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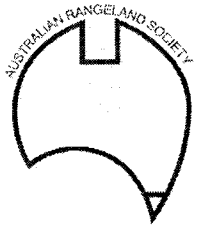

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ASSESSING STATUS AND TRENDS IN TROPICAL ARID GRASSY PASTURES

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ABSTRACT

Loss of perennial grasses (e.g. Chrysopogon fallax, Eriachne flaccida, Panicum decompositum*) on the flood plain of the Fortescue River in the Pilbara district of WA is hypothesised as due to past over-stocking with domesticated animals. Changes in patterns of seasonal presence of flood plain grasses between 1991-1995 have been documented. Above average rainfall in 1995 led to high levels of grass presence. This study examined the status of grass species and condition trends.*

INTRODUCTION

The Ophthalmia Dam, near the WA town of Newman (23°21'S, 119°44'E), was constructed in 1981. The dam is 50 km upstream of the Fortescue River flood plain. In the late 1980s concern was expressed that the dam could be affecting vegetation, and hence potential pastoral production, below the dam (Payne and Mitchell 1992). In some areas the presence of moribund grass butts indicated that perennial grasses had formerly been abundant. Some land has also been affected by historical overgrazing (Payne and Mitchell 1992). A research program commenced in 1992 to document the vegetation and long-term trends on the flood plain downstream of the dam. This paper covers the determination of the status of grass species since these are important for both pastoral production and ecosystem stability.

The vegetation of the flood plain on Ethel Creek and Roy Hill stations consists largely of open grassy woodlands of the coolibah tree *Eucalyptus victrix*. Ground cover is variable; at extremes grass may be absent or dominant. Mulga woodlands or spinifex steppe occur adjacent to the flood plain. Shrub associates include *Acacia tetragonophylla*, *A. synchronicia*, *A. farnesiana* and *Cassia oligophylla*. Low shrubs in the study area are *Capparis lasiantha*, *Rhagodia eremaea* and *Enchylaena tomentosa*.

METHODS

A set of 58 permanent, randomly placed 20 × 25 m plots is used to observe tree and ground cover status in the region. Forty-nine plots on the Fortescue flood plain are grouped in nine discrete regions. Two plot sets overlap the two stations, four are wholly on Ethel Creek and three are on Roy Hill. Controls are on the undammed Jiggalong (3 plots) and Weeli Wolli creeks (6 plots) to the east and west respectively. Plots were established between September 1991 and April 1993. Stock proof exclosures were erected at 3 regions on Ethel Creek station in September 1992. Three plots are located inside each.

Two transects, each 1 m wide and 25 m long, constitute the sample at each plot. At each assessment all species present are scored separately in each 1 × 1 m quadrat for density and cover. Rainfall has been inadequate for plant growth during at least 7 years between 1940 and 1985 (Wilcox and Fox 1995). Recent rainfall at Ethel Creek has been: 1991 - 202 mm; 1992 - 256 mm; 1993 - 342 mm; 1994 -157 mm; 1995 - 351 mm (the annual average is approximately 280 mm). In 1994 no rain fell after February and at most sites grass and other herbage growth died back completely. In contrast, 1993 rainfall created greater cover than in 1991-2 and that of 1995 was sufficient to maintain good grass cover well past mid-year. As a consequence, the status of the grass component presented here is based on the mean percentage cover for grasses at April and June 1995. Where cover exceeds 20% the status is classed as excellent; > 3% and < 20% status is good; > 0.6 and < 3% status is poor; < 0.6% status is very poor. Condition trends are expressed as improving, constant or declining. These trends are based on the observed changes to patterns of cover over the 2-4 years of observations prior to 1995.

RESULTS

Significant differences have not yet emerged between fenced and unfenced plots. Of the 49 flood plain plots, 23 are classed as poor or very poor but 42 as either constant or improving in condition. Six of nine of the control plots are good or excellent and none are ranked as declining. Control plots generally have more species of grass, suggesting that they were not historically overgrazed as much as the Fortescue Valley set, that they are more resilient or that currently they are better watered.

Of 33 species of grass recorded to date, 12 are annuals and 21 are classed as perennials. Several species are uncommon. An important and widespread grass is *Eriachne flaccida*. This is particularly abundant on low-lying, frequently inundated clayey or gilgaied soils and sometimes forms extensive stands. For example, at two plots the vegetation is mono-specific in relation to *E. flaccida*. In good seasons these areas can be described as fully stocked with about 20-30% cover. This species has been noted at 45 plots and from all regions. Other commonly encountered perennials are: *Panicum decompositum* (44 plots; 10 regions); *Dichanthium affine* (37; 11); *Eragrostis xerophila* (34; 11); *Chloris pectinata* (30; 8); *Eragrostis setifolia* (25; 8); *Chrysopogon fallax* (17; 7); *Cenchrus ciliaris* (16; 6) and *Eriochloa pseudoacrotricha* (15; 9). The most frequently encountered annuals have been: *Eragrostis japonica* (42 plots; all 11 regions); *Iseilema membranaceum* (38; 11); *Dactyloctenium radulans* (33; 10); *Eragrostis dielsii* (27; 8); *Panicum whitei* (20; 5); *Setaria dielsii* (14; 6); *Sporobolus australasicus* (13; 7) and *Aristida contorta* (8; 5).

DISCUSSION

Since dam construction (1981), the relative importance of grazing effects and lack of flooding as contributors to reduced production or the mortality of perennial grasses is difficult to assess (Payne and Mitchell 1992). The Ophthalmia study demonstrates grass cover is seasonally driven although there are inherent differences across the area sampled. There is a differential role between annual and perennial grasses. Perennials can only persist as green plants in the presence of year round moisture supplies. Annuals demonstrate seasonal sequences, with *D. radulans* preceding *E. japonica*.

Important potentially long-lived perennials such as *Chrysopogon fallax, Eragrostis setifolia, E. xerophila, Eriachne flaccida* and *Panicum decompositum* have resprouted from dry butts. Further work is required to determine how long these butts can persist. Perennial grasses are likely to establish new individuals following prolonged soaking of the soil. Establishment is dependent on seed availability. Annual grasses germinate rapidly following summer rain and as with *Ptilotus gomphrenoides* (O'Connell 1995) subsequent cover depends on the ensuing rainfall pattern.

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REFERENCES

O'Connell, K.A. (1995). Ecology of *Ptilotus* species in the upper Fortescue Valley, Pilbara, WA. Managing Environmental Impacts - Policy and Practice: Proc. 20th Annual Environmental Workshop. (Ed. P.M. Ruppin). Minerals Council of Australia. Dickson ACT. pp. 166-183.

Payne, A.L. and Mitchell, A.A. (1992). An assessment of the impact of Ophthalmia Dam on the floodplain of the Fortescue River on Ethel Creek and Roy Hill stations. WA Dept. Ag. Tech. Bull. 124.

Wilcox, D.G. and Fox, J.E.D. (1995). Mulga vegetation in the Pilbara. *In* 'Ecological Research and Management in the Mulgalands.' (Eds M.J. Page and T.S. Beutel). Uni. of Qld., pp. 209-217.