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PRELIMINARY RESULTS FROM AN EXPERIMENT TO EVALUATE GRAZING  
IMPACTS OF RABBITS AND LARGER ANIMALS IN AN  
ARID-ZONE NATIONAL PARK

\*R.P. Henzell and \*B.G. Lay

SUMMARY

An experiment to assess the relative importance of rabbits and larger native or feral animals (mainly goats) on the vegetation of the Gammon Ranges National Park is described.

The experiment consists of six sets of exclosures with unfenced controls in three vegetation types typical of foothills of the Northern Flinders Ranges in a 200 mm rainfall area. The results, after 4 years of observation, show that despite the visual evidence of goat grazing activity in the area it is the rabbit which is preventing regeneration of most perennial plant species present there.

INTRODUCTION - BACKGROUND

In 1976, about the time that the Gammon Ranges National Park was dedicated, concern was expressed about the apparent damage being inflicted on the vegetation there by large numbers of feral goats. The local National Parks and Wildlife Service ranger at that time, Brenton Arnold, proposed a study of the effects goats were having on the vegetation of areas where they were in high numbers, by fencing off one or two small plots. Siting these within a national park would eliminate the complicating effect of sheep or cattle.

This proposal was eventually formalized as a joint project between the National Parks and Wildlife service and our Department, with the present authors being responsible for design and implementation of the project.

The immediate problem we encountered was the extreme heterogeneity of the vegetation in the country we selected, which was the foothills and watercourses most preferred by the goats and showing most visible

\* Department of Agriculture, Adelaide.

damage. Following biometrical advice, two sets of exclosures were erected in August 1977 in each of three readily recognisable vegetation types. These are:

- (a) Callitris columellaris - Heterodendrum oleaefolium associated with watercourse and run-on country.
- (b) Acacia aneura with Dodonaea and Eremophila spp. of skeletal hill slopes over shales.
- (c) Casuarina cristata with Cassia nemophila var coriacea of skeletal hill slopes over quartzites.

Each set consists of one plot fenced to exclude all animals rabbit-sized and above, another plot fenced to allow entry of rabbits but to exclude all animals goat sized and above, while a third plot is an unfenced (pegged) control. All plots are 25 m x 25 m in size and gridded for mapping purposes into 5 m x 5 m quadrats. All perennial plants have been mapped and scored for height class each year, and particular regard has been paid to seedling input and survival. A Pluviometer has been established since 1978 by courtesy of the Meteorological Bureau. The exclosures form part of our programme of reference areas within the arid-zone.

#### DATA COLLECTION

In March each year the exclosures are re-mapped, with particular attention being given to the fate of perennial plant seedlings recorded the previous year. A number of mature plants are photographed each year using a background gridded screen (as in Wilson et al 1976), to determine grazing effects or regrowth behaviour of these plants. At least one permanent photopoint has been established at each set of exclosures, as well as at vantage points nearby and further up the watercourse.

In addition to the above work, new dung accumulations along several 25 m x 0.4 m transects are identified and weighed, and the type and extent of rabbit damage to a number of mapped mulga seedlings which

had established themselves before the exclosures were erected are recorded annually.

## RESULTS

The results, summarized below, cannot be considered conclusive as they cover only 4 years of record.

1. Rabbits. The most important finding from this experiment is the degree to which rabbits are suppressing regeneration of important perennial plants in this area. This is particularly significant in that at the time the exclosures were set up, casual observations indicated that rabbits were not particularly numerous, compared with some localities nearby. The mapped seedling inputs of Acacia aneura (Mulga) on one set of exclosures serves to illustrate this point (Fig. 1).

Germination recorded in Fig. 1 probably occurred after 122 mm of rain in February 1979 and was mapped in March, 1979, 1980 and 1981.

The observations of damage to young "established" plants of Mulga predictably shows a marked cyclical pattern, with damage by ring-barking and stem severing corresponding to the onset of dry conditions after a period favourable to rabbit population increase.

