Chapter 19. Ecological Impacts of Invasive Species After Fire

(WC-F-06-06, http://fhm.fs.fed.us/em/funded/07/wc_f_06_06.pdf)

Leigh Dawson[1]

Introduction

The project area was located in Hells Canyon National Recreation Area (HCNRA), one of the largest contiguous areas on native bunchgrass communities in the Western United States. The project was set up to monitor how plant communities, specifically, *Agropyron spicatum* (bluebunch wheatgrass) and *Festuca idahoensis* (Idaho fescue) change after fire, especially in relationship to invasive plants. It was established to analyze the changes in bunchgrass ground and aerial cover values and also the cover of indicator species. In order to accomplish this objective, we utilized baseline data from existing Current Vegetation Survey (CVS) plots. We also supplemented the CVS plots with additional invasive plant monitoring plots located within known weed infestations. Together these plots provided information on density of weed infestation, rate of spread, and change within the native plant communities.

Objectives

- Determine the extent and the direction of spread of known noxious weed sites
- Survey for new noxious weed sites within the fire perimeter
- Evaluate relation between weed response and fire intensity/severity'
- Monitor CVS plots within fire perimeter for noxious weeds and native plants
- Monitor for survival of biological agents released within but prior to fires

Study Area

The project area was located in Hells Canyon National Recreation Area (HCNRA), Wallowa-Whitman National Forest, Region 6. The HCNRA contains one of the largest contiguous areas on native bunchgrass communities in the Western United States. The project area experiences frequent fires of low to medium severity. It also has a high

[1] Wallowa Whitman National Forest

occurrence and a large diversity of invasive plant species. Therefore, it was an ideal location to evaluate the relationship between fire and invasive plants (weeds) in bunchgrass communities.

Methods

In order to accomplish this objective, we utilized baseline data from existing Current Vegetation Survey (CVS) plots. Unfortunately, the initial readings of the CVS plots did not include invasive plants. Therefore when the CVS plots were reread, invasive plant data were also collected. We also supplemented the CVS plots with additional invasive plant monitoring plots located within known weed infestations. Data was collected in a 37ft. circle. Percent cover is measured using Daubenmire classification of selected plant categories. A full species list is generated from each circle as well as determining the apparent trend of the target species (invasive plants) based on current and past monitoring. Given the particular vegetation types, the site condition is also noted during the monitoring process.

To monitor for the survival of biological agents post fire, we recorded agents present. This was accomplished by visual observations of buds, stems, and/or roots.

Results

The invasive plant monitoring plots and the CVS plots demonstrated that there was an overall increase in weed densities within the plots during the initial green-up stage following the fire (figure 19.3). Herbicide treatments were applied to the invasive plant infestations. We found that herbicide treatments applied during this initial growing season resulted in increased treatment efficiency (figure 19.4). Therefore, by the second plot readings the invasive plants were greatly reduced and the native grasses were on the increase.

Several conclusions can be reached as a result of this monitoring. They include:

- Grassland fires of low to medium severity mainly result in the removal of approximately 95 percent of the above-ground vegetation; but do not harm underground root or seed banks of existing vegetation
- Invasive plants are the first to take advantage of the exposed surface, enhanced nutrient and increased light that result from fire and thus an increase in seed germination.
- Herbicide treatments on invasive plants within the first year post fire result in increased treatment efficiency.
- First year treatment enhances native plant re establishment by removing competition from invasive plants
- Idaho fescue appears to be more resilient to low-medium severity fires but both bluebunch and fescue will re establish naturally if pre fire bunchgrass populations are significant (30 percent of plant community)
- Invasive plants were found to have an accelerated rate of spread post fire. This is likely due to the removal of competing vegetation. The removal of competing vegetation of weedy species improved visibility during inventory which also contributed to increased weed census numbers. The accelerated spread rate could also be attributed to the internal winds created by the fire and increased fire suppression activities. The internal fire winds have the potential to transport seed heads over long distances. For instance, during the initial inventory immediately following fire (still black), two *Chondrilla juncea* (rush skeletonweed) rosettes were found ¾ mile upslope from the closest known site!

In conclusion, we have found that it is essential to work in burned areas during the initial green-up stage (figure 19.5). This timing provides excellent visibility for ground surveys and has also proven to be the most effective treatment window, especially for herbicide treatments. This factor alone greatly enhances the ability for native grasses to re-establish. If these steps are followed, the need for reseeding is substantially reduced.

Several guidelines for fire management and Burned Area Emergency Rehabilitation (BAER) were developed as a result of this project. They were developed specifically for

the Wallowa Whitman National Forest vegetation types. These guidelines were available at the 2006 FHM conference and included:

- An abstract for information pertaining to "The Relationship Between Fire and Invasion of Exotic Species"
- A table on "Invasive Plants Displaying Habitat Preference and Response to Fire"
- A chart displaying "Perennial Forbs Used for Post-Fire Rehabilitation"
- Guidelines on "Native Vegetation Species Recommended for Restoration Seeding To Reduce Noxious Weed Infestation"
- A matrix for "Resource Advisor Guidelines and Fire Restoration Alternatives"

Other accomplishments included:

- Monitoring of biological agents concluded that stem weevils on *Linaria dalmatica* (dalmation toadflax) and seed feeders on *Centaurea solstitialis* (yellow starthistle) can survive late summer, low severity burns that move quickly through grasslands, however, numbers may be significantly reduced. Therefore, biological treatment effectiveness is initially reduced as a result of fire.
- Cooperative monitoring efforts were accomplished by Forest Service, U.S. Department of Agriculture fire and weed crews, Oregon Department of Agriculture, Cooperative Weed Management Areas, The Nature Conversancy, Wallowa Resources, and volunteers
- The creation of an educational power point presentation targeted for fire crews showing fire effects on invasive plants and prevention guidelines
- Update CVS data collection requirements to include invasive plants

In conclusion, we will continue to use these monitoring techniques and incorporate findings from this project in our education and prevention program as well as in the development of BAER plans.