PROCEEDINGS OF THE AUSTRALIAN RANGELAND SOCIETY BIENNIAL CONFERENCE

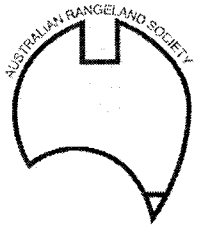
Official publication of The Australian Rangeland Society

Form of Reference

The reference for this article should be in this general form;
Author family name, initials (year). Title. *In*: Proceedings of the nth Australian Rangeland Society Biennial Conference. Pages. (Australian Rangeland Society: Australia).
For example:
Anderson, L., van Klinken, R. D., and Shepherd, D. (2008). Aerially surveying Mesquite *(Prosopis* spp.) in the Pilbara. *In*: 'A Climate of Change in the Rangelands. Proceedings of the 15th Australian Rangeland Society Biennial Conference'. (Ed. D. Orr) 4 pages. (Australian Rangeland Society: Australia).

Disclaimer

The Australian Rangeland Society and Editors cannot be held responsible for errors or any consequences arising from the use of information obtained in this article or in the Proceedings of the Australian Rangeland Society Biennial Conferences. The views and opinions expressed do not necessarily reflect those of the Australian Rangeland Society and Editors, neither does the publication of advertisements constitute any endorsement by the Australian Rangeland Society and Editors of the products advertised.



The Australian Rangeland Society

SOUTH AUSTRALIA CONTRIBUTING TO THE CHALLENGES OF GLOBAL REPORTING ON LOCAL LANDSCAPE CHANGE

M. Fleming[1,2] *and B. Della Torre*[1]

[1]Dept. of Water, Land and Biodiversity Conservation, PO Box 2834 Adelaide SA 5001
[2]Corresponding author. Email fleming.mike@saugov.sa.gov.au

ABSTRACT

The South Australian Government is currently contributing to the Australian Collaborative Rangeland Information System (ACRIS) through information collected at pastoral monitoring sites, biological monitoring surveys and other data sources as available. There are numerous challenges involved in distilling a cohesive report on the state of Australia's rangelands from available, but often disparate, data sets. South Australia has approached these challenges by adopting components of other jurisdictions' reporting procedures to facilitate standardisation and is testing methods aimed at extracting more information from existing data sources. The range of data types used for reporting has also been expanded with the inclusion of land cover change information derived from satellite data using the grazing gradient method. In this poster presentation we will highlight recent changes in the Gawler Ranges bioregion revealed during pilot ACRIS reporting activity. We will also demonstrate how the South Australian Government is contributing to current work by ACRIS to build a more comprehensive picture of change in the rangelands.

INTRODUCTION

The first stage for ACRIS has been testing the quality of available information and our capacity to combine it into a national picture. This has been done across five pilot regions, one in each of the rangeland jurisdictions (QLD, NSW, NT, WA and SA). The reporting period covers approximately 1992 to 2002.

The Gawler Bioregion was chosen as the pilot region for South Australia as it was there that the earliest comprehensive pastoral land assessment occurred. Land assessment as part of a statutory monitoring program began in 1990. A variety of methods were used to establish baseline data on pastoral land condition. These included the establishment of permanent vegetation monitoring sites and the use of a rapid condition survey method known as the Land Condition Index (LCI, Lange *et al.* 1994). The ACRIS pilot program provided an opportunity to test the suitability of South Australia's rangeland monitoring infrastructure for reporting at a regional scale.

THE GAWLER BIOREGION

At 123,070 sq km, the Gawler Bioregion comprises 14% South Australia's rangelands. It lies in the central southern part of the rangelands, immediately north of the Eyre Peninsula (Figure 1). The Gawler Bioregion has a semi-arid to arid climate with long, hot, dry summers and cool mild winters (Laut *et al.* 1977). Average annual rainfall varies across the region. The southern parts are characterised by a higher and distinctly winter-dominant pattern of up to 300 mm per annum. By contrast, in the north and east of the bioregion, rainfall is much more seasonally erratic and annual recordings of less than 150 mm are the norm. (Kingoonya SCB, 1996; Gawler Ranges SCB, 1996). There is a wide diversity of sub-regional landscapes within this bioregion. Granitic rocky hills forming the Gawler Ranges contrast strongly with the surrounding salt lakes. Mulga-dominated sand plains and dunes of the Great Victoria Desert extend to the northwest, while the open, undulating and stone-covered Arcoona tablelands extend to the east along the western edge of Lake Torrens.

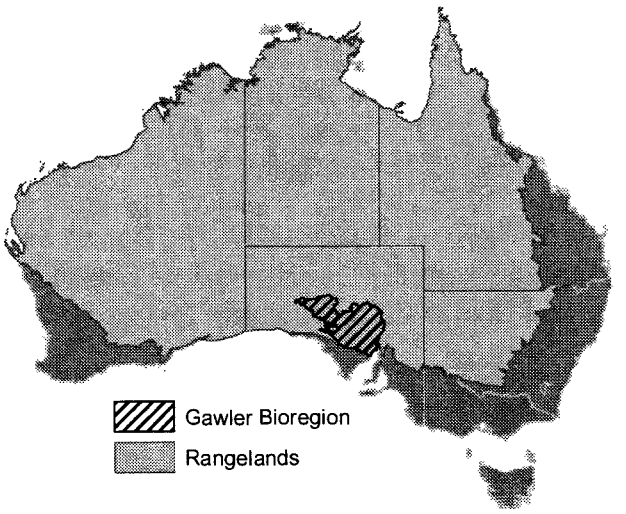


Figure 1: Location of the Gawler Bioregion.

