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KANGAROO GRAZING PREFERENCES AFTER FIRE AT WHITEMAN PARK

Christine M. Rafferty and Byron B. Lamont

Grazing can have a significant effect on plant survival following disturbances such as clearing or fire, with bushland revegetation often difficult in the presence of herbivores such as kangaroos. Whiteman Park Reserve, approximately 14 km NE of Perth, contains over 1000 ha of original banksia woodland and is home to over 600 western grey kangaroos, as well as brush wallabies and rabbits. Our research investigated the role of herbivore feeding upon plant species in the reserve following a large fire in February 2001.

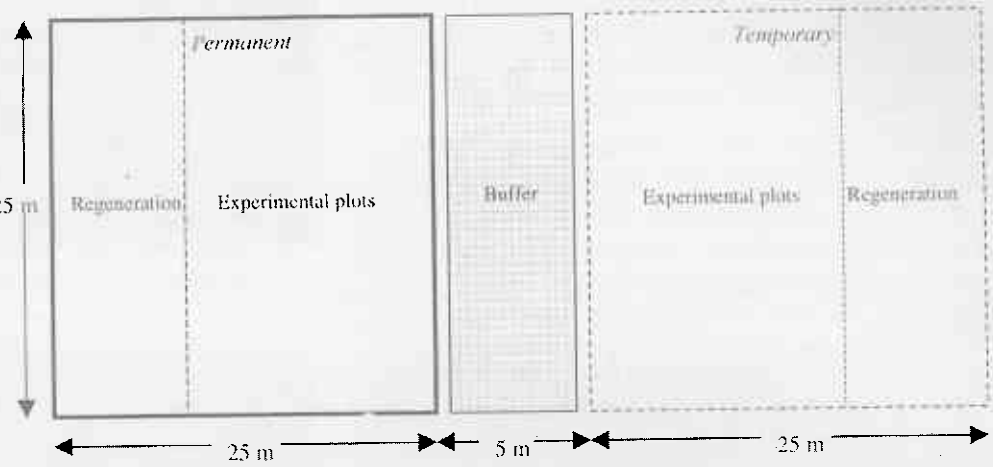

Fig 1: Exclosure design.

Three paired exclosures were constructed in the Reserve immediately following the fire (Fig. 1). Nineteen plant species, all with differing chemical and physical properties were established within the exclosures and allowed to grow for five months. One of each exclosure pair was then removed to allow kangaroo access. The remaining exclosure protected the 'control' plants for the duration of the study. Plants were arranged in groups of nine in high density plots (30 cm spacing between plants) or low density plots (1 m spacing between plants). Overall, 14 of the 19 plant species suffered damage from kangaroo feeding (Fig 2), with the percentage eaten varying greatly for each (Table 1).

Group plantings were favoured by kangaroos and wallabies, with these herbivores enjoying the opportunity to feed in one area rather than browse where possible.

Fig 2: Difference between grazed (right) and ungrazed (left).

Thus, while group plantings may be beneficial in the establishment of plants in harsh environments, they may in fact attract herbivore attention.

All herbivores at the reserve, both rabbits, wallabies and kangaroos, appeared to prefer grasses or grass-like species. *Calothamnus* and marri, which contain relatively high levels of essential oils, phenolics and tannins (compounds which may adversely affect herbivore digestive processes) appeared to be unpalatable.

Of all the plant characteristics analysed, fibre was the most strongly avoided. This aversion has also been noted for brushtail possums and Tasmanian pademelons. Plant spines did little to protect seedlings from being eaten. Spines were either too soft in the young plants, or kangaroos were able to manoeuvre their mouths as to avoid being injured while feeding. Of all the spinescent species planted, *Hakea prostrata* suffered the least herbivore damage, and may be a suitable species for planting in areas difficult to revegetate due to kangaroo feeding activity.

Rabbits shared many food items in common with macropods, but also were observed to eat plants containing essential oils. As expected, the presence of rabbits may therefore compound difficulties of plant regeneration.

The interest and curiosity of

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Table 1: Percentage of plant species eaten at Whiteman Park when exposed to kangaroos. Note the preference for plant species with grass-like features.

Species	Percentage of plants eaten
Grass-like	
Acacia alata	81
Allocasuarina fraseriana	71
Anigozanthos manglesii	100
Calothamnus quadrifidus	61
Calothamnus sanguineus	63
Cyathochaeta avenacea	100
Notodanthonia caespitosa	100
Sphaerolobium vimineum	100
Xanthorrhoea gracilis	98
Xanthorrhoea preissii	98
Shrub	
Acacia pulchella	42
Banksia attenuata	45
Banksia menziesii	47
Bossiaea eriocarpa	90
Corymbia calophylla	22
Hakea prostrata	13
Hardenbergia comptoniana	97
Mirbelia dilatata	86
Oxylobium lanceolatum	100

herbivores within planted areas, in particular the western grey kangaroo, suggested that cleared planting areas may act as a 'beacon' for feeding activity. Feeding was often accompanied by the pulling of whole plants from the soil, and even feeding upon the remains of jiffy pots.

The use of grow bags, protective plastic sleeves enclosing target plantings, provided some protection to seedlings, although this was again very limited. Exposed portions of plants were regularly grazed. Nurse plantings (planting of select species with spinescent or highly unpalatable partners) appeared ineffective also, as the selective feeding behaviour of the western grey kangaroo allowed target species to be quickly consumed despite the presence of prickly or unpalatable neighbours.

Investigation of the many factors contributing to macropod dietary selection suggests that feeding behaviour is strongly influenced by environmental conditions and the availability of alternate food choices. Plant species high in unpalatable chemical components, such as the phenolics, tannins and essential oils (features characteristic of members of the Myrtaceae), are typically avoided, thus plantings of species from this group may have a greater potential for establishment than other selections.

Plants with a low fibre content, particularly soft grass-like species were highly favoured, and protection of these is vital if plants are to reach maturity in areas with high macropod numbers. While impossible in many situations, it does appear that appropriate fencing is the most effective method in providing protection to palatable plant species, at least until plant physical and chemical defence mechanisms are sufficiently developed.

Christine Rafferty undertook this study as part of a PhD under the supervision of Professor Byron Lamont at Curtin University. She is currently employed as a disturbance ecologist with the Botanic Gardens and Parks Authority, and may be contacted for references by email: crafferty@bgpa.wa.gov.au.

WA proves to be even older!

Since the 1980s, Sandgropers have been able to take pride in asserting that WA contains the oldest rocks on Earth. In the Murchison region near Mt Narryer, a zircon crystal 4,200 billion years old (4,200,000,000 years) has been found, contained in a conglomerate rock that is 3,900 billion years old. Well, new research has now shown we are even older!

The Narryer Gneiss, this very ancient rock formation, extends eastward along the line of the Jack Hills. Renewed interest in coal and iron exports have led to considerable geological exploration in the area and Simon Wilde of Curtin University, together with his co-workers, has been looking at the zircons. They have found a crystal that is 4,300 billion years old, with a small portion that is 4,404 billion. This is absolutely astonishing, considering that the Earth itself was only formed 4,600 billion years ago! Even more amazing is the researchers' conclusion that liquid water was present on the Earth's surface at this time, implying that the surface temperatures on the Earth were much cooler than previously thought possible. This has enormous implications for the date at which life could first appear.

Ref: Evidence from detrital zircons for the existence of continental crust and oceans on the Earth 4.4 Gyr ago. 2001. Wilde, SA; Valley, JW; Peck, WH and Graham, CM. Nature, **409**. pp 175-178.