R&D USDA Forest Service
Pacific Southwest Research Station

Research & Development
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General Technical Report

An Ecosystem Management Strategy for Sierran Mixed-Conifer Forests

Background and Purpose

Sierra Nevada forest management is often focused on landscape strategies to achieve immediate fuel reduction. With a focus on limiting fire intensity and spread, these strategies do not explicitly address how forests might be ecologically restored or wildlife habitat enhanced. Without addressing these issues, treatments often face legal challenges. The intent of this report is to provide Sierra forest managers with a summary of "the best available science," and a method for reconciling fuels treatment and provision of wildlife habitat. Collectively, the findings emphasize the ecological role of fire, sensitive wildlife habitat, forest structure heterogeneity, and changing climate conditions.

Summary of Findings

Sierra mixed-conifer forests could benefit from a new management strategy that incorporates long-term ecological restoration and habitat improvement into forestry practices. Important facets include:

Fire and Fuels Management

- **Mechanical fuels management:** Many stands require thinning before they can be burned.
- **Limiting use of crown separation in fuel treatments:** Current models suggest that thinning larger overstory trees has a limited effect on reducing crown fire spread. Reduction of surface and ladder fuels is the most effective treatment.
- **Emphasizing the ecological importance of fire:** Prescribed fire can both help reduce surface fuels and restore many of the ecological processes with which mixed-conifer forests have evolved.

Wildlife Habitat Management

- **Retention of suitable structures for wildlife nest, den, and rest sites:** Large trees and snags provide key habitat features that include broken tops, cavities, and platforms.
- **Recruitment of large trees and snags:** Given their current deficit in mixed-conifer forest and the time necessary for renewal, protect them from harvest and inadvertent loss to prescribed fire; increase the distribution and abundance of large trees over time.
- **Retention of hardwoods, 'defect' trees, and promotion of shrub patches for habitat.** They are valued wildlife habitat.
- **Riparian forest fuel reduction:** Prescribed burning reduces fuels in these important wildlife corridors.

Forest and Landscape Structure and Composition

- **Spatial variation in forest structure:** "Average" stand conditions were rare in active-fire forests. Manage to retain or create highly heterogeneous conditions including clumps of trees and openings.
- **Varying stand density and habitat conditions by topographic features:** For example, local cool or moist areas, with lower historical fire severity, would have higher density and canopy cover. In contrast drier, southern-aspect slopes would have low densities of large fire-resistant trees.
- **Tree-species-specific prescriptions:** Historically, hardwoods and pines were more common. Focus thinning on firs and incense-cedar.
- **Silvicultural model and strategy:** Stand treatments that significantly reduce the proportion of small trees and increase the proportion of large trees will improve forest resilience to fire.

Manage Forests for Climate Change Resilience

- **Focus treatments on affecting fire behavior and reducing moisture stress:** Use prescriptions that adapt to site conditions and affect fire behavior, allowing forests to equilibrate to fire under current and future climate conditions. Reduce stand density and moisture stress for the remaining trees.

Full Report Reference

North, M.; Stine, P.; O'Hara, K.; Zielinski, W.; Stephens, S. 2009. An ecosystem management strategy for Sierran mixed-conifer forests. Gen. Tech. Rep. PSW-GTR-220. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 49 p.
Web link: http://www.fs.fed.us/psw/publications/documents/psw_gtr220/