Monitoring History

The introduction in 1990 of the Pastoral Land Management and Conservation Act 1989 (SA) saw the initiation of a program to scientifically assess grazing effects on pastoral leases. This first round of assessments was completed in December 2000. Although there was already a network of permanent photo-points established by 1990, the bulk of the South Australian pastoral sites were established during that initial assessment phase between 1990 and 2000.

Given that the purpose and historical context of monitoring is concerned with appropriate pastoral management, it is not surprising that these sites are strongly focussed on perennial vegetation within grazing range of water. Most sites in the Gawler Bioregion are located at approximately 1.5 km from water. Sites were selected to be uniform and representative of a major pasture type in the paddock.

Photo-point sites in the Gawler Bioregion consist of a permanently pegged location with records of vegetation composition and density, assessment of rangeland condition and the extent of soil erosion. Quantitative measurement methods include a fixed belt transect to measure shrub density and a step-point technique to estimate projected foliar cover.

ACRIS Questions

Biophysical change data were available from 179 pastoral monitoring sites assessed twice during the 1992-2002 period. The ACRIS Management Committee framed five questions against which to report change in the pilot regions. These are as follows:

1. Change in stock forage productivity
2. Change in native plant species
3. Change in landscape function
4. Capacity for change
5. Change in cover

Change in Stock Forage Productivity

The change in density of perennial species that decrease with grazing was used as a measure of stock forage productivity. Bladder saltbush (*Atriplex vesicaria*) generally increased in density across the region. The density of the relatively longer-lived pearl bluebush (*Maireana sedifolia*) and low bluebush (*M. astrotricha*) remained stable through the monitoring period.

Change in Native Plant Species
The density of all chenopod and other perennial species increased at the majority of sites in the Gawler Bioregion. This would seem to benefit landscape function and improve habitat for various fauna through protection of the soil surface against erosion. There was a reduction in the density of perennial grasses in the northern area, but this followed below-average seasonal conditions.

Change in Landscape Function
Formal methods for assessing landscape function are not part of the pastoral monitoring program in SA. Instead, a method known as the Richards-Green Functionality Index was used. A judgement of landscape function is made at each site on a scale of 1-3. Based on index data averaged across 179 monitoring sites, landscape function improved in the period 1990 to 2002 (index improved from 2.11 to 1.97 – where 1 = 'highly functional' and 3 = 'poorly functioning'). At the site level, the results provide an encouraging indication of improving trend in landscape function. Three-quarters of sites assessed in the below-average season of 2002 maintained or improved their index value. Similarly, 92% of sites assessed the year before (following average seasons) had either stable or improved function compared to when first assessed in the early 1990s.

Capacity for Change
This question was designed to extend ACRIS reporting capacity into the area of socio-economics. Based on ABARE survey data and ABS national census data collected in 1991, 1996 and 2001, the population of Gawler Bioregion is slowly increasing. However the median age of pastoralists is increasing as fewer younger people take on management of pastoral leases. Young people are also leaving the region. This is probably partly due to their need to access further education outside of the region but many then appear not to return to live in the region. These factors combine to produce an increasing age dependency ratio, i.e. a lower proportion of working-age people to support the younger and older components of the population.

Total stock numbers for the Gawler Bioregion have fluctuated between ~250,000 and ~750,000 sheep equivalents between 1992 and 2002. Stock numbers responded to seasonal conditions and commodity prices with the lowest number present in the very dry year of 2002. Unimproved value of leases increased on average by 58% – but this does not mean that improved value has increased by the same amount.

Change in Cover
Information on cover change in the Gawler Bioregion was compiled from step-point measurements at pastoral monitoring sites and Landsat-derived change in forest cover. At 92% of sites reassessed in 2001 and 96% of sites reassessed in 2002, cover remained the same or improved over that first recorded in the period 1990 To 1993. This was an encouraging trend as below average seasonal conditions preceded the 2001-02 reassessments.

Based on the Australian Greenhouse Office's (AGO) definition of "forest" as vegetation greater than 20% canopy cover and greater than 2m in height and using remote sensing, forests covered 11.3% of the Gawler Bioregion in 1972 decreasing to 11% in 2000. This is a decline in forest area of 364 sq km.

FUTURE REPORTING

ACRIS is currently assembling a national report of change across the rangelands. This report is due in mid 2007 and will comprise a number of products grouped under several themes. In addition to site-based pastoral monitoring data, South Australia has expanded capacity to report biophysical change through its involvement in the Desert Knowledge CRC Biodiversity Rewards project. Grazing gradient analysis conducted for this project spans an area of 210,000 sq km and covers the period 1988 to 2002. These results will be included in SA's reporting to ACRIS. A recently completed comprehensive analysis of the distribution of water points and watered area will also contribute to reporting.

REFERENCES

Gawler Ranges Soil Conservation Board (1996). Gawler Soil Conservation District Plan. Gawler Ranges Soil Conservation Board.

Kingoonya Soil Conservation Board. (1996). Kingoonya Soil Conservation District Plan. Kingoonya Soil Conservation Board.

Lange, R.T., Lay, B. & Tynan, R., (1994). Evaluation of Extensive Arid Rangelands: The Land Condition Index (LCI), *Trans. of the Royal Society of SA*, **118**(2), 125-131.

Laut, P., Heyligers, P.C., Keig, G., Loffler, E., Margules, C., Scott, R.M. and Sullivan, M.E. (1977). Environments of South Australia. Division of Land Use Research, Commonwealth Scientific and Industrial Research Organisation, Canberra.