

AS05-01 Revegetation strategies to minimize weed re-colonization following herbicide application. Catherine Zabinski, MSU Dept. of LRES. \$8000

Proposal

This research focuses on revegetation after herbicide application on spotted knapweed infested sites in northwestern Montana grasslands. The seed stored in the soil of weed-infested sites will be measured, to test the hypothesis that seed bank composition and density can be a good predictor of revegetation patterns after herbicide application. Site preparation approaches will be compared to determine whether the seed bank can be effectively manipulated to further management goals. Finally, revegetation methods will be compared to test the efficacy of contrasting seeding rates, species mixes, and transplants in reducing available habitat for weed colonization. The research will be done at two sites in Glacier National Park and one site on the Blackfeet Reservation on the eastern border of the park.

Results/

There is an immediate and on-going need in Glacier National Park (GNP), and other public and private lands, to determine effective methods to re-establish and sustain native plant populations following control treatments of *Centaurea maculosa*. My research was developed in response to GNP concerns regarding annual herbicide treatment of *C. maculosa* invaded sites. The aim of this study was to determine if herbicide applications, site preparation and revegetation methods would increase the density and percent cover of native species, while reducing spotted knapweed at two sites in and near Glacier National Park. A priori contrast analysis was used to determine differences in treatment effects. The results of my experiment show that spot spray herbicide application reduced *C. maculosa* cover without significantly reducing existing native forbs. However, a repeat-herbicide application increased exotic graminoid cover. Tillage reduced the density of *C. maculosa* seedlings, but resulted in an increase in *C. maculosa* percent cover, and an overall decline in native forbs. Revegetation methods had limited success at increasing native species, and reducing *C. maculosa*. The only effect was at Swift Current, where the percent cover of native forbs was significantly higher with the planting treatment, and most pronounced in plots with repeat-herbicide application. Additionally, we measured the composition and density of the seed bank in *C. maculosa* dominated sites using the seedling emergence method. *C. maculosa* density was 3,900 and 6,714 seeds / m² at the two sites, which was 2 and 3 times higher than the sum of all other species. Seed bank composition and density needs to be considered in efforts to restore *C. maculosa* infested areas.

Publications

Thesis to be defended October 22, 2003. Chapter 2 will be submitted to Restoration Ecology for publication.

Benefits of seed money

The results of this research will directly benefit Glacier National Park managers in their efforts to control spotted knapweed.