Brief on:
Potential Natural Vegetation (PNV)

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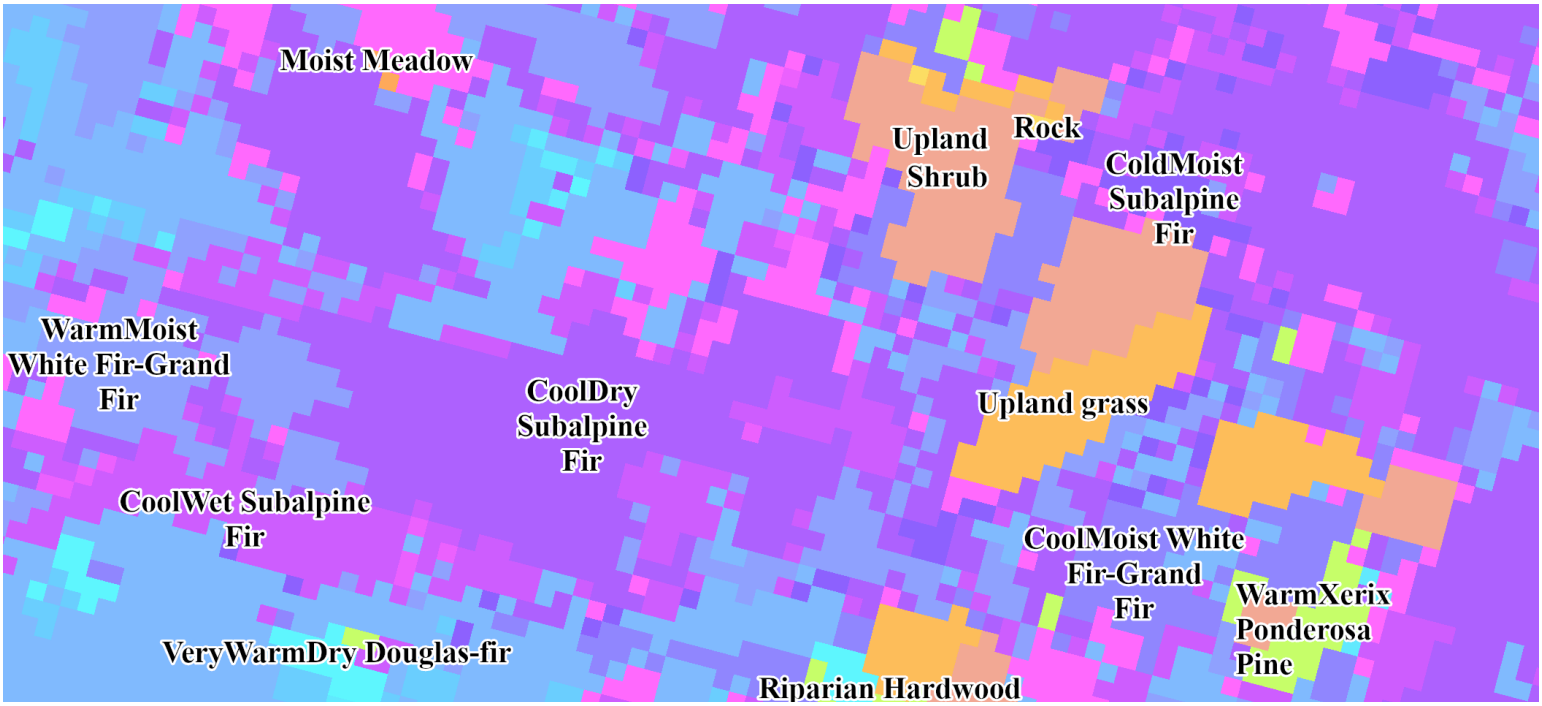

Figure 1. *PNV Subzones in and around Little Eagle Creek on the Wallowa-Whitman National Forest.*

What is Potential Natural Vegetation (PNV)?

PNV reflects land capability, the ability of land to generate specific ecosystems based on climate, geology, geomorphology, soils, and vegetation. Potential vegetation is described using the late seral/old-growth stage of vegetation development. PNV types can be identified and mapped through data analysis of field vegetation plots, with abundance thresholds tied to environmental gradients (typically temperature and moisture). Pay attention to the Scale section below, as this is critical in understanding the different PNV products available (plant association guides, plant association group maps, and vegetation zone and subzone maps).

Approaches to PNV

There are basically two approaches to classifying, inventorying, and mapping PNV. One approach is to assume the sere (set of seral stages from early to late) ends when constrained by climate. This is roughly the same as the climax concept. We refer to this approach as climatically constrained, and disturbances along the way are ignored.

