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ACACIA PEUCE: A CASE STUDY IN CO-OPERATIVE MANAGEMENT

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ABSTRACT

This paper discusses co-operative efforts between Andado pastoralists and the Parks & Wildlife Service of the Northern Territory to fence and protect *Acacia peuce* (Waddy-wood), a relict species of desert tree classified as endangered (IUCN 2001). Issues, problems, and most importantly, the solutions are examined during this process for both the pastoralists and PWSNT. This case study may serve as a guide for similar projects in the future.

INTRODUCTION

Acacia peuce occurs in only three locations in Australia. The smallest population of *A. peuce* is located 230 km south of Alice Springs in the gibber country on the north-western edge of the Simpson Desert. Approximately 1200 *A. peuce* trees (43% of the population) are protected within fenced areas on the Mac Clark Conservation Reserve (MCCR), which was established by the former manager of the Andado Pastoral Station, Mac Clark, and managed by the Parks and Wildlife Service of the Northern Territory (PWSNT). A slightly greater number of trees are located on unfenced areas both within MCCR and on the surrounding Andado station. The *Management Program for Waddy-Wood (Acacia peuce)* prepared by the Parks and Wildlife Service, identifies unfenced *A. peuce* as being vulnerable to the activities of large domestic and feral animals. North Bore and its cattle yards, established many years ago in close proximity to the main stands of *A. peuce*, is a major focus of cattle activity in the area.

In early 2003, the Bloomfield family and the Parks and Wildlife Service commenced a co-operative effort to fence the unprotected *A. peuce* trees both within the Reserve and on Andado station. From the pastoralists' perspective, little economic benefit was to be derived from protecting this species without significant assistance from government agencies; the project involved the erection of 39 km of fencing, the relocation of two bores and attendant yards and equipment. For PWSNT, fencing the unprotected stands of *A. peuce* was seen as necessary to protect the genetic diversity of the species, to ensure that both mature and immature trees were protected from large herbivores, and to address the steady decline of outlying population fragments.

ANDADO STATION

Andado was established as a pastoral station in 1924. In the early years shepherding of sheep proved non-viable and since then the operation has focussed solely on beef production. The first bore, North Bore, located on the gibber flats in the major stand of *Acacia peuce* was drilled in the 1920s using a steam-driven drilling rig. The *Acacia* trees offered a good source of fuel for the drilling rig.

Mac Clarke, who occupied Andado from the early 1950s until 1985, realised the importance of the trees and allowed 3040 ha to be excised from the pastoral property and proclaimed as a conservation area by the NT Government. An unwritten agreement was that only major stands of trees could be fenced due to accessibility problems should the Reserve be fenced along its boundary. The Bloomfield family bought Andado in 1985 and Robert Bloomfield has managed it since 1993.

North Bore is the main handling and trucking yard for several surrounding waters. The location of the bore and inadequate fencing have resulted in negative impacts on the *Acacia* trees.

MAC CLARK *ACACIA PEUCE* CONSERVATION RESERVE (MCCR)

MCCR covers an area of 3042 ha and was excised from the surrounding pastoral station, Andado, in 1977 (Anon 1991). With only 475 ha fenced from large herbivores (camels, donkeys, horses and cattle), it offers protection to only 43% of the local *A. peuce* population. PWSNT rangers visit MCCR four to five times a year to carry out routine maintenance and to collect monitoring data on *A. peuce* and other wildlife.

Climatic data, collected at New Crown Station (25° 41`S, 134° 50`E), 90 km southwest of MCCR, were used to reflect the long-term rainfall trends and aridity of the area – indicating the harsh conditions under which the trees live. These showed that rainfall is low (annual mean is 188.3 mm) and variable, with 67% falling from October to March (data from Bureau of Meteorology). Water courses, usually dry, drain storm water run-off from surrounding high areas through MCCR. Seasonal temperatures are extreme: summers are hot (mean daily maximum for December, January and February at Finke Post Office 110 km southwest is 36.7⁰ C with 25 days > 40⁰ C; Bureau of Meteorology) and night temperatures in winter reach zero and below (mean minimum daily temperature for June, July, and August at Finke Post Office is 6.5⁰ C with 13.4 days < 2⁰ C; Bureau of Meteorology). Humidity is low and evaporation high. Strong south-easterly winds prevail year round (Deveson 1980).

