Long-Term Vegetation Response to Grazing on a Southwest Montana Foothills Range

Noah G. Davis* | Clayton B. Marlow

Department of Animal and Range Sciences, Montana State University, Bozeman, Montana 59717

Introduction

- Most vegetation grazing studies are short term (2-3 years) and therefore unable to capture complete vegetation response
- We present 59 years of vegetation change at two points in time
- Montana State University purchased Red Bluff Ranch in 1956. When acquired, the ranch was heavily grazed; MSU lowered stocking rate.
- In 1958, George Van Dyne established 74 vegetation monitoring sites
- We relocated and read transects in two pastures currently used for winter grazing

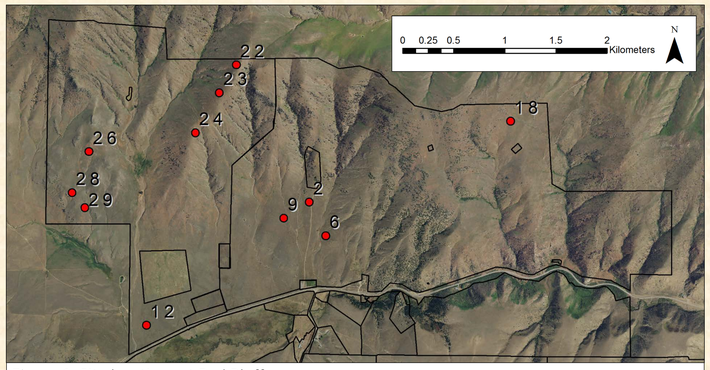

Figure 1: Site locations at Red Bluff

Methods

Location:

- Red Bluff Research Ranch near Norris, MT
- 40 cm (16 in) average precipitation
- 1460 m (4800 ft) elevation

Measurements:

- Replicated original methods
- Relocated all site markers in two pastures
- Five 5-foot transects within a 0.30 ha circle around each site marker
- Measured basal cover with plumb bob and measurement stand

Statistical Analysis:

- Wilcoxon signed rank test

Figure 2: Site 2 looking south

Figure 3: Site 22 looking south

Figure 4: Site 29 looking north

*Presenting author, contact: noah.g.davis@gmail.com

Results

- Of the 28 monitoring sites in both pastures, we were able to relocate 11
- Cover of most perennial, cool season grasses was greater in 2017 than 1958
- Cover of blue grama, a warm season grass, was less in 2017 than 1958
- Cover of cheatgrass, an introduced annual, was greater in 2017 than 1958
  - Present at 7 of 11 sites in 1958
  - Present at 9 of 11 sites in 2017

	Bluebunch wheatgrass	Idaho fescue	Needle and thread	Sandberg bluegrass	Blue grama	Total Perennial Grass	Cheatgrass	Total Forb	Litter	Bare Ground
1958	0.6	0.1	0.4	0.1	2.6	4.3	0.4	1.0	49.2	35.2
2017	4.1	3.2	3.0	1.2	0.3	13.0	16.1	0.4	58.4	3.0
p-value	0.009	0.022	0.099	0.009	0.004	0.004	0.008	0.236	0.029	0.004

Table 1: Average cover and *p*-values

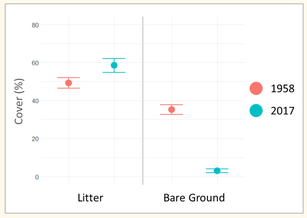

Figure 5: Litter cover and bare ground with standard error bars

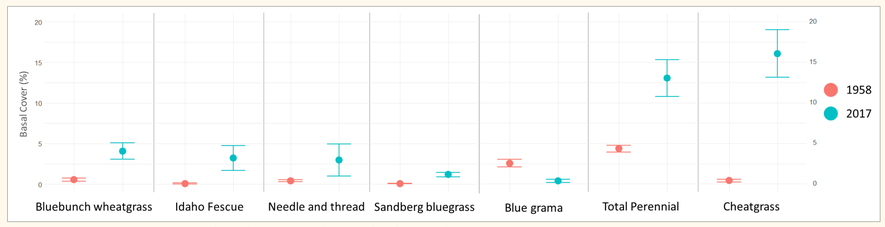

Figure 6: Dominant species basal cover with standard error bars

Conclusions

- It is difficult to make any definitive conclusions, however, ignoring the large difference in cheatgrass cover, the vegetation appears to have responded, as would be expected, to a release from heavy grazing pressure.
- As with all annuals, cheatgrass cover can fluctuate greatly between years, so, with only two years of data, results may be skewed. Cheatgrass had low cover in 1958, but was already widespread. It may have been able to take advantage of the high bare ground or a change in environmental conditions to apparently increase in abundance. Cheatgrass may also take advantage of the early spring availability of organic nitrogen associated with winter grazing.

Acknowledgements: We would like to thank the Montana Academy of Sciences for funding this project as well as Sam Wyffels, Matt Huston and Derek Schleicher for their help completing it.