2. Goats etc. There is no apparent effect of the combined grazing by goats, donkeys and euros on seedling survival. However, as very few seedlings have survived in exclosures subject to rabbit grazing, it is not possible to define their effect with any degree of certainty. What we need here is the mythical fence which allows free and unrestricted entry by goats etc. but precludes rabbits.
3. Germination of Callitris has not been observed in any plots, despite the abundance of mature plants. Presumably the climatic events enabling this have not occurred during the study.

4. Santalum spicatum (Sandalwood), a rare and protected species in South Australia, was seen to be regenerating near the plots and a special rabbit-proof enclosure was erected around a mature individual and two young plants. An unprotected young plant adjacent to this plot has now been grazed off and possibly has died, while 2 out of 5 mature plants in the same area have also died after being repeatedly defoliated by goats.

5. Eremophila alternifolia

Germinations occurred subsequent to enclosure and the seedlings we observed are shown in Figure 1(b). These seedlings occur in the vicinity of two mature bushes. The only other mature plants occur outside the enclosures and controls. Germination probably occurred there also, but no seedlings were observed despite searches for them. The low number of seedlings mapped within the rabbit proof enclosure in March 1979 probably reflects our inability to identify them in the very young stages.

6. Annual herbage. In addition to the regeneration now present in the rabbit-proof plots, there is now a large accumulation of dead ephemeral plants which is not present in either goat-proof or control areas. This further attests to the impact of rabbits here; such growth would have a marked effect in improving rainfall effectiveness by slowing run-off after heavy rain.

## DISCUSSION

The trends evident from this experiment, though tentative, are very disturbing from a resource manager's point of view. At this site we have an area exposed to grazing by apparently high numbers of goats, and yet it is the rabbit which is having what seems to be the most serious long-term impact. These results re-inforce trends already evident from similar enclosures we have established for a longer period in other parts of the arid-zone where rabbits occur.

The chief reason for creating a national park in the arid-zone or elsewhere is to enable the preservation of the flora and fauna in a

natural state free from the degrading effects of introduced animals and plants.

If it were only goats, donkeys or sheep which were doing the damage, then with the aid of suitable mustering and trapping techniques, it is quite practical to control or eliminate them from large areas at a relatively low cost. But the very animal which is preventing the natural plant community from maintaining itself is also the one which is difficult to control on a large scale even in accessible country. The use of the rabbit flea to enhance the value of myxomatosis offers some hope but the effect it will have in the arid zone is yet to be determined. With increasing labour and fuel costs, and the low effectiveness of myxomatosis in arid areas the prognosis is not good.

#### REFERENCE

Wilson, A.D., Mulham, W.E., and Leigh, J.H. (1976). A note on the effects of browsing by feral goats on Belah (Casuarina cristata) - Rosewood (Heterodendrum oleifolium) woodland. Aust. Rangeland Journal 1, 7 - 12.

FIGURE 1

Survival of seedlings of Acacia aneura and Eremophila alternifolia germinating subsequent to the establishment of the exclosures. Results for one of the six sets of exclosures in the Gammon Ranges National Park are illustrated.

Seedlings are shown which have appeared since exclosure on each 5 x 5 m quadrat mapped firstly in March 1979 (after a period of good rainfall) and again in March 1981 (after a dry period).

LEGEND



1 - 10 seedlings recorded.



More than 10 seedlings recorded.