MCCR occurs in the Andado site of botanical significance (White *et al.* 2000) which supports many disjunctions of plant taxa with arido-temperate and arido-tropical distributions. It is an important site for the conservation of several species at or near the edge of their continental range. The tree layer in the vegetation community is represented by *A. peuce* only, the shrub layer is represented by about 60% of the species and the grass sward by the rest (Deveson 1980). *A. peuce* generally grows on low sandy rises adjoining ‘gibber downs’ and drainage lines. The substrate is fragile and highly erodible as evidenced by gully erosion resulting from cattle and vehicle activity (Chuk 1982).

ACACIA PEUCE BIOLOGY

A. peuce flowers in the summer months between October and March. Immature pods may be present in very low numbers at any time of the year but the main season is between October and June, with a peak from December to May or June. Mature pods occur all year round, with low to moderate numbers present in any month except June.

Recruitment is infrequent; only one event (1978-1981) has been recorded in the last 50 years. Monitoring of seedling recruitment and establishment by PWSNT commenced early in the four-year germination event. Seedling numbers recorded in 12 plots (all but one in the fenced area) increased from 75 in 1979 to 154 in 1981. After 1981 few new seedlings appeared and there was a modest attrition rate. No mortalities of young trees were recorded between 1993 and 1999.

Growth rates are very slow and the trees are long-lived. The mean growth rate of ten tagged saplings over the period 1980 to 2002 inclusive, was calculated as 13.24 (±1.4) cm per year. As saplings gained height they grew faster ($r = 0.8362$). In mature trees the mean annual increment in circumference was calculated as 3.43 (±0.3) mm per annum which means that many trees live 500 years or more.

Any decline in the *A. peuce* population would likely result in significant losses in biodiversity; it is a keystone species in the local ecosystem and a prominent species in the Andado site of botanical significance (White *et al.* 2000). The shade of *A. peuce* is essential for water and energy conservation of several animal and plant species and the tree also provides food and shelter for many desert animals. At least 13 rare and threatened plant species are known to occur in this area. Letter-winged kites *Elanus scriptus* roost, nest and breed in the trees; the endangered plains rat *Pseudomys australis* plagues here during good seasons.

MANAGEMENT ISSUES

A number of management issues existed for both the pastoral operation and the conservation effort:

For Andado station:

- The operation needs to be economically viable to allow environmental issues to be addressed.
- Stockyards needed upgrading but the manager was unwilling to invest resources in case PWSNT decided to fence the Reserve along the proclaimed boundary. This would impede cattle management operations.
- Cost of re-drilling East Bore, relocating North Bore and attendant equipment was beyond the operational budget.
- There was no economic incentive to fence small, dispersed stands of the trees (39 km of fencing required).
- Presence of unprotected trees on Andado impacts on sound decision making.

For MCCR:

- The characteristic of germination and seedling establishment relying on abundant and prolonged rainfall, which is erratic and infrequent in current arid zone environments, may contribute to its demise in the long-term.
- Activities of feral herbivores (horses, camels, rabbits) and cattle have been identified as potential threats. Bowland and Heywood (2002) concluded that cattle could hinder all stages of the *A. peuce* life cycle (Table.1). Measures need to be taken to exclude large herbivores, in particular cattle, from all stands of *A. peuce*, both inside and outside the proclaimed area.
- As prominent sentinels of the flat gibber plains in the area, mature *A. peuce* trees are frequently struck by lightning. There is evidence that many trees have been struck and, significantly, not all survive. Lightning is an important mortality factor confronting the mature trees of this population of *A. peuce*; this process needs to be better understood.
- Apart from the direct impact on mature trees, lightning is a prime cause of wildfire when sufficient fuel-loads are present. Along with constraints of infrequent recruitment and severe habitat fragmentation, lightning may be a prominent factor in the possible extinction process.
- In plants, the negative effects of fragmentation in small, isolated fragments include reduced pollination, low seed production and recruitment, and increased inbreeding depression (Lennartsson 2002). The Andado population, dispersed over an area of about 300 sq km, is