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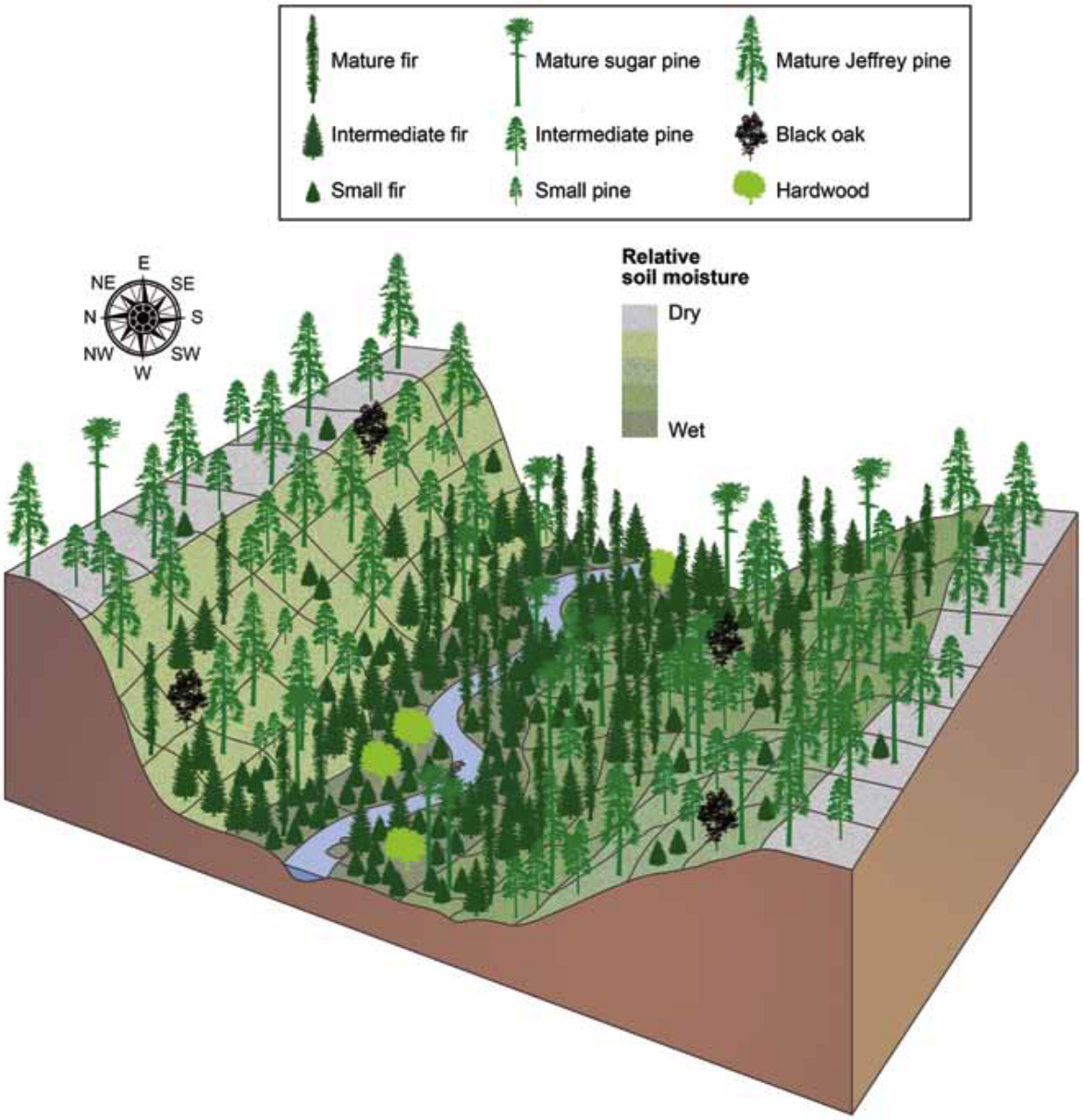

Varying stand density and habitat conditions by topographic features would be of benefit when managing stands for ecological restoration and habitat improvement. Soil moisture is the key factor in determining density and composition of trees and fire frequency/intensity. Bottoms of drainages and north facing slopes have more trees, higher proportion of firs, and less frequent/intense fire, providing the prime habitat for California spotted owls and Pacific fishers. Tops of ridges and south facing slopes, by contrast, have lower densities of trees, higher proportion of pines, and more frequent/intense fire.