

Ecologically based invasive plant management (EBIPM): Lessons from the area-wide demonstration project

A webinar presented on May 9, 2018, by Roger Sheley, Ecologist, USDA-ARS, Burns, OR. Summary by Corey Gucker, Outreach Coordinator, GBFSE.

Access original webinar - <https://youtu.be/8xtaKoBUYBg>

- Summary**
- The key to managing community invasion is maintenance of highly productive and diverse vegetation
 - EBIPM guides site- and time-specific management by identifying and addressing ecological processes
 - A site's infestation level determines management goals, treatment options, and prioritization of management

The Problem

Cheatgrass monocultures support intolerable fire frequencies. These monocultures are likely habitat for other invasive species (e.g., yellow starthistle) or even worse, a complete absence of late season vegetation, which causes soil erosion, even further degradation, or complete loss of site function and value (Fig. 1). In attempts to manage this problem, we now realize that invasive plant management is not rocket science, it is a lot harder than that.

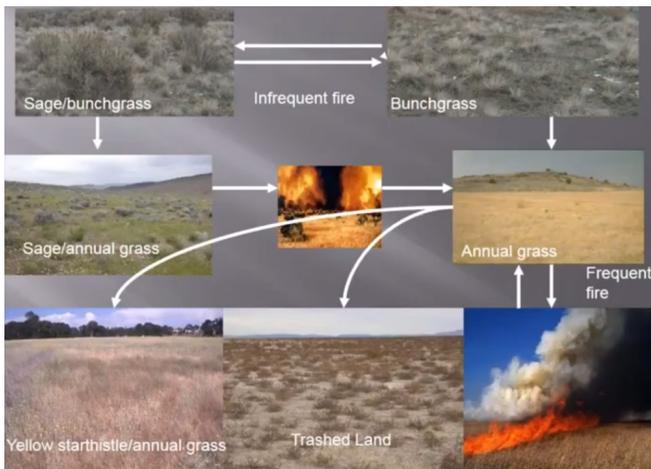


Figure 1. The invasion process and changes associated with increasing cheatgrass dominance.

The key to reducing the chances of community invasion and/or eventual dominance by cheatgrass or other invasive species, is maintaining high productivity and diversity. Highly productive communities tie up available resources, keeping them from invasive species. Temporally and spatially diverse communities occupy all available niches, leaving no space for invasive species.

What Do We Do?

The objective of cheatgrass management is maintaining, directing, or restoring desirable plant communities where all temporal and spatial niches are occupied. This

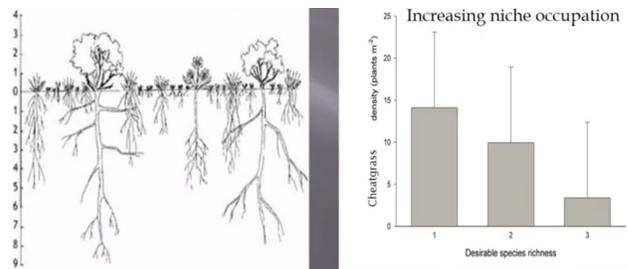


Figure 2. Left: A desirable community that is occupying the majority of niche space in a community. Grasses with fibrous shallow root systems, forbs with deep taproots, and shrubs with even more extensive root systems. Right: Cheatgrass establishment in containers with 1, 2, or 3 native species growing.

community will include early and late emerging species, grasses with fibrous root systems in the upper soil profile, and forbs and shrubs with deep taproots (Fig. 2, left). In controlled studies, establishment of seeded cheatgrass was less successful as species richness increased from 1, 2, to 3 native species (Fig. 2, right).

To combat cheatgrass successfully, management needs to shift the focus from treating the symptom or controlling the weed to understanding the problem and identifying its causes. This involves digging into basic scientific ecological principles and acknowledging that ecology is a relatively new science with still emerging concepts. Understanding the principles behind vegetation change can help management move from prescriptions to practices that affect ecological processes.

Ecologically Based Invasive Plant Management (EBIPM)

Because prescriptive management of invasive species has largely failed, managers and researchers developed the EBIPM framework based on ecological principles (James et al. 2010; Sheley and James 2010). It provides a logical thought process to guide the planning of site- and time-specific management that identifies and addresses ecological processes. By addressing and affecting the underlying causes of vegetation change, EBIPM is more

successful and sustainable in directing desirable outcomes.

Five steps to EBIPM:

1. Complete a rangeland health assessment
2. Identify the cause(s) of invasion and its associated non-functioning processes
3. Use ecological principles to guide decision making
4. Choose appropriate tools and strategies that bring about the desired ecological process
5. Set up a plan and assess how/if it is working

There are many benefits to EBIPM. This framework can accept and use new information on ecological principles as it is learned or gathered. It also provides a common language and guide for both land managers and researchers to learn cooperatively. In a study comparing weed management methods, EBIPM had a 25% greater rate of success.

Prioritizing Management

The first step to prioritizing management is to assess the site and categorize it into one of three situations: No or light infestation; Moderate infestation with some desired plants; High infestation without desired species (Fig.3; Sheley and Smith 2012). The site's infestation level determines the management goals. Another early step is mapping these different types of infestations and identifying the protection zones, action zones, and containment zones, which improves visual and verbal communication about management.

Prevention or protection is the way to manage a site with no or light infestations. These sites are the highest priority for management and have the highest likelihood of success. Prevention includes education, interruption of movement, and early detection and rapid response when you find new infestations. The EBIPM provides a prevention flowchart that outlines actions within each of the three prevention principles. The Weed Wheel tool provides information on invasive species dispersal based on seed adaptations and thus potential ways to prevent infestations or controlling species movement (Davies and Sheley 2007).

For moderate infestations, the management focus is on controlling infestations and increasing the abundance of desired species. One useful management tool includes strategic grazing. An EBIPM Grazing Invasive Annual Grasses: The Green and Brown Guide, provides a strategy for grazing a site when invasive annual grasses are green and desired perennial grasses are dormant, which can lead to mortality of the invasive grass from heavy cattle grazing (Smith et al. 2012).

For heavy infestations, restoration or revegetation is the necessary management. This management is the most complicated and costly. EBIPM provides a 14-step revegetation program that guides management through a series of yes-no questions and answers to develop a site-



Figure 3. Prioritization of weed management based on the degree of the infestation and its associated likelihood of success (Sheley and Smith 2012).

specific revegetation plan.

Regardless of the management plan and treatment methods, adaptive management is critical to EBIPM. This goes beyond monitoring to include investigation of causes of successes and failures by comparing treated and control sites. Understanding whether vegetation changes were a result of treatments or other natural ecological processes is essential to successful management at a given site and for future management at other sites.

Conclusions

By knowing and using the underlying ecological principles in management and following the EBIPM framework, plant communities can be put on a trajectory toward increasing abundance of desired species.

The Ecologically Based Invasive Plant Management website - <http://www.ebipm.org/> provides the resources necessary to succeed with EBIPM.

References

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