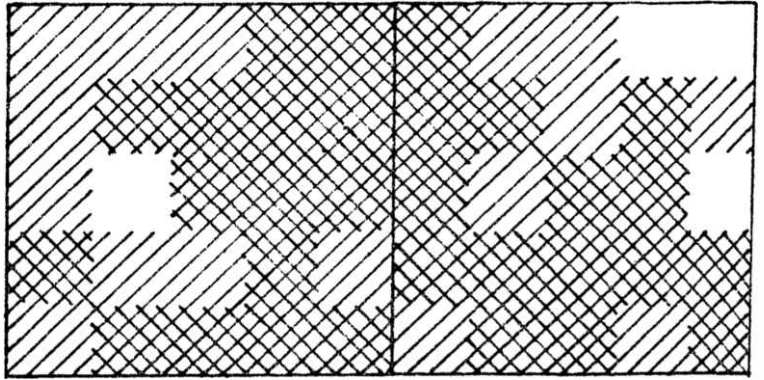
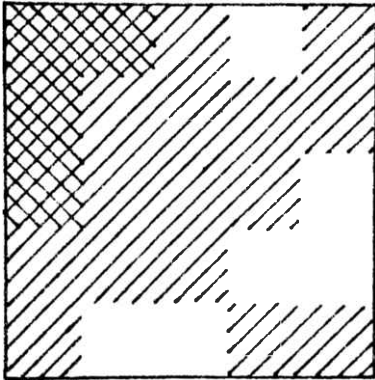
(a) Acacia aneura

March 1979

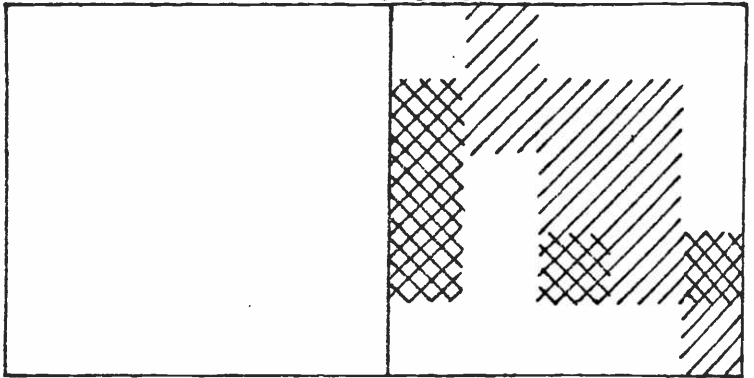
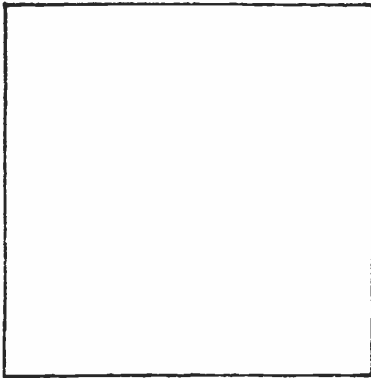
Control

Goat proof

Rabbit proof

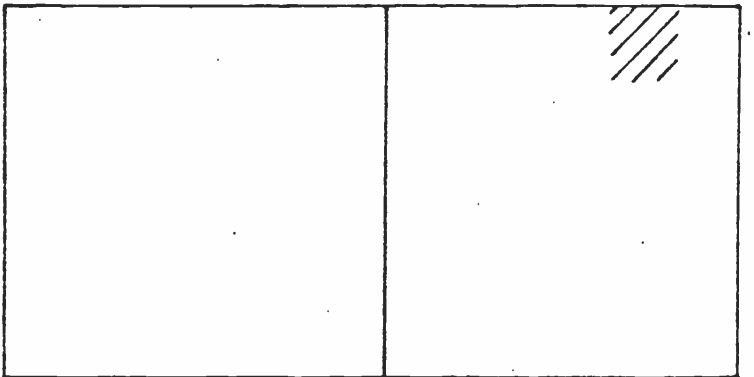
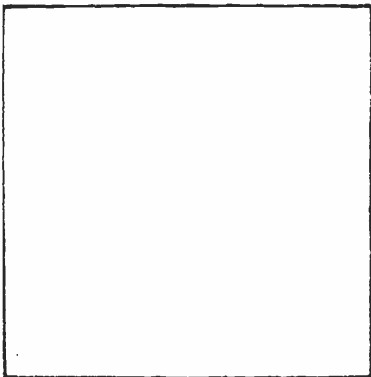


March 1981



(b) Eremophila alternifolia

March 1979



March 1981

