Integrated Control and Assessment of Knapweed and Cheatgrass on DoD Installations

Conservation
CS-1145

Background:

Large areas of the western United States are infested by knapweed and cheatgrass species, and this is a major concern for military installations. Heavy maneuvering of troops and equipment causes large disturbances where native vegetation is stressed, soil is lost, and invasive noxious plants often take hold. The natural process of disturbed lands recovery can take decades or even centuries, depending on the nature of the disturbance. Processes that control the rate of recovery of disturbed lands to late-seral native plant communities are poorly understood, but where they are understood, they can be exploited to expedite succession and eliminate non-indigenous plants. It is imperative to find economical, ecologically sound methods to assess and predict the control of these weeds.

Objective:

The objective of this project is to develop a strategy for the control, monitoring, and prediction of knapweed and cheatgrass infestations on Department of Defense (DoD) installations in the western United States.

Summary of Process/Technology:

Biological control, fire, manipulation of soil nitrogen availability, seeding with native late-seral species, and restoration of the soil community are combined in this strategy. The results of these manipulations on plant community composition will be monitored over a 4-year period on the ground and using remote sensing techniques in order to evaluate success. Results from this study will be incorporated into an existing ecosystems dynamics simulation (EDYS) model. The EDYS model will be calibrated to each of the field study sites to assess the direct and indirect effects of treatments on ecosystem dynamics at multiple spatial scales and to project the potential effects of treatments on long-term successional dynamics.

Benefit:

This project will provide new, effective methodologies for controlling, monitoring, and predicting invasions by non-indigenous plant species. The overall long-term benefit will be the reduction of knapweed and cheatgrass populations on military installations and other lands and a return of native plant communities to provide more realistic training areas and thus improve mission readiness.

Accomplishments:

Results to date indicate that significant treatment effects have occurred in many of the test plots. Biological control agents for knapweed and other species have become well-established. Soil nitrogen availability was reduced with carbon amendments, resulting in significant reductions in weed abundance. Soil microbial community analyses have indicated plot-level differences between treatments, and molecular approaches that are being developed have shown potential for discerning fungal taxa that can be used as markers of restoration success. Overall, results indicate that combinations of treatments that seek to stress noxious weeds and simultaneously aid the establishment of desirable species can be an effective strategy for managing noxious weeds. However, the dynamic nature of plant communities, military disturbances, and climate suggest that monitoring and modeling are an integral part of the strategy and will greatly enhance the effectiveness of control strategies.

Knapweed

Cheatgrass

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