PLANT COMMUNITY RESPONSE FOLLOWING WILDFIRE AND HEAVY WINTER GRAZING DISTURBANCE REGIMES

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Introduction

- Northern Great Plains evolved under grazing and fire.
  - Creates mosaic of plant communities and structure
- Patch burn grazing (PBG) is effective in increasing heterogeneity on the landscape.
- Many landowners are averse to fire due to concerns of property and forage loss.
- Intensive winter Patch Grazing (WPG) is being studied as an alternative non-pyric management strategy for creating heterogeneity.

Objective

Compare effects of a wildfire burned patch (PBG), a WPG patch, and an untreated patch (CG) on plant community recovery, composition, and production following disturbance.

Site Description

- Cottonwood Research Station, South Dakota
- Northern mixed-grass prairie
- Wildfire burned a portion of each pasture Fall 2016
- Other portions of pastures heavily grazed (WPG) in fall-winter 2016 - 2017.
  - Patch intensively grazed by cows to reduce standing dead forage and vegetation structure.

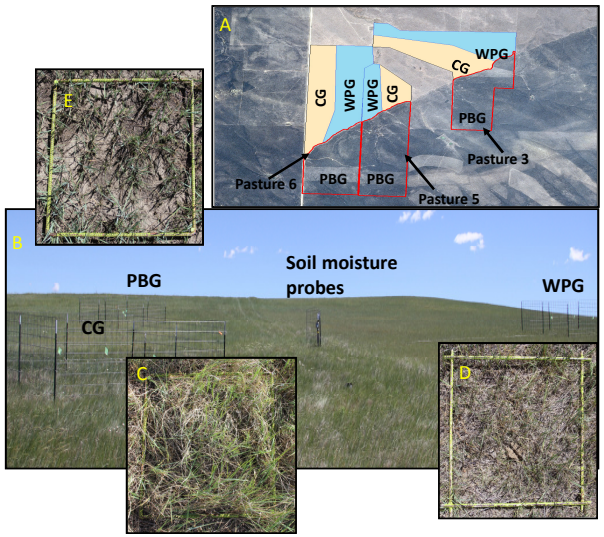

Fig. 1. Study Design (A), Exclosures (B), Vegetation cover CG (C), WPG (D), and PBG (E)

Methods

- Three treatments (PBG, WPG, and CG) were located in each of three pastures.
- Within each pasture and treatment, five 4m x 4m exclosures on the clays ecological site were constructed to exclude cattle in 2017 grazing season.
- Three 0.25m^2 plots were located within each exclosure
- 135 total plots (45 per treatment)
  - Cover by species, bare ground, and litter estimated in mid June and late July
  - Biomass estimated in late July
  - Western wheat grass and shortgrass tiller density recorded
  - Soil moisture probes at 15cm (6”), 30cm (12”), and 61cm (24”) located within each treatment in each pasture (9 total sites)

Results

Standing Crop Biomass Estimates

Treatment	Mean	SE
CG	50.84^A	3.67
WPG	34.07^B	1.21
PBG	22.99^C	0.87

Table 1: August biomass estimates (g/0.25 m^2) for the three treatments.

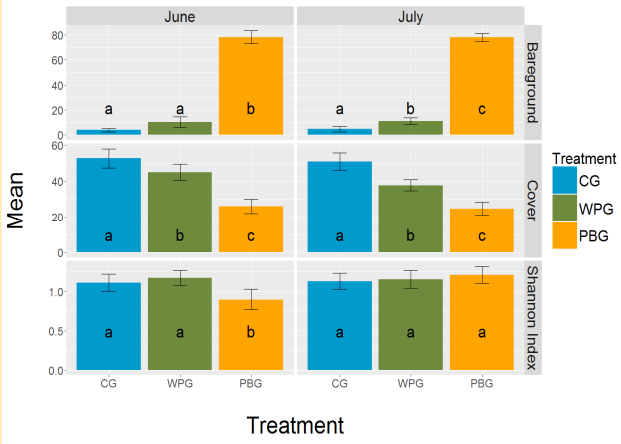

Fig. 2. Bareground, cover, and Shannon diversity index measurements for treatments. Data recorded mid-June and late-July. Sig. P <0.05

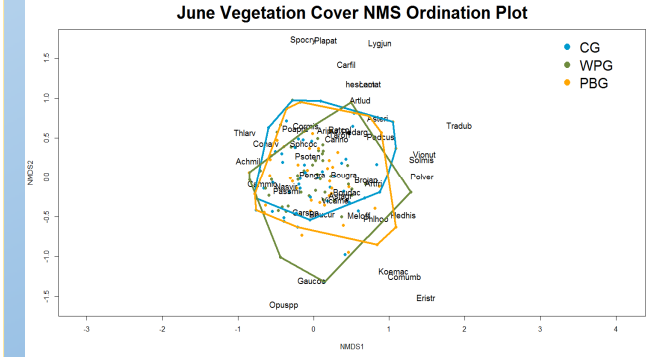

Fig. 3. Ordination plot of June plant community data. Colored dots are plots and abbreviations are species.

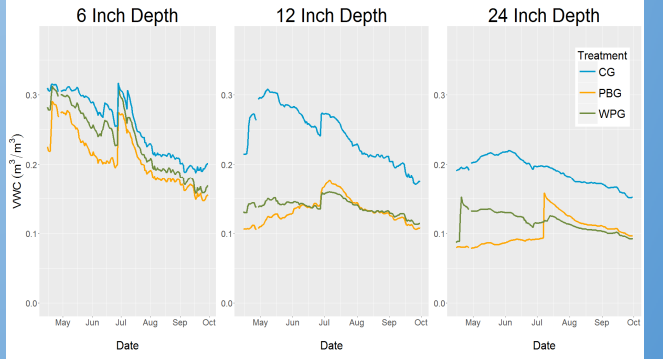

Fig. 4. Volumetric water content for three treatments during the 2017 growing season. Data averaged across pastures.

Conclusions

- PBG characterized by significantly less biomass production, high bareground, and lower vegetation cover.
- WPG tended had significantly more biomass than PBG but less than CG.
- Little difference in plant diversity or community between treatments.
  - Typically would expect a flush of species following fire.
- Soil moisture likely influenced biomass production and limited seed germination.
- WPG may serve as a more palatable tool than fire for land managers.
  - Less water loss and higher production than PBG

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