The other approach is to consider the sere ending when there is a major disturbance event (typically a severe fire). This disturbance-constrained view considers the sere to end and reset when this major disturbance occurs. Consider a higher-elevation forest PNV type described as mountain hemlock, using a climatically-constrained view. Since fires may interrupt this sequence and reset the progress of seral stages to development of lodgepole pine, in a disturbance-constrained view it would be considered lodgepole pine.

The Forest Service officially uses a climatically-constrained view. Interior Department agencies generally use a disturbance-constrained approach. LANDFIRE provides map layers for both—the disturbance-constrained approach for Biophysical Setting (BpS), and the climatically constrained view expressed through Ecological Site Potential (ESP). Both approaches are valid and enhance our understanding of landscapes and how they work.

Table 1. How potential natural vegetation (PNV) varies with scale, drivers, and applications.

Mapping	Classification	Drivers	Applications
Vegetation Zone	Series or groups of Series	Geology, Geomorphology, Climate	Broad planning framework, disturbance (fire regime) framework
Subzone	Subseries or groups of Subseries	Geology, Geomorphology, Climate	Broad planning framework, disturbance (fire regime) framework
Plant Association Group (PAG) Habitat Type Group (HTG)	Subseries	Soils. Floristics (species composition)	Local planning framework, silvicultural prescriptions
(Not mapped)	Plant associations/ Habitat types	Floristics (species composition)	Local planning framework, silvicultural prescriptions

They are generally easy to "translate" to each other through a crosswalk.

Scale

Scale is one of the most important concepts in landscape ecology, and it's critical to identify what PNV product to use depending on your scale of interest. Some properties of ecosystems, such as fire regime, can only be understood at broader scales, because a fire regime can only be described if there is a large enough area for its characteristic fire extent, frequency, and severity to occur in meaningful patterns. Conversely, we use plant associations (sometimes called habitat types) at the local (stand) scale for writing silvicultural prescriptions, wildlife habitat interventions, and other applications. The above table illustrates what PNV looks like at different scales.

In summary:

- Plant associations (PAs) are the most local scale of PNV information available. Numerous guides describe forested plant associations for all of the Pacific Northwest Region. PAs are not mapped.
- Plant association group (PAG) maps are commonly used at the Forest and District level for planning projects.
- Vegetation zones and subzones describe broad landscapes and are used for broad-scale planning. An important application of these maps is using them as the framework for fire regimes.

So What?

Potential vegetation is used in plant associations (PAs) to inform silvicultural prescriptions. We expect different responses for different sorts of sites. PAs are an easily identified "shorthand" for assessing a site's productivity, biodiversity, and resilience to climate change.

At broader scales PNV describes map units that become a powerful assessment and triage tool in planning, at both the project and Forest level. For example, if a wildlife habitat need is identified, those PNV types not meeting that need can be quickly removed from consideration.

In recent years, the use of broad-scale PNV units (vegetation zone and subzone) units have become essential in framing fire regimes across the landscape. Fire regimes, by definition, need a large enough area to encompass the full range of fire sizes, frequency, and severity characteristic of the regimes. Using this framework, we can model a natural range of

forest structure (seral stages) by potential vegetation zone and subzone. More on this in the Ecology Briefing on Ecological Departure.

Some Applications:

- Use plant associations in developing silvicultural prescriptions.
- Plant association group (PAG) and Vegetation zone/Subzone maps can be used as planning tools to organize the planning landscape into opportunities. For example, PNV types can be organized by wildlife habitat suitability, timber productive capability, fire regimes, and other values of interest.
- At broad scale, vegetation zones/subzones frame fire regimes, and in turn can be used to generate ecological departure estimates. A table is available to relate all PNV types at broad scale to their respective fire regimes.
- PNV should be a key base layer in any planning effort.

Additional Resources

PNV vegetation zone/subzone maps and associated documentation can be found at teui-region6-usfs.hub.arcgis.com. This site also has links to all plant association and indicator guides for the Pacific Northwest Region. Limited hard copies of the guides are available on request.

References

1 C. Kenneth Brewer and R. D. Pfister (editors). 2008. Potential Natural Vegetation Classification and Mapping Technical Guide – REVIEW DRAFT. USDA Forest Service, Washington Office, Ecosystem Management Coordination Staff.

2 Roberts, D.W. 1987. A dynamical systems perspective on vegetation theory. Vegetatio 69:27 -33.

3 Winthers, E., D. Fallon, J. Haglund, T. DeMeo, D. Tart, M. Ferwerda, G. Robertson, A. Gallegos, A. Rorick, D. Cleland, W. Robbie, and D. Shadis. 2005. Terrestrial ecological unit inventory technical guide. Washington, DC: USDA For. Serv. Washington Office Gen. Tech. Rep. WO-68, 254 pp.