

Brief on: Ecological Departure and Restoration Needs

Tom DeMeo, Regional Ecologist and CFLRP Coordinator, thomas.demeo@usda.gov
 Skye Greenler, Ecologist and CFLRP Monitoring Coordinator, skye.greenler@usda.gov

Landscape ecology has emerged in recent years as an important field of study. Landscapes function at broad scales and have many implications for Forest planning. At this scale, we can understand processes such as disturbance regimes, notably fire regimes. Our work in landscape assessment, in assessing departure from a natural range of variation, helps meet the direction of the 2012 Planning Rule on assessing sustainability and resilience of landscapes.

Fire regimes before European settlement operated with a characteristic set of fire frequency and severity. This varied with potential natural vegetation (PNV) type, as in the Table.

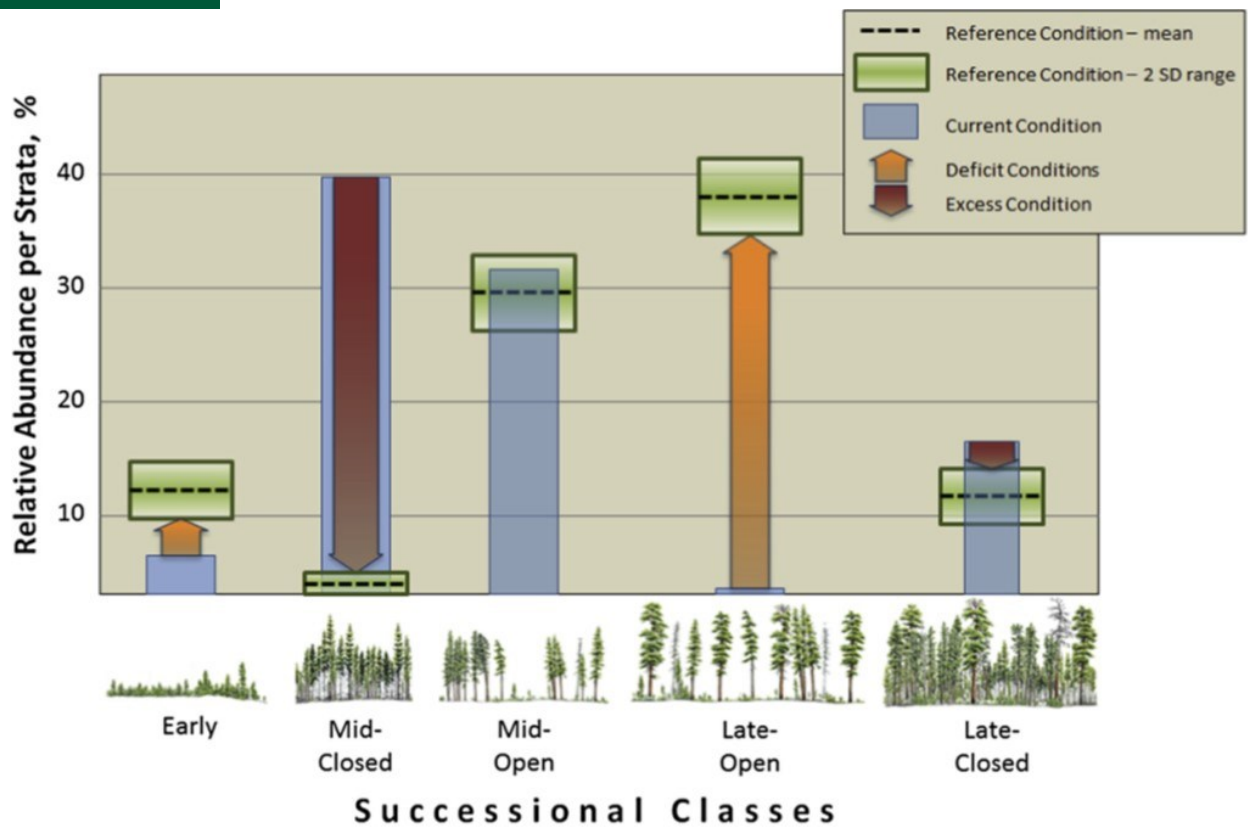
In addition to fire frequency and severity, we can also estimate the pre-European-settlement ranges of the abundance of each seral stage (succession class) that are characteristic for each potential vegetation type. These ranges are based on a long history of tree-ring research and modeling, and are referred to as reference conditions.



Figure 1. Greater La Pine Basin Cohesive Strategy Project showing restoration of dry, fire-adapted forest.

Table. Examples of fire regimes in the Pacific Northwest. Note how potential vegetation provides a framework for organizing the regimes. NRV=Natural Range of Variation. From DeMeo et al. 2018.

Fire Regime	Example Potential Natural Vegetation Zone	Landscape Size	Fire Frequency (NRV)	Fire Severity (NRV)
I	Ponderosa pine	Subwatershed (10000 ac to 40000 ac)	0-35 yrs	Generally low severity replacing less than 25% of overstory
II	Grasslands	Subwatershed (10000 ac to 40000 ac)	0-35 yrs	High Severity/ Stand Replacing (near 100%)
III	Grand fir (Mixed conifer)	Watershed (40000 ac to 250000 ac)	35-200 yrs	Low to Mixed severity generating patches
IV	Lodgepole pine	Watershed (40000 ac to 250000 ac)	35-200 yrs	High severity/Stand Replacing
V	Sitka spruce	Subbasin (Average 700 mi ²)	200+ yrs	High severity/Stand Replacing



Illustrations adapted with permission from Van Pelt 2008

Figure 2. Depiction showing how current seral stages are ecologically departed from a natural (resilient, sustainable) range. This concept can be used to identify what treatments are needed, by vegetation type and watershed or within other landscape units of interest. From Haugo et al. 2015; graphic developed by Ayn (Shlisky) Hunt.

