Can herbicide treatment of cheatgrass enhance rare Susanville beardtongue (Penstemon sudans) occurrences?

Kirsten Bovee, USDA Forest Service, Lassen National Forest, 900 E. Highway 36, Chester, CA 96020
Allison Sanger, USDA Forest Service, Lassen National Forest, 2550 Riverside Dr, Susanville, CA 96130

**BACKGROUND**

In 2013, we identified occurrences of rare Susanville beardtongue (Penstemon sudans, CRPR 18.2) that were heavily invaded by cheatgrass (Bromus tectorum) in Lassen County, California.

Forty 7-m² permanent quadrats were established within invaded and non-invaded portions of three Penstemon sudans occurrences in 2015.

**STUDY QUESTIONS**

1. How does Susanville beardtongue density vary between invaded and non-invaded areas?
2. Is early-season herbicide treatment effective in reducing cheatgrass density?
3. Where cheatgrass density is reduced, is there an increase in Susanville beardtongue density?

**RESULTS**

Herbicide treatment resulted in a significant decrease in B. tectorum cover relative to invaded control plots (Fig. 3), however there was also a strong declining trend in B. tectorum from year to year in all invaded plots.

Pre-treatment monitoring indicated that total plant density (green bars) and flowering plant density (white bars) were significantly lower in invaded versus non-invaded plots in both 2015 and 2016 at α = 0.05 (Fig. 2).

In May 2017, half of invaded plots were sprayed with fluzifop-p-butyl (Fusilade®), a selective, post-emergent herbicide that targets grasses. We attempted to follow the recommendation that herbicide application occur when B. tectorum plants had developed just 3-4 true leaves, but found significant variation in B. tectorum phenology both between and within occurrences.

Changes in P. sudans cover between 2015 and 2018 were negatively correlated with changes in B. tectorum cover, suggesting that P. sudans responds positively to B. tectorum treatment.

Changes in P. sudans cover between 2015 and 2016 were negatively correlated with changes in B. tectorum cover, suggesting that P. sudans responds positively to B. tectorum treatment.

**FUTURE WORK**

High interannual variation across treatments leads us to ask how temperature and precipitation may also affect cover of B. tectorum.

Trends over four years of data collection show that winter precipitation and mean spring temperatures across the study area as modelled by PRISM are strongly associated with several B. tectorum and P. sudans variables (Fig. 5), however additional years of data collection are needed to determine the strength of these relationships.

Establishing which environmental variables best predict B. tectorum cover would help land managers prioritize high B. tectorum years for herbicide treatment.

Herbicide reapplication is planned for Spring 2019.

**THANKS TO**

The Eagle Lake Ranger District, Lassen National Forest for project support; Jim Belsher-Howe, Mount Hough Ranger District, Plumas National Forest for herbicide application; Heidi Jump, and Natalie Pyrooz for assistance with data collection.