Leveraging Land Condition Trend Analysis (LCTA) Data to Understand Vegetation Change on Military Installations: Phase II

Project # 14-623 and 15-623

Background:

Long-term studies of permanent monitoring plots can provide valuable insights about vegetation change and its drivers. Many types of changes are possible, including transitions to new ecological states. Such changes can directly impact the utility of areas for military training, and indirectly threaten military training if, for example, they contribute to the listing of endangered taxa and associated restrictions on activities within critical habitat. Understanding how vegetation changes can also guide management actions to support training activities.

Vegetation change can be summarized in many ways; and the response to change by vegetation can differ in terms of how strongly and rapidly the vegetation is affected by drivers of change. For example, the overall richness of a community may be less sensitive than the abundance of an individual species to a driver like livestock grazing. Furthermore, our ability to detect these changes may be affected by the spatial details of the sampling methods used.

Objective:

The overarching goal of this project was to improve our understanding of vegetation change on military installations. To do so, we leveraged historical data by applying new analytical techniques to them to better understand how military activities and other factors have affected plant communities. We focused on the extensive data collected from Land Condition Trend Analysis (LCTA) plots on the Yakima Training Center (YTC). Previous work (Phase I, Legacy Project #13-623) provided insights from one temporal interval and from one sampling method. In Phase II, we considered multiple temporal intervals and sampling methods.

Summary of Approach:

The LCTA program included frequent monitoring of permanent plots between 1989 and 2004. Each plot was monitored at three spatial sampling grains (point intercept, 15x15 cm frames, 60x60 cm frames). Abundances of individual plant species were measured on each plot in each year, and evidence of disturbances was noted. We combined these data with other information about environmental characteristics, climate, and disturbances.

First, we examined changes in species richness, cover of *Bromus tectorum*, and cover of native shrubs. We focused on 71 plots from a widespread Ecological Site Description, and analyzed intervals from 1 to 13 years. Responses were related to various abiotic, biotic, and disturbance-related factors.

Second, we focused on 45 plots that were repeatedly sampled with all three sampling grains in the same 6 years. We explored how conclusions about vegetation change and community structure were affected by the sampling grain at which vegetation data were collected.

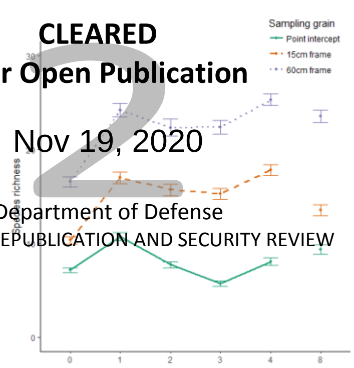
Benefit:

Understanding how and why vegetation changes over time allows for natural resource managers to make more informed decisions about when, where, and what tasks to do to meet their management objectives. We show that it is also challenging to describe as it is sensitive to the sampling grain at which data are collected, temporal interval examined, and choice of response variable. We provide recommendations for future monitoring programs, including sampling methodologies.

Our approach has nationwide implications as over 50 installations, spanning multiple Army divisions, have collected data from LCTA plots. Our white paper, "Leveraging Land Condition Trend Analysis (LCTA) Data to Understand Vegetation Change on Military Installations: Phase II", details our approach so it can be applied elsewhere.

Results:

The spatial sampling grain at which data are collected can strongly affect conclusions about vegetation change and community structure. Livestock grazing was most important at intermediate intervals, but military training activities were related to responses in only a few intervals. Weather-related factors were important over short intervals. No single response variable fully expresses vegetation change; it is important to select responses that encapsulate different aspects.



Spatial sampling grain strongly influences conclusions about vegetation change and community structure, including species richness (y-axis).

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