Northwest Fire Science Consortium
A JFSP FIRE SCIENCE EXCHANGE NETWORK

LANDSCAPE-LEVEL PRESCRIPTIONS

A NEW FOUNDATION FOR RESTORATION PLANNING

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Land management in the Inland Pacific US is facing extraordinary challenges including, increased risk of wildfires, declining plant and animal populations, increased demands for ecosystem services by a growing human population, and great uncertainty regarding the effects of future climate change. Management practices focused on stand level characteristics have created and continue to create landscapes that are less resilient to disturbance and are, in most cases, altering the physical processes by which these landscapes were developed.

Okanogan-Wenatchee National Forest. Photo courtesy of Autumn Ellison, University of Oregon.

Continued conflict around natural resource management and dwindled public confidence in land management agencies has necessitated the development of a new collaborative social contract for land management in the West. However, even within the sphere of collaboration, restoring the key characteristics of landscape resilience to landscapes has been a challenge. Science has a golden opportunity to help inform a sound socio-ecological approach to restorative management, which can be understood by all land ownership and partners. To help guide these landscape planning efforts, researchers have created a framework of seven core principles and their implications for management of fire-prone interior forest landscapes.

Wallowa-Whitman National Forest. Photo courtesy of Autumn Ellison, University of Oregon.

KEY FINDINGS

- Historically, forests were spatially heterogeneous at multiple scales as a result of interactions among succession, disturbance, and other processes.
- Planning and management are needed at fine to broad scales to restore the key characteristics of resilience.
- Landscapes must be viewed as socio-ecological systems that provide services to people within the limited capacities of ecosystems.
- Development of landscape-level prescriptions is the foundation of restoration planning.

The Northwest Fire Science Consortium is a regional fire science delivery system for disseminating knowledge and tools, and a venue for increasing researcher understanding of the needs of practitioners.

SEVEN CORE PRINCIPLES

1. **Principle: Broad Regional landscapes are really landscapes nested within landscapes.** For example, tree neighborhoods nest within successional patches, which nest within local landscapes, eco-subregions and ecoregions.

   Implication: Plan and manage at appropriate scales to effectively restore connectivity, multi-level landscape patterns, processes, and dynamics.

2. **Principle: Topography provides a natural template for restoring vegetation patterns.**

   Implication: Use topography to guide restoration of successional and habitat patchworks. For example, partition the landscape into basic topographic settings, such as valley-bottoms, ridgetops, and south and north-facing slopes, rather than proximity to roads.

3. **Principle: Major disturbances like fire and succession drive ecosystem change.**

   Implication: Restore natural fire regimes and the variation in successional patterns that supported them so that other processes may follow. Use both the historical range of variability of regional successional patterns and a future range of variability to inform management targets.

4. **Principle: Predictable patch size distributions historically emerged from linked climate-disturbance-topography-vegetation interactions.**

   Implication: Restore size distributions of historical successional patches and allow changing climate and disturbance regimes to modify them. Landscape prescriptions should focus on increasing the occurrence of different sized openings and successional patches.

5. **Principle: Successional patches are "landscapes within landscapes."**

   Implication: In ponderosa pine and mixed-conifer patches, restore characteristic tree clump and gap variation. Patch level prescriptions should aim to restore variable patterns within stands and begin to break up uniformity.

6. **Principle: Widely distributed large, old trees provide a critical backbone to dry pine and dry to moist mixed conifer landscapes.**

   Implication: Retain existing old trees and old forests, and large snags and down logs in these forest types, and make more of them. Local landscape restoration projects should increase the amount of closed canopy, old forest patches, especially in refugial settings.

7. **Principle: Land ownership, allocation, management and access patterns disrupt landscape and ecosystem patterns.**

   Implication: Work collaboratively across ownerships to develop restoration projects. Restoration planning benefits from involving stakeholders who are vested in the outcomes, creating opportunities to uncover any concerns before they become litigious.

Researchers suggest that landscape prescriptions are foundational to restoration, providing a strategy for the implementation of the seven principles, while moving away from stand-level management as a primary focus. Stand level management takes on new meaning within landscape prescriptions. They are the "plug and plays" that accomplish creation of vastly revised spatial patterns of forest conditions and their associated functionality.

Landscape prescriptions are required at three levels (Principle 1):

- **Large-scale eco-regional (100,000's to 1,000,000's of acres):** These are strategic prescriptions that identify priority areas for reconnecting habitats and conditions, and where silviculture or burning may be appropriate, and managed wildfires can contribute greatly to restoration efforts.
- **Local landscape (10,000's to 100,000's of acres; Principles 2, 3, 4 and 6):** These are tactical prescriptions that includes restoring successional patch size distributions, the retention of old, legacy trees, and the restoration of wildfire and climate resilient landscapes through the use of a broad toolkit.
- **Patch-level (1's to 1,000's of acres; Principle 5):** These prescriptions provide targets for the heterogeneity of the structure. This includes numbers and sizes of individual trees, tree clumps, and openings.

Wildfire, insect outbreaks, and changes in climate are expected to continue to be a part of the landscape into the foreseeable future. Landscape prescriptions can aim to restore more resilient vegetation patterns that will help adjust the severity and sizes of these disturbances, promote natural post-disturbance recovery, reduce the need for expensive active management, and drastically reduce the role and need of fire suppression.

MORE INFORMATION

This brief is based on the following article :

Hessburg P.F., Churchill D.J., Larson A.J., Haugo R.D., Miller C., Spies T.A., North M.P., Povak N.A., Belote R.T., Singleton P.H., Gaines W.L., Keane R.E., Aplet G.H., Stephens S.L., Morgan P., Bisson P.A., Rieman B.E., Salter, R.B., Reeves G.H. 2015. Restoring fire-prone Inland Pacific landscapes: Seven core principles. *Landscape Ecology* 30(10): 1805-1835. doi:10.1007/s10980-015-0218-0.

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