

A Comprehensive Guide to Fuel Management Practices for Dry Mixed Conifer Forests in the Northwestern United States



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Prescribed Fire

Fire has had a profound historical role in shaping dry mixed conifer forests in the western United States. However, the uncertainty and complexity of prescribed fires raises the question “Is fire always the best option for treating fuels?” The decision to use prescribed fire is dependent upon several factors.

The benefits of prescribed fire include reducing hazardous fuels, disposal of logging debris, preparing sites for natural or artificial regeneration, improving wildlife habitat, managing competing vegetation, and controlling insects and disease. Because each location is unique in terms of fuels, on-site conditions, and predicted fire behavior, what works in one place may not work in another. The use and effectiveness of prescribed fire depends on the objectives, current conditions, and desired post-fire outcomes. Prescribed fire tends to work best when used for maintaining resilient forest conditions that have had either mechanical treatments or have been treated with multiple prescribed fires.

Uncertainty, Complexity and Risks

Even with the maximum amount of care and time invested in planning a prescribed fire, there is always an element of uncertainty. Weather can change creating conditions that may lead to an out of control escape, produce smoke, and pose risks to human and resource safety. The process is far more complex than using other treatment techniques because of unavoidable risks and the ever present potential for an escape.

To mitigate the uncertainty, there are several steps fire managers execute before conducting a prescribed fire. Experienced fire practitioners combine science, decision support tools (e.g., fire behavior models), and monitoring with their own experience and knowledge to reduce the risks of prescribed fire. The organization and equipment required to safely achieve the objectives and control the prescribed fire for instance, depend on the complexity of the prescribed fire. During implementation, onsite leadership is also critical. An onsite presence in the event of an escape, organizational charts indicating individuals and their associated tasks, and communication among all individuals involved is necessary for maintaining safety and tactical resource needs.

Unique Attributes

A successful burn is one that meets objectives without substantial unexpected events. Knowing parameters such as moisture content, seasonality, or the presence of masticated fuels is particularly useful in planning and implementing the prescribed fire. The ability to predict post-fire mortality based on damage to crowns, cambium, and roots is also essential for planning prescribed burns.

When used as a thinning agent, the level of success is dependent upon the target tree species and size, the availability of fuel to contribute to fire intensity, the weather conditions, and the live and dead fuel moisture. Tree species also have various levels of resistance to fire. Some tree species are highly susceptible to crown damage due to low crown base heights, highly flammable foliage, or heat sensitive buds. In those cases, mortality can be achieved with fast-moving, low-intensity surface fires that cause crown scorch and consumption but light damage to the cambium and roots. A manager can tailor a burn prescription to address these aspects in order to meet objectives and avoid excessive mortality.



Figure 1—In the Black Hills, South Dakota, prescribed fire is being used to determine its potential practicality for managing regeneration.

If a site such as a campground is highly visible to the public, or the goal is to minimize tree mortality, it may be advisable to take a conservative approach in restoration efforts.

The use of wildfire as a management option is a technique that allows large acreages to be treated. Naturally ignited wildfires (from lightning) may burn in landscapes that once had fire as a major ecosystem disturbance as long as the impacts are within limits determined beforehand. To be an effective management tool, the land agency unit must go through a planning and analysis process, identifying areas where this practice is permitted, and determining acceptable fire behavior and effects.

Source

Jain, Theresa B.; Battaglia, Mike A.; Han, Han-Sup; Graham, Russell T.; Keyes, Christopher R.; Fried, Jeremy S.; Sandquist, Jonathan E. 2012. A comprehensive guide to fuel management practices for dry mixed conifer forests in the northwestern United States. Chapter 9. Gen. Tech. Rep. RMRS-GTR-292. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 331 p. Available online at www.treearch.fs.fed.us/pubs/42150 [2012]. For a hard copy, contact Theresa Jain at tjain@fs.fed.us.



Figure 2—Minimizing large old tree mortality may require additional parameters and strategies such as tree well burning or raking of deep duff layers surrounding trees.

Citation

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