These describe the natural range of variation assumed to reflect sustainable and resilient landscapes.

Historically, most landscapes contained a range of all successional classes from young, early-seral forest to old-growth, but different vegetation types had different amounts of each successional class across the landscape based on their biophysical conditions and characteristic fire regimes.

By comparing the current abundances of seral stages to the natural (historic) range, we can make estimates of the landscape departure from a sustainable, resilient range of conditions (Fig. 2). Ryan Haugo greatly advanced this methodology by developing a tool to estimate the area (acres) of 1) disturbance (mechanical thinning, prescribed fire, cultural burning, and wildfire); 2) succession (growth); or 3) disturbance followed by succession needed to reduce ecological departure and move landscapes back towards the natural range (Haugo et al. 2015). This is illustrated in Figure 2.

So What?

The maps in Figure 3 indicate restoration need, and thus are a powerful planning tool. They identify the ecological rationale for thinning and prescribed burning needs on landscapes, as well as where stands “just need to grow.”

The maps are best used for Regional and Forest level planning, but also provide context for project implementation. Since they are now updated annually (to reflect both treatments and wildfires), over time we will be able to identify trends. The departure maps are key components of the Common Monitoring Strategy for Collaborative Forest Landscape Restoration Projects (CFLRPs), as well as the Wildfire Crisis Strategy landscape monitoring.

Further Resources

Ecological departure maps are available at [TEUI R6 Hub](#). Tallies of acres in need of treatment, succession, and treatment followed by succession are available upon request from the Ecology Program.

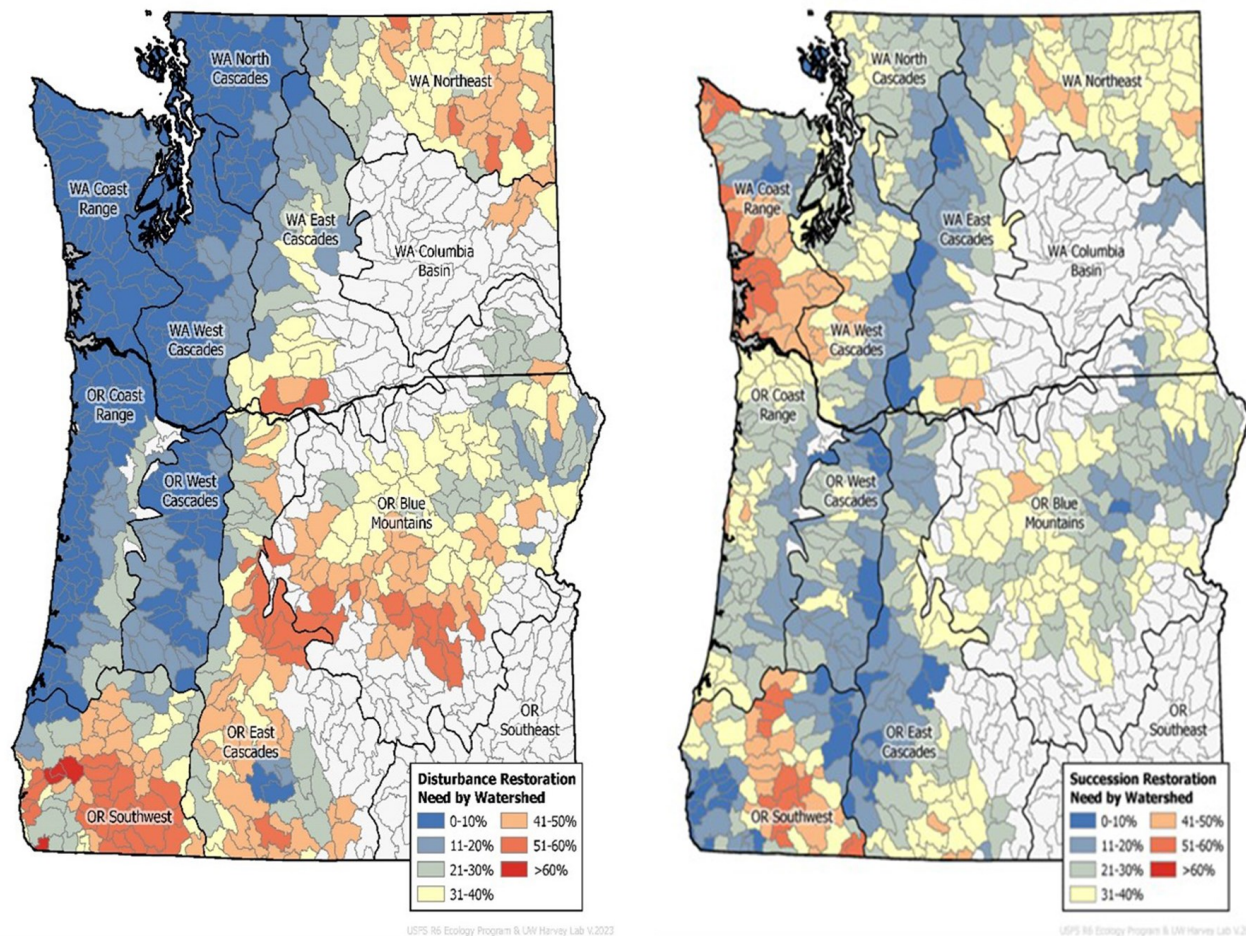


Figure 3. Disturbance-based restoration need (left) and succession-based restoration need (right) for each 5th field HUC in the Pacific Northwest Region. Using this assessment, we can generate estimates of acreage treatment needs for each seral stage in each PNV type in each 5th field HUC. These maps are updated annually through an agreement with the University of Washington. These show the 2023 iteration.

References

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