Table 1. Summary of the impact of cattle activity on various stages of *A. peuce* life cycle (Bowland and Heywood 2002).

<u>Impact</u>	<u>Germination and emergents</u>	<u>Seedlings</u>	<u>Saplings</u>	<u>Intermediate Trees</u>	<u>Mature Trees</u>
Direct:					
Trampling	•	•	•		
Browsing	•	•	•	•	
Rutting			•	•	
Rubbing				•	•
Root exposure			•	•	•
Indirect:					
Herb layer removed	•	•			
Soil loss	•	•	•	•	•
Seed bank exposure	•				
Concentration of waste products	•	•	•	•	•

broken up into several fragments. The three smallest fragments, comprising two, three, and twelve individuals respectively, and large sections of the other fragments are not fenced and are vulnerable to the activities of large herbivores (Bowland and Heywood 2002).

CO-OPERATIVE MANAGEMENT PLAN

Two primary management actions for the conservation of the trees needed to be undertaken. The first was to relocate North Bore and its attendant cattle management infrastructure and redrill East Bore. Second, fence all stands of *A. peuce* on and off the proclaimed conservation area. The details of a co-operative management plan as formulated by the pastoralists are in Table 2.

Table 2. Actions and responsibilities of a co-operative management plan for *A. peuce* on Andado station and MCCR.

Management Action	Due Date	Andado station	PWSNT
Relocate North Bore to Eagle Bore site, and redrill East Bore.	30.06.04		Drilling rigs of Conservation & Natural Resources Group to undertake, operational costs carried by Parks & Wildlife Service.
Fence stands of <i>A. peuce</i> outside the proclaimed reserve.	30.06.04/ 30.06.05	Apply to Australian Government Envirofund (\$30,000). Engage Traditional Owners from Aputula to erect fences.	Assist with application.
Set up Eagle Bore and shut down North Bore as a watering point for cattle.	30.06.05	Transfer pumping equipment, install tanks, troughs, and general infrastructure to Eagle Bore. Relocate yard structures to Olympic bore.	Cap North Bore
Set up East Bore with solar pumping array.	30.06.05	Apply to Australian Government Envirofund (\$30,000) for funds for fencing, tanks, trough, and solar pumping array.	Assist with application.
Realign fences on proclaimed area to include all stands of <i>A. peuce</i>	30.06.06		Minor new works.
Relocation of cattle yards from North Bore to Olympic Bore complete	30.06.06	Purchase 300 portable cattle panels.	
Complete refurbishment of East Bore.	30.06.06	Apply to Australian Government Envirofund (\$30,000) for funds for poly pipe and other minor infrastructure.	Assist with application.

OUTCOMES

- Joint agreement, all parties to do something to achieve a more viable future for the trees.
- North Bore capped, pastoralist gets alternative waters with a significant step taken towards the long term conservation of the trees, a great exchange.
- No real economic hardship – the return from the land area occupied by the fragments of the tree population is insignificant in terms of the area available for grazing, the pastoralist is able to re-locate stock yards.
- Peace of mind for the pastoralists as they are an integral part of the future management of the area of conservation significance.
- With Section 74 agreement, the conservation effort is carried forward should the current pastoralist family leave Andado.
- Nice for the pastoralists to contribute significantly to conservation on the property – it is frequently perceived that they don't really care.

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