

Cheatgrass Encroachment on a Ponderosa Pine Ecological Restoration Project in Northern Arizona, U.S.A.

Christopher M. McGlone¹, Judith D. Springer¹, and W. Wallace Covington^{1,2}

Abstract—Land managers frequently thin small-diameter trees and apply prescribed fire to reduce fuel loads and restore ecosystem structure, function, and process in forested areas. There is increasing concern that disturbances associated with these management practices can facilitate nonnative plant invasions. *Bromus tectorum* is an annual grass from the Mediterranean region. It has invaded large areas of the Interior West and has become the dominant species in many of these areas. In 2003, a ponderosa pine ecological restoration site on Mt. Trumbull in the Uinkaret Mountains of northern Arizona experienced a large increase in *Bromus*. Thinning and burning projects had been conducted on this site since 1996. *Bromus* frequency increased on the thinned and burned plots by six-fold between 1996 and 2003. While *Bromus* also increased on thinned plots that were not burned and the untreated control plots, the frequency of *Bromus* was significantly lower than on the thinned and burned plots. There were two additional factors that may have influenced the *Bromus* invasion. In 2002, the region experienced the most extreme drought recorded in the past 100 years. Substantial rainfall returned to the area in September 2002, coincident with the timing of *Bromus* germination. Additionally, cattle were reintroduced to the study area in July 2002 after a five year hiatus in grazing. We present data that suggest the interaction of prescribed fire, small-diameter tree thinning, cattle grazing, and drought were the primary causes of the spread of *Bromus*.

In: Gottfried, Gerald J.; Shaw, John D.; Ford, Paulette L., compilers. 2008. Ecology, management, and restoration of piñon-juniper and ponderosa pine ecosystems: combined proceedings of the 2005 St. George, Utah and 2006 Albuquerque, New Mexico workshops. Proceedings RMRS-P-51. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

¹ Ecological Restoration Institute, Northern Arizona University, Flagstaff, AZ.

² School of Forestry, Northern Arizona University, Flagstaff, AZ.