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INITIAL IMPACTS OF HEAVY GRAZING PRESSURE UPON REPTILES AND INVERTEBRATES IN A CHENOPOD SHRUBLAND

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INTRODUCTION

Due to their abundance, diversity and resilience to climatic variability, reptiles are potentially valuable bioindicators of the impacts of cattle grazing in chenopod shrublands. Several long-term monitoring studies in the Olympic Dam region of northern South Australia were not, however, able to reveal consistent trends in the response of reptile assemblages to low to moderate grazing pressure. Although carefully selected cross-fence monitoring sites were used in these studies, grazing impacts were masked by the considerable effect of slight edaphic and floristic variability in the structuring of reptile communities (Read 1995). Therefore, a controlled BACI (Before, After, Control, Impact) experimental study was established to measure the response of a known reptile and invertebrate community to intensive grazing pressure. A study site was selected where long-term pitfall trapping had indicated a diverse and relatively consistent reptile assemblage on both sides of a fence separating two essentially ungrazed paddocks.

EXPERIMENTAL DESIGN AND METHODS

Reptiles, invertebrates and vegetation were surveyed in the three major subhabitats within chenopod shrubland in the Olympic Dam region, namely, densely vegetated, usually run-on patches; barren, usually rocky, run-off sites; and sandy dune-base regions. All sites were situated at least 30 m from fencelines to minimise interference from outside the monitoring area. Three replicate sites in each sub-habitat were established in each of two 20 ha experimental paddocks, which were subjected to identical intensive grazing regimes. Four replicates were established in each subhabitat in an adjacent ungrazed control region. Four 20 L buckets linked by a flymesh guidefence served as pitfall traps at each site. Traps were opened for 10 day trapping sessions in November and February, prior to, and following, intensive grazing, respectively. Invertebrate abundance, vegetation cover, floristic composition and grazing pressure was assessed during each trapping session.

RESULTS

Over 1700 individuals from 31 reptile species, along with 4 mammals and a frog species, have been captured to date. Although the intensive grazing pressure dramatically reduced the cover of both perennial and annual vegetation, changes to the reptile community were slight, and were matched by similar changes at control sites for most species and families. Several dragon species increased slightly in the grazed paddocks relative to control sites following grazing, whereas most other species declined proportionally in all regions (Figure 1). Invertebrate numbers, whilst not fully sorted from the February 1996 samples, also appear to have been initially resilient to the heavy grazing pressure.

DISCUSSION

The lack of initial response of the reptile community to intensive cattle grazing pressure attests to the resilience of this community to disturbance and may in part explain why no Australian arid-zone reptile species are known to have become extinct as a result of environmental degradation.

However, any conclusions drawn at this stage must be viewed with caution because the full impacts of grazing upon the reptiles may not yet be expressed. The lifespan of many of the reptile, plant and some invertebrate species exceeds the current length of the experiment and hence impacts on recruitment may not yet be evident. Perennial chenopod shrubs, which were heavily grazed but still provided suitable burrow sites and shelter, may yet die as a result of continued grazing or stress through leaf loss, thus delaying the impact to the reptile community. It is also possible that significant dietary and shelter resources are temporarily available to some reptiles, due to the presence of large numbers of cow pats and the termites and other invertebrates they attract. Termites are a major food source for many of the common species in this study, and hence large reductions of plant (and dung) biomass could be expected to eventually have a measurable impact on the reptile community.

Limitations of the experimental technique may obscure the true response of grazing on reptile communities. Reptiles may not have been active during the intensive bursts of grazing and the grazing may have occurred at a location or time where the reptile community was not vulnerable. Considerable regrowth of perennial plants was recorded following rain received immediately after the first grazing, so impacts may have been greater if plant growth and survivorship had been reduced in a drier period. Capture rates may have been inflated in the grazed areas if the reptiles were ranging further and foraging longer than their counterparts in control regions where food and shelter resources were more abundant. Future monitoring at this experimental site, in conjunction with analyses from other experimental and broad-scale monitoring programmes, is required before reptile bioindicators can be used to assess grazing impacts in chenopod shrublands.

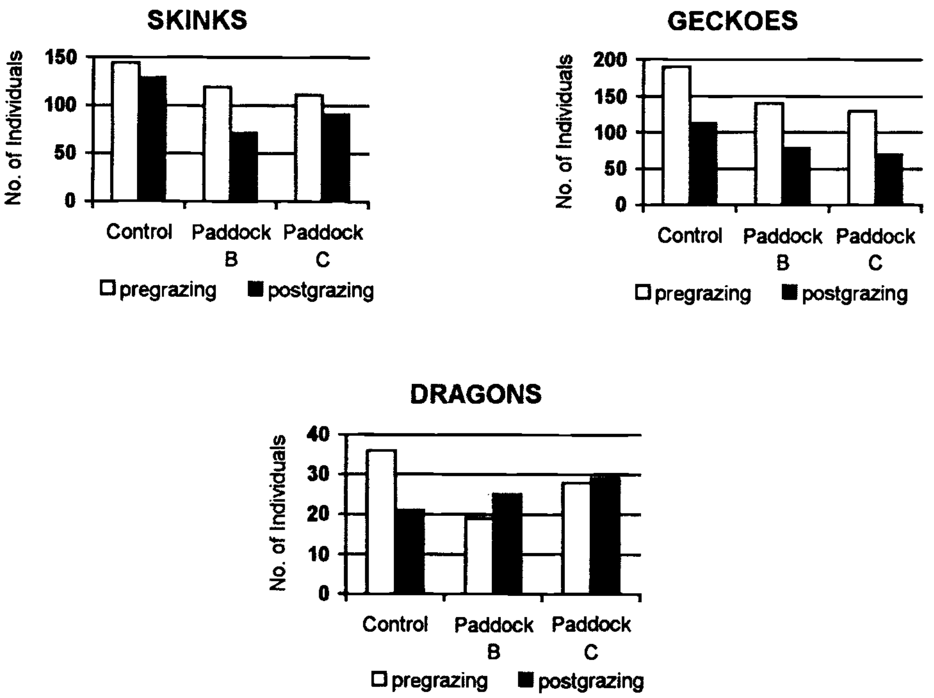

Figure 1. Captures of the major reptile families at control sites and the two experimental paddocks prior to, and following, intensive cattle grazing.

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REFERENCE

Read, J.L. (1995). Subhabitat variability: A key to the high reptile diversity in chenopod shrublands. *Aust. J. Ecol.* 20: 494-501.