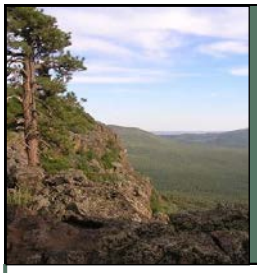

Ecological Restoration Institute

Fact Sheet: Exotic Species Management at Landscape Scales *July 2012*

NORTHERN ARIZONA UNIVERSITY
Ecological Restoration Institute

Tools for Planning Exotic Species Management at Landscape Scales

Introduction

Invasions by exotic plant species can threaten forest ecosystems in numerous ways. Identifying relationships between exotic species invasions and native vegetation, soil properties, and disturbance could be helpful for managing exotic plants by pinpointing the ecological conditions most susceptible to invasion. Ecosystem classification, such as the U.S. Forest Service's Terrestrial Ecosystem Survey (TES) in Region 3, is a valuable tool for integrating factors like environment and disturbance that affect exotic species distributions across landscapes. However, its potential has been little explored for this purpose. For this study, exotic plants were measured on 66 plots in 10 ecosystem types encompassing a range of climatic regimes and soil parent materials in an area within the Coconino National Forest (Arizona) covered by a TES. Ecosystems ranged from xeric, nutrient-poor, black cinder ecosystems containing little understory vegetation, to moist basalt ecosystems with silt loam soils and productive understories.

Research Findings

- A total of 271 plant species (251 native and 20 exotic) were recorded on the plots. *Taraxacum officinale* (common dandelion), *Tragopogon dubius* (yellow salsify), *Bromus tectorum* (cheatgrass), *Verbascum thapsus* (common mullein), and *Poa pratensis* (Kentucky bluegrass) were the most prevalent exotic species.

- The principle that native and exotic species richness and cover are positively correlated in landscape-scale sampling studies was supported (Stohlgren et al., 1999, Fornwalt et al., 2010). Sites with the highest number of native species were the most invaded, indicating that the most invaded sites were favorable for both native and exotic species.

- Environmental variables were more strongly related than disturbance to exotic species richness and cover within our sampling context of relatively undisturbed stands (e.g., wildfire burns were not sampled).

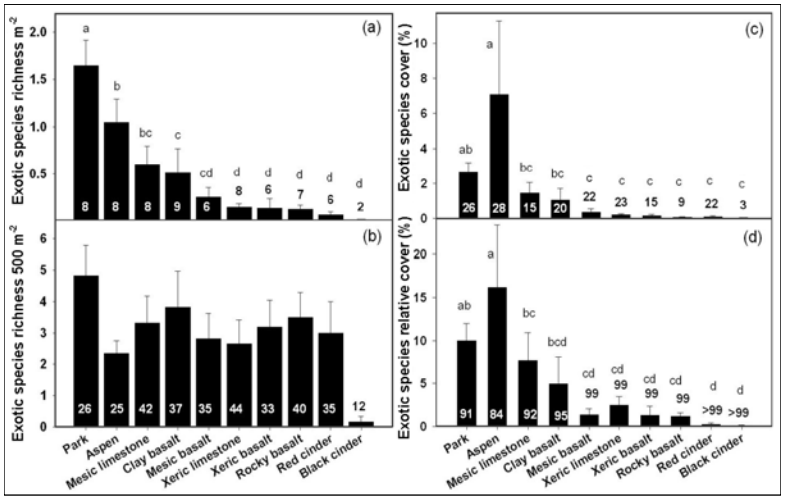

Fig. 1. Mean exotic species richness at the (a) m^2 and (b) 500-m^2 scale, and exotic species (c) raw and (d) relative cover among 10 ecosystem types of northern Arizona ponderosa pine forests. Numbers at the bases of or on top of bars represent native species measures.

- Exotic species richness and cover were strongly related to ecosystem types (Fig. 1). In general, moist ecosystems were more heavily invaded than dry ecosystems. Black cinder soils contained the fewest, and park ecosystems the most, exotic species.

- The top two invaded ecosystems share the characteristic of a lack of ponderosa pine dominance—aspen ecosystems have only small proportions of pine trees and park ecosystems have no tree overstories.

Management Implications

The findings have important implications for managing exotic species related to information needs identified by mandates such as U.S. Forest Service (2004) guidelines for managing species invasions.

- Results can help to identify characteristics of forest sites that are most invaded (useful for mapping and monitoring of invasions); identify exotics that are most prevalent to partly help prioritize species for monitoring and management; and prioritize particular ecosystems for management and develop ecosystem-specific management strategies.

- The U.S. Forest Service's TES was valuable for understanding invasion patterns across the landscape and is useful for exotic species management planning. For example, management strategies may be ecosystem-specific. In the little-invaded black cinder ecosystem, early detection of new invaders may be a primary strategy, whereas containing existing invasions may be more important in heavily invaded ecosystems.

Tragopogon dubius (yellow salsify). Photo by Max Licher.

Verbascum thapsus (common mullein). Photo by Max Licher.

Taraxacum officinale (common dandelion). Photo by Mix Licher.

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This Fact Sheet summarizes information from the following publication:

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