

# Evaluating the Role of Plant Species as Indicators of Climate Change, Disclimax, and Ecotones

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## Overview:

- As our climate changes into the future, we cannot assume habitat types will be static. Rather, habitat types may move across the landscape and plant associations may change over time. Therefore, we must adapt our silvicultural applications to create disturbance-resilient forests and consider other possible indicators of ecotones or shifting plant communities.
- Silviculturists must identify ecotones and predict sites susceptible to disclimax or plant community shifts to determine suitable silvicultural treatments for management objectives and desired forest conditions.
- We often use understory plants as indicators of habitat types because they occur in narrow ecological niches, but some plants may also be useful as threshold indicators.
- Work with plant technicians and botanists to evaluate changing plant communities or sites with limited reforestation success and identify which understory species might indicate possible thresholds, trends, or other management implications.
- These botanical experts can also help evaluate whether the current vegetation classification system adequately describes ecotones and provide suggestions for incorporating any newly identified threshold indicator species.

## Summary:

In recent years, Idaho Panhandle National Forests' employees have noted sites with limited reforestation success, as well as ecotones with evidence of plant shifts or longer-term disclimax following disturbance. I propose that we evaluate some of these sites and similar intact communities to identify plant species that may help us predict where such sites occur.

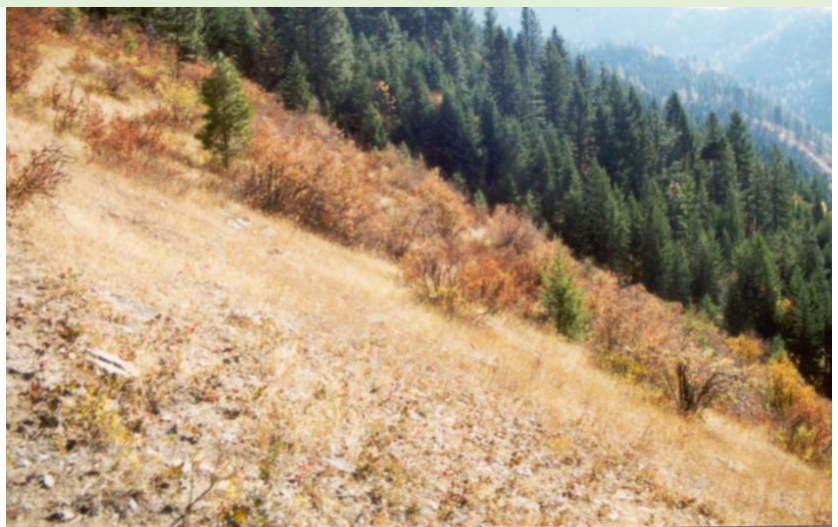


Figure 1.



An iterative process that involves defining thresholds and identifying threshold indicators may be invaluable in successfully managing stands for future resilience.

I also propose that we: (1) Evaluate ecotones and stands with forest health or reforestation issues to define thresholds



**Figure 2.**

between management successes and challenges. (2) Define the thresholds between short-term disclimax and conditions that might indicate a long-



**Figure 3.**

term habitat type or plant community shift. Then, (3) work with botanists (and others skilled in plant

identification) to identify plant species that may help predict the sites where thresholds and other management issues might occur. (4) Update vegetation classification systems to incorporate modified management strategies (particularly in ecotones) and to include any new threshold indicators. Use those thresholds and new indicators to help guide future classification and management strategies.

### **Silvicultural Concepts:**

- Vegetation Classification and Habitat Type Classification are systems that describe a geographic area's climax plant communities, based largely upon soils, aspect, elevation, climate, and productivity. These classification systems provide a means of describing plant communities and often determining appropriate management prescriptions.
- Ecotones are transitional zones between different biological plant communities that often exhibit traits of both and, as such, may be some of the first sites to exhibit disclimax and climate change symptoms (such as shifting plant communities).
- Disclimax usually describes a short-term condition for sites temporarily unable to support their predicted climax plant community. Intensive or repeated disturbance often causes disclimax, especially disturbances that affect soils, productivity, or modify climatic influence.
- Indicator species are those plant species described in vegetation classification that distinguish between plant communities or predict specific site characteristics (like droughty soils, cold air drainages, or specific soil parent materials).

## Management Applications:

- Many variables can impact reforestation success, including aspect, soils, microsites, climatic variables, nursery stock quality, silvicultural prescription, and site preparation. However, some site conditions or plant community changes may require us to reconsider and modify traditional stocking prescriptions.
- Where reforestation success has been problematic or forest health conditions are widespread, assess whether those issues are driven by stand stocking/structure or could be related to short-term disclimax variables (like organic matter, soils, increased wind or insolation, etc.) or possible long-term climate-related plant community shifts, particularly associated with ecotones.
  - Define thresholds for reforestation success on various habitat types.
  - Define thresholds between disclimax and longer-term plant community shifts.
  - Define objectives for ecotones and shifting plant communities.
  - Identify understory species that might correlate with reforestation issues on various habitat types (typically cold, warm, or dry site indicators) or might predict ecotones and potentially shifting plant communities.
  - Evaluate or reevaluate whether your traditional prescriptions (stocking—both species and density, structure, and function), as well as tools and practices are still suitable for those sites.
- Evaluate whether current vegetation classification systems still accurately describe local plant communities and adequately guide management for resilient plant communities.
  - Consider whether additional data collection, monitoring, and analysis should be conducted at local or regional scales (fine- and coarse-scale).
- Consider amending your classification system to include expanded descriptions of ecotones, thresholds, threshold indicators, and management implications.



Figure 4.

Figure 1—Dry site ecotone on Idaho Panhandle National Forests, illustrating limited reforestation.

Figure 2—*Collomia heterophylla*, which is associated with dry ponderosa pine forests in northern Idaho.

Figure 3—*Hydrophyllum capitatum*, which is associated with ponderosa pine, Douglas-fir, and grand fir forests in northern Idaho.

Figure 4—*Arenaria congesta*, which is associated with very droughty soils in northern Idaho.