GBFSE Webinar Series 2018
Managing Cheatgrass by Putting What We Know into Practice

Capitalizing on strategic opportunities to reduce cheatgrass: Examples from the field

A webinar presented on April 25, 2018, by Brian Mealor, Associate Professor, University of Wyoming, Sheridan, WY, and Mike Pellant, retired Rangeland Ecologist, DOI-BLM, Boise, ID. Summary by Corey Gucker, Outreach Coordinator, GBFSE.

Access original webinar - https://youtu.be/P8_7rFHhY6U

Summary

- **Understanding and assessing a site is paramount to restoration or successful treatments to reduce cheatgrass**
- **There are many economic and ecological tools to help with site evaluation and decision making when management opportunities arise**

Defining Success

Successful cheatgrass management depends on employing the **right management tactic** at the **right time** in the **right place** for a **sufficient period of time** to move the site, community, or landscape toward **realistic vegetation goals**. All of the bold terms are highly variable as well as site and goal dependent. No tool or management strategy works for all situations.

To strategically manage a particularly problematic, widespread, invasive species like cheatgrass, identification of leverage points and opportunities is important for spreading resources and improving chances for success.

Understanding your Site and its Risks

There are several useful concepts and tools for identifying and prioritizing treatment sites, timing, and options. Resistance and resilience concepts, largely based on soil moisture and temperature regimes, allow for identification of areas with high potential for success from both an ecological vegetation and habitat restoration standpoint. In Wyoming, areas of habitat with potential to be invaded by greater than 50% cheatgrass cover have been mapped. Coupling these coarse-scale landscape pictures with an understanding of the invasion process and weed spread dynamics further improves site prioritization, identification of leverage points, and site treatments.

Steady states and threshold theory, and cost-benefit analyses are also useful in determining leverage points and management approaches. In sagebrush ecosystems, the desired steady state is that which has substantial native perennial cover and good management in place (Fig. 1). However, when subjected to a change in disturbance regime (e.g., prolonged drought, repeated fire, or excessive and ill-timed grazing), the steady state can be pushed over an ecological threshold and become a new state dominated by annual grasses. Returning the community back to the native-dominated steady state once it has

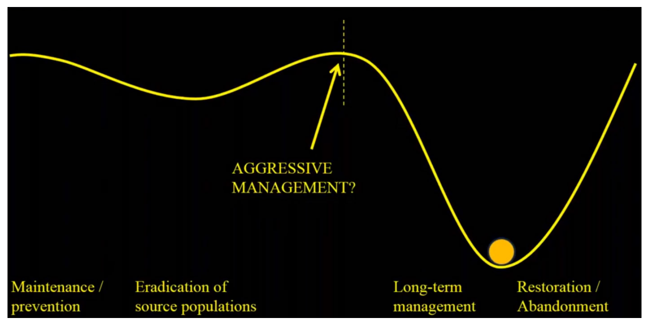

Figure 1. *Cup and ball diagram, illustrating steady state-threshold theory and potential management associated with the community transitions. The first shallow depression represents a native, perennial-dominated sagebrush system, whereas the second steeper depression represents a cheatgrass-dominated system, which exists after the community crosses an ecological threshold (yellow arrow and dashed line).*

crossed the threshold is more difficult, expensive, and has a lower probability of success than if it had not crossed the ecological threshold. Indeed, moving communities back across an ecological threshold is something we cannot do in a meaningful and consistent way. Prevention and maintenance of a site are possible in the native-dominated steady state, but long-term management, restoration, or site abandonment are the only options once a site crosses the threshold. The understanding of threshold dynamics however, is not yet good enough to know when a site in nearing its threshold.

Ongoing research in Wyoming comparing herbicide treatments over a broad region, found that cheatgrass abundance can be reduced by herbicide treatments when the site still has the potential to recover, meaning native perennials are released with cheatgrass mortality (Fig. 2). A certain amount of cheatgrass must be present before its control corresponds to increased perennial grass abundance. There is also a point at which cheatgrass abundance is too high and control does not correspond to increases in perennial grasses.

