

**IMPACTS FROM WINTER-EARLY SPRING ELK GRAZING IN FOOTHILLS
ROUGH FESCUE GRASSLAND**

T.M. Thrift¹, T.K. Mosley², and J.C. Mosley³

¹Bureau of Land Management, Bruneau Field Office, Boise, ID 83705, ²Park County Extension, Montana State University Extension, Livingston, MT 59047, and ³Department of Animal and Range Sciences, Montana State University, Bozeman, MT 59717

Impact Statement

Periodic rest from wildlife or livestock grazing during winter-early spring (mid-November through April) is necessary to sustain native perennial bunchgrasses in foothills rough fescue grasslands. The frequency of rest needed is unknown but is no more often than once every 4 years.

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SUMMARY

Foothills rough fescue (*Festuca campestris*) grasslands provide important foraging habitat for wildlife and livestock in the northwestern United States and southwestern Canada. Foothills rough fescue is a perennial bunchgrass that is sensitive to grazing during late spring-early summer but is believed to be more tolerant of grazing during winter-early spring. We evaluated vegetation and soil impacts from long-term winter-early spring grazing at 2 intensities (HG = heavy grazing, LG = light grazing). We studied a foothills rough fescue grassland in west central Montana that had been grazed almost exclusively by Rocky Mountain elk during winter-early spring for 58 years. Foothills rough fescue tolerated LG but not HG, whereas bluebunch wheatgrass (*Pseudoroegneria spicata*) and Idaho fescue (*Festuca idahoensis*) did not tolerate either LG or HG. Decreased productivity of foothills rough fescue in HG was accompanied by decreased herbaceous

ground cover and increased abundance of the invasive dense clubmoss (*Selaginella densa*). Soil bulk density was 18% greater in HG vs. LG, and the topsoil was 20% thinner in HG. Overall, our results indicated that long-term elk grazing during winter-early spring degraded this grassland, and we concluded that periodic rest from wildlife or livestock grazing during winter-early spring is necessary to sustain foothills rough fescue grasslands.

INTRODUCTION

Foothills rough fescue (*Festuca campestris*) grasslands provide important wildlife and livestock foraging habitat in foothills and mountains of the northwestern US and southwestern Canada. In Montana, potential natural plant communities of these grasslands are dominated by foothills rough fescue, a native, perennial bunchgrass. Bluebunch wheatgrass (*Pseudoroegneria spicata*) and Idaho fescue (*Festuca idahoensis*) are native, perennial bunchgrasses that often co-occur with foothills rough fescue.

The common name for foothills rough fescue was previously “buffalo bunchgrass” because it was the primary winter forage for bison on foothill grasslands in the Northern Rocky Mountains (Fryxell 1928; USDA-Forest Service 1937; Johnston and MacDonald 1967; Dormaar and Willms 1990). Foothills rough fescue is believed to have evolved with heavy grazing by bison during winter, which belief fostered

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misconceptions that foothills rough fescue was tolerant of heavy grazing during other seasons (Johnston and MacDonald 1967). Several studies have documented that foothills rough fescue does not tolerate heavy grazing during late spring or early summer (Johnston et al. 1971; McLean and Wikeem 1985b; Willms et al. 1985, 1988). Co-occurring bluebunch wheatgrass and Idaho fescue also do not tolerate heavy grazing during late spring or early summer (McLean and Wikeem 1985a; Willms et al. 1988; Brewer et al. 2007).

In contrast, light or moderate grazing intensities in late spring or early summer are sustainable for foothills rough fescue and co-occurring bluebunch wheatgrass and Idaho fescue, provided that defoliation does not occur more frequently than 2 successive years (McLean and Wikeem 1985a, 1985b; Willms et al. 1985, 1988; Brewer et al. 2007)

Grazing by wildlife or livestock during winter plant dormancy or early spring is generally believed to impact foothills rough fescue grasslands much less than grazing later in the growing season (McLean and Tisdale 1972; Brewer et al. 2007). However, sustainable thresholds of winter-early spring grazing intensity and frequency have not been established for foothills rough fescue grasslands.

PROCEDURES

We evaluated vegetation, ground cover, and soil effects of long-term winter-early spring grazing at 2 intensities (HG = heavy grazing, LG = light grazing). Our study area was a foothills rough fescue grassland near Augusta, Montana that had been grazed almost exclusively by Rocky Mountain elk during winter-early spring for 58 years. Four LG study sites and 4 HG study sites were randomly selected using GIS. Long-term data records documented that elk grazing use of foothills rough fescue averaged 30% in LG sites and 68% in HG sites. Our 8 study sites

had the same slope, aspect, elevation, soils, and potential natural plant community. The 8 sites differed only in their long-term elk grazing intensity during winter-early spring (LG vs. HG).

Study sites were sampled for 2 consecutive years during July. We measured plant vigor of foothills rough fescue, Idaho fescue, and bluebunch wheatgrass; plant canopy cover; herbaceous plant yield; ground cover; soil bulk density; and the thickness of the topsoil (i.e., Ah soil horizon).

RESULTS AND DISCUSSION

Grazing responses of the dominant perennial grasses in this foothills rough fescue grassland varied among species. Every measure of foothills rough fescue plant vigor and productivity was lower in HG than in LG. Also, the relative amount of foothills rough fescue in the plant community was less in HG than in LG (3% in HG vs. 38% in LG), and the relative amount in LG compared favorably with relict sites (38% in LG vs. 38% in relict sites; Mueggler and Stewart 1980). Bluebunch wheatgrass and Idaho fescue were slightly less productive in HG than in LG, but the amounts present in our study sites were much lower than in relict sites. Bluebunch wheatgrass comprised 13% of LG and HG plant communities compared with 26% in relict sites (Mueggler and Stewart 1980), whereas Idaho fescue comprised 7% in LG and HG sites compared with 15% in relict sites (Mueggler and Stewart 1980). Overall, foothills rough fescue tolerated long-term LG during winter-early spring but not HG, while bluebunch wheatgrass and Idaho fescue did not tolerate either long-term LG or HG during winter-early spring.

Herbaceous plant ground cover was much less in HG than in LG (30% vs. 51%, respectively), and clubmoss ground cover was dramatically greater in HG than in LG (31% vs. < 1%, respectively). Relative

abundance of clubmoss generally increases on Montana rangeland when grazing pressure is excessive (Dolan and Taylor 1972). Herbaceous plant ground cover lost under HG during winter-early spring was apparently replaced largely by clubmoss. Soil bulk density was 18% greater in HG than in LG, and the topsoil was 20% thinner in HG than in LG.

Our results indicate that long-term elk grazing during winter-early spring degraded the vegetation, ground cover, and soils of this foothills rough fescue grassland. Our results add to the small but growing body of literature that documents wild ungulate overgrazing effects on soils and herbaceous vegetation in western North America (Zeigenfuss et al. 2002; Best and Bork 2003; Binkley et al. 2003; Rexroad et al. 2007; Gass and Binkley 2011). Our results also indicate that periodic rest from HG during winter-early spring is necessary to sustain foothills rough fescue, and periodic rest from either LG or HG during winter-early spring is necessary to sustain bluebunch wheatgrass and Idaho fescue. The frequency of rest is unknown but is no more often than once every 4 years for bluebunch wheatgrass (Brewer et al. 2007). Complete details about our study are published in Thrift et al. (2013).

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