



Monitoring Prairie Restoration

Exotic plant species pose one of the greatest challenges for prairie restoration in parks of the Northern Great Plains. Non-native grasses such as smooth brome, cheatgrass and Kentucky bluegrass, and forbs such as yellow sweet clover and leafy spurge, cover large areas of these prairies. These exotic plants lower native plant diversity, reduce wildlife habitat and alter ecosystem processes. Resource management is attacking this problem with a process known as integrated pest management. Using chemicals, biocontrols, chainsaws, and even bare hands, exotic plants can be reduced and sometimes eliminated. Prescribed fire is another tool used to reduce the abundance of exotic plants. At specific times in the growing season, fire can give the native grasses a competitive edge over the exotic plants, often when used in conjunction with chemical or mechanical treatments, or with seeding of native species.

The fire effects crew, based at Wind Cave, measures the success of prescribed fire in reducing exotic species in the Northern Great Plains parks. Their overall task is to determine if prescribed fire objectives are being met and to ensure that no unwanted effects are occurring. Following protocols outlined in the National Park Service Fire Monitoring Handbook, permanent vegetation plots are established and read in designated burned areas. These plots are reread at established intervals following prescribed fires. Plots with similar vegetation and objectives are grouped

for statistical analysis. Through monitoring, managers may learn that some management practices result in more desired outcomes than others and thus are more likely to meet resource management objectives. Being flexible to make changes as a result of data collected from the field is known as adaptive management. Fire effects crews located at Ozark National Scenic Riverways, Indiana Dunes National Lakeshore, and Voyageurs National Park are conducting similar monitoring work.

Two case studies that illustrate the success of this battle against exotic species include Devils Tower National Monument and Badlands National Park. While Devil's Tower is in the Intermountain Region, the Northern Great Plains Fire Management Office oversees fire activities at this park due to its geographic proximity and similarities in vegetation.

Devil's Tower

Prescribed fire has been used at Devils Tower to reduce non-native Kentucky bluegrass. Two prescribed fire treatments have been applied to two adjacent burn units. One burn unit with a single monitoring plot was burned in the fall of 1999 and in spring 2002. A second unit with two monitoring plots was burned in the spring of 1999 and in spring of 2000. Results from these three plots are promising. After two prescribed fires, cover of native species increased more than 83% and cover of non-native species decreased 62% (Figure 1). Specifically, following the second prescribed fire Kentucky bluegrass cover was 66% below pre-burn levels. Native sedges responded very favorably to prescribed fire and increased by more than 650%. The native western wheatgrass appears to be exhibiting an increasing trend (Figure 2).

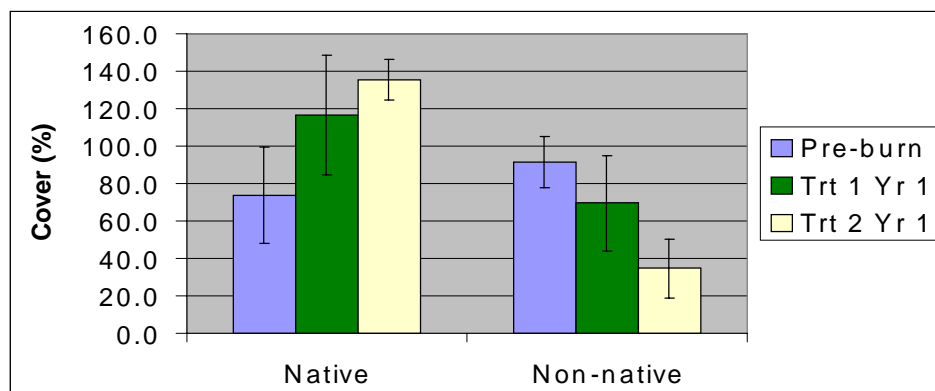


Figure 1. Mean percent cover of native and non-native species on three monitoring plots in two burn units at Devils Tower National Monument following two treatments of prescribed fire.

Badlands

Prescribed fire has been used at Badlands NP to reduce a number of exotic grasses and forbs. Two burn units, containing eight monitoring plots, were treated with late summer or fall prescribed fire in 1999. Vegetation of the burn units is dominated by western wheatgrass and contains smaller amounts of grama grasses, needlegrasses, sedges, and scurfpeas. Non-native species include yellow sweetclover, Japanese brome, and cheatgrass. Prescribed fire objectives were to decrease non-native grass species and increase native grass species. There were no changes in native species following the prescribed fire, but non-native grasses were reduced for two years while non-native forbs were reduced for one year.

The overall trends of vegetation changes are encouraging. Prescribed fire appears to be causing decreases in exotic species, while promoting the growth of native species. With additional applications of prescribed fire, continued monitoring of these plots over time, and the treatment and monitoring of new areas, a clearer picture of how prescribed fire is helping reduce exotic vegetation should emerge. Combined with other methods of pest control and sowing of native plant species, park resource management will be able to use adaptive management to restore the prairies of the Northern Great Plains.

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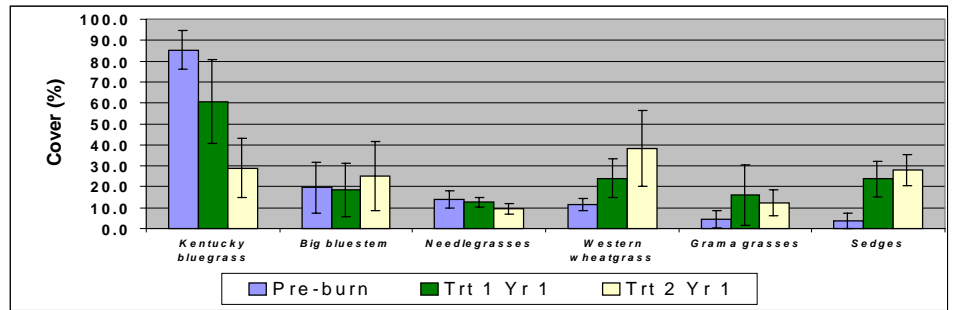


Figure 2. Mean percent cover of the six most common genera in the two burn units at Devils Tower National Monument following two treatments with prescribed fire. Kentucky bluegrass is the only exotic species shown.

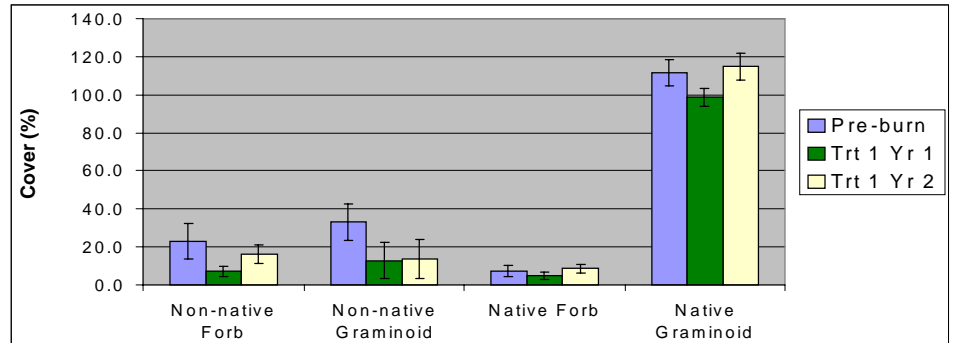


Figure 3. Mean percent cover by guild in two burn units at Badlands National Park two years following treatment by prescribed fire.



Badlands National Park - preburn photo of vegetation plot in Big Buffalo burn unit.



Badlands National Park - photo of vegetation plot in Big Buffalo burn unit, two years after burn.