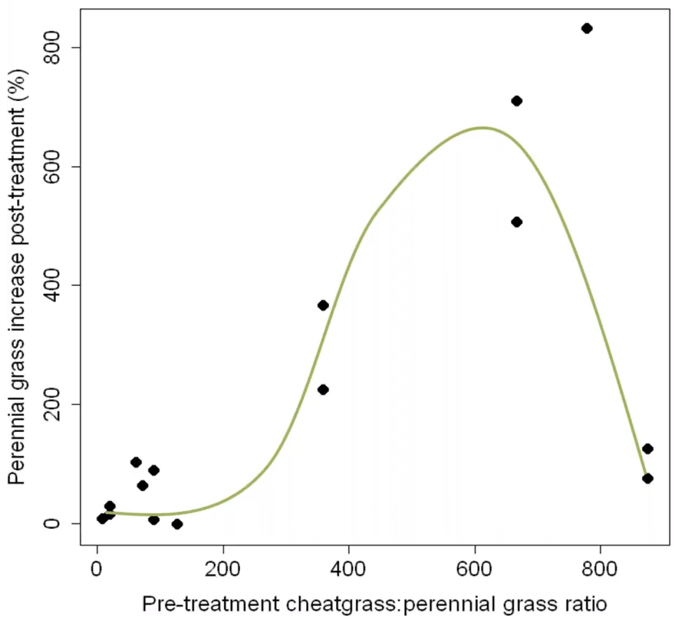

Figure 2. *Preliminary results of an ongoing study indicating that there is a curvilinear relationship between increases in perennial grasses with herbicide treatments in cheatgrass-invaded sites. This relationship can be used to evaluate the cost:benefit of an herbicide treatment given the ratio of cheatgrass:perennial grass at a site. This graph represents many herbicide trials replicated over a broad region in Wyoming.*

This relationship can be used to analyze the costs and benefits of herbicide treatment.

Opportunities to Reduce Cheatgrass Abundance

Cheatgrass die-offs and burned areas both offer opportunities to reduce cheatgrass abundance. Recent studies conducted in the Winnemucca, Nevada area (the epicenter of cheatgrass die-offs) found many die-off hot spots or areas that have experienced multiple die-off episodes over several decades (Boyte et al. 2005; Weisberg et al. 2017). Die offs occurred when a winter drought followed multiple years of low precipitation, which likely provided conditions conducive to outbreaks of cheatgrass pathogens. When restoration seedings in die-off areas were compared to seedings in non-die off areas, perennial grass (Sandberg's bluegrass and bottlebrush squirreltail) establishment in the first year was 280% greater in die offs than non-die offs. Doubling the seeding rates of grasses from 21 to 42 pure live seed/ft^2, increased native grass establishment an average of 175%. Forb establishment, however, was poor in both die off and non-die-off areas.

Burned areas also provide opportunities for cheatgrass management, particularly because of the funding associated with post-fire rehabilitation programs. However, highly altered, burned landscapes often leave little in the way of clues about the pre-fire condition and thus natural regeneration potential. There are tools available to help approximate pre-fire site condition, assess fire severity, and guide post-fire treatment necessity. Resistance and resilience (R & R) mapping can help with the initial sorting and prioritizing of management or treatment actions in large burned landscapes. *The Field Guide for Rapid Assessment of Post-Wildfire Recovery Potential in Sagebrush and Pinyon-Juniper Ecosystems in the Great Basin* (Miller et al. 2015), provides a checklist and questions to answer about the site, vegetation, fire, weather, and management that guide decision making (Fig. 3). The Web Soil Survey (https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx) database produces R & R soils reports, which are useful in assessing your site's pre-fire R & R and in answering key questions about your site as asked for in the field guide. The Multi-Resolution Land Characteristics (www.mrlc.gov/nlcdshrub.php) database also provides a way to assess pre-fire vegetation and fire severity, both key components presented in the field guide.

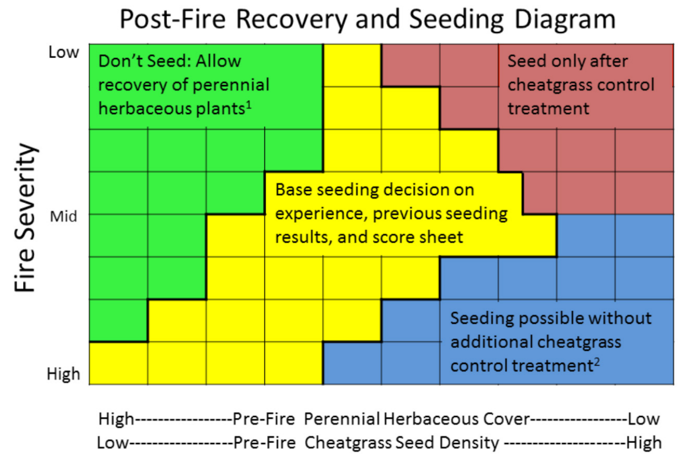

Figure 3. *Matrix to aid post-fire decision making by analysis of the relationships between pre-fire vegetation, wildfire severity, and the predicted post-fire cheatgrass seed bank, see Miller et al. 2015 for more details.*

Conclusions

The better the site assessment, the better the chances for success with treatments or restoration to reduce cheatgrass. Several tools can help you evaluate your site and improve decision making when management opportunities arise, whether they be economic or ecological.

References

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