



**A COMPARISON
OF THE EFFECTS OF
GRAZING AND MINING
ON VEGETATION OF SELECTED PARTS
OF NORTHERN SOUTH AUSTRALIA**

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ABSTRACT

This study examines the effects on vegetation at selected sites in northern South Australia of excluding various herbivores over a four and a half year period and of two intense but controlled grazing pulses over a six month period followed by an 18 month recovery period in a dune-swale land system. These changes are compared with changes recorded over an 11-year period at the Olympic Dam mine site.

Seven sets of exclosures were constructed on pastoral country, with all but one in cattle country north of the Dog Fence. Each set of exclosures consisted of a rabbit and stock-proof area, a stock-proof area that gave access to rabbits, and a control area that allowed unrestricted grazing. The grazing experiment site and Olympic Dam are south of the Dog Fence.

Data on vegetation composition at exclosure sites were collected biannually. Monitoring at Olympic Dam was also carried out at six-monthly intervals. Monitoring at the grazing experiment site was carried out before and after each grazing pulse and following heavy rainfall two years after the initial grazing. A range of edaphic and topographic information was collected for all sites.

All data were analysed using the classification and ordination modules of the CSIRO PATN computer package. Classification of exclosure data showed few differences between grazed and ungrazed sites. Major rapid shifts between classification groups correlated with heavy rainfall events, while slower shifts correlated with the drying-off of vegetation. Four exclosure sites had four years with less than 100 mm of annual rainfall, although above average rainfall preceded the first monitoring. Heavy rainfall prior to the final monitoring correlated with the majority of shifts between classification groups. There were no shifts between groups at other exclosure sites, where annual rainfall was more consistent.

Data from the grazing experiment showed a distinct and rapid shift between classification groups at grazed sites after both grazing pulses. A partial recovery occurred at swale sites following light rainfall after both pulses, with recovery to a better condition than at the start of the experiment following heavy rainfall preceding the final monitoring. There was less recovery on dunes than on swales between grazing pulses, or following the major rainfall event. A generally unpalatable grass species that was largely removed by grazing did not fully recover during the monitoring period. A relatively high cover of cryptogams remained after the two grazing events.

The Olympic Dam data showed no correlations between classification groups and different land uses. Rapid shifts between groups correlated with major rainfall events, while slower shifts followed attrition of annual species as conditions became drier. One group based on an introduced species was not recorded following heavy rainfall that allowed establishment of native species. Another poor-condition group appeared at a time when most vegetation was moving towards a better condition following heavy rainfall. This may have been because of emissions from the tailings ponds or processing plant and was restricted to within 500 m of the emission source. Although massive germination was recorded at many sites, recruitment of perennials, even at fenced sites, was sufficient only to maintain populations at their baseline level.

Species richness on the mine lease was only about half of that for the exclosure sites, possibly as a result of high kangaroo numbers on the mine lease, or of higher kangaroo numbers south of the Dog Fence than to the north.

The main finding of these studies is that short-term changes in vegetation revealed by ordination of periodical cover, density and species richness, are attributable to the periodicity of rainfall and that, under present grazing regimes, rainfall effects override grazing effects.

Differences between the effects of sheep and cattle hoof damage are worthy of further investigation, as is the impact of kangaroo grazing. These two factors may have important implications for the management of Australian rangelands.