



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

Project # 13-623

## Background:

Sagebrush steppe ecosystems provide high quality land for military training and critical habitat for wildlife. However, disturbances such as fire, livestock grazing, and military training can cause large changes in vegetation composition, directly impacting the utility of areas for military training and indirectly threatening military training if, for example, they contribute to the listing of endangered species and associated restrictions on activities within critical habitat. Understanding how vegetation changes over time is necessary to identify future management activities that would best support training activities.

## Objective:

The objective of this project was to leverage historical data by applying new analytical techniques to them to better understand how military activities have affected plant communities. Specifically, we:

1. Classified plant communities in 1989 and 2002;
2. Identified areas of greatest and least change;
3. Evaluated the impact of disturbance on plant communities; and
4. Refined a state-and-transition model to be more directly relevant for land management.

## Summary of Approach:

The Joint Base Lewis-McChord Yakima Training Center (YTC) served as the pilot installation. YTC collected vegetation data multiple times from 1989-2002 on 321 permanent Land Condition Trend Analysis (LCTA) plots. Here, we focused on 201 plots measured in 1989 and 2002. We used cluster analysis to identify plant communities in each year, and Indicator Species Analysis (ISA) to identify species that had increased or decreased in abundance.

We also compiled a detailed history of each plot, focusing on abiotic conditions, human activities (military training, habitat enhancement, livestock grazing, roads), and natural disturbances (fires) from 1989-2002. These variables were related to the changes that occurred between 1989 and 2002.

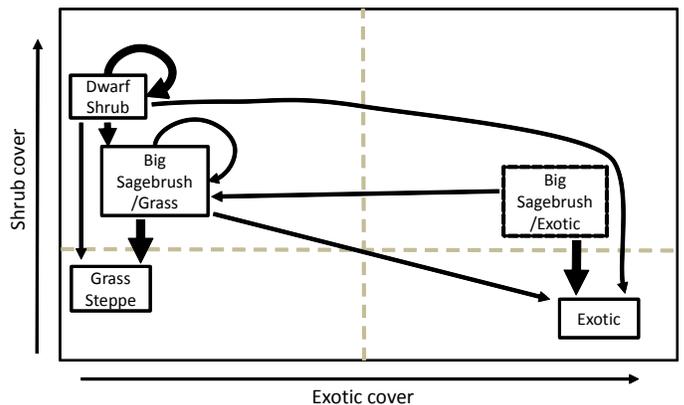
## Benefit:

The results of this project begin to clarify how military training, fires, and livestock grazing have altered the vegetation on YTC. Ongoing work will examine the vegetation at dates between 1989 and 2002 to distinguish short- and long-term effects of disturbances, and will incorporate plant functional traits into analyses.

The approach used in this project also has nationwide implications as over 50 installations, spanning multiple Army divisions, have collected data from LCTA plots.

## Accomplishments:

Three communities were identified in 1989, and four communities in 2002. Although plots tended to continue to be classified in the same community, ten of the twelve possible transitions were detected. These changes were integrated into a state-and-transition model.



The amount of change averaged 31% but spanned almost the full range possible (6-100%). Dynamics of individual plots were related to their disturbance histories. Increased military training intensity resulted in more compositional change, less cover, and less richness. Fires increased the abundance of grasses and reduced that of shrubs. Livestock grazing increased compositional change, cover, and richness, and favored shrubs over grasses.

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