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LONG-TERM MANAGEMENT OF THE CHENOPOD SHRUBLANDS: A 46 YEAR PERSPECTIVE

J.R. Maconochie and B.G. Lay

Pastoral Management, Dept Env & Nat Res, GPO Box 1047, Adelaide SA 5001

INTRODUCTION

In 1945, Fred Jessup, then a soil conservation officer for the South Australian Department of Agriculture, embarked on a largely descriptive survey of the North-West of South Australia (Jessup 1951) - the area now covered by the Kingoonya Soil Conservation District. During the survey he developed a system of recording the density and extent of the three main species of the chenopod shrubland on which sheep are particularly dependent, *Maireana sedifolia* (pearl bluebush), *Maireana astrotricha* (low bluebush), and *Atriplex vesicaria* (bladder saltbush). In 1970-71 Brendan Lay re-evaluated Jessup's survey and in 1993-4, approximately 23 years after Lay's study, the survey was again re-evaluated by John Maconochie to evaluate the trends in condition of the saltbush and bluebush pastures (Maconochie and Lay 1996).

Of the 22 pastoral runs in the Kingoonya district, the most recent survey in 1993-94 covers six stations, or 40% of the district. This survey covered 5140 km, with 86% of Lay's and 30% of Jessup's traverse routes found to be comparable. The study is described in two parts: the 46-year period providing Data Set I (DS I), and the larger 23-year period providing Data Set II (DS II). The three surveys together are unique, forming the longest running study of broadscale changes in chenopod shrublands in Australia (46 years).

JESSUP'S DENSITY RATING SYSTEM

Jessup's initial survey described the three species as dominants in two 'associations', *M. sedifolia* and *A. vesicaria* / *M. astrotricha*. Density stages for the three species are based on a unit area, with the limits originally defined by using the wheel marks of a vehicle as the external boundary (approximately 5 feet or 1.5 metres) and driving for a distance of 0.1 miles (160 m) across a bush stand, thus outlining an area of approximately 245 m². The numerical limits for each of the five stages differed according to the two principal vegetation types, e.g. *M. sedifolia* dominant Stage 3 (15-34 plants) and *A. vesicaria* / *M. astrotricha* dominant Stage 3 (55-134 plants).

SURVEY FINDINGS

The most recent survey has shown a 20% improvement in the density of the chenopod communities over the last 23 years. The greatest improvement (29%) was observed in the *A. vesicaria* / *M. astrotricha* complex, with *M. sedifolia* showing a 12% improvement. This is in contrast to the results of Lay (DS I) which showed a large decrease in the density of the chenopod component. Approximately 68% of the chenopod component remained in the 1970-2, survey with the greatest decline observed in the *A. vesicaria* / *M. astrotricha* association.

This decline is believed to be the result of underdeveloped stations running high stock numbers on few water points exerting a greater pressure on the more palatable components. In the last 23 years station development and improved management would appear to have resulted in a gradual improvement (20%) in the condition of the country.

Overall, large numbers of paddock subdivisions in the last twenty years and improved management has helped to relieve the pressure of stock on the chenopods. The recuperation of the chenopod shrublands over the last 23 years has been slow (DS II, 12% improvement) and it will require many more decades before these stands recover to the densities which occurred in 1948 and the early days of settlement.

Table 1. Summary of the plant densities and species occurrence in the surveyed area.

Comparable periods	<i>A. vesicaria</i> / <i>M. astrotricha</i>		<i>M. sedifolia</i>	
	Occurrence (%)	No. of plants/245 m ²	Occurrence (%)	No. of plants/245 m ²
DS I: 1948	15	11	44	11
1971	19	7	37	8
1994	20	9	42	9
DS II: 1971	21	8	36	7
1994	21	10	41	8

Regeneration of pearl bluebush in the chenopod shrublands of Australia is rare and is usually associated with heavy abnormal rainfall events, with a once-in-twenty year (or greater) recruitment pattern (Wotton 1993). With this in mind, only two episodic heavy rainfall events have occurred in the last 23 years (1973-4 and 1989) which may have led to flowering and regeneration events. Pearl bluebush regeneration was recorded across the district, with 15% of the stands observed having seedlings or young plants. As regeneration of pearl bluebush is rare, careful management of these stands is required to promote the establishment of mature plants and hence the long-term stability of the land.

The findings of this survey are of significance to the chenopod shrublands of South Australia. It is generally felt in the wider community that the arid zone is under substantial pastoral pressure and is in a state of degradation. This survey has provided evidence contrary to this belief for the Kingoonya District and provides testimony to the sustainability of the current management practices in the district. It is considered that enlightened management practices and reduced rabbit populations, coupled with the regeneration and recovery opportunities provided by the favourable seasons, have positively influenced the survival and regeneration of both chenopod communities.

This survey has provided a significant insight into the long-term effects of stocking, drought and fire on the perennial chenopod vegetation of the district. Management of this land should aim to promote the retention and regeneration of these desirable species.

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