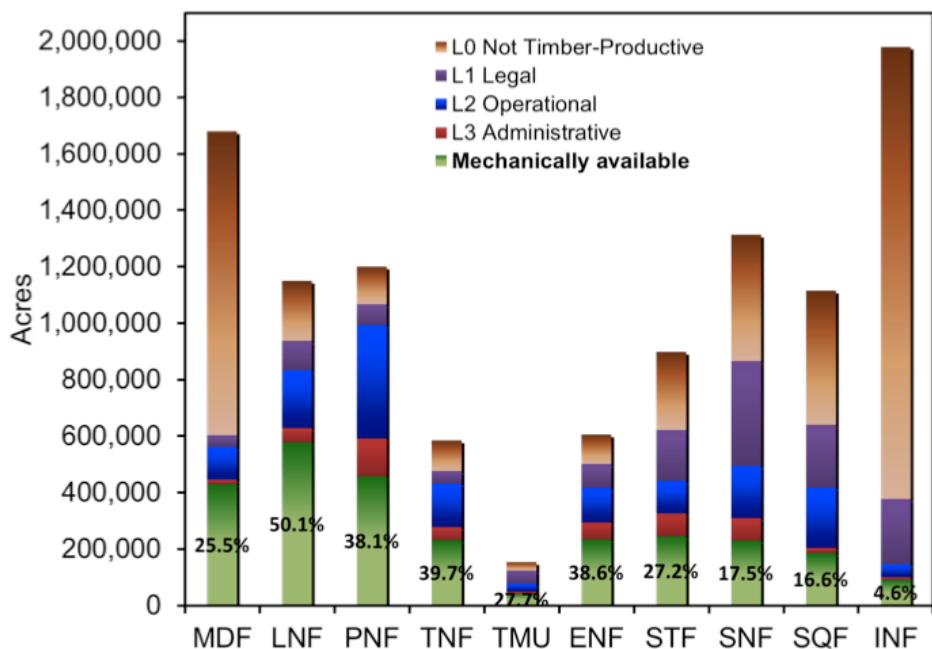


Figure 2. Different constraints that reduce total acreage available to mechanical treatment in the ten national forests of the Sierra Nevada bioregion. The height of the bar indicates the total acreage in each national forest (arranged mostly from north to south), with each constraint designated by a different color. The remaining acreage available for mechanical treatment is in the green portion of each bar and is indicated by the percentage values.