

THE IMPACT OF SMALL MAMMAL BROWSING ON VEGETATION SUCCESS ON A RECLAIMED MINE IN NEW MEXICO¹

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Abstract: Although traditional livestock or wildlife grazing species may be excluded from impacting a reclaimed area through fencing, small animals (such as rabbits) are able to persist on the site. Beyond anecdotal evidence, there is little known about the extent to which small animals have an impact on plant production on reclaimed areas. The impact of their browsing may be extremely important, specifically where reclaimed areas do not have significantly greater cover or production than the standard. Thirty-eight randomly located, 1 m² exclosures were constructed to prevent browsing by rabbits, and the vegetation production from these exclosures was compared with that from 38 randomly located sample plots of the same size. The yearly new growth was clipped and weighed to determine production. Vegetative production inside the exclosures was significantly greater than it was outside of the exclosures. Statistical, as well as visual evidence are used to demonstrate the destructive capacity of small animals.

Additional Key Words: Small Mammals, Vegetation Impact, Reclamation

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Introduction

Traditional grazing species are known to impact vegetation production on reclaimed areas (Hofmann and Ries 1988). Livestock and large wildlife species are easily excluded from these areas through fencing. This, however, still allows small animals access to the site. Studies have shown that rabbits can have a dramatic effect on a site's vegetation (Edwards and Crawley 1999), but similar work has not been performed on reclaimed mine lands. We developed a study in coordination with BHP-Billiton San Juan Coal Company at Black Diamond Mine in La Plata, New Mexico to determine the impact of small mammal (primarily rabbit) browsing on plant production.

Methods

Small mammal exclosures were constructed at 38 randomly selected locations at Black Diamond mine on May 3-10, 2006. Each exclosure was constructed out of rebar and metal mesh fabric. They were pyramidal in shape and each had a footprint of just over 1 m². The exclosures were left for the growing season to allow plant growth. The exclosures were removed and a 1 m² area under the exclosure was clipped on November 13-15, 2006. All new grass and forb growth in the exclosure was clipped and bagged. For a comparison group, a 1 m² plot was clipped 3 m west of the center of the exclosure plot. All the samples were dried and weighed. A survey of rabbit pellets was also conducted to estimate the rabbit population at Black Diamond Mine. A 2,500 cm² (0.25 m²) plot frame divided into 25 equal sections was placed 3 m south of the plot center, Figure 1. The number of pellets was read in the highlighted areas, averaged and reported in pellets per hectare. These data were collected to the south of the exclosure to ensure that the pellets were not disturbed by the vegetation data collection.

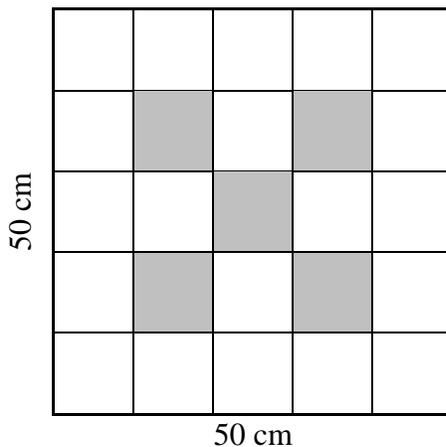


Figure 1: Rabbit Pellet Count Plot Frame

Results

The data collected from the exclosure were compared with the data from the transect plot 3 m to the west. The mean production in the exclosure plots was 986.2 g/m² (SD 128.8), and that of the non-exclosures was 620.6 g/m² (SD 175.4). The exclosure plots had nearly 60% more

biomass than the non-excused plots. T tests support our hypothesis that the excused locations had significantly higher production than the non-excused, paired plot on the transect. These findings are supported using both paired and unpaired t tests, Tables 1 and 2. Although no statistical tests using rabbit pellets as a covariate were conducted, rabbits are believed to be the main browsing species. The mean number of rabbit pellets collected adjacent to the production plots was 1.16 million per hectare.

Table 1: Two Sample Paired T Test

	Mean	SD	N	t	Two-tailed test (P<x)	One-tailed test (P<x)
Transect	986.2	128.8	38	1.68*	0.098	0.049
Exclosure	620.6	175.4				

Table 2: Two Sample Unpaired T Test

	Mean	SD	N	t	Two-tailed test (P<x)	One-tailed test (P<x)
Transect	986.2	128.8	38	2.10*	0.042	0.021
Exclosure	620.6	175.4				

Conclusion

The difference in biomass between the excused and non-excused plots demonstrates that small animal (rabbit) predation is a cause of lower plant production on reclaimed mine land. It would be unreasonable to attempt to remove and/or eradicate the animals from a reclaimed site; however, this should be considered when determining the vegetative success of a reclaimed area.

Literature Cited

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